Review of Stormwater Works

Blacktown Contributions Plan No. 22W (Rouse Hill)

59918190

section 94

Prepared for

IPART

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Cardno

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1 Introduction

Cardno (NSW/ACT) Pty Ltd (Cardno) was engaged by the Independent Pricing and Regulatory Tribunal (IPART) to undertake a review of the stormwater items contained in Draft Section 94 Contributions Plan No. 22W – Rouse Hill (Works) (CP22), prepared by Blacktown City Council (BCC).

1.1 Objectives

The objectives of this review included assessing whether:

1. the proposed stormwater works are reasonable in terms of nexus (the stormwater works are required because of demand created by development in the precincts of Area 20 and Riverstone East);
2. the proposed costs of stormwater works are reasonable, and if the costs are not reasonable, recommend alternative costs; and
3. the apportionment of stormwater costs to development both within the precincts and outside the precincts is reasonable, and if the apportionment approach is not reasonable, recommend a reasonable approach.

This review has been guided by the Local Infrastructure Contributions – Practice Note (Department of Planning, January 2018) and will inform IPART's assessment of stormwater works in CP22 against criteria 2, 3 and 5 of the Practice Note (nexus, reasonable cost and apportionment).

1.2 Location

CP22 applies to land within the Area 20 Precinct and Riverstone East Precinct within the North West Priority Growth Area.

CP22 covers works within three catchments (refer **Figure 1-1**):

- First Ponds Creek
- Second Ponds Creek
- Killarney Chain of Ponds Creek.

It is noted that planning within the Killarney Chain of Ponds Creek catchment and also within part of the First Ponds Creek catchment (to the north of Garfield Road East) has not been finalised and hence review of items in this area are generally considered to be preliminary.

Figure 1-1 Catchments Referenced Within CP22 (extract from BCC CP22)

1.3 Data

The following reports and data have been provided to inform this review:

Contributions Plan

- Draft Section 94 Contributions Plan No. 22W – Rouse Hill (Works), Blacktown City Council
- Spreadsheet Summary of CP22: "*CP 22 Works Rouse Hill - 2018 Adoption.xlsx*", Blacktown City Council

Precinct Planning Technical Reports

Area 20

- Area 20 Precinct, Rouse Hill - Water Cycle Management Strategy Report Incorporating Water Sensitive Urban Design Techniques, Issue D (J. Wyndham Prince, October 2010)
- Area 20 Precinct, Rouse Hill - Water Cycle Management Strategy Report Incorporating Water Sensitive Urban Design Techniques, Issue F (J. Wyndham Prince, July 2011)

Riverstone East

- Riverstone East - Water Cycle Management Report, Revision F (Mott MacDonald, April 2015)
- Riverstone East – Water Cycle Management Report, Revision G (Mott MacDonald, May 2016)
- Riverstone East – Infrastructure Precinct Planning Report, Revision E (Mott MacDonald, March 2015)

Blacktown City Council Technical Data

- File Note: Riverstone East Stormwater Quality Modelling (Blacktown City Council, 24 September 2018)
- MUSIC model file: "*Riverstone East.sqz*" (Blacktown City Council, 24 September 2018)
- Riverstone East Stages 1 & 2 , CP 22W Concept Drainage Design (Blacktown City Council, 24 September 2018)

2 Nexus Review

The objective of this component of the review is to assess whether the proposed stormwater works are reasonable in terms of nexus (ie. the stormwater works are required because of demand created by development in the precincts of Area 20 and Riverstone East).

In assessing the nexus, this review has considered whether the proposed stormwater works are required to meet, but not exceed, the demand created by proposed development in the Area 20 and Riverstone East precincts.

2.1 Methodology

In assessing the nexus, we have initially assumed the precinct planning technical reports, which have been through various reviews and a public exhibition process, are technically sound and also that the stormwater management criteria documented within them are appropriate.

BCC has also undertaken revised stormwater quality modelling and concept design for Riverstone East due to issues that they identified following rezoning (eg; insufficient land to fit the proposed devices in some locations due to site constraints). We have therefore undertaken a review of the data provided by BCC (refer **Section 1.3)**.

The focus of this review is on whether any deviations that CP22 proposes from the technical reports are reasonable, including whether the additional stormwater quality modelling and concept design is reasonable.

Stormwater infrastructure has been grouped in CP22 into the following categories and our review uses the same categories:

1. Raingardens (bioretention systems)
2. Gross Pollutant Traps (GPTs)
3. Detention Basins
4. Channels
5. Culverts

2.2 Sizing Review

A summary of the review in relation to sizing is included in the following sections.

2.2.1 Raingardens

There are two main types of raingardens:

1. Embedded (within a detention basin)
2. Standalone

Table 2-1 provides a summary of standalone raingardens only. Embedded raingardens are included with detention basins.

For Second Ponds Creek, the raingarden sizes in CP22 were found to be consistent with the technical report and therefore have not been reviewed further.

For First Ponds Creek and Killarney Chain of Ponds Creek there were a number of significant differences between CP22 and the technical report as shown in **Table 2-1**. We note that CP22 also reported a significant difference between the 'plan' areas and 'report' areas within the technical report for raingardens (refer table within Section 2.3 of CP22). From our review, it appears this inconsistency relates to Revision F (April 2015)

of the technical report, rather than the more recent Revision G (May 2016). The Revision G report was found to have consistent values for area in the 'plan' and 'report'. The Revision G values are compared with CP22 values in **Table 2-1**.

For First Ponds Creek, **Table 2-1** shows there are significant changes in size for a number of raingardens (eg; F39.2) and overall there is a 14% increase in total filter area. For Killarney Chain of Ponds Creek, a similar increase is noted (approx. 16%) in total CP22 raingarden areas relative to the technical report areas.

Table 2-1 First Ponds Creek and Killarney Chain of Ponds - Raingardens Comparison

CP22 Name	CP22 Filter Area (m^2)	Technical Report Name	Technical Report Filter Area (m^2)	Difference (m^2)
F40.1	1,900	M1A/M10A	1,520	380
F39.2	8,000	M2A/B	5,500	2,500
F30.2	1,236	M3A	1,400	-44
F31.2	120			
F32.2	1,923	M4A	1,400	523
F33.1	1,152	M4B	800	352
F35.2	2,520	M4C/D	3,2000	-680
F36.2	3,642	M4E/F	3,550	92
F37.1	3,776	M5B	8,000	-108
F37.5	4,116	M5A		
F37.9	629	-	-	629
First Ponds Creek Total	***29,015***		***25,370***	***3,645***
K6.3	3600	M7A/B	3000	600
K5.3	8700	M6A/B/C	5,200	5,700
K3.1	2154	M8A/B/C/D	1350	804
K1.2	1850	M9A/B	4500	-2,650
Killarney Chain of Ponds Total	***16,304***		***14,050***	***2,254***

Justification for the increase in filter area is provided in Riverstone East Stormwater Quality Modelling (Blacktown City Council, 24 September 2018). In a number of instances, the filter area has been reduced (eg; F35.2 and K1.2) due to insufficient SP2 zoned land once constraints such as constructability, maintenance, flooding and site topography are considered. This then requires other raingardens to be oversized to compensate (eg; F39.2 and K5.3). When stormwater treatment is offset in different catchments, this is generally less efficient and would be expected to result in a net increase in filter area.

The stormwater quality modelling undertaken by BCC (in accordance with BCC MUSIC modelling guidelines) demonstrates that the overall system is meeting, but not exceeding, the targets and hence the overall sizing is considered to be reasonable (refer **Table 2-2**). We note that a system achieving a result within 1-2% of the target, as is the case for Total Suspended Solids (TSS), is considered to simply be meeting the targets as

stormwater quality models, especially at this stage in the design process, are rarely refined beyond this level. Also, in order to achieve the target for one pollutant, it is common to exceed the target for one or both of the other pollutants, as is the case here where TSS is meeting the target, but Total Nitrogen (TN) significantly exceeds the target.

Table 2-2 Stormwater Quality Reduction Targets and Modelled System Performance

Pollutant	Target*	BCC MUSIC Model
Total Suspended Solids (TSS)	85%	86%
Total Phosphorus (TP)	65%	68%
Total Nitrogen (TN)	45%	55%

**Targets are the percentage reduction in average annual pollutant loads relative to the proposed development without any treatment measures*

2.2.2 Gross Pollutant Traps

The approach adopted by both the technical report and CP22, to provide GPTs at inlets to all bioretention systems and for areas that are unable to discharge to bioretention systems, is standard industry practice and is considered reasonable. The proposed units are all 'Rocla CDS' and the sizing has been reviewed relative to the upstream catchment area.

We note that F32.6 is nominated as being 'at inlet to bioretention', however it appears it should be 'at inlet to channel'. Regardless, a GPT at this location is considered reasonable.

Checks of the proposed GPT sizes against the nominated catchment areas were undertaken against the indicative sizing table provided in Council's spreadsheet. In many instances in the First Ponds Creek and Killarney Chain of Ponds Creek catchments it was found that the nominated GPT was larger than that indicated in the sizing table. For example, in the First Ponds Creek catchment, GPT's F35.3 and F36.3 have nominal catchment areas of approximately 29.3 ha and 33.7 ha respectively. Council's table suggests that a CDS 2028 would be appropriate, being suitable for a catchment of up to 44 ha. However, a CDS 3024 has been proposed, which is suitable for catchment areas of 45 to 68 ha. A summary of all GPT's in these catchments is provided in **Table 2-3 (**values in **bold** represent differences). In the Second Ponds Creek catchment the GPT's were found to be in accordance with the indicative sizing table.

In discussions with Council, they indicated that in the Riverstone East precinct, in addition to increasing the total filter area, a further measure required to offset the inefficiency of the revised system was to incorporate larger GPT's. While it is not ideal to increase GPT sizes, in this instance it is considered reasonable, in particular because TSS was found to be the limiting pollutant and GPT's are most suited to removing TSS (rather than TP or TN). As discussed previously, the modelling has demonstrated the overall system is simply meeting, not exceeding, targets (refer **Section 2.2.1**).

Table 2-3 Gross Pollutant Trap Sizing for First Ponds Creek and Killarney Chain of Ponds Creek

CP22 Name	Approx. Catchment Area (ha)[1]	CP22 GPT Model No.	GPT Model No. Based on Sizing Table
F37.11	17.9	CDS-2018	CDS-2018
F37.10	4.0	CDS-1012	CDS-1012
F37.6	30.4	**CDS-3024**	**CDS-2028**
F37.2	24.6	**CDS-2028**	**CDS-2018**
F36.3	29.3	**CDS-3024**	**CDS-2028**
F35.3	33.7	**CDS-3024**	**CDS-2028**
F32.6	16.6	CDS-2018	CDS-2018

F33.2	11.17	**CDS-2018**	**CDS-1518**
F32.3	8.22	**CDS-1518**	**CDS-1512**
F31.3	2.7	CDS-1012	CDS-1012
F30.3	4.3	**CDS-1512**	**CDS-1012**
F39.9	15.4	**CDS-2018**	**CDS-1518**
F39.8	11.2	**CDS-2018**	**CDS-1518**
F39.10	43.0	**CDS-3024**	**CDS-2028**
F39.3	70.0	CDS-3030	CDS-3030
F40.2	16.5	CDS-2018	CDS-2018
K1.3	31.5	**CDS-3024**	**CDS-2028**
K2.1	1.7[2]	CDS-2028	CDS-1009
K3.2	21.5	**CDS-2028**	**CDS-2018**
K4.1	4.0	CDS-1512	CDS-1012
K5.4	13.0	**CDS-2018**	**CDS-1518**
K5.5	11.1	**CDS-2018**	**CDS-1518**
K5.6	20.7	**CDS-2028**	**CDS-2018**
K5.7	28.0	**CDS-2028**	**CDS-2018**
K6.4	32.0	CDS-3024	**CDS-2028**

[1] From BCC CP22 spreadsheet
[2] Assume there is an error in the catchment area

2.2.3 Detention Basins

Detention basins are proposed for First Ponds Creek and Killarney Chain of Ponds Creek only (Second Ponds Creek is serviced by Sydney Water trunk drainage infrastructure and does not require additional detention basins).

Table 2-4 provides a summary of volumes for the proposed detention basins.

For First Ponds Creek it is noted that there is a significant overall reduction in detention basin volume. As noted in CP22, this is largely due to the provision of detention as part of the Sydney Metro North West project. The increase in volume of F39.1 (Basin 3) is assumed to partly offset the removal of Basin 1 with the remainder of Basin 1 volume being a result of the Sydney Metro North West basin.

For Killarney Chain of Ponds Creek, there is a 38% increase in CP22 detention volumes relative to the technical report volumes. With limited details of the proposed development and associated stormwater infrastructure in the Killarney Chain of Ponds catchment, it isn't possible to assess whether these changes in size are reasonable. If there has been a significant increase in the proposed impervious area (eg; parkland has been replaced by residential development) during the planning process then this would likely explain the increase in detention volume. The total cost of detention basins in Killarney Chain of Ponds Creek is approximately $17.7m. Nominally reducing this by 38% would result in a reduction in cost of approximately $6.7m (including design and contingency).

Table 2-4 First Ponds Creek and Killarney Chain of Ponds – Detention Basin Comparison

CP22 Name	CP22 Storage Volume (m^3)	Technical Report Name	Technical Report Storage Volume (m^3)	Difference (m^3)
-	-	Basin 1*	35,650	-35,650
F1.1	35,322	Basin 2	33,750	1,572
F39.1	44,256	Basin 3	25,750	18,506
First Ponds Creek Total	***79,578***		***95,150***	***-15,572***
K1.5	7,565	Basin 4	4,800	2,765
K5.2	28,289	Basin 5	21,400	6,889
K6.2	22,536	Basin 6	18,500	4,036
K3.4	9,689	Basin 7	4,800	4,889
Killarney Chain of Ponds Total	***68,079***		***49,500***	***18,579***

* No longer required due to detention provided as part of Sydney Metro North West project and also offset in other areas

2.2.4 Channels

For Second Ponds Creek, the channel sizes in CP22 were found to be consistent with the technical report with the following exceptions:

- S2.3 was nominated in the technical report as an open channel within a drainage reserve. The final ILP for this area no longer includes a drainage reserve at this location (it has been replaced with low density residential) and therefore replacement of this channel with a culvert is considered reasonable.
- S1.1 was nominated in the technical report as an open channel. The final ILP for this area includes a road which wasn't included when the technical report was prepared. Culverts at this location are considered reasonable.
- S9.3, which is nominated as a trunk drainage line and overland flowpath, was not included in the technical report. However, a trunk drainage line at this location appears to be appropriate to convey flows through the park, rather than through the potential school site to the south.

For First Ponds Creek, the length of channels wasn't explicitly included in the technical report so a direct comparison with the values applied by Council is not possible. However, a visual inspection of the channels shown on the *Proposed Creek Re-Alignment and Detention Strategy Plan* (refer Appendix A of Riverstone East Water Cycle Management Report) generally align with those included in CP22 and are considered to be reasonable.

To check the length of channels included in Council's spreadsheet, a review was undertaken by measuring channel lengths in *CP 22W Concept Drainage Design* drawings. This review found that the values in Council's spreadsheet, in some instances, are considerably different to the values in the concept design drawings. For example, F32.5 is nominated as being 154 m long by Council, but the concept design drawings give a total length of almost 315 m. A summary of the length comparisons is included in **Table 2-5**.

Table 2-5 First Ponds Creek – Indicative Channel Length Comparison

CP22 Name	CP22 Length (m)	Concept Design Drawing Length (m)	Difference (m)
F32.5	154	315	-161
F32.1	60	57	3
F36.1	176	170	6
F37.4	170	295	-125
F37.8	513	400	113
F38.1	500	500	0

We note that F38.1 and F31.1 are new channels in CP22 (ie. not included in the technical report). CP22 provides an explanation for needing F38.1, where the existing riparian corridor is required to be upgraded to accommodate the rezoning associated with an existing religious facility. We assume F31.1, which is only a short length of channel, is required to connect the trunk drainage system to First Ponds Creek. These deviations are considered reasonable.

Overall, the net difference in channel lengths in the First Ponds Creek catchment is 164 m less in CP22 than the concept design drawings. Applying a rate of approximately $6,000 /m of channel (including design and contingency), if the total channel length in CP22 was increased by 164 m this would result costs increasing by approximately $984,000.

2.2.5 Culverts

The culvert sizing and justification for additional culverts nominated in CP22 appear to be reasonable when compared to the technical report. Lengths of culverts provided in Council's spreadsheet also appear to be reasonable in the First Ponds Creek catchment.

For F39.7, we note there was an inconsistency in sizing between the table with the CP22 report body (2400 x 1200 culvert) and the spreadsheet data (3000 x 1200 culvert). The 3000 x 1200 culvert has been used for costing purposes and we consider this to be a reasonable replacement for 3 x 1050 diameter culverts.

Additional culverts in the First Ponds Creek catchment have been nominated as:

- F34.1 Riverstone Road Crossing – Riverstone Road was not previously proposed to cross the creek, however the current ILP includes this crossing and therefore the culvert is required.
- F38.2 Gordon Road – Gordon Road was not previously proposed to cross the creek, however the current ILP includes this crossing and therefore the culvert is required.
- F33.3 Clarke St Bioretention – the culvert at this location is shown discharging under Clarke Street into the proposed bioretention system and is considered reasonable.
- F30.4 Garfield Road East – this falls within the northern area of the catchment that is still subject to planning and it therefore isn't possible to assess whether it is reasonable.

Additional culverts in the Killarney Chain of Ponds Creek catchment have been nominated as K1.4, K2.2, K3.3 and K6.6. With limited details of the proposed development and associated stormwater infrastructure in the Killarney Chain of Ponds Creek catchment, it isn't possible to assess whether these additional culverts are reasonable. If these additional culverts were removed from CP22, the reduction in cost would be approximately $2.0m (including design and contingency).

2.3 Findings

1. Raingardens – given the overall raingarden area for Second Ponds Creek is the same as the technical reports, the overall sizing of these items is considered reasonable.

2. Raingardens – the sizing of raingardens for First Ponds Creek and Killarney Chain of Ponds Creek catchment are significantly larger in CP22 than in the technical reports. However, modelling provided by BCC demonstrates that overall the system meets, and does not exceed, the relevant targets. This deviation is therefore considered reasonable.
3. GPTs – the number of GPT's was found to be reasonable. While the sizing in many instances was found to be outside typical ranges, modelling provided by BCC demonstrates that overall the system meets, and does not exceed, the relevant targets. This deviation is therefore considered reasonable.
4. Detention Basins – the detention volumes in First Ponds Creek and Second Ponds Creek are considered to be reasonable.
5. Detention Basins – it is unclear why the detention basins for Killarney Chain of Ponds Creek are significantly larger in CP22 than in the technical report. This deviation is considered unreasonable without further justification. If the detention basins are reduced to the sizes nominated in the technical report, this is expected to reduce costs by approximately $6.7m.
6. Channels – there are some significant differences in channel lengths between CP22 and concept design drawings. These should be updated to be consistent. If the changes were made in line with the investigations noted above, this would result in an increase in cost of approximately $984,000.
7. Culverts – culvert sizing and deviations from the technical report are generally considered to be reasonable. With limited details of the proposed development and associated stormwater infrastructure in the Killarney Chain of Ponds catchment, it isn't possible to assess whether additional culverts are reasonable. If these additional culverts were removed from CP22, the reduction in cost would be approximately $2.0m.

3 Costs Review

3.1 Methodology

An initial review of costing was undertaken by comparing costs contained in CP22 with costs in CP21. A spreadsheet was prepared to allow the comparative assessment of unit rates for various stormwater management measures. Data from each of the contributions plans was entered to enable a 'first pass' review of each item and it is recognised that there may be many site specific reasons why costs are different.

Subsequent to this and following identification of significant differences, details of a number of costing parameters which had a significant impact on total costs was undertaken.

3.2 Comparison with other Contribution Plans

3.2.1 Raingardens

The average cost of raingardens was compared on a 'per m^2 of filter area' basis and the results are shown in **Figure 3-1**. This shows that the costs for raingardens are significantly higher in CP22 relative to CP21.

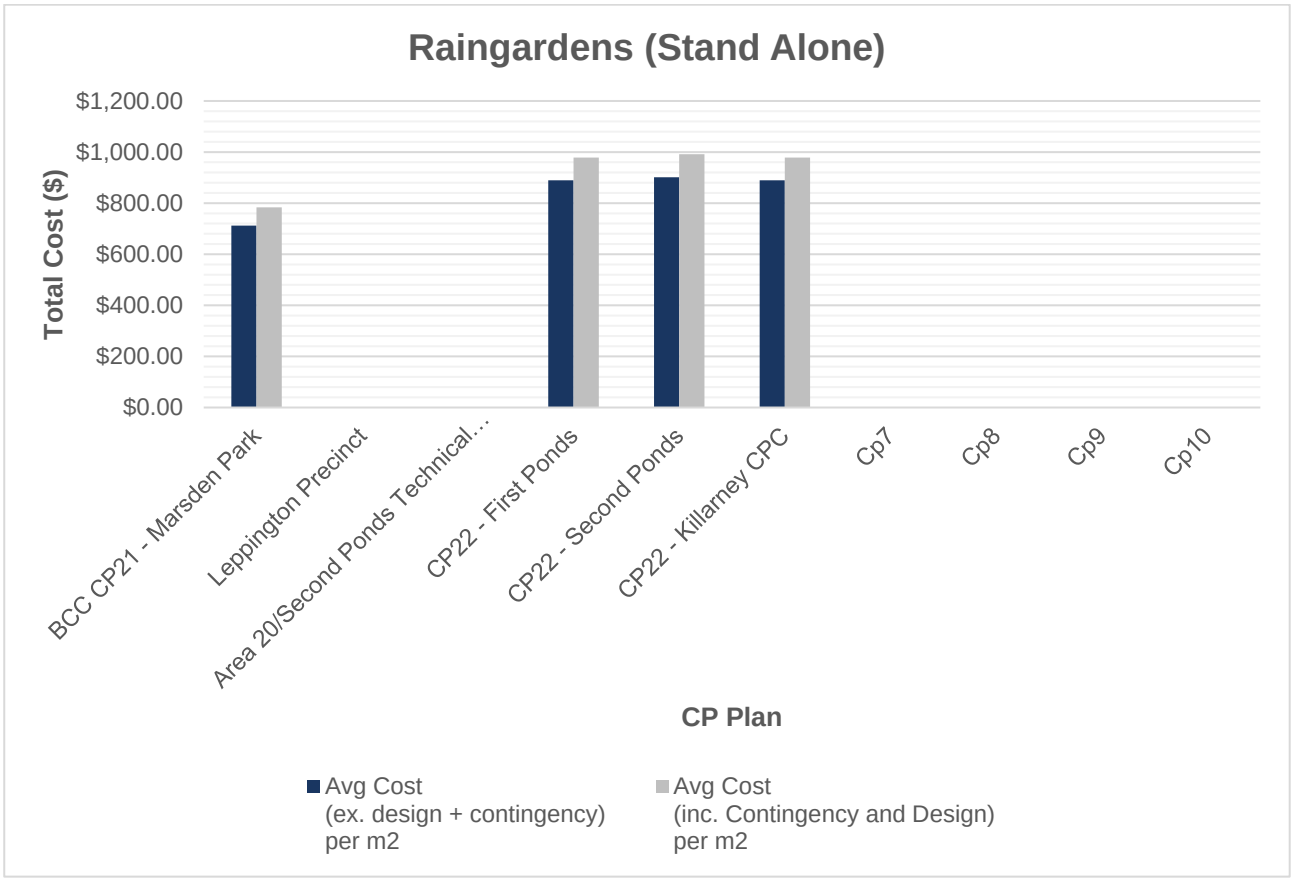

Figure 3-1 Comparison of Raingarden Costs

3.2.2 Gross Pollutant Traps

The total cost of GPTs was compared on a 'per hectare of catchment' basis was undertaken and the results are shown in **Figure 3-2**. This shows that the costs for GPT's are significantly higher in CP22 relative to CP21.

The greater relative cost is likely due to:

- the GPT units specified are generally larger than required (refer **Section 2**); and
- There has been a significant difference in the cost rates applied from CP21 to CP22 (approximately 15-20% increase for most units).

The increase in GPT unit sizes has been justified (refer **Section 2.2.2**), however the increased cost rates appears to be unreasonable. For a total GPT cost of approximately $8.9m (including design and contingency), reducing the unit rates by 15% would reduce the total cost by approximately $1.3m.

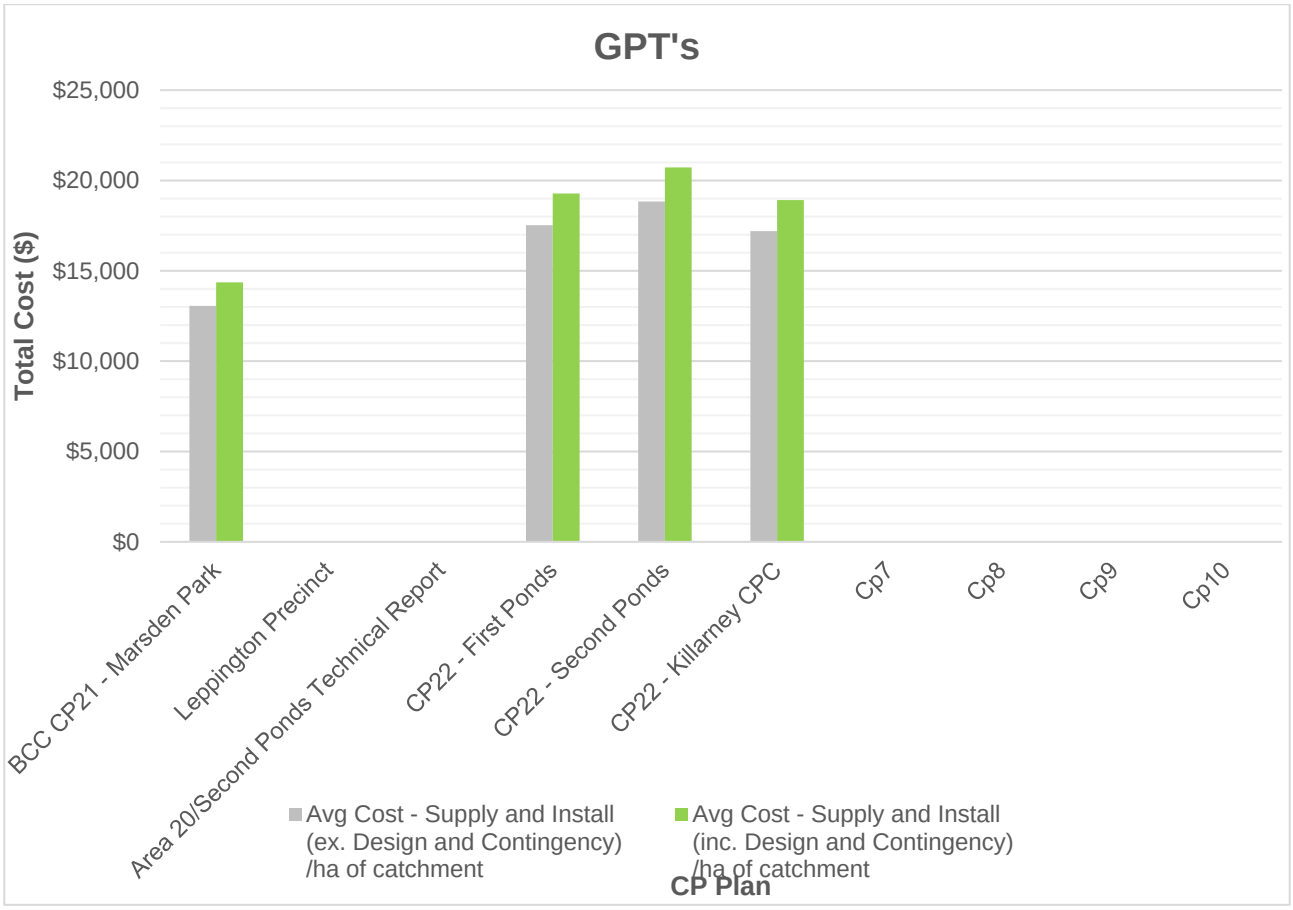

Figure 3-2 Comparison of GPT Costs

3.2.3 Detention Basins

The average cost of detention basins was compared on a 'per m2 of overall site area' basis and the results are shown in **Figure 3-2**. This shows that the costs of detention basins in First Ponds Creek are comparable to CP21, however in Killarney Chain of Ponds Creek the costs are significantly higher. It is noted however that there is only a small number of detention basins

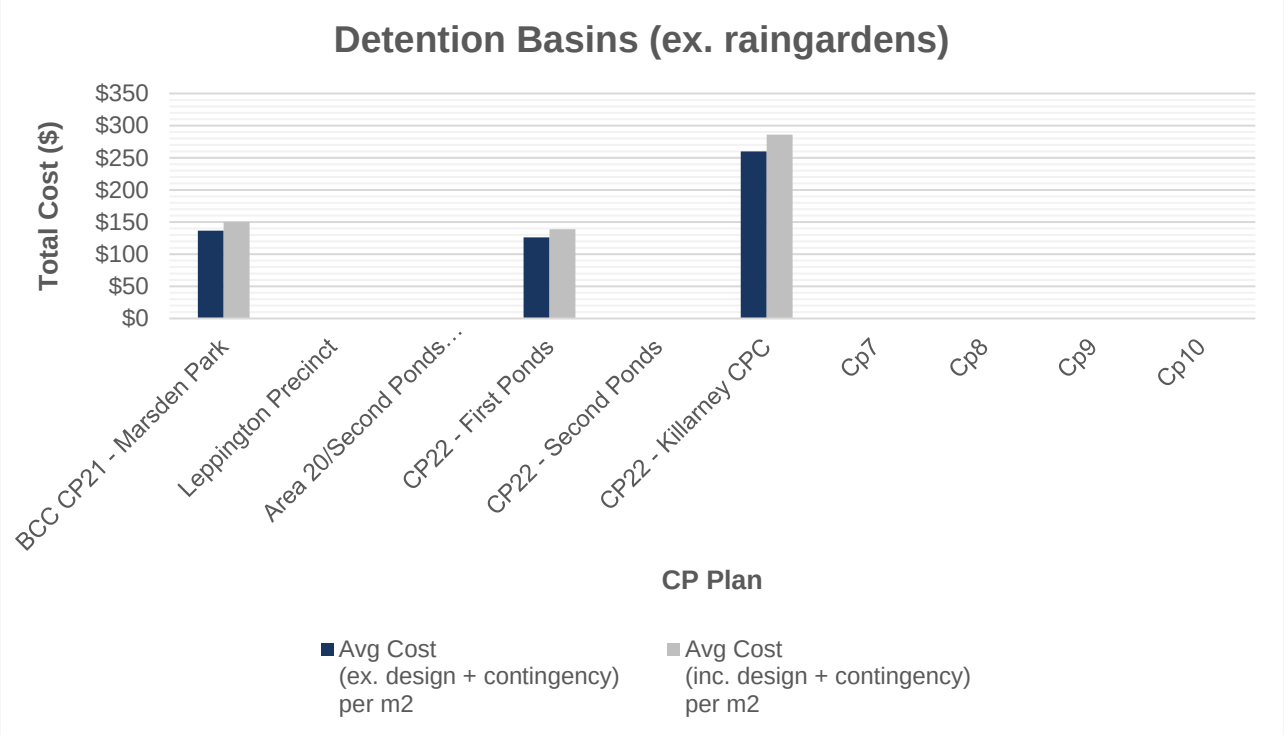

Table 3-1 Comparison of Detention Basin Costs

3.2.4 Channels

The average cost of channel was compared on a 'per m^2 of total surface area' basis and the results are shown in **Figure 3-3**. This shows that the costs of channels in First Ponds Creek and Killarney Chain of Ponds Creek are significantly higher than CP21. There are only two channels in Second Ponds Creek so there is limited value in this comparison.

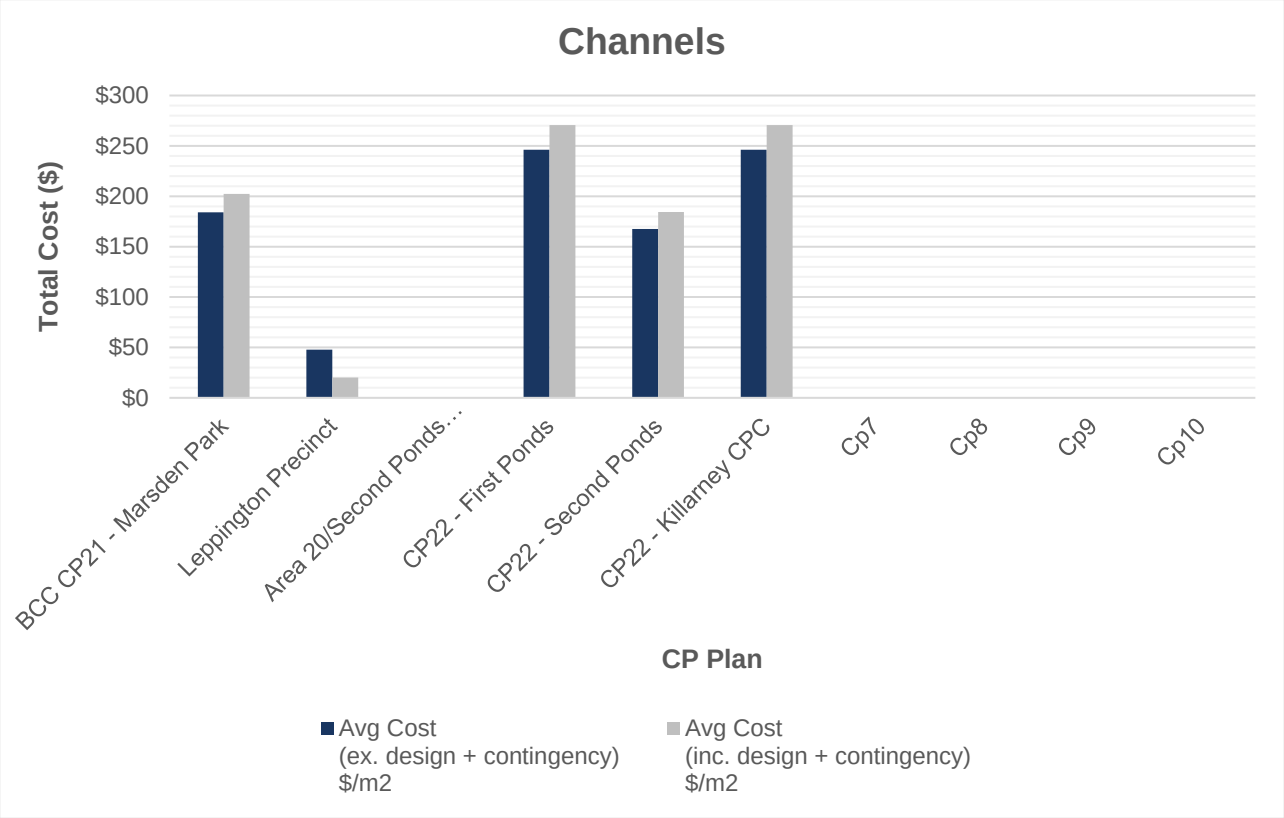

Figure 3-3 Comparison of Channel Costs

3.2.5 Culverts

The average cost of culverts was compared on a 'per m of culvert length' basis and the results are shown in **Figure 3-4**. This shows that the costs of channels in Second Ponds Creek are similar to CP21, however First Ponds Creek costs are higher and Killarney Chain of Ponds are significantly higher.

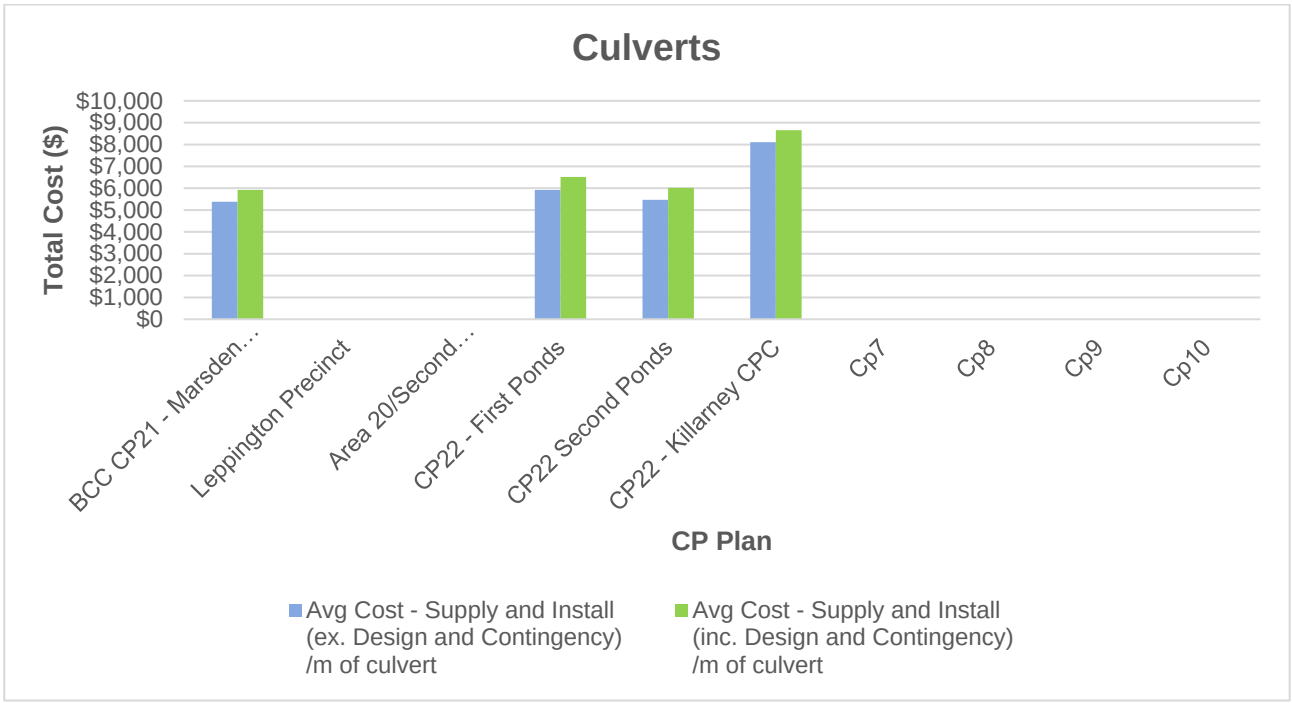

Figure 3-4 Comparison of Culvert Costs

3.3 Review of Cost Parameters

3.3.1 Costing Spreadsheet Setup

An initial note in relation to reviewing the cost parameters is that this process was difficult due to a number of different costing templates being used across the various items and areas. It would be preferred if a consistent costing methodology and format was applied across all items and areas, including references to the source of all cost rates.

3.3.2 Materials Excavation and Disposal

The most significant cost parameters relate to managing excavated materials. Excavated materials have been divided into:

- Virgin Excavated Natural Material (VENM)
- Contaminated Waste
- Asbestos Waste

The total costs for managing excavated material are sensitive to the:

- Total volume of excavated material
- Assumed proportion of each type of material (eg; 80% VENM, 18% Contaminated Waste, 2% Asbestos Waste)
- Location for disposal of each type of material (ie. waste management facility or other construction site)
- Cost rates for disposal.

Without undertaking a detailed review of the designs, the total volumes of excavated material generally seem reasonable for the size of the proposed facilities.

Recognising that every site will have different levels of contamination and the need/ability to reuse excavated materials on-site, the assumed proportion of materials of various types doesn't seem unreasonable. However, contaminated material excavation and disposal also typically represents the single largest cost for many items. For example, for most of the raingardens this represents greater than 25% of the total cost. Given this is so significant, it is recommended that a site specific estimate be used, which could be based on preliminary contamination investigations undertaken as part of the rezoning process and/or other information where available. If there are instances where unexpected contamination is found, this could be addressed through future revisions of the contributions plan.

In relation to cost rates, we have compared the rates applied to First Ponds Creek/Killarney Chain of Ponds Creek and Second Ponds Creek for some of the significant cost items and have found some differences (refer **Table 3-2**). For example, in First Ponds Creek disposal of VENM has a rate of \$70 /m^3 (assumed to include excavation, cartage and tip fees), while in Second Ponds Creek a rate of \$86.49 /m^3 has been applied (by adding tip fees, cartage and excavation). While both of these rates fall within the range nominated in Rawlinsons 2018 (\$0 – \$105 /m^3) and hence are considered reasonable, unless there are site specific reasons for the differences then they should be updated to a consistent value. Assuming the adopted rate is somewhere between the two rates currently used then this would have a negligible impact on total cost.

Disposal rates for contaminated waste and mixed waste were found to be closer (refer **Table 3-2**), however when undertaking a first principles cost estimate for contaminated waste disposal using Rawlinsons 2018, the estimate for excavation and disposal of contaminated waste was \$310 – \$430 /m^3. A rate of approximately \$400 /m^3 is therefore considered reasonable.

For excavation and disposal of mixed waste, the cost rates are only slightly less (approximately \$10 /m^3) than an estimate derived from Rawlinsons 2018. These rates are therefore considered to be reasonable.

Table 3-2 Comparison of Cost Rates Between Catchments

Cost Item	First Ponds Creek and Killarney Chain of Ponds Creek	Second Ponds Creek[1]	Rawlinsons 2018[1]
Disposal of Surplus VENM ($/m^3)	70	86.49	0 – 105
Excavate and Dispose of Contaminated/Asbestos Waste ($/m^3)	468.74[2]	478.89[3]	20 – 30 (excavate) + 10 (cartage) + 280 – 390 (tip fees) = **310 – 430 (total)**
Excavate and Disposal of Mixed Soil/Waste ($/m^3)[3]	328.88[2]	333.70[3]	340-350

[1] An assumed density of 1.8t/m3 has been used to convert $/t to $/m3.
[2] Assumed to include excavation, cartage and tip fees
[3] Calculated from tip fees + cartage x 20km + Bulk cut

There are also some inconsistencies between the different items within a particular catchment. For example, the rate applied for excavation of clay in First Ponds Creek varied from $10.14 to $20.74/m^3 (refer **Table 3-3**). Different rates to reflect for different types of excavation are potentially reasonable, however given the sizes of these projects are all relatively large and excavation methods would be similar, it is recommended that a single rate be applied. Rawlinsons 2018 recommends a value of $30.80 /m^3 which is considerably higher than the rates used. It would be reasonable to apply this rate unless Council has a rate from previous projects or quotes from various civil contractors.

In relation to the cost rates, a consistent rate should be applied across catchments and within catchments for different items unless additional justification can be provided for site specific variations.

Table 3-3 Comparison of Cost Rates Between Items in First Ponds Creek

Cost Item	Detention Basins	Embedded Bioretention	Standalone Bioretention	Channels	Culverts
Excavation in Clay ($/m^3)	10.14	20.74	16.28	13.65	16.28

The overall impact on cost of applying the changes discussed above is difficult to estimate due to the inconsistent setup of the costing spreadsheets and some uncertainty around the ultimate values which should be adopted. Some changes would likely result in increases in cost while others in decreases, with the net effect therefore being difficult to estimate.

3.3.3 Investigations

A range of investigation costs which are required to inform detailed design and construction are included in the cost estimates. The investigations generally allowed for include geotechnical, contamination, flora and fauna, survey, heritage and archaeology investigations.

The cost rates applied are generally considered reasonable if all items were constructed as standalone projects. However, in many instances there would be significant savings where projects are adjacent or related to each other and would likely be designed and constructed as a single project (eg; culverts and channels in series). In some instances within CP22, such as Area 20 raingardens, the investigation costs have already been shared across a number of items to reflect this and this approach should be applied to all items.

Investigation costs in CP22 are currently approximately $120,000 per raingarden, $120,000 per channel, $150,000 per detention basin and $50,000 per culvert. To provide a simplistic estimate of the potential impact on cost, taking an average cost rate of $120,000 per item, but now divided by three gives a rate of $40,000 per item (a reduction of $80,000 per item). The total number of detention basins, culverts, channels and raingardens in First Ponds Creek and Killarney Chain of Ponds Creek is 52. Therefore the total reduction is cost is expected to be in the order of 52 * $80,000 = $4.2m. This is a simplistic estimate, but the potential cost impact is clearly significant.

3.3.4 Landscaping and Landscaping Maintenance

Similarly to other items, a range of values for landscaping and landscaping maintenance have been applied. The landscaping cost rate for planted areas in channels ($33 /$m^2$) is higher than the rate for basin areas ($25 /$m^2$). This is considered reasonable due to the increased requirements for channels which are typically exposed to higher velocities and therefore have increased requirements. These rates are within typical ranges. The rates applied for turf ($8 /$m^2$) and hydroseeding ($1 /m^2) are also within typical ranges.

Typical rates for maintenance of bioretention systems are $5-10 /$m^2$/yr, with this expected to be towards the higher end during initial establishment. Therefore a rate of approximately $19 /$m^2$ to allow for 3 years maintenance is considered reasonable. Similar maintenance requirements apply during establishment to other planted areas and therefore applying the same rate is considered reasonable.

3.4 Findings

1. The size of GPTs is reasonable, however cost rates are significantly higher. Reducing the cost rates by 15% would reduce the total cost by approximately $1.3m.
2. A lack of site specific considerations for the management of excavated materials when it represents such a large cost is considered unreasonable. Cost estimates should be updated with site specific information where available and/or at a minimum consider the contamination studies completed as part of the rezoning process.
3. There are some significant variations in cost rates between different areas within CP22 and also in the costing methodologies/spreadsheet setup. It would be preferred if a consistent costing methodology and format was applied across all areas and items. Further, it is unreasonable to apply different rates for the same items and these should be updated to be consistent. The potential cost impact of adjusting various rates to be consistent is difficult to quantify due to the complexity of the costing spreadsheet.
4. Costs for investigations are unreasonable. These should be adjusted such that they are shared across a number of related items. A simplistic estimate is that the reduction in cost associated with this approach is in the order of $4.2m.
5. Landscaping and landscaping maintenance costs are reasonable.

4 Cost Apportionment Review

4.1 Introduction

One of the criteria used to evaluate contributions plans is the reasonable apportionment of costs between:

- existing demand and new demand for the services, and
- different types of development that generate new demand for the services (e.g. between different types of residential development such as detached dwellings and multi-unit dwellings, and between different land uses such as residential, commercial and industrial).

4.2 Review

CP22 proposes to levy stormwater management contributions on the basis of the 3 main stormwater catchments (ie. First Ponds Creek, Second Ponds Creek and Killarney Chain of Ponds Creek). This approach is considered reasonable to achieve the stated aim “to promote efficiency in the timing of the provision of infrastructure”.

For water quality items, different contribution rates are also applied to account for the different approach applied to low density residential and other land use types. CP22 states that: “regional Section 94 stormwater treatment measures are generally only provided for low density residential areas”. This is consistent with the approach adopted in sizing the facilities (Refer Section 7.2.2.2 of Water Cycle Management Report Riverstone East, May 2016) and is therefore also considered reasonable for the purpose of cost apportionment.

For online detention facilities on First Ponds Creek which also service other precincts (ie. Riverstone Precinct and Alex Avenue Precinct), it is reasonable for the costs to be apportioned based on developable area. CP22 states that: “GHD work indicated that half the cost of online basins servicing Riverstone and Riverstone East should be allocated to each precinct”. This is reasonable, assuming the developable area draining to this facility is approximately equal from each Precinct.

4.3 Findings

1. The apportionment of costs is considered reasonable.

5 Conclusion

In relation to CP22, this review has assessed whether:

1. the proposed stormwater works are reasonable in terms of nexus (the stormwater works are required because of demand created by development in the precincts of Area 20 and Riverstone East);
2. the proposed costs of stormwater works are reasonable, and if the costs are not reasonable, recommend alternative costs; and
3. the apportionment of stormwater costs to development both within the precincts and outside the precincts is reasonable, and if the apportionment approach is not reasonable, recommend a reasonable approach.

A number of findings/recommendations have been made and are summarised in the sections above.

APPENDIX

A

BCC CP22 DATA SHEET