ATTACHMENT

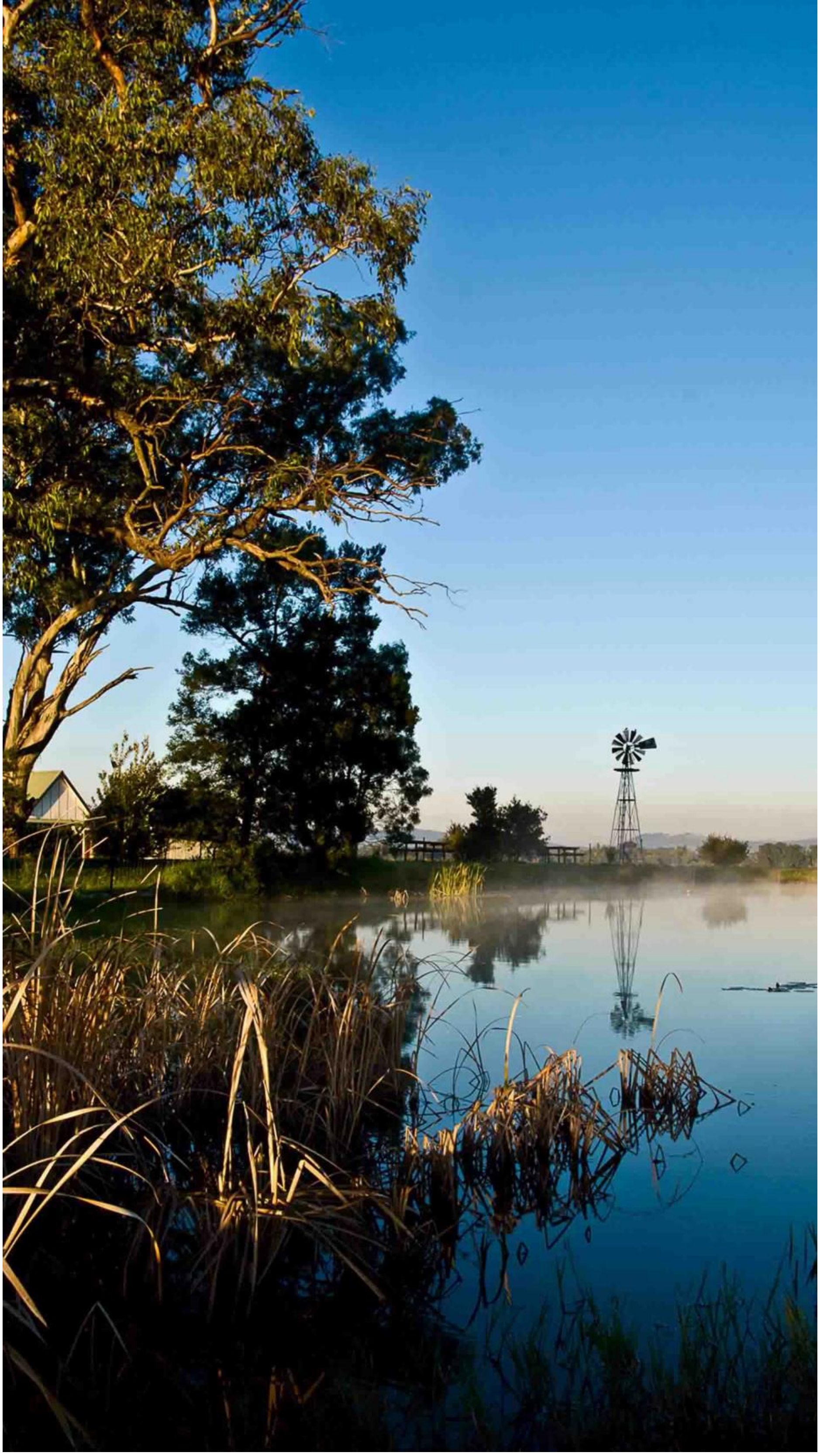
2015

COUNCIL BUSINESS PAPERS

Ordinary Meeting 18 MARCH 2015

ATTACHMENT **6.2.3**

- Capital Program Update



Good Government

MONTHLY BUDGET REVIEW

ATTACHMENT 1 – CAPITAL PROGRAM UPDATE

OPERATIONAL PLAN/ DELIVERY PROGRAM – 2014/15

JANUARY

MID-WESTERN REGIONAL COUNCIL

FINANCE AND ADMINISTRATION

TOWARDS 2030

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT

Looking after our Community

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
RURAL FIRE SERVICE - CUDGEGONG HERITAGE BUILDING	135	0	135	0	135	2	1%	Land has been allocated and NSW RFS are currently designing the building and survey work can commence.
RURAL FIRE SERVICE - WINDEYER RFS SHED	0	20	20	0	20	18	89%	Complete
COMM. TRANSPORT- VEHICLE PURCHASE	50	0	50	0	50	23	47%	Year to date one vehicle has been replaced as per policy, it is anticipated that we will be replacing another vehicle before the end of March 2015.
GPS CEMETERY SITES	24	0	24	0	24	6	26%	Works will continue throughout the year
PUBLIC TOILETS - CAPITAL UPGRADES	10	0	10	0	10	0	0%	Budget only for reactive works as required.
PUBLIC TOILETS - PERCY NOTT PARK	110	7	117	0	117	0	0%	Currently finalising quotes from a new supplier. Expected to finish work by the end of the 14/15 financial year.
PUBLIC TOILETS - MUDGEE CEMETERY	40	0	40	0	40	1	4%	Development Application has been lodged. Work expected to commence in March.
PUBLIC TOILETS - LAWSON PARK TOILETS UPGRADE	6	0	6	0	6	4	73%	Completed works to repaint facilities, replace cracked tiles and construct access path through Robinson Park.
PUBLIC TOILETS - ROBERTSON PARK MUDGEE	6	0	6	0	6	5	79%	Completed works to repaint facilities, replace cracked tiles and reseal floors.
PUBLIC TOILETS - PARENTS ROOM	20	0	20	0	20	0	0%	Work has been deferred until a suitable site can be found.
LIBRARY BOOKS	83	(20)	63	0	63	47	76%	Ongoing purchase of books continues throughout the year.

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KANDOS MUSEUM - CAPITAL	116	(31)	85	0	85	72	85%	Complete
CULTURAL CENTRE INVESTIGATION	0	10	0	0	0	0	0%	Revoted budget not required 2014/15, project now being managed under "Art Gallery Facility". Budget was removed in the December QBR.
COMMUNITY CENTRES - PERRY ST COMPLEX CAPITAL	35	0	35	0	35	0	0%	Work has been deferred until a suitable site can be found.
CAPITAL UPGRADE - GULGONG MEMORIAL	65	0	65	0	65	54	82%	Evaporative coolers installed and are now operational
CAPITAL UPGRADE - RYLSTONE HALL	25	0	25	0	25	25	101%	Works completed - Internal painting and repairs to the floor, and heating system.
CAPITAL UPGRADE - KANDOS HALL	230	0	230	0	230	168	73%	Roof removal commenced 3 November and completed on 18 November 2014. Project now completed.
CAP UPGRD-CLANDULLA FACILITIES	5	0	5	0	5	0	1%	Investigating alternative uses for the funds in the Clandulla area.
CAPITAL UPGRADE - KANDOS PRESCHOOL	5	0	5	0	5	5	93%	Council has now completed their portion of works. The current tenant is still finalising some of their own works.
ANZAC PARK GULGONG ROTUNDA	3	0	3	0	3	3	107%	A quote has been requested to complete painting of rotunda and associated structures. This work will be complete before ANZAC day.
RURAL HALLS UPGRADE	25	0	25	0	25	0	0%	Scope of works still to be finalised. This is expected to be complete by the end of March.
MUDGEE POOL SAFETY ITEMS	45	(10)	35	0	35	27	77%	Turnstiles installed - works complete.
GULGONG POOL SAFETY ITEMS	25	7	32	0	32	24	74%	Turnstiles installed - works complete.
KANDOS POOL SAFETY ITEMS	27	13	40	0	40	31	78%	Turnstiles installed - works complete.
GULGONG POOL REPAIRS	0	50	50	0	50	42	84%	Repairs completed and scuba divers are to check for leaks in the off season 2015.

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MUDGEE SHOWGROUNDS - REDEVELOPMENT	45	16	71	0	71	16	23%	Design for main arena drainage yet to be completed and further investigation required for heating the main pavilion.
GLENWILLOW SPORTS GROUND UPGRADES	40	0	40	0	40	36	91%	Complete. New fence provided around No.2 field.
RYLSTONE SHOWGROUND UPGRADE	250	(38)	233	0	233	164	70%	New bar complete. Project is now nearing completion with storage shed to be constructed after show in February.
GLEN WILLOW SOCCER AMENITES REBUILD	235	5	240	0	240	245	102%	Complete
GULGONG SHOWGROUND UPGRADE	250	0	250	0	250	161	65%	Completed works this financial year include new day yards (horses), round and holding yards (cattle), poultry shed including demolition of the old lean to, new canteen and bar facilities (old facility demolished), and toilet block. Further works include entry way patching, widening and reseal.
VICTORIA PARK - FENCING	70	0	70	0	70	0	0%	Confirmed fencing types with tennis club, quotes now being sought
VICTORIA PARK - GRANDSTAND REPAIRS	10	0	10	0	10	8	82%	Complete
BILLY DUNN OVAL - UPGRADES	27	0	37	0	37	0	0%	Designs being finalised
VICTORIA PARK UPGRADES	500	0	500	0	500	6	1%	Community consultation completed. Quotes being finalised. Orders to be placed in March.
PLAYGROUND UPGRADE - GULGONG TENNIS COURTS	50	0	50	0	50	48	95%	Complete
SAMMY'S FLAT CRICKET NETS	0	5	20	0	20	0	0%	Works to commence in March after the show
PASSIVE PARKS - LANDSCAPING IMPROVEMENTS	5	0	5	0	5	3	63%	Various minor landscaping works currently being undertaken.

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RED HILL RESERVE - TOURISM DEVELOPMENT INVESTIGATION	0	499	499	0	499	130	26%	The committee has resolved the design concept for the development with the Development Application to be lodged by the 30 January 2015. The DA will be reported to Council for determination.
PLAYGROUND EQUIPMENT UPGRADE	6	0	6	0	6	3	46%	Two slides replaced. Remaining budget being used for reactive works later in the year.
SCULPTURES ACROSS THE REGION	30	0	30	0	30	13	44%	Two sculptures chosen. Due for installation at Lawson Park in February.
AVISFORD RESERVE - CAPITAL	35	2	37	0	37	0	0%	This project on hold. Awaiting advice regarding endangered Pea Flower
DEWHURST DRIVE MUDGEE PLAYGROUND UPGRADE	40	0	40	0	40	40	100%	Complete
NOYES PARK KANDOS PLAYGROUND UPGRADE	35	0	35	0	35	33	96%	Complete
LAWSON PARK - LIGHTING	50	0	50	0	50	4	7%	Works commenced, will be completed March 2015
LAWSON PARK - RESTORATION STONE FENCE	50	(47)	3	0	3	3	91%	Survey revealed very little movement in the wall over the last five years. No restoration works are required at this stage. Complete.
NEW PARK - MELTON ROAD	250	(50)	200	0	200	0	0%	Orders placed, work to commence in April
VICTORIA PARK - RELOCATE PLAYGROUND	60	0	60	0	60	60	100%	Complete
PLAYGROUND SHADING PROGRAM	15	0	15	0	15	13	89%	Complete
LUE PLAYGROUND	0	39	39	0	39	38	97%	Complete

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PASSIVE PARKS - LAND MATTERS	180	158	338	0	338	161	48%	1. Purchase of land for Park at 8 Doug Gudgeon Drive, complete. 2. Purchase of 74 Fairydale Lane - Contract signed, deposit paid and agreed conditions to be completed before settlement occurs. Plan of subdivision lodged with LPI 21/1/2015. Estimated completion date - 2 months from lodgement of plan with LPI - 31/3/2015.
ART GALLERY FACILITY	50	0	50	0	50	0	0%	Report will be presented to Council in March 2015.
STREET SCAPE CAPITAL IMPROVEMENTS	16	0	13	0	13	0	1%	Tree works undertaken throughout the year.
STREET CAPITAL IMPROVEMENTS - ANGUS AVE	3	0	3	0	3	3	140%	Complete
STREETSCAPE IMPROVEMENTS - BELLEVUE ESTATE	5	0	8	0	8	8	102%	Complete
STREETSCAPE - BIN REPLACEMENT PROGRAM	12	0	12	0	12	0	0%	Completed replacement of street bins as required. This line item also covered costs associated with the upgrading of the timber slatted bins in the Gulgong CBD as part of the recycling bin program.
STREETSCAPE - RECYCLING BIN PROGRAM	10	16	26	0	26	27	104%	Grant funded purchase and installation of street recycling bins for Kandos, Rylstone, Gulgong and Mudgee completed.
STREETSCAPE - TREE PLANTING RYLSTONE/KANDOS	8	0	8	0	8	3	44%	Autumn planting programmed for Mudgee and Louee Streets
Total	**3,425**	**650**	**4,122**	**0**	**4,122**	**1,786**	**43%**	

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Protecting our Natural Environment								
RURAL WASTE DEPOT UPGRADES	55	(45)	10	0	10	0	0%	Budget only.
MUDGEE WASTE DEPOT UPGRADES	30	135	165	0	165	45	27%	Fencing works completed. Investigation for suitable clay to line new cell through GHD completed. Waiting on feedback from the EPA on the ground water investigation to determine scope of works for sediment dam. Entry road to be upgraded later in the year when resources are available through roads team.
WASTE SITES REHABILITATION	100	(100)	0	0	0	0	0%	Budget only.
WTS - HOME RULE UPGRADE	0	10	10	0	10	0	0%	Replacement fencing that has been damaged or stolen. Work to commence in February.
WASTE SITE REHAB - WINDEYER	0	50	50	0	50	0	0%	Remediation works and capping to Windeyer Waste Transfer Station. Works to commence in March 2015
DRAINAGE CAPITAL IMPROVEMENTS	258	0	258	0	258	0	0%	Tender documents currently being prepared
CULVERT INSTALLATIONS	54	0	54	0	54	5	9%	Ongoing
CAUSEWAY IMPROVEMENTS	60	(60)	0	0	0	0	0%	Budget transferred to Coricudgy Road Bridge Repair.
ENV - PUTTA BUCCA WETLANDS CAPITAL	15	0	15	0	15	0	0%	Tree planting programmed for Autumn.
WATER NEW CONNECTIONS	132	0	132	0	132	66	50%	Provision of new connections to new development as required.
WATER AUGMENTATION - GULGONG	25	0	25	0	25	0	0%	Increase plant control including replacement of online monitoring equipment. Quotations sought. Installation to commence after

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								commissioning of online monitoring equipment at Mudgee WTP.
WATER AUGMENTATION - MUDGEE	5,060	(5,060)	0	0	0	0	0%	Budget has been reallocated to individual water augmentation projects below.
WATER AUGMENTATION - MUDGEE HEADWORKS	0	2,540	2,540	0	2,540	5	0%	Plant upgrades to the raw water transfer system, chemical dosing, and additional filtration to cater for growth. Plant designers reviewing current plant capacity prior to proceeding to concept development.
WATER AUGMENTATION - WEST MUDGEE EXTENSION	0	970	485	0	485	0	0%	Extension of distribution infrastructure West Mudgee. Consultant has provided detailed designs for review. Construction will be scheduled in association with development progress.
WATER AUGMENTATION - ULAN RD EXTENSION	0	1,600	1,600	0	1,600	0	0%	Extension of distribution infrastructure for development along Ulan Rd. Design works yet to commence. Construction works to be scheduled in association with development progress.
WATER REDBANK DAM UPGRADE	0	41	41	0	41	4	10%	This budget revoted from 2013/14. Completion of valve pit lid installation beneath dam wall during November 2014.
WATER SECURITY OF RYLSTONE SUPPLY	0	6	6	0	6	1	11%	Completed November 2014.
WATER TELEMETRY - BUDGET ONLY	20	0	20	0	20	0	2%	Implementation of remote SCADA control for on-call operations. Initial trial completed January 2015. Provision of digital RTUs for Mudgee Pump Stations.

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WATER LOSS MANAGEMENT WORKS	26	4	30	0	30	0	1%	Flow meter and data logger installation at Kandos, Charbon and Clandulla reservoirs. Installation works planned to commence after the summer period.
WATER MAINS - CAPITAL BUDGET ONLY	300	(300)	0	0	0	0	0%	Budget only. Allocated as per below projects.
WATER MAINS - CHURCH ST SOUTH - MADERIA TO SPRING	0	250	204	0	204	200	98%	Water main replacement works commenced opposite Medical Centre in September 2014. Budget variation due to reduced scope of works in line with road works. Works completed for area of road restoration works in December 2014.
WATER MAINS - MEDLEY STREET	0	70	70	0	70	0	0%	Replacement of 1950's cast iron main that has failed multiple times over the last 18 months. Scheduled to commence in March 2015. Scope of works increased with reallocation of Mayne St water main replacement budget ($18K), budget variation to be recommended in March QBR.
WATER MAINS - MAYNE STREET	0	18	18	0	18	0	0%	Valve and main replacement in conjunction with programmed road works. Road works postponed. Budget to be reallocated to Medley St water main replacement in March QBR.
WATER MAINS - SPRING ROAD	0	120	120	0	120	0	0%	Extension of water main along Spring Road to mitigate potential for low water pressure during peak periods in South Mudgee. Requested additional budget in September QBR to allow for additional length of pipework required. Works scheduled to commence April 2015.

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WATER MAINS - MARKET ST (LEWIS TO LAWSON)	0	0	47	0	47	2	4%	Replacement of water mains to correspond with planned roadworks in March 2015. Works completed. Awaiting final invoicing.
WATER PUMP STATION - CAPITAL BUDGET ONLY	64	0	24	0	24	0	0%	Budget only. Allocations as per below.
WATER PUMP STATION - CLEARWATER MUDGEE	0	0	40	0	40	0	0%	Pump No. 2 refurbishment to be completed following summer period.
WATER RESERVOIR - FLIRTATION HILL MUDGEE	0	39	39	0	39	0	0%	This budget revoted from 2013/14. Works continuing. Reservoir roofing to be replaced after summer period. Quotations received.
RESERVOIRS - PALERMO RD MUDGEE	0	5	5	0	5	0	0%	This budget revoted from 2013/14. Works continuing to seal roofing.
RAW WATER SYSTEMS RENEWALS	15	0	15	0	15	0	0%	Church St reservoir refurbishments due to leaks. Quotations sought.
WATER TREATMENT WORKS - MUDGEE	0	18	18	0	18	15	83%	Filter media top-up at Mudgee WTP completed October 2014.
WATER TREATMENT PLANT - GULGONG	0	6	6	0	6	3	43%	Filter media top-up at Gulgong WTP completed October 2014.
WATER TREATMENT PLANT - RENEWALS	68	(24)	45	0	45	36	81%	Rylstone WTP Flocculation tank has been patch sealed during August 2014. Installation of chemical bunding at Rylstone WTP rescheduled for February 2015. Clear water pump No. 1 at Mudgee WTP refurbished and reinstalled October 2014.
WATER METERS - BULK	110	0	110	0	110	11	10%	Program to replace water meters greater than 15 years old.
SEWER NEW CONNECTIONS	46	0	46	0	46	17	37%	Provision of new connections to new development as required.

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SLUDGE DEWATERING MOBILE UNIT	374	49	422	0	422	123	29%	Contract commenced June 2014 for unit to process STP sludge. Project Documentation received and approved for construction commencement (offsite). Contract scheduled to complete in April 2015. Contractor has advised delay in completion until May 2015.
SEWER AUGMENTATION - RYLSTONE & KANDOS	530	0	530	0	530	0	0%	Land matters. Commencement of works yet to be confirmed.
SEWER AUGMENTATION - MUDGEE	0	49	49	0	49	12	26%	Lab equipment and site works including provision of shed and boosted potable water supply scheduled to be completed December 2014. Shed and tank installed December 2014. Electrical connections yet to be completed.
SEWER TELEMETRY	20	0	20	0	20	0	2%	Implementation of remote SCADA control for on-call operations. Initial trial completed January 2015. Provision of digital RTUs for Mudgee Pump Stations.
SEWER TELEMETRY - RYLSTONE/KANDOS LINK	15	0	15	0	15	0	1%	Survey to establish line of sight for telemetry implementation at sewage pump stations. Scheduled to be completed January 2015
SEWER MAINS - CAPITAL BUDGET ONLY	361	(205)	156	0	156	0	0%	Budget only. It is proposed to allocate the remaining budget to the following projects upon further investigation: Lawson Park bridge rising main replacement, sewer main relining.
SEWER MAINS RELINING	0	313	313	0	313	318	101%	Year 2 of 3 year contract for relining works were completed in July 2014.
SEWER MAINS - MUDGEE INDUSTRIAL AREA	0	1	1	0	1	0	0%	Provision of WAE drawings for Mudgee Industrial area sewerage system upgrades constructed in 2013.

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SEWER MAINS - BELLEVUE TO RIFLE RANGE ROAD	0	47	47	0	47	0	0%	Awaiting final works and invoicing
SEWER MAINS - RISING MAIN CAERLEON	0	826	413	0	413	0	0%	Provision of sewer rising main for Caerleon development. Timing of works dependant on development progress. 50% deferred as works will not be completed by June 2014/15.
SEWER PUMP STATION - CAPITAL BUDGET ONLY	68	0	68	0	68	0	0%	Pump renewals to be confirmed. Projects include Pump replacement Kandos Ilford Road SPS, provision of all-weather access to Airport SPS. Diesel pump refurbishment, Hospital Pump Station Gulgong undertaken within maintenance budget.
SEWER PUMP STATION - INDUSTRIAL	0	10	10	0	10	0	0%	This budget revoted from 2013/14. Awaiting final WAE.
SEWER PUMP STATION - FLOW METERING	50	43	93	0	93	0	0%	Commence infiltration flow monitoring program (scheduling is weather dependant). Continue 2014 flow metering program at sewage pump stations.
SEWER PUMP STATION - CAERLEON	0	324	162	0	162	0	0%	This budget revoted from 2013/14. Timing of works in conjunction with Development progress. 50% deferred as works will not be completed by June 2014/15.
SEWER PUMP STATION - ACCESS AT AIRPORT	5	0	5	0	5	0	0%	Provide all-weather access to Airport SPS. After investigations into land matters complete, further budget to be transferred from Sewer Pump Station Capital Budget.
DECOMMISSION MUDGEE STP PUTTA BUCCA	150	150	300	0	300	0	0%	Decommissioning of the old Mudgee sewage treatment plant. Quotations sought for Remediation Plan.

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SEWER TREATMENT WORKS - RENEWALS	45	0	45	0	45	0	0%	Renewals as required at the four sewage treatment plants. Dosing systems at all plants to be reviewed in 2014. Alternate chemical dosing trial investigated for Mudgee STP in January 2015 aiming achieve further phosphorus reduction for reduced chemical cost. Trial to be undertaken March-April 2015.
Total	**8,055**	**1,901**	**8,896**	**0**	**8,896**	**864**	**10%**	

Building a Strong Local Economy

CUDGEGONG WATERS AMENITIES	157	0	157	0	157	3	2%	Work has commenced with the building currently at slab stage.
RIVERSIDE CARAVAN PARK - POWER POLES	0	10	10	0	10	0	0%	The lessee is replacing the poles as part of the lease agreement. Work due to be completed by May 2015. Budget entry for funds to be returned to asset replacement reserve to be recommended in the March QBR.
ENTRANCE SIGNAGE - RYLSTONE/KANDOS	14	0	14	0	14	7	49%	Mostly complete - minor signage being constructed
STREET BANNERS - GULGONG	0	9	9	0	9	0	0%	Report on options to go to Council in March
SALEYARDS - CAPITAL BUDGET ONLY	10	(10)	0	0	0	0	0%	Budget only. Allocated to projects below
SALEYARDS - CATTLE CRUSH	0	0	11	0	11	11	101%	Complete
SALEYARDS - POST AND RAIL REPLACEMENT	0	10	10	0	10	3	34%	Ongoing rail and post replacements will continue
SALEYARDS - PARKING AREA ROAD	20	0	20	0	20	0	0%	Roadworks scheduled for later this

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WORKS								year
PROPERTY - KANDOS SURPLUS LAND BLOCKS	3	0	3	0	3	1	32%	45 Dunn Street - Council resolution to sell 3/9/2014. Property on market. Advice from real estate agent is land sales in Kandos slow - may take 18 months to sell (on average only sell 2-3 blocks of vacant land per year). No interest in land as at 13/2/2015.
PROPERTY - EX SALEYARDS STAGE I	0	75	75	0	75	49	65%	Investigating road closure matters prior to being able to consider options for sale.
PROPERTY - MORTIMER ST PRECINCT	20	0	20	0	20	0	0%	Obtaining second quotes to commence work. Painting front façade to match adjacent building, replacement air-conditioning unit, internal painting repairs to ceiling and roof repairs.
RIVERVIEW ESTATE - ROAD CLOSURE	0	0	0	0	0	1	0%	Application for closure of part Perry St - Council resolution to close and sell 3/12/2014. Valuations being sought. Applicant responsible for all costs.
COMMERCIAL PROP - PRESCHOOL FACILITY	1,000	0	1,000	0	1,000	2	0%	DA has been lodged with Council and will be determined at the February Council meeting. Subject to this approval work is to commence in March with the building being completed at the end of October 2015.
Total	**1,224**	**94**	**1,329**	**0**	**1,329**	**77**	**6%**	

Connecting our Region

URBAN RESEAL - PERRY STREET MUGDEE	90	0	90	0	90	8	9%	Works completed, awaiting final invoices

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URBAN RESEAL - FLIRTATION HILL LOOKOUT GULGONG	9	0	9	0	9	0	4%	Works completed, awaiting final invoices
URBAN RESEAL - LITTLE BELMORE STREET GULGONG	15	0	15	0	15	1	6%	Works completed, awaiting final invoices
URBAN RESEAL - LOWE STREET GULGONG	6	0	6	0	6	0	2%	Works completed, awaiting final invoices
URBAN RESEAL - MAYNE STREET GULGONG	10	0	10	0	10	0	1%	Works completed, awaiting final invoices
URBAN RESEAL - BLIGH CLOSE MUDGEE	3	0	3	0	3	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - BULGA STREET GULGONG	12	0	12	0	12	0	1%	Works completed, awaiting final invoices
URBAN RESEAL - COOMBER STREET RYLSTONE	8	0	8	0	8	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - COOYAL STREET GULGONG	7	0	7	0	7	0	2%	Works completed, awaiting final invoices
URBAN RESEAL - DABEE STREET RYLSTONE	6	0	6	0	6	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - GLADSTONE STREET MUDGEE	79	0	79	0	79	0	0%	Heavy Patching planned for the 1st week in March
URBAN RESEAL - JAMISON STREET KANDOS	17	0	17	0	17	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - MEALEY STREET MUDGEE	14	0	14	0	14	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - PHILIP CLOSE MUDGEE	5	0	5	0	5	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - MACQUARIE DRIVE MUDGEE	11	0	11	0	11	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - MULGOA WAY MUDGEE	32	0	32	0	32	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - ROBERTSON STREET MUDGEE	15	0	15	0	15	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - WOODSIDE CLOSE MUDGEE	21	0	21	0	21	0	0%	Works completed, awaiting final invoices
URBAN RESEAL - LISBON ROAD MUDGEE	18	0	18	0	18	0	0%	Works completed, awaiting final invoices

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
URBAN ROADS KERB & GUTTER CAPITAL	22	0	22	0	22	7	31%	Works ongoing
FAIRY DALE LANE UPGRADE	800	2,600	1,020	0	1,020	3	0%	Currently this project is in the design phase concentrating on Saleyards Lane and the culvert design. Following survey it was determined that 8 power poles need to be relocated. An electrical designer has been engaged and is awaiting the new road alignment to finalise design. It is likely that the power poles will need to be relocated prior to drainage works commencing and there is a risk that this may delay the start of the project.
REHAB - HENBURY AVENUE KANDOS	75	0	75	0	75	4	5%	Works will be commencing following the completion of the Fitzgerald Street rehab project in mid-March.
REHAB - CHURCH STREET MUDGEE	417	0	417	0	417	143	34%	The bridge works, pavement construction and sealing have been completed. The only outstanding work is the asphalt works to the roundabout at Madeira Street. These asphalt works will be undertaken with other asphalt works in Mudgee in March 2015.
REHAB - MAYNE ST ASPHALT, GULGONG	155	0	155	0	155	0	0%	This project has been cancelled as per Council resolution. The budget is to be reallocated to other works during the March QBR.
REHAB - LEWIS ST MUDGEE SEG 40	175	0	175	0	175	115	65%	Completed
REHAB - FARRELLY ST CLANDULLA SEG 10	20	0	20	0	20	8	39%	Works completed
REHAB - MARKET ST MUDGEE SEG 20	140	0	140	0	140	16	11%	Road pavement were delayed by 4 weeks to allow for water main replacement works. Pavement reconstruction will commence early

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
								March 2015
REHAB - JACQUES/DENGAR ST KANDOS	25	0	25	0	25	1	5%	Works to be undertaken in April 2015
REHAB - JACQUES/RODGERS ST KANDOS	25	0	25	0	25	4	18%	Works to be undertaken in April 2015
REHAB - FIRST ST MUDGEE SEG 10	40	0	40	0	40	0	0%	Works to be undertaken in April 2015
REHAB - FITZGERALD ST RYLSTONE SEG 10	75	0	75	0	75	0	0%	Works are commencing late February with seal planned for March 2015.
REHAB - MORTIMER ST MUDGEE SEG 60 70 80	100	0	100	0	100	21	21%	Completed
REHAB - CUDGEGONG RD EVANS CROSSING	220	0	220	0	220	9	4%	Design completed and fisheries approvals have been received. The culvert sections have been ordered and are due to be delivered in March. Works will commence in March constructing a side track followed by the culvert construction.
RESHEETING - URBAN ROADS	13	0	13	0	13	4	31%	Currently resources are working on construction projects. Resheeting of urban street will be undertaken towards the end of the financial year.
FAIRYDALE LANE LAND MATTERS CAPITAL	0	0	114	0	114	0	0%	Separate budget allocated to cover legals, site clean up and development application fees. Funded from S94. Negotiations with landowner finalised. MOU being prepared by Council's solicitor - document will be completed by 20/2/2015.

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
URBAN ROADS LAND MATTERS CAPITAL	26	0	26	0	26	4	14%	1. Engineers Road reserve - in last stages of removing unauthorised occupier - Occupier has agreed to vacate Road Reserve by 20/2/2015. Consultation to then occur with adjoining land owners as to future of road reserve. 2. Castlereagh Highway realignment from Putta Bucca to Hill End Road - documentation not completed from 1997 - plans now lodged with LPI but requisitions need to be finalised. Est completion date 2 months after requisitions complete and verified by LPI - 30/4/2015.
RURAL RESEALS - ACACIA DRIVE RYLSTONE	43	0	21	0	21	21	101%	Complete
RURAL RESEALS - GORRIES LANE GOOLMA	8	0	7	0	7	0	0%	Works completed, awaiting final invoices
RURAL RESEALS - BORONIA ROAD RYLSTONE	20	0	11	0	11	11	101%	Complete
RURAL RESEALS - DABEE ROAD RYLSTONE	2	0	2	0	2	0	0%	Works completed - cost included within the Dabee Road Reseal project (below separate segment of Dabee Road – costs to be reallocated).
RURAL RESEALS - DABEE ROAD RYLSTONE	110	0	42	0	42	42	101%	Complete
RURAL RESEALS - NARRANGO ROAD RYLSTONE	130	0	63	0	63	64	101%	Complete
RURAL RESEALS - BURRUNDULLA ROAD MUDGEE	96	0	56	0	56	39	70%	Complete
RURAL RESEALS - QUEENS PINCH ROAD MUDGEE	90	0	53	0	53	53	100%	Complete
RURAL RESEALS - ROCKY WATERHOLE ROAD MUDGEE	89	0	56	0	56	55	99%	Complete
RURAL RESEALS - YARRABIN ROAD	163	0	144	0	144	144	101%	Complete

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
RURAL REHAB - LUE RD (OLIVE FARM)	0	0	20	0	20	0	0%	Final seal to be placed in February 2015
HEAVY PATCHING BUDGET	101	0	101	0	101	5	5%	Heavy patching program currently being developed with focus on Henry Lawson Drive. Works to commence in quarter 4.
BLACKSPOT YARRAWONGA RD SHOULDER WIDENING	0	108	108	0	108	96	88%	Complete
RURAL REHAB - LUE ROAD	628	0	628	0	628	410	65%	The project will be completed at the end of February 2015
RURAL REHAB - GLEN ALICE ROAD	172	0	92	0	92	79	86%	Complete
FUTURE YRS REFS - BUDGET ONLY	5	0	5	0	5	0	0%	Expended as required for planned road works.
RURAL SEALED ROAD LAND MATTERS	15	0	15	0	15	1	4%	Investigations continuing into land acquired to realign Happy Valley Road in 1997 but plan never registered - will be resolved by incorporating with Sale of Land for Unpaid Rates action (presented to Council on 17/12/2014 - Auction date 9/5/2015).
RURAL SEALED REGIONAL ROAD RESEALS	595	(595)	0	0	0	0	0%	Budget only, reallocated to below reseal projects.
RURAL SEALED REGIONAL ROAD REPAIR PROGRAM	400	(182)	218	0	218	0	0%	The REPAIR funding application was not successful this year. $182K was reallocated onto other projects.
BLACKSPOT BYLONG VALLEY WAY - GROWEE GULPH	0	29	29	0	29	0	0%	Complete
BLACKSPOT COPE RD SHOULDER WIDENING	0	11	11	0	11	12	101%	Complete
BLACKSPOT COPE RD SHOULDER WIDENING	0	29	29	0	29	29	101%	Complete
REHAB COPE ROAD UPGRADE BUDGET ONLY	2,564	(2,564)	0	0	0	0	0%	Budget only item, budget reallocated to below separate projects.
BLACKSPOT BYLONG VALLEY WAY - STH OF KANDOS	0	250	250	0	250	71	28%	Works predominantly completed, linemarking and minor works outstanding, awaiting final invoices.

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
REHAB COPE ROAD UPGRADE - MILESTONE 1	0	1,419	1,419	0	1,419	1,377	97%	Milestone 1 has been completed with the exception the installation of safety barrier over the Deadmans Creek culverts which is planned for early March 2015.
REHAB COPE ROAD UPGRADE - CONFORMING RESEALS	0	103	103	0	103	34	33%	33% of works have been completed as scheduled.
REHAB COPE ROAD UPGRADE - MILESTONE 2	0	853	853	0	853	50	6%	Milestone 2 has commenced with culvert extensions completed and widening underway in the first 900m of the work. Aiming for sealing at the end of March 2015.
REHAB COPE ROAD UPGRADE - SEGMENT 3150	0	173	173	0	173	0	0%	Commencing following completion of Milestone 2, May 2015.
REHAB COPE ROAD UPGRADE - LINEMARKING	0	17	17	0	17	0	0%	Progressively being completed as reseals and rehabilitation works are completed.
PITTS LANE/ULAN RD SIGNAGE	0	15	15	0	15	7	45%	The signs have been ordered and will be installed on delivery.
ULAN WOLLAR ROAD UPGRADES	146	0	146	0	146	0	0%	Scope to be determined, it is proposed to continue the resheeting of the unsealed section.
REG RESEALS - WOLLAR ROAD	0	401	377	0	377	245	64%	Works completed
REG RESEALS - BYLONG VALLEY WAY RESEAL	0	180	180	0	180	0	0%	Reseal works undertaken late February. Project completed.
REG RESEAL - HILL END ROAD RESEAL	0	199	199	0	199	153	77%	Original scope of project completed. Planning to undertake some minor patching works in the works area with remaining budget
REG RESEAL - GOLLAN ROAD SEG 40 & 50	0	110	110	0	110	47	43%	Complete
RURAL SEALED REGIONAL ROAD LAND MATTERS CAPITAL	5	0	5	0	5	0	1%	Gollan Road, Goolma matters x 2 - Road Widening at Shearmans Bridge, registration of plans etc.Owners contacted 20/1/2015 and surveyor consulted.

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SEAL EXTENSION - NULLO MOUNTAIN	120	0	150	0	150	80	53%	Works completed, awaiting final invoices
SEAL EXTENSION - LOCHIEL LN	4	0	4	0	4	2	55%	Complete
RESHEETING - BUDGET ONLY	1,200	0	1,200	0	1,200	648	54%	Works continuing slowly, however resources are currently on construction projects. It is proposed that resheeting works will commence in the final quarter of 14/15.
UNSEALED ROADS LAND MATTERS CAPITAL	5	0	5	0	5	2	33%	Beechworth Road plan registered and titles created 30/9. Transfer of land parcel to affected property owner commenced.
RURAL UNSEALED REGIONAL ROAD RESHEETING	52	(52)	0	0	0	0	0%	Budget reallocated on the expectation of successful application to Resources for Regions for the upgrade of Wollar Road.
SEAL EXTENSION - WOLLAR ROAD	185	(185)	0	0	0	0	0%	Budget reallocated on the expectation of successful application to Resources for Regions for the upgrade of Wollar Road.
GREEN GULLY BRIDGE	0	50	99	0	99	106	107%	Bridge repair works completed.
BUTTER FACTORY BRIDGE	0	50	50	0	50	61	121%	The side track is installed thus providing access to all vehicles. The bridge will be replaced in 2015/16.
CORICUDGY ROAD BRIDGE - REPAIR	0	60	60	0	60	1	2%	The design is underway.
STONEY CREEK BRIDGE	0	52	76	0	76	76	100%	The side track is installed thus providing access to all vehicles. The bridge will be replaced in 2015/16.
ULAN ROAD STRATEGY - CAPITAL BUDGET ONLY	3,297	(3,297)	0	0	0	0	0%	Budget only, reallocated to below projects.
ULAN ROAD - MIDBLOCK 19.999 TO 22.215	0	295	646	0	646	485	74%	Works have been completed, but some remedial works are planned to rectify pavement ride quality.

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
ULAN ROAD - WOLLAR RD INTERSECTION	0	765	795	0	795	390	49%	The Budgee Creek culvert extension works are nearly completed as is the road pavement on Ulan Road except that section over the culverts. The eastern headwall and wingwall of the culvert section have been poured and will be stripped and backfilled by the end of January. Culvert units for Wollar Rd have been delivered and will be installed in March 2015.
ULAN ROAD - MT PLEASANT LN TO BUCKAROO LN	0	350	400	0	400	46	12%	Final design is under GHD internal review and will be submitted late February for MWRC review. Property boundary issues are being addressed.
ULAN ROAD - SPRINGVIEW LN TO MIDBLOCK 13.478	0	0	144	0	144	139	97%	Final design is under GHD internal review. Property boundary issues to address.
ULAN ROAD - COPE RD TO UCML MINE ENTRANCE	0	0	17	0	17	13	75%	Final design is under GHD internal review.
ULAN ROAD - WATTLEGROVE LN TO MIDBLOCK 19.999	0	0	114	0	114	97	86%	Final design is under GHD internal review.
ULAN ROAD - WYALDRA LN TO QUARRY ENTRANCE 27.783	0	0	39	0	39	29	76%	Final design is under GHD internal review.
ULAN ROAD - WINCHESTER CRES TO MIDBLOCK 31.106	0	0	200	0	200	68	34%	Final design is under GHD internal review.
ULAN ROAD - LAGOONS RD TO TOOLE RD	0	1,413	2,117	0	2,117	640	30%	The last 1km of the rehabilitation and widening works is underway. Seal planned for this section in late March 2015, including the Toole Road intersection.
FOOTWAYS - CAPITAL BUDGET ONLY	247	(48)	199	0	199	16	8%	Works to commence on the extension of the footpath along Robertson Road.
FOOTWAYS - BUS SHELTERS	2	46	48	0	48	0	0%	Quotations have been received and an order has been placed for the shelters.
PEDESTRIAN - KANDOS TO CLANDULLA	100	0	100	0	100	0	0%	This project is subject to ARTC Approvals.

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
PEDESTRIAN - CHARBON PEDESTRIAN BRIDGE	99	0	99	0	99	0	0%	This project is subject to ARTC Approvals.
PEDESTRIAN - GLEN WILLOW WALKWAY	50	102	152	0	152	99	65%	Complete
GULGONG WALKWAY	100	0	100	0	100	50	50%	Works will commence on the continuation of the walkway in March 2015. The route from Herbert Street to the CDB requires confirmation as there is no straight forward options. Construction constraints include steep batters requiring retainment, trees, culverts crossings, width and property issues.
PEDESTRIAN - RYLSTONE PEDESTRIAN BRIDGE	200	(50)	150	0	150	5	3%	This project is currently out at tender. Tender closes 2nd March 2015.
CYCLEWAY - RYLSTONE TO KANDOS RESEAL	50	0	50	0	50	0	0%	This project is currently under review as the location of the future water main is likely to be located underneath the cycleway which means that the cycleway will be damaged during its installation.
CYCLEWAY - PITTS LANE	0	103	103	0	103	92	90%	Footpath construction works are completed, awaiting the modifications to the fencing to provide a gated entry for pedestrians.
PEDESTRIAN - MELTON PARK	0	35	35	0	35	0	0%	Works to be commence March 2015
PEDESTRIAN - MAYNE & MEDLEY ST GULGONG	0	0	3	0	3	0	0%	Kerb blisters at intersection
AIRPORT EXTEND TAXIWAY	0	140	140	0	140	154	110%	This project is almost completed and only requires linemarking
AIRPORT - APPROACH LIGHTS	0	650	650	0	650	154	24%	This work is currently in progress and is expected to be completed in March
AIRPORT - AIRCRAFT PARKING	0	340	340	0	340	224	66%	This project is almost completed and only requires linemarking

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AIRPORT - CARPARKING FACILITIES	0	95	95	0	95	30	31%	The kerb and gutter is complete and it is expected to be sealed in late February and line marked in May 2015
AIRPORT - TERMINAL EXTENSION	0	300	300	0	300	0	0%	Design work completed and currently being prepared for building quotations - noting that works may be occurring when the new RPT commences operation
AIRPORT - CAPITAL UPGRADES	2,000	(1,785)	215	0	215	70	33%	Electrical work in the hanger has been completed and the new switchboard installed. Additional drainage works will depend on the available funds after finalisation of the civil works
AIRPORT - REALIGN AIRPORT ENTRY	0	180	180	0	180	0	0%	Preliminary works have commenced and will continue over the coming months
AIRPORT - BACKUP POWER	0	80	80	0	80	3	3%	Quotes have been received and an order placed with works expected to be completed during March 2015
STREET LIGHTS - HERBERT & MAYNE INT	20	0	20	0	20	0	0%	Lighting design and approval process is underway but has been delayed, we anticipate that the construction phase will commence in February 2015.
Total	**15,820**	**2,845**	**17,772**	**0**	**17,772**	**7,182**	**40%**	

Good Government

AUSTRALIA DAY BOARDS	3	0	3	0	3	0	10%	Awaiting final proof of board design. Wall prepared for installation.
MUDGEE ADMINISTRATION BUILDING UPGRADE	50	0	50	0	50	40	80%	Works now complete. Further review of staff layout required, before any additional works can be completed.

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
GULGONG ADMIN BUILDING	90	0	90	0	90	2	2%	Final quotes now being received. Work is to commence 16 March 2015 and is expected to take approximately two weeks to complete.
MUDGEE TOURIST OFFICE	20	0	20	0	20	13	65%	Works complete. New lighting and carpet installed.
CAPITAL UPGRADE - MWRC DEPOT	0	43	43	0	43	41	96%	Scheduled works complete.
CAPITAL UPGRADE - RYLSTONE DEPOT	5	0	5	0	5	0	9%	These works have been postponed until adequate funds become available to carry-out the works to a satisfactory level. A funding proposal has been put forward for the 2015/16 financial year.
WEEDS CARPARK CAPITAL UPGRADE	20	(20)	0	0	0	0	0%	Budget reallocated to Capital Upgrade - MWRC Depot, to better manage total project works.
TELEPHONE SYSTEM - VOIP	200	0	200	0	200	81	41%	Evaluation of responses in progress
OFFSITE RECORDS STORAGE	30	0	30	0	30	0	0%	Clean up of Rylstone records being completed so amount of storage and requirements can be determined.
IT NETWORK UPGRADES	0	0	0	0	0	38	0%	Operations wireless link is now operating
IT CORPORATE SOFTWARE	15	88	49	0	49	16	32%	Currently reviewing licences for the internal cloud software (virtual servers)
IT - EMAIL ARCHIVE SOLUTION	20	0	20	0	20	16	81%	Complete
IT - WEBCASTING EQUIPMENT COUNCIL CHAMBERS	0	6	6	0	6	5	93%	Webcasting camera repair in progress
ASSET MANAGEMENT SYSTEM UPGRADES	0	0	62	0	62	75	121%	Asset management plans are programmed to be presented to Council prior to June 2015 and the asset management system work orders to go live no later than June
PLANT PURCHASES	3,670	1,625	5,375	0	5,375	4,326	80%	The majority of heavy plant has been ordered and all new plant should be received by April 2015

$'000	ORIGINAL ANNUAL BUDGET	APPROVED VARIATIONS	REVISED ANNUAL BUDGET	PROPOSED VARIATIONS	PROPOSED ANNUAL BUDGET	ACTUAL YTD	% PROPOSED ANNUAL BUDGET	COMMENT
RYLSTONE DEPOT CAPITAL WORKS	0	3	3	0	3	3	101%	Storage container.
Total	**4,123**	**1,745**	**5,955**	**0**	**5,955**	**4,659**	**78%**	
Total Capital Works Program	**32,647**	**7,235**	**38,074**	**0**	**38,074**	**14,568**	**38%**	

ATTACHMENT

2015

COUNCIL BUSINESS PAPERS

Ordinary Meeting 18 MARCH 2015

ATTACHMENT **6.2.21**

- Flood Study for Kandos & Rylstone

SINCLAIR KNIGHT MERZ

SKM

Mid-Western Regional Council

Flood Study for Kandos and Rylstone

FLOOD STUDY REPORT

- FINAL
- November 2013

Flood Study for Kandos and Rylstone

FLOOD STUDY REPORT

- FINAL
- November 2013

Sinclair Knight Merz
ABN 37 001 024 095
100 Christie Street
St Leonards NSW 2065 Australia
Postal Address
PO Box 164 St Leonards NSW 2065 Australia
Tel: +61 2 9928 2100
Fax: +61 2 9928 2500
Web: www.globalskm.com

LIMITATION: The sole purpose of this report and the associated services performed by Sinclair Knight Merz Pty Ltd (SKM) is to UNDERTAKE A FLOOD STUDY in accordance with the scope of services set out in the contract between SKM and Mid-Western Regional Council. That scope of services, as described in this report, was developed with Mid-Western Regional Council.

In preparing this report, SKM has relied upon, and presumed accurate, certain information (or absence thereof) provided by the Client and other sources. Except as otherwise stated in the report, SKM has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

SKM derived the data in this report from a variety of sources. The sources are identified at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. SKM has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose of the project and by reference to applicable standards, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by SKM for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, Mid-Western Regional Council and is subject to, and issued in connection with, the provisions of the agreement between SKM and Mid-Western Regional Council. SKM accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

FOREWORD

The primary objective of the New South Wales Government's Flood Prone Land Policy is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods, wherever possible. Under the Policy, the management of flood prone land remains the responsibility of local government.

The policy provides for a floodplain management system comprising the following five sequential stages:

1. Data Collection	Involves compilation of existing data and collection of additional data
2. Flood Study	Determines the nature and extent of the flood problem
3. Floodplain Risk Management Study	Evaluates management options in consideration of social, ecological and economic factors relating to flood risk with respect to both existing and future development
4. Floodplain Risk Management Plan	Involves formal adoption by Council of a plan of management for the floodplain
5. Implementation of the Plan	Implementation of flood, response and property modification measures (including mitigation works, planning controls, flood warnings, flood preparedness, environmental rehabilitation, ongoing data collection and monitoring by Council

Mid-Western Regional Council (Council) is responsible for local planning and land management in its Local Government Area (LGA), including the management of flood prone areas in the townships of Kandos and Rylstone. Through its Floodplain Risk Management Committee, Council proposes to prepare a comprehensive Floodplain Risk Management Plan for Kandos and Rylstone in accordance with the New South Wales Government's 2005 Floodplain Development Manual.

This report represents the first and the second stages of the management process and has been prepared for Council by Sinclair Knight Merz. It documents the nature and extents of flooding throughout Kandos and Rylstone and is an essential resource for the subsequent stages of the floodplain risk management process.

Contents

Document history and status

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
1	26-4-12	John Wall	John Wall	26-4-12	Practice and PD Review
2	5-7-13	John Wall	John Wall	*8/7/13*	Change in Study Area Boundary for Rylstone

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1. Introduction

1.1. Background

Mid-Western Regional Council (MWRC) is responsible for local planning and land management in the towns of Kandos and Rylstone. Council is currently reviewing its Local Environment Plan (LEP) and preparing a Development Control Plan (DCP). Council has no formal floodplain risk management strategies in place to provide an appropriate level of protection for the Kandos and Rylstone communities. Further, Council has no formal emergency management strategies to effectively manage the continuing flood problems for the two towns. Hence, Council proposes to develop floodplain risk management plans for both Kandos and Rylstone in phases, in accordance with the NSW Government's (2005) Floodplain Development Manual. Initial investigations (including data collection and review of all relevant data) and a flood study, are included in the first phase (Phase 1). For both towns, a Floodplain Risk Management Study (the Study) and Plan (the Plan) will be developed in the second phase (Phase 2), with the Plan being implemented in the third phase (Phase 3).

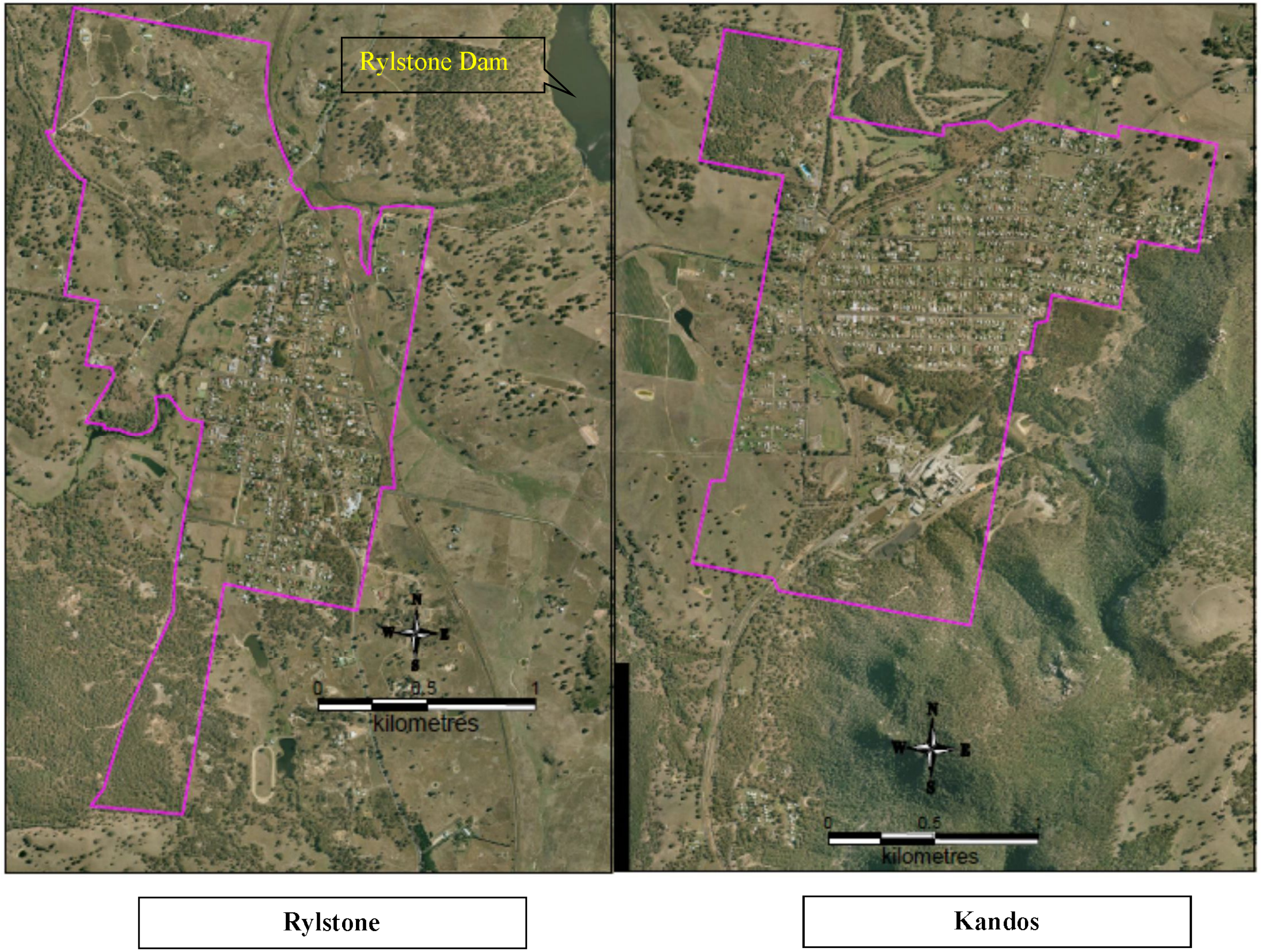
Sinclair Knight Merz (SKM) was engaged by Council in June 2011 to develop a Floodplain Risk Management Plan for Kandos and Rylstone encompassing all activities in Phase 1 and Phase 2. This report details outcomes from Phase 1 of the project.

1.2. Study Areas

1.2.1. Kandos

The study area for Kandos is shown in **Figure 1-1**. Kandos (population approximately 1,440) is located in the Central Tablelands of NSW. The town is located on the headwaters of Cumber Melon Creek, which is a tributary of the Cudgegong River. Kandos has a history of overland flooding and in recent times, Kandos experienced minor overland flooding in 2010 and 2012. Minor development has modified overland flow paths to some extent and future development has the potential to aggravate overland flooding further. Council is reviewing its LEP and also preparing a DCP, in order to guide the expansion of the township, and Council needs to assess the impact of future urbanisation on the catchment.

- **Figure 1-1 Study Areas**



1.2.2. Rylstone

The study area for Rylstone is shown in **Figure 1-1**. Rylstone (population approximately 730) is located in the upper Cudgegong River catchment and has a history of both overland flooding and, to a much lesser extent, riverine flooding from the Cudgegong River. The town experienced several major floods in the 1950s due to flooding in the Cudgegong River and in recent times significant overland flooding problems were experienced in some parts of the town in 2010 and 2012.

Rylstone Dam, which provides water supply for Rylstone and Kandos, is located on the Cudgegong River approximately 1 km upstream of Rylstone. Failure of Rylstone Dam (catchment area 535 km^2 and a storage capacity of 3,038 ML) has the potential to impact on flooding in Rylstone.

1.3. Overall Objective

Council needs to develop a Floodplain Risk Management Plan (FRMP) for Kandos and Rylstone, to address the existing, future and continuing flood problems, in accordance with the NSW Floodplain Development Manual (2005). To meet the requirements of the Manual, Council needs a FRMP in order to:

- Reduce the flood hazard and risk to people and property in the existing community;
- Provide valuable flood intelligence to assist State Emergency Service (SES) in updating Local Flood Plans for the townships;
- Protect, maintain and, where possible, enhance the river and floodplain environment, and
- Ensure flood management decisions integrate the social, economic and environmental considerations.

The study is being undertaken in three phases. Major activities undertaken in each phase are provided below:

- **Phase 1**
  - **Initial Investigations**
    - A site inspection;
    - Data collection and review of all relevant documents, data and reports;
    - Consultation with the community and stakeholders; and
    - Identification of additional data needs to undertake the study.
  - **Flood Study**
    - Review of existing hydrologic and hydraulic models for the Cudgegong River catchment at Rylstone and defining flood behaviour for 0.5%, 1%, 2%, 5%, 10%,

20% Annual Exceedance Probability (AEP) events and the Probable Maximum Flood (PMF) event;
   - Investigations of overland flooding for both Kandos and Rylstone under the existing catchment and floodplain conditions for the full range of flood events including 0.5%, 1%, 2%, 5%, 10%, 20% AEP events and the PMF event;
   - Identification of flooding issues within the catchments and an assessment of the existing stormwater drainage network in both Kandos and Rylstone; and
   - Preparation of provisional flood mapping for both Kandos and Rylstone for the PMF, 1% AEP, 1% AEP +0.5m and 20% AEP events.
   - Climate variability was not part of this study.
- **Phase 2 Floodplain Risk Management Study and Draft Plan**
  - An assessment of potential flood management and mitigation measures in order to achieve improvements necessary to meet the required service levels. Such measures may include improved drainage works within both Kandos and Rylstone, levees, bypass floodways, culvert amplification, house floor raising, construction of flood retarding basins, flood warning and public education, zoning and development control, voluntary purchase etc;
  - Estimation of flood damages and annual average damages and their net present worth;
  - An economic assessment of the floodplain management measures based on life cycle cost and benefits;
  - Prioritisation of improved drainage measures and estimate the cost thereof; and
  - Final flood mapping.
- **Phase 3 Floodplain Risk Management Plan Implementation**

1.4. Structure of the Report

This report describes the Data Collection (Stage 1) and Flood Study (Stage 2) aspects as defined in Section 1.3. The outcome of the Floodplain Risk Management Study and draft Plan (Stage 3) will be produced in a separate report.

The report has been divided into the following sections:

- **Section 1:** introduces the study
- **Section 2:** provides details on the initial investigations undertaken for the study including review of the available data and community consultation
- **Section 3:** details riverine flooding assessment for the Cudgegong River in Rylstone, including a dambreak assessment for Rylstone Dam

- **Section 4**: details stormwater capacity assessment for both Kandos and Rylstone townships
- **Section 5**: assesses local overland flooding for both Kandos and Rylstone township
- **Section 6**: acknowledges input provided by others in completing the study
- **Section 7**: provides conclusions on the study
- **Appendix A**: Questionnaire sent to residents
- **Appendix B**: Additional topographic data
- **Appendix C**: Flood modelling for Cudgegong River
- **Appendix D**: Input data used and results obtained from the stormwater capacity assessment for both towns
- **Appendix E**: Details on local overland flood assessment for both Kandos and Rylstone
- **Appendix F**: Combined flood maps for Rystone due to flooding in the Cudgegong River and local overland flooding

This report contains the most up-to-date information on flooding for both Rylstone and Kandos, which was estimated on the basis of available historical flood data, detailed topographic data and review of catchment hydrology. Outcomes from the study will be used in the development of a Floodplain Risk Management Plan and information presented in this report will be useful to SES in updating the Local Flood Plans for Rylstone and Kandos. In addition, the information on dambreak modelling for Rylstone Dam can be utilised to update its Dam Safety Emergency Plan (DSEP).

2. Initial Investigations

2.1. Site Inspection

A site inspection was carried out on 7 and 8 June 2011 to:

- Gain an appreciation of the catchment characteristics, Rylstone Dam, potential flooding problem areas and stormwater systems; and
- Estimate Manning's roughness coefficients for the floodplains.

2.2. Review of Relevant Reports

Mid-Western Regional Council Local Flood Plan (July 2007)

SES prepared the Local Flood Plan for the Council area, which includes the townships of Rylstone and Kandos. The Plan identifies the effects of flooding on the community in the townships, rural areas, road closures and utilities and infrastructure. Implications of failure of Rylstone Dam on Rylstone are also discussed in the Plan.

Integrated Water Cycle Modelling (August 2002)

Hunter Water Australia (HWA) prepared the report for Rylstone Shire Council to document outcomes from the integrated water cycle modelling. HWA developed the following quantitative models of the various components of the water cycle:

- Catchment modelling using XP-RAFTS;
- Floodplain modelling using MIKE11;
- Water system modelling using PIPES^{++};
- Wastewater system modelling using MOUSE; and
- Effluent modelling as part of a sustainable effluent management plan.

The report details the above models developed by HWA and, where appropriate, provides recommendations for future work, which could be undertaken to improve the models. Both XP-RAFTS and MIKE11 models developed in the 2002 study were available to this study.

Windamere Dam PMP Design Flood and Spillway Adequacy Study (1999)

The report was prepared by SMEC Australia for the then NSW Department of Land and Water Conservation. A hydrologic model using XP-RAFTS was developed for the catchment area (1,088km^2) of Windamere Dam. The XP-RAFTS model was calibrated against recorded streamflow data for three storm events (1971, 1973 and 1976) and the model was verified against recorded streamflow data for four storm events (1956, 1986, July 1990 and August 1990). The verified model was used to define inflow and outflow frequency curves for Windamere Dam for storm events between 5% and 0.0001% AEP. Inflows to Windamere Dam for the 5%, 2% and 1%

AEP events were estimated at 430 m^3/s, 607m^3/s and 768m^3/s, respectively. The XP-RAFTS model used in the 1999 study was not available to this study.

Rylstone Flood Study Report (June 1987)

This reconnaissance flood study report was prepared by the Department of Water Resources to define flood behaviour for the town of Rylstone under the current conditions. The report details the results of flood investigations based on the historical flood of February 1955, which was considered as the highest flood recorded in the last century. The elevation of the 1955 flood is equivalent to a gauge height of 4m at Rylstone Bridge gauge (GS 421038). No residential or industrial properties were affected by the 1955 flood and, hence, no flood marks were recorded on buildings or other structures. The Department obtained three flood marks of the 1955 flood, which allowed an estimate of the 1955 profile in the town to be made. Estimated 1955 flood levels at the Filtration Plant, Louee Street Bridge, Dabee Street and Cudgegone Street were 570.5, 570.0, 569.5 and 568.5 mAHD, respectively.

Report on Stormwater Drainage for the Towns of Kandos & Rylstone (July 1975)

The report was prepared by Sinclair Knight & Partners for Rylstone Shire Council as an outcome of a study on the overall drainage systems of Kandos and Rylstone. The following tasks were undertaken as part of the study:

- Delineation of stormwater catchment boundaries;
- Calculation of discharge rates in the 20% AEP storm event;
- Comparison of the capacity of the existing structures with calculated discharge rates; and
- Recommendations for various works.

While the calculation methods were not stated in the report, it is likely that the flows and pipe capacities were estimated based on Rational Method flow calculations and Manning's n capacity calculations.

Studies Relating to Rylstone Dam

Council provided over a dozen reports on Rylstone Dam addressing spillway hydrology, dam break study, structural review, geotechnical investigation, dam surveillance, dam safety emergency plan, portfolio risk assessment, review of environmental factors, flood security upgrade, survey of reservoir etc. The following reports of relevance to this study were reviewed and key outcomes from the review are summarised below:

- **Dam Safety Emergency Plan for Rylstone Dam (February 2010) -** A Dam Safety Emergency Plan (DSEP) for Rylstone Dam was prepared by NSW Public Works for Council to address preparedness in relation to the occurrence of an emergency condition at Rylstone Dam resulting from flooding, earthquake and other emergency situations. The report provides information necessary for emergency agencies to manage a downstream evacuation in the unlikely event of a dam failure. The study used flooding conditions downstream of the Rylstone Dam based on a Base Safety Conditions (BSC) Study undertaken by Public Works Department in 2001 (PWD 2001). Inundation maps were produced as part of the DSEP using 16 surveyed cross sections from the 2001 BSC along Cudgegong River covering a distance of 3.1km downstream of the Dam. Flood inundation maps were used to estimate the number of houses inundated by the various flood cases. The PMF for Rylstone Dam adopted in the study was approximately 6,100 m^3/s. The study recommended updating the BCS Study based on the 2003 PMF Study for Rylstone Dam, which determined the peak inflow to be 14,700 m^3/s.

- **Rylstone Dam Survey prepared by GHD Pty Ltd (2009)** – company 'Whelans Insites' undertook a topographic and bathymetric survey over the catchment area of the Rylstone Dam extending to RL 580.5 mAHD on 6 and 13 November 2008. The storage volumes at the Dam were calculated for various depths from 568.0 to 580.5 mAHD.
- **Rylstone Dam Probable Maximum Flood Study (August 2003)** - The report was prepared by NSW Department of Commerce for Rylstone Shire Council to assist in the preparation of a dam safety emergency plan for Rylstone Dam. A hydrological model using RORB was developed for the catchment area and model parameter values were estimated using recommended regional relationships. The Bureau of Meteorology's Bulletin 53, as amended in December 1996, was used to estimate the probable maximum precipitation for the catchment area. Estimated peak outflows from the Dam for the PMF event varied between 5,455 m^3/s and 13,350 m^3/s depending on the value of k_c (a parameter of the RORB model). Hydrographs based on three values of k_c (14.32, 21.91 and 42.62) are presented in the report. A k_c value of 14.32 provides the upper bound flood estimate while a k_c value of 42.62 provides the lower bound flood estimate for the PMF event. The study estimated the peak inflow to be approximately 14,700 m^3/s. Details of the RORB model set up are not available in the report and the RORB model was not available to this study.
- **Rylstone Dam, Dambreak Study for Rylstone Shire Council (January 1993)** - NSW Public Works undertook the dambreak study for a 3 km reach of the Cudgegong River using the BOSS DAMBRK model which included 16 cross sections. Cross sections were obtained from Council's on-site physical survey, after confirmation of locations by a combined PWD/Council site inspection. A preliminary estimate on the PMF (peak inflow of 6,077 m^3/s) was derived from the 6 hour Probable Maximum Precipitation (PMP) event. Three hypothetical dambreak scenarios were investigated in the study including a Sunny Day Failure (SDF) and Imminent Failure Flood (IFF) with and without dam failure. The number of dwellings located within the flood inundation zones for the SDF event, IFF without dam failure and IFF with dam failure were estimated at 2, 3 and 11, respectively.

2.3. Review of Available Data

2.3.1. Rainfall Data

The Bureau of Meteorology's website was searched to locate rainfall stations in the close proximity of both townships. Location of daily read rain gauges in the vicinity of the study area is shown in **Figure 2-1** and details on the gauges are provided in **Table 2-1**.

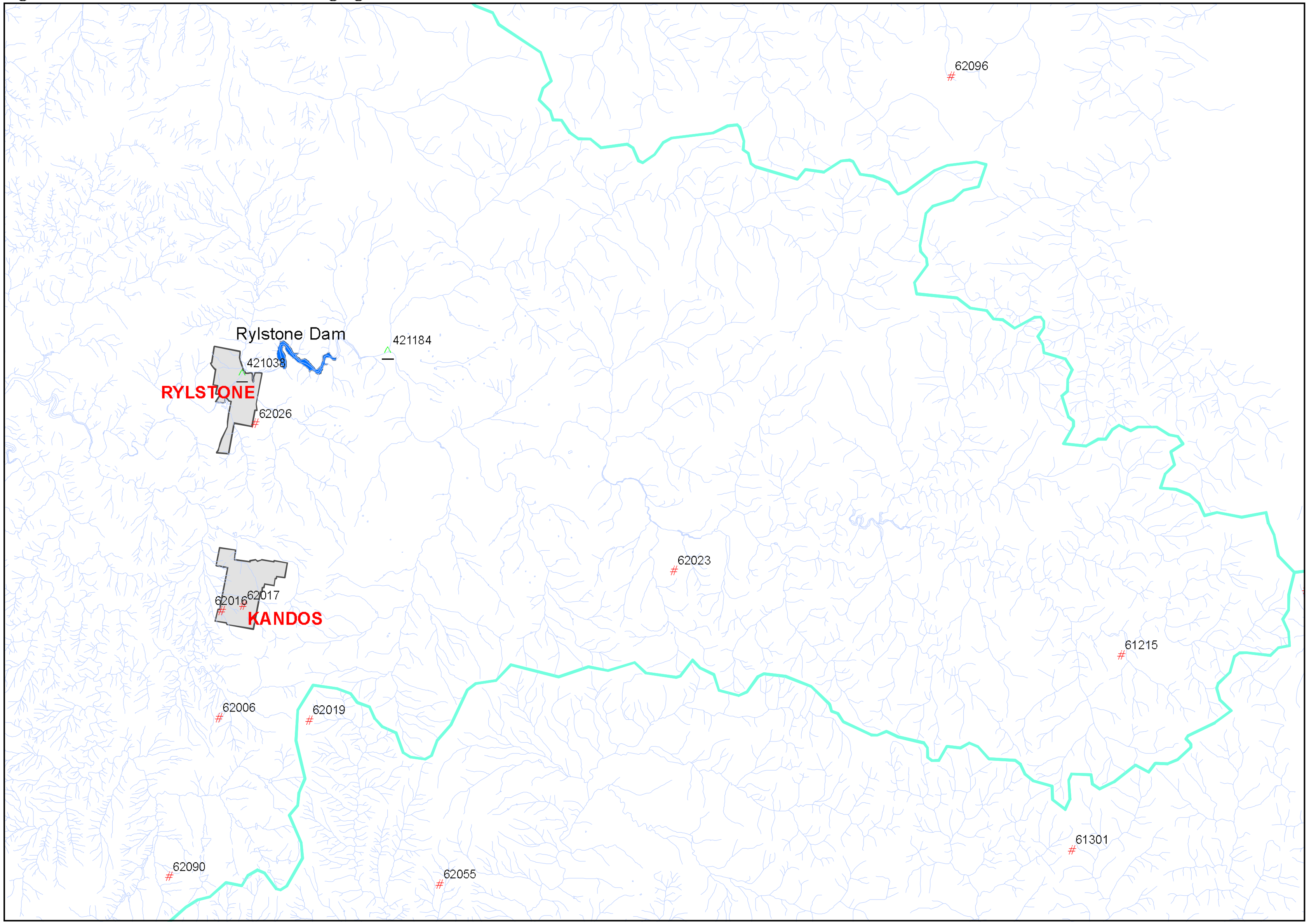
▪ **Table 2-1 Rain Gauge Details**

Station No.	Station Name	Latitude (degree)	Longitude (degree)	Year Opened	Year Closed
61215	Rylstone (Kelgoola)	-32.872	150.299	1962	
61301	The Nile	-32.933	150.283	1930	1954
62006	Charbon Standard Portland Cement	-32.900	149.967	1929	1978
62016	Kandos	-32.867	149.967	1938	1967
62017	Kandos Cement Works	-32.865	149.975	1951	
62023	Springdale	-32.850	150.133	1898	1967
62026	Rylstone (Ilford Rd)	-32.808	149.977	1881	
62055	Marsden Forest	-32.950	150.050	1948	1984
62090	Edenvale	-32.950	149.950	1973	1977
62096	Rylstone (Yoothamurra)	-32.693	150.230	1981	1998

Table 2-1 shows that there are three rain gauges which are currently in operation and the remaining gauges are no longer in operation. The rain gauge (No. 62026) located at Rylstone (Ilford Road) is the closest rain gauge to both Kandos and Rylstone. The gauge was opened in 1881 and is still in operation. Twenty (20) highest 1-day (9 AM to 9 AM) rainfall events recorded at the gauge are shown in **Figure 2-2**.

The Bureau of Meteorology's web site (*www.bom.gov.au*) indicates that two pluviographs are located within 50km of Rylstone. One pluviograph (62100 Nullo Mountain Aws) became operational in February 2010 and the other pluviograph (62101 Mudgee Airport Aws) commenced operation in September 2011.

Figure 2-1 Rainfall and Streamflow Gauging Stations



LEGEND

- Study Area
- Catchment
- Drainage Line
- Rain Gauge
- Stream Gauge

Sinclair Knight Merz does not warrant that this document is definitive nor free of error and does not accept liability for any loss caused or arising from reliance upon information provided herein.

[GDA1994 MGA ZONE 55]
A3 1:143,858

0 5
Kilometres

SKM

- **Figure 2-2 Recorded 1-day Peak Rainfall in Rylstone (Ilford Road) Gauge**

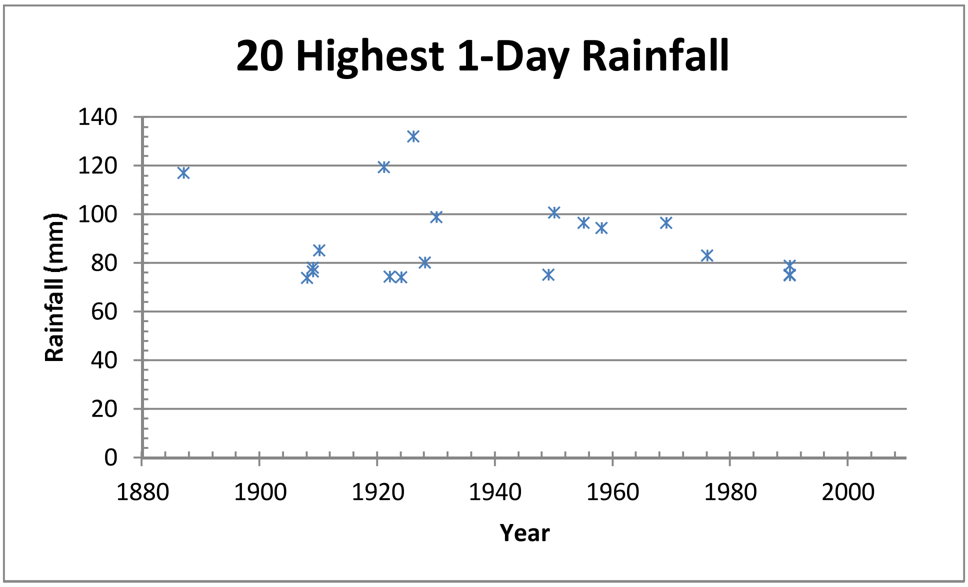


Figure 2-2 shows that the maximum 1-day rainfall recorded at the gauge was 132mm, which occurred in 1926, and since 1980 the recorded 1-day peak rainfall is lower than 80mm.

Significant flooding was experienced in Rylstone and Kandos in December 2010. A review of rainfall data for November and December 2010 indicates that a number of storm events were recorded at the gauge indicating wet catchment conditions during both months. The recorded rainfall for November 2010 (142.7mm) was more than double the mean monthly rainfall for November and the rainfall recorded in December 2010 (184mm), was almost three times the mean monthly rainfall for December. However, the 1-day maximum rainfall in both November and December 2010 were less than 40mm. Wet catchment conditions coupled with additional rainfalls from other storm events resulted in flooding in parts on the catchment in December 2010.

2.3.2. Streamflow Data

A review of PINNEENA version 9.3 (a surface water database released by NSW Office of Water) shows that there are two streamflow gauging sites on the Cudgegong River in Rylstone. Details on the gauges are provided below and location of the streamflow gauges is shown in **Figure 2-1**:

- Cudgegong River at Upstream Rylstone (GS 421184) - This site commenced in June 2009 and water level records for two months are available in PINNEENA.
- Cudgegong River at Rylstone Bridge (GS 421038) – The Bridge is located on the Cudgegong River at Bridge Street. This gauge was commissioned in 1957 and was discontinued in 1980. Monthly flow volumes are available in PINNEENA for this site. SES holds a flood intelligence card for this gauge (SES 2007), however, no flood classifications are available from SES for this gauge.

Council provided information on flooding in the Cudgegong River for the flood events of 2010 and 2012. The information provided was limited to photographs captured during the floods. The photographs were captured from the ground and the flood was confined within the main channel of the Cudgegong River for both events. The flood event of 2012 was smaller than the 2010 flood.

2.3.3. Data Provided by Council

Council provided the following data including: topographic data, aerial photography, GIS layers and modelling data:

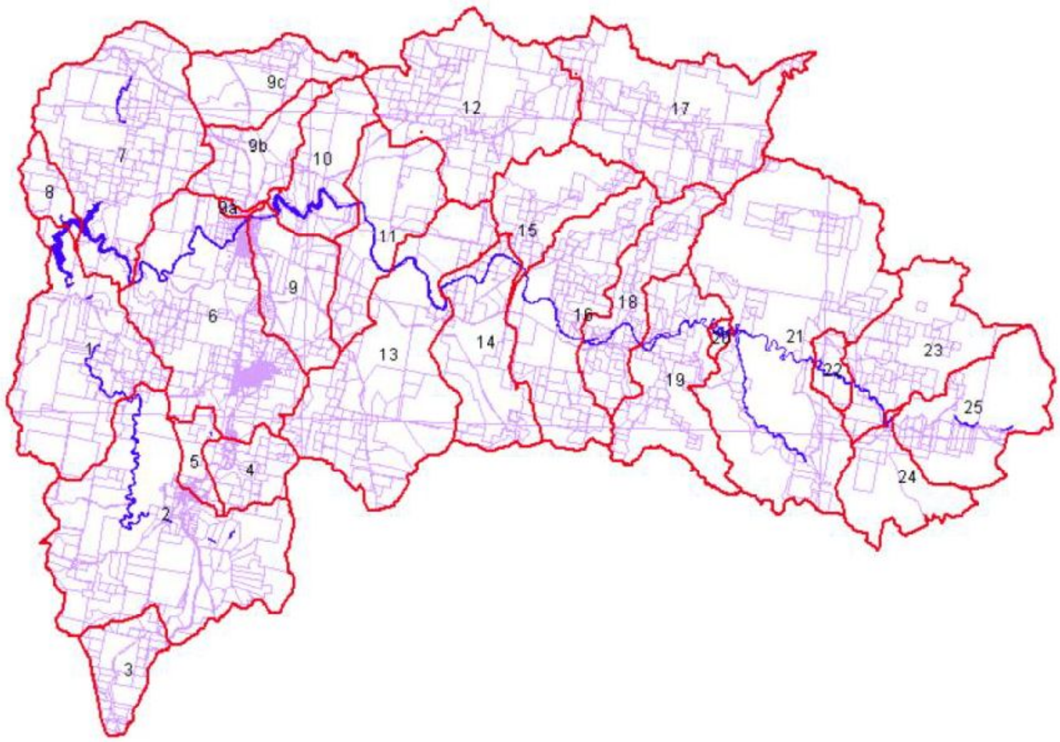
- Airborne Laser Survey (ALS) with a vertical accuracy 63% within +/- 0.15m
- 0.5m contours based on ALS data
- Corrected Cadastre accurate to 0.15m
- Layout plan of the existing drainage system in MapInfo
- Imagery for the study areas
- Natural drainage layer in MapInfo
- Zoning maps in MapInfo
- Hydrologic and hydraulic modelling data from the Integrated Water Cycle Modelling Study (August 2002).

2.4. Review of the Available Computer Models

2.4.1. Hydrologic Model

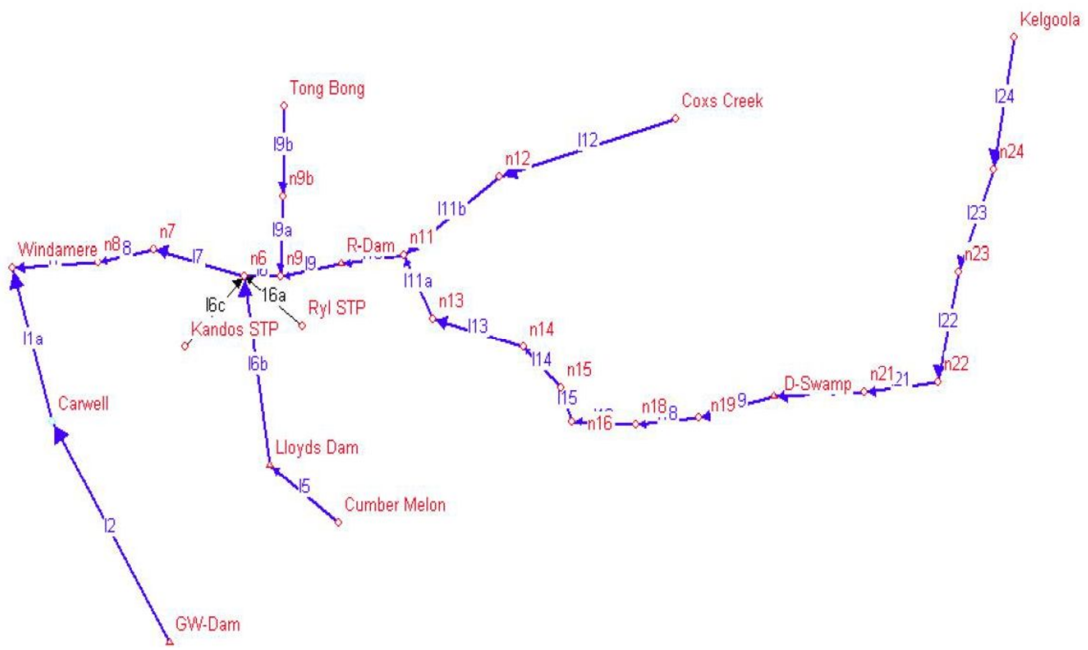
The XP-RAFTS hydrologic model used in the Rylstone Integrated Water Cycle Modelling Study (HWA 2002) was provided by Council for use in this study. Sub-catchments of the XP-RAFTS model are shown **Figure 2-3** and a schematic of the XP-RAFTS model is shown in **Figure 2-4**.

- **Figure 2-3 XP-RAFTS Sub-catchments (HWA 2002)**



SINCLAIR KNIGHT MERZ SKM

- **Figure 2-4 Schematic of XP-RAFTS Model (HWA 2002)**



A review was undertaken of the XP-RAFTS hydrologic model (HWA 2002) prior to using the model in this study. Outcomes from the review are provided below:

- Catchment Area - The total catchment area of the Cudgegong River represented in the XP-RAFTS model is 862 km^2, which is 226 km^2 smaller than the catchment area of Windamere Dam. The catchment area represented in the model at Rylstone Dam is 533 km^2, which is similar to the catchment area for Rylstone Dam reported elsewhere.
- Impervious Areas - A 32.7 ha area is included in the XP-RAFTS model to represent impervious areas in Rylstone. This is considered a reasonable estimate.
- Rylstone Dam - The storage capacity of Rylstone Dam at the full supply level (FSL) of 580.03 mAHD, is 3,320 ML according to the flood study undertaken in 2003(DoC 2003). However, a storage volume of 13,012 ML is represented in the XP-RAFTS model (HWA 2002) at FSL, which is almost four times the actual storage capacity of Rylstone Dam at FSL. The spillway discharge is calculated in the model using a 140m long broad crested weir (crest at FSL) with a coefficient of discharge value of 2.1. A 260 m long fuse plug at dam crest is also defined in the model. The report (HWA 2002) does not clarify why a stage-discharge table was not used to define the capacity of the spillway. Hence, appropriate storage and spillway capacities for Rylstone Dam need to be used in the updated XP-RAFTS model.
- Model calibration and verification - The report (HWA 2002) does not indicate that the XP-RAFTS model was calibrated or validated. Consequently, calibration of the XP-RAFTS model was outside the scope of this flood study.

- Although the catchment area is located in “Zone 2” as defined in Australian Rainfall Runoff, rainfall temporal patterns for "Zone 1" were adopted in the XP-RAFTS HWA 2002 study. The updated XP-RAFTS model needs to use rainfall temporal patterns for “Zone 2”.
- Rainfall losses - An initial rainfall loss of 20mm and a continuing rainfall loss of 2.3mm/hour were used for both pervious and impervious areas for all storm events up to and including the 1% AEP event. The adopted rainfall losses for pervious areas are considered reasonable, however, it is considered appropriate to use 1mm initial loss and zero continuing loss for impervious areas.
- Comparison of design peak discharge - The XP-RAFTS model (HWA 2002) was used to simulate design discharges for the 100%, 50%, 20%, 10%, 5%, 2% and 1% AEP events. A comparison of estimated peak discharges for the 5%, 2% and 1% AEP events for the Cudgegong River is shown in **Table 2-2**, which shows that design discharges estimated in the XP-RAFTS model HWA 2002 study are significantly higher than that estimated in the Windamere Dam SMEC 1999 study. It is to be noted that the hydrologic model used in this latter study was calibrated and verified against recorded streamflow data, and hence, design discharges estimated in the 1999 SMEC study are considered more robust than that estimated in the 2002 HWA study.

- **Table 2-2 Comparison of Peak Design Discharges (m^3/s)**

Flood Event (AEP)	Cudgegong River and Carwell Creek Junction (Catchment area = 862 km^2)[1]	Inflow to Windamere Dam (Catchment area = 1,070 km^2)[2]
5%	492	430
2%	662	607
1%	832	768

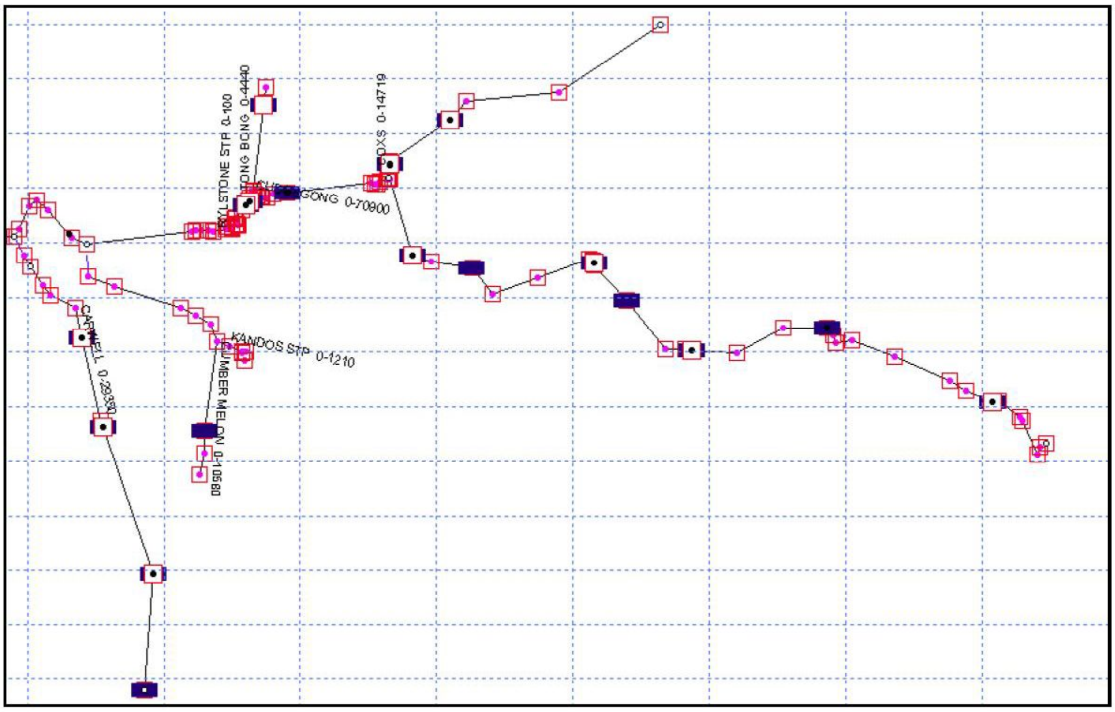
[1] HWA XP-RAFTS model 2002; [2] Windamere Dam study,SMEC 1999

The HWA (2002) study overestimated peak discharges due to a number of reasons including the adoption of inappropriate temporal patterns, storage and spillway rating curves for Rylstone Dam, rainfall losses for impervious areas, etc. and hence it was recommended that the HWA XP-RAFTS model for the Cudgegong River be updated as part of this study.

2.4.2. Hydraulic Model

A MIKE11 hydraulic model used in the Rylstone Integrated Water Cycle Modelling Study (HWA 2002) was provided by Council for use in this study. A schematic of the MIKE11 model is presented in **Figure 2-5**.

- **Figure 2-5 MIKE11 Model Schematic (HWA 2002)**



A review was undertaken on the MIKE11 hydraulic model prior to using the model in this study. Outcomes from the review are provided below:

- Model extent – The following flow paths were represented in the MIKE11model:
  - Cudgegong River (70.9 km) including a 51.6 km reach of Cudgegong River upstream of Rylstone Dam;
  - Cumber Melon Creek (10.6 km) which is located outside the area of interest to this study;
  - Carwell Creek (29.4 km) which is located outside the study area for this study;
  - Coxs Creek (14.7 km) which is located upstream of Rylstone Dam; and
  - A 4.44 km reach of Tong Bong Creek.
- Channel network - The Cudgegong River and its associated floodplain is represented as a single flowpath within the study area for Rylstone. The model includes additional flow paths that are located outside the study area for this study, which could be excluded from the model configuration.
- Cross Sections - The report (HWA 2002) shows that 18 cross sections used in the MIKE11 model are surveyed cross sections. Insufficient information was available on location of cross sections and generally cross sections were extrapolated to represent the floodplain in the model. Cross sections for Cudgegong River used in the model further downstream of Rylstone Sewage Treatment Works were possibly sourced from the available topographic mapping. A

comparison of three surveyed cross sections with the corresponding cross sections extracted from the ALS data showed a reasonable agreement between the two sets of data. Hence, additional cross sections need to be extracted from the ALS data for a better representation of the terrain in the MIKE11 model.

- Waterway Crossings - Bridges, weirs etc. represented in the model, need to be updated using "work as executed" drawings and field survey.
- Manning's n values - Manning's n values used in the model are generally considered reasonable estimates.
- Downstream boundary condition - The model uses a fixed water level at Lake Windamere. It is considered appropriate to use a stage-discharge rating curve as the downstream boundary of the model. A stage-discharge rating curve will be developed for use in the model.

2.5. Community Consultation

2.5.1. Flood Questionnaire

A community consultation process was initiated to obtain flood information for past events. This involved sending a newsletter and a questionnaire (included in **Appendix A**) to residents and landowners within the study areas in Kandos and Rylstone. The newsletter introduced the floodplain management process to the residents of the areas, described the purpose of the questionnaire and provided the residents with contacts for their responses. The questionnaire was prepared in consultation with Council to help identify flood and drainage issues in the study areas and to provide reliable flood information to assist in the validation of the hydrologic and hydraulic computer models. An electronic copy of the newsletter and questionnaire was provided to Council and Council distributed printed copies of the newsletter and questionnaire within the community in July 2011.

The flood information that was requested included:

- General information such as:
  - Residents from the Study Area
  - Ownership of the residence
  - How long residents lived at the property
- Specific flood information such as:
  - Experience on flooding in residence and/or at work
  - Location and depth of flood water in the worst flood experienced
  - Duration of flooding
  - Flood damages to residence and business
  - Disruption to vehicular access to residence during flooding
  - Identify information (eg. flood photographs, newspaper clippings, flood marks etc) that can be provided to Consultants
  - Flooding to residence made worse by works on other properties or by construction of roads or other structures
  - Any comments on any other issues associated with this study.

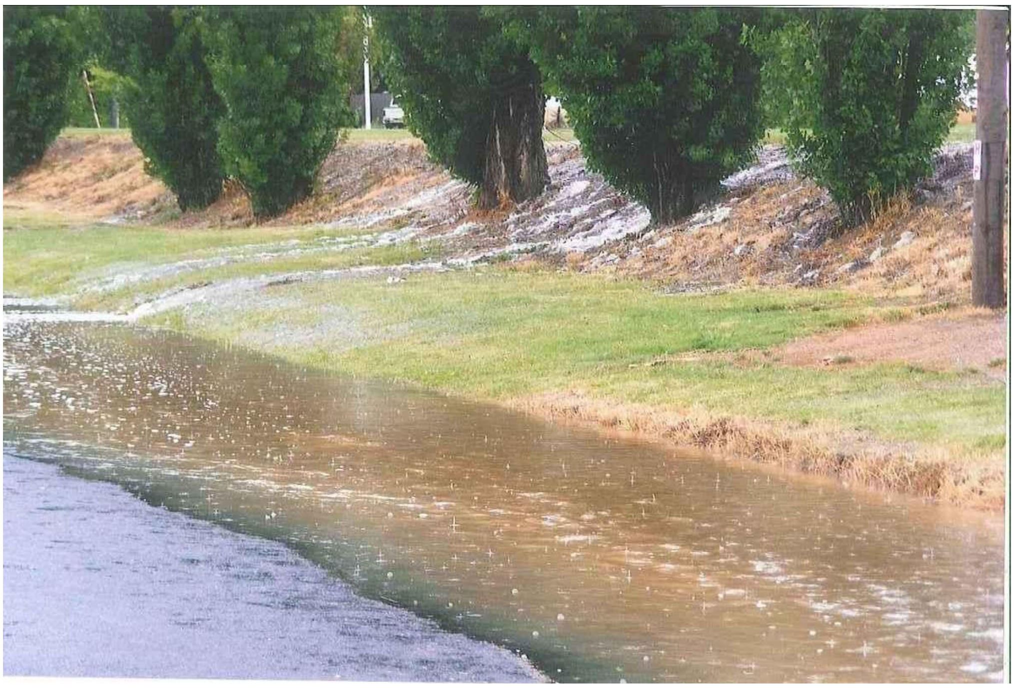
The responses to the community survey were thoroughly reviewed for information of major flooding effects that could be useful for validation of the hydrologic and hydraulic computer models.

2.5.2. Summary of Responses to Flood Questionnaire

In total six (6) responses were received from the community to the questionnaire. Three (3) respondents are residents of Rylstone; one respondent is a resident of Kandos; one respondent lives in Clandulla (which is located outside the study area) who identified a flooding problem area in Rylstone, which is also located outside the study area; and one respondent intends to live in Rylstone and identified benefits of flooding on the re-vegetation of the riparian area of the Cudgegong River through Rylstone. A summary of information provided by respondents is provided below.

Kandos

The owner has been living in the dwelling on 15 George Street, Kandos for the last 30 years. A storm event in 2010 resulted in a 0.4m depth of flooding in the garage and washed out the driveway. Photographs (refer to **Figure 2-6** to **Figure 2-8**) provided by the owner indicate that stormwater from Darton Park (located at the corner of George and Mason Street) runs along both George Street and Mason Street, which is obstructed by the culvert under the driveway of the property on 15 George Street. The obstruction at the driveway culvert caused stormwater to run along the driveway in a northerly direction.



- **Figure 2-6 Stormwater from Darton Park moving along George Street**

- **Figure 2-7 Stormwater impeded by culvert under the Driveway of 15 George Street**

- **Figure 2-8 Stormwater running along the Driveway of 15 George Street**

Rylstone

Information provided by respondents relating to flooding issues in Rylstone is discussed below:

- Blockage of pipe culvert under driveway of 42 Carwell Street, Rylstone - A pipe culvert (approximately 900mm diameter) under the driveway is approximately 75% blocked with silt, gravel and rocks. Stormwater from the adjoining Council yard and Piper Street is drained through the pipe culvert under the driveway, and hence, clearing this culvert is desirable.
- Flooding on 2571 Bylong Valley Way, Rylstone - Two respondents identified flooding on this property. Following further discussion with the owner of the property it is understood that the backyard was flooded during a storm event about ten (10) years ago.
- Re-vegetation and Rylstone Weir - The respondent (who lives outside the study area) highlighted the importance of re- vegetation along the Cudgegong River in mitigating bank erosion. The respondent was involved in re-vegetation of a 450m reach along the Cudgegong River upstream of Rylstone. The respondent believes that removal of the weir will have a positive impact on flooding in Rylstone and movement of fish and platypus.
- Access to Rylstone Cemetery cut-off - The respondent (who lives outside the study area) identified flooded sections of Glen Alice Road, Brown Lane and Narrango Road, which cut off access to the cemetery. In 2010, Narrango Road was impassable for a week due to one storm event. However, Council clarified that access to the cemetery was restricted for a day due to flooding on the causeway on Fitzgerald Street and an alternative access to the cemetery via Glen Alice Road was open. Council further clarified that Narrango Road was not impassable for a week.

2.6. Additional Topographic Survey

Collection of stormwater details by Council was included as part of the study. Survey of additional waterway crossings (eg. bridges, culverts, weirs etc) was included in the scope of the additional topographic survey. Council engaged Whelans Insites to undertake the additional survey and this topographic data is included in **Appendix B**. Council provided additional data on culverts in May 2013 and this is also included in **Appendix B**.

3. Cudgegong River Catchment Flooding - Rylstone

3.1. Background

Cudgegong River drains a catchment area of approximately 590 square kilometres at the southern boundary of Rylstone, near the sewage treatment works (STW). Rylstone Dam (catchment area 535 square kilometres) is located on Cudgegong River approximately 1.5 kilometres north-east of Rylstone. The dam (15m high, a crest length of 143m and a storage capacity of 3,320 ML at FSL) comprises of a concrete arch section with earthfill embankments at both ends.

Cudgegong River flows in a westerly direction through a well-defined valley for approximately 1 kilometre downstream of Rylstone Dam. An unnamed creek joins the River from the south beside the water treatment plant (WTP). Tongbong Creek joins the River from the north approximately 200 metres downstream of the WTP. The Wallerawang-Gwabegar Railway line crosses Cudgegong River downstream of its junction with Tongbong Creek. Bylong Valley Way crosses the River downstream of the Railway crossing. The River then flows along the western edge of the township into open undulating country before flowing into Windamere Dam reservoir located 15 kilometres downstream.

Except for the urban area of the township, the dominant land use within the catchment is forest and there are significant rural areas within the catchment. Urban development in Rylstone extends to the edge of the narrow floodplain of the Cudgegong River with the only developments on the floodplain being playing fields and associated buildings.

3.1.1. Updating of the Hydrologic Model

The hydrologic model used in the Integrated Water Cycle Modelling (HWA 2002) was updated to reconcile estimates of design discharges with SMEC 1999 study. The following updates were made to the XP-RAFTS hydrologic model:

- Details on the storage capacity of Rylstone Dam and the spillway rating curve adopted in this study are presented **Appendix C**;
- An initial rainfall loss of 1mm and a continuing rainfall loss rate of 0 mm/hour were assigned to represent losses for the impervious area;
- Rainfall temporal pattern were set to "Zone 2" instead of "Zone 1" as defined in the HWA 2002 study; and
- Areal reduction factors (ARF) were calculated based on Australian Rainfall & Runoff (Engineers Australia, April 2013).

The updated XP-RAFTS model was run for the 30 hour storm (which produced peak discharges in Rylstone) for all design flood events. A comparison of peak discharge between the updated XP-RAFTS model and SMEC 1999 study, are shown in **Table 3-1**, which shows that discharges estimated for Windamere Dam catchment (area 1070 km^2) are consistently higher than the corresponding discharges adopted in this study.

Table 3-1 Comparison of Peak Design Discharges (m^3/s)

Flood Event (AEP)	Cudgegong River and Carwell Creek Junction (Catchment area = 862 km^2)[1]	Inflow to Windamere Dam (Catchment area = 1,070 km^2)[2]
5%	354	430
2%	469	607
1%	605	768

[1] this study; [2] SMEC 1999

Peak discharges estimated for the full range of flood events between 20% AEP and 0.5% AEP events are shown in **Table 3-2**. It is to be noted that design rainfall intensity-frequency-duration data for all events were calculated in XP-RAFTS and Rylstone Dam was assumed to be at full supply level prior to commencement of the storm event. **Table 3-2** also shows peak inflows and outflows for Rylstone Dam, which indicates almost no attenuation of peak discharge due to Rylstone Dam.

Table 3-2 Estimated Peak Design Discharges (m^3/s) for 30 Hour Storm

Flood Event (AEP)	Rylstone Dam (node* 'R-Dam')		Tong Bong Creek (node 'n9b')	Town Catchment (node 'n9' -local)	Tong Bong/ Cudgegong River (node 'n9' - total)
	Inflow	Outflow			
20%	130	129	20	15	132
10%	182	180	26	19	187
5%	265	263	36	26	274
2%	347	345	45	32	360
1%	445	442	56	40	462
0.5%	548	546	67	48	573

* XP-RAFTS node (refer to **Figure 2-4**)

The inflow hydrograph for the PMF event adopted in this study was sourced from the DoC's 2003 report, which produced a peak inflow of 14,700 m^3/s from Rylstone Dam for the 4 hour PMP event.

3.1.2. Updating of the Hydraulic Model

A review of the MIKE11 hydraulic model developed in the Integrated Water Cycle Modelling (HWA 2002) project was undertaken as part of the study. Outcomes from the review are provided in Section 2.4.2. The following updates were made to the MIKE11 model:

- All flow paths located outside Rylstone were removed from the model set up which included Cumber Melon Creek, Carwell Creek and Cox's Creek;
- Reduced lengths of Cudgegong River (between Chainage 51630m to 56140m) and Tong Bong Creek (between 3400m to 4440m) were included in the model due to the availability of ALS data for the study area within Rylstone;
- An additional flow path was included in the MIKE11 model to represent the elevation-lake area relationship and spillway capacity for Rylstone Dam;
- In total twenty eight (28) cross sections were used in the MIKE11 model to represent Cudgegong River of which 9 cross sections were sourced from the HWA 2002 study and the remaining 19 cross sections were extracted from the ALS data;
- All nine (9) cross sections used to represent Tong Bong Creek were extracted from the ALS data;
- A global Manning's n value of 0.033 was adopted in the MIKE11 model. Relative resistance values were assigned based on site reconnaissance and aerial imagery to vary Manning's n along each cross section;
- A tailwater rating curve was used to define the downstream boundary of the model in the Cudgegong River; and
- The foot bridge over Cudgegong River was included in the model. However, Rylstone Weir could not be included in the model as the weir crest was located above the invert of cross sections extracted from the ALS data.

Details on the MIKE11 model set up are provided in **Appendix C**.

3.1.3. Model Calibration

The flood event of February 1955 is considered to be a major event in Rylstone, no residential or industrial properties were affected by 1955 flood, and as a result no flood marks were recorded on buildings or other structures (DWR 1987). In addition, no recorded flood levels are available for the recent flood events of 2010 and 2012 and flood events that occurred between 1955 and 2010. Hence, in the absence of recorded data it was not possible to calibrate the hydrologic and hydraulic models for the Cudgegong River.

3.2. Flood Behaviour for the Existing Condition

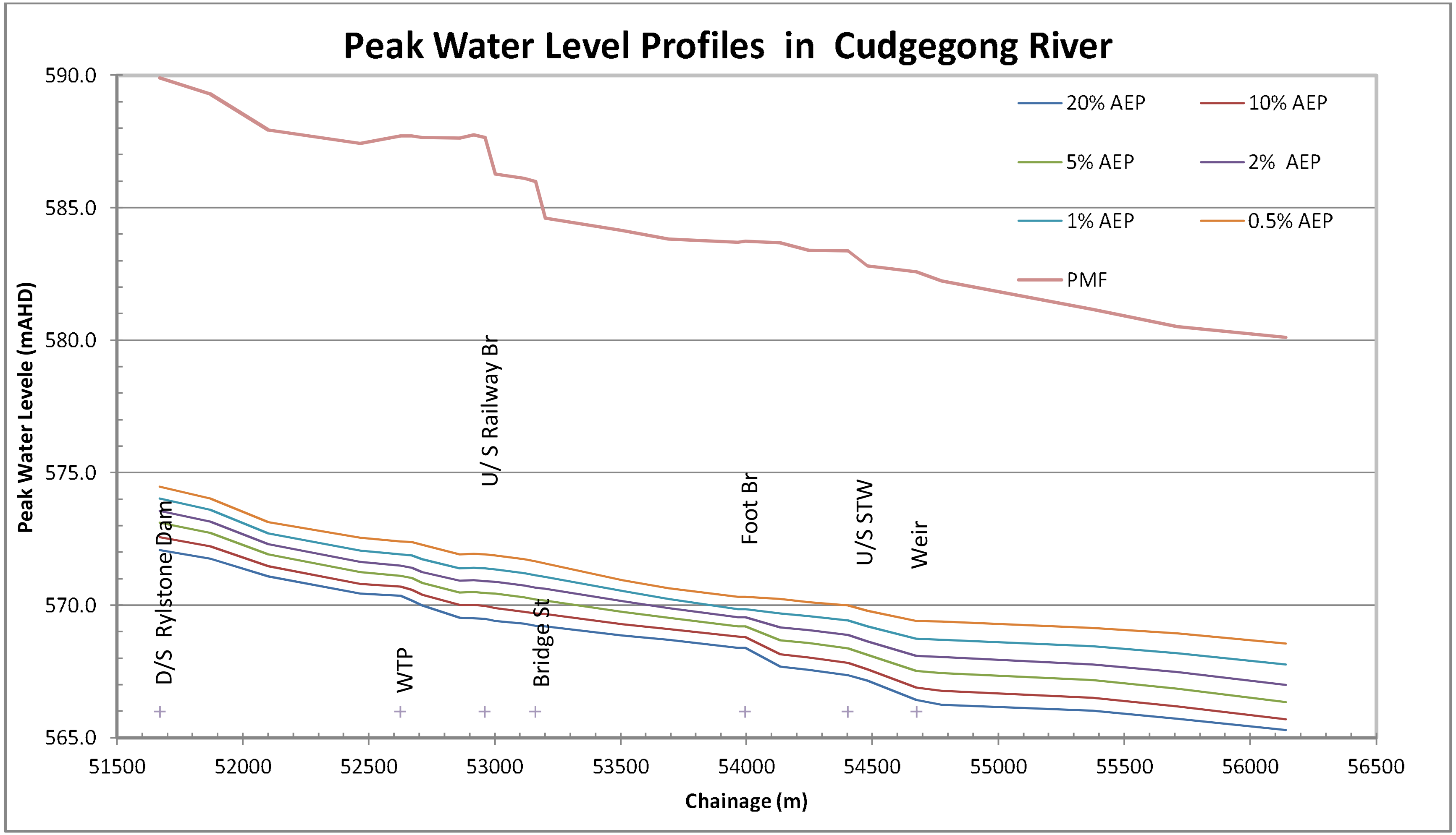
3.2.1. Flood Behaviour

The updated MIKE11 model was run for the 0.5%, 1%, 2%, 5%, 10%, and 20% AEP events and the PMF event. Peak water levels, discharge, velocities and times to reach peak water levels for all modelled events are presented in **Appendix C**. Rylstone Dam was assumed to be at FSL prior to occurrence of all modelled flood events. Peak water level profiles and peak velocity profiles in Cudgegong River downstream of Rylstone Dam are shown in **Figure 3-1** and **Figure 3-2**. Following observations can be made from **Figure 3-1**and **Figure 3-2**:

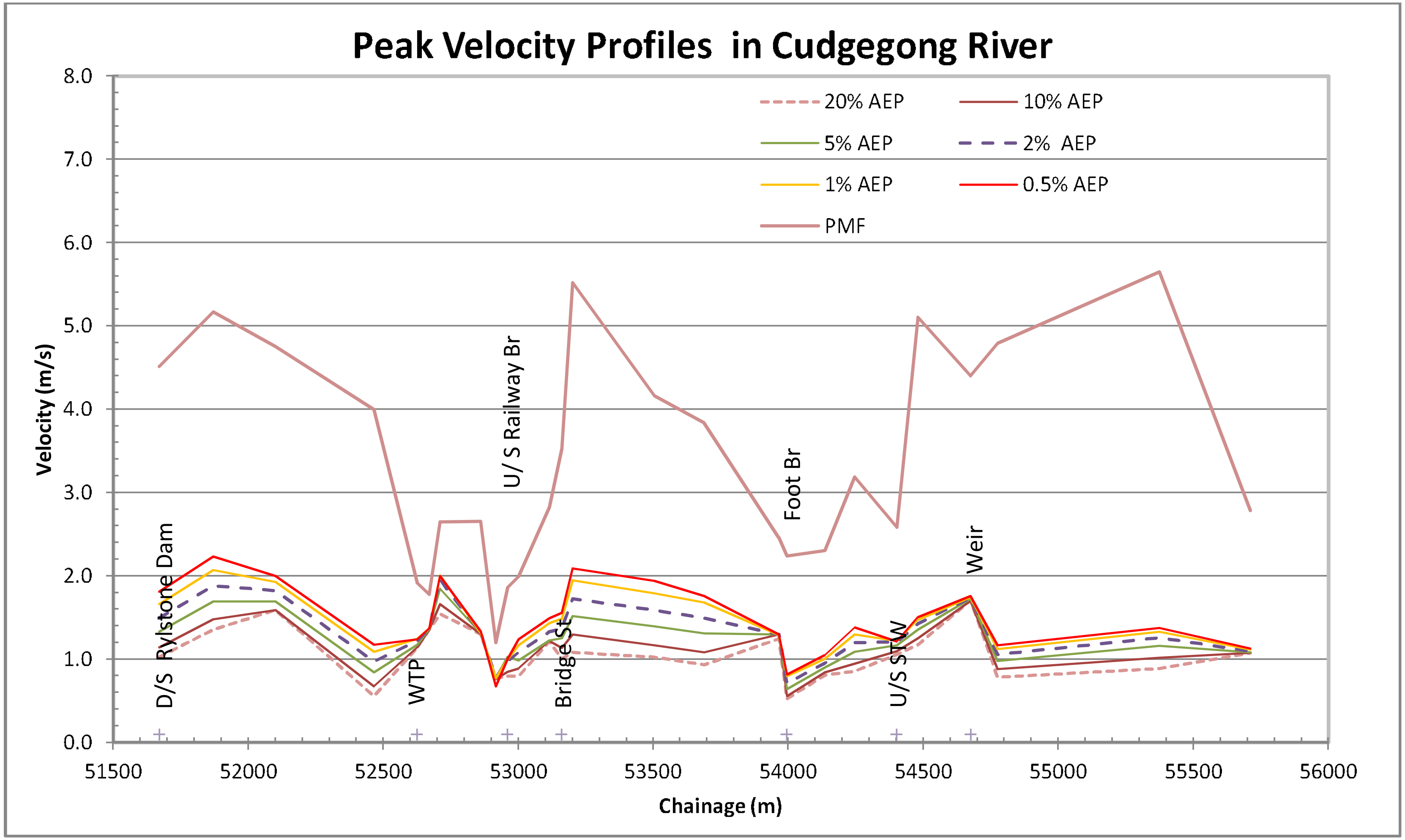
- Variation in peak water level profiles for all flood events between 0.5% AEP and 20% AEP is consistent;
- Peak water levels in Cudgegong River for the 0.5% AEP and 20% AEP events vary between 2m to 3.5m. The range of variation for the two events is the smallest in the vicinity of the foot bridge and largest downstream of the Weir; and
- The flood profile for the PMF event is, at least, 10m above the flood profile for the 0.5% AEP event and the afflux at the Railway Bridge and Bridge Street are very pronounced.

Peak velocities in Cudgegong River for the 20% AEP to 0.5% AEP events vary between 0.5m/s to 2.5m/s as shown in **Figure 3-2**. However, velocities can be as high as 6m/s in the case of the PMF event.

- **Figure 3-1 Peak Water Level Profiles in Cudgegong River**



▪ **Figure 3-2 Peak Velocity Profiles in Cudgegong River**



3.2.2. Comparison of Peak Water Level Profiles

Peak water levels in Cudgegong River for the 1% AEP event estimated in the HWA 2002 study were provided by Council. A comparison of peak water level profiles between this study and the HWA 2002 study is shown in **Figure 3-3**.

- **Figure 3-3 Comparison of 1% AEP Peak Water Levels in Cudgegong River**

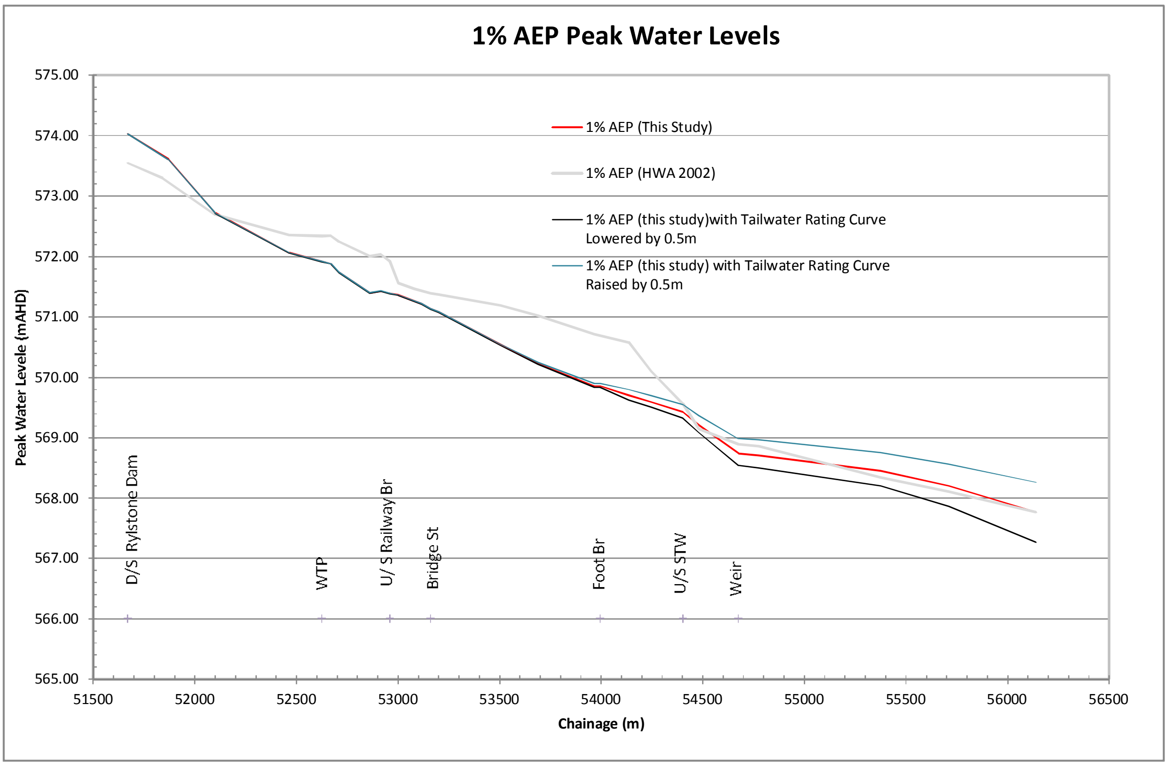


Figure 3-3 shows that peak water levels estimated in the 2002 study between Bridge Street and the Foot Bridge are up to 0.8m higher than this study. Downstream of STW, peak water levels estimated in this study are in close agreement with those estimated in the 2002 study.

3.2.3. Sensitivity Analysis

The sensitivity of the 1% AEP peak water level profile on the adopted downstream boundary condition was assessed by lowering and raising the downstream boundary condition by 0.5m. The resulting 1% AEP peak water level profiles are also shown in **Figure 3-3**, which indicates that peak water levels upstream of the Foot Bridge are almost insensitive to a 0.5m variation in the adopted tailwater boundary condition. In the vicinity of the Weir, located downstream of the study area boundary, the 1% AEP flood level is changed by approximately 0.2m due to 0.5m changes in the downstream boundary conditions. A 0.2m variation in flood levels is considered reasonable.

It is to be noted that the most downstream cross section of the Cudgegong River (chainage 56140m) used in the MIKE11 model is located at the extremity of the ALS survey. Moreover, cross sections used in the HWA 2002 study downstream of cross section 56140m were estimated based on the available topographic maps. Considering a reasonable change (0.2m) in 1% AEP flood level at the downstream boundary of the study area and due to the unavailability of reliable topographic data, in consultation with Council, the MIKE11 model was not extended farther downstream.

It is to be noted that a sensitivity analysis due to climate change was outside the scope of the study.

3.2.4. Flood Mapping

Modelled peak water levels for the following events were used in ArcMap to delineate flood extents which are shown in **Figure 3-4**.

- 20% AEP;
- 1% AEP;
- 1% AEP + 0.5m (ie. the Flood Planning Level(FPL)); and
- PMF.

Figure 3-4 shows that the flood extent for the 20% AEP event is limited within the bank of Cudgegong River and flood extents for the 1% AEP event and 1% AEP event plus 0.5m freeboard are very similar. The PMF event causes extensive inundation in Rylstone and the majority of the township area is inundated by the PMF event.

A flood hazard map was prepared for the Flood Planning Level (FPL) using the flood extent for the FPL event and peak velocities for the 1% AEP event. High hazard and low hazard areas were identified for the FPL using the criteria adopted in the NSW Government's Floodplain Development Manual (2005), and are shown in **Figure 3-5**.

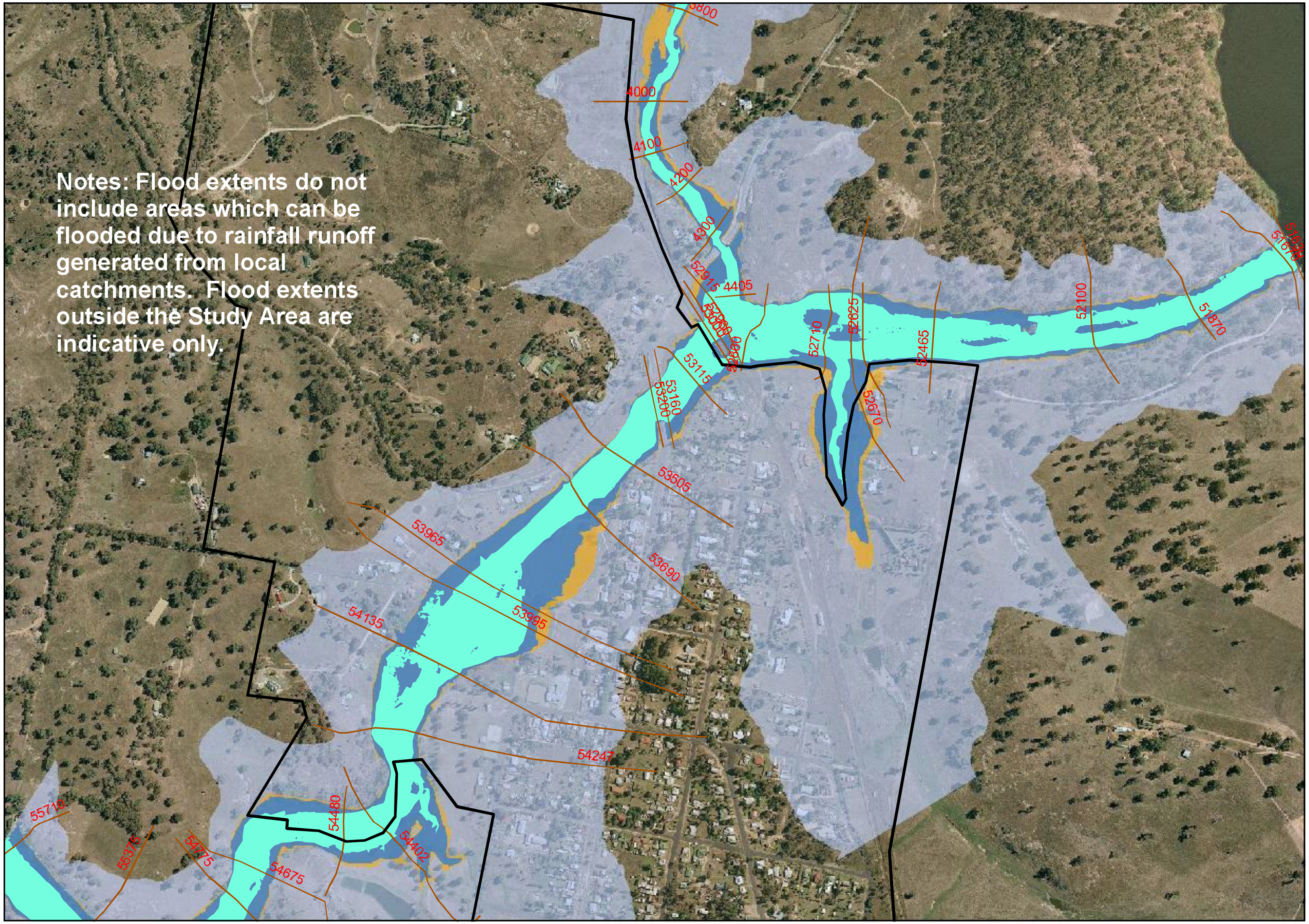
The delineation of hydraulic categories is important with the adoption of merit based flood policy. This is because the NSW Government's Floodplain Development Manual (2005) recognises three hydraulic categories of flood prone land (floodway, flood fringe and flood storage). Definition of floodways, flood storage and flood fringe, as given in the Manual, are presented below:

- Floodways are those areas where a significant volume of water flows during floods and are often aligned with obvious natural channels. They are areas that, even if only partially blocked, would cause a significant increase in flood levels and/or a significant redistribution of flood flow, which may in turn adversely affect other areas. They are often, but not necessarily, areas with deeper flows or areas where higher velocities occur.

- Flood Storage areas are those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.
- Flood fringe is the remaining area of land affected by flooding, after floodway and flood storage areas have been defined. Development in flood fringe areas would not have any significant effect on the pattern of flood flows and/or flood levels.

After reviewing the nature of riverine flooding in Rylstone and considering the fact that the low flow channel of the Cudgegong River is poorly represented in the ALS data, it is recommended that the flood extent for the 20% AEP event be classified provisionally as floodway and the remaining areas would be classified as flood fringe. It is further recommended that the provisional hazard categories be based on hazard categories shown in **Figure 3-5**.

Figure 3-4 Extent of Flood Inundation in Rylstone due to Flooding in Cudgegong River under the Existing Conditions



LEGEND

- MIKE11 Cross Section
- Study Area
- 20% AEP Flood Extent
- 1% AEP Flood Exent
- Provisional Flood Planning Level
- PMF Extent

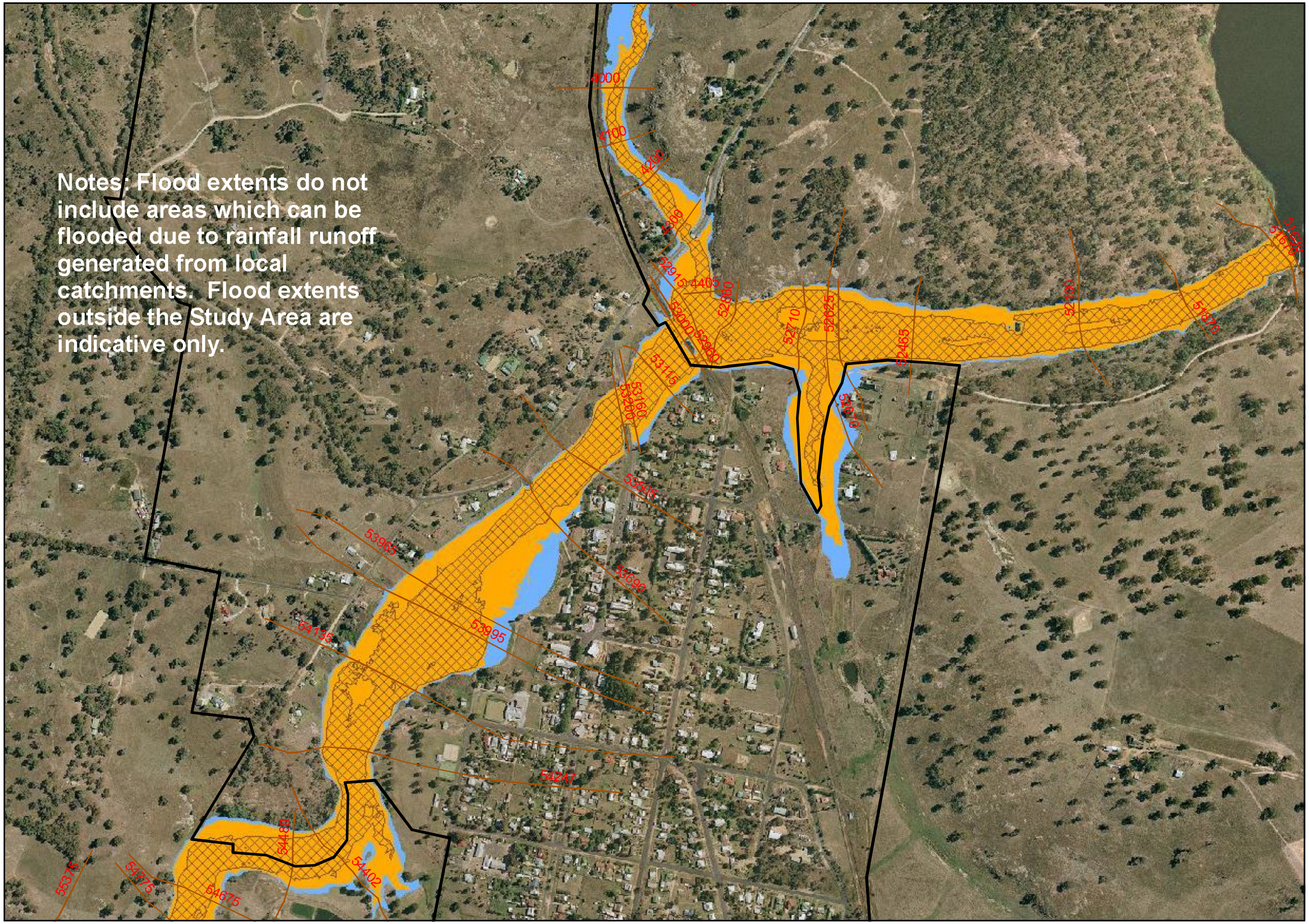
The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:9,098

0 0.3
Kilometres

SKM

Figure 3-5 Provisional Flood Categorisation for Rylstone due to Flooding in Cudgegong River



LEGEND

- Study Area
- MIKE11 Cross Section
- Hazard Category:
- Low Hazard
- High Hazard
- Floodway

The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:8,646

0 0.3
Kilometres

3.3. Flood Behaviour with Potential Failure of Rylstone Dam

Failure of Rylstone Dam has the potential to impact on flooding in Rylstone. Hence, an assessment was made to quantify potential impact on flood behaviour in Rylstone.

3.3.1. Dam Break Scenarios

Scenarios investigated in this study included the following:

- A Sunny Day Failure (SDF) of Rylstone Dam;
- A Dam Crest Flood (DCF) with and without failure of Rylstone Dam; and
- A PMF event with and without failure of Rylstone Dam.

For all scenarios, it was assumed that the reservoir was at FSL. This assumption is consistent with the previous dambreak study for Rylstone Dam undertaken by Public Works (PWD 1993). The discharge hydrographs (with a peak inflow of 14,700 m^3/s) generated by a 4 hour PMP was sourced from the DPWS 2003. The DCF was estimated to be about 0.37 PMF. A 1% AEP flood was assumed downstream of the Dam for all flood scenarios and a small release was assumed for the Sunny Day Failure scenario.

3.3.2. Failure Mechanism

Rylstone Dam consists of a central concrete arch with embankment sections on both ends. The failure mechanism due to overtopping can be rapid due to sudden failure of the concrete section or slow due to erosion failure of the embankment sections. Based on the outcomes from the sensitivity undertaken by PWD (1993), a failure of the concrete section was investigated in this study. A failure time of 5 minutes and vertical side slopes with a breach width of 50m were adopted for the failure of the concrete section for all dam break scenarios. The failure mechanism was represented in the MIKE11 model for the investigated scenarios.

3.3.3. Modelling Results

Modelling results for the dam break scenarios in terms of peak water levels, discharges, velocities and times to peak water levels are presented in **Appendix C**. Peak water level, peak velocity and time to peak water level profiles along Cudgegong River downstream of Rylstone Dam are presented in **Figure 3-6**, **Figure 3-7** and **Figure 3-8**, respectively. **Figure 3-6** and **Figure 3-7** show that both peak water levels and peak velocities in Cudgegong River for the flood scenarios with and without dam failure remain almost unchanged, indicating the capacity of the storage is too small to dominate flooding conditions downstream. However, **Figure 3-8** shows that times to peak water levels are slightly shorter for flood scenarios with dam break.

- **Figure 3-6 Peak Water Level Profiles in Cudgegong River for Dam Break Scenarios**

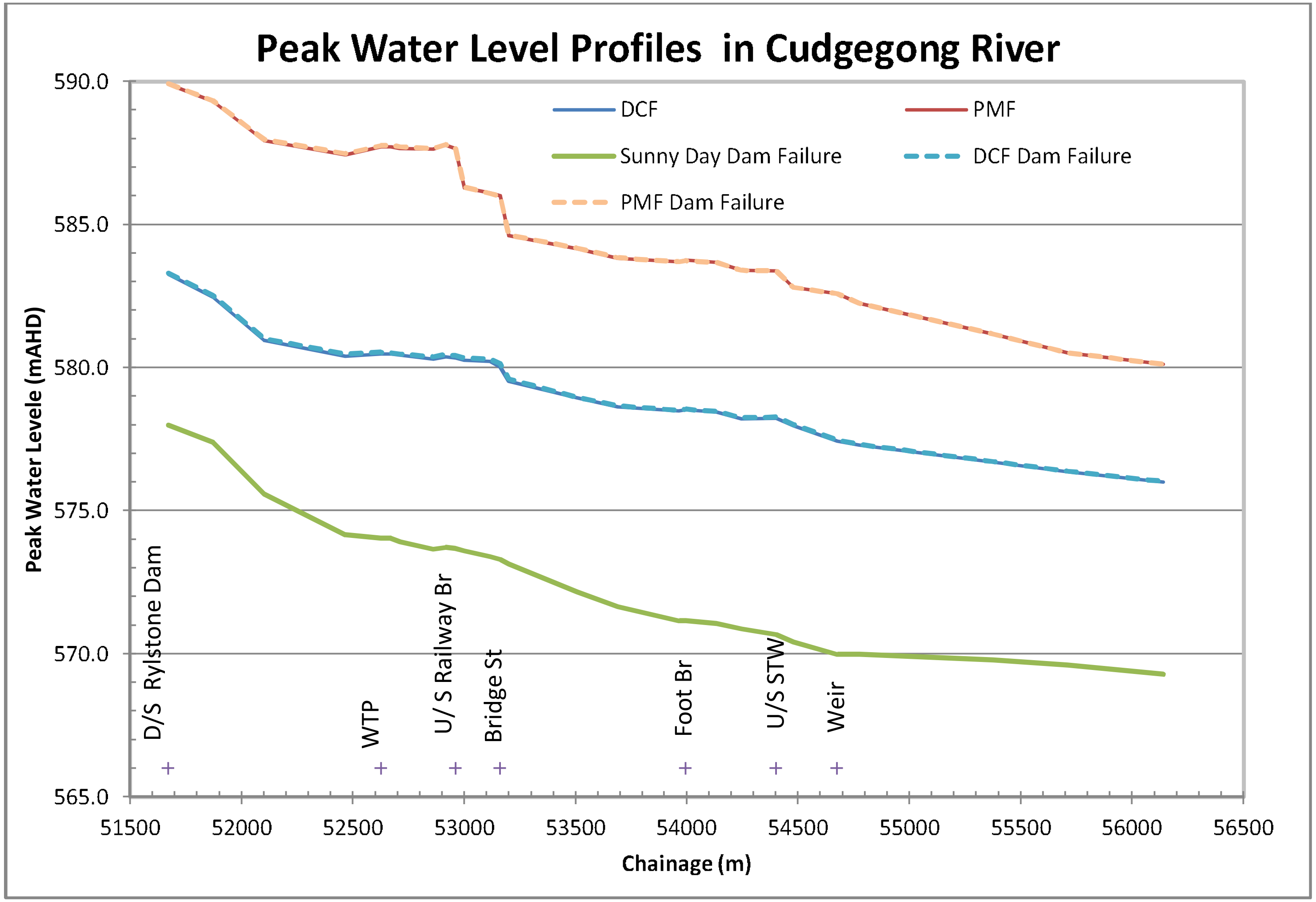
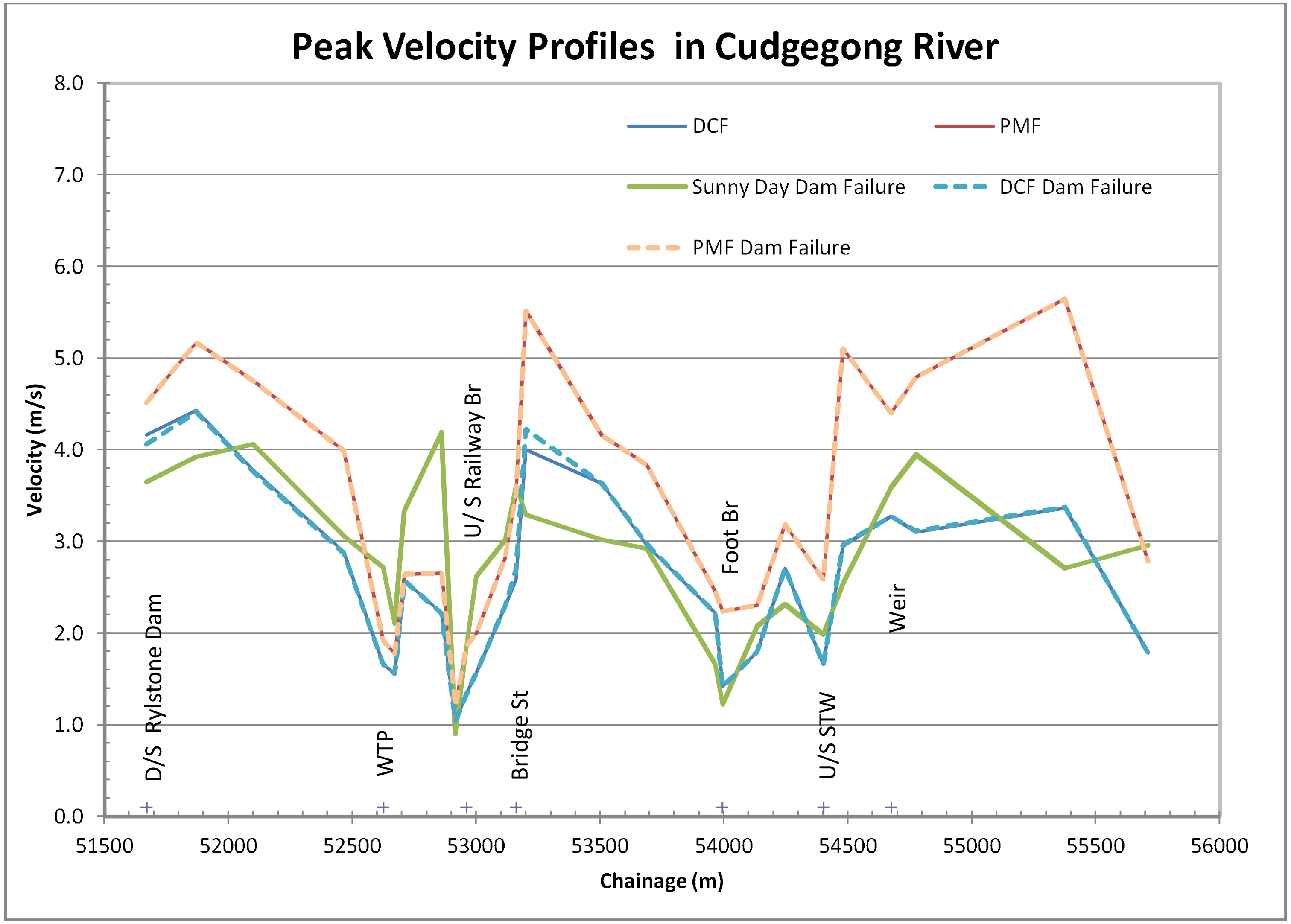
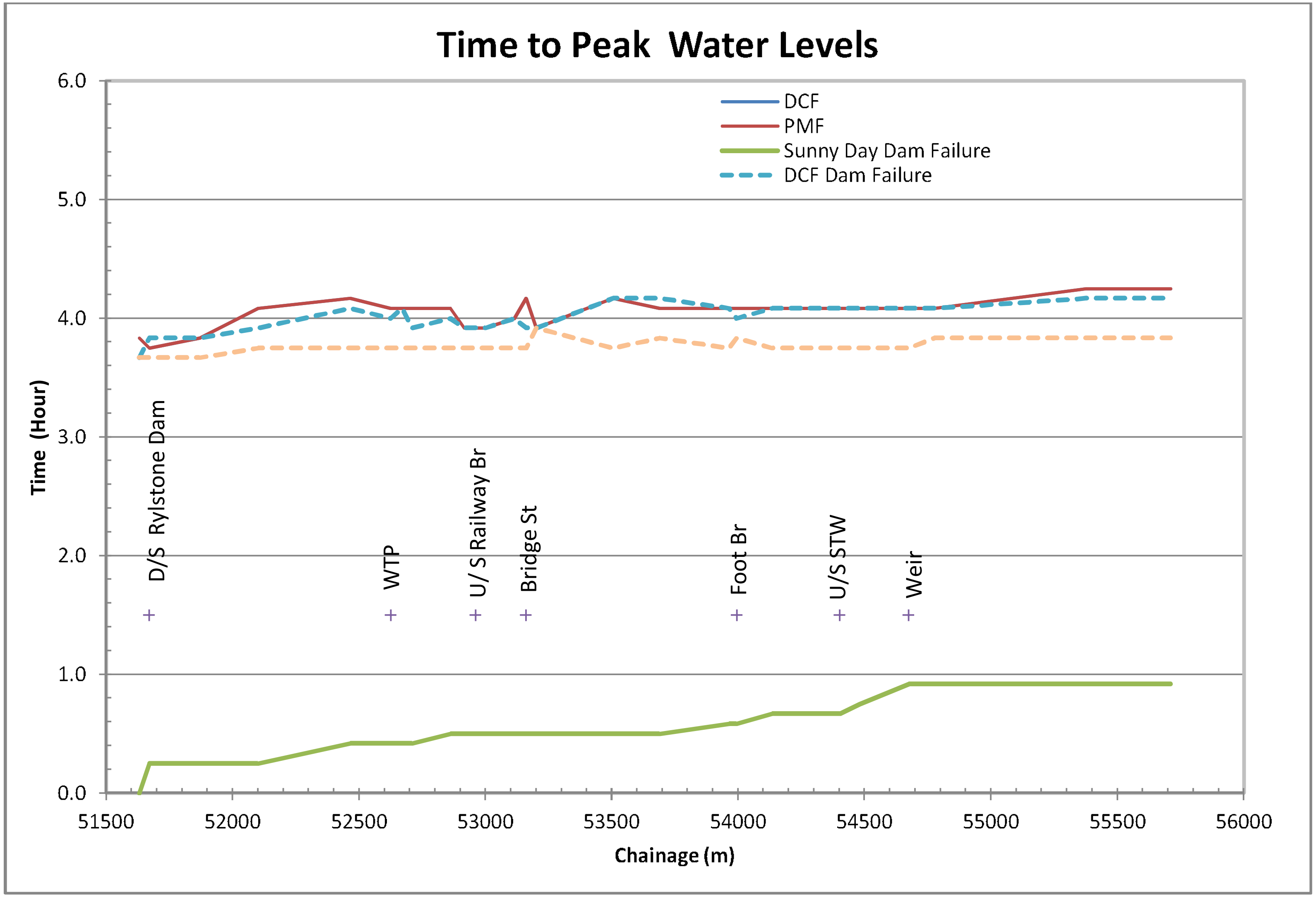


Figure 3-7 Peak Velocity Profiles in Cudgegong River for Dam Break Scenarios



- **Figure 3-8 Time to Peak Water Level Profiles in Cudgegong River for Dam Break Scenarios**



In the case of the Sunny Day Dam Failure, peak water levels in Cudgegong River upstream of the STW are higher than the 0.5% AEP event. The difference in peak water level between Sunny Day Dam Failure and 0.5% AEP event gradually increases upstream of the STW and the increment is up to a maximum of 3m at the toe of the Dam. Peak velocities in Cudgegong River for the Sunny Day Dam Failure vary between 1m/s to 4 m/s. Times to reach peak water levels for the Sunny Day Failure scenario vary from 0.25 hour at the toe of the dam to 0.67 hour upstream of the STW. In the case of the other dambreak scenarios, times to reach peak water levels vary between 3.6 hour at the Dam and 4.4 hour upstream of the STW.

Previous dambreak studies for Rylstone Dam were undertaken using limited topographic data and different estimates of PMF and hence a comparison dambreak modelling results between this study and the previous studies was not undertaken.

4. Stormwater Capacity Assessment

4.1. Background

Computer models were set up in the DRAINS program to assess the capacity of the existing drainage systems for both Kandos and Rylstone. DRAINS simulates the rainfall-runoff process on natural and developed catchments, developing flow hydrographs at each entry point in the drainage system and then routing and combining flows through the drainage network. DRAINS is capable of modelling multiple storm patterns, pit bypass flows and overland flows.

4.2. Approach

4.2.1. Modelling Program

The computer program that was selected for use in this study was DRAINS (O'Loughlin and Stack, 2003). DRAINS is a comprehensive program for designing and analysing urban stormwater drainage systems. DRAINS is an updated version of the ILSAX (O'Loughlin, 1993) program. DRAINS includes additional functionality compared to the ILSAX program and allows more detailed and accurate modelling of drainage systems including overland flowpaths.

DRAINS can model drainage systems of all scales, from very large to very small. The program converts rainfall patterns to stormwater runoff hydrographs and routes these through a network of pipes, channels and streams. DRAINS carries out the hydrological modelling using ILSAX, the Rational Method and storage routing models, together with hydraulic modelling of pipes and open channels and automatic design procedures for piped drainage systems. The version of the DRAINS program used in this study was version 2012.04 – 12 March 2012.

4.2.2. Setting Up DRAINS Models

The DRAINS models were configured based on pit and pipe survey collected for Council for this study. The survey data was comprised of an MS Excel spreadsheet with the following details:

- Pits: Easting, Northing, pit inlet type and dimensions, depth of pit, comments.
- Pipes: Conduit type (pipe or box culvert), dimensions, invert levels, Easting and Northing of surveyed point (typically one point per pipe), number of cells, comments.
- Bridges in the study area were also surveyed but not included in the DRAINS models.

The drainage features included in the DRAINS models are pits, pipes and overflow routes. The pit and pipe survey data was plotted in MapInfo as point data, to define their location. Pipe lines were then digitised manually, based on CAD data accompanying the survey table data and the aerial photography, to link up the pits and headwall inlets and outlets on each stormwater branch.

For the purposes of this study, it was assumed that all pits were of unlimited capacity; hence, the drainage system capacity is defined by pipe capacity.

Overflow routes were then manually digitised to define the surface flow routes between pits, headwall inlets/outlets and for other flow paths. The overflow routes were defined typically as following the surface contours and natural overland flow paths, rather than the street drainage, which is a more realistic representation for overland flow patterns in larger magnitude events. This approach in configuration results in overland flows often bypassing stormwater pits, and hence the drainage network cannot intercept these flows.

Catchment SIM was used to automatically generate a sub-catchment at each pit and to produce a GIS sub-catchment layer. Impervious fractions and travel times were estimated from aerial photography and ALS by overlaying the sub-catchment layer onto land-use GIS layers. An impervious fraction value, visually estimated from the aerial photography, was adopted for each land-use type. The impervious fractions are tabulated in **Table 4-1**.

Table 4-1 DRAINS Sub-Catchment Land-Use Impervious Fractions

Land Use	Fraction Impervious
Open Space	0.05
Commercial	0.50
Railway	0.20
Road	0.70
Rural/Rural Residential	0.10
Urban/Residential	0.30
Quarry	0.80

Overland flowpaths, destinations and travel times were determined from the ALS and aerial photography data. Sub-catchments were typically assigned to a pit or headwall at its outlet where appropriate; otherwise, a simple node was digitised at the sub-catchment outlet and linked to the downstream drainage network with an overflow route.

Significant storages upstream of overland flow paths were modelled as detention basins. Only one significant storage was identified in the study area, that being the storage upstream of the Railway embankment on the flow path to the north of Kandos Quarry, with a storage depth of approximately 6m before it overflows over the railway embankment, and a storage volume of approximately 25,000m^3. Other minor storages were identified upstream of the Railway embankment, to the north of Kandos Railway Station. However, these storages are unlikely to significantly attenuate flood flows, and hence were excluded from the DRAINS model. This is considered a conservative assumption.

Input data used in the DRAINS models for both Kandos and Rylstone are included in **Appendix D**.

4.2.3. Parameter Values Used in DRAINS

The following modelling approach and assumptions have been adopted in the DRAINS modelling:

- Unlimited pit inlet capacity was assumed and hence pit inlet blockage factors were zero (unblocked). DRAINS models would estimate capacity of stormwater pipes. Pit inlet blockage factors will be considered in the assessment of drainage improvement strategies in the floodplain risk management study.
- A pit hydraulic loss coefficient (K_u) value of 1.5 was adopted for the purposes of this study. For part-full flows, K_u values were set to 35 mm;
- Sag pits were defined with a typical sag storage volume of $10m^3$ and a depth of 0.5m based on a review of ALS data at major sags;
- Headwall inlets were assumed to have a K_u value of 0.5;
- It was assumed that all impervious areas are directly connected, i.e. that supplementary areas = 0. This provides a conservative estimate as it assumes runoff from paved areas flows out of each subcatchment without lagging from flow over grassed areas.
- The pipe roughness was kept at the default Colebrook-White roughness coefficient value of 0.3mm; and
- Travel times for sub-catchments and overflow routes were based on the longest flow path determined in Catchment SIM and flow velocities of 0.7 m/s for paved areas and 0.5 m/s for grassed areas. This is consistent with kinematic wave equation with typical catchment slope of 5%.

4.2.4. Estimation of Design Rainfall and Runoff

An ILSAX hydrological model was adopted for the DRAINS modelling with the following parameters used:

- An Antecedent Moisture Condition “AMC” of 3 (“Rather Wet” soil moisture condition) for storm events up to and including the 1% AEP event. An AMC of 4 (“Totally Saturated” soil moisture condition) was adopted for the 0.5% AEP and PMF events;
- A soil type of 3 (slow infiltration rates which may have layers that impede downward movement of water);
- Paved area depression storage of 1 mm and grassed area depression storage of 5 mm.

Design rainfall intensities for the 20%, 10%, 5%, 2%, 1% and 0.5% AEP events were estimated based on Intensity-Frequency-Duration (IFD) parameter values from the Bureau of Meteorology online IFD calculator for both Kandos and Rylstone. Temporal patterns for AR&R Zone 2 (Murray-Darling Basin) were assumed. The DRAINS models were run for the 10, 15, 20, 25, 30, 45, 60, 90, 120 and 180 minutes duration events for these design AEP events.

Intensities for the PMP events were calculated based on the Generalised Short Duration Method (GSDM) (BOM, 2003). Design temporal patterns from GSDM were adopted. A constant rainfall depth across each catchment was assumed. The PMP storm was also run for the 15, 30, 45 and 60 minute storm durations.

4.3. Stormwater Capacities for Rylstone

DRAINS model results for are presented in **Appendix D** and model results for Rylstone were analysed to determine the design capacity for each pipe, which is mapped in **Figure 4-1**. The pipes with a 1% AEP capacity are typically located in the upper sections of the drainage network or on minor branches, where there is typically a number of overflow routes bypassing this section of the network. These overflow routes tend to converge on the lower sections of the drainage network, hence the flows intercepted by the network are relatively larger and the pipe event AEP tends to be smaller. Often adjoining pipes with the same size have different capacities which result from different pipe slopes.

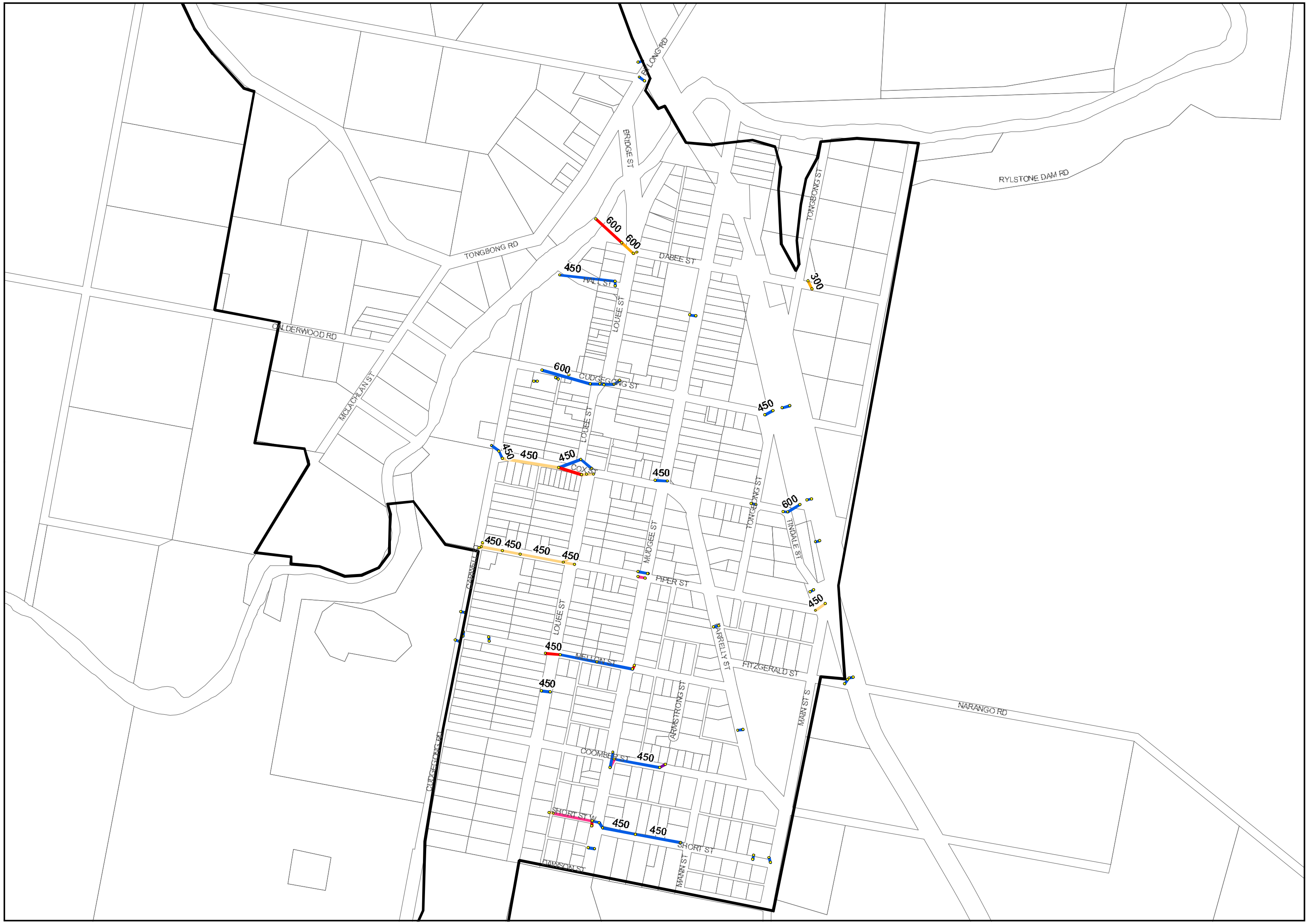
4.4. Stormwater Capacities for Kandos

The DRAINS model results (presented in **Appendix D**) for Kandos were analysed to determine the design AEP capacity event for each pipe, which is mapped in **Figure 4-2**. The estimated pipe capacities range from less than the 20% AEP event to greater than the 1% AEP event. The pipes with a 1% AEP capacity are typically located in the upper sections of the drainage network or on minor branches, where there is typically a number of overflow routes bypassing this section of the network. These overflow routes tend to converge on the lower sections of the drainage network, hence the flows intercepted by the network are relatively larger and the pipe event AEP tends to be smaller. Often adjoining pipes with the same size have different capacities which result from different pipe slopes.

The majority of pipes in Kandos have adequate capacities for events up to 20% AEP. The main stormwater system starting at Buchanan Street and crossing Angus Avenue, Rodgers Street, Dangar Street, Fleming Street and finally discharging on Dunn Street, have capacities less than 20% AEP in the section between Buchanan Street and Fleming Street, which run through private properties.

Note that there is uncertainty in the pipe network configuration upstream of pipe ST00520 (corner of George Street and Bent Street, Kandos). It was difficult to determine the exact configuration from the available survey, Council GIS layers, aerial photography and DEM due to incomplete and conflicting information. There is therefore likely to be some inaccuracy in the pipe hydraulic conditions at this location, though overland flows are likely to be estimated satisfactorily.

Figure 4-1 Stormwater Pipe Capacity - Rylstone



LEGEND
- Stormwater Pit
- Stormwater Pipe Capacity
- Adequate for less than 20% AEP
- Adequate for less than 10% AEP
- Adequate for less than 5% AEP
- Adequate for less than 2% AEP
- Adequate for less than 1% AEP
- Adequate for more than 1% AEP
- Cadastre
- Study Area

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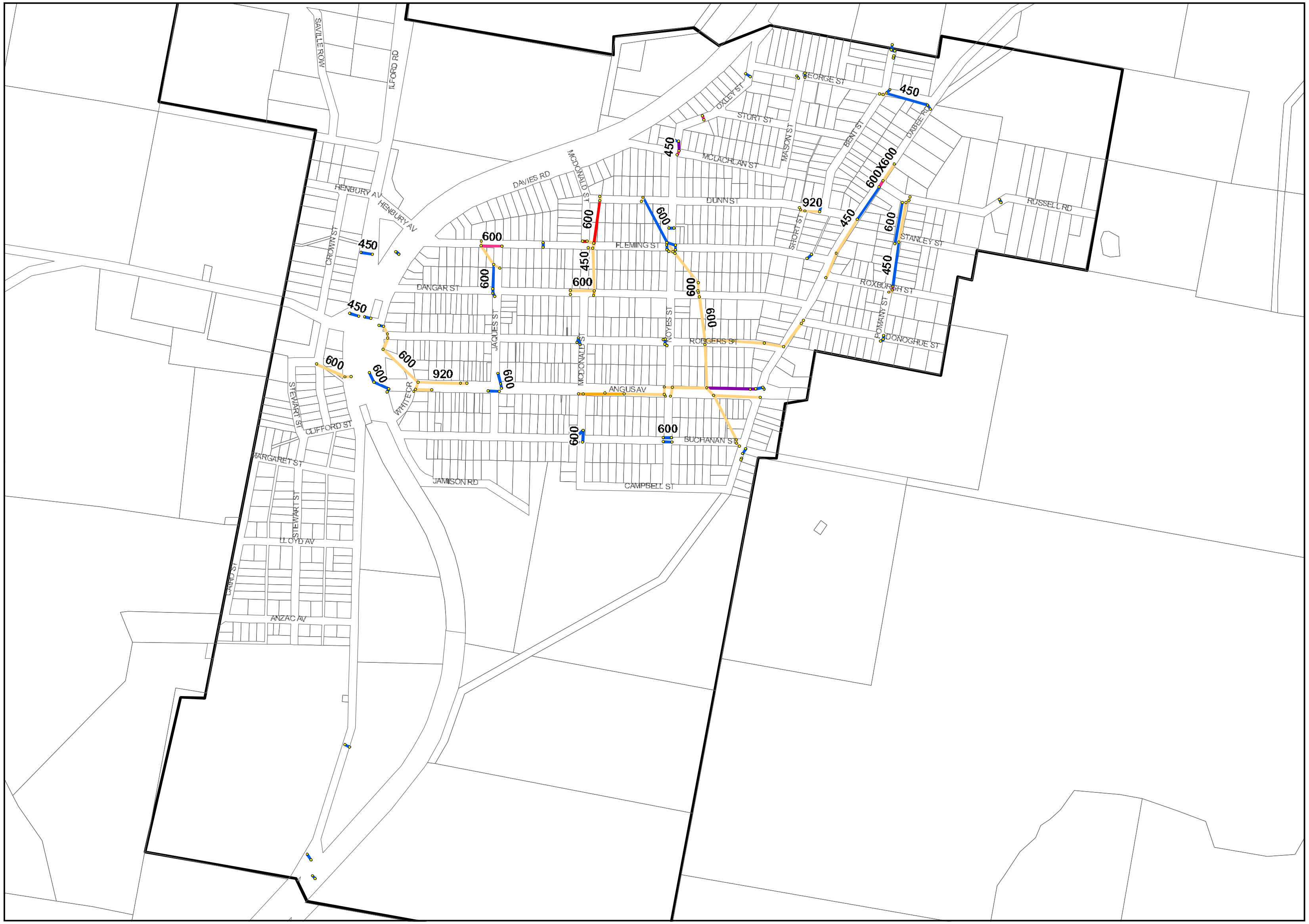
0 0.3
Kilometres

SKM

Figure 4-2 Stormwater Pipe Capacity - Kandos



LEGEND

- Stormwater Pit
- Stormwater Pipe Capacity
  - Adequate for less than 20% AEP
  - Adequate for less than 10% AEP
  - Adequate for less than 5% AEP
  - Adequate for less than 2% AEP
  - Adequate for less than 1% AEP
  - Adequate for more than 1% AEP
- Cadastre
- Study Area

Sinclair Knight Merz does not warrant that this document is definitive nor free of error and does not accept liability for any loss caused or arising from reliance upon information provided herein.

[GDA1994 MGA ZONE 55]
A3

0 — 0.4
Kilometres

SKM

5. Local Overland Flooding – Kandos & Rylstone

5.1. General

Stormwater drainage, which surcharges the piped drainage system, is likely to be conveyed along the street system and natural flow paths in the towns, and/or rural areas bordering the towns. Hydraulic modelling was undertaken to estimate flooding conditions in major overland flow paths including depths, velocities and flood hazard category of flow in the street and other overland flow paths. Hydraulic models for the main flow paths in the two towns were set up using HEC-RAS.

A Digital Elevation Model (DEM) was created using the ALS data for each town. The DEM was used to cut adequate cross sections for the selected overland flow paths to be represented in the HEC-RAS models. Major hydraulic structures and obstructions to flow and bed resistances were defined in the HEC-RAS model. The flows applied to the HEC-RAS models were computed from the DRAINS modelling and represented discharges surcharging or not captured by the existing piped system.

5.2. Approach

5.2.1. HEC-RAS Model Development

HEC-RAS (US Army Corps of Engineers, 2003) program was used to undertake hydraulic modelling of the main overland flow paths in and around both Kandos and Rylstone. Main flow paths modelled using HEC-RAS were selected on the basis of the following considerations:

- Location: flow paths that run through a number of properties; and
- Peak discharge: those flow paths carrying a relatively high discharge are more likely to present a flood risk.

Cross-sections, which were extracted from the ALS data, were used to set up the HEC-RAS models. The ALS data represented the existing topographic conditions. The cross-sections were located at more frequent intervals in potential flooding problem areas, in order to define flood levels and velocities in more detail at these locations. It was assumed in the HEC-RAS model that existing fencing would fail and would allow floodwater to move freely from one property to another without forming a solid obstruction. A high Manning's n value of 0.1 was used in HEC-RAS models to represent friction losses through properties. Recent aerial photography of the area and a site reconnaissance were used to assign Manning's n values to model cross sections.

The HEC-RAS models were set up to include the overland flow paths connected to, and including a section of, the downstream main waterways. This was done to ensure that realistic tailwater conditions were applied to the local overland flow paths affecting both Kandos and Rylstone townships. In the case of the HEC-RAS model for Rylstone, a peak discharge of 100 m^3/s was used just downstream of Rylstone Dam for all modelled events to represent minor flooding in the Cudgegong River. The adopted peak discharge (ie. 100 m^3/s) represents a flood event smaller than the 20% AEP event in the Cudgegong River.

All HEC-RAS models were run for steady-state solutions for the mixed flow regimes, which were considered suitable for the level of detail required in this study. Normal flood depths were used to define both upstream and downstream boundary conditions for running the models for the mixed flow regimes.

All HEC-RAS models were run for 20%, 10%, 5%, 2%, 1%, 0.5% AEP and PMF events under the existing conditions.

5.2.2. Flood Behaviour

A set of flood surfaces was created using the HEC-RAS modelling results for the 20% AEP, 1% AEP, 1% AEP + 0.5m freeboard (ie. FPL) events and the PMF. The modelling results were imported into the GIS, where each cross-section was attributed with the flood level results. This allowed the creation of flood surface data. The intersection between the DTM (created using ALS data) and the flood surfaces was calculated, which defined the extent of flooding. This allowed flood prone areas to be accurately defined. Flood maps were produced from the GIS, showing inundation extents for each flood event. All analysis and mapping was undertaken using ArcMap.

A flood hazard map was prepared for the Flood Planning Level (FPL) using flood extent for the FPL and peak velocities for the 1% AEP event. High hazard and low hazard areas were identified for the FPL using the criteria adopted in the NSW Government's Floodplain Development Manual (2005).

5.3. Local Overland Flood Behaviour for Rylstone

Detailed HEC-RAS modelling results in terms of peak water levels, discharges and velocities for all modelled events are given in **Appendix E**. Flood extents for the four selected flood events for Rylstone are presented in

Figure 5-1 which shows the following:

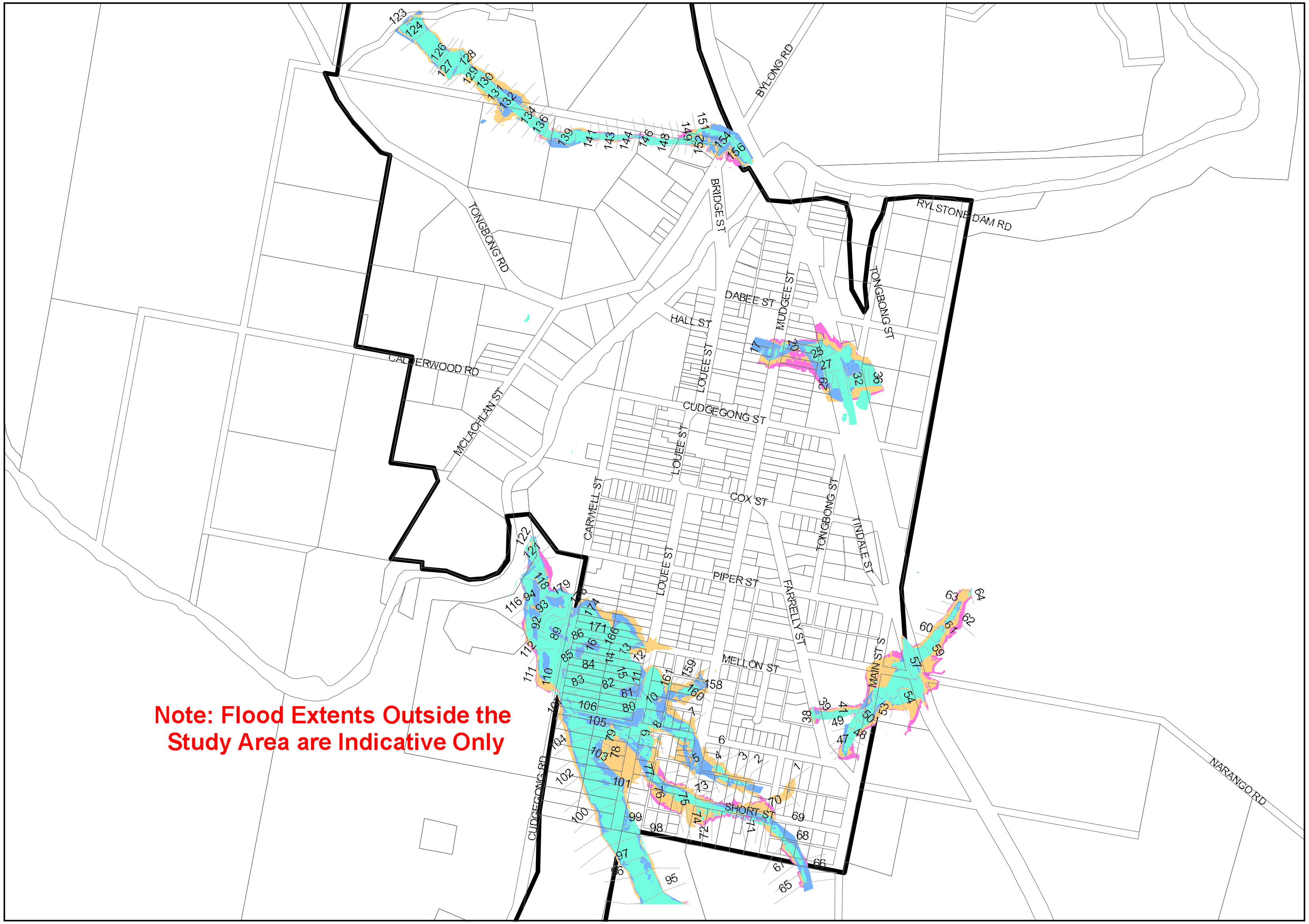
- A number of properties are impacted by local overland flooding in a 20% AEP event. These properties are located on the southern end of Louee Street between Dawson Street and Melon Street; Cudgegong Road between Dawson Street and Piper Road; Dawson Street; Short Street; and Coombers Street.
- The extent of inundation in a 1% AEP event is slightly more extensive than the 20% AEP extent.
- The FPL covers more area than the PMF, indicating that the FPL is higher than PMF levels in some areas.

Flood hazards for the FPL for Rylstone are shown in **Figure 5-2**. This shows that most areas are low hazard with some isolated areas being high hazard. Flood hazard on sections of Tongbong Road, Short Street and Main Street are high for the FPL.

5.4. Combined Flood Behaviour

The flood behaviour in Rylstone due to flooding in the Cudgegong River is discussed in Section 3 of this report and the overland flood behaviour in Rylstone is discussed in Section 5.3. A combined flood extent map for Rylstone is included in **Appendix F** which shows flood extents for the 20% AEP, 1% AEP and the PMF events. The extent of the FPL is also shown on the same map. A combined provisional flood hazard map for Rylstone is also included in **Appendix F**.

Figure 5-1 Extent of Flood Inundation in Rylstone due to Rainfall Runoff Generated from Local Catchments



LEGEND

- Study Area
- HEC-RAS Cross Section
- 20% AEP Flood Extent
- 1% AEP Flood Extent
- Provisional Flood Planning Level
- PMF Extent

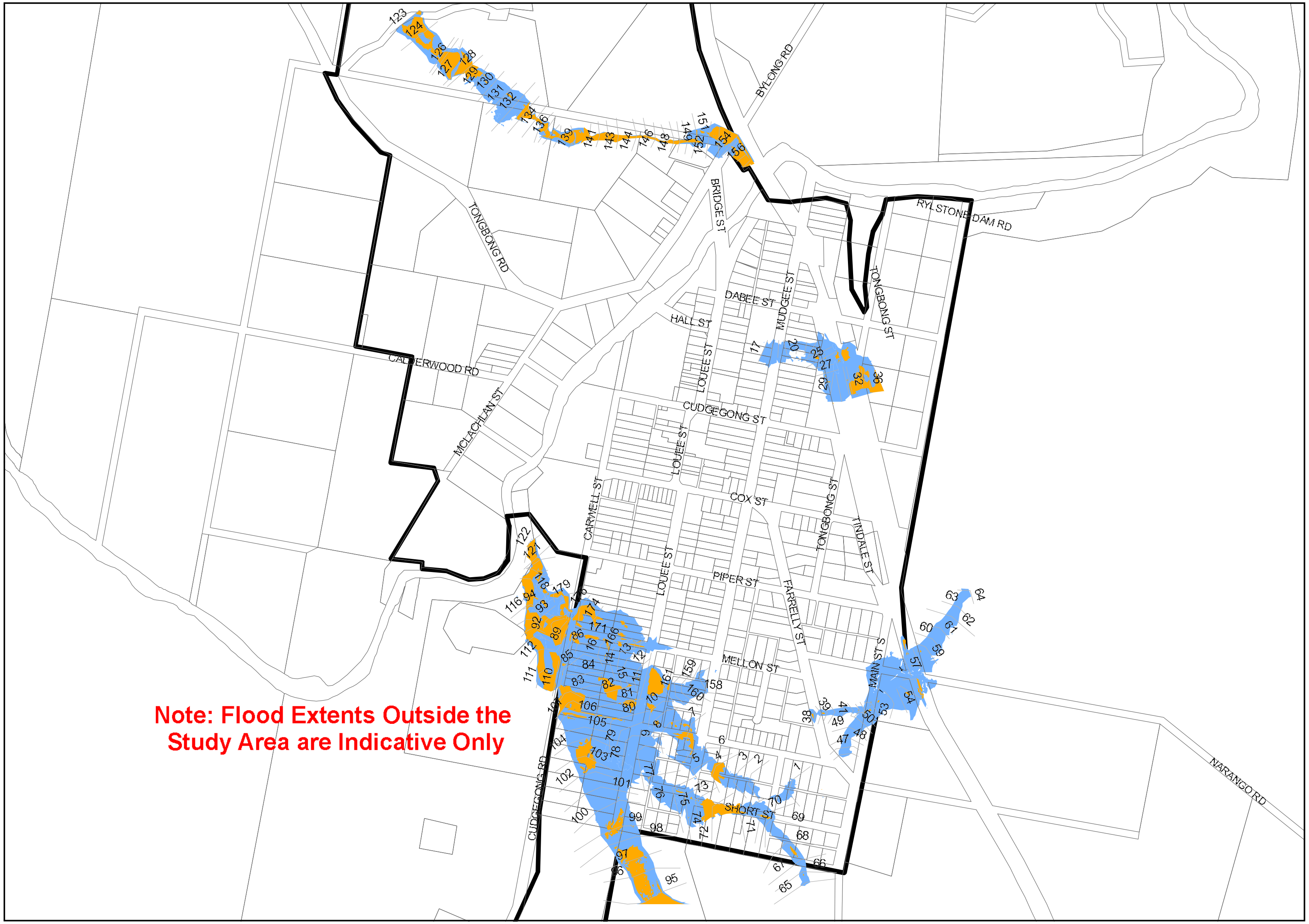
The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:11,410

0 0.4
Kilometres

SKM

Figure 5-2 Provisional Flood Hazard Categorisation for Rylstone due to Rainfall Runoff Generated from Local Catchments



LEGEND

- Study Area
- HEC-RAS Cross Section
- High Hazard
- Low Hazard

The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:11,410

0 0.4
Kilometres

5.5. Local Overland Flood Behaviour for Kandos

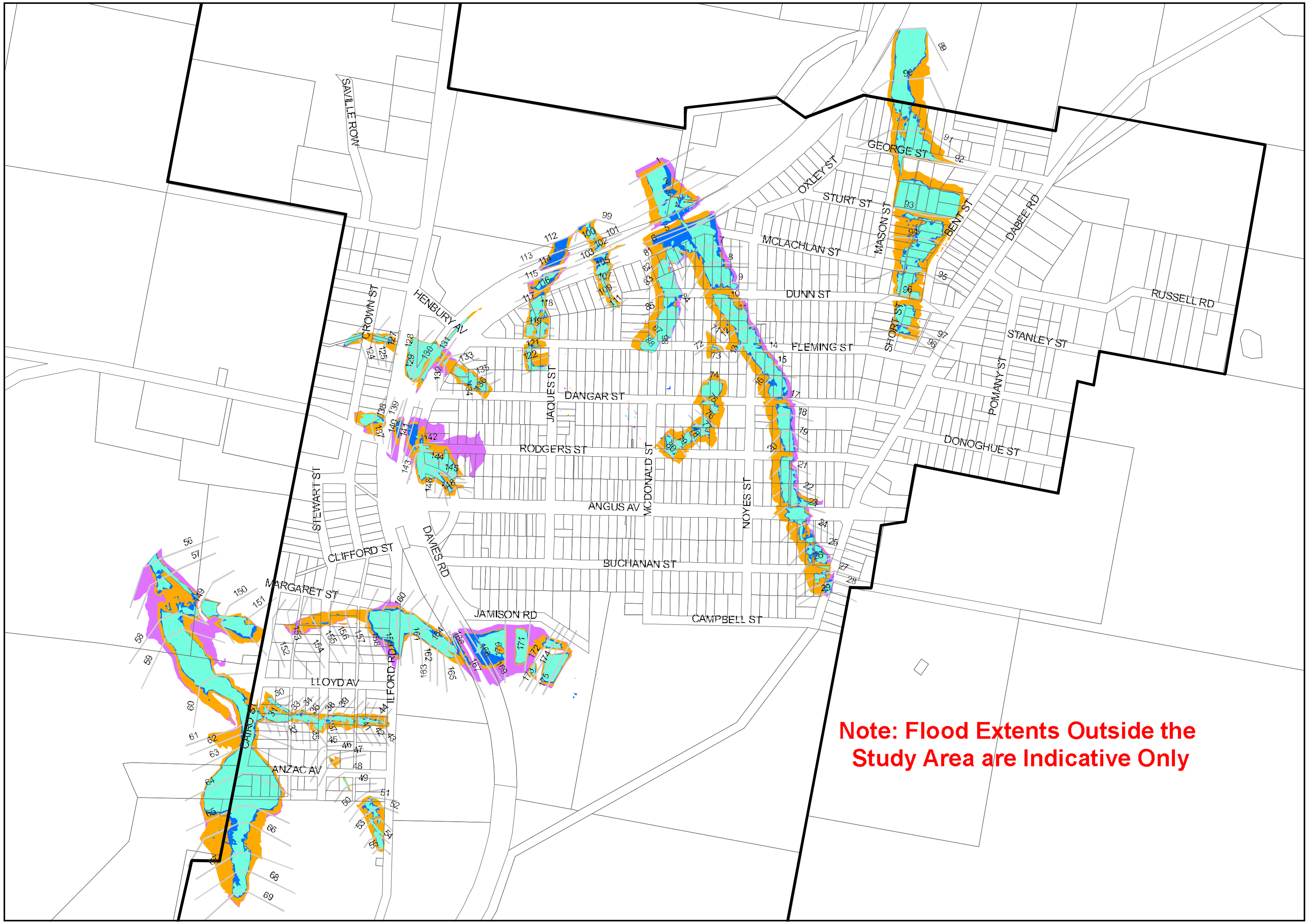
Detailed HEC-RAS modelling results in terms of peak water levels, discharges and velocities for all modelled events are presented in **Appendix E**. Flood extents in Kandos for the selected flood events are presented in **Figure 5-3** which shows significant flooding in Kandos for the 20% AEP event. Overflows associated with the main stormwater system crossing the Railway at the corner of Davies Road and McLachlan Street result in flooding of adjoining properties located along its overland flow paths. Properties along the overland flow path for the stormwater system crossing Georges Street are impacted by overflows in the 20% AEP event. A number of properties on Davies Road are also impacted due to the 20% AEP event. An overland flow path runs east to west between Lloyd Avenue and Anzac Avenue, which impacts of a number of properties in the 20% AEP event.

The flood extent for the 1% AEP event is slightly more extensive than the 20% AEP flood extent. In some areas, the PMF is less than 0.5m higher than the 1% AEP event and in some areas the PMF is higher than the FPL.

Flood hazards for the FPL are shown in **Figure 5-4** which indicates the following:

- Flood hazard is generally low in the majority of the flooded areas; and
- Areas with high flood hazard are present on overland flow paths between Dangar Street and Dunn Street; Whites Crescent, Davies Road; Ilford Road; Cario Street and Anzac Avenue.

Figure 5-3 Extent of Flood Inundation in Kandos due to Rainfall Runoff Generated from Local Catchments under the Existing Conditions



LEGEND

- Study Area
- HEC-RAS Cross Section
- 20% AEP Extent
- 1% AEP Extent
- Provisional Flood Planning Level
- PMF Extent

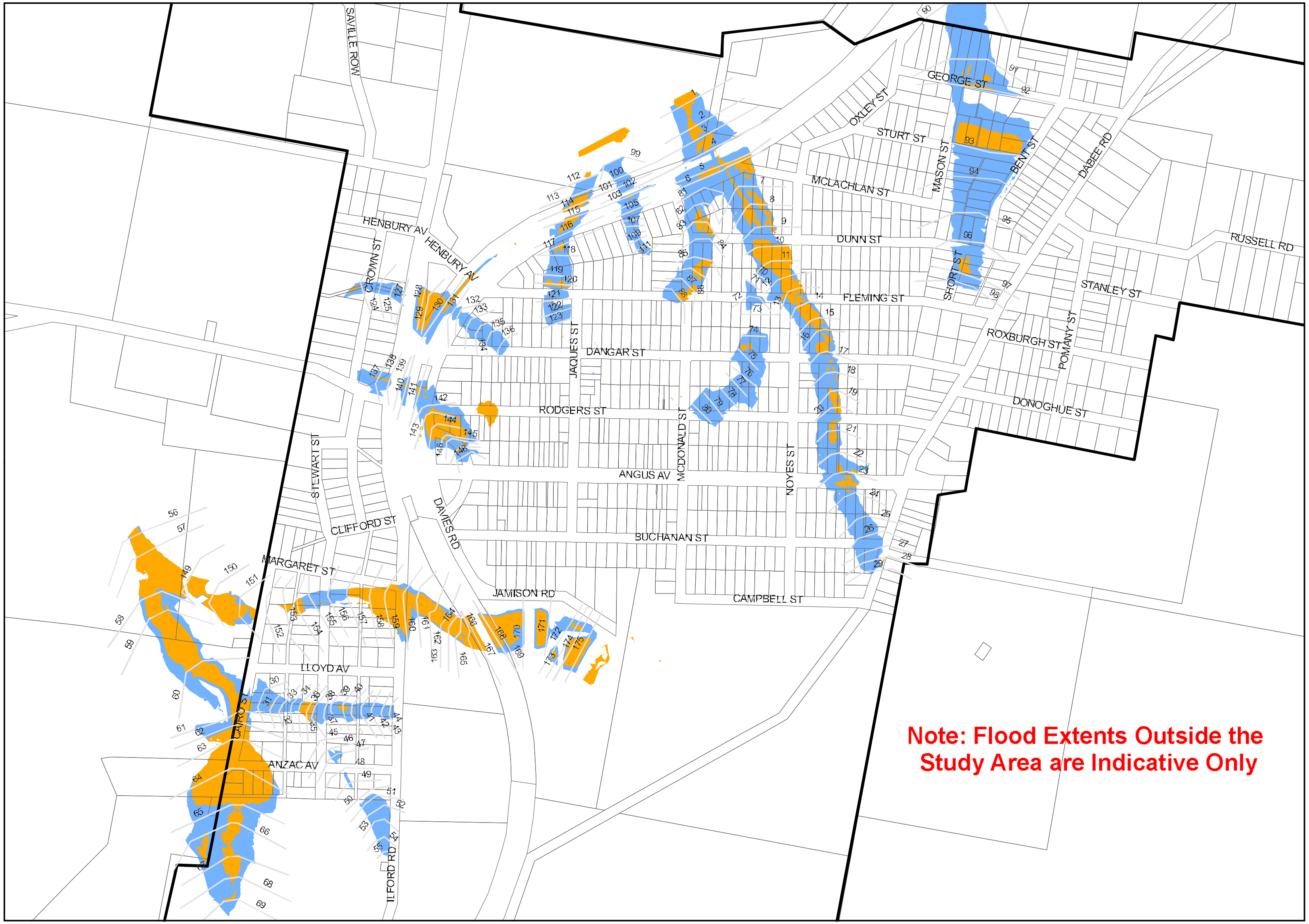
The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:9,328

0 0.3
Kilometres

SKM

Figure 5-4 Provisional Flood Hazard Categorisation for Kandos due to Rainfall Runoff Generated from Local Catchments



LEGEND

- Study Area
- HEC-RAS Cross Section
- Low Hazard
- High Hazard

The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:8,442

0 0.3
Kilometres

SKM

6. Acknowledgements

The study was carried out by Sinclair Knight Merz with funding provided from Mid-Western Regional Council and the Commonwealth and NSW Governments, through the Office of Environment and Heritage.

A number of organisations and individuals have contributed both time and valuable information to this study. The assistance of the following in providing data and/or guidance to the study is gratefully acknowledged:

- Residents of Kandos and Rylstone;
- Councillors and Council staff from Mid-Western Regional Council;
- Office of Environment and Heritage; and
- Roads and Maritime Services.

7. Conclusions

In accordance with NSW Government Policy, Mid-Western Regional Council is committed to preparing a Floodplain Risk Management Plan for the townships of Kandos and Rylstone. This report documents the first two stages of the process of preparing the Plan – that is, the preparation of a flood study report.

The study area included the townships of Kandos and Rylstone. The township of Kandos is located in the upper catchment areas of Cumber Melon Creek and hence is not subject to riverine flooding. However, isolated areas within the township have experienced local overland flooding due to limited stormwater capacity. The township of Rylstone is located on the left bank (looking downstream) of the Cudgegong River, which has a very narrow floodplain consisting of a series of river flats. Rylstone Dam is located one (1) kilometre upstream of the town. Rylstone experienced local overland flooding in recent years due to limited stormwater capacity. However, both residential and commercial/industrial properties within the township are yet to be impacted by riverine flooding in recent memory.

A community consultation process was undertaken to collect information on flooding from the community. Information provided by the community indicated no major flooding issues in Kandos and Rylstone.

Hydrologic and hydraulic computer models for Cudgegong River used in a previous study were updated to define riverine flood behaviour for Rylstone. A range of flood events between the 20% AEP and PMF events was investigated and flood extents and provisional flood hazard mapping were undertaken to define flood behaviour in Rylstone. Flood behaviour due to potential failure of Rylstone Dam was also assessed.

The capacity of the stormwater systems for both Kandos and Rylstone was assessed through the development of computer based hydrologic model DRAINS. Hydraulic modelling was undertaken using HEC-RAS hydraulic models to define local overland flood behaviour for both towns. Results from HEC-RAS models were used to map flood extents and hazards on local overland flow paths.

Detailed hydrologic and hydraulic modelling undertaken in this study provide a sound platform for the flood modelling tasks that will be undertaken during preparation of the Floodplain Risk Management Study and Plan for Kandos and Rylstone.

8. References

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9. Glossary

Annual Exceedence Probability (AEP)	The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage.
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average Annual Damage (AAD)	Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.
Average Recurrence Interval (ARI)	The long-term average number of years between the occurrences of a flood as big as or larger than the selected event. For example, floods with a discharge as great as or greater than the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.
Catchment	The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.
Development	Is defined in Part 4 of the EP&A Act <u>In fill development</u>: refers to the development of vacant blocks of land that are generally surrounded by developed properties and is permissible under the current zoning of the land. Conditions such as minimum floor levels may be imposed on infill development. New development: refers to development of a completely different nature to that associated with the former land use. Eg. The urban subdivision of an area previously used for rural purposes. New developments involve re-zoning and typically require major extensions of exiting urban services, such as roads, water supply, sewerage and electric power. Redevelopment: refers to rebuilding in an area. Eg. As urban areas age, it may become necessary to demolish and reconstruct buildings on a relatively large scale. Redevelopment generally does not require either re-zoning or major extensions to urban services.
Effective Warning Time	The time available after receiving advise of an impending flood and before the floodwaters prevent appropriate flood

	response actions being undertaken. The effective warning time is typically used to move farm equipment, move stock, raise furniture, evacuate people and transport their possessions.
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
Flood fringe areas	The remaining area of flood prone land after floodway and flood storage areas have been defined.
Flood liable land	Is synonymous with flood prone land (i.e.) land susceptibility to flooding by the PMF event. Note that the term flooding liable land covers the whole floodplain, not just that part below the FPL (see flood planning area)
Floodplain	Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is flood prone land.
Floodplain risk management options	The measures that might be feasible for the management of particular area of the floodplain. Preparation of a floodplain risk management plan requires a detailed evaluation of floodplain risk management options.
Floodplain risk management plan	A management plan developed in accordance with the principles and guidelines in this manual. Usually include both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defines objectives.
Flood plan (local)	A sub-plan of a disaster plan that deals specifically with flooding. They can exist at state, division and local levels. Local flood plans are prepared under the leadership of the SES.
Flood planning levels (FPLs)	Are the combination of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the "designated flood" or the “flood standard” used in earlier studies.

Flood proofing	A combination of measures incorporated in the design, construction and alteration of individual buildings and structures subject to flooding, to reduce or eliminate flood damages.
Flood readiness	Readiness is an ability to react within the effective warning time.
Flood risk	Potential danger to personal safety and potential damage to property resulting from flooding. The degree of risk varies with circumstances across the full range of floods. Flood risk in this manual is divided into 3 types, existing, future and continuing risks. They are described below. Existing flood risk: the risk a community is exposed to as a result of its location on the floodplain. Future flood risk: the risk a community may be exposed to as a result of new development on the floodplain. Continuing flood risk: the risk a community is exposed to after floodplain risk management measures have been implemented. For a town protected by levees, the continuing flood risk is the consequences of the levees being overtopped. For an area without any floodplain risk management measures, the continuing flood risk is simply the existence of its flood exposure.
Flood storage areas	Those parts of the floodplain that are important for the temporary storage of floodwaters during passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. Hence, it is necessary to investigate a range of flood sizes before defining flood storage areas
Floodway areas	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.
Freeboard	Provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. Freeboard is included in the flood planning level.

Hazard	A source of potential harm or situation with a potential to cause loss. In relation to this manual the hazard is flooding which has the potential to cause damage to the community.
Local overland flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.
m AHD	Metres Australian Height Datum (AHD)
m/s	Metres per second. Unit used to describe the velocity of floodwaters.
m^3/s	Cubic metres per second or "cusecs". A unit of measurement of creek or river flows or discharges. It is the rate of flow of water measured in terms of volume per unit time.
Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
MIKE11	A computer program used for analysing behaviour of unsteady flow in open channels and floodplains.
Modification measures	Measures that modify either the flood, the property or the response to flooding.
Overland flowpath	The path that floodwaters can follow as they are conveyed towards the main flow channel or if they leave the confines of the main flow channel. Overland flowpaths can occur through private property or along roads.
$PIPE^{++}$	A computer program for analysing water supply systems.
Probable Maximum Flood (PMF)	The largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation couplet with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land, that is, the floodplain.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. In the context of the manual it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Runoff	The amount of rainfall which actually ends up as a streamflow, also known as rainfall excess.
Stage	The amount of rainfall which actually ends up as streamflow, also known as rainfall excess.

SES	State Emergency Service of New South Wales.
Stage hydrograph	A graph that shows how the water level at particular location changes with time during a flood. It must be referenced to a particular datum.
XP-RAFTS	A computer program used in the estimation of rainfall runoff

Appendix A Questionnaire

Mid-Western Regional Council	**Kandos and Rylstone Flood Study - Questionnaire**

Mid-Western Regional Council is overseeing the "Kandos and Rylstone Flood Study". Council has contracted the Consultant, Sinclair Knight Merz (SKM), to undertake the study. The study is aimed at addressing the stormwater flooding issues within Kandos and both stormwater and riverine flooding issues within Rylstone. The Consultant would like to receive feedback from the community on a number of issues and topics already highlighted by the Council with regard to stormwater/ riverine flooding in the townships of Kandos and Rylstone.

If you cannot answer any question, or do not wish to answer a question, then leave it unanswered and proceed to the next question. **Your input to this important study will be greatly appreciated.** If you need additional space, please add sheets.

If you would prefer to provide a letter with your comments or send your response to this questionnaire directly to the consultant, this would also be welcomed. Contact details of the Consultant's Project Manager are provided below:

Akhter Hossain
P O Box 164
St Leonards, NSW 1590
email: ahossain@globalskm.com

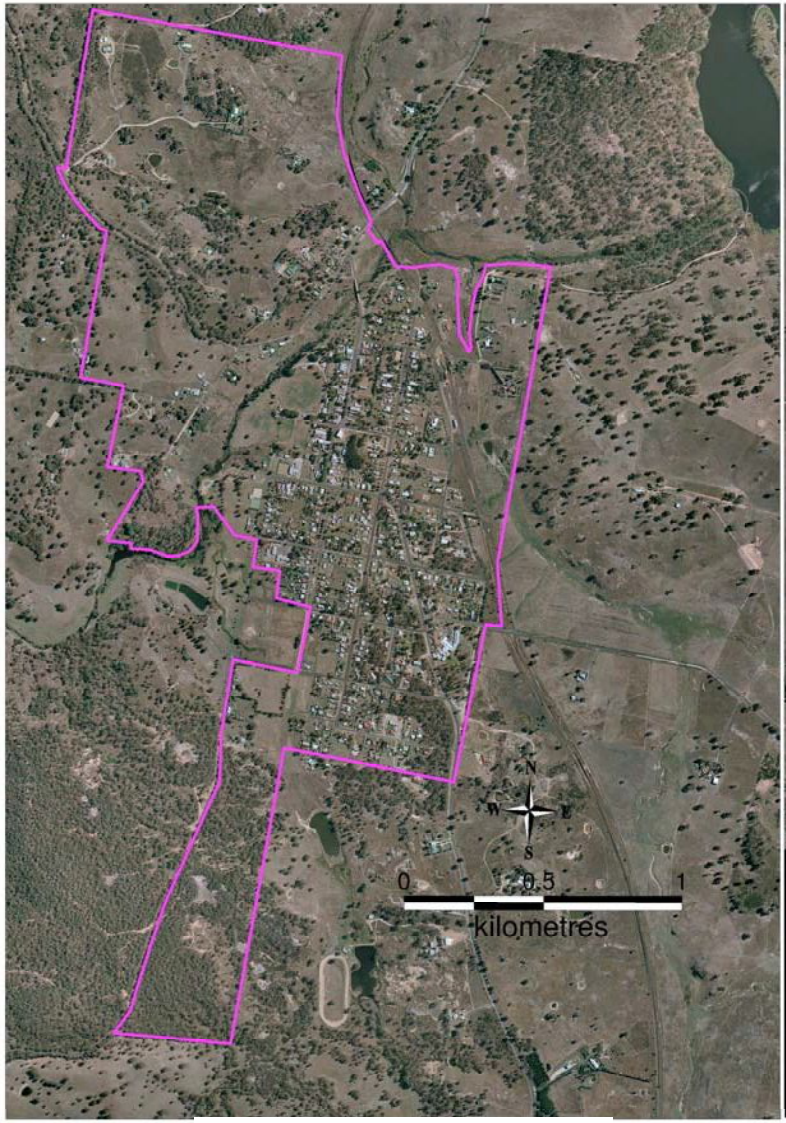
Place a tick or write a number in the relevant box as per instruction or write answers.

Question No.	Question and Answer
1.	**Do you live (reside) or have lived in the study area shown on the attached plan?** A Yes (Please provide your address) .... A No (Go to Question 3)
2.	**Do you own or rent your residence in the study area (Kandos and Rylstone)?** A Own A Rent How long have you lived in the study area? (Please write number of years)………..........
3.	**Do you own or manage a business in the study area?** A Yes, For how many years? ………………. A No (go to Question 5)
4.	**What kind of business?** A Home based business A Shop/commercial premises A Light industrial A Heavy industry A Others, please write type of business ………………………

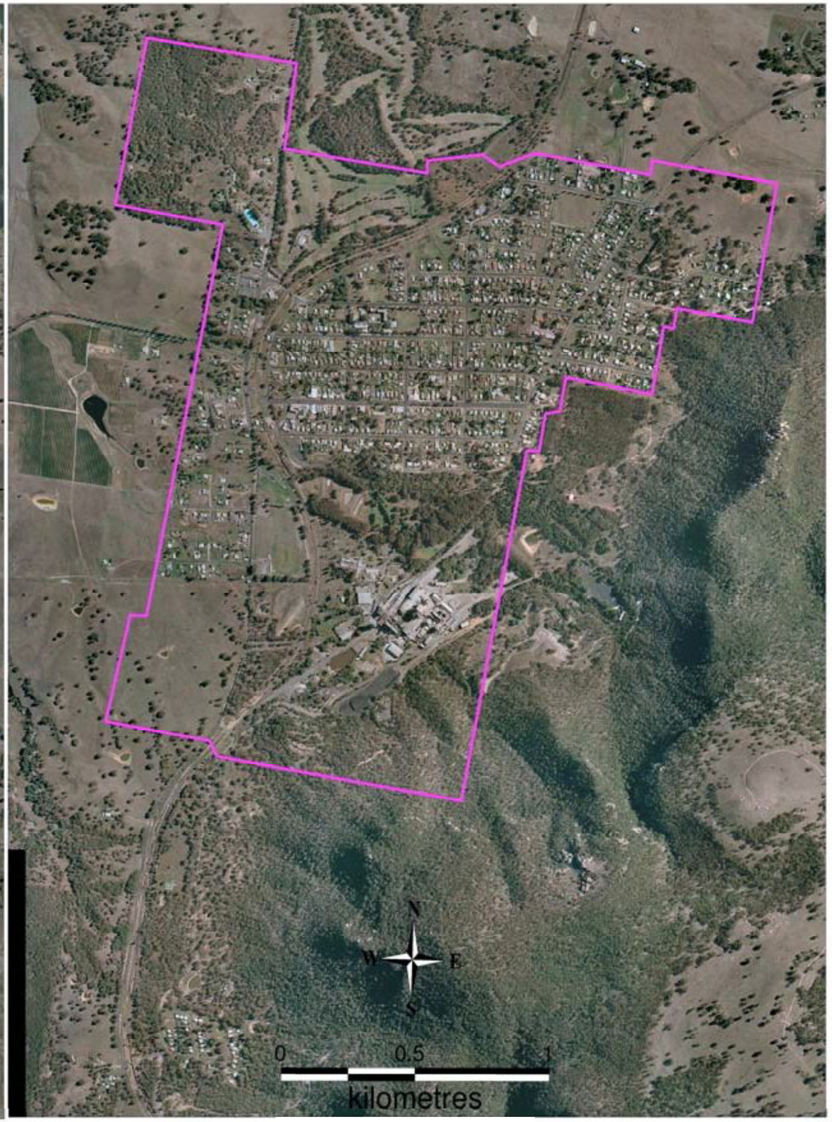
Quest-ion No.	Question and Answer
5.	**Have you had any experience of flooding (due to storm events as well) in and around where you live or work?** A Yes A No (Go to Question 14)
6.	**How deep was the floodwater (from storm water as well) in the worst flood/ storm event that you experienced?** Please estimate the depth ……………………......... What was the year of this flood?…………………… Where was this flood? A At your house? A At work? A Elsewhere? Please provide the street address for this flood? ………………………..........................
7.	**How long did the floodwaters stay up?** A Few minutes A Less than one hour A More than one hour
8.	**What damage resulted from this flood in your residence?** (Please indicate either "none", "minor", "moderate" or "major". A Damage to garden, lawns or backyard A Damage to external house walls A Damage to internal parts of house (floor, doors, walls etc) A Damage to possessions (fridge, television etc) A Damage to car A Damage to garage A Other damage, please list………………………………………. A What was the cost of the repairs, if any?…………………........
9.	**What damage resulted from this flood in your business?** (Please indicate either "none", "minor", "moderate" or "major".) A Damage to surroundings A Damage to building A Damage to stock A Other damages, please list………………….. A What was the cost of the repairs, if any?………………….
10.	**Was vehicle access to/from your property disrupted due to floodwaters during the worst flooding/ storm event?** A Not affected A Minor disruption (roads flooded but still driveable) A Access cut off
11.	**What information can you provide on past floods/ storm events that created flooding?** (You can tick more than one box). Please write any descriptions at the end of the questionnaire A No information A Information on extent or depth of floodwater at particular locations, newspaper clippings or other images on the past floods A Any permanent marks indicating maximum flood level for particular floods A Memory of flow directions, depth or velocities

Question No.	Question and Answer
12.	**Do you consider that flooding of your property has been made worse by works on other properties, or by the construction of roads or other structures?** A Yes (please provide further details. Attach extra page if necessary. Provide sketch if possible. A Unsure A No
13.	**Do you have any photographs of past floods that would be useful for the consultant to help him understand the area flooded or other flood effects?** If possible please attach the photographs (with dates and location) which will be copied and returned. A Yes (either attach or the consultant will contact you to arrange for a copy to be made and returned) A No
14.	**Do you wish to comment on any other issues associated with this study? Please add comments at the end of the questionnaire Or please indicate your willingness to answer questions over the phone?.** ________________________________ ________________________________ ________________________________ ________________________________
15.	**Do you wish to remain on the mailing list for further details, Newsletters etc?** A Yes (please provide contact details, see next question) A No
16.	If you would like, please provide details of where you live and how we can contact you if we need to follow up on some details or seek additional comment. **Name:** ____________________________ **Address:** ____________________________ ____________________________ **Telephone: ....** **Fax: ....** **Email:……………………...............**
	Space for additional comments ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________ ________________________________

Study Areas



Rylstone



Kandos

Appendix B Additional Topographic Data

Table B.1. Additional Topographic Data

1. mMGA to be used for Easting and Northings, elevations and invert levels.
2. Sizes in mm, lengths in m.
3. Digital photographs required for each asset.
4. Bridge general arrangement sketches to include: piers (location, size and shape); abutments (shape and elevation); deck (elevation mAHD and thickness); railings (height); and width of the deck.

(yellow)	Information required
(red)	Important note

GENERAL											PITS				PIPES / CULVERTS								BRIDGES	Notes
Asset ID	Type				Coordinate Data				Digital Photos	Location of Additional Assets	Type	Size of Lintel	Grate Size	Depth[1]	Type	Diameter / Size	Length	Material	# Cells	Invert Levels		Angle of Wing Walls	GA Sketch[4] (Yes/No)	
	Pit	Culvert / Pipe	Bridge	Other	Latitude	Longitude	Easting[1]	Northing[1]												U/S	D/S			
1	X						778433.257	6367419.401	1		KIP	1000	900X550	760										
2	X						778433.515	6367419.324	2		KIP	1000	900X550	600										
8	X						778304.648	6367570.682	8		KIP	760X150	0	670										
9	X						778296.451	6367567.471	9		GKIP	1800	800X400	1040										
10	X						778253.300	6367489.363	10		GIP	0	900X600	570										
11	X						778252.852	6367500.194	11		GIP	0	900X600	540										
12	X						778268.455	6367593.673	12	Stormwater Qualtiy Improvement Device	GKIP	1800	800X400	1280										
13	X						778263.676	6367261.318	13		GKIP	2400	900X450	570										
14	X						778249.807	6367252.457	14		GIP	0	900X450	770										
15	X						778170.767	6367233.464	15		GIP	0	580X460	520										
16	X						778192.959	6367252.593	16		GIP	0	450X450	790										
17	X						778171.621	6367239.265	17	NEWPIT LOCATED UPSTREAM	GIP	0	450X450	850										
18	X						778169.781	6367038.914	18		LETTERBOX	450x150	-	500										
19	X						778196.326	6367048.998	19		GKIP	1000	900X450	800										
20	X						778170.812	6367071.214			GKIP	500	450X450	580										
21	X						778200.749	6367035.687	21		GKIP	1800	900x450	900										
22	X						778183.775	6367035.326	22		GIP	0	450X450	460										
23	X						778171.771	6367034.567			GKIP	1000	900x450	460										
24	X						778117.004	6367051.222	24		KERB OUTLET			-										
25	X						777981.478	6367073.017	25		GKIP	1800	900x450	1150										
26	X						777973.460	6367090.971	26		GKIP	1800	900x450	1130										
27	X						778332.655	6366796.733	27		KIP	600	-	420										LETTERBOX PIT
28	X						778331.696	6366796.759	28		GKIP	1000	900X450	520										
29	X						778325.320	6366785.876	29		KIP	600	-	300										
30	X						778160.268	6366828.825	30		GKIP	2000	900X450	1120										
31	X						778156.495	6366833.836	31		GIP	-	900X450	1430										
32	X						778145.752	6366836.115	32		GIP	-	900X450	1000										
33	X						777934.278	6366870.992	33		GIP	-	900x450	760										
34	X						777930.823	6366861.023	34		GKIP	1800	800X400	720										
35	X						778298.994	6366574.764	35		LETTERBOX	400X200	-	750										
36	X						778294.864	6366566.630	36		GKIP	2400	800X400	700										
37	X						778209.632	6366583.503	37		GKIP	2400	800X400	1650										
38	X						778120.035	6366600.545	38		GKIP	2700	800X400	1900										
39	X						778373.238	6366336.618	39		GKIP	900	900X450	1450										
40	X						778359.677	6366328.871	40		GKIP	900	900X450	1260										
41	X						778247.539	6366366.334	41		GKIP	900	900X400	660										
42	X						778232.389	6366366.678	42		GKIP	900	900X450	900										
43	X						778250.622	6366349.579	43		GKIP	850	900X450	1200										
44	X						778240.389	6366329.069	44		GKIP	900	900X4.5	710										
45	X						778410.710	6366147.683	45		GKIP	2400	800X400	1260										
46	X						778301.280	6366168.697			GKIP	2400	800X400	1270										
47	X						778222.958	6366183.691	47		GKIP	2400	800X400	1130										
48	X						778214.824	6366196.035	48		GKIP	1000	900X450	890										
50	X						778127.846	6366823.714	50	New pit on Piper St outside depot	JUNCTION PIT													LEVELS NOT OBTAINED - BURIED PIT
51	X						778196.292	6366188.763	51		CULVERT INLET				Pipe	450		CONCRETE	1			45		
52	X						778197.527	6366200.140	52		JUNCTION PIT													
ST00001		X					778722.505	6366752.991	ST00001						Pipe	450	10	CONCRETE	1	582.538	582.236			
ST00002		X													Pipe	450	5		1					UNABLE TO FIND START OF PIPE NUMBER ST00002
ST00003		X					778735.05	6366707.237	ST00076_A						Pipe	450	15	CONCRETE	1	583.464	583.255			
ST00004		X					778715.502	6366560.854	ST00004						Pipe	375	17	CONCRETE	1	587.603	587.154	NA		PIPE FOUND TO BE 375, NOT 450
ST00005		X					778715.322	6366544.715	ST00005						Pipe	450	17	CONCRETE	1	587.725	587.442	NA		
ST00006		X					778694.198	6366426.691	ST00006						Pipe	450	17	CONCRETE	1	590.970	590.203	30		
ST00007		X					778613.157	6367178.562	ST00007						Pipe	450	12	TIMBER	1	576.581	576.262	0		
ST00008		X					778580.260	6366965.196	ST00008						Pipe	450	12	CONCRETE	1	583.711	583.369	45		
ST00009		X					778489.88	6366668.151	ST00080						Pipe	450	12	CONCRETE	1	596.765	596.018			
ST00010		X					778548.198	6366418.527	ST00081_A						Pipe	450	12	CONCRETE	1	600.405	600.039	45		
ST00011		X					778560.503	6366420.463	ST00081_E						Pipe	450	34	CONCRETE	1	600.039	597.947	45		
ST00012		X					778636.694	6366245.307	ST00012						Pipe	450	12	CONCRETE	1	599.713	599.189	45		
ST00013		X					778587.700	6366285.166	ST00013						Pipe	600	20	CONCRETE	1	599.636	599.512	30		PIPE FOUND TO BE 600, NOT 450
ST00014		X					778433.515	6367419.324	ST00015						Pipe	450	20	CONCRETE	1	581.571	581.428			
ST00015		X					778447.675	6367416.915	ST00015						Pipe	450	95	CONCRETE	1	581.428	579.101			
ST00016		X					778326.056	6367684.996	ST00016	LETTERBOX INLET PIT - START OF PIPE					Pipe	450	8	CONCRETE	1	570.495	570.402	45		
ST00017		X					778097.116	6366511.199	ST00017						Pipe	450	20	CONCRETE	2	575.338	569.455	45		
ST00018		X					778304.648	6367570.682	8						Pipe	375	5	CONCRETE	1	574.753	574.645			
ST00019		X					778296.54	6367568.136	9						Pipe	600	30	CONCRETE	1	574.645	574.126	0		
ST00020		X					778243.312	6367631.737	ST00020	New pipe from ST00020 - Outlet at River					Pipe	600	75	CONCRETE	1	574.126	566.125			
ST00021		X					778253.3	6367489.363	10						Pipe	450	15	CONCRETE	1	576.479	576.154			
ST00022		X					778249.807	6367252.457	13						Pipe	450	15	CONCRETE	1	583.095	582.000			
ST00023		X					778217.238	6367255.45	15						Pipe	600	20	CONCRETE	1	580.141	579.518			
ST00024		X					778077.082	6367285.918	ST00024						Pipe	600	140	CONCRETE	1	579.518	571.522	45		
ST00025		X					778109.835	6367268.007	ST00025						Pipe	220	75	CONCRETE	1	578.878	575.656			
ST00026		X					778348.727	6367020.529	ST00026						Pipe	450	25	CONCRETE	1	594.015	592.160			
ST00027		X					778170.812	6367071.214	20						Pipe	450	22	CONCRETE	1	582.094	581.561			
ST00028		X					778170.812	6367071.214	24						Pipe	450	27	CONCRETE	1	581.561	580.256			
ST00029		X					778200.345	6367035.762	21						Pipe	450	5	CONCRETE	1	582.213	582.229			
ST00030		X					778171.476	6367034.603							Pipe	450	5	CONCRETE	1	582.229	582.032			
ST00031		X					778113.936	6367051.826	24						Pipe	450	20	CONCRETE	1	582.032	580.256			
ST00032		X					778117.004	6367051.222							Pipe	450	137	CONCRETE	1	580.256	576.736			

ST00033		X					777972.181	6367078.2	25						Pipe	450	20	CONCRETE	1	575.585				Downstream outlet of ST00033 Unable to be found. Query possible buried junction pit and outlet at ST00034
ST00034		X					777973.014	6367091.094	26						Pipe	450	15	CONCRETE	1	575.758	575.497	NONE		
ST00035		X					778554.793	6366737.604	ST00116						Pipe	450	10	CONCRETE	1	589.881	589.707			
ST00036		X					778332.781	6366796.704	27						Pipe	450	2	CONCRETE	1	588.852	588.826			
ST00037		X					778308.688	6366801.021	28						Pipe	450	17	CONCRETE	1	588.826	588.120			
ST00038		X					778308.520	6366789.023	29						CULVERT	600x300	17	CONCRETE	1	588.842	588.242			
ST00039		X					778156.495	6366833.836	30						Pipe	450	2	CONCRETE	1	583.063	581.875			
ST00040		X					778145.788	6366835.845	32						Pipe	600	17	CONCRETE	1	581.875	581.581			
ST00041		X					778145.788	6366835.845	50						Pipe	450	15	CONCRETE	1	581.581				ST00041 D/S INVERT UNABLE TO BE OBTAINED PIT NOT LOCATED - BURIED?
ST00042		X					778154.888	6366818.235	34						Pipe	450	220	CONCRETE	1		577.677			Unable to obtain upstream invert - buried pit
ST00043		X					777931.18	6366861.071	33						Pipe	450	10	CONCRETE	1	577.677	577.596			
ST00044		X					778298.994	6366574.764	35						Pipe	450	15	CONCRETE	1	584.131	584.106			
ST00045		X					778294.542	6366566.448	37						Pipe	450	90	CONCRETE	1	584.106	579.474			
ST00046		X					778209.632	6366583.503	37						Pipe	450	80	CONCRETE	1	579.474	576.742			
ST00047		X					778085.189	6366604.287	ST00047						Pipe	450	20	CONCRETE	1	576.742	575.598	45		
ST00048		X					777949.656	6366633.460	ST00048						Pipe	450	12	CONCRETE	2	573.864	573.762	45		
ST00049		X					777891.832	6366702.633							Pipe	450	9	CONCRETE	1	572.425	572.119			
ST00050		X					777887.884	6366655.684	ST00050						Pipe	450	13	CONCRETE	1	573.708	573.626	45		
ST00051		X					777878.655	6366633.524							Pipe	600	12	CONCRETE	2	572.730	572.512	45		
ST00052		X					778233.252	6366366.619	42						Pipe	600	15	CONCRETE	1	580.891	-			Unable to locate outlet to pipe ST00052
ST00053		X					778225.984	6366331.366	44_2	NEW PIPE AND CULVERT UPSTREAM					Pipe	600	20	CONCRETE	1	580.695	580.345			
ST00054		X					778250.546	6366348.666	43						Pipe	450	110	CONCRETE	1	587.439	580.775			
ST00055		X					778250.622	6366349.579	44						Pipe	450	15	CONCRETE	1	580.839	580.541			
ST00056		X					778240.389	6366329.069	44						Pipe	450	2	CONCRETE	1	580.775	580.541			
ST00057		X					778373.118	6366336.589	39						Pipe	375	15	CONCRETE	1	588.356	587.439			
ST00058		X					777882.163	6366431.530	ST00058						Pipe	900	10	CONCRETE	2	574.964	574.782	0		
ST00059		X					777849.974	6366494.819	ST00059						CULVERT	1800X1500	9	CONCRETE	2	573.220	573.166	45		
ST00060		X					778626.732	6366100.773	ST00060						Pipe	450	12	CONCRETE	1	600.285	599.951	30		
ST00061		X					778584.760	6366108.283	ST00061						Pipe	450	9	CONCRETE	1	602.164	601.954	30		
ST00062		X					778410.71	6366147.683	45						Pipe	450	150	CONCRETE	1	587.412	584.165			
ST00063		X					778223.533	6366183.594	47						Pipe	450	60	CONCRETE	1	584.149	581.488			
ST00064		X					778197.527	6266200.140	ST00064	INLET PIT LOCATED (UNDER COTTAGE LN) REFER A30					Pipe	-	108	CONCRETE	1	-				INVERTS UNABLE TO BE OBTAINED DUE TO COVERED JUNCTION PITS
ST00065		X					778215.221	6366195.986	48						Pipe	450	2	CONCRETE	1	581.488	581.081			
ST00066		X					778197.527	6366200.140	52						Pipe	450	22	CONCRETE	1	581.081	-			ST00066 RUNS FROM PIT 48 TO PIT 52
ST00067		X					778203.566	6366133.371	ST00067						Pipe	450	20	CONCRETE	2	581.454	581.081			
ST00068		X					778203.566	6366133.371	ST00068						CULVERT	600X300	10	CONCRETE	1	581.269	581.262	45		
ST00069		X					777630.340	6367222.709	ST00069						Pipe	450	12	CONCRETE	2	574.035	573.868	30		
ST00070		X					777680.157	6367302.704	ST00070						Pipe	450	12	CONCRETE	1	573.014	572.587	45		
ST00071		X					777698.260	6367339.048	ST00071						Pipe	450	10	CONCRETE	1	574.086	573.815			
ST00072		X					777751.304	6367393.153	ST00072						Pipe	600	10	CONCRETE	1	574.423	574.081	20		PIPE FOUND TO BE 600, NOT 450
ST00073		X					777818.458	6367492.257	ST00073	EXTRA 600mm PIPE (same location)					Pipe	450 & 600	10	CONCRETE	2	577.264	577.024	20		ONE 450 DIAMETER, ONE 600 DIAMETER
ST00074		X					778062.763	6367617.501	ST00074						Pipe	450	8	CONCRETE	1	572.830	572.491	10		
ST00075		X					778323.563	6367982.552	ST00075						Pipe	450	12	CONCRETE	1	573.201	572.792	30		
ST00076	X						778735.050	6366707.237	ST00076		INLET	600X200	-	760										
ST00077	X										INLET			0										Pit not located - nothing found on site
ST00079	X						778489.880	6366668.151	ST00079		GRATE	0	900X600	650										
ST00080	X						778502.075	6366670.434	ST00080		GRATE	0	900X600	1340										
ST00081	X						778548.198	6366418.527	ST00081		KERB-INL	1000	900X600	2230										
ST00116	X						778561.228	6366740.360	ST00116		KERB-OUTLET	2400	-	0										
ST00125		X					778025.739	6360329.886							Pipe	450	30	CONCRETE	1	640.273				Unable to find outlet to ST00125 - overgrown and possibly buried - long grass and excess landfill in location
ST00126		X					778098.573	6360438.710							Pipe	450	40	CONCRETE	1	638.891	638.830			
ST00127		X					778057.074	6360439.457							Pipe	450	30	CONCRETE	1	638.830	638.582			
ST00128		X					777984.535	6360433.114							Pipe	450	5	CONCRETE	1	636.055	635.958			
ST00129		X					777988.655	6360440.942							Pipe	450	35	CONCRETE	1	635.958	633.723			
ST00130		X					777951.518	6360458.004							Pipe	450	35	CONCRETE	1	633.723	632.793			
ST00132		X					778063.924	6360458.521							Pipe	450	125	CONCRETE	1	638.019	632.374			
ST00133		X					777975.5	6360527.108							Pipe	450	25	CONCRETE	1	633.230	632.374			
ST00134		X					777974.997	6360542.29							Pipe	450	50	CONCRETE	1	632.374	630.388			Note: Culvert C02 exists instead of this pipe - condition of pipe unknown. Inverts obtained by pit at either end
ST00135		X					777975.715	6360601.271							Pipe	750	15	CONCRETE	1	630.388	630.259			
ST00136		X					777985.91	6360571.156							Pipe	450	18	CONCRETE	1	630.848	630.827			
ST00137		X					777985.108	6360581.494							Pipe	450	5	CONCRETE	1	630.827	630.388			
ST00138		X					778041.611	6360763.355							Pipe	450	14	CONCRETE	1	633.178	632.993			
ST00139		X					778153.086	6360876.478	ST00320						Pipe	375	10	CONCRETE	1	629.217	629.199			
ST00140		X					778241.475	6360920.286	ST00321						Pipe	900	10	CONCRETE	1	627.354	626.773	15		
ST00141		X					778382.987	6360978.944	ST00141		INLET	1200X300			Pipe	450	10	CONCRETE	1	627.388	627.152			(FOUND LETTERBOX PIT)
ST00142		X					778461.298	6361003.134	ST00325						Pipe	450	12	CONCRETE	1	628.560	628.138			
ST00143		X					778259.642	6360677.645	ST00313						Pipe	450	5	CONCRETE	1	635.855	635.448			

ST00144	X	778255.438	6360686.361	ST00144		INLET	600	450X450	Pipe	375	20	CONCRETE	1	635.448	635.299	(FOUND TO BE 375 NOT 450) (FOUND TO BE GKIP)	
ST00145	X	778255.673	6360697.073	ST00315					Pipe	450	60	CONCRETE	1	635.299	634.161		
ST00146	X	778273.553	6360749.57	ST00529					Pipe	450	17	CONCRETE	1	635.104	633.761		
ST00147	X	778225.312	6360819.157	ST00319					Pipe	450	17	CONCRETE	1	630.978	630.739		
ST00148	X	778279.187	6360806.43	ST00317					Pipe	450	55	CONCRETE	1	632.552	630.978		
ST00149	X	778261.239	6360757.425	ST00530					Pipe	450	60	CONCRETE	1	634.631	632.851		
ST00150	X	778383.675	6360804.226	ST00322					Pipe	450	15	CONCRETE	1	633.536	633.182		
ST00151	X	778383.861	6360815.982	ST00323					Pipe	450	105	CONCRETE	1	633.182		Unable to find outlet for ST00151 - outlet appears to have been buried	
ST00152	X	778528.932	6360922.976	ST00327					Pipe	450	15	CONCRETE	1	628.652	628.603		
ST00153	X	778513.449	6360813.525	ST00502					Pipe	450	110	CONCRETE	1	631.760	628.652		
ST00154	X	778496.338	6360819.17	ST00328					Pipe	375	15	CONCRETE	1	632.905	632.855		
ST00155	X	778499.363	6360801.953	ST00329					Pipe	450	10	CONCRETE	1		632.902	No pipe inlet visible for pipe ST00155 - downstream IL given is pit invert of ST00329. CO-ordinates are also from ST00329	
ST00156	X								Pipe	450	12					Site inspection in 1998/99 revealed this pipe did not exist - please check.	Pipe unable to be found
ST00157	X	778514.396	6360692.095	ST00513					Pipe	450	90	CONCRETE	1	638.179	632.497		
ST00158	X	778512.562	6360680.445	ST00506					Pipe	450	40	CONCRETE	1	638.357	638.179		
ST00159	X	778481.196	6360677.483	ST00159					Pipe	225	20	CLAY	1	639.568		Downstream end of pipe not found - possible buried junction pit at ST00505	
ST00160	X	778453.187	6360693.074	ST00409					Pipe	450	23	CONCRETE	1	638.157		Downstream end of pipe not found - possible buried junction pit at ST00505	
ST00161	X	778453.075	6360682.33						Pipe	450	12	CONCRETE	1	638.355	638.157		
ST00162	X	778478.841	6360555.528						Pipe	450	15	CONCRETE	1	644.565	644.192		
ST00163	X	778470.737	6360560.441						Pipe	450	13	CONCRETE	1	644.346	644.192		
ST00164	X	778474.044	6360571.807						Pipe	450	5	CONCRETE	1	644.192	643.590		
ST00165	X	778271.585	6360435.369						Pipe	450	35	CONCRETE	1	647.400	645.967		
ST00166	X	778276.667	6360442.956						Pipe	450	20	CONCRETE	1	647.150	646.328		
ST00167	X	778275.236	6360453.926						Pipe	450	22	CONCRETE	1	646.328	646.056		
ST00168	X	778268.912	6360325.089						Pipe	300	35	CONCRETE	1	657.330	655.800		
ST00169	X	778473.897	6360304.204	ST00425					Pipe	450	5	CONCRETE	1	662.716	662.378		
ST00170	X	778470.084	6360308.999	ST00426					Pipe	450	22	CONCRETE	1	662.378	661.248		
ST00171	X	778470.04	6360320.972	ST00427					Pipe	450	16	CONCRETE	1	661.248	660.573		
ST00172	X	778485.168	6360304.926	ST00424					Pipe	450	22	CONCRETE	1	662.298	660.573		
ST00173	X	778475	6360428.216						Pipe	450	15	CONCRETE	1	654.588	654.117		
ST00174	X	778486.976	6360427.332						Pipe	450	100	CONCRETE	1	654.117	648.087		
ST00175	X	778591.489	6360428.972						Pipe	450	100	CONCRETE	1	648.087	646.280		
ST00176	X	778697.682	6360422.449						Pipe	450	10	CONCRETE	1	646.710	646.280		
ST00177	X	778693.337	6360426.997						Pipe	450	20	CONCRETE	1	646.280	645.663		
ST00178	X	778693.687	6360445.586						Pipe	450	25	CONCRETE	1	645.663	645.606	Pit ST00510 unable to be opened (junction pit)	
ST00179	X	778709.97	6360422.311						Pipe	450	30	CONCRETE	1	645.680	645.166	Pit ST00510 unable to be opened (junction pit)	
ST00180	X	778690.637	6360305.903	ST00408					Pipe	450	30	CONCRETE	1	653.670	653.370		
ST00181	X	778691.291	6360316.268	ST00409					Pipe	450	30	CONCRETE	1	653.433	652.610		
ST00182	X	778701.213	6360551.824						Pipe	450	2	CONCRETE	1	666.122		equipment	
ST00183	X	778701.213	6360551.824						Pipe	450	25	CONCRETE	1				
ST00184	X	778691.075	6360567.634						Pipe	450	25	CONCRETE	1	640.753		Unable to find outlet of pipe ST00184	
ST00185	X	778697.716	6360676.74						Pipe	450	30	CONCRETE	1	636.743	636.349		
ST00186	X	778697.182	6360688.192						Pipe	450	30	CONCRETE	1	636.668	635.999		
ST00187	X	778705.413	6360793.08	ST00335					Pipe	450	2	CONCRETE	1	630.970	630.954	Inspection in 1998/99 failed to find this pipe.	
ST00188	X	778716.495	6360792.397	ST00336					Pipe	450	30	CONCRETE	1	630.970	630.970	Inspection in 1998/99 failed to find this pipe.	
ST00189	X	778722.85	6360797.091	ST00337					Pipe	450	2	CONCRETE	1	631.025	630.970	Inspection in 1998/99 failed to find this pipe.	
ST00190	X	778635.608	6360920.854						Pipe	600	60	CONCRETE	1		627.293	Unable to fnd pit ST00512	
ST00191	X	778722.776	6360809.009						Pipe	450	30	CONCRETE	1	630.663	629.088		
ST00192	X	778709.955	6360852.836						Pipe	450	20	CONCRETE	1	629.824	629.544		
ST00193	X	778706.396	6360852.796						Pipe	450	40	CONCRETE	1	629.544		Unable to fnd pit ST00512	
ST00194	X								Pipe	450	30	CONCRETE	1			Unable to find inlet for pipe ST00194 (Pit ST00407 Unable to be found)	
ST00195	X	778879.153	6360301.394	ST00405					Pipe	450	30	CONCRETE	1	648.575	648.064		
ST00196	X	778878.276	6360310.913	ST00405					Pipe	600	125	CONCRETE	1	648.061	641.560		
ST00197	X	778820.388	6360424.318	ST00404					Pipe	600	35	CONCRETE	1	641.560	641.166		
ST00198	X	778802.416	6360443.598	ST00403					Pipe	600	105	CONCRETE	1	641.166	636.950		
ST00199	X	778798.337	6360554.67	ST00402					Pipe	600	20	CONCRETE	1	636.950	636.884		
ST00200	X	778797.772	6360565.459	ST00401	Junction and two inlet pits located upstream				Pipe	600	145	CONCRETE	1	636.884	633.335		
ST00201	X	778780.581	6360712.686	ST00513					Pipe	600	100	CONCRETE	1	633.335	631.025		
ST00202	X	778722.85	6360797.091	ST00337					Pipe	600	40	CONCRETE	1	631.138	629.088		
ST00203	X	778700.187	6360809.47						Pipe	600	55	CONCRETE	1	629.088		Unable to fnd pit ST00512	
ST00204	X	778635.608	6360920.854						Pipe	600	13	CONCRETE	1	627.293	627.133		
ST00205	X	778641.266	6360950.171						Pipe	600	13	CONCRETE	1	627.133	625.990		
ST00206	X	778925.331	6360414.393						Pipe	450	5	CONCRETE	1	646.548		Downstream invert not obtained as pit ST00514 could not be found	
ST00207	X	778939.747	6360420.094						Pipe	450	25	CONCRETE	1	646.612		Downstream invert not obtained as pit ST00514 could not be found	
ST00208	X	778949.244	6360440.709						Pipe	450	2	CONCRETE	1	646.836	646.571		

ST00209		X					778946.661	6360445.059							Pipe	450	18	CONCRETE	1	646.571				Downstream invert not obtained as pit ST00395could not be found	
ST00210		X					778927.934	6360441.117							Pipe	450	152	CONCRETE	1	646.066	641.166				
ST00211		X					778927.934	6360441.117							Pipe	450	2	CONCRETE	1	641.166				Downstream invert not obtained as pit ST00395could not be found	
ST00212		X					779050.311	6360616.842							Pipe	450	18	CONCRETE	1	645.804	645.608				
ST00213		X					779044.740	6360608.640							Pipe	450	76	CONCRETE	1	445.608	644.973				
ST00214		X					778999.809	6360549.031							Pipe	450	65	CONCRETE	1	644.973	643.478				
ST00215		X					778950.039	6360558.301							Pipe	450	45	CONCRETE	1	643.478	640.413				
ST00216		X					778869.994	6360563.902							Pipe	450	109	CONCRETE	1	640.413	636.884				
ST00217		X					778724.791	6360930.733							Pipe	450	25	CONCRETE	1	631.022	629.535				
ST00218		X					778724.534	6360918.026							Pipe	450	25	CONCRETE	1	631.013	629.535				
ST00219		X					778726.772	6361040.994	ST00343						Pipe	450	15	CONCRETE	1	630.025	629.624				
ST00220		X					778731.186	6361050.94	ST00344						Pipe	450	15	CONCRETE	1	629.624	628.852				
ST00221		X					778730.937	6361075.186	ST00345						Pipe	450	20	CONCRETE	1	628.852	628.661				
ST00222		X					778795.35	6361129.311	ST00348						Pipe	450	20	CONCRETE	1	630.035	629.881				
ST00223		X					778791.516	6361140.215	ST00347						Pipe	450	25	CONCRETE	1	629.881				Unable to obtain invert of outlet due to overgrown area	
ST00224		X					778914.101	6361240.21	ST00350						Pipe	450	13	CONCRETE	1	626.511	626.342				
ST00225		X					778914.101	6361240.21	ST00349						Pipe	450	20	CONCRETE	1	626.342	626.266				
ST00226		X					778907.604	6361129.745	ST00226						Pipe	450	13	CONCRETE	1	630.918	630.873				
ST00227		X					779004.660	6361064.542							Pipe	450	20	CONCRETE	1	633.934	633.842				
ST00228		X					779022.293	6361103.336							Pipe	450	20	CONCRETE	1	632.348	630.456				
ST00229		X					779012.003	6361105.690							Pipe	450	20	CONCRETE	1	632.466	630.599				
ST00230		X					779037.313	6361236.378	ST00351						Pipe	450	2	CONCRETE	1	625.043	625.002				
ST00231		X					779032.788	6361242.609	ST00352						Pipe	450	24	CONCRETE	1	625.002	624.162				
ST00232		X					779053.739	6361238.752	ST00354						Pipe	450	12	CONCRETE	1	624.162	624.114				
ST00233		X					779040.092	6360904.803							Pipe	450	2	CONCRETE	1	637.704	637.615				
ST00234		X													Pipe	450	13		1					Inspection in 1998/99 failed to find this pipe.	Pipe unable to be found
ST00235		X													Pipe	450	37		1					Inspection in 1998/99 failed to find this pipe.	Pipe unable to be found
ST00236		X													Pipe	450	13		1					Inspection in 1998/99 failed to find this pipe.	Pipe unable to be found
ST00237		X					779042.868	6360898.874							Pipe	450	13	CONCRETE	1	637.715	637.551				
ST00238		X					779091.62	6360895.147							Pipe	450	15	CONCRETE	1	637.419	637.318				
ST00239		X					779059.059	6360775.352							Pipe	450	13	CONCRETE	1	642.994	642.712				
ST00240		X					779109.293	6360990.167							Pipe	450	110	CONCRETE	1	634.287	631.113				
ST00241		X					779244.314	6361196.469							Pipe	450	33	CONCRETE	1	629.911	626.635				
ST00242		X					779254.773	6361194.253							Pipe	450	5	CONCRETE	1	626.635	626.489				
ST00243		X					779367.681	6361167.791							Pipe	450	105	CONCRETE	1	630.089	626.489				
ST00244		X					779262.85	6361197.708							Pipe	450	20	CONCRETE	1	626.489				Unable to locate downstream pit (ST00519). Pit buried or does not exist	
ST00245		X													Pipe	450	100		1					Unable to find pit ST00519 - No upstream information available.	
ST00246		X					779107.639	6360725.396							Pipe	450	75	CONCRETE	1	644.949	643.470				
ST00247		X					779133.558	6360788.388							Pipe	450	110	CONCRETE	1	643.476	640.272				
ST00248		X					779243.666	6360958.106							Pipe	450	100	CONCRETE	1	640.272	636.770				
ST00249		X					779243.666	6360958.106							Pipe	450	15	CONCRETE	1	636.77	636.744				
ST00250		X					779252.207	6360958.955	ST00363						Pipe	450	70	CONCRETE	1	636.877	632.711				
ST00251		X					779282.544	6361016.672	ST00362						Pipe	450	18	CONCRETE	1	632.711				Unable to obtain downstream invert - pit ST00522 Not Found (Query Buried)	
ST00252		X					779326.778	6361084.092	ST00361						Pipe	450	18	CONCRETE	1	630.768				Unable to obtain downstream invert - pit ST00523 Not Found (Query Buried)	
ST00253		X					779374.626	6361157.056	ST00360						Pipe	450	18	CONCRETE	1	630.413	630.089				
ST00254		X													Pipe	450	80		1					Unable to obtain information - Pits ST00522 and ST00523 Not Found	
ST00255		X					779236.979	6360565.823	ST00389						Pipe	450	18	CONCRETE	1	660.426	660.203				
ST00256		X					779247.014	6360564.034	ST00388						Pipe	450	15	CONCRETE	1	660.534	660.490				
ST00257		X					779262.053	6360689.556	ST00385						Pipe	450	30	CONCRETE	1	653.161					
ST00258		X					779268.626	6360689.051	ST00384						Pipe	450	2	CONCRETE	1	653.879	653.060				
ST00259		X					779277.388	6360694.526	ST00383						Pipe	450	20	CONCRETE	1	653.060	652.800				
ST00260		X					779278.909	6360703.709	ST00382						Pipe	450	20	CONCRETE	1	652.800	645.771			Did not find junction between pipe ST00260 and culvert C08 (assumed that ST00260 runs full length and joins with pipe ST00263	
ST00261		X					779283.665	6360812.583	ST00380						Pipe	450	120	CONCRETE	1	645.912	639.470			Inspection in 1998/99 failed to find this pipe.	Pipe found - pipe ST00262 not found
ST00262		X													Pipe	450	18		1					Pipe Not Found - Does Not Exist	
ST00263		X					779293.654	6360816.506	ST00381						Pipe	450	120	CONCRETE	1	645.771	639.379				
ST00264		X					779313.106	6360918.186	ST00366						Pipe	450	2	CONCRETE	1	639.379	639.179				
ST00265		X					779320.48	6360923.426	ST00365						Pipe	450	18	CONCRETE	1	639.179	639.029				

ST00266		X					779322.959	6360932.181							Pipe	450	20	CONCRETE	1	630.029				Unable to obtain downstream invert - Pit ST00528 not found. Possibly buried	
ST00267		X					779556.194	6360918.278							Pipe	450	18	CONCRETE	1	651.316	651.218				
ST00268		X					779551.382	6360926.448							Pipe	450	82	CONCRETE	1	651.218				Unable to find outlet to pipe. Outlet possibly buried	
ST00269		X					777859.337	6360961.710	ST00269						Pipe	375	15	CONCRETE	1	628.085	627.926			PIPE MEASURED TO BE 375, NOT 475	
ST00270		X					777876.482	6360942.568	ST00428						Pipe	475	15	CONCRETE	1	629.056	628.759				
ST00271		X					777854.522	6360828.533	ST00271						Pipe	525	20	CONCRETE	1	626.077	625.685			PIPE MEASURED TO BE 525, NOT 450	
ST00272		X					777821.387	6360657.578	ST00272						Pipe	1050	20	CONCRETE	1	624.644	624.396	35 ENTRY , 45 EXIT		PIPE MEASURED TO BE 1050, NOT 900	
ST00273		X					777845.633	6360612.100	ST00273						Pipe	450	16	CONCRETE	1	625.902	625.584			Inspection in 1998/99 failed to find this pipe.	" PIPE FOUND (LETTER BOX. LINTEL SIZE: 300X250 DEPTH:0.75)
ST00274	X										ENCLOSED			0											Pit not located - only outlet to pipe ST00296 in this location - refer to photo
ST00275		X					777892.907	6360472.332	ST00430						Pipe	450	35	CONCRETE	1	631.824					
ST00276		X					777804.653	6360504.89	ST00431	LETTERBOX PIT LOCATED BEFORE OUTLET ON CROWN STREET					Pipe	450	80	CONCRETE	1	631.084	627.555				
ST00277		X					777946.926	6360800.502	ST00277						Pipe	450	35	CONCRETE	1	629.327	628.836				
ST00278		X					777911.225	6360627.399	ST00278						Pipe	900	28	CONCRETE	1	626.950	626.456	30		Inspection in 1998/99 failed to find this pipe.	
ST00279		X					777841.939	6360347.204	ST00279						Pipe	475	22	CONCRETE	1	631.543	630.706	30			
ST00280		X					777773.258	6360332.939	ST00280						Pipe	475	13	CONCRETE	1	627.461	627.393				
ST00281		X					777756.11	6360310.281	ST00281						Pipe	475	25	CONCRETE	1	627.393	627.003				
ST00282		X					777776.835	6360309.479	ST00500						Pipe	475	2	CONCRETE	1		627.393			FAILED TO FIND UPSTREAM INLETS FOR PIPES 282 AND 283	
ST00283		X					777776.835	6360309.479	ST00500						Pipe	475	2	CONCRETE	1		627.393			FAILED TO FIND UPSTREAM INLETS FOR PIPES 282 AND 284	
ST00284		X					777609.746	6360037.472	ST00284						Pipe	1200	18	CONCRETE	1	643.427	643.287				
ST00285		X					777797.07	6359838.302	ST00285						Pipe	600	22	CONCRETE	1	625.933	625.641				
ST00286		X					777796.066	6359837.892	ST00285						Pipe	600	22	CONCRETE	1	626.012	625.653				
ST00287		X					777742.719	6359843.938	ST00287						Pipe	300	18	CONCRETE	1	627.641	627.424				
ST00288		X					777583.965	6359848.238	ST00288	2 SMALL CULVERTS UNDER DRIVEWAYS EAST OF ST00288 EITHER SIDE OF ANZAC AVE					Pipe	450	22	CONCRETE	1	622.268	621.875				
ST00289		X					777753.707	6359900.683	ST00290						Pipe	450	30	CONCRETE	1	623.997	623.374			pipe 450 not 600	
ST00290		X					777752.381	6359900.238	ST00290						Pipe	600	30	CONCRETE	1	623.929	623.355				
ST00291		X					777915.839	6360178.594							Pipe	1500	15	CONCRETE	1	625.271	625.054				
ST00292		X					777915.615	6360177.063							Pipe	1500	15	CONCRETE	1	625.269	625.054				
ST00293		X					777909.856	6359915.562		extra pit on opposite side of road					Pipe	450	65	CONCRETE	1	628.868	628.720				
ST00294		X					777910.533	6359958.922							Pipe	450	22	CONCRETE	1	628.720	628.203				
ST00295		X					777908.027	6359847.802							Pipe	450	23	CONCRETE	1	629.636	629.329				
ST00296		X					777896.085	6359852.823	ST00296						Pipe	450	2	CONCRETE	1	629.481	629.329				
ST00297	X						778025.739	6360329.886			KERB-INL	2000	900X450	710											
ST00298	X						778098.573	6360438.710			KERB-INL	1800	900X600	730											
ST00299	X						778053.058	6360435.037			GRATE	0	450X450	350											
ST00300	X						777988.655	6360440.942			KERB-INL	0	900X600	920											
ST00301	X						777984.535	6360433.114			GRATE	600X80	0	700											
ST00302	X						777951.518	6360458.004			KERB-INL	2400	800X400	1570											
ST00303	X						778173.010	6360455.936			INLET	-	900x6000	350										New trafficisland and kerb blister in main street - gutter bridge	
ST00304	X						778063.924	6360458.521			KERB-INL	900	900X600	650											
ST00305	X						777975.531	6360527.092			GRATE	0	450	600											
ST00306	X						777974.997	6360542.29			KERB-INL	1000	900x600	670											
ST00307	X						777985.91	6360571.156			KERB-INL	1800	900x400	820											
ST00308	X						777985.108	6360581.494			KERB-INL	2100	900x400	900											
ST00309	X						777975.715	6360601.271			KERB-INL	900	900x600	1175											
ST00310	X						778268.999	6360325.054			KERB-INL	1000	800X400	430											
ST00311	X						778276.667	6360442.956			INLET	2800	900X600	600											
ST00312	X						778275.236	6360453.926			KERB-INL	2700	900X600	1000											
ST00313	X						778259.781	6360677.781			KERB-INL	600	450x450	730											
ST00314	X						778259.781	6360677.506	ST00314		KERB-INL	600	450X450	720											
ST00315	X						778255.690	6360696.818	ST00315		KERB-INL	600	450X450	920											
ST00316	X						778041.611	6360763.355			KERB-INL	900	900x600	850											
ST00317	X						778279.187	6360806.430	ST00317		GRATE	600X900		440 TO OBV											
ST00318	X						778224.682	6360807.915	ST00318		KERB-INL	900X600		900											
ST00319	X						778225.312	6360819.157	ST00319		KERB-INL	900X600		900											
ST00320	X						778153.086	6360876.478	ST00320		INLET	600X250		900											
ST00321		X					778241.475	6360920.286	ST00321		INLET			0										PIT ST00321 NOT LOCATED HEADWALL ENTRY NOT PIT AT THIS LOCATION. REFER PIPE ST00140 FOR DETAILS	

ST00322	X						778383.675	6360804.226			GRATE	600X80	450X500	1350										
ST00323	X						778383.861	6360815.982			GRATE	-	450x500	1750										
ST00324	X						778382.987	6360978.944			INLET	1200x300	-	950										
ST00325	X						778461.298	6361003.134	ST00325		INLET	600X250		930 (FROM LID)										
ST00326	X						778528.621	6360933.525			INLET	600X350	0	450										
ST00327	X						778528.932	6360922.976			KERB-INL	2400X110	800X400	790										
ST00328	X						778484.691	6360819.221			KERB-INL	1200X220	-	-										Unable to obtain pit depth
ST00329	X						778499.363	6360801.953	ST00329		GRATE	-	900X600	1040										Pipe inlet to ST00329 not found
ST00330	X						778511.187	6360801.395			KERB-INL	1000X200	0	0										
ST00331	X						778639.950	6360931.856			GRATE	0	950X950	790										
ST00332	X						778635.608	6360920.854			KERB-INL	2400X110	800X400	800										
ST00333	X						778700.923	6360815.637			ENCLOSED	0	0	2050										JUNCTION PIT NOT KIP
ST00334	X						778700.649	6360798.021			KERB-INL	1020X150	900X600	350										
ST00335	X						778705.413	6360793.080			KERB-INL	970X150	900X600	420										Inspection in 1998/99 failed to find this pit.
ST00336	X						778716.495	6360792.397			KERB-INL	970X129	900X600	640										Inspection in 1998/99 failed to find this pit.
ST00337	X						778722.850	6360797.091			KERB-INL	1020X150	0	500										
ST00338	X						778722.776	6360809.009			KERB-INL	1100X150	900X600	800										
ST00339	X						778718.533	6360852.832			KERB-INL	870X190	0	830										
ST00340	X						778706.396	6360852.796			KERB-INL	-	1600X960	680										
ST00341	X						778724.534	6360918.026			INLET	700X140	0	600										
ST00342	X						778724.791	6360930.733			INLET	600X200	0	500										
ST00343	X						778726.772	6361040.994			INLET	600X280	0	780										
ST00344	X						778731.186	6361050.940			INLET	600X250	0	880										
ST00345	X						778730.937	6361075.186			INLET	600X260	0	1080										
ST00346	X						778719.841	6361078.168			INLET	600X260	0	1100										
ST00347	X						778791.516	6361140.215			INLET	600X250	0	940										
ST00348	X						778795.350	6361129.311			INLET	600X220	0	860										
ST00349	X						778902.045	6361247.364			INLET	600X290	0	1010										
ST00350	X						778914.101	6361240.210			INLET	600X200	0	1080										
ST00351	X						779037.313	6361236.378			INLET	600X250	0	960										
ST00352	X						779032.788	6361242.609			INLET	600X250	0	1010										
ST00353	X						779053.564	6361249.305			INLET	600X280	0	1050										
ST00354	X						779053.739	6361238.752			INLET	600X250	0	1150										
ST00355	X						779244.314	6361196.469			INLET	620X150	0	620										
ST00356	X						779271.037	6361207.292			INLET	540X130	0	1040										
ST00357	X						779254.773	6361194.253			KERB-INL	1700X100	960X540	1120										
ST00358	X						779262.850	6361197.708			INLET	560X110	0	1000										NOT FOUND
ST00359	X						779367.681	6361167.791			KERB-INL	1890X180	980X580	530										
ST00360	X						779374.626	6361157.056			INLET	1890X180	980X580	2400										
ST00361	X						779326.778	6361084.092			GRATE	0	1000X500	1950										
ST00362	X						779282.544	6361016.672			GRATE	2150	1000X530	2050										
ST00363	X						779253.653	6360973.968			INLET	500X200	0	400										
ST00364	X						779322.959	6360932.181			GRATE	1000X120	900X400	740										
ST00365	X						779320.480	6360923.428			GRATE	1860X110	870X440	920										
ST00366	X						779313.106	6360918.186			GRATE	1200X120	900X400	900										
ST00367	X						779303.359	6360917.867			GRATE	1800X110	900X400	870										
ST00368	X						779243.666	6360958.106			GRATE	920X170	880X500	850										
ST00369	X						779551.662	6360926.315			KERB-INL	2400	800X400	1000										
ST00370	X						779556.194	6360918.278			KERB-INL	2400	800x400	840										
ST00371	X						779088.366	6360906.635			INLET	600x350	-	1050										
ST00372	X						779091.62	6360895.147			INLET	600x300	-	1080										
ST00373	X						779053.757	6360896.886			INLET	600x250	-	920										
ST00374	X						779042.868	6360898.874			INLET	600x250	-	930										
ST00375	X						779040.092	6360904.803			INLET	600x260	-	800										
ST00376	X						779070.722	6360785.371			KERB-INL	1000	900x600	960										
ST00377	X						779059.059	6360775.352			KERB-INL	1000	900x600	820										
ST00378	X										GRATE			0										Pit 378 Unable to be recorded
ST00379	X						779133.558	6360788.388			GRATE	1000	900X600	630										
ST00380	X						779283.665	6360812.583			GRATE	2400x110	900x400	1130										
ST00381	X						779293.654	6360816.506			GRATE	1800X110	900X400	980										
ST00382	X						779278.909	6360703.709			INLET	600x330	-	1500										
ST00383	X						779277.388	6360694.526			KERB-INL	2401	1000x400	470										
ST00384	X						779268.626	6360689.051			KERB-INL	3340	1000x380	1270										
ST00385	X						779262.053	6360689.556			KERB-INL	3341	1000x381	1080										
ST00386	X						779107.639	6360725.396			KERB-INL	800X600	2400	1145										
ST00387	X						779254.183	6360568.411			KERB-INL	2400	870x410	700										
ST00388	X						779247.014	6360564.034			KERB-INL	600x270	-	1350										
ST00389	X						779236.979	6360565.823			INLET	600X260	0	720										
ST00390	X						779050.311	6360616.842			KERB-INL	2450X120	870X410	1180										
ST00391	X						779044.740	6360608.640			KERB-INL	2430X110	870X410	1180										
ST00392	X						778999.809	6360549.031			KERB-INL	2630X100	900X400	1180										
ST00393	X						778950.039	6360558.301			KERB-INL	1250X120	0	840										
ST00394	X						778869.994	6360563.902			KERB-INL	1200X120	0	860										
ST00395	X										GRATE			0										Pit was not located
ST00396	X						778946.661	6360445.059			GRATE	510	450X450	510										
ST00397	X						778949.244	6360440.709			GRATE	0	450X450	540										
ST00398	X						778939.747	6360420.094			KERB-INL	970X180	0	1100										
ST00399	X						778925.331	6360414.393			GRATE	0	900X600	1030										
ST00400	X						778927.934	6360441.117			GRATE	0	450X450	670										
ST00401	X						778797.772	6360565.459			KERB-INL	1230X120	0	1600										
ST00402	X						778798.337	6360554.670			KERB-INL	1100X150	0	1550										
ST00403	X						778802.416	6360443.598			KERB-INL	2400X120	800X400	1800										
ST00404	X						778820.388	6360424.318			KERB-INL	2100X300	900X550	1550										
ST00405	X						778878.276	6360310.913			KERB-INL	1900	900X600	810										
ST00406	X						778879.153	6360301.394			KERB-INL	2420	800X400	900										
ST00407	X										KERB-INL													Unable to locate pit ST00407 (only ST00405 & ST00406 found at this location)
ST00408	X						778713.375	6360305.356			KERB-INL	900	900X450	810										
ST00409	X						778691.291	6360316.268			KERB-INL	900	900X450	680										
ST00410	X						778709.970	6360422.311			KERB-INL	1900	900X600	1360										
ST00411	X						778697.682	6360422.449			KERB-INL	1900	900X600	700										
ST00412	X						778693.337	6360426.997			KERB-INL	2060	900X600	1030										

ST00413	X						778693.687	6360445.586			GRATE	450	900X600	800										
ST00414	X						778695.611	6360555.905			INLET	760X170	0	1120										
ST00415	X						778691.075	6360567.634			INLET	430X140	0	830										
ST00416	X						778701.213	6360551.824			INLET	440X220	0	340										
ST00417	X						778591.489	6360428.972			KERB-INL	2100	900X600	1600										
ST00418	X						778470.700	6360560.395			INLET	500X150	0	490										
ST00419	X						778478.446	6360555.077			INLET	1000	-	370										
ST00420	X						778478.446	6360555.077			INLET	1000	0	520										
ST00421	X						778475.000	6360428.216			KERB-INL	2200	900X600	800										
ST00422	X						778486.976	6360427.332			KERB-INL	2000	-	1220										
ST00423	X						778486.426	6360335.074			KERB-OUT	3000X160	0	0										
ST00424	X						778485.168	6360304.926			INLET	700X170	0	1000										
ST00425	X						778473.897	6360304.204			KERB-INL	800X140	900X600	570										
ST00426	X						778470.084	6360308.999			KERB-INL	500X230	-	0										
ST00427	X						778470.040	6360320.972			KERB-INL	620X120	0	700										
ST00428	X						777876.482	6360942.568	ST00428		KERB-INL	500X250		0.83										LETTERBOX PIT
ST00429	X						777859.389	6360962.112	ST00429		INLET	1000	1000X450	860										
ST00430	X						777892.907	6360472.332	ST00430		GRATE	850	900X600	850										
ST00431	X						777876.997	6360471.867	ST00431		KERB-INL	950	900X600	1455										
ST00432	X						777910.539	6359958.763			GRATE	900	900X600	560										
ST00433	X						777909.574	6359915.545			GRATE	900	900X600	600										
ST00434	X						777893.464	6359709.375			GRATE	900	900x600	750										
ST00435		X													Pipe	400	17		1					Charbon/Clandulla
ST00436		X													Pipe	600	20		1					Charbon/Clandulla
ST00437		X													Pipe	450	5		1					Charbon/Clandulla
ST00438		X													Pipe	450	20		1					Charbon/Clandulla
ST00439		X													Pipe	450	14		1					Charbon/Clandulla
ST00440		X													Pipe	450	17		1					Charbon/Clandulla
ST00441		X													Pipe	450	25		1					Charbon/Clandulla
ST00442		X													Pipe	450	30		1					Charbon/Clandulla
ST00443		X													Pipe	450	25		1					Charbon/Clandulla
ST00444		X													Pipe	450	20		1					Charbon/Clandulla
ST00444		X													Pipe	450	20		1					Charbon/Clandulla
ST00445		X													Pipe	600	22		1					Charbon/Clandulla
ST00446		X													Pipe	450	25		1					Charbon/Clandulla
ST00447		X													Pipe	450	25		1					Charbon/Clandulla
ST00448		X													Pipe	450	15		1					Charbon/Clandulla
ST00449		X													Pipe	450	15		1					Charbon/Clandulla
ST00450		X													Pipe	450	15		1					Charbon/Clandulla
ST00451		X													Pipe	450	15		1					Charbon/Clandulla
ST00452		X																						Charbon/Clandulla
ST00453		X													Pipe	450	20		1					Charbon/Clandulla
ST00454		X													Pipe	450	23		1					Charbon/Clandulla
ST00455		X													Pipe	450	23		1					Charbon/Clandulla
ST00456		X													Pipe	450	20		1					Charbon/Clandulla
ST00457		X													Pipe	450	20		1					Charbon/Clandulla
ST00458		X													Pipe	450	15		1					Charbon/Clandulla
ST00459		X													Pipe	450	11		1					Charbon/Clandulla
ST00460		X													Pipe	450	11		1					Charbon/Clandulla
ST00461		X													Pipe	450	11		1					Charbon/Clandulla
ST00462		X													Pipe	450	8		1					Charbon/Clandulla
ST00463		X													Pipe	450	8		1					Charbon/Clandulla
ST00464		X													Pipe	450	8		1					Charbon/Clandulla
ST00465		X													Pipe	450	8		1					Charbon/Clandulla
ST00466		X													Pipe	450	8		1					Charbon/Clandulla
ST00467		X													Pipe	450	8		1					Charbon/Clandulla
ST00468		X													Pipe	450	8		1					Charbon/Clandulla
ST00469		X													Pipe	450	12		1					Charbon/Clandulla
ST00470		X													Pipe	450	10		1					Charbon/Clandulla
ST00471		X													Pipe	450	13		1					Charbon/Clandulla
ST00472		X													Pipe	450	13		1					Charbon/Clandulla
ST00473		X													Pipe	450	13		1					Charbon/Clandulla
ST00474		X													Pipe	450	17		1					Charbon/Clandulla
ST00475		X													Pipe	450	17		1					Charbon/Clandulla
ST00476		X													Pipe	450	5		1					Charbon/Clandulla
ST00477		X													Pipe	450	13		1					Charbon/Clandulla
ST00478		X													Pipe	450	10		1					Charbon/Clandulla
ST00479		X													Pipe	450	12		1					Charbon/Clandulla
ST00480	X										INLET			0										Charbon/Clandulla
ST00481	X										INLET			0										Charbon/Clandulla
ST00482	X										INLET			0										Charbon/Clandulla
ST00483	X										INLET			0										Charbon/Clandulla
ST00484	X										INLET			0										Charbon/Clandulla
ST00485	X										INLET			0										Charbon/Clandulla
ST00486	X										INLET			0										Charbon/Clandulla
ST00487	X										KERB-INL			0										Charbon/Clandulla
ST00488	X										KERB-INL			0										Charbon/Clandulla
ST00489		X					778154.888	6366818.235	ST00489						Pipe	450	20	CONCRETE	1	582.881				
ST00490		X					778196.292	6366188.763	51						Pipe	450	22	CONCRETE	1	581.178	-	45		Unable to obtain downstream invert due to buired pit 52 (large concrete cover with no lifting lugs installed
ST00498	X						778453.075	6360682.330			GRATE	1200	800x400	660										
ST00499	X						778453.187	6360693.074			GRATE	1200	800X400	690										
ST00500	X						777776.863	6360309.489			ENCLOSED	470X150	-	790										
ST00501	X						778496.338	6360819.17			KERB-INL	670	450x500	490										Pit found to be grated kerb inlet pit, not enclosed pit
ST00502	X						778513.449	6360813.525			KERB-INL	1000	900x600	1900										
ST00503		X					778496.338	6360819.17	ST00501						Pipe	450	5	CONCRETE	1	632.855	631.760			
ST00504		X					778511.187	6360801.395	ST00330						Pipe	450	15	CONCRETE	1	632.497	631.760			
ST00505	X										ENCLOSED			0										Pit Unable to be located - assumed buried
ST00506	X										ENCLOSED			0										Pit Unable to be located - assumed buried
ST00507		X					778512.562	6360680.445	ST00507						Pipe	450	30	CONCRETE	1	638.357	638.179			

ST00508		X					778512.562	6360680.445	ST00508						Pipe	450	7	CONCRETE	1		638.179			Pit ST00505 unable to be found - unable to get upsream invert level	
ST00509		X													Pipe	450	2		1					pit ST00505 unable to be found - Pipe ST00509 also unable to be found	
ST00510	X						778714.418	6360445.188			ENCLOSED	0	0	1520											
ST00511		X					778802.416	6360443.598							Pipe	450	90	CONCRETE	1	644.486	641.166			UNABLE TO GET D/S INV COVERED LID	
ST00512	X										ENCLOSED			0										Unable to find pit ST00512 - Covered pit in backyard	
ST00513	X						778780.581	6360712.686			ENCLOSED	0	0	1468											
ST00514	X										ENCLOSED			0											
ST00515		X													Pipe	450	120		1					Inspection in 1998/99 failed to find this pipe.	
ST00516	X										ENCLOSED			0										Inspection in 1998/99 failed to find this pit.	Pipe unable to be found
ST00517	X										ENCLOSED			0										Inspection in 1998/99 failed to find this pit.	Pit unable to be found
ST00518		X													Pipe	450	13		1					Inspection in 1998/99 failed to find this pipe.	Pit unable to be found
ST00519	X										ENCLOSED			0										Pit buried - Unable to find any evidence of pit	Pipe unable to be found
ST00520		X					779262.85	6361197.70E							Pipe	450	15	CONCRETE	1	626.489	626.264				
ST00521		X																						Inspection in 1998/99 failed to find this pipe.	
ST00522	X										ENCLOSED			0										Unable to locate pit ST00522 on Western side of Dabee Road	Pipe Not Found - Does Not Exist
ST00523	X										ENCLOSED			0										Unable to locate pit ST00523 on Dabee Road.	
ST00524		X													Pipe	450	85		1					No pit located on the Western side of Dabee Road (ST00523)	
ST00525		X					779388.101	6361179.834							Pipe	450	18	CONCRETE	1	630.905	630.676				
ST00526		X					779253.055	6360568.334	ST00387						Pipe	450	10	CONCRETE	1	660.490	659.927				
ST00527		X					779253.653	6360973.968							Pipe	450	55	CONCRETE	1		636.744			Upstream invert unable to be found (ST00528 not found)	
ST00528	X										ENCLOSED			0										Pit ST00528 Unable to be located - Buried junction pit	
ST00529	X						778273.553	6360749.570	ST00529		INLET	570X570	-	670											
ST00530	X						778256.775	6360759.716	ST00530		ENCLOSED	-	-	2510											
ST00533		X																						Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00534	X										KERB4NL			0										Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00535	X										KERB4NL			0										Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00536		X																						Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00537		X																						Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00538		X																						Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00539		X																						Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00540		X																						Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00541	X										KERB4NL			900										Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00542	X										JUNCTION			1000										Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	
ST00543	X										JUNCTION			1000										Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers	

ST00544	X										KERB4NL			1000										Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers
ST00555	X										KERB4NL			1300										Unable to locate data on MapInfoFiles - Not able to correlate survey with Asset Numbers
A01		X								Access Road on 22/DP872861														NOT FOUND - DOES NOT EXIST
A02		X								North of block 2/DP837670														NOT FOUND - DOES NOT EXIST
A03		X					778229.180	6368345.345		Under railway, 470m north of Bylong Valley Way					CULVERT	1200	7.03	C.IRON	1	572.936	572.645			
A04		X								Access road for 22/DP872861, around 300m north of Panorama Ct														NOT FOUND - DOES NOT EXIST
A05		X					777612.881	6368375.583	A05	Under road at 47 Panorama Ct					CULVERT	450		CONCRETE	1	611.458				Downstream end unable to be accessed due to extremely dense blackberry
A06		X					778241.566	6368528.716		Under railway, 330m north of Bylong Valley Way					CULVERT	600	6.59	C.IRON	1	574.445	574.179			
A07			X							Rail Bridge over Cudgegong River													YES	
A08			X							Rail bridge over access Road north of Louee Street													YES	
A09		X					778503.469	6367741.929	A09	Mudgee Street level rail crossing					CULVERT	450	6.41	C. IRON	2	574.577	574.475	NA		
A10			X							Bylong Valley Way road bridge over Cudgegong River													See notes.	Update datum only - we already have plans for this bridge.
A11		X					778579.028	6367555.836	A11	Under railway at Dabee Street level crossing					CULVERT	300	10.24	CONCRETE	1	577.083	577.041	30		
A12			X				778718.896	6367501.056		Dabee Street footway													YES	Foot bridge - Details on GA Sketch
A13		X					778721.482	6367495.460	A13	Tongbong Street / Dabee Street					CULVERT	300	6.27	CONCRETE	1	570.169	569.999	90		Culvert under concrete causeway. Causeway level 570.653
A14		X					778105.715	6362009.828		Next to A32. Under Bylong Valley Way, south of Sewer Plant.					CULVERT		9.01	CONCRETE	2	598.769	598.711	30		
A15		X								Calderwood Road														Nothing found at this location - crest of hill
A16		X								Under rail, just south of Rylstone Station														NOT FOUND - POSSIBLY FILLED IN/OVER
A17		X					778640.603	6367338.456	A17_1 A17_2	Under rail, east of 17/DP1136979					CULVERT	850	44	BRICK	1	577.014	575.914	NONE		
A18			X							Cudgegong River footbridge, adjacent to cricket oval													YES	See general arrangement sketch for details
A19		X					778654.576	6367195.723	A19_3	Under rail, east of Cudgegong Street					CULVERT	1520	19.14	BRICK	1	575.214	574.958	NONE		
A20		X					778714.992	6366973.400	A20	Under rail, east of Cox Street					CULVERT	600x300	11.24	CONCRETE	2	578.654	578.529	30 APPROX		TIMBER AND STONE HEADWALL - REFER TO PHOTO
A21		X								Under track next to railway, east of A22														A21 IS THE OUTLET OF A22 - LONG 1.1m DIAMETER CORRUGATED IRON CULVERT
A22		X					778740.943	6366879.692	A21_B	Under road adjacent to DP829365					CULVERT	1100	40.22	CORRUGATED IF	2	578.714	577.841	NONE		A22 IS A21 AS WELL
A23		X								Under access track adjacent to rail near A24														A23 DOES NOT EXIST - ONLY A24 UNDER RAILWAY FOUND AT THIS LOCATION
A24		X					778764.829	6366757.854	A23	Under rail adjacent to Piper Street, Tindale Street					CULVERT/BRI	3X	3.13	CONCRETE	3	579.727	579.699	NONE		REFER TO PHOTO A23 FOR ARRANGEMENT - SMALL BRIDGE RATHER THAN DEFINED CULVERTS
A25		X								Under rail access road just north of Narrango Road														NOT LOCATED AT ACCESS TRACK
A26		X					778815.237	6366551.979		Under railway to north of Narrango Road					CULVERT	600X300	3.45	CONCRETE	3	583.432	583.362	NONE		REFER TO NEW ASSETS RYLSTONE12 AND RYLSTONE13
A27		X					778829.360	6366525.602		REFER TO NEW ASSETS RYLSTONE 12					PIPE	450	16.39	CONCRETE	1	584.105	583.808	NONE		
A28		X								Carwell Street, 50m north of Coomber														A28 is acutally pipe ST00059
A29		X								Carwell Street, 140m south of Coomber														NOT FOUND - No drainage structures within 100m each way of this location
A30		X					778094.723	6366222.101	ST0064_2	Short St, Western End					PIPE	600	9.86	CONCRETE	2	578.175	-	NONE		UPSTREAM INVERT UNABLE TO BE OBTAINED DUE TO COVERED JUNC TION PIT
A31		X								Top corner of 7/DP755789														NOTHING OBSERVED AT THIS LOCATION
A32			X							Next to A14. Cycle way bridge on Bylong Valley Way south of Sewer Plant													YES	REFER TO GENERAL ARRANGEMENT SKETCH LABELLED A14
A33		X								Under Bylong Valley Way, opposite # 1863														NOTHING FOUND - Possibly new grated inlet pit located with asset C17 - see Kandos10 in new assets found.
A34		X								Under unnamed Road between #1857 & 1863 Bylong Valley Way														Nothing found at this location - no pipe/culvert under Larges Lane
A35		X					778028.483	6361352.893		Under Bylong Valley Way, just north of 1827					PIPE	600	12.94	CONCRETE	1	613.656	613.353	NONE		
A36		X					778895.212	6361343.836		Under trailway, off north end of Oxley Street					CULVERT	900X600	5.14	CONCRETE	2	622.577	622.533			
A37		X					779280.696	6361288.249		Off north end of Bent Street					PIPE	300	5.024	CONCRETE	1	624.819	624.709	NONE		
A38		X					778767.948	6361224.310		Under rail, north of 9 Oxley Street					CULVERT	1800X400	3.71	CONCRETE	2	625.068	625.030			

A39		X					778496.955	6361717.959		Golf Course, north of A40					CULVERT	600	3.04	CONCRETE	2	620.479	620.407			
A40		X					778520.192	6361125.028		Under golf course track, north of A41					CULVERT	900	3.63	CONCRETE	1	621.700	621.673			
A41		X					778554.914	6361091.665		Under railway north of norhtern end of Davies Road / Mclachlan Street					CULVERT	1800x1100	8.41	CONCRETE	2	623.298	623.103			
A42		X					778245.979	6360972.830	A42	Under rail, north of Henbury Avenue					CULVERT	1520	10.05	BRICK	1	626.455	626.344	0		
A43			X				778100.533	6360869.585	A43	Henbury Avenue bridge over railway													YES	
A44		X					778007.155	6360791.855		Under railway, west of 46 Davies Road					CULVERT	600X600	3.64	CONCRETE	2	630.989	630.877			
A45		X								Under railway, west of 58 Davies Road														Nothing observed at this location
A46		X					777926.708	6360625.580	A46	Under railway, west of 60 Davies Road					CULVERT	920	16.64	BRICK	1	628.069	627.841			
A47			X							Railway overbridge													NA	RAILWAY LEVEL CROSSING, NOT OVERBRIDGE
A48		X								Under Angus Avenue, just east of railway crossing														A48 IS THE OUTLET OF ST00130 - NO OTHER ASSETS FOUND. REFER TO ST00130
A49		X					777993.116	6360270.366		Under railway, east of 45 Ilford Road					CULVERT	500x550	3.42	CONCRETE	2	634.561	634.528			
A50		X								Under driveway west of Margaret Street														No drainage structure found at this location. Possible causeway over driveway but no pipes/culverts under driveway.
A51		X								Ilford Road x Margaret Street														Nothing at this location - only pipe ST00291 within 200m.
A52		X								Under road x Ilford Road														Nothing at this location - only pipe ST00291 within 200m.
A53		X								Between Ilford Road and Railway														A53 IS A GROUP OF NEW PITS AND PIPES. SEE KANDOS 12 - KANDOS 20
A54		X					778092.764	6360116.987		Under railway, east of 49 Ilford Road					CULVERT	2000	17.25	BRICK	1	630.027	629.854			
A55		X								53 Ilford Road														Nothing at this location. Only pipe St00291 and ST00294 - nothing inbetween
A56		X								Jamison Street, south of loop intersection - GIS info shows a challe crossing the St.														Nothing at this location. Only culvert C20 exists in this area
A57		X								Cairo St x Lloyd Avenue														A57 is actually pipe ST00284
A58		X								Dabee Road, 190m south of Cambell Street														Nothing observed at this location
A59		X								Cairo St x Lloyd Avenue														A59 is either pipe ST00288 or C24 - nothing else exists at this location
A60		X								Private access off west end of Anzac Avenue.														No drainage found - driveway appears to fall all the way down to Cairo Street with no pipes or culverts under.
A61		X								Possible pipe/culvert over natural drainage on private property west of Cooper Drive and south of OH conveyor														Not found - Natural channel appears to continue from A65 to ST00286 without pipes in between.
A65		X					777905.310	6359706.438		Under Cooper Drive 130m south of Anzac Avenue					PIPE	750	12.2	CONC	2	632.555	632.276	45		
A66		X					777886.309	6359527.713		Cooper Drive 190m from Anzac Avenue					PIPE	450	8.726	CONC	1	641.481	641.316	NONE		
A67		X					778136.366	6359642.921		Under railway, west of cement works, 130m south of OH conveyor					CULVERT	900	11.17	BRICK	1	641.945	641.350			
A68		X					778093.565	6359539.523		Under railway, west of cement works, 250m south of OH conveyor					CULVERT	0.74X0.57	11.25	CONCRETE	1	644.953	644.464			
A69		X								Internal cement works road, immediately south of buildings														NO ASSESTS OBSERVED AT THIS LOCATION
A70		X								Internal cement works road, south west of A69														NO ASSESTS OBSERVED AT THIS LOCATION
A71		X					777786.986	6359235.854		Crossing on Clandulla Road, south of Charbon Road Intersection					PIPE	600	9.91	CONC	1	651.324	651.095	45		
A72		X					777794.025	6359194.458		Rail crossing, Charbon Road					PIPE	1600	9.12	C. IRON	1	653.853	653.853	NONE		Culvert details (expected to be the same culvert as for A71)
C01		X					778499.363	6360801.953		Flemming Street close to McDonald Street (from Pit ST00329 to ST00330)					PIPE	450	11.84	CONCRETE	1	632.902	632.497			Inspection in 1998/99 revealed that this pipe existed instead of pipe ST00156.
C02		X					777974.997	6360542.290		Davies Road from White Circle to Rogers Street					PIPE		30.79	CONCRETE	1	632.374	630.848			Inspection in 1998/99 revealed that this pipe existed instead of pipe ST00134.
C03		X					778057.074	6360439.457		Crossing Angus Avenue, east of White Circle					CULVERT	450	20.25	CONCRETE	1	638.890	638.019			Inspection in 1998/99 revealed that this pipe existed.
C04	X						778053.058	6360435.037		On Angus Avenue east of White Circle	GIP	-	450x450	0.35										Pit located just South of Angus Ave/White Crescent intersection on Eastern side
C05		X					778724.534	6360918.026		Dunn Street, across Noyes Street					PIPE	450	32.58	CONCRETE	1	631.013	629.222			Inspection in 1998/99 revealed that this pipe existed instead of pipe ST00218.
C06		X					778700.649	6360798.021		Across Flemming Street, west of Noyes Street								CONCRETE	1	630.954	629.088			Inspection in 1998/99 revealed that this pipe existed instead of pipe ST00187, 188, 189 and pits ST00335, 336.

C07		X					779053.757	6360896.886		Dunn Street, east of Short Street								CONCRETE		637.551	637.419			Inspection in 1998/99 revealed that this pipe existed instead of pipe ST00234, 518, 235, 238, 236 and pits ST00516, 517, 371.
C08		X								Pomany Street, south of Stanley Street														Could not find juntion between ST00260 and C08. Assumed that pipe ST00260 runs full length and connects with Pipe ST00263
C09		X					779274.658	6361308.566		Bent Street, north end					CULVERT	900	14.22	CONCRETE	1	623.439	623.228	NONE		
C10		X					779284.130	6361306.084		Across Bent street, north end					PIPE	750	9.79	CONCRETE	1	623.878	623.228	NONE		
C11		X								George Street, east of Bent Street														Pipe does not exist
C12		X								Across Rogers Streeet, east of Noyes Street														Pipe appears to head east towards pit ST00402 instead of across Rogers Stree
C13		X					778925.331	6360414.393		Across Angus Avenue, west of Dabee Road					CULVERT			CONCRETE		645.545				Upstream invert taken from pit level. Pipe size unable to be otained. Downstream invert unable to be obtained due to pit ST00514 not located (buried)
C14		X					778886.162	6360294.484	ST00405	Dabee Road (western side) at Buchanan Street					CULVERT	450X300	11	CONCRETE	1	649.612	648.575			Inspection in 1998/99 revealed that this pipe existed. Please include any inlet/outlet details.
C15		X					778894.8	6360275.396	C15	Dabee Road (eastern side) at Buchanan Street					CULVERT	600X300	30	CONCRETE	1	650.632	649.412			Inspection in 1998/99 revealed that this pipe existed. Please include any inlet/outlet details.
C16		X								Across Campbell Street, west of Noyes Street														Unable to find asset.
C17		X					778078.220	6361831.050		Bylong Valley Way, 280m south of Sewer Plant					CULVERT	600	10.34	CONCRETE	1	602.110	601.724	-		GRATED PIT INLET TO PIPE - SEE "KANDOS 10" IN NEW ASSETS
C18		X					778056.131	6361584.909		1857 Bylong Valley Way					PIPE	450	11.47	CONCRETE	1	607.781	607.242	NONE		
C19		X					778143.239	6360916.232							CULVERT	900	10.49	BRICK	1	626.971	626.895			
C20		X					778351.883	6360129.128		Jamison Street, just north of access loop					CULVERT	1400X600	8.89	CONCRETE	2	639.520	639.320			
C21		X					777593.665	6359952.141	C21	18/20 Cairo St east side					PIPE	300	5.01	CONCRETE	1	619.328	619.236			
C22		X					777582.135	6359946.134	C22	18/20 Cairo St west side					PIPE	375	5.13	CONCRETE	1	619.091	619.046	45		
C23		X					777591.804	6359939.807	C23	22 Cairo Street east side					PIPE	200	4.47	CONCRETE	1	619.419	619.341			
C24		X					777566.376	6359864.778	C24	Cairo Street west side, north of Anzac Avenue					PIPE	300	4.98	CONCRETE	1	621.540	621.213			
C25		X								Cairo Street west side, south of Anzac Avenue														C25 unable to be found - Only C24 exists

MUDGEE ST
PIPER ST
MELLON ST
LOUEE ST
COOMBER ST
CARWELL ST
WISTERIA COTTAGE LANE
NO DRAIN
DP 758891
DP 565936
DP 863581
1
2
3
4
5
6
7
8
9
10

DRAINAGE STRUCTURES IN CARWELL, MELLON, LOUEE AND COOMBER STREETS, RYLSTONE

ID NO	DRAIN TYPE	NO OF BARRELS	LENGTH (M)	UPSTREAM INV	DOWNSTREAM INV	PHOTO NOS
1	750MM DIA PIPE & HEADWALL	1	13.7	574.42	574.09	1-U,1A-U,1-D,1A-D
2	1050MM DIA PIPE & HEADWALL	1	10.05	571.35	571.04	2-U,2A-U,2-D,2A-D
3	600MM DIA PIPES & HEADWALL	2	10.15	572.73	572.56	3-U,3A-U,3-D,3A-D
4	450MM DIA PIPES & HEADWALL	2	10.25	573.88	573.78	4-U,4A-U,4-D,4A-D
5	450MM DIA PIPE	1	10.1	573.99	573.95	5-U,5A-U,5-D,5A-D
	(HEADWALL UPSTREAM)					
6	450MM DIA PIPE (HWALL DSTREAM,	1	34.6	576.74	575.65	6-U,6A-U,6-D,6A-D
	KERB INLET PIT UPSTREAM)					
7	450MM DIA PIPES & HEADWALLS	2	23.6	NTH PIPE=575.4	575.17	7-U,7A-U,7-D,7A-D
			23.9	STH PIPE=575.35	574.89	
8	450MM DIA PIPES & HEADWALLS	1	7.45	576.13	575.94	8-U,8A-U,8-D,8A-D
9	900MM DIA PIPES & ROCK HEADWALLS	2	8.8	574.06	573.83	9-U,9A-U,9-D,9A-D
10	CULVERT-CENTRE SUPPORT 0.2 WIDE	2	7.6	573.23	573.22	10-U,10A-U,10-D,10A-D
	NTH CHAMBER=1.52 HIGHx1.83 WIDEx7.6 LONG					
	STH CHAMBER=1.52 HIGHx1.73 WIDEx7.6 LONG					

Appendix C Cudgegong River Flood Modelling

Figure C-1 MIKE11 Model Layout for Rylstone

LEGEND

Study Area

MIKE11 Cross Section

Creek/ Overland Flowpath

The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:11,691

0 0.4
Kilometres

SINCLAIR KNIGHT MERZ
SKM

■ **Table C-9-1 Storage Capacity of Rylstone Dam**

Elevation (mAHD)	Surface Area (m^2)	Storage Volume (m^3)
568.00	0	0
568.50	388	53
569.00	1,245	443
569.50	4,759	1,801
570.00	10,476	5,425
570.50	19,799	12,799
571.00	29,493	25,046
571.50	39,653	42,313
572.00	52,885	65,423
572.50	71,657	96,290
573.00	100,226	138,572
573.50	136,738	197,436
574.00	178,168	276,290
574.50	226,218	377,906
575.00	231,218	499,616
575.50	296,785	639,813
576.00	332,580	796,815
576.50	376,008	974,398
577.00	420,811	1,172,714
577.50	477,474	1,397,862
578.00	535,103	1,650,846
578.50	588,195	1,931,731
579.00	645,967	2,240,165
579.50	715,730	2,579,806
580.00	772,240	2,952,943
580.11	779,334	3,038,275
580.50	817,667	3,349,211

Source: Council; GHD (2009)

Table C-9-2 Adopted Spillway Rating for Rylstone Dam

Elevation (mAHD)	Discharge (m^3/s)
580.11	0
580.41	23
581.08	211
581.58	439
581.59	444
582.08	751
583.08	1,602
583.41	1,929
583.42	1,939
584.08	2,679
585.08	3,982
586.08	5,390
586.46	5,962
586.47	5,977
587.08	6,935
588.08	8,607
589.08	10,395
590.08	12,294
591.08	14,296
591.58	15,334
592.08	16,396

Source: NSW Department of Commerce (2003); GHD (2009)

Table C-9-3 Modelled Peak Water Levels (mAHD)

Flowpath	Chainage	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	DCF	PMF	Sunny Day DB	DCF DB	PMF DB	Remarks
CUDGEGONG	51630	580.21	580.24	580.30	580.36	580.44	580.53	583.41	589.95	580.11	583.42	589.96	U/S Rylstone Dam
CUDGEGONG	51670	572.10	572.57	573.12	573.57	574.03	574.48	583.26	589.90	578.00	583.31	589.92	Rylstone Dam Toe
CUDGEGONG	51870	571.77	572.22	572.74	573.17	573.61	574.04	582.47	589.31	577.40	582.52	589.32	
CUDGEGONG	52100	571.09	571.48	571.93	572.31	572.72	573.15	580.96	587.93	575.58	581.00	587.96	
CUDGEGONG	52465	570.45	570.82	571.26	571.63	572.07	572.55	580.40	587.43	574.15	580.48	587.47	
CUDGEGONG	52625	570.36	570.71	571.12	571.49	571.92	572.42	580.48	587.72	574.03	580.54	587.76	WTP
CUDGEGONG	52670	570.18	570.58	571.03	571.43	571.88	572.40	580.48	587.72	574.03	580.53	587.77	
CUDGEGONG	52710	569.99	570.40	570.86	571.27	571.74	572.29	580.43	587.66	573.92	580.47	587.71	
CUDGEGONG	52860	569.53	570.01	570.49	570.93	571.40	571.92	580.30	587.63	573.65	580.39	587.66	
CUDGEGONG	52915	569.52	570.02	570.50	570.95	571.43	571.95	580.39	587.77	573.72	580.45	587.80	
CUDGEGONG	52960	569.49	569.99	570.47	570.92	571.39	571.92	580.33	587.65	573.68	580.41	587.68	U/S Railway Br
CUDGEGONG	53000	569.41	569.90	570.44	570.90	571.37	571.88	580.25	586.29	573.59	580.33	586.30	
CUDGEGONG	53115	569.31	569.76	570.30	570.75	571.22	571.73	580.22	586.11	573.39	580.29	586.09	
CUDGEGONG	53160	569.24	569.69	570.23	570.68	571.14	571.66	580.03	586.00	573.30	580.15	585.99	U/S Bridge St
CUDGEGONG	53200	569.22	569.67	570.19	570.63	571.08	571.58	579.52	584.62	573.14	579.60	584.62	
CUDGEGONG	53505	568.87	569.30	569.77	570.16	570.54	570.96	578.94	584.16	572.16	578.96	584.17	
CUDGEGONG	53690	568.69	569.11	569.53	569.89	570.23	570.65	578.62	583.82	571.65	578.66	583.83	
CUDGEGONG	53965	568.41	568.82	569.21	569.55	569.86	570.32	578.50	583.71	571.14	578.52	583.70	
CUDGEGONG	53995	568.40	568.81	569.20	569.55	569.86	570.33	578.52	583.75	571.15	578.55	583.74	Foot Bridge
CUDGEGONG	54135	567.69	568.15	568.69	569.18	569.71	570.24	578.45	583.69	571.05	578.47	583.68	
CUDGEGONG	54247	567.58	568.03	568.58	569.07	569.60	570.13	578.22	583.39	570.87	578.24	583.39	
CUDGEGONG	54402	567.36	567.83	568.38	568.88	569.43	569.99	578.23	583.37	570.67	578.26	583.37	U/S STW
CUDGEGONG	54480	567.16	567.59	568.14	568.64	569.21	569.80	577.98	582.81	570.41	578.01	582.81	
CUDGEGONG	54675	566.43	566.90	567.52	568.10	568.74	569.41	577.44	582.58	569.97	577.46	582.58	Weir
CUDGEGONG	54775	566.25	566.78	567.45	568.05	568.71	569.39	577.29	582.25	569.97	577.31	582.25	
CUDGEGONG	55375	566.03	566.52	567.17	567.78	568.46	569.16	576.70	581.17	569.77	576.73	581.16	
CUDGEGONG	55710	565.72	566.20	566.86	567.48	568.20	568.94	576.37	580.52	569.60	576.39	580.52	
CUDGEGONG	56140	565.29	565.71	566.35	567.00	567.77	568.57	576.00	580.13	569.28	576.02	580.13	
TONG_BONG	3400	575.13	575.36	575.66	575.88	576.12	576.35	580.40	587.79	573.86	580.47	587.79	
TONG_BONG	3600	574.15	574.36	574.64	574.85	575.07	575.28	580.40	587.78	573.83	580.43	587.79	
TONG_BONG	3800	572.88	573.07	573.33	573.51	573.68	573.82	580.41	587.77	573.78	580.45	587.79	
TONG_BONG	4000	571.78	571.96	572.25	572.41	572.55	572.67	580.39	587.78	573.73	580.44	587.79	
TONG_BONG	4100	571.15	571.35	571.58	571.74	571.90	572.05	580.40	587.78	573.71	580.46	587.79	
TONG_BONG	4200	570.90	571.06	571.26	571.41	571.55	571.96	580.42	587.77	573.72	580.45	587.80	
TONG_BONG	4300	569.98	570.22	570.51	570.96	571.43	571.95	580.42	587.78	573.72	580.48	587.80	
TONG_BONG	4405	569.52	570.02	570.50	570.95	571.43	571.95	580.40	587.77	573.71	580.46	587.80	
TONG_BONG	4440	569.52	570.02	570.50	570.95	571.43	571.95	580.39	587.77	573.72	580.45	587.80	Cudgegong River

DB - Dambreak

Table C-9-4 Modelled Peak Discharges (m^3/s)

Flowpath	Chainage (m)	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	DCF	PMF	Sunny Day DB	DCF DB	PMF DB	Remarks
CUDGEGONG	51650	130	182	265	347	445	548	5,586	14,513	0	0	0	Rylstone Dam
CUDGEGONG	51770	130	182	265	347	445	548	5,304	14,507	2,013	5,324	14,512	
CUDGEGONG	51985	130	182	265	347	445	548	5,287	14,498	2,047	5,318	14,506	
CUDGEGONG	52282.5	130	182	265	347	445	548	5,280	14,474	2,034	5,305	14,495	
CUDGEGONG	52545	130	182	265	347	445	548	5,287	14,500	1,913	5,359	14,495	
CUDGEGONG	52647.5	130	182	265	347	445	548	5,279	14,476	1,782	5,345	14,482	
CUDGEGONG	52690	130	182	265	347	445	548	5,273	14,464	1,704	5,323	14,476	WTP
CUDGEGONG	52785	130	182	265	348	446	548	5,275	14,451	1,584	5,447	14,463	
CUDGEGONG	52887.5	130	182	265	348	447	554	5,249	14,460	1,542	5,651	14,452	
CUDGEGONG	52937.5	133	187	273	359	463	571	5,329	14,493	1,237	5,344	14,440	
CUDGEGONG	52980	133	187	273	359	462	571	5,347	14,480	1,218	5,366	14,439	U/S Railway Bridge
CUDGEGONG	53057.5	133	187	273	360	462	570	5,456	14,560	1,196	5,538	14,477	
CUDGEGONG	53137.5	133	188	273	360	462	569	5,651	14,624	1,201	5,979	14,449	
CUDGEGONG	53180	133	200	273	360	462	569	5,803	15,070	1,120	5,957	15,114	Bridge Street
CUDGEGONG	53352.5	133	188	274	360	463	570	5,257	14,481	1,160	5,320	14,429	
CUDGEGONG	53597.5	133	188	274	361	464	571	5,247	14,464	1,160	5,294	14,438	
CUDGEGONG	53827.5	133	188	274	362	465	572	5,252	14,490	1,154	5,268	14,436	
CUDGEGONG	53980	133	188	275	362	465	573	5,251	14,461	1,138	5,266	14,456	Foot Bridge
CUDGEGONG	54005	133	189	275	362	465	573	5,330	14,502	1,136	5,138	14,579	
CUDGEGONG	54191	133	189	275	363	466	574	5,241	14,467	1,075	5,268	14,450	
CUDGEGONG	54324.5	133	189	275	363	466	574	5,237	14,456	1,057	5,266	14,451	
CUDGEGONG	54441	133	189	275	363	466	575	5,236	14,450	1,043	5,272	14,453	STW
CUDGEGONG	54577.5	133	189	276	363	467	575	5,239	14,454	1,030	5,279	14,455	
CUDGEGONG	54725	134	189	276	364	467	576	5,240	14,454	1,002	5,276	14,457	D/S Weir
CUDGEGONG	55075	134	189	276	364	467	575	5,238	14,464	906	5,257	14,456	
CUDGEGONG	55542.5	134	189	276	363	467	575	5,236	14,468	814	5,259	14,456	
CUDGEGONG	55925	134	189	276	363	467	575	5,230	14,469	677	5,255	14,455	
TONG_BONG	3500	20	26	36	45	56	67	56	70	1	56	73	
TONG_BONG	3700	20	26	36	45	56	67	87	135	3	80	101	
TONG_BONG	3900	20	26	36	45	56	67	141	234	11	108	179	
TONG_BONG	4050	20	26	36	45	56	67	165	277	19	123	225	
TONG_BONG	4150	20	26	36	45	56	67	172	298	26	130	241	
TONG_BONG	4250	20	26	36	45	56	67	182	323	33	138	257	
TONG_BONG	4352.5	20	26	36	45	56	67	197	349	48	146	273	
TONG_BONG	4422.5	20	26	36	45	56	67	215	361	53	191	287	Cudgegong River
DAM	30									1,984	2,178	2,767	Dambreak Outflows

DB - Dambreak

Table C-9-5 Modelled Peak Velocities (m/s)

Flowpath	Chainage	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	DCF	PMF	Sunny Day DB	DCF DB	PMF DB	Remarks
CUDGEGONG	51630	0.15	0.21	0.31	0.40	0.51	0.62	4.19	0.00	0.00	4.05	0.00	U/S Rylstone Dam
CUDGEGONG	51670	1.02	1.14	1.33	1.49	1.66	1.81	4.16	4.52	3.65	4.06	4.52	Rylstone Dam Toe
CUDGEGONG	51870	1.35	1.48	1.70	1.88	2.07	2.23	4.43	5.17	3.93	4.41	5.17	
CUDGEGONG	52100	1.59	1.59	1.70	1.82	1.93	2.00	3.78	4.75	4.06	3.76	4.75	
CUDGEGONG	52465	0.56	0.68	0.84	0.97	1.09	1.17	2.89	3.99	3.06	2.87	3.99	
CUDGEGONG	52625	1.14	1.14	1.17	1.22	1.24	1.24	1.66	1.92	2.71	1.66	1.92	WTP
CUDGEGONG	52670	1.36	1.36	1.37	1.37	1.37	1.37	1.56	1.78	2.11	1.56	1.78	
CUDGEGONG	52710	1.55	1.66	1.85	1.95	2.00	2.00	2.57	2.65	3.34	2.57	2.65	
CUDGEGONG	52860	1.30	1.31	1.32	1.32	1.32	1.33	2.22	2.66	4.20	2.21	2.66	
CUDGEGONG	52915	0.77	0.77	0.77	0.77	0.77	0.67	1.04	1.20	0.90	1.04	1.20	
CUDGEGONG	52960	0.80	0.85	1.03	0.98	1.00	1.00	1.34	1.86	1.84	1.33	1.86	U/S Railway Br
CUDGEGONG	53000	0.80	0.89	0.98	1.08	1.17	1.24	1.56	1.99	2.61	1.57	1.99	
CUDGEGONG	53115	1.21	1.22	1.23	1.33	1.43	1.49	2.29	2.82	3.01	2.30	2.82	
CUDGEGONG	53160	1.01	1.13	1.25	1.37	1.49	1.56	2.59	3.52	3.61	2.70	3.52	U/S Bridge St
CUDGEGONG	53200	1.09	1.30	1.52	1.73	1.95	2.09	4.00	5.52	3.29	4.22	5.52	
CUDGEGONG	53505	1.02	1.17	1.39	1.59	1.79	1.94	3.63	4.16	3.02	3.63	4.16	
CUDGEGONG	53690	0.93	1.08	1.31	1.49	1.68	1.76	2.96	3.84	2.92	2.97	3.84	
CUDGEGONG	53965	1.25	1.29	1.30	1.30	1.29	1.29	2.22	2.46	1.66	2.22	2.46	
CUDGEGONG	53995	0.53	0.55	0.64	0.71	0.80	0.81	1.42	2.24	1.22	1.42	2.24	Foot Bridge
CUDGEGONG	54135	0.81	0.84	0.90	0.95	1.00	1.05	1.79	2.30	2.08	1.80	2.30	
CUDGEGONG	54247	0.85	0.95	1.09	1.20	1.30	1.38	2.71	3.19	2.31	2.71	3.19	
CUDGEGONG	54402	1.06	1.09	1.17	1.20	1.22	1.21	1.66	2.58	1.99	1.66	2.58	U/S STW
CUDGEGONG	54480	1.17	1.25	1.36	1.43	1.48	1.50	2.96	5.11	2.54	2.96	5.11	
CUDGEGONG	54675	1.70	1.70	1.72	1.74	1.75	1.76	3.27	4.40	3.59	3.28	4.40	Weir
CUDGEGONG	54775	0.78	0.88	0.98	1.06	1.12	1.17	3.10	4.79	3.95	3.12	4.79	
CUDGEGONG	55375	0.89	1.02	1.16	1.26	1.33	1.38	3.37	5.65	2.71	3.38	5.65	
CUDGEGONG	55710	1.08	1.08	1.09	1.10	1.11	1.13	1.78	2.79	2.96	1.78	2.79	
CUDGEGONG	56140	1.08	1.08	1.09	1.10	1.11	1.13	1.78	2.79	2.96	1.78	2.79	
TONG_BONG	3400	1.10	1.19	1.32	1.40	1.50	1.57	1.49	1.41	0.44	1.49	1.41	
TONG_BONG	3600	1.20	1.32	1.47	1.58	1.70	1.80	1.70	1.58	0.67	1.69	1.58	
TONG_BONG	3800	0.94	1.02	1.12	1.21	1.30	1.36	1.30	1.20	0.41	1.30	1.20	
TONG_BONG	4000	1.52	1.59	1.61	1.61	1.60	1.60	1.60	1.60	0.80	1.60	1.60	
TONG_BONG	4100	0.84	0.90	1.00	1.07	1.15	1.21	1.05	1.00	0.45	1.05	1.00	
TONG_BONG	4200	0.86	0.91	1.01	1.08	1.17	1.26	1.05	1.00	0.47	1.05	1.00	
TONG_BONG	4300	1.36	1.35	1.37	1.37	1.39	1.44	1.36	1.31	0.61	1.36	1.31	
TONG_BONG	4405	1.67	1.72	1.80	1.84	1.89	1.93	1.58	1.29	0.50	1.59	1.29	
TONG_BONG	4440	2.92	2.93	2.94	2.96	2.97	3.00	3.16	2.40	1.18	3.17	2.40	Cudgegong River

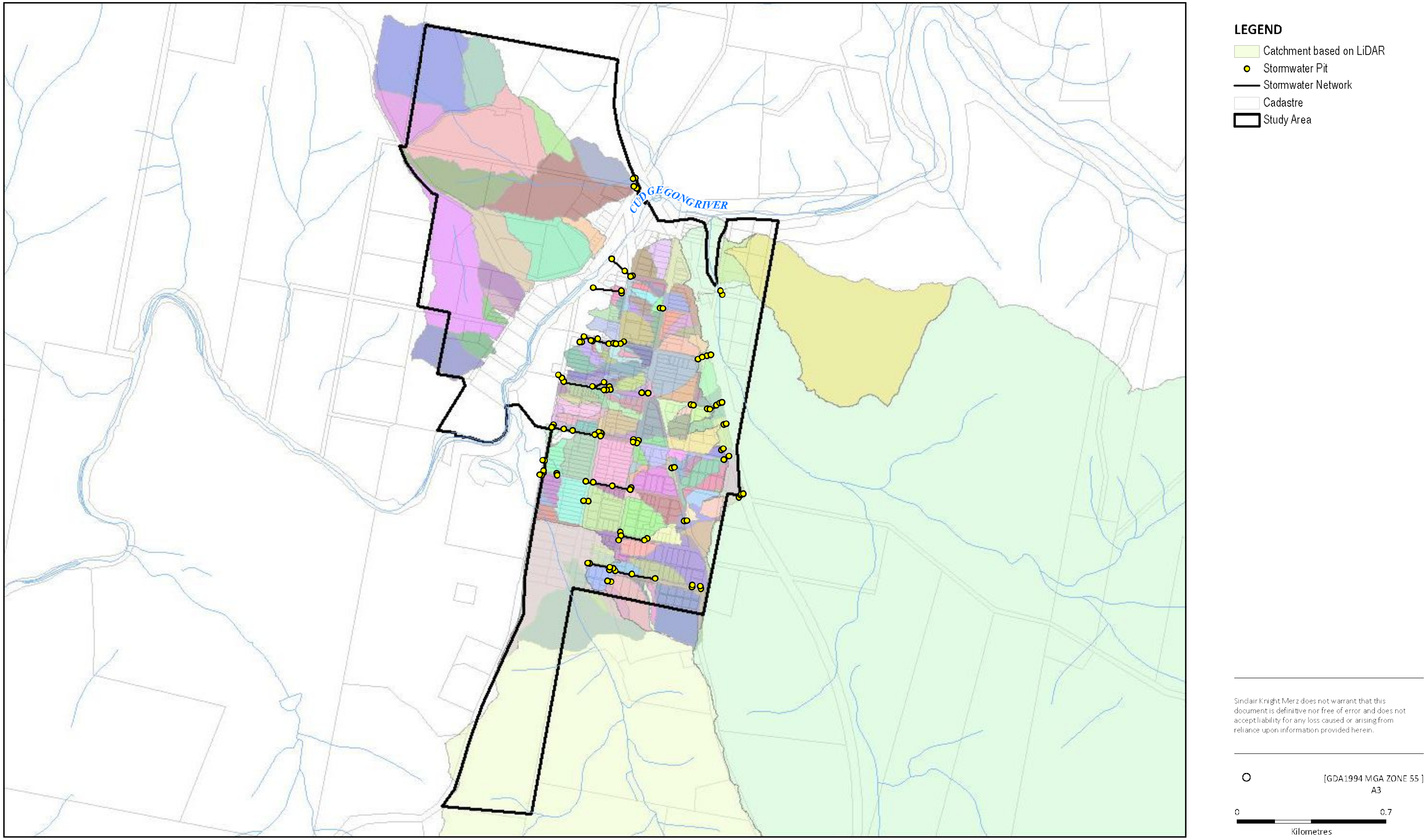
DB - Dambreak

▪ Table C-9-6 Modelled Time to Peak Water Level (Hour)

Flowpath	Chainage	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	DCF	PMF	Sunny Day DB	DCF DB	PMF DB	Remarks
CUDGEGONG	51630	26.00	22.50	20.75	19.75	19.00	18.25	3.83	3.83	0.00	3.67	3.67	U/S Rylstone Dam
CUDGEGONG	51670	26.25	22.50	20.75	19.75	19.00	18.25	3.75	3.75	0.25	3.83	3.67	Rylstone Dam Toe
CUDGEGONG	51870	26.25	22.75	20.75	19.75	19.00	18.25	3.83	3.83	0.25	3.83	3.67	
CUDGEGONG	52100	26.25	22.75	20.75	19.75	19.00	18.25	4.08	4.08	0.25	3.92	3.75	
CUDGEGONG	52465	26.25	22.75	20.75	19.75	19.00	18.50	4.17	4.17	0.42	4.08	3.75	
CUDGEGONG	52625	26.25	22.75	20.75	19.75	19.00	18.50	4.08	4.08	0.42	4.00	3.75	WTP
CUDGEGONG	52670	26.25	22.75	20.75	19.75	19.00	18.50	4.08	4.08	0.42	4.08	3.75	
CUDGEGONG	52710	26.25	22.75	20.75	19.75	19.00	18.50	4.08	4.08	0.42	3.92	3.75	
CUDGEGONG	52860	26.25	22.50	20.75	19.75	19.00	18.75	4.08	4.08	0.50	4.00	3.75	
CUDGEGONG	52915	26.25	22.50	20.75	19.75	19.00	18.50	3.92	3.92	0.50	3.92	3.75	
CUDGEGONG	52960	26.25	22.50	20.75	19.75	19.00	18.25	3.92	3.92	0.50	3.92	3.75	U/S Railway Br
CUDGEGONG	53000	26.25	22.50	20.75	19.50	19.00	18.25	3.92	3.92	0.50	3.92	3.75	
CUDGEGONG	53115	26.25	22.50	20.75	19.75	19.00	18.50	4.00	4.00	0.50	4.00	3.75	
CUDGEGONG	53160	26.25	22.50	20.75	19.75	19.00	18.50	4.17	4.17	0.50	3.92	3.75	U/S Bridge St
CUDGEGONG	53200	26.25	22.50	20.75	19.75	19.00	18.50	3.92	3.92	0.50	3.92	3.92	
CUDGEGONG	53505	26.25	22.75	20.75	19.75	19.00	18.50	4.17	4.17	0.50	4.17	3.75	
CUDGEGONG	53690	26.25	22.75	20.75	19.75	19.00	18.50	4.08	4.08	0.50	4.17	3.83	
CUDGEGONG	53965	26.25	22.75	20.75	19.75	19.00	18.75	4.08	4.08	0.58	4.08	3.75	
CUDGEGONG	53995	26.50	22.75	20.75	19.75	19.00	18.75	4.08	4.08	0.58	4.00	3.83	Foot Bridge
CUDGEGONG	54135	26.50	22.75	21.00	19.75	19.25	18.75	4.08	4.08	0.67	4.08	3.75	
CUDGEGONG	54247	26.50	22.75	21.00	19.75	19.25	18.75	4.08	4.08	0.67	4.08	3.75	
CUDGEGONG	54402	26.50	22.75	21.00	20.00	19.25	18.75	4.08	4.08	0.67	4.08	3.75	U/S STW
CUDGEGONG	54480	26.50	22.75	21.00	20.00	19.25	18.75	4.08	4.08	0.75	4.08	3.75	
CUDGEGONG	54675	26.50	23.00	21.00	20.00	19.25	18.75	4.08	4.08	0.92	4.08	3.75	Weir
CUDGEGONG	54775	26.75	23.00	21.00	20.00	19.25	18.75	4.08	4.08	0.92	4.08	3.83	
CUDGEGONG	55375	26.75	23.00	21.00	20.00	19.25	18.75	4.25	4.25	0.92	4.17	3.83	
CUDGEGONG	55710	26.75	23.00	21.25	20.00	19.50	18.75	4.25	4.25	0.92	4.17	3.83	
CUDGEGONG	56140	26.75	23.00	21.25	20.00	19.50	19.00	4.25	4.25	0.92	4.08	3.83	
TONG_BONG	3400	8.00	8.00	7.75	8.00	7.75	7.25	4.08	4.08	0.50	4.00	3.75	
TONG_BONG	3600	8.00	8.00	8.00	8.00	7.75	7.25	4.00	4.00	0.42	4.00	3.75	
TONG_BONG	3800	8.25	8.00	8.00	8.00	7.75	7.25	4.00	4.00	0.42	4.00	3.75	
TONG_BONG	4000	8.25	8.00	8.00	8.00	7.75	7.50	4.17	4.17	0.42	4.00	3.75	
TONG_BONG	4100	8.25	8.25	8.00	8.00	8.00	7.50	4.00	4.00	0.42	4.00	3.75	
TONG_BONG	4200	8.25	8.50	8.00	8.25	8.00	18.25	4.08	4.08	0.50	3.92	3.75	
TONG_BONG	4300	8.25	8.75	20.50	19.50	19.00	18.50	4.08	4.08	0.50	4.00	3.75	
TONG_BONG	4405	26.25	22.50	20.75	19.75	19.00	18.50	3.92	3.92	0.50	3.92	3.75	
TONG_BONG	4440	26.25	22.50	20.75	19.75	19.00	18.50	3.92	3.92	0.50	3.92	3.75	Cudgegong River
DB - Dambreak													

Appendix D DRAINS Modelling Input and Output

Figure D1-1 Rylstone Subcatchments



SKM

Table D1-1: Rylstone subcatchments data

Catchment draining to pit	Total area (ha)	Paved area (%)	Grass area (%)
N_HW2	0.37	45.4	54.6
N_R024	1.83	41.6	58.4
Pit01	0.17	0.1	99.9
34	0.09	60.8	39.2
RYLSTONE6	0.15	36.4	63.6
RYLSTONE1	0.58	31.1	68.9
ST00081	0.4	49.1	50.9
ST00079	0.41	54.2	45.8
ST00080	0.07	70	30
Pit3	1.3	41.9	58.1
41	2.89	38.7	61.3
39	0.98	36.2	63.8
40	0.06	69.9	30.1
43	0.13	64.4	35.6
35	2.1716	38	62
36	1.86	42.2	57.8
38	0.59	43.6	56.4
30	0.38	48.4	51.6
29	1.04	39.1	60.9
N_R010	0.49	45.9	54.1
27	0.47	71.5	28.5
N_R009	1.53	40	60
21	0.48	54.4	45.6
22	0.13	38.1	61.9
23	0.89	41.7	58.3
24	0.43	51.1	48.9
19	0.86	35.2	64.8
20	0.18	45.2	54.8
13	0.14	63.9	36.1
14	0.73	43.8	56.2
10	0.29	55.6	44.4
11	0.39	41.6	58.4
8	0.48	47.8	52.2
9	0.44	51.8	48.2
1	0.3	26.5	73.5
N_R027	0.74	56.6	43.4
N_R185	2.01	33.8	66.2
N_R183	0.32	60.4	39.6
N_R180	0.39	17.5	82.5
N_R179	0.73	21.9	78.1
N_R178	0.73	16.7	83.3
N_R176	0.25	53.9	46.1
N_R173	0.54	51.8	48.2
N_R172	4.92	18.8	81.2
N_R171	0.38	23.4	76.6
N_R170	0.31	17.9	82.1
N_R169	0.22	25.3	74.7

N_R168	0.6	37.3	62.7
N_R167	0.24	52.4	47.6
N_R165	3.65	26.2	73.8
N_R162	0.39	36.9	63.1
N_R161	0.25	45.1	54.9
N_R160	1.08	31.7	68.3
N_R159	0.27	45.2	54.8
N_R158	1.63	35.4	64.6
N_R157	1.4	20.2	79.8
N_R156	0.33	50.8	49.2
N_R155	0.43	28.8	71.2
N_R151	10.75	7.7	92.3
N_R150	2.82	15.6	84.4
N_R147	0.79	50.6	49.4
N_R145	0.27	50.1	49.9
N_R144	0.27	46.2	53.8
N_R143	0.25	59.6	40.4
N_R142	3.07	33.4	66.6
N_R141	3.62	36.5	63.5
N_R140	1.12	43.1	56.9
N_R136	1.6	39.4	60.6
N_R133	0.24	50.8	49.2
N_R132	0.16	34.2	65.8
N_R131	0.23	33.2	66.8
N_R130	0.46	45.5	54.5
N_R128	1.51	32.9	67.1
N_R127	0.14	70	30
N_R125	0.67	41.9	58.1
N_R124	0.07	31.1	68.9
N_R123	0.79	35.8	64.2
N_R122	0.55	21.2	78.8
N_R121	0.95	35.6	64.4
N_R120	1.05	57.8	42.2
N_R119	2.15	37.8	62.2
N_R118	0.64	35.7	64.3
N_R116	0.13	50.6	49.4
N_R114	0.12	32.7	67.3
N_R113	0.35	49.8	50.2
N_R112	1.12	31.2	68.8
N_R111	0.47	37.3	62.7
N_R110	0.24	45.9	54.1
N_R109	0.93	37.7	62.3
N_R107	0.18	38.4	61.6
N_R106	0.71	33.7	66.3
N_R105	0.44	49	51
N_R103	0.27	4.3	95.7
N_R102	1.07	25	75
N_R101	0.98	32.8	67.2
N_R100	3.76	27.1	72.9
N_R099	1.03	19.1	80.9
R_18_out	1.28	24.7	75.3

N_R095	0.24	30.3	69.7
N_R094	0.54	34.9	65.1
N_R092	0.18	33.5	66.5
N_R090	0.23	51.3	48.7
N_R089	0.54	17.5	82.5
N_R088	0.51	14.1	85.9
N_R087	0.71	18.5	81.5
N_R086	0.91	24.4	75.6
N_R084	0.72	31.5	68.5
N_R083	0.92	31.2	68.8
N_R081	1.03	33.9	66.1
N_R080	0.71	25.9	74.1
N_R079	0.31	30.1	69.9
N_R078	0.55	40.3	59.7
N_R077	0.46	30.1	69.9
N_R076	0.26	30	70
N_R075	0.28	33.9	66.1
R17_out	1.13	24.1	75.9
N_R074	2.84	40.7	59.3
N_R070	2.61	5.4	94.6
N_R069	6.81	11.7	88.3
N_R068	16.12	13.3	86.7
N_R065	5.34	6.4	93.6
N_R064	14.87	6	94
N_R063	4.71	17.5	82.5
R16_out	4.72	7.4	92.6
R15_out	2.47	6.2	93.8
R14_out	1.35	20.3	79.7
N_R049	1.28	21.5	78.5
N_R050	0.05	63.7	36.3
N_R051	0.81	47.4	52.6
N_R061	0.04	53.4	46.6
N_R060	0.15	66.6	33.4
R8_out	1.57	12.6	87.4
R7_out	14.96	10.4	89.6
R6_out	0.76	16	84
R5_out	0.96	9.3	90.7
R4_out	6.26	22.6	77.4
R3_out	8.31	10.7	89.3
N_R018	0.2	63.4	36.6
N_R020	0.85	27.1	72.9
N_R019	10.63	16.4	83.6
N_R012	0.04	39.5	60.5
ST00116	0.4	49	51
N_R146	3.26	30.6	69.4
N_R072	11.58	10.1	89.9
N_R071	3.31	10.4	89.6
N_R046	0.4	42.3	57.7
N_R043	1.05	23.8	76.2
N_R034	325.68	8.1	91.9
N_R054	1.41	28.2	71.8

N_R040A	0.27	38.4	61.6
N_R038	0.16	20.3	79.7
N_R036	0.18	55.9	44.1
N_R021	0.28	70	30
HW7	2.47	17.2	82.8
HW6	0.48	31.9	68.1
HW3	1.24	20.8	79.2
HW8	0.18	57.9	42.1
HW1	0.74	19.7	80.3
15	0.27	42.5	57.5
51	0.13	69	31

Table D1-2: Rylstone peak pipe flow results

Pipe ID	Peak pipe flows (m^3/s)						
	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	PMF
ST00489	0.25	0.25	0.25	0.25	0.25	0.25	0.25
P_50	0.47	0.47	0.47	0.47	0.47	0.47	0.47
P_RYLSTONE9	0.35	0.35	0.35	0.35	0.35	0.35	0.35
P_RYLSTONE10	0.34	0.34	0.33	0.33	0.33	0.33	0.34
P_34	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Rylstone5	0.04	0.04	0.05	0.06	0.07	0.09	0.27
RYLSTONE3	0.34	0.43	0.52	0.55	0.57	0.59	0.60
RYLSTONE4	0.34	0.43	0.54	0.63	0.73	0.82	0.83
ST00010	0.10	0.12	0.15	0.17	0.19	0.24	0.43
ST00009	0.10	0.12	0.15	0.17	0.20	0.24	0.44
ST00003	0.32	0.32	0.32	0.32	0.32	0.32	0.32
ST00062	0.07	0.08	0.10	0.11	0.13	0.16	0.52
ST00063	0.07	0.08	0.10	0.11	0.13	0.16	0.53
ST00065	0.07	0.08	0.10	0.11	0.13	0.16	0.41
ST00066	0.07	0.08	0.10	0.11	0.13	0.16	0.29
P_52	0.41	0.44	0.46	0.49	0.50	0.50	0.50
A30	0.76	0.76	0.76	0.76	0.76	0.76	0.77
ST00056	0.27	0.27	0.27	0.27	0.27	0.27	0.27
ST00057	0.20	0.26	0.32	0.36	0.41	0.42	0.43
ST00054	0.22	0.28	0.35	0.39	0.45	0.58	0.59
ST00055	0.25	0.32	0.39	0.42	0.42	0.46	0.47
ST00044	0.27	0.27	0.27	0.27	0.27	0.27	0.28
ST00045	0.39	0.39	0.39	0.39	0.39	0.39	0.39
ST00046	0.40	0.41	0.43	0.42	0.43	0.48	0.50
ST00047	0.44	0.44	0.44	0.44	0.45	0.45	0.45
ST00043	0.16	0.20	0.22	0.23	0.23	0.23	0.25
ST00039	0.45	0.51	0.51	0.52	0.52	0.52	0.52
ST00040	0.41	0.41	0.41	0.41	0.41	0.41	0.46
ST00041	0.31	0.31	0.31	0.30	0.30	0.33	0.32
ST00038	0.22	0.29	0.35	0.39	0.47	0.50	0.50
ST00036	0.12	0.15	0.17	0.20	0.23	0.27	0.27
ST00037	0.12	0.15	0.17	0.20	0.23	0.28	0.36
ST00029	0.30	0.31	0.31	0.31	0.31	0.31	0.31
ST00030	0.27	0.27	0.27	0.27	0.27	0.27	0.27
ST00031	0.32	0.32	0.34	0.34	0.34	0.34	0.34
ST00032	0.44	0.47	0.47	0.49	0.49	0.49	0.49
ST00033	0.46	0.46	0.46	0.46	0.47	0.47	0.47
ST00034	0.47	0.47	0.47	0.47	0.47	0.47	0.47
ST00027	0.17	0.23	0.28	0.31	0.36	0.36	0.36
ST00028	0.24	0.31	0.33	0.33	0.33	0.33	0.33
ST00022	0.04	0.04	0.05	0.06	0.07	0.08	0.39
ST00023	0.17	0.21	0.27	0.31	0.36	0.46	0.89
ST00024	0.17	0.22	0.27	0.31	0.36	0.46	0.81
ST00021	0.07	0.09	0.11	0.12	0.14	0.17	0.28
ST00021B	0.17	0.20	0.24	0.28	0.33	0.37	0.38
ST00018	0.16	0.19	0.20	0.21	0.22	0.22	0.22
ST00019	0.70	0.70	0.73	0.74	0.74	0.74	0.76

Pipe ID	Peak pipe flows (m^3/s)						
	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	PMF
ST00020	0.81	0.81	0.81	0.81	0.81	0.81	0.81
ST00014	0.07	0.09	0.10	0.12	0.14	0.18	0.37
ST00017	0.96	1.00	1.04	1.07	1.10	1.16	1.16
ST00075	0.34	0.36	0.37	0.38	0.39	0.42	1.73
RYLSTONE14	0.32	0.43	0.56	0.71	0.85	1.21	1.47
A26	0.81	1.08	1.19	1.24	1.28	1.36	1.36
ST00001	0.43	0.47	0.48	0.49	0.49	0.50	1.09
A22	0.12	0.15	0.18	0.21	0.24	0.32	0.42
A20	0.34	0.43	0.54	0.63	0.66	0.69	0.96
A13	0.18	0.19	0.21	0.23	0.25	0.29	0.93
RYLSTONE 12	0.31	0.32	0.33	0.34	0.35	0.37	0.37
ST00008	0.07	0.08	0.10	0.11	0.13	0.16	0.58
A19	1.44	1.93	2.49	2.93	3.49	4.97	9.80
ST00007	0.48	0.49	0.50	0.51	0.52	0.54	0.90
A17	0.70	0.94	1.20	1.43	1.50	1.56	2.01
ST00061	0.00	0.00	0.00	0.00	0.00	0.00	0.33
ST00060	0.07	0.08	0.10	0.11	0.13	0.16	0.29
P_HW7	0.28	0.30	0.31	0.32	0.32	0.34	0.37
ST00051	1.59	1.66	1.74	1.80	1.86	1.98	1.98
ST00050	0.00	0.00	0.00	0.00	0.00	0.00	0.59
ST00048	0.52	0.55	0.59	0.62	0.66	0.73	0.90
ST00049	0.35	0.37	0.38	0.40	0.41	0.44	0.56
ST00026	0.25	0.26	0.27	0.28	0.28	0.29	0.56
P_HW1	0.27	0.27	0.28	0.28	0.28	0.29	0.60
ST00490	0.34	0.36	0.37	0.38	0.40	0.42	0.40

Table D1-3: Rylstone peak overland flow results

Overland flowpath ID	from	to	Peak overland flows (m^3/s) 20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	PMF
O_8	8	9	0.014	0.038	0.085	0.116	0.169	0.261	1.785
O_9	9	12	0.199	0.477	0.754	0.965	1.237	1.825	10.633
O_12	12	R1_out	0.089	0.341	0.619	0.83	1.103	1.692	10.501
O_10	10	11	0	0	0	0	0	0	0.509
O_11	1	N_R002	0	0	0	0	0	0.032	1.476
O_RYLSTONE6	RYLSTONE6	N_R004	0	0	0	0	0	0	0.148
O_HW1	HW1	N_R005	0.027	0.109	0.197	0.264	0.35	0.542	2.391
O_21	21	22	0.153	0.278	0.433	0.581	0.74	1.065	6.148
O_22	22	23	0.224	0.351	0.508	0.662	0.823	1.155	6.352
O_25	25	26	0.842	1.171	1.556	1.907	2.298	3.081	14.596
O_26	26	N_R007	1.045	1.415	1.909	2.351	2.843	3.911	19.74
O_N_R007	N_R007	N_R008	1.516	1.886	2.38	2.822	3.313	4.382	20.21
O_28	28	N_R009	0	0	0	0	0	0	0.917
O_N_R009	N_R009	30	0.402	0.513	0.644	0.732	0.841	1.074	5.059
O_N_R010	N_R010	Pit01	0.336	0.429	0.521	0.587	0.697	0.867	3.971
O_30	30	31	0	0.058	0.2	0.312	0.439	0.717	5.253
O_31	31	32	0.043	0.163	0.306	0.408	0.538	0.816	5.352
O_50	50	RYLSTONE9	0	0	0	0	0	0	0
O_RYLSTONE9	RYLSTONE9	RYLSTONE10	0.125	0.125	0.125	0.125	0.125	0.125	0.125
O_RYLSTONE10	RYLSTONE10	34	0.152	0.152	0.152	0.152	0.152	0.152	0.152
O_33	33	34	0.381	0.566	0.776	1.05	1.304	1.818	9.933
O_34	34	N_R011	0.531	0.732	0.939	1.233	1.489	2.006	10.138
O_N_R011	N_R011	HW2	0.961	1.162	1.369	1.663	1.919	2.436	10.569
O_N_R012	N_R012	HW3	0.965	1.175	1.387	1.665	1.925	2.461	10.596
O_HW3	HW3	N_R013	1.871	2.402	2.998	3.627	4.279	5.829	26.78
O_N_R015	N_R015	HW3	0	0	0	0	0	0	0.404
O_HW4	HW4	HW5	0	0	0	0	0	0	1.099
O_37	37	38	0	0	0	0	0	0	0
O_38	38	N_R017	0.078	0.116	0.15	0.179	0.218	0.288	1.557
O_N_R017	N_R017	HW4	0.515	0.554	0.588	0.616	0.656	0.726	1.995
O_HW8	HW8	N_R006	0.155	0.264	0.398	0.516	0.638	0.897	5.205
O_29	29	N_R010	0	0	0	0	0	0.093	2.221
O_45	45	46	0	0	0	0	0	0	0.194
O_46	46	47	0	0	0	0	0	0	0.19
O_47	47	52	0	0	0	0	0	0	0.314
O_48	48	52	0	0	0	0	0	0	0.166
O_39	39	40	0	0	0	0	0.047	0.241	2.236
O_40	40	43	0	0	0	0	0	0.012	2.106
O_41	41	42	0.229	0.375	0.553	0.709	0.876	1.217	6.753
O_52	52	Pit3	0	0	0	0.003	0.031	0.072	0.432
O_43	43	42	0	0	0	0.016	0.08	0.192	2.499
O_44	44	pit1	0.688	0.819	0.961	1.051	1.114	1.276	3.379
O_27	27	28	0	0	0	0	0	0.009	1.145
O_N_R019	N_R019	N_R020	2.822	3.696	4.847	6.113	7.285	10.971	50.164
O_N_R021	N_R021	N_R022	0	0	0	0	0	0	0.14
O_N_R023	N_R023	N_R186	0.066	0.081	0.099	0.109	0.128	0.159	0.577
O_N_R186	N_R186	45	0.066	0.081	0.099	0.109	0.128	0.159	0.717
O_51	51	Pit3	0.72	1.079	1.505	1.915	2.343	3.416	5.191
O_HW7	HW7	N_R025	0	0.077	0.189	0.314	0.447	0.758	4.893
O_1	1	N_R027	0	0	0	0	0	0	0.499
O_N_R036	N_R036	N_R037	0.426	0.703	1.046	1.38	1.767	2.525	13.988
O_N_R037	N_R037	N_R038	0.906	1.194	1.547	1.891	2.288	3.063	14.488
O_N_R038	N_R038	N_R039	0	0	0	0	0	0	18.857
O_N_R039	N_R039	R18_out	1.927	2.559	3.31	4.053	4.902	6.516	30.654
O_N_R029	N_R029	N_R039	0.703	0.939	1.199	1.428	1.502	1.562	2.009
O_HW6	HW6	N_R016	0.746	1.439	2.318	3.256	4.102	6.222	38.246
O_N_R061	N_R061	N_R054	0.535	0.705	0.873	0.978	1.161	1.501	7.198
O_ST00081	ST00081	N_R059	0	0	0	0	0	0	0.727

O_N_R040A	N_R040A	N_R040B	0	0	0	0	0	0	0.32
O_RYLSTONE1	RYLSTONE1	RYLSTONE2	0	0	0.023	0.076	0.169	0.505	4.03
O_RYLSTONE2	RYLSTONE2	N_R041	0	0	0	0	0	0.144	3.67
O_N_R041	N_R041	N_R042	0.339	0.431	0.542	0.626	0.732	0.959	4.486
O_N_R042	N_R042	N_R043	0	0	0	0	0.077	0.267	3.527
O_N_R044	N_R044	N_R045	0	0	0	0	0	0	0
O_N_R046	N_R046	N_R047	0	0.067	0.185	0.324	0.466	0.722	5.17
O_N_R047	N_R047	N_R048	0.425	0.537	0.663	0.808	0.956	1.222	5.67
O_N_R062	N_R062	N_R048	0.444	0.566	0.714	0.844	1.011	1.335	6.187
O_N_R051	N_R051	N_R054	0.158	0.201	0.255	0.292	0.335	0.428	2.022
O_N_R054	N_R054	N_R053	0.509	0.767	1.017	1.271	1.583	2.172	11.847
O_N_R057	N_R057	N_R058	0	0	0.158	0.373	0.648	1.18	11.713
O_N_R034	N_R034	N_R035	3.816	5.454	7.668	10.464	12.867	20.797	102.01
O_N_R063	N_R063	N_R066	0.453	0.611	0.805	1.009	1.202	1.758	8.242
O_N_R064	N_R064	N_R066	0.989	1.383	1.912	2.524	3.039	4.695	22.226
O_N_R066	N_R066	N_R067	1.414	1.924	2.57	3.318	3.986	6.186	28.976
O_N_R065	N_R065	N_R067	0.528	0.695	0.912	1.16	1.406	2.087	9.818
O_N_R067	N_R067	N_R068	1.879	2.515	3.334	4.227	5.043	7.803	36.252
O_N_R074	N_R074	N_R026	0.406	0.514	0.646	0.789	0.942	1.248	5.765
O_N_R027	N_R027	N_R083	0.241	0.3	0.364	0.41	0.483	0.605	2.685
O_N_R084	N_R084	N_R085	0.128	0.17	0.221	0.251	0.29	0.381	1.813
O_N_R083	N_R083	N_R085	0.379	0.475	0.585	0.692	0.816	1.058	4.929
O_N_R086	N_R086	N_R028	0.129	0.173	0.226	0.278	0.339	0.451	2.146
O_N_R085	N_R085	N_R087	0.496	0.643	0.805	0.926	1.102	1.431	6.742
O_N_R087	N_R087	N_R028	0.586	0.773	0.977	1.149	1.371	1.786	8.437
O_N_R028	N_R028	N_R088	0	0	0	0	0.205	0.673	11.219
O_N_R088	N_R088	N_R089	0.107	0.137	0.167	0.191	0.339	0.859	11.219
O_16	16	N_R090	0	0	0	0	0	0	0.086
O_15	15	N_R090	0.067	0.08	0.096	0.111	0.129	0.161	0.75
O_N_R092	N_R092	N_R093	0.344	0.43	0.528	0.597	0.695	0.894	5.06
O_14	14	N_R095	0	0	0	0	0	0	1.268
O_N_R094	N_R094	N_R090	0.152	0.194	0.245	0.279	0.322	0.424	3.096
O_N_R095	N_R095	N_R094	0.058	0.069	0.084	0.096	0.112	0.143	1.778
O_N_R100	N_R100	N_R036	0.531	0.704	0.915	1.118	1.359	1.838	8.634
O_N_R101	N_R101	R_17_out	0.166	0.219	0.283	0.336	0.389	0.506	2.418
O_N_R102	N_R102	N_R104	0.355	0.456	0.564	0.698	0.823	1.067	5.005
O_N_R103	N_R103	N_R104	0.06	0.073	0.089	0.103	0.121	0.159	0.741
O_N_R104	N_R104	N_R036	0.381	0.493	0.63	0.77	0.909	1.184	5.591
O_N_R107	N_R107	N_R108	0.044	0.053	0.064	0.073	0.085	0.107	0.496
O_20	20	N_R108	0	0	0.06	0.1	0.168	0.307	2.607
O_N_R108	N_R108	N_R105	0.044	0.053	0.123	0.17	0.253	0.408	3.04
O_N_R106	N_R106	N_R105	0.107	0.139	0.179	0.215	0.26	0.348	1.62
O_N_R105	N_R105	26	0.216	0.284	0.362	0.488	0.643	0.922	5.464
O_N_R110	N_R110	25	0.298	0.39	0.5	0.59	0.69	0.912	4.282
O_N_R109	N_R109	25	0.173	0.226	0.291	0.33	0.38	0.496	2.342
O_19	19	N_R115	0	0	0	0	0.008	0.119	1.858
O_N_R114	N_R114	N_R115	0.029	0.035	0.042	0.048	0.056	0.071	0.336
O_N_R115	N_R115	20	0.029	0.035	0.042	0.048	0.06	0.184	2.149
O_N_R111	N_R111	N_R110	0.272	0.359	0.461	0.541	0.63	0.823	3.854
O_23	23	18	0.262	0.412	0.603	0.798	1.009	1.439	7.86
O_18	18	24	0.262	0.412	0.603	0.798	1.009	1.439	7.86
O_N_R116	N_R116	N_R117	0.033	0.039	0.047	0.054	0.063	0.078	0.361
O_N_R006	N_R006	N_R117	0.404	0.521	0.664	0.788	0.916	1.187	5.612
O_N_R117	N_R117	21	0.416	0.536	0.682	0.812	0.947	1.231	5.825
O_N_R118	N_R118	24	0.117	0.154	0.199	0.226	0.26	0.34	1.612
O_N_R119	N_R119	HW8	0.371	0.482	0.617	0.735	0.854	1.108	5.249
O_N_R120	N_R120	N_R102	0.212	0.264	0.327	0.378	0.437	0.551	2.551
O_N_121	N_R121	RYLSTONE1	0.192	0.253	0.313	0.348	0.415	0.533	2.464
O_32	32	N_R126	0.399	0.58	0.784	1.02	1.264	1.726	8.948
O_N_R128	N_R128	32	0.243	0.319	0.412	0.495	0.59	0.769	3.655
O_N_R127	N_R127	N_R126	0.037	0.044	0.053	0.06	0.07	0.084	0.399
O_N_R126	N_R126	N_R125	0.405	0.589	0.796	1.06	1.311	1.784	9.187
O_N_R125	N_R125	34	0.444	0.646	0.865	1.16	1.434	1.948	10.064

O_N_R124	N_R124	N_R129	0.017	0.02	0.024	0.028	0.033	0.042	0.198
O_N_R123	N_R123	N_R129	0.122	0.158	0.202	0.241	0.291	0.387	1.801
O_N_R129	N_R129	N_R113	0.139	0.178	0.226	0.267	0.316	0.427	1.943
O_HW2	HW2	N_R012	0.965	1.174	1.386	1.665	1.925	2.461	10.596
O_N_R130	N_R130	N_R139	0.203	0.254	0.312	0.35	0.407	0.518	2.387
O_N_R131	N_R131	N_R135	0.056	0.067	0.081	0.093	0.108	0.137	0.636
O_N_R132	N_R132	N_R134	0.039	0.047	0.056	0.065	0.075	0.095	0.445
O_N_R136	N_R136	ST00076	0.241	0.308	0.389	0.47	0.563	0.754	3.434
O_ST00073	ST00076	N_R062	0.126	0.247	0.395	0.525	0.693	1.017	5.869
O_ST00116	ST00116	N_R139	0.101	0.121	0.144	0.166	0.193	0.239	1.1
O_N_R139	N_R139	N_R135	0.304	0.374	0.457	0.512	0.599	0.757	3.374
O_N_R135	N_R135	N_R134	0.349	0.428	0.522	0.592	0.692	0.876	3.944
O_N_R134	N_R134	N_R133	0.376	0.464	0.565	0.642	0.751	0.952	4.331
O_N_R133	N_R133	N_R046	0.406	0.507	0.618	0.708	0.828	1.048	4.872
O_N_R050	N_R050	N_R140	0.013	0.016	0.019	0.021	0.025	0.03	0.147
O_N_R040	N_R140	ST00076	0.204	0.26	0.327	0.385	0.453	0.593	2.753
O_Pit01	Pit01	N_R141	0.124	0.225	0.329	0.404	0.521	0.71	4.125
O_N_R141	N_R141	N_R142	0.588	0.76	0.971	1.286	1.592	2.192	11.145
O_N_R142	N_R142	N_R148	0.973	1.28	1.615	1.93	2.308	3.241	15.007
O_N_R014	N_R014	N_R148	0.515	0.554	0.588	0.617	0.656	0.725	0.896
O_N_R148	N_R148	HW3	1.481	1.825	2.197	2.529	2.949	3.948	15.883
O_N_R145	N_R145	N_R146	0.453	0.694	0.969	1.155	1.408	1.955	10.346
O_HW5	HW5	N_R149	0	0	0	0	0	0	0.693
O_N_R146B	N_R146B	N_R150	2.268	3.058	3.98	4.85	5.769	7.763	37.556
O_N_R150	N_R150	HW6	2.315	3.097	4.05	5.041	5.946	8.163	38.748
O_pit1	pit1	N_R147	0.688	0.819	0.961	1.051	1.114	1.276	3.379
O_N_R147	N_R147	N_R146	1.564	2.037	2.588	3.087	3.623	4.829	22.063
O_Pit3_out	Pit3_out	N_R152	1.291	1.693	2.189	2.712	3.228	4.487	21.203
O_N_R151	N_R151	N_R152	0.809	1.089	1.468	1.904	2.294	3.683	17.394
O_ST00080	ST00080	N_R153	0.117	0.144	0.172	0.198	0.229	0.282	1.279
O_N_R153	N_R153	N_R130	0.117	0.144	0.172	0.198	0.229	0.282	1.279
O_N_R143	N_R143	N_R141	0.062	0.076	0.09	0.104	0.12	0.148	0.674
O_N_R144	N_R144	N_R154	0.065	0.08	0.096	0.11	0.128	0.159	0.73
O_35	35	N_R154	0.169	0.304	0.446	0.528	0.666	0.944	5.326
O_36	36	N_R054	0.182	0.265	0.371	0.46	0.573	0.799	4.077
O_N_R154	N_R154	N_R145	0.414	0.646	0.911	1.087	1.327	1.849	9.782
O_N_R059	N_R059	N_R156	0.101	0.121	0.145	0.166	0.193	0.239	1.151
O_N_R156	N_R156	N_R155	0.185	0.22	0.264	0.303	0.352	0.437	2.058
O_N_R155	N_R155	N_R061	0.269	0.33	0.396	0.456	0.531	0.669	3.197
O_N_R157	N_R157	N_R061	0.268	0.368	0.472	0.532	0.633	0.828	3.995
O_N_R159	N_R159	N_R147	0.702	0.906	1.156	1.438	1.736	2.375	11.167
O_N_R160	N_R160	44	0.178	0.234	0.304	0.365	0.426	0.554	2.646
O_N_R161	N_R161	N_R164	0.063	0.075	0.09	0.103	0.12	0.149	0.689
O_N_R163	N_R163	N_R164	2.196	2.863	3.737	4.659	5.543	8.24	37.903
O_N_R152	N_R152	N_R163	2.17	2.831	3.697	4.609	5.51	8.155	37.424
O_N_R162	N_R162	N_R163	0.085	0.11	0.132	0.152	0.177	0.224	1.03
O_N_R164	N_R164	N_R019	2.214	2.885	3.764	4.693	5.583	8.294	38.209
O_N_R165	N_R165	N_R166	0.468	0.608	0.771	0.977	1.181	1.622	7.562
O_N_R158	N_R158	N_R166	0.235	0.303	0.385	0.469	0.564	0.763	3.479
O_N_R166	N_R166	N_R159	0.668	0.865	1.111	1.41	1.707	2.321	10.94
O_N_R060	N_R060	N_R157	0.04	0.047	0.056	0.064	0.074	0.09	0.42
O_N_168	N_R168	N_R167	0.132	0.169	0.204	0.234	0.273	0.345	1.589
O_N_R022	N_R022	N_R173	0	0	0	0	0	0	0
O_N_R172	N_R172	N_R173	0.542	0.731	0.961	1.217	1.485	2.095	9.86
O_N_R173	N_R173	N_R174	0.646	0.862	1.126	1.387	1.683	2.344	10.795
O_N_R171	N_R171	N_R174	0.065	0.089	0.117	0.131	0.153	0.205	0.965
O_N_R174	N_R174	N_R175	0.708	0.947	1.23	1.486	1.799	2.5	11.488
O_N_R170	N_R170	N_R175	0.046	0.064	0.085	0.102	0.121	0.16	0.77
O_N_R175	N_R175	N_R176	0.752	1.009	1.308	1.571	1.891	2.641	12.054
O_N_R176	N_R176	N_R177	0.771	1.032	1.337	1.61	1.927	2.702	12.315
O_N_R169	N_R169	N_R177	0.035	0.048	0.063	0.074	0.087	0.113	0.546
O_N_R177	N_R177	51	0.8	1.069	1.382	1.665	1.976	2.787	12.669
O_N_R187	N_R025	N_R182	0.277	0.375	0.497	0.63	0.77	1.095	5.178

O_N_R178	N_R178	N_R182	0.128	0.178	0.225	0.253	0.299	0.398	1.883
O_N_R182	N_R182	Pit3	0.128	0.178	0.225	0.253	0.299	0.398	1.883
O_N_R179	N_R179	N_R181	0.104	0.141	0.186	0.228	0.28	0.367	1.762
O_N_R180	N_R180	N_R181	0.068	0.094	0.12	0.135	0.159	0.212	1.003
O_N_R181	N_R181	N_R151	0.169	0.232	0.303	0.36	0.427	0.567	2.731
O_N_R018	N_R018	N_R184	0.053	0.062	0.074	0.085	0.099	0.12	0.562
O_N_R183	N_R183	N_R184	0.065	0.08	0.098	0.113	0.132	0.166	0.769
O_N_R184	N_R184	N_R165	0.109	0.133	0.161	0.183	0.212	0.27	1.196
O_ST00079	ST00079	ST00080	0	0	0	0	0	0	0.657
O_N_R167	N_R167	N_R152	0.156	0.203	0.251	0.292	0.349	0.449	2.141
O_N_R185	N_R185	N_R079	0.333	0.436	0.563	0.674	0.791	1.03	4.898
O_N_R079	N_R079	N_R078	0.395	0.517	0.661	0.784	0.915	1.195	5.614
O_N_R078	N_R078	N_R077	0.515	0.662	0.835	0.979	1.144	1.489	6.822
O_N_R077	N_R077	N_R076	0.605	0.775	0.971	1.132	1.326	1.73	7.837
O_N_R076	N_R_076	9	0.655	0.838	1.048	1.218	1.428	1.866	8.427
O_13	13	11	0	0	0	0	0	0	0
O_N_R090	N_R090	N_R092	0.269	0.336	0.415	0.471	0.547	0.706	4.296
O_N_R075	N_R075	8	0.655	0.838	1.048	1.218	1.428	1.866	8.427
O_N_R093	N_R093	N_R081	0.344	0.43	0.528	0.597	0.695	0.894	5.06
O_N_R004	N_R004	N_R092	0.037	0.044	0.053	0.061	0.071	0.09	0.413
O_N_R003	N_R003	HW1	0.17	0.215	0.268	0.313	0.364	0.462	0.807
O_N_R005	N_R005	R_17_out	0.294	0.381	0.474	0.544	0.634	0.831	2.72
O_N_R112	N_R112	N_R111	0.181	0.239	0.31	0.373	0.439	0.572	2.731
O_N_R113	N_R113	N_R008	0.204	0.258	0.322	0.377	0.442	0.59	2.656
O_R_18_out	R_18_out	N_R089	0.213	0.288	0.379	0.437	0.511	0.667	3.218
O_N_R089	N_R089	N_R038	0.384	0.52	0.684	0.781	0.927	1.466	12.426
O_N_R099	N_R099	N_R038	0.172	0.238	0.313	0.352	0.414	0.553	2.621
O_N_R122	N_R122	N_R044	0.117	0.15	0.182	0.209	0.245	0.317	1.473
O_N_R053	N_R053	N_R057	0.814	1.084	1.345	1.608	1.931	2.537	12.213
O_42	42	N_R147	0.229	0.375	0.553	0.719	0.941	1.385	9.178
O_N_R071	N_R071	R10_out	0	0	0	0	0	0.061	4.235
O_N_R146	N_R146	N_R146B	1.309	2.06	2.943	3.78	4.667	6.599	37.056
O_Pit3	Pit3	Pit3_out	0.548	0.952	1.449	1.973	2.487	3.74	20.458
O_N_R040B	N_R040B	RYLSTONE1	0.067	0.08	0.096	0.11	0.128	0.161	0.739
O_24	24	25	0.488	0.729	1.019	1.275	1.535	2.068	10.015
O_N_R072	N_R072	R9_out	0.324	0.583	0.888	1.3	1.644	2.791	15.53

Figure D2-1. Kandos Subcatchments

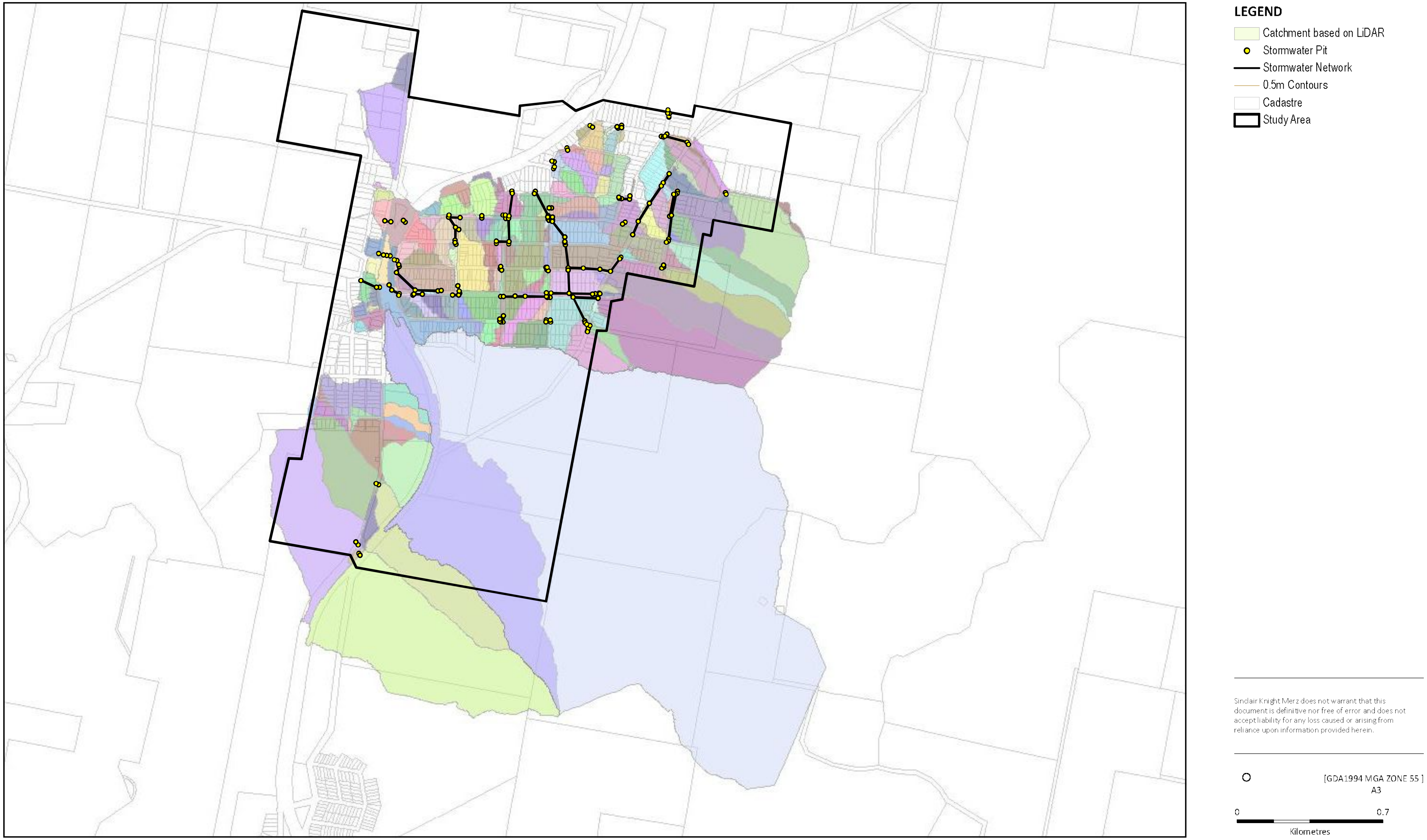


Table D2-1:Kandos subcatchments data

Catchment draining to pit	Total area (ha)	Paved area (%)	Grass area (%)
ST00297	0.17	67.5	32.5
ST00298	0.91	38.5	61.5
ST00299	0.33	43.4	56.6
N_K005	0.32	48	52
ST00304	0.15	68.7	31.3
ST00306	0.46	51.6	48.4
ST00308	1.09	35.7	64.3
ST00309	0.96	46.8	53.2
ST00301	0.67	47.3	52.8
ST00300	0.09	63.5	36.5
ST00302	0.19	67.7	32.3
ST00310	0.07	69.9	30.1
ST00311	2.91	38.1	61.9
ST00312	2.25	41.7	58.3
ST00313	0.46	49.8	50.2
N_K052	0.09	48.2	51.8
ST00315	0.01	70	30
ST00318	1.9	36.5	63.5
ST00319	0.74	49.8	50.2
ST00316	1.61	41.2	58.8
ST00317	0.84	53.4	46.6
ST00320	0.42	44.7	55.3
ST00322	0.64	51.3	48.7
ST00323	0.09	64.9	35.1
ST00324	1.99	33.8	66.2
ST00325	0.26	41.5	58.5
ST00328	0.16	53.1	46.9
ST00501	0.03	65.9	34.1
ST00327	1.15	39.5	60.5
ST00326	0.14	50.3	49.7
ST00329	0.17	40.8	59.3
ST00330	0.71	33.3	66.8
ST00332	2.54	37.7	62.3
ST00331	0.02	70	30
ST00335	0.1	43.1	56.9
ST00337	0.22	65.6	34.4
ST00338	0.67	43.8	56.2
ST00340	1.56	33	67
ST00341	0.24	55.5	44.5
ST00342	0.51	42.8	57.2
ST00345	0.52	43.9	56.1
ST00346	0.03	70	30
ST00348	1.69	36.2	63.8
ST00347	0.25	55	45
ST00350	1.15	40.9	59.1
ST00349	0.33	42.7	57.3
ST00351	0.54	41	59

ST00354	0.18	50.7	49.3
ST00360	0.12	56.6	43.4
ST00361	2.4	21.8	78.2
ST00370	10.59	7.7	92.3
ST00375	0.43	38.1	61.9
ST00372	1.46	39	61
ST00377	0.58	38.1	61.9
ST00376	0.12	67.6	32.4
ST00380	0.3	52.9	47.1
ST00367	0.26	49.1	50.9
ST00384	0.01	61.8	38.2
ST00383	4.78	14.1	85.9
ST00381	5.09	12.9	87.1
ST00366	0.09	67.2	32.8
ST00365	5.95	19.5	80.5
ST00379	0.18	37.4	62.6
ST00388	1.51	40.2	59.8
ST00387	6.22	9.9	90.1
N_K060	0.03	59.9	40.1
ST00389	0.15	45.2	54.8
ST00390	0.33	50.2	49.8
ST00392	11.6	7.5	92.5
ST00393	0.06	69.6	30.4
ST00394	0.3	51.4	48.6
ST00401	0.14	56.2	43.8
N_K043	4.82	39.1	60.9
N_K046	2.84	37.1	62.9
ST00397	0.21	53	47
ST00396	0.36	42.6	57.4
ST00403	0.28	70	30
ST00402	2.59	35.7	64.3
ST00398	17.83	10.3	89.8
ST00404	4.43	40.2	59.8
ST00410	0.03	66.3	33.7
ST00510	0.01	70	30
ST00411	0.43	37.4	62.6
ST00412	1.83	38.4	61.6
ST00413	0.26	67.5	32.5
ST00415	0.63	38.4	61.6
ST00416	0.29	46.5	53.5
ST00418	0.02	63.6	36.4
ST00420	0.17	60.8	39.2
ST00421	0.1	66.9	33
ST00424	0.05	70	30
ST00425	0.36	30.4	69.6
ST00427	0.02	70	30
ST00430	3.56	39.4	60.6
K5_out	0.86	33.4	66.6
ST00432	1.86	9.9	90.1
ST00433	1.51	9.3	90.8
ST00499	1.15	39	61

N_K051	0.32	44.7	55.3
ST00500	0.28	20.5	79.5
ST00529	3.49	39.5	60.5
K1_out	1.3	29.2	70.8
K2_out	6.45	19.6	80.4
K3_out	0.99	31	68.9
K4_out	0.82	39.9	60.1
HW1	0.58	25.7	74.3
HW2	0.67	29.1	70.9
HW3	0.88	41	59
N_K007	0.9	32.4	67.6
N_K008	0.43	32	68
HW6	5.48	12.9	87.1
N_K016	0.8	7.7	92.3
N_K017	2.98	16.1	83.9
N_K018	0.66	36.5	63.5
K8_out	4.25	20.5	79.5
N_K020	0.96	28.4	71.6
HW7	0.28	25.4	74.6
K7_out	0.23	32.8	67.2
N_K024	0.25	29.4	70.6
HW9	21.96	9.1	90.9
HW8	44.79	7.4	92.6
N_K026	1.16	33.9	66.1
HW12	15.29	6.3	93.7
HW10	99.74	21.4	78.6
N_K032	151.85	8.9	91.1
ST00303	0.81	44.6	55.4
N_K035	0.78	37	63
N_K038	0.74	43	57
N_K040	1.27	14.7	85.3
HW13	3.96	16	84
N_K049	0.15	68	32
N_K050	0.52	39.4	60.6
N_K053	1.18	33.8	66.2
K9_out	1.01	36.7	63.3
K10_out	0.28	26.7	73.3
K11_out	4.87	36.7	63.3
N_K055	0.99	37.9	62.1
K12_out	1.07	29.1	70.9
N_K056	0.8	35.1	64.9
K13_out	0.99	36.2	63.8
N_K057	0.58	43.5	56.5
N_K058	0.05	62.5	37.5
N_K059	1.27	36.5	63.5
N_K061	0.03	56	44
N_K062	0.76	13.1	86.9
N_K063	1.06	18	82
HW15	1.32	36.3	63.7
N_K068	0.26	37.1	62.9
N_K069	0.28	42.1	57.9

N_K073	8.81	7.6	92.4
N_K075	0.08	61.6	38.4
N_K077	0.09	66.8	33.3
N_K080	0.14	18.6	81.4
N_K082	0.17	62.6	37.4
N_K084	0.04	70	30
HW17	1.46	38.6	61.4
N_K089	0.97	40.8	59.2
N_K090	0.44	30.9	69.2
N_K093	0.07	55.8	44.2
N_K094	0.22	45.9	54.1
N_K095	0.21	35.2	64.8
N_K096	0.65	38.9	61.1
N_K098	0.73	35.4	64.6
N_K099	0.59	43.3	56.7
N_K101	0.15	39.8	60.2
N_K103	0.15	55.7	44.3
N_K104	0.05	70	30
N_K106	1.06	39.7	60.3
N_K109	0.07	70	30
N_K110	0.25	41.9	58.1
N_K112	1.27	36.1	63.9
N_K113	1.86	44.3	55.7
N_K114	3.99	35.5	64.6
N_K115	2.19	40.9	59.1
N_K116	0.12	56.8	43.2
N_K117	0.17	33.4	66.6
N_K120	0.17	63.4	36.6
N_K121	1.54	37.6	62.4
N_K122	0.51	30.1	69.9
N_K123	0.09	65.3	34.7
N_K125	0.03	69.3	30.8
N_K127	24.39	5	95
N_K128	2.13	34.6	65.4
N_K129	0.4	30.7	69.3
N_K130	0.11	67.6	32.4
N_K132	3.36	38.9	61.1
N_K133	0.04	69.6	30.4
N_K134	0.75	43.7	56.3
N_K135	0.2	32.2	67.8
N_K136	0.28	44.5	55.5
K14_out	0.55	47.5	52.5
N_K137	1.24	37.3	62.7
N_K138	0.36	34.4	65.6
N_K139	0.45	36.8	63.2
N_K141	0.81	28	72
N_K142	1.14	14.4	85.6
N_K143	5.51	8.8	91.2
N_K144	0.97	40.2	59.8
ST00429	0.1	45.9	54.1
ST00428	0.46	36.3	63.7

ST00356b	0.27	56.8	43.2

Table D.2.2: Kandos peak pipe flow results

Pipe ID	Peak pipe flows (m^3/s)						
	20% AEP	**10% AEP**	**5% AEP**	**2% AEP**	**1% AEP**	**0.5% AEP**	**PMF**
ST00277	0.09	0.11	0.13	0.16	0.18	0.24	0.55
A46	1.57	1.72	1.93	2.23	2.33	2.42	3.06
ST00278	1.78	1.81	1.84	1.84	1.87	1.95	2.66
ST00135	0.99	0.99	0.99	0.99	0.99	0.99	0.97
ST00137	0.46	0.45	0.45	0.45	0.45	0.45	0.41
ST00136	0.34	0.35	0.32	0.34	0.34	0.33	0.31
ST00134	0.47	0.47	0.47	0.47	0.47	0.47	0.47
ST00132	0.62	0.62	0.62	0.62	0.62	0.62	0.67
P_ST00299	0.07	0.08	0.10	0.11	0.13	0.16	0.21
ST00127	0.31	0.34	0.35	0.36	0.36	0.36	0.38
ST00126	0.20	0.23	0.27	0.30	0.31	0.31	0.32
ST00130	0.23	0.27	0.31	0.36	0.41	0.50	0.63
ST00275	0.44	0.44	0.44	0.44	0.44	0.44	0.44
P_ST00431	0.64	0.64	0.64	0.64	0.64	0.64	0.64
A71	0.79	0.81	0.83	0.85	0.87	0.94	1.34
A72	1.96	2.46	3.17	4.05	4.82	6.70	10.22
A66	0.46	0.47	0.48	0.49	0.51	0.54	0.90
KANDOS 21	0.16	0.16	0.16	0.16	0.16	0.16	0.14
KANDOS 22	0.43	0.43	0.43	0.43	0.43	0.43	0.43
ST00165	0.16	0.19	0.22	0.25	0.29	0.29	0.30
ST00166	0.27	0.27	0.27	0.27	0.27	0.27	0.27
ST00167	0.43	0.43	0.43	0.43	0.43	0.43	0.43
ST00169	0.08	0.10	0.11	0.13	0.16	0.19	0.39
ST00170	0.08	0.10	0.11	0.13	0.16	0.19	0.42
ST00172	0.01	0.02	0.02	0.02	0.03	0.03	0.15
ST00171	0.26	0.31	0.36	0.37	0.37	0.37	0.38
ST00173	0.03	0.03	0.04	0.06	0.12	0.19	0.27
ST00174	0.28	0.33	0.39	0.44	0.49	0.49	0.49
ST00175	0.44	0.44	0.44	0.45	0.45	0.45	0.45
ST00176	0.10	0.11	0.12	0.13	0.13	0.14	0.15
ST00177	0.44	0.44	0.44	0.44	0.44	0.44	0.44
ST00179	0.01	0.01	0.01	0.04	0.10	0.24	0.44
ST00178	0.39	0.39	0.39	0.39	0.39	0.40	0.41
P_ST00510	0.40	0.40	0.40	0.42	0.48	0.51	0.51
ST00180	0.17	0.19	0.23	0.26	0.30	0.37	0.46
ST00181	0.26	0.30	0.35	0.37	0.37	0.37	0.37
KANDOS7	0.37	0.38	0.38	0.39	0.40	0.41	0.54
C15	0.20	0.24	0.29	0.34	0.40	0.52	0.64
C14	0.24	0.25	0.26	0.26	0.27	0.29	0.41
ST00195	0.51	0.51	0.51	0.51	0.52	0.52	0.53
ST00196	0.95	1.08	1.11	1.10	1.11	1.10	1.09
ST00208	0.05	0.06	0.07	0.08	0.09	0.11	0.18
ST00209	0.14	0.16	0.18	0.21	0.24	0.30	0.31
ST00210	0.13	0.16	0.18	0.21	0.24	0.30	0.49
ST00207	0.61	0.60	0.62	0.59	0.62	0.56	0.63
ST00197	0.82	0.82	0.82	0.81	0.81	0.81	0.90

Pipe ID	Peak pipe flows (m^3/s)						
	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	PMF
ST00198	1.12	1.12	1.12	1.12	1.12	1.12	1.15
ST00199	0.44	0.44	0.44	0.44	0.44	0.44	0.44
ST00183	0.33	0.33	0.33	0.33	0.33	0.33	0.33
P_ST00414	0.35	0.34	0.35	0.34	0.35	0.33	0.33
ST00184	0.14	0.17	0.20	0.22	0.26	0.32	0.44
ST00212	0.09	0.10	0.12	0.14	0.16	0.16	0.25
ST00213	0.12	0.12	0.14	0.15	0.17	0.18	0.23
ST00214	0.54	0.54	0.54	0.54	0.54	0.54	0.54
ST00215	0.57	0.57	0.57	0.57	0.57	0.57	0.57
ST00216	0.52	0.52	0.53	0.53	0.53	0.52	0.58
ST00200	0.91	0.91	0.91	0.91	0.91	0.91	0.91
P_N_K043	0.54	0.54	0.54	0.54	0.54	0.55	0.56
P_N_K044	0.66	0.66	0.66	0.66	0.66	0.66	0.66
P_N_K045	0.93	0.93	0.93	0.93	0.93	0.93	0.93
ST00201	1.03	1.03	1.03	1.03	1.03	1.03	1.00
P_N_K046	0.78	0.78	0.78	0.78	0.78	0.78	0.80
ST00188	0.19	0.19	0.19	0.19	0.19	0.19	0.19
ST00187	0.22	0.22	0.23	0.23	0.23	0.24	0.25
C06	0.22	0.21	0.22	0.22	0.22	0.22	0.35
ST00203	0.33	0.33	0.33	0.33	0.33	0.33	0.45
ST00202	0.05	0.06	0.07	0.08	0.09	0.11	0.54
ST00191	0.20	0.23	0.27	0.30	0.30	0.30	0.43
P_ST00333	1.65	1.65	1.66	1.65	1.65	1.65	1.65
ST00193	0.00	0.00	0.00	0.01	0.05	0.14	0.40
ST00163	0.01	0.01	0.01	0.01	0.01	0.01	0.06
ST00162	0.04	0.05	0.06	0.08	0.09	0.11	0.39
ST00161	0.18	0.19	0.20	0.21	0.21	0.20	0.21
ST00160	0.27	0.27	0.28	0.29	0.31	0.31	0.33
ST00508	0.13	0.16	0.19	0.23	0.26	0.28	0.39
ST00157	0.48	0.52	0.57	0.59	0.61	0.63	0.64
ST00150	0.16	0.18	0.21	0.24	0.27	0.34	0.60
C01	0.05	0.05	0.05	0.05	0.05	0.05	0.09
P_ST00328	0.04	0.05	0.06	0.07	0.08	0.09	0.26
ST00503	0.18	0.18	0.20	0.22	0.23	0.23	0.35
ST00504	0.43	0.43	0.43	0.43	0.43	0.43	0.41
ST00153	0.55	0.55	0.56	0.57	0.58	0.58	0.58
ST00152	0.44	0.44	0.45	0.45	0.45	0.45	0.45
ST00143	0.10	0.12	0.14	0.16	0.18	0.23	0.30
ST00144	0.13	0.15	0.17	0.19	0.22	0.27	0.31
ST00145	0.13	0.15	0.17	0.20	0.22	0.28	0.40
ST00146	0.56	0.56	0.56	0.56	0.56	0.56	0.56
P_ST00530	1.01	1.01	1.01	1.01	1.02	1.01	1.02
ST00148	0.20	0.23	0.27	0.30	0.30	0.31	0.34
P_ST00318	0.65	0.65	0.69	0.70	0.70	0.71	0.71
ST00204	0.65	0.67	0.65	0.65	0.65	0.65	0.63
ST00219	0.21	0.25	0.29	0.33	0.35	0.36	0.37
ST00220	0.24	0.29	0.34	0.38	0.40	0.42	0.45
ST00221	0.36	0.41	0.47	0.53	0.56	0.56	0.57

Pipe ID	Peak pipe flows (m^3/s)						
	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	PMF
ST00222	0.33	0.39	0.40	0.40	0.40	0.40	0.40
ST00225	0.43	0.43	0.43	0.43	0.43	0.43	0.44
ST00256	0.22	0.22	0.21	0.22	0.22	0.20	0.20
ST00526	0.55	0.55	0.55	0.55	0.55	0.55	0.55
ST00258	0.30	0.30	0.28	0.28	0.28	0.28	0.29
ST00259	0.46	0.46	0.46	0.46	0.46	0.46	0.48
ST00260	0.46	0.46	0.46	0.46	0.46	0.47	0.49
P_ST00380	0.07	0.08	0.09	0.10	0.12	0.15	0.53
ST00263	0.71	0.71	0.71	0.71	0.71	0.71	0.71
ST00264	0.48	0.48	0.48	0.48	0.48	0.48	0.48
ST00265	0.48	0.48	0.48	0.48	0.48	0.48	0.48
ST00239	0.14	0.16	0.20	0.26	0.30	0.31	0.48
ST00246	0.47	0.48	0.48	0.47	0.49	0.47	0.44
ST00249	0.43	0.43	0.43	0.44	0.44	0.43	0.43
ST00527	0.43	0.43	0.43	0.43	0.43	0.43	0.43
ST00267	0.48	0.48	0.48	0.48	0.48	0.48	0.49
ST00253	0.03	0.04	0.04	0.06	0.06	0.07	0.33
ST00243	0.09	0.11	0.14	0.17	0.20	0.29	0.54
ST00520	0.53	0.53	0.54	0.54	0.54	0.54	0.54
ST00242	0.22	0.23	0.25	0.26	0.27	0.27	0.31
ST00241	0.17	0.17	0.18	0.19	0.19	0.19	0.23
KANDOS 10	0.47	0.48	0.49	0.50	0.52	0.54	0.82
C10	1.06	1.11	1.14	1.18	1.20	1.27	1.80
C09	1.56	1.61	1.64	1.68	1.70	1.77	2.04
ST00375	0.06	0.06	0.06	0.06	0.06	0.06	0.07
ST00237	0.21	0.21	0.21	0.21	0.21	0.21	0.20
C07	0.19	0.19	0.19	0.19	0.19	0.18	0.13
ST00238	0.40	0.41	0.42	0.44	0.44	0.44	0.45
ST00230	0.19	0.22	0.26	0.30	0.35	0.41	0.42
ST00232	0.05	0.06	0.07	0.08	0.10	0.10	0.48
A44	0.61	0.71	0.84	0.94	1.07	1.36	2.48
ST00247	0.47	0.47	0.47	0.47	0.47	0.47	0.47
ST00248	0.47	0.47	0.51	0.53	0.52	0.50	0.47
ST00128	0.16	0.18	0.21	0.25	0.28	0.29	0.30
ST00129	0.18	0.21	0.25	0.28	0.32	0.32	0.42
A54	6.20	7.06	7.93	8.32	8.57	9.20	16.85

Table D.2.3: Kandos peak overland flow results

			Peak overland flows (m³/s)						
Overland flowpath ID	**from**	**to**	**20% AEP**	**10% AEP**	**5% AEP**	**2% AEP**	**1% AEP**	**0.5% AEP**	**PMF**
O_N_K039	N_K039	ST00405	0.255	0.297	0.351	0.368	0.37	0.372	1.816
O_ST00408	ST00408	ST00406	0.165	0.191	0.225	0.258	0.296	0.37	0.462
O_HW8	HW8	N_K023	0	0	0	0	0	0.828	37.92
O_N_K023	N_K023	N_K024	1.959	2.464	3.174	4.046	4.817	7.527	47.994
O_HW9	HW9	N_K025	0.47	0.749	1.154	1.651	2.112	3.629	25.511
O_N_K024	N_K024	N_K071	1.961	2.466	3.178	4.054	4.827	7.536	48.089
O_N_K025	N_K025	N_K071	1.258	1.555	1.982	2.503	2.983	4.568	26.855
O_N_K071	N_K071	N_K022	3.201	3.992	5.127	6.549	7.802	11.829	71.587
O_N_K022	N_K022	K7_out	3.201	3.992	5.127	6.549	7.802	11.829	71.587
O_HW7	HW7	N_K021	0.238	0.278	0.328	0.375	0.431	0.552	2.893
O_N_K026	N_K026	N_K072	2.761	3.271	3.926	4.492	5.214	7.043	37.946
O_N_K027	N_K027	N_K072	2.305	2.803	3.445	3.999	4.708	6.507	37.074
O_HW12	HW12	N_K027	2.999	3.547	4.253	4.85	5.636	7.594	40.836
O_N_K072	N_K072	N_K073	3.704	4.425	5.344	6.169	7.116	9.732	52.665
O_N_K073	N_K073	N_K074	3.704	4.425	5.344	6.169	7.116	9.732	52.665
O_N_K074	N_K074	N_K020	3.712	4.434	5.354	6.208	7.164	9.807	52.893
O_N_K020	N_K020	HW7	0.021	0.025	0.03	0.037	0.042	0.043	0.232
O_N_K075	N_K075	N_K076	0.904	1.089	1.327	1.578	1.845	2.533	13.219
O_N_K017	N_K017	N_K076	0.908	1.093	1.332	1.589	1.856	2.545	13.317
O_N_K076	N_K076	N_K018	0.137	0.163	0.196	0.227	0.264	0.355	1.93
O_N_K016	N_K016	N_K018	0.24	0.295	0.365	0.447	0.526	0.737	3.74
O_ST00432	ST00432	N_K077	0.218	0.267	0.33	0.392	0.457	0.625	3.308
O_ST00433	ST00433	N_K077	1.552	1.88	2.29	2.758	3.222	4.426	22.939
O_N_K077	N_K077	K8_out	1.096	1.321	1.606	1.919	2.24	3.064	16.07
O_N_K018	N_K018	N_K077	0	0	1.097	4.624	7.753	17.785	81.352
O_HW10	HW10	N_K028	6.203	7.058	9.031	12.939	16.32	26.984	98.197
O_N_K028	N_K028	N_K029	6.203	7.058	9.031	12.939	16.32	26.984	98.197
O_N_K029	N_K029	N_K030	6.203	7.058	9.031	12.939	16.32	26.984	98.197
O_N_K030	N_K030	N_K013	6.203	7.058	9.031	12.939	16.32	26.984	98.197
O_N_K013	N_K013	N_K012	6.203	7.058	9.031	12.939	16.32	26.984	98.197
O_N_K012	N_K012	N_K011	6.23	7.094	9.078	13.007	16.421	27.158	98.197
O_HW6	HW6	N_K011	6.23	7.094	9.078	13.007	16.421	27.158	98.197
O_N_K011	N_K011	HW11	6.23	7.094	9.078	13.007	16.421	27.158	98.197
O_HW11	HW11	N_K031	0.194	0.226	0.267	0.306	0.352	0.448	2.326
O_N_K007	N_K007	N_K079	0.065	0.077	0.095	0.119	0.137	0.149	0.806
O_ST00500	ST00500	N_K079	0.134	0.156	0.193	0.244	0.283	0.305	1.581
O_N_K008	N_K008	N_K077	0.024	0.028	0.034	0.042	0.048	0.049	0.259
O_N_K077	N_K077	K6_out	0.032	0.039	0.047	0.059	0.069	0.075	0.407
O_N_K080	N_K080	N_K008	0.387	0.529	0.681	0.789	0.956	1.317	10.123
O_ST00430	ST00430	ST00431	5.413	6.774	8.719	10.962	13.091	20.261	124.46
N_K032	N_K032	HW10	0	0	0	0	0.004	0.073	1.637
O_ST00301	ST00301	ST00302	0	0	0	0	0	0	0
O_ST00300	ST00300	ST00302	0	0	0	0	0	0	1.918
O_ST00302	ST00302	ST00430	0.044	0.05	0.059	0.077	0.089	0.092	0.47
O_N_082	N_K082	N_K083	0.395	0.644	0.923	1.242	1.53	2.167	13.968
O_ST00306	ST00306	N_K083	0.161	0.161	0.161	0.161	0.161	0.161	0.161
O_ST00307	ST00307	ST00308	0.323	0.373	0.425	0.472	0.532	0.651	2.888
O_ST00308	ST00308	ST00309	0.309	0.446	0.671	1.064	1.403	2.16	15.233
O_ST00309	ST00309	N_K004	1.236	1.345	1.569	1.962	2.301	3.059	16.132
O_N_K004	N_K004	HW2	0	0	0	0	0.256	1.058	14.201
O_HW2	HW2	N_K002	1.565	1.72	1.93	2.232	2.582	3.476	17.255
O_N_K002	N_K002	HW3	0.014	0.164	0.347	0.627	0.909	1.691	15.866
O_HW3	HW3	N_K003	1.782	1.92	2.144	2.46	2.778	3.636	18.528
O_N_K003	N_K003	K4_out	0.402	0.652	0.939	1.263	1.556	2.201	14.127

O_N_K083	N_K083	ST00309	0.361	0.418	0.492	0.563	0.646	0.81	4.176
O_ST00316	ST00316	HW17	0	0	0	0	0	0	4.57
O_HW17	HW17	N_K070	0.606	0.708	0.84	0.938	1.068	1.364	7.05
O_N_K070	N_K070	N_K084	0	0	0	0	0	0	0.664
O_HW1	HW1	N_K001	0.09	0.11	0.133	0.158	0.182	0.242	1.217
O_N_K001	N_K001	N_K085	0.625	0.731	0.867	0.968	1.103	1.406	7.277
O_N_K084	N_K084	N_K085	0.711	0.833	0.989	1.11	1.273	1.641	8.48
O_N_K085	N_K085	K3_out	0	0	0	0.01	0.058	0.139	1.912
O_ST00317	ST00317	ST00318	1.065	1.362	1.727	1.993	2.326	3.117	17.008
O_ST00318	ST00318	ST00319	1.722	2.018	2.414	2.756	3.129	3.954	19.04
O_ST00319	ST00319	N_K053	0	0	0	0	0	0	0.884
O_ST00313	ST00313	N_K052	0	0	0	0	0	0.01	1.164
O_N_K052	N_K052	ST00315	0	0	0	0	0	0	0.99
O_ST00315	ST00315	ST00530	0.646	0.846	1.075	1.247	1.461	1.956	10.199
O_ST00529	ST00529	ST00530	0.211	0.418	0.692	0.894	1.137	1.686	11.073
O_ST00530	ST00530	ST00318	0.714	0.785	0.866	0.936	1.05	1.265	5.61
O_N_K037	N_K037	ST00529	0	0	0	0	0	0	0.661
O_ST00299	ST00299	N_K005	0.07	0.12	0.186	0.254	0.295	0.361	1.722
O_N_K005	N_K005	N_K086	0.232	0.474	0.682	0.917	1.138	1.615	12.085
O_ST00304	ST00304	N_K086	0.232	0.477	0.733	1.034	1.31	1.924	13.436
O_N_K086	N_K086	ST00306	0	0	0	0	0.035	0.127	1.973
O_ST00298	ST00298	ST00304	0.244	0.423	0.594	0.817	1.035	1.458	10.355
O_ST00303	ST00303	ST00304	0	0	0	0	0	0.072	1.614
O_N_K035	N_K035	N_K034	0.392	0.521	0.626	0.771	0.918	1.188	7.124
O_ST00311	ST00311	N_K034	0.018	0.021	0.025	0.032	0.037	0.038	0.195
O_ST00310	ST00310	N_K084	0.159	0.185	0.219	0.245	0.285	0.293	0.298
O_N_K036	N_K036	N_K087	0.159	0.185	0.219	0.245	0.285	0.293	0.298
O_N_K087	N_K087	ST00303	0.044	0.051	0.06	0.073	0.087	0.092	0.47
O_ST00297	ST00297	ST00431	0	0	0	0	0	0	0.626
O_ST00425	ST00425	ST00426	0	0	0	0	0	0	0.588
O_ST00426	ST00426	ST00427	0	0	0	0	0	0	0
O_ST00424	ST00424	ST00423	0	0	0	0.044	0.103	0.231	2.786
O_ST00427	ST00427	ST00421	0	0	0	0	0	0.07	2.848
O_ST00421	ST00421	ST00420	0.207	0.24	0.283	0.324	0.372	0.469	2.438
O_N_K089	N_K089	ST00417	0.036	0.113	0.211	0.336	0.388	0.586	2.7
O_ST00417	ST00417	ST00412	0	0.017	0.047	0.064	0.084	0.133	1.059
O_ST00411	ST00411	ST00412	0.43	0.532	0.731	0.931	1.137	1.486	7.841
O_ST00412	ST00412	ST00413	0.535	0.651	0.844	1.051	1.275	1.679	8.502
O_ST00413	ST00413	ST00416	0.1	0.117	0.137	0.158	0.182	0.23	1.175
O_N_K090	N_K090	ST00416	0.28	0.41	0.668	0.882	1.099	1.547	9.443
O_ST00416	ST00416	N_K092	0	0	0	0	0	0	0
O_ST00414	ST00414	N_K092	0	0	0	0	0	0	1.224
O_ST00415	ST00415	N_K042	0.28	0.41	0.668	0.882	1.099	1.547	9.443
O_N_K092	N_K092	N_K091	0.708	0.859	1.118	1.365	1.596	2.157	11.259
O_N_K091	N_K091	N_K043	0.018	0.022	0.026	0.032	0.037	0.038	0.209
O_N_K093	N_K093	N_K094	0.072	0.083	0.1	0.13	0.149	0.156	0.826
O_N_K094	N_K094	N_K046	4.673	5.706	7.021	8.36	9.835	13.688	72.371
O_ST00336	ST00336	N_K047	0	0	0	0	0	0	0.163
O_ST00334	ST00334	N_K047	0	0	0	0	0	0	0.033
O_ST00337	ST00337	ST00333	4.579	5.618	6.939	8.277	9.756	13.609	72.316
O_N_K047	N_K047	ST00333	0	0	0	0.013	0.054	0.136	1.921
O_ST00338	ST00338	ST00339	4.125	5.185	6.548	8.097	9.455	13.675	79.12
O_ST00333	ST00333	N_K095	0.303	0.355	0.421	0.472	0.587	0.826	5.656
O_ST00340	ST00340	N_K095	0	0	0	0	0	0	1.526
O_ST00339	ST00339	ST00340	4.143	5.215	6.598	8.217	9.546	13.946	81.758
O_N_K095	N_K095	ST00332	0.059	0.068	0.079	0.091	0.104	0.127	0.646
O_ST00341	ST00341	ST00332	3.584	4.675	6.124	7.673	9.141	13.659	84.645
O_ST00332	ST00332	ST00331	5.839	6.931	8.38	9.928	11.396	15.918	81.96
O_ST00331	ST00331	N_K054	0.124	0.143	0.169	0.207	0.247	0.274	1.388

O_ST00342	ST00342	N_K054	5.859	6.956	8.411	9.947	11.441	15.982	82.426
O_N_K054	N_K054	K11_out	1.027	1.236	1.466	1.686	1.982	2.559	13.482
O_ST00326	ST00324	K11_out	0	0	0	0	0	0	1.218
O_ST00322	ST00322	ST00323	0.178	0.205	0.24	0.275	0.315	0.385	1.946
O_ST00323	ST00323	ST00324	0.564	0.656	0.774	0.871	1.001	1.277	6.8
O_ST00324	ST00324	K10_out	0	0	0	0	0	0	0
O_ST00418	ST00418	N_K048	0	0	0	0	0	0	2.715
O_ST00420	ST00420	N_K048	0.156	0.182	0.216	0.246	0.282	0.352	3.806
O_N_K049	N_K049	ST00498	0	0.03	0.069	0.109	0.155	0.249	3.746
O_ST00498	ST00498	ST00499	0.173	0.259	0.356	0.451	0.579	0.838	5.128
O_ST00499	ST00499	N_K096	0.249	0.341	0.463	0.602	0.754	1.063	6.417
O_N_K096	N_K096	ST00501	0	0	0	0	0	0	0.198
O_ST00328	ST00328	ST00327	0.583	0.792	1.017	1.217	1.505	2.058	12.806
O_ST00327	ST00327	ST00326	0	0	0	0	0	0.057	1.329
O_N_K050	N_K050	N_K051	0	0	0	0	0	0	1.922
O_N_K051	N_K051	ST00330	0	0.046	0.148	0.235	0.318	0.423	3.864
O_ST00330	ST00330	ST00502	0.392	0.521	0.626	0.771	0.918	1.188	7.124
O_ST00311	ST00311	ST00312	0.255	0.297	0.351	0.402	0.464	0.593	3.127
O_N_K099	N_K099	ST00409	0	0	0	0	0	0.078	0.308
O_ST00510	ST00510	ST00403	0	0	0	0	0	0	2.36
O_ST00410	ST00410	ST00404	1.81	2.148	2.438	2.839	3.321	4.354	22.8
O_ST00404	ST00404	ST00403	0.147	0.171	0.202	0.225	0.258	0.334	1.774
O_N_K098	N_K098	N_K099	0	0	0	0	0	0	1.445
O_N_K038	N_K038	N_K039	0	0	0	0.034	0.094	0.222	2.757
O_ST00409	ST00409	ST00410	0.167	0.28	0.424	0.591	0.752	1.176	7.383
O_HW13	HW13	N_K145	0	0	0	0	0	0.014	2.313
O_N_K040	N_K040	N_K102	0.196	0.238	0.29	0.34	0.395	0.519	0.635
O_N_K041	N_K041	N_K102	0.196	0.238	0.29	0.34	0.395	0.532	2.813
O_N_K102	N_K102	N_K101	0.536	0.656	0.807	0.981	1.15	1.588	7.921
O_N_K145	N_K145	HW14	0.294	0.407	0.552	0.719	0.881	1.304	7.509
O_HW14	HW14	ST00406	0.184	0.331	0.507	0.717	0.92	1.436	7.888
O_ST00406	ST00406	ST00405	0	0.063	0.342	0.584	0.79	1.307	9.036
O_ST00405	ST00405	N_K101	0.215	0.28	0.607	0.936	1.199	1.865	11.983
O_N_K101	N_K101	ST00404	0.038	0.043	0.053	0.068	0.078	0.081	0.415
O_N_K103	N_K103	ST00404	0.763	1.068	1.5	1.997	2.441	3.799	24.415
O_ST00398	ST00398	N_K104	0	0	0	0	0	0	0.437
O_ST00397	ST00397	ST00400	0	0	0	0	0	0	1.088
O_ST00400	ST00404	N_K104	0	0	0	0	0	0	0.832
O_ST00396	ST00396	ST00400	0.765	1.07	1.503	2.001	2.445	3.806	24.589
O_N_K104	N_K104	ST00403	2.192	2.754	3.329	4.169	5.032	7.056	39.132
O_ST00403	ST00403	ST00402	3.119	3.735	4.353	5.217	6.093	8.322	42.553
O_ST00402	ST00402	ST00401	3.576	4.411	5.253	6.342	7.474	10.421	58.333
O_ST00401	ST00401	N_K043	0.403	0.55	0.788	1.038	1.331	2.274	16.072
O_ST00392	ST00392	ST00393	0.38	0.549	0.792	1.023	1.321	2.262	16.074
O_ST00393	ST00393	ST00394	0.463	0.629	0.874	1.113	1.396	2.352	16.296
O_ST00394	ST00394	ST00401	0	0	0	0	0.019	0.039	0.883
O_ST00390	ST00390	ST00391	0	0	0	0	0	0	0.707
O_ST00391	ST00391	ST00392	5.113	6.108	7.366	8.658	10.082	13.783	69.74
O_N_K043	N_K043	N_K044	4.952	5.946	7.204	8.496	9.92	13.621	69.578
O_N_K044	N_K044	N_K045	4.756	5.747	7.004	8.298	9.723	13.425	69.518
O_N_K045	N_K045	ST00513	4.46	5.451	6.708	8.002	9.426	13.129	69.228
O_ST00513	ST00513	N_K046	0.037	0.044	0.054	0.067	0.077	0.081	0.421
O_ST00389	ST00389	N_K105	0.105	0.155	0.216	0.264	0.386	0.533	3.433
O_ST00388	ST00388	ST00387	0.212	0.368	0.569	0.777	1.059	1.667	10.926
O_ST0387	ST00387	N_K060	0.781	0.974	1.167	1.387	1.668	2.292	12.389
O_ST00384	ST00384	ST00385	0.781	0.974	1.167	1.387	1.668	2.292	12.389
O_ST00385	ST00385	N_K105	0.805	1.072	1.367	1.708	2.101	3.199	19.216
O_N_K105	N_K105	ST00386	0.379	0.677	0.965	1.312	1.714	2.822	18.967
O_ST00379	ST00379	N_K106	0.605	0.827	1.211	1.654	2.065	3.35	20.477

O_N_K109	N_K109	N_K108	0	0	0	0	0	0	0
O_N_K107	N_K107	N_K112	0.237	0.28	0.332	0.374	0.43	0.554	2.921
O_N_K112	N_K112	N_K111	0.034	0.033	0.035	0.034	0.035	0.036	0.035
O_ST00368	ST00368	N_K111	0.211	0.245	0.289	0.33	0.38	0.481	2.502
O_N_K055	N_K055	ST00343	0.03	0.037	0.044	0.055	0.063	0.065	0.34
O_N_K116	N_K116	ST00344	0	0	0	0.028	0.091	0.191	2.214
O_ST00343	ST00343	ST00344	0	0	0	0	0.083	0.199	2.511
O_ST00344	ST00344	ST00345	0	0	0	0	0.061	0.215	3.442
O_ST00345	ST00345	ST00346	0.363	0.416	0.474	0.538	0.631	0.789	4.066
O_ST00346	ST00346	K11_out	0	0	0.059	0.113	0.187	0.352	3.616
O_ST00348	ST00348	ST00347	0.388	0.454	0.532	0.592	0.675	0.864	4.501
O_ST00347	ST00347	K12_out	0.003	0.068	0.155	0.24	0.341	0.541	4.764
O_ST00350	ST00350	ST00349	0.505	0.581	0.685	0.787	0.904	1.136	5.999
O_ST00349	ST00349	K13_out	0.19	0.221	0.26	0.342	0.398	0.429	2.193
O_N_K056	N_K056	ST00350	0.039	0.045	0.053	0.061	0.07	0.088	0.451
O_N_K117	N_K117	N_K114	0	0	0	0	0	0.012	1.805
O_ST00351	ST00351	ST00353	0.187	0.217	0.255	0.296	0.352	0.408	0.416
O_ST00352	ST00352	ST00353	0	0	0	0	0	0	0.058
O_ST00354	ST00354	ST00353	0.225	0.26	0.306	0.352	0.415	0.504	2.644
O_ST00353	ST00353	N_K114	0.141	0.163	0.192	0.236	0.282	0.312	1.579
O_N_K057	N_K057	N_K058	0.147	0.171	0.201	0.242	0.288	0.328	1.701
O_N_K058	N_K058	N_K059	0.453	0.527	0.621	0.711	0.817	1.035	5.554
O_N_K059	N_K059	N_K118	1.539	1.811	2.16	2.64	3.034	4.124	26.965
O_N_K118	N_K118	N_K119	1.539	1.811	2.16	2.64	3.034	4.124	26.965
O_N_K119	N_K119	N_K114	0.119	0.133	0.153	0.179	0.199	0.246	1.129
O_ST00357	ST00357	ST00355	0.367	0.438	0.526	0.619	0.713	0.922	4.481
O_ST00355	ST00355	N_K113	2.109	2.571	3.161	3.778	4.327	5.747	27.817
O_ST00358	ST00358	ST00356	2.652	3.113	3.706	4.336	4.889	6.321	28.563
O_ST00356	ST00356	HW15	2.242	2.666	3.257	3.929	4.495	5.967	82.839
O_HW15	HW15	N_K064	2.71	3.144	3.748	4.434	5.01	6.506	83.586
O_N_K064	N_K064	HW16	0	0.19	0.484	0.795	1.103	2.043	49.694
O_HW16	HW16	N_K066	2.21	2.644	3.248	3.934	4.51	6.006	83.126
O_N_K065	N_K065	N_K066	1.058	1.296	1.628	1.97	2.304	3.309	18.412
O_N_K062	N_K062	HW16	0.555	0.784	1.103	1.429	1.755	2.775	17.218
O_ST00370	ST00370	ST00369	1.028	1.257	1.575	1.901	2.227	3.247	17.691
O_ST00369	ST00369	N_K062	0.085	0.103	0.128	0.158	0.186	0.268	1.513
O_N_K063	N_K063	ST00359	0	0	0	0	0	0	0.031
O_ST00360	ST00360	ST00359	0	0	0	0	0	0	1.115
O_ST00359	ST00359	ST00358	0.294	0.347	0.41	0.459	0.534	0.693	3.491
O_N_K111	N_K111	N_K120	0.317	0.373	0.441	0.496	0.571	0.746	3.762
O_N_K120	N_K120	N_K124	2.135	2.427	2.821	3.213	3.581	4.583	20.066
O_N_K121	N_K121	N_K124	2.32	2.695	3.169	3.638	4.068	5.184	22.618
O_N_K124	N_K124	N_K123	0.108	0.126	0.149	0.17	0.196	0.25	1.307
O_N_K122	N_K122	N_K123	0.309	0.377	0.463	0.561	0.656	0.9	4.482
O_ST00361	ST00361	N_K123	0.107	0.145	0.177	0.212	0.246	0.285	1.238
O_ST00375	ST00375	N_K125	0	0	0	0.004	0.087	0.232	3.179
O_ST00372	ST00372	N_K125	0.602	0.824	1.206	1.649	2.058	3.342	20.439
O_N_K067	N_K067	N_K109	0.371	0.637	0.931	1.273	1.666	2.764	18.78
O_ST00386	ST00386	ST00379	0	0	0	0	0	0	1.136
O_ST00377	ST00377	ST00376	0.171	0.197	0.247	0.314	0.362	0.377	1.947
O_ST00376	ST00376	N_K125	0.058	0.146	0.271	0.414	0.543	0.913	6.672
O_ST00383	ST00383	N_K105	0	0	0	0	0	0	0
O_ST00382	ST00382	ST00381	0	0	0	0	0	0	0.25
O_ST00380	ST00380	ST00367	0.164	0.261	0.393	0.541	0.676	1.076	7.173
O_ST00381	ST00381	ST00366	0.13	0.15	0.176	0.201	0.231	0.285	1.297
O_ST00367	ST00367	ST00363	0.058	0.067	0.079	0.09	0.104	0.129	0.661
O_N_K110	N_K110	N_K111	0.396	0.494	0.628	0.777	0.914	1.318	7.493
O_ST00366	ST00366	N_K061	0.666	0.814	1.003	1.222	1.432	1.988	10.214
O_ST00365	ST00365	ST00364	1.137	1.286	1.474	1.693	1.903	2.459	10.685

O_ST00364	ST00364	N_K061	0.077	0.104	0.163	0.202	0.228	0.291	1.306
O_ST00363	ST00363	ST00362	0.508	0.535	0.595	0.633	0.66	0.722	1.738
O_ST00362	ST00362	N_K121	2.609	3.058	3.629	4.216	4.761	6.1	27.038
O_N_K123	N_K123	ST00358	0.062	0.076	0.091	0.114	0.131	0.14	0.736
O_N_K068	N_K068	N_K059	0.068	0.083	0.1	0.124	0.142	0.151	0.792
O_N_K069	N_K069	ST00351	0.23	0.265	0.309	0.355	0.405	0.496	0.631
O_N_K006	N_K006	HW2	0.255	0.388	0.491	0.64	0.783	1.123	8.543
O_N_K034	N_K034	ST00303	0	0	0	0	0.001	0.093	0.223
O_N_K126	ST00422	ST00417	1.583	1.987	2.558	3.233	3.814	5.658	33.141
O_N_K127	N_K127	N_K032	0.063	0.073	0.09	0.115	0.132	0.14	0.718
O_N_K128	N_K128	ST00357	1.901	2.167	2.675	3.058	3.476	4.4	21.307
O_N_K129	N_K129	ST00357	1.474	1.69	1.979	2.328	2.652	3.524	16.607
O_ST00325	ST00325	K11_out	0.137	0.192	0.287	0.385	0.487	0.539	2.694
O_N_K053	N_K053	K9_out	0	0	0	0	0	0	0
O_N_K061	N_K061	N_K121	0.164	0.22	0.321	0.428	0.532	0.599	2.987
O_ST00374	ST00374	N_K130	0.361	0.528	0.712	0.874	1.088	1.451	7.043
O_ST00373	ST00373	N_K130	0.303	0.343	0.356	0.371	0.388	0.401	0.786
O_N_K130	N_K130	N_K125	0	0	0	0	0.073	0.196	3.989
O_ST00501	ST00501	N_K131	0.361	0.528	0.712	0.874	1.088	1.529	10.363
O_ST00329	ST00329	ST00330	0.763	0.885	1.042	1.194	1.37	1.719	8.812
O_ST00502	ST00502	N_K131	0.011	0.013	0.015	0.019	0.021	0.022	0.119
O_N_K131	N_K131	ST00327	0.764	0.921	1.122	1.33	1.612	2.22	11.51
O_N_K132	N_K132	ST00333	0.866	1.04	1.264	1.479	1.762	2.39	12.451
O_N_K133	N_K133	ST00530	0.134	0.155	0.182	0.234	0.272	0.296	3.692
O_N_K060	N_K060	N_K134	0.047	0.057	0.069	0.087	0.1	0.107	0.562
O_N_K134	N_K134	ST00385	0.481	0.495	0.521	0.551	0.583	0.648	1.979
O_N_K048	N_K048	N_K049	0.506	0.544	0.589	0.622	0.67	0.758	2.622
O_N_K135	N_K135	ST00498	0.261	0.303	0.358	0.409	0.47	0.597	3.115
O_N_K042	N_K042	N_K136	0.195	0.346	0.522	0.652	0.843	1.262	11.21
O_N_K136	N_K136	N_K091	0	0	0	0	0	0	0
O_N_K137	N_K137	ST00392	0.176	0.205	0.243	0.278	0.32	0.409	2.116
O_N_K139	N_K139	K5_out	0.216	0.255	0.304	0.347	0.402	0.534	2.852
O_N_K140	N_K140	ST00300	0.422	0.524	0.666	0.824	0.967	1.407	7.975
O_N_K141	N_K141	ST00427	0.234	0.271	0.335	0.427	0.491	0.521	2.678
O_N_K142	N_K142	N_K017	0.086	0.099	0.117	0.153	0.179	0.193	0.987
O_N_K143	N_K143	N_K017	0.275	0.319	0.376	0.388	0.397	0.4	0.528
O_N_K144	N_K144	ST00374	0.101	0.246	0.404	0.518	0.691	1.064	10.278
O_N_K138	N_K138	N_K048	0.4	0.699	0.997	1.39	1.803	2.985	19.998
O_ST00423	ST00423	ST00422	0.427	0.547	0.712	0.886	1.089	1.463	8.913
O_ST00431	ST00431	N_K139	1.03	1.197	1.412	1.754	2.179	3.558	23.07
O_N_K106	N_K106	N_K067	0.299	0.359	0.436	0.524	0.608	0.792	4.038
O_N_K125	N_K125	N_K108	0	0	0	0	0	0	0
O_N_K108	N_K108	N_K118	4.82	5.849	7.163	8.503	9.98	13.835	72.485
O_N_K115	N_K115	N_K118	0	0	0	0	0	0	0.258

Appendix E Overland Flood Behaviour

Table E1 - HEC-RAS Model Results for Rylstone

Cross Section ID*	River	Reach	River Station	20% AEP Q Total (m^3/s)	20% AEP W.S. Elev (mAHD)	20% AEP Vel Chnl (m/s)	10% AEP Q Total (m^3/s)	10% AEP W.S. Elev (mAHD)	10% AEP Vel Chnl (m/s)	5% AEP Q Total (m^3/s)	5% AEP W.S. Elev (mAHD)	5% AEP Vel Chnl (m/s)	2% AEP Q Total (m^3/s)	2% AEP W.S. Elev (mAHD)	2% AEP Vel Chnl (m/s)	1% AEP Q Total (m^3/s)	1% AEP W.S. Elev (mAHD)	1% AEP Vel Chnl (m/s)	0.5% AEP Q Total (m^3/s)	0.5% AEP W.S. Elev (mAHD)	0.5% AEP Vel Chnl (m/s)	PMF Q Total (m^3/s)	PMF W.S. Elev (mAHD)	PMF Vel Chnl (m/s)
1	trib 10	10	0.05	1.10	574.79	0.51	1.31	574.81	0.58	1.56	574.82	0.63	1.90	574.86	0.67	2.25	574.86	0.77	2.92	574.91	0.83	13.14	575.34	1.52
2	trib 10	10	0.07	1.10	574.95	1.07	1.31	574.97	1.17	1.56	574.99	1.24	1.90	575.01	1.34	2.25	575.02	1.44	2.92	575.05	1.59	13.14	575.38	2.75
3	trib 10	10	0.1	1.10	575.39	1.15	1.31	575.41	1.17	1.56	575.42	1.22	1.90	575.44	1.30	2.25	575.45	1.37	2.92	575.48	1.48	13.14	575.78	2.22
4	trib 10	10	0.14	1.10	575.79	1.23	1.31	575.83	1.29	1.56	575.86	1.36	1.90	575.90	1.45	2.25	575.93	1.54	2.92	575.95	1.87	13.14	576.38	2.29
5	trib 10	10	0.16	1.10	576.03	1.50	1.31	576.07	1.57	1.56	576.10	1.63	1.90	576.15	1.66	2.25	576.23	1.47	2.92	576.28	1.50	13.14	576.64	2.07
6	trib 9	9b	0.07	2.32	574.58	0.78	3.10	574.60	0.82	4.05	574.61	0.41	5.04	574.61	0.51	5.95	574.61	0.60	8.16	574.61	0.82	38.75	574.79	1.44
7	trib 9	9b	0.11	2.27	574.67	0.22	3.06	574.69	0.26	3.98	574.71	0.31	4.85	574.72	0.35	5.77	574.74	0.39	7.76	574.77	0.45	37.56	575.04	0.86
8	trib 9	9b	0.13	2.27	574.69	0.39	3.06	574.71	0.45	3.98	574.74	0.50	4.85	574.76	0.53	5.77	574.77	0.57	7.76	574.81	0.63	37.56	575.09	1.11
9	trib 9	9b	0.15	2.27	574.86	0.50	3.06	574.88	0.56	3.98	574.91	0.63	4.85	574.93	0.68	5.77	574.94	0.73	7.76	574.98	0.81	37.56	575.27	1.46
10	trib 9	9b	0.18	2.27	575.19	0.64	3.06	575.22	0.71	3.98	575.25	0.77	4.85	575.27	0.82	5.77	575.30	0.86	7.76	575.34	0.94	37.56	575.62	1.60
11	trib 9	9b	0.23	1.31	576.61	2.93	2.06	576.63	2.99	2.94	576.64	0.31	3.78	576.64	0.39	4.67	576.64	0.49	6.60	576.66	0.60	37.06	576.84	1.22
12	trib 9	9	0.31	1.56	576.27	1.02	2.04	576.29	1.10	2.59	576.68	0.17	3.09	576.70	0.19	3.62	576.72	0.21	4.83	576.76	0.26	22.06	576.51	2.55
13	trib 9	9	0.34	1.56	577.09	1.01	2.04	577.11	1.05	2.59	577.12	1.23	3.09	577.15	1.17	3.62	577.16	1.30	4.83	577.18	1.44	22.06	577.37	1.89
14	trib 9	9	0.38	1.56	578.13	1.07	2.04	578.17	1.06	2.59	578.18	1.21	3.09	578.21	1.22	3.62	578.22	1.30	4.83	578.25	0.56	22.06	578.31	1.27
15	trib 9	9	0.46	1.56	579.91	0.78	2.04	579.87	1.90	2.59	579.90	2.13	3.09	579.87	2.87	3.62	579.87	3.49	4.83	579.90	2.45	22.06	580.10	3.99
16	trib 9	9	0.52	1.56	581.01	1.12	2.04	581.04	1.22	2.59	581.06	1.31	3.09	581.08	1.41	3.62	581.08	1.66	4.83	581.16	1.43	22.06	581.47	2.46
17	trib 9	9	0.56	0.67	581.98	1.17	0.87	582.00	1.16	1.11	582.01	1.27	1.41	582.02	1.40	1.71	582.03	1.51	2.32	582.06	1.64	10.94	582.25	2.32
18	trib 9	9	0.63	0.67	583.21	0.56	0.87	583.22	0.60	1.11	583.24	0.65	1.41	583.25	0.71	1.71	583.26	0.76	2.32	583.28	0.84	10.94	583.46	1.39
19	trib 9	9	0.7	0.11	585.45	0.65	0.13	585.41	0.60	0.16	585.46	0.73	0.18	585.47	0.72	0.21	585.47	0.84	0.27	585.49	0.78	1.20	585.56	1.13
20	trib 9	9	0.74	0.11	586.68	0.66	0.13	586.69	0.60	0.16	586.69	0.65	0.18	586.70	0.67	0.21	586.70	0.71	0.27	586.71	0.77	1.20	586.78	1.27
21	trib 9	9	0.85	0.11	590.70	0.30	0.13	590.71	0.33	0.16	590.72	0.31	0.18	590.72	0.33	0.21	590.72	0.34	0.27	590.73	0.39	1.20	590.81	0.58
22	trib 2	2	0.04	3.56	571.35	2.01	4.80	571.45	1.97	6.41	571.55	2.03	8.26	571.58	2.46	9.92	571.68	2.36	15.32	571.81	2.81	72.94	572.51	4.30
23	trib 2	2	0.06	3.56	572.31	1.46	4.80	572.34	1.66	6.41	572.39	1.85	8.26	572.43	2.08	9.92	572.47	2.21	15.32	572.61	2.35	72.94	573.37	3.34
24	trib 2	2	0.1	3.56	573.42	1.39	4.80	573.46	1.49	6.41	573.51	1.60	8.26	573.56	1.68	9.92	573.58	1.82	15.32	573.72	1.88	72.94	574.33	2.84
25	trib 2	2	0.11	3.56	574.33	0.13	4.80	574.37	0.17	6.41	574.41	0.21	8.26	574.45	0.26	9.92	574.48	0.30	15.32	574.57	0.41	72.94	575.18	1.09
26	trib 2	2	0.14	2.57	575.40	1.52	3.45	575.46	1.26	4.59	575.50	1.27	5.87	575.53	1.32	7.03	575.55	1.41	10.84	575.59	0.31	50.93	575.61	1.39
27	trib 2	2	0.17	2.57	575.71	0.76	3.45	575.75	0.81	4.59	575.80	0.86	5.87	575.85	0.88	7.03	575.88	0.92	10.84	575.98	1.02	50.93	576.17	2.90
28	trib 2	2	0.2	2.57	576.63	1.59	3.45	576.68	1.74	4.59	576.76	1.84	5.87	576.83	1.94	7.03	576.88	2.02	10.84	577.05	2.17	50.93	577.34	3.80
29	trib 2	2	0.23	2.57	577.25	1.00	3.45	577.32	1.12	4.59	577.40	1.24	5.87	577.47	1.36	7.03	577.53	1.46	10.84	577.69	1.72	50.93	578.39	3.28
30	trib 2	2	0.25	2.57	577.58	1.05	3.45	577.66	1.15	4.59	577.74	1.26	5.87	577.83	1.36	7.03	577.90	1.43	10.84	578.08	1.64	50.93	579.00	2.84
31	trib 2	2	0.26	2.57	578.06	1.39	3.45	578.13	1.52	4.59	578.21	1.67	5.87	578.29	1.81	7.03	578.35	1.93	10.84	578.39	2.77	50.93	579.30	4.47
32	trib 2	2	0.28	2.57	578.86	1.54	3.45	578.93	1.70	4.59	579.01	1.85	5.87	579.08	2.00	7.03	579.14	2.12	10.84	579.34	2.33	50.93	580.27	4.07
33	trib 2	2	0.32	2.57	579.84	1.28	3.45	579.92	1.41	4.59	580.01	1.55	5.87	580.10	1.67	7.03	580.18	1.77	10.84	580.38	2.01	50.93	581.25	3.91
34	trib 2	2	0.34	2.57	580.67	1.35	3.45	580.74	1.50	4.59	580.82	1.67	5.87	580.90	1.82	7.03	580.97	1.95	10.84	581.14	2.33	50.93	582.19	4.35
35	trib 2	2	0.37	2.57	581.81	1.60	3.45	581.91	1.74	4.59	582.02	1.89	5.87	582.12	2.03	7.03	582.21	2.14	10.84	582.44	2.44	50.93	583.60	3.80
36	trib 2	2	0.42	2.57	584.43	1.92	3.45	584.50	2.01	4.59	584.57	2.18	5.87	584.64	2.34	7.03	584.73	2.27	10.84	584.88	2.47	50.93	585.67	2.91
37	trib 2	2	0.45	2.57	585.32	1.40	3.45	585.37	1.55	4.59	585.38	2.03	5.87	585.49	1.89	7.03	585.48	2.30	10.84	585.65	2.50	50.93	586.43	2.94
38	trib 2	2	0.47	2.57	585.99	1.71	3.45	586.04	1.87	4.59	586.11	1.98	5.87	586.22	1.90	7.03	586.27	1.97	10.84	586.37	2.43	50.93	586.90	4.01
39	trib 2	2	0.5	2.57	586.53	2.28	3.45	586.58	2.44	4.59	586.63	2.63	5.87	586.69	2.75	7.03	586.73	2.81	10.84	586.85	3.17	50.93	587.43	4.93
40	trib 2	2	0.55	2.57	589.25	1.66	3.45	589.32	1.78	4.59	589.40	1.86	5.87	589.48	1.89	7.03	589.62	1.07	10.84	589.64	1.51	50.93	589.94	2.39
41	trib 2	2	0.59	2.57	589.54	0.43	3.45	589.64	0.49	4.59	589.74	0.55	5.87	589.83	0.62	7.03	589.88	0.70	10.84	590.02	0.88	50.93	590.64	2.02
42	trib 2	2	0.61	2.57	591.06	1.41	3.45	591.10	1.56	4.59	591.15	1.71	5.87	591.21	1.83	7.03	591.25	1.93	10.84	591.38	2.20	50.93	591.88	1.98
43	trib 2	2	0.63	2.57	591.27	0.28	3.45	591.34	0.33	4.59	591.43	0.37	5.87	591.51	0.42	7.03	591.58	0.45	10.84	591.77	0.54	50.93	592.22	1.36
44	trib 2	2	0.65	1.88	591.35	0.78	2.52	591.41	0.82	3.33	591.49	0.86	4.23	591.56	0.89	5.04	591.63	0.93	7.80	591.81	1.03	36.25	591.99	3.75
45	trib 2	2	0.68	1.88	592.15	1.48	2.52	592.10	2.29	3.33	592.19	2.37	4.23	592.27	2.46	5.04	592.34	2.54	7.80	592.49	2.86	36.25	593.29	4.28
46	trib 2	2	0.71	1.88	595.20	1.95	2.52	595.25	2.07	3.33	595.31	2.19	4.23	595.37	2.28	5.04	595.43	2.22	7.80	595.55	2.25	36.25	596.00	2.33
47	trib 2	2	0.74	1.88	597.38	0.97	2.52	597.40	1.07	3.33	597.43	1.17	4.23	597.45	1.22	5.04	597.47	1.32	7.80	597.54	1.39	36.25	597.60	1.70
48	trib 2	2	0.78	1.88	598.47	0.87	2.52	598.49	0.96	3.33	598.51	1.07	4.23	598.54	1.17	5.04	598.55	1.24	7.80	598.62	1.34	36.25	598.88	1.90
49	trib 2	2	0.83	1.41	599.88	1.58	1.92	599.90	1.73	2.57	599.92	1.89	3.32	599.99	1.25	3.99	600.01	1.32	6.19	600.07	1.43	28.98	600.33	2.30
50	trib 2	2	0.87	1.41	601.18	1.41	1.92	601.23	1.28	2.57	601.27	1.27	3.32	601.29	1.45	3.99	601.31	1.55	6.19	601.35	1.63	28.98	601.60	2.74
51	trib 2	2	0.91	1.41	602.39	1.41	1.92	602.41	1.58	2.57	602.42	1.72	3.32	602.44	1.90	3.99	602.45	2.09	6.19	602.48	2.41	28.98	602.71	4.02
52	trib 2	2	0.95	1.41	605.63	0.88	1.92	605.64	0.93	2.57	605.66	0.99	3.32	605.68	1.07	3.99	605.70	1.09	6.19	605.71	0.24	28.98	605.82	1.15
53	trib 2	2	0.98	1.41	605.67	0.03	1.92	605.69	0.04	2.57	605.72	0.05	3.32	605.75	0.07	3.99	605.77	0.08	6.19	605.75	0.12	28.98	606.05	0.46
54	trib 2	2	0.99	1.41	605.67	0.10	1.92	605.69	0.13	2.57	605.72	0.16	3.32	605.75	0.19	3.99	605.77	0.22	6.19	605.75	0.36	28.98	606.03	1.07
55	trib 2	2	1.08	1.41	608.46	1.54	1.92	608.49	1.75	2.57	608.53	1.78	3.32	608.57	1.92	3.99	608.60	1.94	6.19	608.70	1.94	28.98	608.78	2.50
56	trib 2	2	1.13	1.41	611.18	0.95	1.92	611.21	1.06	2.57	611.23	1.19	3.32	611.26	1.21	3.99	611.28	1.26	6.19	611.34	1.37	28.98	611.59	1.00
57	trib 4	4d	0.03	10.52	567.24	0.76	14.46	567.27	1.01	19.56	567.29	1.35	26.58	567.26	1.88	33.80	567.23	2.45	43.93	567.08	3.69	205.83	568.20	5.16
58	trib 4	4d	0.06	10.52	567.43	1.66	14.46	567.54	1.84	19.56	567.65	2.05	26.58	567.78	2.28	33.80	567.91	2.49	43.93	568.10	2.65	205.83	569.39	4.13
59	trib 4	4d	0.09	10.52	567.67	1.23	14.46	567.80	1.32	19.56	567.94	1.40	26.58	568.11	1.50	33.80	568.27	1.56	43.93	568.47	1.63	205.83	569.76	3.06

Cross Section ID*	River	Reach	River Station	20% AEP			10% AEP			5% AEP			2% AEP			1% AEP			0.5% AEP			PMF		
				Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)
60	trib 4	4c	0.12	10.52	567.97	1.84	14.46	568.00	2.27	19.56	568.09	2.44	26.58	568.26	2.38	33.80	568.30	2.82	43.93	568.49	2.72	205.83	570.06	1.98
61	trib 4	4c	0.15	10.52	568.60	0.78	14.46	568.68	0.89	19.56	568.75	1.07	26.58	568.83	1.27	33.80	568.90	1.46	43.93	569.00	1.64	205.83	570.11	2.72
62	trib 4	4c	0.2	9.55	568.91	1.96	13.28	569.10	1.52	18.17	569.18	1.72	24.92	569.28	1.93	31.88	569.37	2.11	41.47	569.20	3.82	195.23	569.89	6.23
63	trib 4	4	0.22	5.34	569.05	1.65	7.36	569.38	0.78	10.19	569.49	0.87	14.78	569.62	0.97	19.62	569.73	1.07	24.11	569.37	2.64	104.45	569.95	4.04
64	trib 4	4	0.26	5.34	570.33	1.70	7.36	570.37	2.01	10.19	570.46	2.14	14.78	570.60	2.15	19.62	570.71	2.28	24.11	570.78	2.43	104.45	571.64	3.23
65	trib 4	4	0.29	5.34	571.20	1.77	7.36	571.29	1.88	10.19	571.40	1.38	14.78	571.46	1.68	19.62	571.43	2.45	24.11	571.47	2.66	104.45	572.32	2.82
66	trib 4	4	0.32	5.34	571.66	1.37	7.36	571.74	1.50	10.19	571.83	1.66	14.78	571.96	1.85	19.62	572.09	1.99	24.11	572.18	2.09	104.45	572.84	2.93
67	trib 4	4	0.36	5.34	572.27	1.38	7.36	572.35	1.51	10.19	572.45	1.64	14.78	572.58	1.80	19.62	572.69	1.94	24.11	572.78	2.05	104.45	573.59	3.00
68	trib 4	4	0.42	5.34	573.63	1.18	7.36	573.69	1.28	10.19	573.76	1.44	14.78	573.88	1.65	19.62	573.96	1.76	24.11	574.03	1.85	104.45	574.59	2.50
69	trib 4	4	0.48	5.34	574.11	1.00	7.36	574.22	1.18	10.19	574.31	1.35	14.78	574.42	1.55	19.62	574.58	0.69	24.11	574.48	2.20	104.45	574.95	1.84
70	trib 4	4	0.49	5.34	574.30	0.73	7.36	574.51	0.82	10.19	574.79	0.89	14.78	575.08	1.00	19.62	575.03	1.38	24.11	574.96	1.80	104.45	575.59	1.65
71	trib 4	4	0.52	5.34	575.13	1.63	7.36	575.17	1.85	10.19	575.24	1.92	14.78	575.28	2.42	19.62	575.26	3.36	24.11	575.30	3.29	104.45	575.88	2.77
72	trib 4	4	0.54	5.34	575.68	1.58	7.36	575.75	1.61	10.19	575.79	1.86	14.78	575.88	1.91	19.62	575.95	2.03	24.11	575.98	2.22	104.45	576.37	2.83
73	trib 4	4	0.58	5.21	576.02	1.21	7.19	576.03	1.63	9.97	576.09	1.99	14.50	576.20	1.26	19.29	576.25	1.42	23.68	576.28	1.61	102.39	576.69	2.38
74	trib 4	4	0.62	5.21	576.61	0.55	7.19	576.61	0.75	9.97	576.63	0.82	14.50	576.66	0.92	19.29	576.69	1.01	23.68	576.72	1.08	102.39	577.05	1.74
75	trib 4	4	0.65	5.21	576.87	0.67	7.19	576.91	0.74	9.97	576.93	0.86	14.50	576.97	1.01	19.29	577.01	1.14	23.68	577.04	1.26	102.39	577.35	1.82
76	trib 4	4	0.7	5.21	577.25	1.00	7.19	577.29	1.09	9.97	577.33	1.26	14.50	577.39	1.39	19.29	577.44	1.47	23.68	577.59	1.07	102.39	577.82	2.37
77	trib 4	4	0.75	5.21	577.69	0.83	7.19	577.72	0.85	9.97	577.75	0.90	14.50	577.80	0.97	19.29	577.84	1.03	23.68	577.93	0.87	102.39	578.24	1.69
78	trib 4	4	0.8	5.09	578.06	0.37	7.06	578.06	0.52	9.82	578.09	0.60	14.36	578.13	0.72	19.12	578.17	0.82	23.29	578.20	0.89	100.82	578.56	1.58
79	trib 4	4	0.85	5.09	578.33	0.49	7.06	578.37	0.59	9.82	578.41	0.68	14.36	578.46	0.79	19.12	578.51	0.89	23.29	578.55	0.97	100.82	578.98	1.83
80	trib 4	4	0.92	5.09	578.90	0.96	7.06	578.93	1.05	9.82	578.98	0.98	14.36	579.00	1.27	19.12	579.04	1.36	23.29	579.07	1.42	100.82	579.48	2.10
81	trib 4	4	0.96	5.09	579.05	0.52	7.06	579.09	0.57	9.82	579.13	0.64	14.36	579.19	0.74	19.12	579.24	0.83	23.29	579.28	0.89	100.82	579.75	1.62
82	trib 4	4	1.02	5.09	579.50	1.05	7.06	579.53	1.21	9.82	579.58	1.24	14.36	579.63	1.32	19.12	579.68	1.40	23.29	579.72	1.47	100.82	580.15	2.29
83	trib 4	4	1.06	5.09	579.93	0.79	7.06	579.97	0.94	9.82	580.01	1.08	14.36	580.07	1.24	19.12	580.12	1.38	23.29	580.16	1.50	100.82	580.60	2.46
84	trib 4	4	1.14	5.09	580.55	0.65	7.06	580.56	0.84	9.82	580.60	0.95	14.36	580.65	1.11	19.12	580.70	1.22	23.29	580.74	1.30	100.82	581.21	2.12
85	trib 5	5b	0.02	6.03	568.97	1.95	5.92	569.21	0.71	7.98	569.32	0.72	10.14	569.45	0.69	12.26	569.57	0.69	37.36	569.28	3.67	175.78	570.02	5.73
86	trib 5	5b	0.06	6.03	570.75	1.92	5.92	570.74	1.91	7.98	570.83	2.04	10.14	570.93	2.09	12.26	571.04	1.97	37.36	571.35	2.93	175.78	572.01	4.29
87	trib 5	5b	0.08	6.03	571.14	1.48	5.92	571.14	1.47	7.98	571.24	1.54	10.14	571.32	1.61	12.26	571.39	1.69	37.36	571.65	2.99	175.78	572.42	4.33
88	trib 5	5b	0.1	6.03	571.53	1.66	5.92	571.52	1.66	7.98	571.60	1.72	10.14	571.67	1.79	12.26	571.74	1.85	37.36	572.07	2.77	175.78	572.80	4.11
89	trib 5	5b	0.13	6.03	572.18	2.33	5.92	572.17	2.34	7.98	572.23	2.53	10.14	572.27	2.73	12.26	572.31	2.83	37.36	572.69	3.47	175.78	573.41	4.28
90	trib 5	5b	0.14	6.03	573.30	1.48	5.92	573.27	1.66	7.98	573.34	1.63	10.14	573.39	1.71	12.26	573.42	1.85	37.36	573.58	2.09	175.78	574.07	2.93
91	trib 5	5b	0.16	5.79	573.99	0.29	2.08	573.88	0.13	2.66	573.91	0.15	3.26	573.93	0.18	3.87	573.95	0.21	25.31	574.16	0.78	110.06	574.73	1.52
92	trib 5	5	0.17	1.60	573.99	0.09	2.08	573.88	0.15	2.66	573.91	0.18	3.26	573.93	0.21	3.87	573.95	0.25	25.31	574.17	0.95	110.06	574.74	1.73
93	trib 5	5	0.18	1.60	573.98	0.87	2.08	574.00	1.00	2.66	574.00	1.20	3.26	574.02	1.24	3.87	574.03	1.37	25.31	574.32	2.12	110.06	574.75	3.04
94	trib 5	5	0.24	1.60	574.37	0.64	2.08	574.40	0.68	2.66	574.42	0.72	3.26	574.44	0.75	3.87	574.46	0.79	25.31	574.77	1.14	110.06	575.20	1.63
95	trib 5	5	0.3	1.60	575.00	0.09	2.08	575.00	0.11	2.66	575.00	0.15	3.26	575.00	0.18	3.87	575.00	0.21	25.31	575.22	1.03	110.06	575.58	1.95
96	trib 5	5	0.32	1.60	575.76	0.76	2.08	575.77	0.82	2.66	575.78	0.92	3.26	575.79	0.03	3.87	575.79	0.04	25.31	575.79	0.24	110.06	575.91	1.17
97	trib 5	5	0.36	1.60	576.10	0.22	2.08	576.10	0.29	2.66	576.10	0.37	3.26	576.10	0.46	3.87	576.10	0.54	25.31	576.22	0.12	110.06	576.22	0.53
98	trib 5	5	0.4	1.60	576.11	0.01	2.08	576.11	0.01	2.66	576.11	0.02	3.26	576.12	0.02	3.87	576.12	0.03	25.31	576.23	0.22	110.06	576.36	0.95
99	trib 5	5	0.45	1.60	576.11	0.36	2.08	576.12	0.47	2.66	576.12	0.59	3.26	576.13	0.71	3.87	576.14	0.83	25.31	576.41	1.28	110.06	576.73	2.07
100	trib 5	5	0.48	1.60	576.51	0.46	2.08	576.52	0.52	2.66	576.53	0.66	3.26	576.54	0.71	3.87	576.56	0.75	25.31	576.82	1.46	110.06	577.17	2.60
101	trib 5	5	0.51	1.60	576.68	0.50	2.08	576.70	0.55	2.66	576.72	0.59	3.26	576.74	0.65	3.87	576.75	0.70	25.31	577.02	0.96	110.06	577.47	1.66
102	trib 5	5	0.55	1.51	577.11	0.66	1.97	577.13	0.72	2.53	577.15	0.79	3.11	577.17	0.84	3.70	577.18	0.88	25.09	577.42	1.51	109.03	577.70	2.88
103	trib 5	5	0.64	1.42	578.64	0.91	1.86	578.66	1.01	2.39	578.69	1.10	2.95	578.71	1.18	3.50	578.73	1.25	24.83	579.07	2.05	107.79	579.66	2.46
104	trib 5	5	0.73	0.98	580.66	1.26	1.43	580.72	0.98	1.93	580.72	1.31	2.41	580.77	1.07	2.95	580.77	1.33	24.23	581.07	2.28	94.10	581.57	2.15
105	trib 5	5	0.76	0.72	581.67	1.80	1.08	581.70	2.00	1.51	581.74	2.04	1.92	581.80	1.81	2.37	581.84	1.57	23.49	582.08	2.89	90.62	582.23	5.35
106	trib 5	5	0.8	0.80	582.74	1.24	1.07	582.76	1.23	1.38	582.77	1.28	1.67	582.78	1.39	1.98	582.79	1.43	22.79	583.06	3.56	97.83	583.37	6.56
107	trib 5	5	0.87	0.75	584.33	2.38	1.01	584.34	2.54	1.31	584.36	2.73	1.57	584.37	2.85	1.89	584.38	3.01	22.64	584.66	5.31	97.25	585.05	7.98
108	trib 5	5	0.9	0.71	586.96	1.56	0.95	586.99	1.57	1.23	587.02	1.67	1.49	587.03	1.90	1.80	587.06	1.84	22.50	587.56	2.86	96.68	587.90	5.91
109	trib 5	5	0.98	0.61	588.54	1.43	0.81	588.56	1.53	1.06	588.58	1.61	1.33	588.60	1.67	1.61	588.62	1.66	22.25	588.96	3.22	95.72	589.38	4.95
110	trib 5	5	1.01	0.61	589.55	1.27	0.81	589.55	1.42	1.06	589.56	1.47	1.33	589.58	1.49	1.61	589.58	1.57	22.25	589.79	3.53	95.58	590.09	5.26
111	trib 5	5	1.08	0.54	593.19	0.85	0.73	593.19	0.97	0.96	593.21	1.01	1.22	593.21	1.11	1.49	593.23	1.15	22.10	593.49	2.68	94.86	593.83	4.76
112	trib 5	5	1.13	0.54	596.61	0.85	0.73	596.62	0.97	0.96	596.63	1.06	1.22	596.64	1.16	1.49	596.65	1.21	22.10	596.97	3.12	94.86	597.39	5.35
113	trib 5	5	1.16	0.54	598.63	1.19	0.73	598.65	1.25	0.96	598.66	1.37	1.22	598.68	1.46	1.49	598.69	1.57	22.10	599.10	3.20	94.86	599.58	4.87
114	trib 5	5	1.19	0.54	600.92	0.93	0.73	600.94	1.00	0.96	600.97	0.95	1.22	600.99	1.05	1.49	601.01	1.08	22.10	601.45	2.08	94.86	602.08	3.23
115	trib 6	6b	0.02	0.51	575.32	1.57	0.77	575.36	1.41	1.02	575.41	0.98	1.27	575.43	1.05	1.58	575.44	1.16	22.17	575.79	2.51	96.85	576.24	4.10
116	trib 6	6b	0.08	0.51	576.94	6.23	0.77	576.98	1.96	1.02	577.01	1.16	1.27	577.05	0.94	1.58	577.05	1.13	22.17	577.44	2.45	96.85	578.02	3.82
117	trib 6	6b	0.12	0.51	578.05	0.86	0.77	578.07	0.95	1.02	578.08	1.05	1.27	578.09	1.12	1.58	578.11	1.18	22.17	578.42	2.56	96.85	578.81	4.05
118	trib 6	6b	0.16	0.51	579.90	0.94	0.77	579.91	1.10	1.02	579.93	1.11	1.27	579.95	1.20	1.58	579.97	1.22	22.17	580.27	2.81	96.85	580.68	4.38
119	trib 6	6b	0.19	0.51	581.36	0.78	0.77	581.37	0.89	1.02	581.37	1.28	1.27	581.39	1.05	1.58	581.40	1.01	22.17	581.62	2.43	96.85	581.94	3.93

Cross Section ID*	River	Reach	River Station	20% AEP			10% AEP			5% AEP			2% AEP			1% AEP			0.5% AEP			PMF		
				Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)
120	trib 6	6b	0.22	0.51	582.34	0.97	0.77	582.36	1.12	1.02	582.38	1.16	1.27	582.39	1.25	1.58	582.41	1.24	22.17	582.71	2.86	96.85	583.11	4.02
121	trib 6	6b	0.26	0.51	583.34	1.03	0.77	583.38	1.18	1.02	583.42	1.28	1.27	583.45	1.37	1.58	583.49	1.47	22.17	584.03	1.93	96.85	584.42	2.92
122	trib 6	6b	0.29	0.45	584.26	0.13	0.59	584.30	0.17	0.74	584.34	0.20	0.84	584.36	0.22	0.99	584.40	0.25	21.27	585.15	1.42	91.05	585.79	1.90
123	trib 6	6b	0.32	0.45	584.70	1.10	0.59	584.71	1.17	0.74	584.73	1.26	0.84	584.73	1.32	0.99	584.75	1.31	21.27	585.38	1.27	91.05	586.05	2.74
124	trib 6	6b	0.36	0.45	586.26	0.79	0.59	586.28	0.71	0.74	586.28	0.81	0.84	586.28	0.98	0.99	586.28	1.06	21.27	586.58	2.46	91.05	586.88	4.02
125	trib 6	6b	0.39	0.45	587.43	0.53	0.59	587.43	0.67	0.74	587.44	0.78	0.84	587.45	0.68	0.99	587.44	1.03	21.27	587.66	2.39	91.05	587.92	4.13
126	trib 6	6b	0.42	0.45	588.49	5.00	0.59	588.54	1.30	0.74	588.54	1.26	0.84	588.57	0.83	0.99	588.58	0.84	21.27	588.88	2.47	91.05	589.22	4.23
127	trib 6	6b	0.47	0.45	590.29	3.91	0.59	590.41	1.11	0.74	590.44	1.14	0.84	590.45	1.19	0.99	590.46	1.25	21.27	590.74	1.91	91.05	590.74	8.14
128	trib 6	6	0.51	0.27	591.37	0.97	0.37	591.39	1.05	0.47	591.41	1.13	0.53	591.43	1.13	0.63	591.45	1.17	20.83	591.67	2.46	89.00	592.05	4.55
129	trib 6	6	0.53	0.04	592.23	1.10	0.05	592.24	0.87	0.06	592.25	0.68	0.06	592.25	0.64	0.07	592.26	0.60	20.09	592.60	3.02	85.42	592.90	5.14
130	trib 6	6	0.56	0.04	593.95	0.57	0.05	593.95	0.60	0.06	593.95	0.66	0.06	593.96	0.67	0.07	593.96	0.73	20.09	594.36	3.46	85.42	594.66	5.90
131	trib 6	6	0.59	0.04	595.89	0.44	0.05	595.89	0.49	0.06	595.90	0.43	0.06	595.90	0.47	0.07	595.90	0.60	20.09	596.25	3.42	85.42	596.66	5.47
132	trib 6	6	0.62	0.04	597.78	0.72	0.05	597.77	3.37	0.06	597.79	0.66	0.06	597.80	0.70	0.07	597.80	0.71	20.09	598.26	3.15	85.42	598.64	4.99
133	trib 6	6	0.64	0.04	599.04	0.40	0.05	599.03	0.71	0.06	599.03	0.61	0.06	599.04	0.52	0.07	599.05	0.52	20.09	599.54	1.84	85.42	600.08	2.68
134	trib 7	7	0.01	0.27	591.08	1.07	0.33	591.10	1.06	0.40	591.11	1.15	0.46	591.13	1.17	0.53	591.15	1.14	20.67	591.74	4.07	88.20	592.17	6.25
135	trib 7	7	0.03	0.19	592.07	1.19	0.22	592.08	1.23	0.26	592.09	1.28	0.30	592.09	1.31	0.35	592.10	1.40	20.44	592.59	4.40	87.06	593.00	6.56
136	trib 7	7	0.04	0.19	593.55	1.10	0.22	593.55	1.16	0.26	593.56	1.21	0.30	593.57	1.23	0.35	593.58	1.28	20.44	594.01	4.34	87.06	594.37	6.58
137	trib 7	7	0.07	0.19	595.18	0.87	0.22	595.19	0.92	0.26	595.20	0.95	0.30	595.20	0.98	0.35	595.21	1.02	20.44	595.52	3.81	87.06	595.85	6.69
138	trib 7	7	0.09	0.10	597.36	0.83	0.12	597.36	0.91	0.15	597.37	0.94	0.17	597.38	0.95	0.19	597.38	0.97	20.24	597.82	3.95	86.15	598.22	6.98
139	trib 7	7	0.12	0.10	599.08	1.10	0.12	599.08	1.13	0.15	599.09	1.18	0.17	599.09	1.23	0.19	599.09	1.26	20.24	599.51	5.36	86.15	600.10	7.60
140	trib 7	7	0.13	0.10	601.25	0.88	0.12	601.26	0.94	0.15	601.26	1.02	0.17	601.27	1.02	0.19	601.27	1.09	20.24	601.73	3.81	86.15	602.45	4.70
141	trib 7	7	0.15	0.10	602.46	0.17	0.12	602.46	0.20	0.15	602.46	0.25	0.17	602.46	0.28	0.19	602.46	0.33	20.24	602.82	1.94	86.15	603.39	3.18
142	trib 8	8	0.01	1.42	572.30	0.36	1.89	572.34	0.17	2.40	572.37	0.20	2.86	572.40	0.22	3.21	572.42	0.23	23.80	572.36	2.08	97.59	572.57	4.73
143	trib 8	8	0.02	1.42	573.19	1.32	1.89	573.20	1.44	2.40	573.22	1.53	2.86	573.22	1.70	3.21	573.23	1.77	23.80	573.47	3.28	97.59	573.90	5.15
144	trib 8	8	0.04	1.42	574.03	1.28	1.89	574.04	1.38	2.40	574.06	1.48	2.86	574.07	1.57	3.21	574.09	1.48	23.80	574.43	2.24	97.59	575.08	3.55
145	trib 8	8	0.05	1.42	574.52	1.39	1.89	574.53	1.48	2.40	574.54	1.61	2.86	574.53	2.18	3.21	574.52	3.12	23.80	574.67	2.79	97.59	574.89	5.05
146	trib 8	8	0.06	1.42	575.45	1.21	1.89	575.48	1.22	2.40	575.49	1.39	2.86	575.50	1.41	3.21	575.51	1.51	23.80	575.79	2.78	97.59	576.53	3.50
147	trib 8	8	0.07	1.42	576.23	1.99	1.89	576.33	2.10	2.40	576.45	1.98	2.86	576.55	1.80	3.21	576.60	0.11	23.80	576.60	0.79	97.59	576.95	1.94
148	trib 8	8	0.09	1.42	578.11	0.36	1.89	578.19	0.44	2.40	578.26	0.51	2.86	578.32	0.56	3.21	578.32	0.62	23.80	578.52	1.51	97.59	579.04	1.91
149	trib 8	8	0.12	1.42	578.59	0.14	1.89	578.61	0.17	2.40	578.61	0.23	2.86	578.60	0.28	3.21	578.60	0.31	23.80	578.83	0.97	97.59	579.22	1.90
150	trib 8	8	0.14	0.72	578.63	0.16	0.95	578.63	0.21	1.20	578.64	0.26	1.43	578.66	0.27	1.71	578.64	0.37	22.24	578.92	1.11	95.58	578.94	4.48
151	trib 8	8	0.15	0.50	578.63	0.23	0.64	578.64	0.29	0.81	578.65	0.36	0.93	578.66	0.40	1.10	578.65	0.49	21.43	579.19	2.27	91.74	579.87	3.51
152	trib 8	8	0.17	0.50	578.66	0.84	0.64	578.68	0.98	0.81	578.70	1.08	0.93	578.72	1.12	1.10	578.75	1.19	21.43	579.48	0.92	91.74	580.40	1.43
153	trib 8	8	0.19	0.50	578.84	0.61	0.64	578.87	0.62	0.81	578.90	0.65	0.93	578.92	0.66	1.10	578.94	0.69	21.43	579.52	0.86	91.74	580.42	1.37
154	trib 8	8	0.21	0.50	578.86	0.25	0.64	578.89	0.27	0.81	578.92	0.30	0.93	578.94	0.13	1.10	578.97	0.14	21.43	579.57	0.66	91.74	580.50	1.13
155	trib 8	8	0.23	0.24	578.86	0.14	0.30	578.90	0.10	0.36	578.93	0.11	0.41	578.95	0.11	0.48	578.97	0.12	20.61	579.58	0.58	87.68	580.51	1.02
156	trib 8	8	0.25	0.24	578.87	0.11	0.30	578.90	0.11	0.36	578.93	0.11	0.41	578.95	0.11	0.48	578.98	0.11	20.61	579.58	0.85	87.68	580.49	1.35
157	trib 8	8	0.27	0.24	579.30	0.84	0.30	579.32	0.81	0.36	579.32	1.04	0.41	579.34	0.91	0.48	579.33	1.14	20.61	579.69	2.94	87.68	580.23	4.43
158	trib 8	8	0.29	0.24	579.97	1.16	0.30	579.99	1.22	0.36	580.01	1.27	0.41	580.02	1.29	0.48	580.04	1.38	20.61	580.58	2.98	87.68	581.11	4.43
159	trib 8	8	0.32	0.24	581.00	0.87	0.30	581.02	0.85	0.36	581.02	0.97	0.41	581.03	0.98	0.48	581.03	1.03	20.61	581.29	2.87	87.68	581.69	4.51
160	trib 8	8	0.35	0.24	582.20	0.79	0.30	582.21	0.87	0.36	582.22	0.83	0.41	582.23	0.84	0.48	582.24	0.77	20.61	582.71	1.78	87.68	583.19	2.83
161	trib 8	8	0.36	0.07	582.37	1.18	0.09	582.41	0.55	0.10	582.41	0.67	0.12	582.41	0.66	0.14	582.42	0.73	20.18	582.91	1.32	85.86	583.15	3.72
162	trib 8	8	0.38	0.07	583.40	0.49	0.09	583.40	0.52	0.10	583.41	0.51	0.12	583.41	0.27	0.14	583.41	0.32	20.18	583.88	1.88	85.86	584.27	2.66
163	Trib 11	1	0.05	0.45	577.02	1.19	0.69	577.04	1.34	0.97	577.05	1.42	1.16	577.06	1.51	1.41	577.07	1.62	1.96	577.10	1.78	10.35	577.24	2.90
164	Trib 11	1	0.06	0.45	578.56	0.78	0.69	578.49	5.64	0.97	578.54	2.54	1.16	578.61	0.96	1.41	578.54	3.41	1.96	578.65	1.00	10.35	578.82	1.64
165	Trib 11	1	0.08	0.45	579.57	0.67	0.69	579.60	0.75	0.97	579.62	0.81	1.16	579.63	0.85	1.41	579.64	0.91	1.96	579.67	1.00	10.35	579.82	1.82
166	Trib 11	1	0.09	0.45	581.05	0.41	0.69	581.08	0.46	0.97	581.10	0.52	1.16	581.12	0.56	1.41	581.13	0.61	1.96	581.16	0.68	10.35	581.36	1.09
167	Trib 11	1	0.1	0.45	582.62	0.57	0.69	582.65	0.60	0.97	582.66	0.70	1.16	582.68	0.70	1.41	582.68	0.77	1.96	582.71	0.80	10.35	582.89	1.13
168	Trib 11	1	0.13	1.48	567.86	0.39	1.83	567.98	0.35	2.20	568.12	0.32	2.53	568.28	0.28	2.95	568.44	0.27	3.95	568.65	0.28	15.88	570.22	0.42
169	Trib 11	1	0.14	1.48	567.96	1.26	1.83	568.00	1.24	2.20	568.12	0.91	2.53	568.28	0.66	2.95	568.44	0.52	3.95	568.65	0.46	15.88	570.22	0.44
170	Trib 11	1	0.18	1.48	568.12	0.46	1.83	568.16	0.49	2.20	568.21	0.50	2.53	568.32	0.44	2.95	568.46	0.37	3.95	568.66	0.35	15.88	570.22	0.40
171	Trib 11	1	0.22	1.48	568.40	1.09	1.83	568.43	1.14	2.20	568.45	1.14	2.53	568.46	1.19	2.95	568.48	1.23	3.95	568.65	0.72	15.88	570.22	0.45
172	Trib 11	1	0.23	1.48	568.55	0.64	1.83	568.57	0.71	2.20	568.59	0.78	2.53	568.61	0.84	2.95	568.63	0.91	3.95	568.70	0.97	15.88	570.22	0.57
173	Trib 11	1	0.26	1.48	568.93	0.97	1.83	568.95	1.05	2.20	568.97	1.12	2.53	568.99	1.18	2.95	569.01	1.24	3.95	569.05	1.37	15.88	570.22	0.72
174	Trib 11	1	0.28	1.48	569.25	0.83	1.83	569.27	0.89	2.20	569.29	0.95	2.53	569.31	0.99	2.95	569.33	1.05	3.95	569.37	1.17	15.88	570.22	0.93
175	Trib 11	1	0.31	1.48	570.28	1.17	1.83	570.31	1.16	2.20	570.33	1.24	2.53	570.34	1.35	2.95	570.36	1.35	3.95	570.40	1.50	15.88	570.70	2.28
176	Trib 11	1	0.34	1.48	571.28	1.44	1.83	571.29	1.58	2.20	571.32	1.58	2.53	571.33	1.68	2.95	571.34	1.77	3.95	571.36	2.01	15.88	571.53	3.22
177	Trib 11	1	0.35	1.48	571.54	1.37	1.83	571.57	1.47	2.20	571.60	1.54	2.53	571.63	1.64	2.95	571.67	1.65	3.95	571.73	1.81	15.88	572.22	2.36
178	Trib 11	1	0.36	1.48	572.63	0.22	1.83	572.88	0.15	2.20	573.22	0.11	2.53	573.52	0.09	2.95	573.53	0.10	3.95	573.56	0.13	15.88	573.76	0.45
179	Trib 11	1	0.37	1.48	572.63	0.17	1.83	572.88	0.14	2.20	573.22	0.11	2.53	573.52	0.09	2.95	573.53	0.11	3.95	573.56	0.14	15.88	573.76	0.48

Cross Section ID*	River	Reach	River Station	20% AEP			10% AEP			5% AEP			2% AEP			1% AEP			0.5% AEP			PMF		
				Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)
180	Trib 11	1	0.39	1.48	572.75	0.83	1.83	572.88	0.49	2.20	573.22	0.24	2.53	573.52	0.17	2.95	573.53	0.20	3.95	573.56	0.26	15.88	573.75	0.81
181	Trib 11	1	0.41	1.10	573.18	1.60	1.31	573.18	1.71	1.56	573.19	1.85	1.90	573.52	0.32	2.25	573.53	0.37	2.92	573.56	0.44	13.14	573.78	1.14
182	Trib 11	1	0.42	1.10	573.55	1.13	1.31	573.57	1.17	1.56	573.59	1.23	1.90	573.61	1.27	2.25	573.64	1.30	2.92	573.68	1.39	13.14	573.96	2.21
183	Trib 11	1	0.43	1.10	574.76	0.30	1.31	574.77	0.35	1.56	574.78	0.41	1.90	574.80	0.47	2.25	574.82	0.54	2.92	574.85	0.66	13.14	575.07	1.95
184	Trib 11	1	0.45	1.10	574.76	0.28	1.31	574.77	0.33	1.56	574.78	0.38	1.90	574.81	0.44	2.25	574.82	0.51	2.92	574.85	0.63	13.14	575.11	2.03
185	Trib 11	1	0.48	1.10	574.78	0.21	1.31	574.78	0.25	1.56	574.80	0.29	1.90	574.83	0.33	2.25	574.83	0.39	2.92	574.87	0.47	13.14	575.23	1.28
186	Trib 11	1	0.49	1.10	574.78	0.28	1.31	574.79	0.33	1.56	574.81	0.37	1.90	574.84	0.40	2.25	574.84	0.48	2.92	574.89	0.54	13.14	575.30	1.18

* Refer to the flood map in Section 5 for location of cross section

Table E2 - HEC-RAS Model Results for Kandos

Cross Section ID*	River	Reach	River Station	20% AEP			10% AEP			5% AEP			2% AEP			1% AEP			0.5% AEP			PMF		
				Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)
1	1	1a	0.06	6.89	621.03	0.45	8.19	621.08	0.48	9.88	621.13	0.50	11.63	621.18	0.53	13.42	621.23	0.55	18.54	621.34	0.61	95.91	622.27	1.05
2	1	1a	0.11	6.89	621.75	1.31	8.19	621.78	1.35	9.88	621.83	1.29	11.63	621.85	1.33	13.42	621.88	1.37	18.54	621.82	2.47	95.91	622.34	2.63
3	1	1a	0.14	6.89	622.30	1.07	8.19	622.28	1.49	9.88	622.31	1.43	11.63	622.33	1.53	13.42	622.35	1.57	18.54	622.40	1.62	95.91	622.71	3.01
4	1	1a	0.18	6.89	623.24	1.04	8.19	623.26	1.08	9.88	623.28	1.08	11.63	623.29	1.13	13.42	623.30	1.20	18.54	623.35	1.28	95.91	623.73	2.06
5	1	1a	0.22	6.89	624.52	0.86	1.24	624.86	1.08	1.47	624.95	0.16	1.69	625.22	0.06	13.42	625.54	0.17	2.56	626.05	0.02	95.91	626.47	0.46
7	1	1c	0.27	5.86	625.56	3.32	6.96	625.62	1.45	8.41	625.66	1.21	9.95	625.69	1.19	11.44	625.70	1.25	15.98	626.04	0.50	82.43	626.42	1.35
8	1	1c	0.31	5.86	626.60	2.01	6.96	626.69	1.02	8.41	626.63	2.03	9.95	626.65	1.97	11.44	626.67	1.92	15.98	626.72	1.84	82.43	627.22	2.01
9	1	1c	0.36	5.86	627.74	1.19	6.96	627.77	1.20	8.41	627.78	1.35	9.95	627.80	1.42	11.44	627.82	1.43	15.98	627.87	1.63	82.43	628.24	2.73
10	1	1c	0.4	5.84	628.66	1.65	6.93	628.67	1.77	8.38	628.69	1.89	9.93	628.70	1.99	11.40	628.72	2.05	15.92	628.75	2.28	81.96	629.04	3.94
11	1	1c	0.44	5.84	629.55	1.08	6.93	629.57	1.13	8.38	629.58	1.28	9.93	629.54	2.04	11.40	629.55	2.15	15.92	629.66	1.53	81.96	630.19	2.10
12	1	59	0.49	4.13	630.39	1.26	5.19	630.41	1.37	6.55	630.44	1.45	8.10	630.46	1.50	9.46	630.48	1.59	13.68	630.54	1.73	80.65	630.92	3.51
13	1	59	0.52	4.13	631.16	1.17	5.19	631.17	1.36	6.55	631.20	1.48	8.10	631.23	1.57	9.46	631.25	1.64	13.68	631.31	1.88	79.12	631.81	3.73
14	1	59	0.55	4.13	631.94	1.21	5.19	631.95	1.39	6.55	631.99	1.34	8.10	632.01	1.48	9.46	632.03	1.59	13.68	632.08	1.73	72.49	632.46	3.08
15	1	59	0.59	4.13	633.04	1.37	5.19	633.07	1.30	6.55	633.08	1.58	8.00	633.10	1.63	9.43	633.12	1.70	13.13	633.16	1.86	69.23	633.47	3.36
16	1	59	0.62	4.13	634.07	1.06	5.19	634.05	1.54	6.55	634.11	1.21	8.00	634.13	1.31	9.43	634.14	1.46	13.13	634.17	1.67	69.23	634.49	3.05
17	1	59	0.66	4.13	635.12	1.25	5.19	635.15	1.28	6.55	635.19	1.35	8.30	635.22	1.45	9.72	635.24	1.51	13.13	635.30	1.64	69.52	635.83	2.54
18	1	59	0.7	3.58	636.11	0.92	4.41	636.13	1.02	5.25	636.13	1.21	6.34	636.16	1.14	7.47	636.17	1.30	10.42	636.21	1.42	58.33	636.49	2.91
19	1	59	0.74	3.58	637.08	1.03	4.41	637.09	1.19	5.25	637.09	1.44	6.34	637.13	1.30	7.47	637.15	1.37	10.42	637.20	1.46	58.33	637.54	2.93
20	1	59	0.78	3.58	637.84	1.23	4.41	637.87	1.29	5.25	637.89	1.37	6.34	637.91	1.43	7.47	637.93	1.50	10.42	637.98	1.65	58.33	638.47	2.60
21	1	59	0.83	2.19	639.42	1.07	2.75	639.44	1.18	3.33	639.46	1.24	4.17	639.48	1.30	5.03	639.50	1.44	7.06	639.54	1.59	39.13	639.84	2.90
22	1	59	0.87	2.19	641.10	0.57	2.75	641.13	0.60	3.33	641.15	0.64	4.17	641.19	0.68	5.03	641.22	0.72	7.06	641.27	0.81	39.13	641.76	1.46
23	1	59	0.91	2.19	643.02	1.23	2.75	643.06	1.00	3.33	643.06	1.19	4.17	643.07	1.28	5.03	643.10	1.28	7.06	643.13	1.41	39.13	643.45	2.41
24	1	59	0.96	0.22	644.60	1.11	0.28	644.60	1.14	0.61	644.63	1.44	0.94	644.64	1.54	1.20	644.66	1.62	1.87	644.69	1.71	11.98	644.85	2.57
25	1	59	1.01	0.22	646.96	0.27	0.28	646.97	0.28	0.61	647.00	0.38	0.94	647.03	0.43	1.20	647.04	0.47	1.87	647.08	0.52	11.98	647.32	1.03
26	1	59	1.05	0.22	648.55	0.23	0.28	648.55	0.25	0.61	648.58	0.34	0.94	648.61	0.40	1.20	648.62	0.43	1.87	648.66	0.50	11.98	648.92	0.92
27	1	59	1.08	0.22	649.90	0.60	0.28	649.90	0.66	0.61	649.91	0.94	0.94	649.92	1.08	1.20	649.93	1.18	1.84	649.94	1.36	10.32	650.02	2.55
28	1	59	1.11	0.22	650.76	1.22	0.28	650.77	1.33	0.61	650.79	1.44	0.94	650.81	1.55	1.20	650.82	1.62	1.84	650.84	1.81	10.32	650.98	2.87
29	1	59	1.13	0.17	651.84	0.65	0.28	651.85	0.76	0.42	651.87	0.80	0.59	651.89	0.88	0.75	651.90	0.94	1.18	651.93	1.07	7.38	652.13	1.63
30	trib 10	10b	0.08	1.12	619.95	0.89	1.35	619.97	0.90	1.64	619.98	0.92	1.96	620.00	0.93	2.29	620.01	0.97	3.11	620.03	1.06	16.33	620.27	1.69
31	trib 10	10b	0.13	1.12	620.49	0.41	1.35	620.50	0.44	1.64	620.52	0.49	1.96	620.53	0.52	2.29	620.55	0.55	3.11	620.58	0.60	16.33	620.85	1.03
32	trib 10	10b	0.15	1.12	620.73	0.99	1.35	620.76	0.94	1.64	620.76	1.08	1.96	620.79	1.03	2.29	620.79	1.24	3.11	620.83	1.26	16.33	621.11	1.82
33	trib 10	10b	0.18	1.12	621.20	0.60	1.35	621.21	0.67	1.64	621.24	0.67	1.96	621.25	0.74	2.29	621.28	0.72	3.11	621.32	0.82	16.33	621.61	1.51
34	trib 10	10b	0.2	1.12	621.50	0.97	1.35	621.52	0.91	1.64	621.54	0.91	1.96	621.55	0.99	2.29	621.56	1.11	3.11	621.59	1.16	16.33	621.90	1.79
35	trib 10	10b	0.22	1.12	621.85	5.52	1.35	621.86	5.57	1.64	621.86	5.59	1.96	621.94	1.51	2.29	621.88	5.67	3.11	621.89	5.74	16.33	622.01	6.12
36	trib 10	10	0.24	0.46	622.12	0.23	0.56	622.05	0.77	0.69	622.15	0.25	0.84	621.99	5.52	0.98	622.07	0.83	1.36	622.22	0.31	7.05	622.18	2.06
37	trib 10	10	0.26	0.46	623.07	0.65	0.56	623.07	0.64	0.69	623.08	0.67	0.84	623.08	0.77	0.98	623.09	0.86	1.36	623.04	5.32	7.05	623.25	1.35
38	trib 10	10	0.28	0.46	623.58	0.57	0.56	623.59	0.63	0.69	623.51	4.04	0.84	623.61	0.70	0.98	623.63	0.71	1.36	623.62	1.02	7.05	623.80	1.63
39	trib 10	10	0.3	0.46	624.35	0.88	0.56	624.37	0.75	0.69	624.38	0.81	0.84	624.35	1.56	0.98	624.35	2.04	1.36	624.41	1.00	7.05	624.55	1.66
40	trib 10	10	0.32	0.46	625.24	0.82	0.56	625.22	1.51	0.69	625.24	1.19	0.84	625.24	1.50	0.98	625.24	1.55	1.36	625.26	1.49	7.05	625.35	2.75
41	trib 10	10	0.34	0.46	626.38	0.84	0.56	626.40	0.62	0.69	626.40	0.77	0.84	626.41	0.75	0.98	626.41	0.80	1.36	626.42	0.96	7.05	626.56	1.43
42	trib 10	10	0.36	0.46	627.07	0.59	0.56	627.06	0.92	0.69	627.07	0.92	0.84	627.07	1.06	0.98	627.08	1.12	1.36	627.09	1.28	7.05	627.25	1.93
43	trib 10	10	0.38	0.46	627.93	2.44	0.56	627.99	0.81	0.69	628.00	0.92	0.84	628.01	0.90	0.98	628.02	0.95	1.36	628.05	1.02	7.05	628.21	1.79
44	trib 10	10	0.41	0.46	628.63	0.95	0.56	628.66	0.79	0.69	628.67	0.82	0.84	628.68	0.91	0.98	628.69	0.95	1.36	628.72	1.06	7.05	628.93	1.49
45	trib 11	11	0.04	1.10	623.48	1.30	1.32	623.48	1.47	1.61	623.50	1.53	1.92	623.51	1.54	2.24	623.52	1.76	3.06	623.54	1.97	16.07	623.76	2.70
46	trib 11	11	0.07	1.10	625.07	0.85	1.32	625.09	0.85	1.61	625.10	0.91	1.92	625.10	1.01	2.24	625.12	0.98	3.06	625.14	1.05	16.07	625.33	1.74
47	trib 11	11	0.1	1.10	625.81	0.70	1.32	625.82	0.76	1.61	625.83	0.80	1.92	625.84	0.80	2.24	625.85	0.89	3.06	625.87	0.99	16.07	626.06	1.57
48	trib 11	11	0.12	0.91	626.19	0.54	1.09	626.10	2.22	1.33	626.22	0.59	1.59	626.23	0.63	1.86	626.25	0.64	2.55	626.29	0.70	13.32	626.53	1.19
49	trib 11	11	0.16	0.42	627.51	0.68	0.52	627.52	0.75	0.67	627.52	0.91	0.82	627.48	2.17	0.97	627.55	0.98	1.41	627.58	1.05	7.98	627.80	1.70
50	trib 11	11	0.18	0.42	628.25	1.03	0.52	628.26	1.18	0.67	628.27	1.22	0.82	628.30	1.18	0.97	628.29	1.48	1.41	628.32	1.66	7.98	628.56	2.40
51	trib 11	11	0.21	0.42	629.89	0.69	0.52	629.90	0.68	0.67	629.91	0.76	0.82	629.91	0.88	0.97	629.93	0.76	1.41	629.95	0.83	7.98	630.09	1.30
52	trib 11	11	0.23	0.42	630.69	0.88	0.52	630.71	0.62	0.67	630.72	0.64	0.82	630.73	0.63	0.97	630.73	0.79	1.41	630.74	0.91	7.98	630.85	1.63
53	trib 11	11	0.25	0.42	631.55	0.56	0.52	631.56	0.57	0.67	631.57	0.65	0.82	631.57	0.72	0.97	631.58	0.69	1.41	631.60	0.78	7.98	631.74	1.36
54	trib 11	11	0.3	0.42	632.61	0.45	0.52	632.62	0.51	0.67	632.63	0.53	0.82	632.64	0.56	0.97	632.65	0.64	1.41	632.67	0.73	7.98	632.73	2.61
55	trib 11	11	0.34	0.42	634.04	0.76	0.52	634.04	0.88	0.67	634.06	0.94	0.82	634.07	1.01	0.97	634.09	1.03	1.41	634.12	1.13	7.98	634.38	1.75
56	12	12b	0.01	13.16	608.69	0.72	15.54	608.79	0.76	19.58	608.95	0.81	25.77	609.16	0.88	31.39	609.34	0.94	48.77	609.80	1.06	222.71	611.63	1.55
57	12	12b	0.04	13.16	608.66	4.50	15.54	608.70	4.50	19.58	608.76	4.50	25.77	608.84	4.52	31.39	608.91	4.54	48.77	609.09	4.56	222.71	611.65	1.75
58	12	12c	0.15	6.93	612.00	1.31	8.45	612.04	1.29	10.51	612.07	1.33	12.76	612.10	1.39	14.97	612.12	1.45	21.61	612.18	1.63	124.51	614.06	0.65
59	12	12c	0.19	6.93	612.62	0.86	8.45	612.63	0.98	10.51	612.65	1.09	12.76	612.68	1.18	14.97	612.64	1.70	21.61	612.69	1.92	124.51	614.05	0.99
60	12	12c	0.31	6.93	615.72	1.18	8.45	615.74	1.25	10.51	615.76	1.33	12.76	615.79	1.41	14.97	615.81	1.47	21.61	615.87	1.66	124.51	616.28	3.16

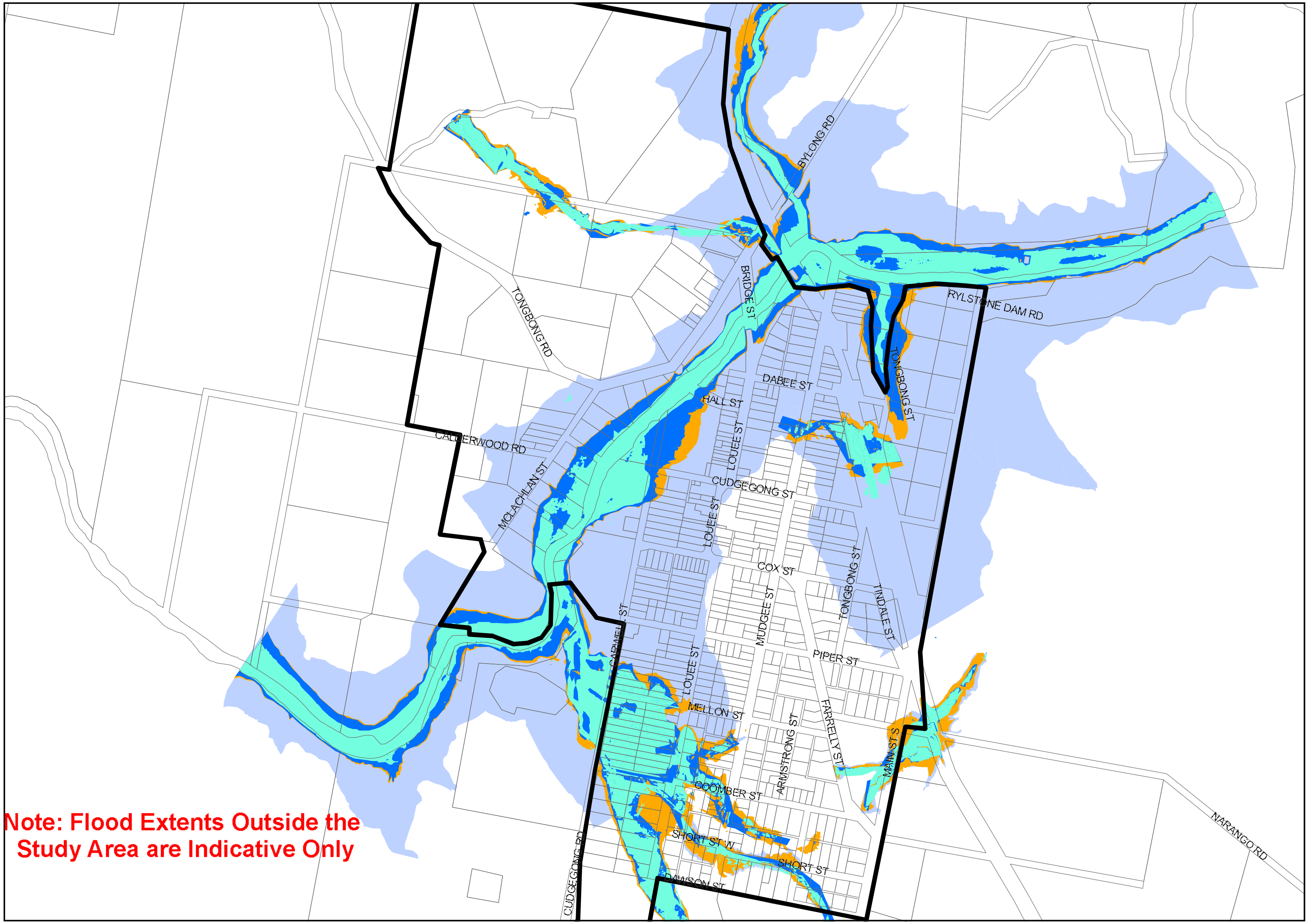
Cross Section ID*	River	Reach	River Station	20% AEP			10% AEP			5% AEP			2% AEP			1% AEP			0.5% AEP			PMF		
				Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)	Q Total (m^3/s)	W.S. Elev (mAHD)	Vel Chnl (m/s)
61	12	14	0.46	6.91	619.26	1.49	8.42	619.28	1.63	10.47	619.31	1.77	12.72	619.33	1.90	14.92	619.35	2.01	21.56	619.42	2.22	124.25	619.90	3.16
62	12	14	0.48	6.91	619.91	1.36	8.42	619.94	1.43	10.47	619.98	1.51	12.72	620.02	1.57	14.92	620.05	1.63	21.56	620.12	1.79	124.25	620.49	3.92
63	12	14	0.51	6.91	620.58	3.42	8.42	620.61	3.04	10.47	620.63	3.30	12.72	620.65	3.46	14.92	620.66	3.63	21.56	620.69	4.56	124.25	621.03	7.32
64	12	14	0.6	6.20	625.73	1.11	7.54	625.74	1.27	9.38	625.77	1.34	11.40	625.80	1.38	13.44	625.82	1.44	19.42	625.89	1.55	112.42	626.38	2.30
65	12	14	0.66	6.20	625.94	0.42	7.54	625.98	0.45	9.38	626.01	0.50	11.40	626.05	0.53	13.44	626.09	0.58	19.42	626.18	0.66	112.42	626.77	1.25
66	12	14	0.7	6.20	627.16	1.42	7.54	627.18	1.54	9.38	627.21	1.59	11.40	627.23	1.70	13.44	627.25	1.80	19.42	627.30	1.99	112.42	627.55	3.25
67	12	14	0.77	6.20	629.53	1.25	7.54	629.55	1.31	9.38	629.56	1.49	11.40	629.58	1.58	13.44	629.59	1.65	19.42	629.64	1.86	112.42	629.99	2.75
68	12	14	0.81	3.20	630.83	1.08	3.99	630.85	1.18	5.13	630.88	1.15	6.55	630.91	1.28	7.80	630.92	1.38	11.83	630.98	1.55	71.59	631.24	3.27
69	12	14	0.86	3.20	631.87	1.01	3.99	631.89	1.06	5.13	631.91	1.25	6.55	631.94	1.32	7.80	631.97	1.36	11.83	632.03	1.53	71.59	632.56	2.44
70	trib 2	2	0.03	1.30	631.10	0.97	1.51	631.11	0.96	1.78	631.12	1.07	2.04	631.12	1.17	2.34	631.13	1.17	2.95	631.14	1.39	15.23	631.36	2.25
71	trib 2	2	0.05	1.30	632.12	0.52	1.51	632.12	0.59	1.78	632.14	0.58	2.04	632.15	0.59	2.34	632.16	0.65	2.95	632.19	0.66	15.23	632.43	1.22
72	trib 2	2	0.08	1.30	632.84	1.26	1.51	632.86	1.17	1.78	632.86	1.36	2.04	632.87	1.38	2.34	632.88	1.43	2.95	632.90	1.42	15.23	633.06	2.26
73	trib 2	2	0.11	1.30	634.33	0.86	1.51	634.27	5.95	1.78	634.34	0.93	2.04	634.35	0.98	2.34	634.36	1.01	2.95	634.36	1.21	15.23	634.51	1.88
74	trib 2	2	0.15	1.30	636.00	0.98	1.51	636.02	0.94	1.78	636.02	1.09	2.04	636.03	1.11	2.34	636.04	1.16	2.95	636.07	1.08	15.23	636.24	1.95
75	trib 2	2	0.2	0.76	637.99	0.54	0.89	637.99	0.69	1.04	637.99	0.80	1.19	638.00	0.74	1.37	638.00	0.70	1.72	638.01	0.72	8.81	638.09	1.22
76	trib 2	2	0.24	0.76	638.91	0.34	0.89	638.91	0.38	1.04	638.92	0.42	1.19	638.94	0.42	1.37	638.95	0.45	1.72	638.97	0.49	8.81	639.22	0.85
77	trib 2	2	0.26	0.76	640.32	0.92	0.89	640.32	1.06	1.04	640.32	1.20	1.19	640.33	1.26	1.37	640.34	1.28	1.72	640.35	1.33	8.81	640.47	2.45
78	trib 2	2	0.29	0.76	641.54	0.39	0.89	641.54	0.43	1.04	641.55	0.46	1.19	641.56	0.47	1.37	641.57	0.48	1.72	641.60	0.49	8.81	641.81	0.91
79	trib 2	2	0.33	0.76	642.95	0.42	0.89	642.95	0.46	1.04	642.97	0.48	1.19	642.98	0.49	1.37	642.99	0.51	1.72	643.01	0.54	8.81	643.19	0.79
80	trib 2	2	0.35	0.76	643.93	0.70	0.89	643.93	0.73	1.04	643.94	0.77	1.19	643.94	0.80	1.37	643.95	0.84	1.72	643.96	0.90	8.81	644.08	1.69
81	trib 3	3	0.05	1.03	625.93	0.80	1.24	625.94	0.90	1.47	625.94	0.97	1.69	625.95	0.97	1.98	625.95	1.16	2.56	626.04	0.48	13.48	626.47	0.43
82	trib 3	3	0.1	1.03	627.31	1.15	1.24	627.31	1.25	1.47	627.32	1.24	1.69	627.32	1.34	1.98	627.34	1.32	2.56	627.35	1.47	13.48	627.46	2.50
83	trib 3	3	0.13	1.03	629.64	0.85	1.24	629.64	0.98	1.47	629.66	0.87	1.69	629.66	0.99	1.98	629.69	0.84	2.56	629.69	1.02	13.48	629.89	1.52
84	trib 3	3	0.17	0.58	629.73	0.17	0.79	629.75	0.19	1.02	629.55	2.26	1.22	629.78	0.24	1.51	629.80	0.27	2.06	629.83	0.31	12.81	630.12	0.65
85	trib 3	3	0.21	0.36	631.42	0.61	0.53	631.42	0.85	0.71	631.44	0.69	0.87	631.44	0.83	1.09	631.46	0.70	1.53	631.47	0.85	10.56	631.61	1.76
86	trib 3	3	0.25	0.36	633.04	0.28	0.53	633.04	0.37	0.71	633.07	0.34	0.87	633.07	0.39	1.09	633.10	0.38	1.53	633.12	0.44	10.36	633.32	0.90
87	trib 3	3	0.28	0.25	633.41	1.29	0.34	633.41	1.39	0.46	633.42	1.49	0.60	633.43	1.57	0.75	633.43	1.62	1.06	633.45	1.76	6.42	633.55	2.66
88	trib 3	3	0.3	0.17	635.00	0.54	0.26	635.00	0.69	0.36	635.02	0.69	0.45	635.02	0.75	0.58	635.03	0.90	0.84	635.05	0.90	5.13	635.20	1.59
89	87	0	0.09	1.80	617.09	0.24	2.12	617.10	0.26	2.52	617.12	0.28	3.05	617.14	0.30	3.52	617.16	0.31	4.72	617.20	0.35	30.06	617.66	0.68
90	87	0	0.2	1.80	620.27	0.93	2.12	620.29	0.85	2.52	620.30	0.98	3.05	620.31	1.00	3.52	620.32	1.06	4.72	620.35	1.11	30.06	620.59	1.84
91	87	0	0.32	1.80	623.87	1.08	2.12	623.88	1.14	2.52	623.89	1.14	3.05	623.90	1.28	3.52	623.90	1.32	4.72	623.91	1.59	30.06	624.12	1.99
92	87	0	0.38	1.73	625.87	1.04	2.03	625.89	1.07	2.42	625.90	1.13	2.94	625.92	1.13	3.39	625.94	1.17	4.53	625.98	1.22	27.38	626.01	1.58
93	87	0	0.51	1.61	630.31	0.15	1.89	630.32	0.15	2.26	630.33	0.15	2.76	630.34	0.17	3.18	630.35	0.18	4.28	630.36	0.21	27.76	630.55	0.26
94	87	0	0.57	1.18	632.61	0.36	1.37	632.62	0.37	1.61	632.63	0.39	2.00	632.65	0.40	2.47	632.67	0.43	3.89	632.72	0.46	24.77	632.93	0.83
95	87	0	0.64	1.03	635.24	0.85	1.20	635.24	0.83	1.41	635.25	0.81	1.75	635.26	0.85	2.18	635.27	0.96	3.56	635.29	1.15	23.07	635.43	2.30
96	87	0	0.7	1.03	637.34	0.84	1.20	637.34	0.92	1.41	637.35	0.94	1.75	637.37	0.92	2.18	637.39	0.90	3.56	637.43	0.96	23.07	637.62	1.77
97	87	0	0.77	0.55	640.18	1.19	0.87	640.20	0.95	1.21	640.21	1.17	1.63	640.22	1.12	2.08	640.21	1.81	3.20	640.23	1.91	20.91	640.38	3.09
98	87	0	0.79	0.54	641.30	0.55	0.83	641.30	0.74	1.18	641.32	0.78	1.59	641.33	0.93	2.03	641.36	0.79	3.14	641.38	0.90	20.73	641.59	1.55
99	40	0	0.04	0.56	623.69	0.17	0.66	623.70	0.18	0.77	623.71	0.19	0.87	623.72	0.19	1.00	623.73	0.20	1.28	623.76	0.22	6.80	624.05	0.40
100	40	0	0.07	0.56	624.87	0.91	0.66	624.88	0.85	0.77	624.89	0.94	0.87	624.89	1.02	1.00	624.92	0.89	1.28	624.93	1.00	6.80	625.12	1.46
101	40	0	0.08	0.56	625.89	0.66	0.66	625.84	2.34	0.77	625.90	0.76	0.87	625.91	0.76	1.00	625.91	0.94	1.28	625.91	1.21	6.80	625.97	3.39
102	40	0	0.1	0.56	626.28	1.39	0.66	626.30	1.42	0.77	626.33	1.43	0.87	626.34	1.54	1.00	626.37	1.57	1.28	626.43	1.58	6.80	626.91	2.49
103	40	0	0.11	0.56	627.12	0.17	0.66	627.31	0.16	0.77	627.51	0.06	0.87	627.52	0.07	1.00	627.53	0.08	1.28	627.55	0.10	6.80	627.73	0.35
104	40	0	0.13	0.56	627.30	1.34	0.66	627.32	1.42	0.77	627.48	0.89	0.87	627.48	0.99	1.00	627.49	1.13	1.28	627.47	1.52	6.80	628.03	2.95
105	40	0	0.14	0.56	628.52	0.05	0.66	628.53	0.06	0.77	628.54	0.07	0.87	628.55	0.07	1.00	628.55	0.09	1.28	628.57	0.10	6.80	628.75	0.37
106	40	0	0.16	0.18	628.52	0.30	0.21	628.53	0.30	0.24	628.54	0.29	0.28	628.48	2.36	0.32	628.54	0.34	0.39	628.57	0.31	1.95	628.75	0.45
107	40	0	0.17	0.18	628.93	0.61	0.21	628.93	0.63	0.24	628.94	0.66	0.28	628.94	0.70	0.32	628.94	0.77	0.39	628.96	0.71	1.95	629.05	1.20
108	40	0	0.19	0.18	629.54	0.75	0.21	629.54	0.82	0.24	629.54	0.91	0.28	629.55	0.95	0.32	629.55	0.98	0.39	629.56	0.99	1.95	629.65	1.64
109	40	0	0.2	0.18	630.29	0.79	0.21	630.29	0.78	0.24	630.30	0.79	0.28	630.31	0.83	0.32	630.31	0.87	0.39	630.32	0.96	1.95	630.42	1.56
110	40	0	0.22	0.18	631.96	1.24	0.21	631.96	1.57	0.24	631.95	2.05	0.28	631.96	2.16	0.32	631.96	2.11	0.39	631.97	1.83	1.95	632.00	3.72
111	40	0	0.23	0.18	633.61	0.79	0.21	633.62	0.76	0.24	633.63	0.74	0.28	633.64	0.77	0.32	633.64	0.81	0.39	633.65	0.92	1.95	633.79	1.24
112	28	0	0.03	1.90	623.87	0.30	2.17	623.89	0.31	2.68	623.93	0.33	3.06	623.95	0.34	3.48	623.98	0.35	4.40	624.03	0.38	21.31	624.54	0.66
113	28	0	0.06	1.90	624.96	0.98	2.17	624.97	1.01	2.68	624.98	1.05	3.06	625.00	1.05	3.48	625.01	1.09	4.40	625.03	1.13	21.31	625.23	1.92
114	28	0	0.09	1.90	625.83	1.79	2.17	625.86	1.83	2.68	625.91	1.98	3.06	625.95	2.05	3.48	625.98	2.18	4.40	626.06	2.35	21.31	627.10	3.96
115	28	0	0.11	1.90	627.55	0.53	2.17	627.64	0.56	2.68	627.79	0.61	3.06	627.90	0.64	3.48	628.02	0.68	4.40	628.28	0.74	21.31	628.78	0.29
116	28	0	0.14	1.90	627.55	0.99	2.17	627.64	1.02	2.68	627.79	1.05	3.06	627.90	1.06	3.48	628.02	1.07	4.40	628.28	1.08	21.31	628.77	0.79
117	28	0	0.17	1.72	628.54	0.11	2.02	628.56	0.13	2.41	628.57	0.14	2.76	628.59	0.16	3.13	628.60	0.18	3.95	628.65	0.20	19.04	628.97	0.59
118	28	0	0.19	1.72	628.62	0.76	2.02	628.63	0.85	2.41	628.63	0.96	2.76	628.55	6.16	3.13	628.65	1.05	3.95	628.67	1.09	19.04	629.03	1.24
119	28	0	0.23	1.72	630.55	0.58	2.02	630.56	0.58	2.41	630.58	0.58	2.76	630.59	0.60	3.13	630.59	0.67	3.95	630.61	0.73	19.04	630.69	2.10
120	28	0	0.25	1.72	631.19	1.12	2.02	631.21	1.19	2.41	631.19	1.63	2.76	631.25	1.17	3.13	631.19	2.15	3.95	631.25	0.60	19.04	631.34	2.02

Cross Section ID*	River	Reach	River Station	20% AEP Q Total (m^3/s)	20% AEP W.S. Elev (mAHD)	20% AEP Vel Chnl (m/s)	10% AEP Q Total (m^3/s)	10% AEP W.S. Elev (mAHD)	10% AEP Vel Chnl (m/s)	5% AEP Q Total (m^3/s)	5% AEP W.S. Elev (mAHD)	5% AEP Vel Chnl (m/s)	2% AEP Q Total (m^3/s)	2% AEP W.S. Elev (mAHD)	2% AEP Vel Chnl (m/s)	1% AEP Q Total (m^3/s)	1% AEP W.S. Elev (mAHD)	1% AEP Vel Chnl (m/s)	0.5% AEP Q Total (m^3/s)	0.5% AEP W.S. Elev (mAHD)	0.5% AEP Vel Chnl (m/s)	PMF Q Total (m^3/s)	PMF W.S. Elev (mAHD)	PMF Vel Chnl (m/s)
121	28	0	0.29	0.21	632.45	0.70	0.42	632.47	0.94	0.69	632.51	0.98	0.89	632.52	1.11	1.14	632.54	1.16	1.69	632.57	1.29	11.07	632.83	2.15
122	28	0	0.31	0.21	633.44	0.61	0.42	633.48	0.55	0.69	633.48	0.90	0.89	633.50	0.85	1.14	633.51	0.93	1.69	633.53	1.04	11.07	633.74	1.56
123	28	0	0.34	0.21	633.98	0.33	0.42	633.98	0.54	0.69	633.99	0.72	0.89	634.02	0.49	1.14	634.02	0.62	1.69	634.03	0.72	11.07	634.19	1.43
124	32	0	0.03	0.71	625.43	0.31	0.83	625.45	0.33	0.99	625.48	0.35	1.11	625.50	0.36	1.27	625.52	0.37	1.64	625.57	0.40	8.48	626.09	0.63
125	32	0	0.07	0.71	627.26	0.81	0.83	627.27	0.91	0.99	627.27	1.02	1.11	627.28	0.97	1.27	627.31	0.88	1.64	627.31	1.10	8.48	627.52	1.62
126	32	0	0.11	0.71	628.03	0.53	0.83	628.04	0.53	0.99	628.05	0.58	1.11	628.06	0.59	1.27	628.07	0.65	1.64	628.09	0.71	8.48	628.17	2.25
127	32	0	0.13	0.71	628.91	1.37	0.83	628.94	1.38	0.99	628.96	1.44	1.11	628.99	1.46	1.27	629.01	1.54	1.64	629.05	1.65	8.48	629.60	2.79
128	32	0	0.18	0.63	632.23	0.01	0.73	632.24	0.01	0.87	632.25	0.01	0.97	632.25	0.01	1.10	632.25	0.01	1.41	632.26	0.01	7.94	632.38	0.07
129	32	0	0.19	0.61	632.23	0.01	0.71	632.24	0.01	0.84	632.25	0.01	0.94	632.25	0.01	1.07	632.25	0.01	1.36	632.26	0.02	7.05	632.38	0.07
130	32	0	0.22	0.61	632.23	0.08	0.71	632.24	0.09	0.84	632.24	0.11	0.94	632.25	0.12	1.07	632.24	0.14	1.36	632.26	0.17	7.05	632.36	0.83
131	32	0	0.25	0.36	632.26	0.10	0.42	632.28	0.11	0.49	632.30	0.13	0.56	632.32	0.15	0.65	632.34	0.17	0.81	632.41	0.19	4.18	634.56	0.07
132	32	0	0.27	0.36	633.40	0.96	0.42	633.41	0.84	0.49	633.41	0.95	0.56	633.42	0.96	0.65	633.44	0.82	0.81	633.44	1.02	4.18	634.56	0.13
133	32	0	0.3	0.36	634.48	0.67	0.42	634.47	0.81	0.49	634.49	0.78	0.56	634.49	0.81	0.65	634.50	0.86	0.81	634.50	0.98	4.18	634.66	1.36
134	32	0	0.32	0.36	635.00	0.58	0.42	635.01	0.54	0.49	635.01	0.62	0.56	635.02	0.64	0.65	635.03	0.66	0.81	635.04	0.70	4.18	635.16	1.22
135	32	0	0.35	0.36	635.77	0.29	0.42	635.77	0.32	0.49	635.78	0.32	0.56	635.79	0.33	0.65	635.80	0.35	0.81	635.81	0.37	4.18	635.98	0.64
136	32	0	0.37	0.36	637.06	0.80	0.42	637.07	0.76	0.49	637.07	0.78	0.56	637.08	0.82	0.65	637.08	0.90	0.81	637.10	0.91	4.18	637.25	1.30
137	18	0	0.02	1.78	626.82	0.38	1.92	626.84	0.39	2.14	626.86	0.41	2.46	626.88	0.43	2.78	626.91	0.44	3.64	626.96	0.49	18.53	627.45	0.83
138	18	0	0.04	1.78	627.39	1.82	1.92	627.41	1.86	2.14	627.50	1.52	2.46	627.53	1.51	2.78	627.56	1.52	3.64	627.62	1.54	18.53	627.95	2.37
139	18	0	0.06	1.78	627.60	0.69	1.92	627.63	0.72	2.14	627.66	0.78	2.46	627.69	0.86	2.78	627.72	0.94	3.64	627.78	1.15	18.53	628.35	3.56
140	18	0	0.09	1.57	628.46	0.38	1.72	628.66	0.36	1.93	628.96	0.34	2.23	629.13	0.36	2.58	629.23	0.40	3.48	629.44	0.49	17.26	631.15	1.40
141	18	0	0.11	1.57	629.39	0.46	1.72	629.54	0.44	1.93	629.79	0.41	2.23	630.25	0.34	2.58	630.73	0.31	3.48	632.15	0.25	17.26	632.75	0.13
142	18	0	0.14	1.24	631.67	0.93	1.35	631.67	0.95	1.57	631.68	1.04	1.96	631.70	1.04	2.30	631.72	1.07	3.06	632.16	0.16	16.13	632.75	0.24
143	18	0	0.18	0.63	631.96	1.69	0.92	631.97	1.79	1.25	631.98	1.97	1.62	631.99	2.05	1.96	631.99	2.13	2.70	632.16	0.44	14.76	632.75	0.40
144	18	0	0.21	0.23	634.70	0.83	0.48	634.71	1.07	0.73	634.73	1.09	1.03	634.75	1.15	1.31	634.76	1.20	1.92	634.78	1.29	13.44	634.92	2.49
145	18	0	0.23	0.23	635.21	0.76	0.48	635.24	0.83	0.73	635.27	0.93	1.03	635.29	1.01	1.31	635.31	1.11	1.92	635.35	1.17	13.44	635.68	1.62
146	18	0	0.25	0.23	635.27	0.29	0.48	635.31	0.38	0.73	635.35	0.45	1.03	635.38	0.51	1.31	635.41	0.56	1.92	635.45	0.64	13.44	635.48	3.93
147	18	0	0.27	0.23	636.09	1.37	0.48	636.11	1.56	0.73	636.13	1.73	1.03	636.15	1.88	1.31	636.17	1.93	1.92	636.19	2.12	13.44	636.40	3.57
148	18	0	0.29	0.23	637.06	0.70	0.48	637.09	0.80	0.73	637.11	0.85	1.03	637.13	0.94	1.31	637.14	1.01	1.92	637.17	1.13	13.44	637.39	2.07
149	trib 9	9	0.1	6.23	612.91	2.24	7.09	612.94	2.29	9.08	612.99	2.38	13.01	613.06	2.55	16.42	613.12	2.66	27.16	613.27	2.92	98.20	613.74	3.56
150	trib 9	9	0.13	6.23	614.26	1.70	7.09	614.27	1.79	9.08	614.30	1.96	13.01	614.35	2.22	16.42	614.39	2.42	27.16	614.48	2.92	98.20	614.84	4.49
151	trib 9	9	0.21	6.23	616.23	1.33	7.09	616.25	1.36	9.08	616.29	1.45	13.01	616.35	1.59	16.42	616.40	1.68	27.16	616.52	1.87	98.20	616.97	2.58
152	trib 9	9	0.28	6.23	617.09	2.10	7.09	617.12	1.88	9.08	617.14	2.02	13.01	617.18	2.26	16.42	617.21	2.50	27.16	617.28	3.05	98.20	617.61	4.69
153	trib 9	9	0.32	6.23	618.82	1.54	7.09	618.82	1.79	9.08	618.85	1.98	13.01	618.92	2.27	16.42	618.97	2.40	27.16	619.12	2.76	98.20	619.66	3.92
154	trib 9	9	0.35	6.23	619.50	2.48	7.09	619.60	1.68	9.08	619.64	1.78	13.01	619.73	1.91	16.42	619.78	2.07	27.16	619.92	2.40	98.20	620.58	2.95
155	trib 9	9	0.38	6.23	620.34	1.61	7.09	620.39	1.38	9.08	620.42	1.51	13.01	620.47	1.75	16.42	620.51	1.86	27.16	620.64	2.09	98.20	621.05	3.31
156	trib 9	9	0.41	6.23	621.10	1.24	7.09	621.11	1.31	9.08	621.14	1.40	13.01	621.20	1.58	16.42	621.24	1.70	27.16	621.32	2.15	98.20	621.78	3.24
157	trib 9	9	0.45	6.23	621.83	1.25	7.09	621.85	1.31	9.08	621.88	1.45	13.01	621.95	1.64	16.42	621.99	1.81	27.16	622.13	2.09	98.20	622.56	3.67
158	trib 9	9	0.51	6.23	623.22	3.12	7.09	623.23	3.35	9.08	623.24	3.86	13.01	623.27	4.63	16.42	623.28	5.22	27.16	623.33	6.51	98.20	623.52	9.78
159	trib 9	9	0.56	6.20	625.14	2.47	7.06	625.19	2.58	9.03	625.31	2.80	12.94	625.53	3.17	16.32	625.70	3.41	26.98	626.17	4.04	98.20	628.09	0.36
160	trib 9	9	0.59	6.20	627.85	0.62	7.06	628.11	0.06	9.03	628.15	0.07	12.94	628.20	0.10	16.32	628.24	0.12	26.98	628.34	0.19	98.20	628.77	0.53
161	trib 9	9	0.6	6.20	628.18	1.18	7.06	628.20	1.22	9.03	628.22	1.32	12.94	628.28	1.45	16.32	628.31	1.56	26.98	628.41	1.82	98.20	628.87	2.61
162	trib 9	9	0.66	6.20	628.99	1.00	7.06	628.92	1.64	9.03	628.97	1.62	12.94	629.00	1.91	16.32	629.04	2.07	26.98	629.11	2.51	98.20	629.46	3.86
163	trib 9	9	0.69	6.20	629.60	1.25	7.06	629.61	1.35	9.03	629.64	1.42	12.94	629.70	1.55	16.32	629.75	1.67	26.98	629.86	1.93	98.20	630.37	2.79
164	trib 9	9	0.73	6.20	629.94	1.79	7.06	629.95	1.86	9.03	629.98	2.05	12.94	630.03	2.19	16.32	630.06	2.35	26.98	630.15	2.71	98.20	630.60	3.67
165	trib 9	9	0.75	6.20	630.50	1.26	7.06	630.51	1.31	9.03	630.55	1.35	12.94	630.59	1.55	16.32	630.63	1.64	26.98	630.74	1.88	98.20	630.91	4.53
166	trib 9	9	0.77	6.20	630.75	0.89	7.06	630.76	0.93	9.03	630.79	1.04	12.94	630.86	1.15	16.32	630.76	2.20	26.98	630.77	3.51	98.20	630.82	5.01
167	trib 9	9	0.78	5.41	630.14	5.07	6.77	630.78	2.52	8.72	630.65	3.72	10.96	631.00	3.27	13.09	631.14	3.46	20.26	631.54	4.03	98.20	634.59	6.76
168	trib 9	9	0.82	5.41	631.79	0.85	6.77	632.05	0.93	8.72	632.41	1.00	10.96	632.89	1.04	13.09	633.57	1.00	20.26	636.15	0.07	98.20	636.92	0.26
169	trib 9	9	0.83	1.58	632.24	0.87	1.99	632.24	1.09	2.56	632.47	0.37	3.23	632.96	0.12	3.81	633.63	0.06	5.66	636.15	0.02	33.14	636.92	0.09
170	trib 9	9	0.9	1.58	634.16	0.52	1.99	634.18	0.52	2.56	634.15	0.94	3.23	634.18	0.87	3.81	634.17	1.06	5.66	636.15	0.03	33.14	636.92	0.13
171	trib 9	9	0.96	1.58	634.40	0.13	1.99	634.42	0.16	2.56	634.45	0.17	3.23	634.47	0.19	3.81	634.50	0.16	5.66	636.15	0.04	33.14	636.92	0.14
172	trib 9	9	1.02	1.58	636.35	1.04	1.99	636.38	1.04	2.56	636.40	1.13	3.23	636.42	1.22	3.81	636.44	1.29	5.66	636.49	1.48	33.14	636.86	2.56
173	trib 9	9	1.03	1.58	637.00	1.57	1.99	637.06	1.13	2.56	637.09	1.22	3.23	637.11	1.32	3.81	637.14	1.37	5.66	637.19	1.55	33.14	637.57	2.90
174	trib 9	9	1.05	1.58	637.61	1.07	1.99	637.64	1.08	2.56	637.66	1.19	3.23	637.69	1.28	3.81	637.71	1.36	5.66	637.77	1.54	33.14	638.27	2.37
175	trib 9	9	1.07	1.58	637.68	1.07	1.99	637.71	1.08	2.56	637.74	1.19	3.23	637.78	1.28	3.81	637.81	1.36	5.66	637.90	1.54	33.14	638.58	0.08

* Refer to flood extent map in Section 5 for location of cross section

Appendix F Combined Riverine and Overland Flood Maps for Rylstone

Figure F-1 Combined Flood Extents for Rylstone



LEGEND

- Study Area
- 20% AEP Flood Extent
- 1% AEP Flood Extent
- Provisional Flood Planning Area
- PMF Flood Extent

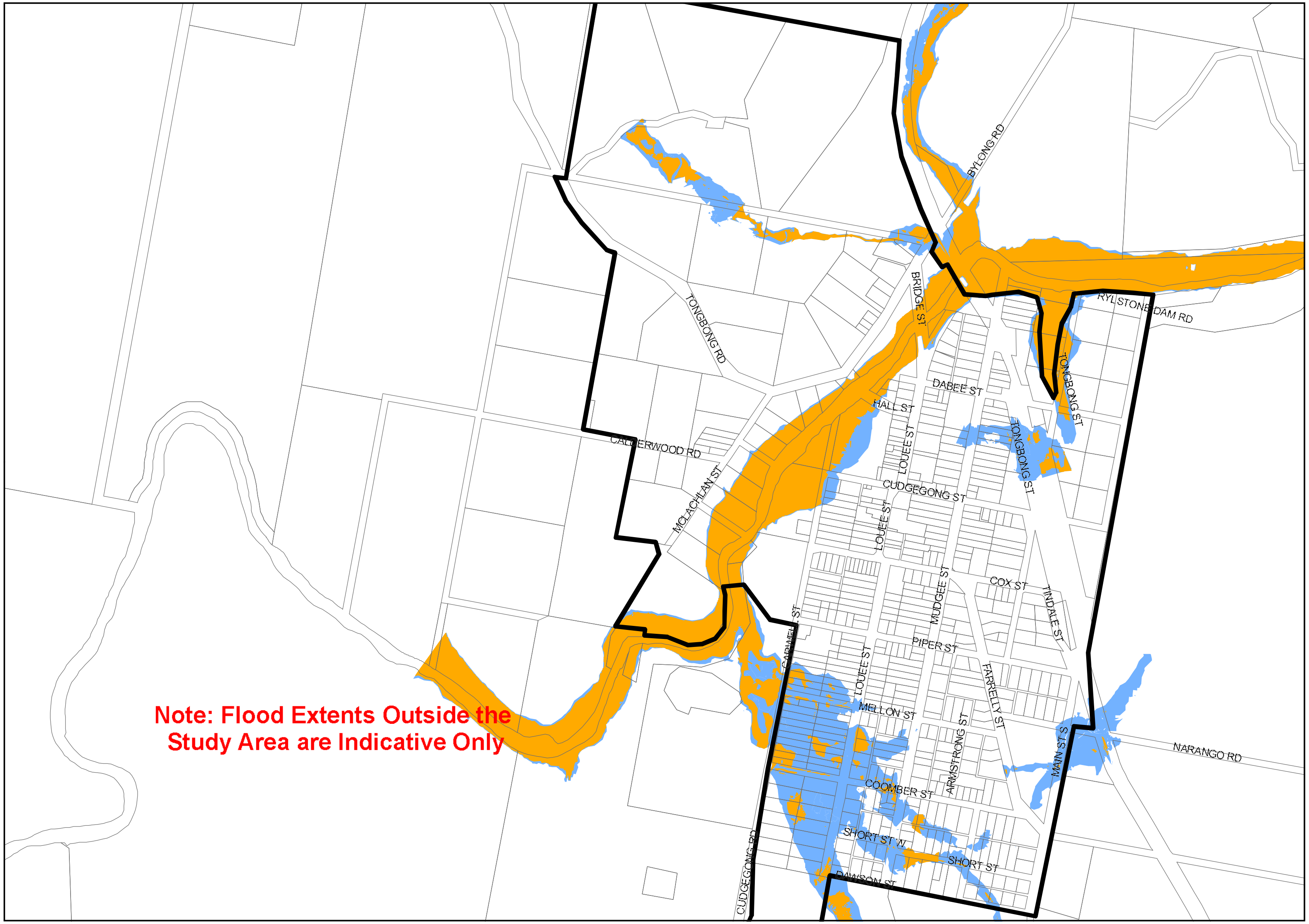
The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:12,137

0 0.4
Kilometres

SKM

Figure F-2 Combined Provisional Flood Hazard Categorisation for Rylstone



LEGEND

- Study Area
- High Hazard
- Low Hazard

The flood inundation map is based on the available data and the assumptions made in the flood study. Hence, the flood study report must be read to draw any conclusion on the basis of the flood inundation map.

[GDA1994 MGA ZONE 55]
A3 1:12,336

0 0.4
Kilometres

SKM