

MEMORANDUM

ADDENDUM TO AURA BROOK FLOOD INVESTIGATION REPORT, REVISION E

18 September 2024

Author(s)	Ashleigh Maynard & Daniel Yates
Entity	Egis Water Resources QLD
Version	A
Reference	18-000340-TM07A_Aura_Brook_Addendum

The following memorandum responds to Item 1 within the Further Issues Letter (DEV2018/987/210) received from Economic Development Queensland on the 29th August 2024, in relation to the Material Change of Use, Reconfiguring a Lot and Operational Work Applications for 167 Bells Creek Road, Bells Creek. Item 1 of the letter specifically refers to a query regarding the *Aura Brook Flood Investigation Report – Revision E* (Report No. 18-000340_FIR.01E.LM.dy.am dated 24th July 2024). It is intended that this technical memorandum forms an addendum to the Aura Brook Flood Investigation Report, Revision E.

The query requested further justifications of how overall reductions in peak flows are achieved in comparison to the previously approved report (Report No. 18-000340_FIR.01D.LM.dy.jh dated 9th March 2021). The memorandum presents comparative catchment parameters between the two report revisions in addition to corresponding peak flow differences at specific reporting locations. Direct correlation has been established between the changed catchment parameters, constriction of the channel cross section and the differences of peak flows.

Similar to the Flood Investigation Report, the following sections refer to peak flow reporting locations as depicted in **Figure 1-1** below.



FIGURE 1-1 - PEAK FLOW REPORTING LOCATIONS

1 CATCHMENT PARAMETERS COMPARISON

Table 1 below summarises the differing catchment delineation and corresponding parameters for Revision E and Revision D reporting. For reference, Catchment Sketch Plans (18-000340-SK3101) previously included within Revision E and Revision D reports are provided within **Attachment A**.

CATCHMENT ID	REV E – CATCHMENT AREA (HA)	REV D – CATCHMENT AREA (HA)	CATCHMENT AREA DIFFERENCE (REV E – REV D) (HA)	REV E – IMPERVIOUS AREA (HA)	REV D – IMPERVIOUS AREA (HA)	IMPERVIOUS AREA DIFFERENCE (REV E – REV D) (HA)
B1	28.71	24.46	4.24	13.349	7.584	5.765
B2A	6.13	6.20	-0.06	5.110	4.959	0.151
B2B	0.85	1.86	-1.02	0.594	1.379	-0.785
B2C¹	3.42	N/A	N/A	2.918	N/A	N/A
B3A²	N/A	7.88	N/A	N/A	6.304	N/A
B3	6.66	6.17	0.49	5.200	4.753	0.447
B4	17.95	17.07	0.88	13.972	13.484	0.488
B5A	6.90	6.61	0.29	5.522	5.290	0.232

B5B	4.10	3.95	0.15	3.277	3.158	0.120
B6A	18.78	19.05	-0.28	14.673	11.814	2.859
B6B	15.32	15.62	-0.31	9.463	9.686	-0.223
B7	10.68	9.91	0.77	8.363	8.123	0.240
B8A	12.51	10.89	1.62	9.613	8.389	1.224
B8B	14.01	14.24	-0.23	7.481	7.690	-0.209
B8C	6.45	5.93	0.52	4.656	4.267	0.389
B9A	4.35	4.32	0.03	3.479	3.457	0.023
B9B	4.83	4.85	-0.01	4.045	4.071	-0.026
B10	12.28	12.33	-0.06	9.251	9.374	-0.123
B11	9.90	10.31	-0.41	0.112	0.619	-0.507
B13	7.39	7.61	-0.22	0.699	0.609	0.090
B15	2.92	2.92	0.00	0.120	0.263	-0.143
B16	3.46	3.46	0.00	0.405	0.485	-0.079
B17	8.57	8.57	0.00	1.087	1.114	-0.027
B18	1.94	1.94	0.00	0.000	0.097	-0.097
TOTAL	208.11	206.17	1.94³	123.39	116.97	6.42³

1 Catchment only within Revision E Report.

2 Catchment only within Revision D Report.

3 Please note these totals are based on the total catchment/imperious areas, not on the difference totals due to the exclusion of Catchments B2C and B3A.

Cumulative catchment areas contributing to each reporting link within the XP-SWMM model are provided in **Table 2** below. The largest difference between the two models is at Link 20, where Catchment B1 now discharges further downstream after Link 20 (into Link 21), thus accounting for the large catchment area difference.

TABLE 2 – CUMULATIVE CATCHMENT AREA COMPARISON

CATCHMENT ID	CULUMULATIVE CATCHMENT AREA – REV E (HA)	CULUMULATIVE CATCHMENT AREA – REV D (HA)	DIFFERENCE OF CUMULATIVE CATCHMENT AREA (REV E – REV D) (HA)
Into Link 20	10.41	32.53	-22.12
Into Link 21	55.68	56.89	-1.22
Into Link 22	84.62	84.52	0.10
Into Link 24	129.39	129.10	0.29
Into Link 44	174.11	172.10	2.01
Into Link 26	194.14	192.20	1.94

Table 3 below details the comparison of the cumulative impervious areas between the XP-SWMM models. In accordance with the cumulative catchment area differences, a reduction of impervious area occurs at Link 20 due to the redirection of Catchment B1 discharge further downstream. As shown, all other reporting links have additional impervious area directed to the corresponding links.

TABLE 3 – CUMULATIVE IMPERVIOUS AREA COMPARISON			
CATCHMENT ID	CULUMULATIVE IMPERVIOUS AREA – REV E (HA)	CULUMULATIVE IMPERVIOUS AREA – REV D (HA)	DIFFERENCE OF CUMULATIVE IMPERVIOUS AREA (REV E – REV D) (HA)
Into Link 20	8.62	13.92	-5.30
Into Link 21	27.170	24.979	2.192
Into Link 22	50.05	47.53	2.525
Into Link 24	82.553	77.152	5.401
Into Link 44	108.48	101.56	6.918
Into Link 26	121.90	115.27	6.626

2 PEAK FLOW COMPARISONS

A peak flow comparison between the two report revisions is provided in **Table 4**. At Link 20, the reduction in peak flows is directly related to the Catchment B1 flow redirection downstream as previously detailed in **Section 1**. Reductions in peak flow are also demonstrated across all storm events at Links 21 and 22. This is explained through a reduced conveyance area within the channel resultant from the removal of the lake which previously fronted Catchment B4 and Catchment B5A. This reduced conveyance area has resulted in reduced peak flow. This has also impacted Link 24 during the 1% AEP plus climate change storm due to larger cumulative reductions as depicted below.

Links 24, 44 and 26 show increased peak flows for all storm events except for the 1% AEP plus climate change. This is directly related to the increase of catchment and impervious area detailed within **Section 1**.

For reference, **Table 5** and **Table 6** below reiterate the peak flows and critical storm analysis reported on within the Revision E and Revision D reports.

TABLE 4 – PEAK FLOW COMPARISON					
ANALYSIS LOCATION	DIFFERENCE OF PEAK FLOWS (REV E – REV D) (m ³ /s)				COMMENT
	39% AEP	18% AEP	1% AEP	1% AEP + CC	
Link 20	-0.829	-1.247	-4.280	-5.773	Catchment B1 enters the Brook further downstream within the Rev E model.
Link 21	-0.675	-1.185	-1.558	-2.825	Less conveyance area due to removal of lake fronting Catchment B4.
Link 22	-2.473	-3.336	-3.063	-4.790	Less conveyance area due to removal of lake fronting Catchment B4.
Link 24	0.507	1.305	0.459	-3.226	Additional impervious area. Catchment response to narrower channel (cumulative reductions impacting 1% AEP + CC).
Link 44	1.765	3.891	5.161	5.322	Additional catchment and impervious area. Larger culvert configuration.
Link 26	0.491	1.756	0.876	-0.904	Additional catchment and impervious area. Negligible change.

TABLE 5 – CRITICAL STORM BY ANALYSIS LOCATION - REVISION E REPORT								
ANALYSIS LOCATION	39% AEP		18% AEP		1% AEP		1% AEP + CC	
	CRITICAL STORM	PEAK FLOW	CRITICAL STORM	PEAK FLOW	CRITICAL STORM	PEAK FLOW	CRITICAL STORM	PEAK FLOW
Link 20	10 min	2.641	15 min	3.253	10 min	4.731	15 min	6.034
	TP 1		TP 6		TP 6		TP9	
Link 21	30 min	6.065	30 min	7.395	25 min	12.340	25 min	14.862
	TP 9		TP 5		TP 9		TP 4	
Link 22	30 min	10.057	15 min	11.914	25 min	20.612	25 min	24.488
	TP 9		TP 1		TP 4		TP 4	
Link 24	30 min	13.637	30 min	17.165	45 min	30.725	45 min	34.550
	TP 7		TP 9		TP 6		TP 2	
Link 44	30 min	15.015	1 hr	20.881	45 min	36.365	30 min	42.273
	TP 5		TP 9		TP 2		TP 8	
Link 26	1 hr	14.081	1 hr	18.946	1.5 hr	32.819	1.5 hr	37.753
	TP 4		TP 7		TP 5		TP 5	

TABLE 6 – CRITICAL STORM BY ANALYSIS LOCATION – REVISION D REPORT

ANALYSIS LOCATION	39% AEP		18% AEP		1% AEP		1% AEP + CC	
	CRITICAL STORM	PEAK FLOW	CRITICAL STORM	PEAK FLOW	CRITICAL STORM	PEAK FLOW	CRITICAL STORM	PEAK FLOW
Link 20	15 min	3.47	30 min	4.5	30 min	9.011	30 min	11.807
	TP 6		TP 6		TP 1		TP 7	
Link 21	15 min	6.74	30 min	8.58	45 min	13.898	30 min	17.687
	TP 7		TP 10		TP 5		TP 8	
Link 22	15 min	12.53	15 min	15.25	25 min	23.675	25 min	29.278
	TP 5		TP 5		TP 8		TP 5	
Link 24	30 min	13.13	30 min	15.86	1 hr	30.266	45 min	37.776
	TP 5		TP 5		TP 3		TP 6	
Link 44	30 min	13.25	3 hr	16.99	1.5 hr	31.204	1.5 hr	36.951
	TP 7		TP 9		TP 6		TP 6	
Link 26	45 min	13.59	3 hr	17.19	1.5 hr	31.943	2 hr	38.657
	TP 1		TP 2		TP 6		TP 6	

3 CONCLUSION

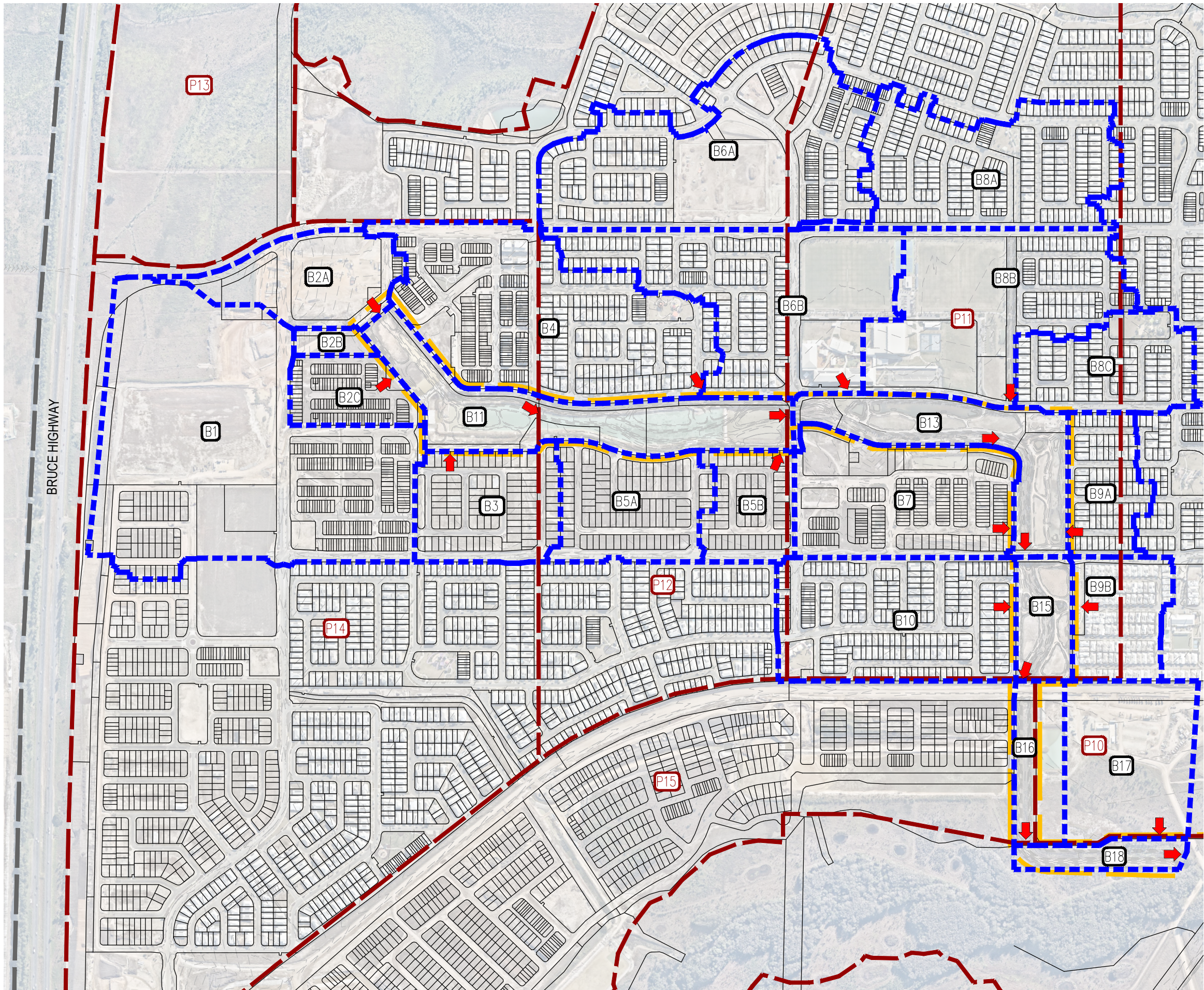
Through the comparisons provided herein, it is concluded that the differences in reported peak flows between the Aura Brook Flood Investigation Report Revision E and D are adequately justified.

If you have any queries or require further elaboration, please contact the undersigned.

Daniel Yates

Associate Engineer / RPEQ – Water Resources QLD

ATTACHMENT A: CATCHMENT SKETCH PLANS



CATCHMENT DATA TABLE		
CATCHMENT	AREA (ha)	% IMPERVIOUS
B1	28.71	47%
B2A	6.13	83%
B2B	0.85	70%
B2C	3.42	85%
B3	6.66	78%
B4	17.95	78%
B5A	6.90	80%
B5B	4.10	80%
B6A	18.78	78%
B6B	15.32	62%
B7	10.68	78%
B8A	12.51	77%
B8B	14.01	53%
B8C	6.45	72%
B9A	4.35	80%
B9B	4.83	84%
B10	12.28	75%
B11	9.90	1%
B13	7.39	9%
B15	2.92	4%
B16	3.46	12%
B17	8.57	13%
B18	1.94	0%
TOTAL	208.11	-

LEGEND:

- BROOK BOUNDARY
- LOT BOUNDARY
- CADASTRE
- DEVELOPED CONTOURS (0.5m)
- DEVELOPED CATCHMENT BOUNDARY
- PRECINCT BOUNDARY
- A

DEVELOPED CATCHMENT LABEL
- A

PRECINCT LABEL
- DISCHARGE DIRECTIONS

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH EGIS REPORT 18-000340_FIR.01E DATED JULY 2024.
2. ALL INFORMATION PRESENTED ON THIS DRAWING IS CONCEPT ONLY AND TO BE CONFIRMED FOR SUBSEQUENT DETAILED DESIGN.
3. THE HYDRAULIC CONFIGURATIONS PRESENTED HEREIN REPRESENT THE 2D FLOOD MODEL CONFIGURATION AND DO NOT CAPTURE MINOR CHANGES TO THE LOT LAYOUT AND CULVERT DETAILS WHICH HAVE OCCURRED.

INITIAL	DES	DRN	CHK	APP	DATE	AMENDMENT DETAILS		STATUS		SCALE	
	MP	DMP			23.11.18			PRELIMINARY		1:4,000 40 0 40 80 120 160 200 A1	
B	DY	DC			04.03.21	UPDATED DRAWING NOTES		APPROVED		1:8,000	
								BY:		RPEQ NO:	
								SIGN:		DATE:	

STATUS	
PRELIMINARY	
APPROVED	
BY:	RPEQ NO:
SIGN:	DATE:

SCALE	
1:4,000 40 0 40 80 120 160 200 A1	
1:8,000	



CLIENT
STOCKLAND DEVELOPMENTS PTY LTD
Stockland AURA

PROJECT
AURA BROOK - NORTH CENTRAL LOCALITY PRECINCTS 11 & 12

DRAWING TITLE		
AURA BROOK CATCHMENT PLAN		
PROJECT No.	DRAWING No.	REVISION
18-000340	SK3101	B

