

Our Ref: 89914004-050:BCP/dna
Contact: Dr Brett C. Phillips



15th August 2016

The Manager
Scentre Group Design
GPO Box 4004
SYDNEY NSW 2001

Attention: Mr Wail Thomas

Dear Wail,

STORMWATER MANAGEMENT DA2008/1741 AT WARRINGAH MALL - SECTION 96 APPLICATION

In response to a recent submission to Council on DA 2008/1741 in July 2016, Council raised a number of concerns regarding the omission of flood mitigation works and potential impact on flooding of adjacent properties of Stage 1 for recently constructed stormwater augmentation works at Warringah Mall. Council have highlighted that some works as per the approved 200 Series Drawings for Stage 1 works have not been constructed. Cardno prepared the supporting documentation for a Section 96 Application on 15 October 2014 to modify the stormwater augmentation works however it appears that this documentation was not submitted to Council for approval. A Section 96 for DA 2008/1742 was lodged with Council in October 2014 and it was understood that this Section 96 was to address both DA's. The Stage 1 works have now been constructed as per the attached 300 Series Drawings.

We summarise the main changes from the constructed stormwater augmentation works to the approved works as follows:

Re-configuration of the DA2008/1741 Stormwater Layout

Subsequent to Stage 2 modelling assessments to optimise the layout of Chambers B4 and B6 further consideration was given to the interaction of the proposed works with other services, the feasibility of relocating services at the southern end of Green Street, traffic management during construction, construction sequencing and potential hydraulic impacts during construction.

This led to further consideration of the proposed construction of two additional culverts under Condamine Street and the merit of separating the alignment of the new stormwater culverts from the existing culverts realigning the additional stormwater culverts through the Bing Lee site. These are discussed as follows.

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Green Street Inlet

The structural design of the Green Street inlet incorporates “360 UB 50” transfer beams at 960 mm centres to support the grated inlet. On the side facing Green Street this has created a 9.6 m wide and 0.36 m high side entry inlet with an invert level set at 8.86 m AHD. The underside of the grates are set at 9.22 m AHD while the top of the trafficable grate is set at 9.32 m AHD.

This configuration substantially lowers the level at which water ponded in the Green Street low point can spill into the new culverts. It also increases the complexity of inflows into the inlet.

Consequently a rating curve was developed for the inlet which accounts for the initial weir flow through the side inlet which changes to orifice flow when the water level in Green Street rises above around 9.22 m AHD in combination with initial weir flow spilling across the grates which in turn changes regime if the water level rises to a level which covers the grated inlet.

The latest configuration has a substantial reserve capacity to deal with any blockage of the side inlet and/or the grates.

Re-alignment of Additional Culverts

In our letter of 21 February 2014 we concluded that the temporary closure of a main culvert to allow the reconstruction of Chamber B4 would have a significant adverse impact on flood levels in a number of locations and that in events greater than a 10 year ARI event the construction impacts are sufficient to initiate flows through entries into Warringah Mall sooner than would otherwise would be the case (and subject to the to the degree of debris blockage of key inlets).

Further consideration was also given to the interaction of the proposed works with other services and the feasibility of relocating services at the southern end of Green Street and traffic management during construction. This led to a decision to realign the additional stormwater culverts through the Bing Lee site.

The ramifications of this decision include:

- The hydraulic separation of the existing culverts and the additional culverts;
- The simplification of the proposed works due to the removal of the need to adjust culverts sizes to match existing culvert sizes and the removal of a limitation on pit invert levels due to the need to match existing pit invert levels;
- No need to reconstruct Chamber B4 thereby avoiding the adverse impacts on flood levels during construction;

At the same time it has been possible to retain the same inlet configuration at Chamber B6 as was assessed during the physical model study.

The re-aligned layout of the proposed stormwater culverts is given in the attached drawings.

Further Refinements

Based on a review of the number of flood barriers required to achieve the required freeboard during Stage 1 which would not be required under Stage 2 further refinement of the Stage 1 works was undertaken. These refinements include:

Cross Street roundabout/loading dock road:

- Raising the level of the parapet wall inside Warringah Mall beside the access road (opposite Harrison's property) on the upstream side of Warringah Mall by 400 mm to confine overflows over the parapet wall and existing catch drain to the west of the access road flood barrier.
- Including the access road swinging gates flood barriers in Stage 1 rather than Stage 2 as previously proposed;
- Provision of ram push up flood barrier at Cross Street roundabout entry.
- Provision of drop down flood barrier at the Cross Street roundabout entry just west of ram push up flood barrier.
- Removal of flood doors to non retail assets.
- Including the transfer beams which span the open chamber Pit B1 southeast of the Cross Street roundabout in the hydraulic model;

Green Street inlet:

- Connecting the new Green Street culverts temporarily to the existing culvert at the southern end of Green Street by installing a temporary 1350 mm diameter RCP connection;

Myer Courtyard:

- Upgrading conduits which convey Myer roof runoff to the drainage system, namely replacing 525 mm diameter pipes with 750 mm diameter pipes, and replacing 450 mm diameter or smaller pipes with 525 mm diameter pipes.

Starfish Car Park / access road:

- Removal of flood barrier at Starfish entry due to a reduction in flood levels achieving 500mm freeboard to floor levels.
- Provision of a drop down flood barrier at pedestrian exit at the western side of Starfish car park.
- Replacement of flood barrier at south west corner of Starfish car park with ramping road to 11.50 to achieve freeboard.
- Relocating the high capacity inlet pit on the access road south and modify shape to avoid existing services.
- Removal of flood doors to non retail assets.

Woolworths Loading dock:

- Removal of flood barriers within the Woolworths Loading dock due to a reduction in flood levels achieving 500mm freeboard to floor levels.
- Provision of twin 675mm RCP in lieu of culvert in Woolworths Loading dock.

David Jones loading dock:

- Replacement of flood barriers at David Jones loading dock to permanent flood walls and flood stairs due to access provisions by the asset owner.
- Shifting the crest at the post office further west to avoid the existing post office boxes.

Updated Results

As Council is aware design flood levels have been extracted from the 1D/2D Brookvale Creek floodplain model at a series of reference locations including those locations plotted in **Attachment A**. Table A.5 from the 2010 Warringah Mall Flood Impact Assessment Addendum has been updated to include:

- The estimated 100 year ARI flood levels for both 50% and 0% blockage of key stormwater inlets,

- Updated estimated 100 year ARI flood levels under Stage 1 (formerly called First Stage Retail (FSR)) for both 50% and 0% blockage of key stormwater inlets;
- The estimated 100 year ARI flood levels under Stage 1 for both 50% and 0% blockage of key stormwater inlets with the new major inlet in Green Street temporarily blocked during Stage 1;
- Additional reference locations as follows:
 - Reference locations 221, 222 – DJ Loading Dock
 - Reference Locations 300 – 307 – Green St, Cross St and Dale St
 - Reference Locations 401 -404 – “Bus Depot” subcatchment east of Pittwater Road
 - Reference Locations 501-505 – Anchor Car Park / Coles Loading Dock

Also attached is a table which summarises the floor levels of commercial properties surveyed in the vicinity of the Green Street / Cross Street intersection (refer **Attachment B**). This table has been updated to include the results of the assessment of the latest Stage 1 configuration of stormwater works.

It identifies three properties that are affected by overfloor flooding under Existing Conditions (Formrite Group, K Mart Tyre & Auto and Northshore & City Towing). The basement car park of a fourth property (AlemLube) may be inundated if the overland flood level exceeds the level of the car park entry.

For properties that are already subject to overfloor flooding the original Stage 1 works would lead to small increases in the flood level that could be experienced in the interim period while the overall augmentation works are completed. No property that does not experience overfloor flooding under Existing Conditions would experience overfloor flooding in a 100 year ARI event due to the original Stage 1 works in the interim period while the overall augmentation works are completed.

Notwithstanding the assessed minimal impact of original Stage 1 augmentation works on 100 year ARI flood levels in the vicinity of the Cross St / Green St intersection, consideration has been given to a further measure to further mitigate the temporary local impacts on 100 year ARI flood levels in this area. This measure is temporarily seal the major inlet to be constructed adjacent to Green Street. The inlet would be activated upon commissioning of the stormwater augmentation works to be undertaken under Stage 2 (ie. under DA 2008/1742).

The impact of this approach is detailed in the expanded and updated version of Table A.5 and in **Attachment B**. It is concluded that this approach reduces the 100 year ARI flood levels on adjacent properties to lower than existing 100 year ARI flood levels ie. no adverse impact on adjacent properties during Stage 1.

Yours faithfully



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Dr Brett C. Phillips
Director, Water Engineering
for **Cardno**

Table A.5 Updated Comparison of Updated Stormwater DA with Existing Conditions (xpswmmV10)

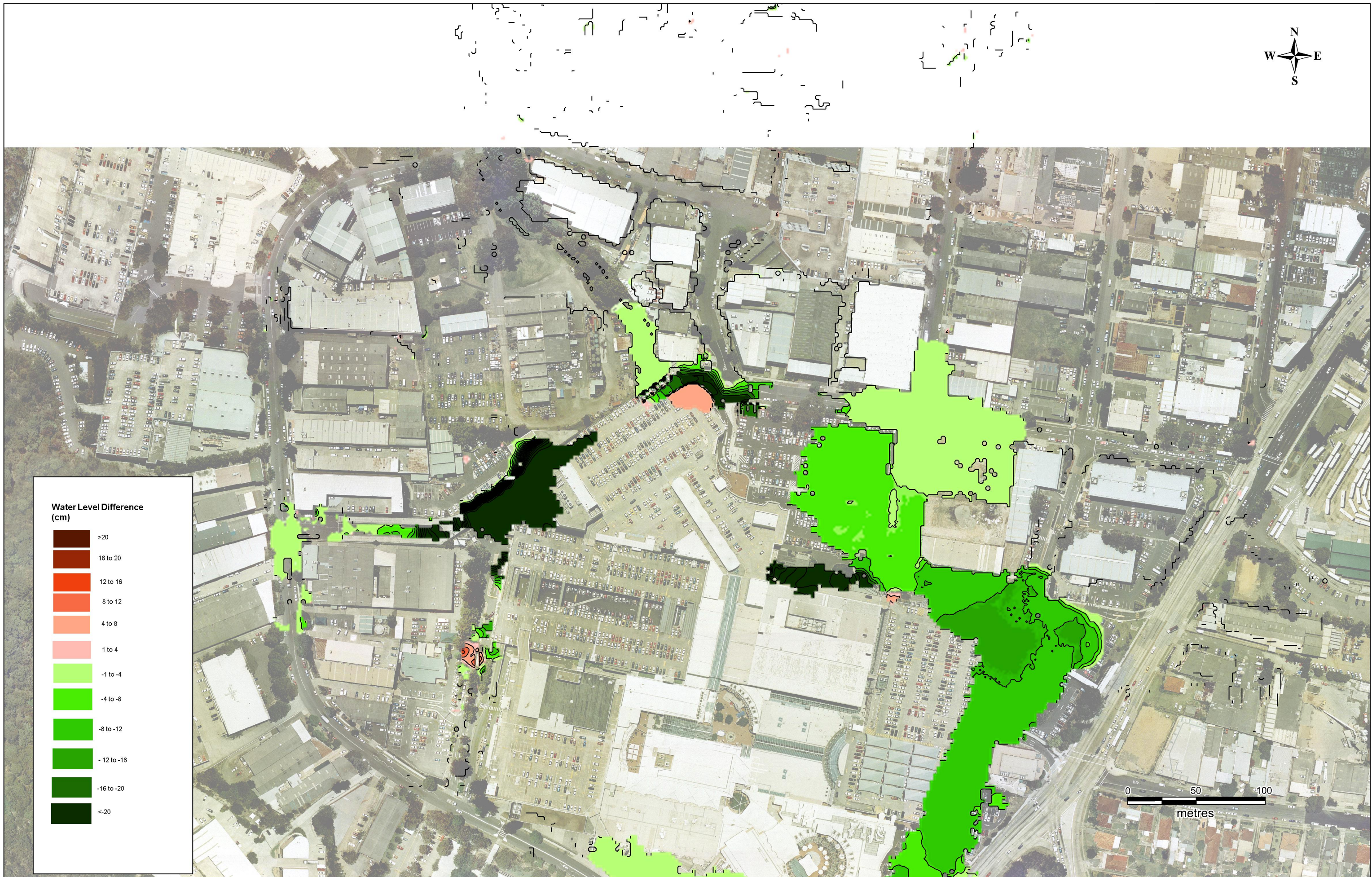
			Existing Conditions										Updated FSR DA + Green St Inlet Sealed										Updated FSR DA (DA 1741) with Green St Sealed																																																																																																			

Existing Conditions

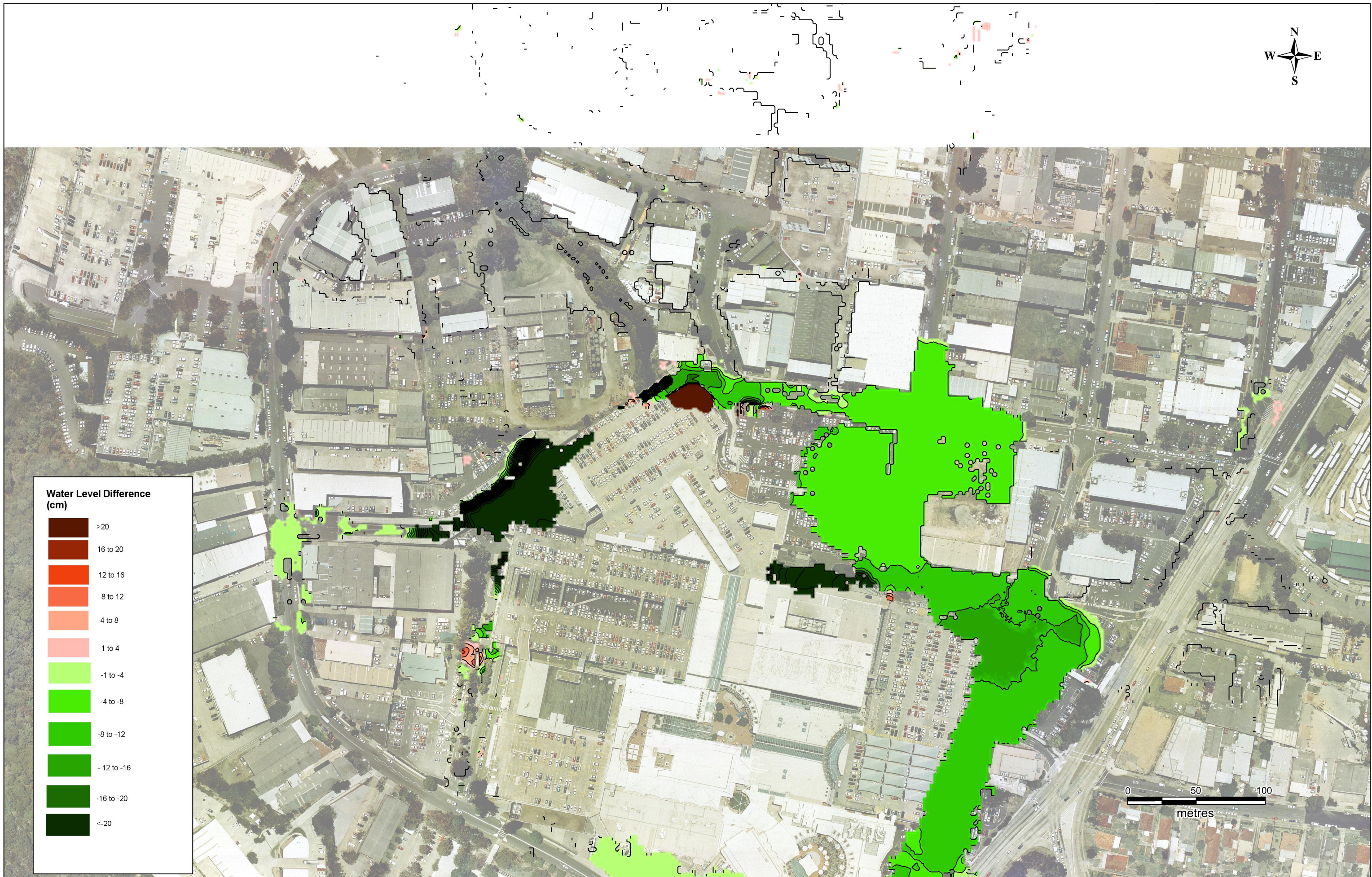
Updated FSR DA + Green St Inlet Sealed

Updated FSR DA (DA 1741) with Green St Sealed

			12 June 2013										12 June 2013										18 Sep 2014										18 Sep 2014									
			100yr 1.5h ARI 50% Blockage				100yr 1.5h ARI 0% Blockage				100yr 1.5h ARI FSR 50% Blockage + GreenStInletSealed				100yr 1.5h ARI FSR 0% Blockage + GreenStInletSealed				100yr 1.5h ARI DA 50% Blockage				100yr 1.5h ARI DA 0% Blockage																			
Survey Point	Floor Level (mAHd)	Street Address	Flood Level (mAHd)	Depth over Ground (cm)	Depth over Floor (cm)	Flood Level (mAHd)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Max FL (m AHd)	Flood Level (mAHd)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Flood Level (mAHd)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Max FL (m AHd)	Flood Level (mAHd)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Flood Level (mAHd)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)	Diff (cm)	Max FL (m AHd)										
			(a)				(b)				(ae)				(af)				(bk)				(bl)																			
P131	12.18	25 Cross Street	12.03	11	0	12.02	10	0	-1	12.03	12.03	11	0	0	1	12.02	10	0	-2	7	12.18	12.03	11	0	0	1	12.02	10	0	0	0	12.03										
P132	12.04	23 Cross Street	12.04	13	0	12.03	12	0	-1	12.04	12.04	13	0	0	0	12.03	12	0	0	0	12.04	12.04	13	0	0	0	12.03	12	0	0	0	12.04										
P133	12.12	21 Cross Street	11.94	24	0	11.93	23	0	-1	11.94	11.94	24	0	0	1	11.93	23	0	-1	0	11.94	11.93	23	0	-1	0	11.93	23	0	0	0	11.93										
P134	9.95	19 Cross Street	11.36	151	141	11.21	136	126	-15	11.36	11.27	142	132	-9	1	11.16	131	121	-5	3	11.27	11.29	144	134	-7	3	11.16	131	121	-5	3	11.29										
P137	14.61	Old Pittwater Road	12.79	19	0	12.72	12	0	-7	12.79	12.78	18	0	-1	1	12.71	11	0	-1	2	12.78	12.78	18	0	-1	1	12.71	11	0	-1	2	12.78										
P138	12.99	Old Pittwater Road	12.91		0	12.91		0	0	12.91	12.91		0	0	0	12.91		0	0	0	12.91	12.91		0	0	12.91		0	0	0	12.91											
P139	12.90	Old Pittwater Road	13.04	24	14	13.04	24	14	0	13.04	13.04	24	14	0	0	13.04	24	14	0	0	13.04	13.04	24	14	0	0	13.04	24	14	0	0	13.04										
P140	13.12	Old Pittwater Road	13.14	12	2	13.14	12	2	0	13.14	13.14	12	2	0	0	13.14	12	2	0	0	13.14	13.14	12	2	0	0	13.14	12	2	0	0	13.14										
P141	12.31	Old Pittwater Road	12.41	20	10	12.27	6	0	-14	12.41	12.41	20	10	0	2	12.25	4	0	-2	3	12.41	12.41	20	10	0	2	12.26	5	0	-1	4	12.41										
P142		Brookvale Creek upstream of Mall	12.18	394		11.99	375		-19	12.18	12.18	394		0	3	11.97	373		-2	7	12.18	12.19	395		1	4	11.98	374		-1	8	12.19										
P143			12.19	394		11.99	374		-20	12.19	12.18	393		-1	3	11.97	372		-2	6	12.18	12.19	394		0	4	11.98	373		-1	7	12.19										
P144			12.24	411		12.06	393		-18	12.24	12.24	411		0	3	12.04	391		-2	6	12.24	12.24	411		0	3	12.04	391		-2	6	12.24										
P145			12.30	381		12.13	364		-17	12.30	12.29	380		-1	2	12.11	362		-2	5	12.29	12.30	381		0	3	12.12	363		-1	6	12.30										
P146			12.38	419		12.23	404		-15	12.38	12.37	418		-1	2	12.21	402		-2	4	12.37	12.38	419		0	3	12.22	403		-1	5	12.38										
P147			12.57	429		12.47	419		-10	12.57	12.56	428		-1	1	12.46	418		-1	3	12.56	12.57	429		0	2	12.46	418		-1	3	12.57										
P148			12.63	429		12.54	420		-9	12.63	12.62	428		-1	1	12.52	418		-2	1	12.62	12.62	428		-1	1	12.53	419		-1	2	12.62										
P149			12.70	447		12.62	439		-8	12.70	12.69	446		-1	1	12.61	438		-1	2	12.69	12.69	446		-1	1	12.61	438		-1	2	12.69										
P150			12.76	430		12.70	424		-6	12.76	12.76	430		0	1	12.69	423		-1	1	12.76	12.76	430		0	1	12.69	423		-1	1	12.76										
P151			12.76	348		12.70	342		-6	12.76	12.76	348		0	1	12.69	341		-1	1	12.76	12.76	348		0	1	12.69	341		-1	1	12.76										
P152			12.95	361		12.91	357		-4	12.95	12.95	361		0	1	12.91	357		0	1	12.95	12.95	361		0	1	12.91	357		0	1	12.95										
P153			13.03	343		12.99	339		-4	13.03	13.02	342		-1	0	12.99	339		0	1	13.02	13.03	343		0	1	12.99	339		0	1	13.03										
P154			13.11	475		13.07	471		-4	13.11	13.10	474		-1	0	13.07	471		0	1	13.10	13.10	474		-1	0	13.07	471		0	1	13.10										
P155		Harrison Property	12.20	33		12.01	14		-19	12.20	12.20	33		0	3	11.99	12		-2	6	12.20	12.21	34		1	4	12.00	13		-1	7	12.21										
P156			12.26	14		12.08			-18	12.26	12.25	13		-1	2	12.06			-2	6	12.25	12.26	14		0	3	12.07			-1	7	12.26										
P157			12.51	3		12.39			-12	12.51	12.50	2		-1	2	12.38			-1	3	12.50	12.51	3		0	3	12.38			-1	3	12.51										
P158			12.66	60		12.58	52		-8	12.66	12.65	59		-1	1	12.57	51		-1	2	12.65	12.65	59		-1	1	12.57	51		-1	2	12.65										
P159			12.71	48		12.64	41		-7	12.71	12.71	48		0	1	12.63	40		-1	2	12.71	12.71	48		0	1	12.63	40		-1	2	12.71										
P160			12.80	99		12.73	92		-7	12.80	12.79	98		-1	1	12.72	91		-1	1	12.79	12.79	98		-1	1	12.73	92		0	2	12.79										
P161			12.96	11		12.96	11		0	12.96	12.96	11		0	0	12.96	11		0	0	12.96	12.96	11		0	0	12.96	11		0	0	12.96										
P162			13.65	24		13.64	23		-1	13.65	13.64	23		-1	-1	13.64	23		0	0	13.64	13.65	24		0	0	13.64	23		0	0	13.65										
P163			12.78	31		12.71	24		-7	12.78	12.77	30		-1	1	12.70	23		-1	1	12.77	12.78	31		0	2	12.70	30		-1	1	12.78										
P164		Driveway to Woolworth Loading Dock	10.96	109		10.84	97		-12	10.96	10.98	71		-38	11	10.12	25		-72	5	10.98	10.03	16		-93	-44	10.08	21		-76	1	10.08										
P165			11.01	82		10.86	67		-15	11.01	10.61	42		-40	10	10.32	13		-54	6	10.61	10.19			-82	-32	10.19			-67	-7	10.19										
P166			11.11	57		10.92	38		-19	11.11	10.76	22		-35	4	10.65	11		-27	3	10.76	11.19	65		8	47	10.96	42		4	34	11.19										
P167		Roundabout in Cross Street	11.34	68		11.21	55		-13	11.34	10.98	32		-36	3	10.89	23		-32	4	10.98	11.20	54		-14	25	10.96	30		-25	11	11.20										
P168			11.19	26		11.13	20		-6	11.19	11.09	16		-10	0	11.09	16		-4	0	11.09	11.13	20		-6	4	11.09	16		-4	0											









ATTACHMENT A



ATTACHMENT B

NA49913132 Cross Street and Dale Street Flood Levels

	If floodwaters are able to flow over entry to car park
	Depth over Car Park
	Depth over Floor

Existing and FSR

					50%Blockage			0%Blockage			Max FL (m AHD)
					Existing _ (100yr1.5h flood)			Existing _ (100yr1.5h flood)			
Survey Point	Ground (mAHD)	Floor Level (mAHD)	Street Address	Business Name	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor/Car Park (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor/Car Park (cm)	
					(a)			(b)			
P300	10.68	11.12	4 Cross St	Rent -A-Space Self Storage	10.78	10	-	10.75	6	-	10.78
P301	9.22	10.12	2 Cross St	Formrite Group	10.15	94	3.3	10.13	92	1.1	10.15
	9.22	9.38	2 Cross St	Formrite Group Loading Dock	10.15	94	77	10.13	92	75	10.15
P302	9.29	10.08	(Cross St)	K Mart Tyre & Auto	10.15	86	7.2	10.13	84	5.1	10.15
P303	10.27	10.45	Cross St	SuperCheap Auto	10.37	10	-	10.37	10	-	10.37
P307	10.13	11.55	20 Green St	AlemLube Office	10.27	14	-	10.27	14	-	10.27
	10.13	8.91	20 Green St	AlemLube Basement Car Park	10.27	14	136	10.27	14	136	10.27
P306	9.65	10.65	24 Green St	Beaurepaires	10.15	50	-	10.13	48	-	10.15
P305	9.24	10.08	26 Green St	K Mart Tyre & Auto	10.15	91	7.3	10.13	89	5.1	10.15
P175	9.16	9.96	28-32 Green St	ALDI Car Park	10.15	99	19	10.14	98	18	10.15
P176	9.09	9.96	28-32 Green St	ALDI Car Park	10.15	106	19	10.14	104	18	10.15
P177	9.01	9.96	28-32 Green St	ALDI Car Park	10.15	114	19	10.14	113	17	10.15
P178	8.95	9.96	28-32 Green St	ALDI Car Park	10.15	120	19	10.14	119	17	10.15
P179	8.85	10.31	28-32 Green St	ALDI Supermarket	10.15	130	-	10.14	128	-	10.15
P304	10.86	10.87	2 Dale St	Northshore & City Towing	10.95	9	7.7	10.95	9	7.7	10.95

Model Run 12 June 2013

Model Run 12 June 2013

100yr1.5h ARI FSR - 50% blocked				100yr1.5h ARI FSR - 0% blocked				Max FL (m AHD)	Max Diff (cm)
Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor/Car Park (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)		
(c) dry	-		(c)-(a) -	(d) dry	-		(d)-(b) -		
10.17	95	5.2	1.9	10.19	97	6.5	3.2	10.19	4
10.17	95	79	2.2	10.19	97	81	3.5	10.19	4
10.17	88	9.1	1.9	10.18	89	10.4	3.2	10.18	3
10.37	10	-	0	10.27	0	-	-10	10.37	0
10.27	14	-	0.7	10.27	14	-	0.6	10.27	0
10.27	14	136		10.27	14	136		10.27	0
10.17	52	-	1.9	10.19	54	-	3.2	10.19	4
10.17	93	9.2	1.9	10.19	95	10.5	3.2	10.19	4
10.17	101	21	1.8	10.19	103	23	3.6	10.19	4
10.17	108	21	1.7	10.19	110	23	3.6	10.19	4
10.17	116	21	1.6	10.19	118	23	3.5	10.19	4
10.16	121	20	1.5	10.18	123	22	3.4	10.18	3
10.16	131	-	1.4	10.18	133	-	3.5	10.18	3
10.95	9	7.7	0	10.95	9	7.7	0	10.95	0

FSR + Temporary Sealing Green Street Inlet

					50%Blockage Existing_(100yr1.5h flood)			0%Blockage Existing_(100yr1.5h flood)			Max FL (m AHD)
Survey Point	Ground (mAHD)	Floor Level (mAHD)	Street Address	Business Name	Depth over		Depth over		Max FL (m AHD)		
					Flood Level (mAHD)	Ground (cm)	Flood Level (mAHD)	Ground (cm)			
					(a)			(b)			
P300	10.68	11.12	4 Cross St	Rent -A-Space Self Storage	10.78	10	-	10.75	6	-	10.78
P301	9.22	10.12	2 Cross St	Formrite Group	10.15	94	3.3	10.13	92	1.1	10.15
	9.22	9.38	2 Cross St	Formrite Group Loading Dock	10.15	94	77	10.13	92	75	10.15
P302	9.29	10.08	(Cross St)	K Mart Tyre & Auto	10.15	86	7.2	10.13	84	5.1	10.15
P303	10.27	10.45	Cross St	SuperCheap Auto	10.37	10	-	10.37	10	-	10.37
P307	10.13	11.55	20 Green St	AlemLube Office	10.27	14	-	10.27	14	-	10.27
	10.13	8.91	20 Green St	AlemLube Basement Car Park	10.27	14	136	10.27	14	136	10.27
P306	9.65	10.65	24 Green St	Beaurepaires	10.15	50	-	10.13	48	-	10.15
P305	9.24	10.08	26 Green St	K Mart Tyre & Auto	10.15	91	7.3	10.13	89	5.1	10.15
P175	9.16	9.96	28-32 Green St	ALDI Car Park	10.15	99	19	10.14	98	18	10.15
P176	9.09	9.96	28-32 Green St	ALDI Car Park	10.15	106	19	10.14	104	18	10.15
P177	9.01	9.96	28-32 Green St	ALDI Car Park	10.15	114	19	10.14	113	17	10.15
P178	8.95	9.96	28-32 Green St	ALDI Car Park	10.15	120	19	10.14	119	17	10.15
P179	8.85	10.31	28-32 Green St	ALDI Supermarket	10.15	130	-	10.14	128	-	10.15
P304	10.86	10.87	2 Dale St	Northshore & City Towing	10.95	9	7.7	10.95	9	7.7	10.95

Model Run 12 June 2013

Model Run 12 June 2013

100yr1.5h ARI FSR - 50% blocked				100yr1.5h ARI FSR - 0% blocked				Max FL (m AHD)	Max Diff (cm)	Max Incremental Diff (cm)
+ Temporary Sealing Green St Inlet										
Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor/Car Park (cm)	Diff (cm)	Flood Level (mAHD)	Depth over Ground (cm)	Depth over Floor (cm)	Diff (cm)			
(c) dry	-	-	(c)-(a) -	(d) dry	-	-	(d)-(b) -			
10.09	87	-	-5.9	10.11	89	-	-4.3	10.11	-4	-8
10.09	87	71	-5.6	10.11	89	73	-4.0	10.11	-4	-8
10.09	80	1.4	-5.8	10.11	82	3.0	-4.2	10.11	-4	-7
10.37	10	-	0	10.27	0	-	-10	10.37	0	0
10.27	14	-	0.7	10.27	14	-	0.6	10.27	0	0
10.27	14	136	-	10.27	14	136	-	10.27	0	0
10.10	45	-	-5.7	10.10	45	-	-5.7	10.10	-5	-9
10.10	86	1.6	-5.7	10.10	86	1.6	-5.7	10.10	-5	-9
10.09	93	13	-5.9	10.11	95	15	-4.3	10.11	-4	-8
10.09	100	13	-6.2	10.11	102	15	-4.6	10.11	-4	-8
10.09	108	13	-6.4	10.10	109	14	-4.8	10.10	-5	-9
10.08	113	12	-6.5	10.10	115	14	-4.9	10.10	-5	-8
10.08	123	-	-6.6	10.10	125	-	-4.9	10.10	-5	-8
10.95	9	7.7	0	10.95	9	7.7	0	10.95	0	0

Stage 1 + Temporary Sealing Green Street Inlet

					50%Blockage Existing (100yr1.5h flood)			0%Blockage Existing (100yr1.5h flood)			Max FL (m AHD)
Survey Point	Ground (mAHD)	Floor Level (mAHD)	Street Address	Business Name	Depth over		Depth over		Max FL (m AHD)		
					Flood Level (mAHD)	Ground (cm)	Flood Level (mAHD)	Ground (cm)			
					(a)			(b)			
P300	10.68	11.12	4 Cross St	Rent -A-Space Self Storage	10.78	10	-	10.75	7	-	10.78
P301	9.22	10.12	2 Cross St	Formrite Group	10.15	94	3.3	10.13	92	1.1	10.15
	9.22	9.38	2 Cross St	Formrite Group Loading Dock	10.15	94	77	10.13	92	75	10.15
P302	9.29	10.08	(Cross St)	K Mart Tyre & Auto	10.15	86	7.2	10.13	84	5.1	10.15
P303	10.27	10.45	Cross St	SuperCheap Auto	10.37	10	-	10.37	10	-	10.37
P307	10.13	11.55	20 Green St	AlemLube Office	10.27	14	-	10.27	14	-	10.27
	10.13	8.91	20 Green St	AlemLube Basement Car Park	10.27	14	136	10.27	14	136	10.27
P306	9.65	10.65	24 Green St	Beaurepaires	10.15	50	-	10.13	48	-	10.15
P305	9.24	10.08	26 Green St	K Mart Tyre & Auto	10.15	91	7.3	10.13	89	5.1	10.15
P175	9.16	9.96	28-32 Green St	ALDI Car Park	10.15	99	19	10.14	98	18	10.15
P176	9.09	9.96	28-32 Green St	ALDI Car Park	10.15	106	19	10.14	104	18	10.15
P177	9.01	9.96	28-32 Green St	ALDI Car Park	10.15	114	19	10.14	113	17	10.15
P178	8.95	9.96	28-32 Green St	ALDI Car Park	10.15	120	19	10.14	119	17	10.15
P179	8.85	10.31	28-32 Green St	ALDI Supermarket	10.15	130	-	10.14	128	-	10.15
P304	10.86	10.87	2 Dale St	Northshore & City Towing	10.95	9	7.7	10.95	9	7.7	10.95

Model Run 18 September 2014

Model Run 18 September 2014

100yr1.5h ARI FSR - 50% blocked				100yr1.5h ARI FSR - 0% blocked				Max FL (m AHD)	Max Diff (cm)	Max Diff (cm)
+ Palm Tree Car Park + Temporary Sealing Green St Inlet										
Depth over Flood Level	Ground	Depth over Floor/Car Park	Diff	Depth over Flood Level	Ground	Depth over Floor	Diff			
(mAHD)	(cm)	(cm)	(cm)	(mAHD)	(cm)	(cm)	(cm)			
(c)			(c)-(a)	(d)			(d)-(b)			
10.74	6	-	-4.4	dry	-	-	-			
10.09	87	-	-6.5	10.10	88	-	-5.2	10.10	-5	-9
10.09	87	71	-6.2	10.10	88	72	-4.9	10.10	-5	-9
10.09	80	0.8	-6.4	10.10	81	2.1	-5.1	10.10	-5	-8
10.37	10	-	0	10.37	10	-	0	10.37	0	0
10.27	14	-	0.2	10.27	14	-	0.2	10.27	0	0
10.27	14	136	-	10.27	14	136	-	10.27	0	0
10.09	44	-	-6.4	10.10	45	-	-5.0	10.10	-5	-9
10.09	85	0.9	-6.4	10.10	86	2.3	-5.0	10.10	-5	-9
10.09	93	13	-6.6	10.10	94	14	-5.2	10.10	-5	-9
10.08	99	12	-6.8	10.10	101	14	-5.5	10.10	-5	-9
10.08	107	12	-7.1	10.09	108	13	-5.7	10.09	-6	-10
10.08	113	12	-7.2	10.09	114	13	-5.9	10.09	-6	-9
10.08	123	-	-7.3	10.09	124	-	-5.9	10.09	-6	-9
10.95	9	7.6	0	10.95	9	7.6	0	10.95	0	0