

Independent Pricing and Regulatory  
Tribunal (IPART)

# East Leppington Draft Contributions Plans

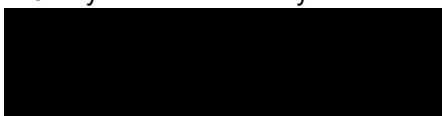
Review of Stormwater Works - Nexus and  
Costs

<b>FINAL REPORT</b>

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# 1 EXECUTIVE SUMMARY

The East Leppington (EL) precinct is part of the South West Priority Land Release Area and was rezoned in March 2013 to support urban development. A contributions plan was developed for the Precinct in 2014 and this was adopted by Liverpool Council and took effect from 3 June 2015.

The draft *Liverpool Contributions Plan 2021 East Leppington Precinct* (EL CP21) was prepared as an update to the adopted 2014 contributions plan. This now includes a cost for drainage works of more than \$35M which is an increase of 200% on this component of the adopted plan. IPARTS preliminary assessment identified that the proposed per hectare cost of the stormwater works was almost double the median cost of other contributions plans being assessed around that time. Due to these significant increases in stormwater infrastructure costs, the Independent Pricing and Regulatory Tribunal (IPART) has sought assistance from J. Wyndham Prince to undertake a review and respond to four key questions regarding EL CP21. A summary response to each of the four key questions posed by IPART is presented below. Further detailed discussions on each of the questions are contained in the body of this report.

## 1. Review the stormwater works schedules in the plan and establish whether the costs from this list are reasonable.

A high-level assessment of the costs of key components of the stormwater works proposed for the EL precinct within EL CP21 has identified that costs in the draft plan are likely overestimated by around **\$11.9 M** ( $\pm 25$  % certainty).

The contributions plan adjustments relating to stormwater works being sought by Liverpool Council in EL CP21 reflect an additional \$23.5M which is a 200% increase on the adopted plan. Council's application to IPART suggests this is needed to offset CPI increases between 2013 and 2020 and is also due to the need to prepare more detailed drainage design elements as the development of the East Leppington precinct evolves.

Unfortunately, there was insufficient information available in the background technical reports to allow for a detailed review of costs. Alternatively, we have derived the cost increases associated with an end-of-pipe raingarden over this same period as an indicator of the potential cost impacts. This demonstrates a significantly higher than CPI increase (40.8% vs 18.4%) is applicable for these works. There is no specific discussion in Council's submission to IPART that explains what is meant by the need to prepare more detailed design elements.

The raingarden bed sizes presented in the 2013 Cardno water cycle management strategy for the precinct represent around 0.3% of the contributing catchment areas and are likely to be undersized based on current stormwater quality modelling techniques. Applying current water quality modelling approaches and parameters, it is typically necessary to provide raingarden beds that have an area of around 0.7% of the catchment to meet the water quality performance objectives applicable to growth centre developments. Consequently, we have assessed the potential cost increases applicable if raingarden bed areas are 2.3 times (i.e. 0.7/0.3) the size allowed for in the 2013 contributions plan. When combining this with the expected 40.8 % increase in the cost of providing stormwater works, the estimated additional cost to the plan is \$11.9M, which compares to the \$23.3M proposed (refer to Table 1-1 which is replicated in this Executive Summary).

Given the uncertainties with the potential cost increases, it may be warranted to undertake a more detailed review of both the water quality modelling and the associated costs that underpin the 2013 Contributions Plan.

## 2. Review whether the costs are consistent with the respective plan's stormwater technical studies.

The stormwater works costings for the EL precinct appear to have been derived independently of the work undertaken by Cardno in their 2013 water cycle management study for the precinct, as there are no costs reported. There is alignment between the nomenclature applied to the drainage works components and the mapping of the works across both the CP and the Water Cycle Management report (Cardno 2013)

## 3. If a cost is not reasonable, recommend an alternative cost.

The alternative estimate of likely total stormwater works costs identified for each of the Draft Contributions Plans are presented in Table 1-1:

Table 1-1 – Total Stormwater Works Costs Summary

Plan	CP14 Costs	Draft CP21 Costs	2022 Indicative Estimate (JWP)	Cost Change	Cost Change %
EL CP21	\$11.7 M (\$10,255 / lot)	\$35.2 M (\$31,174 / lot)	\$23.3 M (\$20,693 / lot)	<b>-\$11.9 M</b>	<b>-33.8%</b>

It should be noted that these are indicative estimates of the likely changes as they are based on a high-level review only. A more detailed assessment would be needed before the amended contributions plans are adopted.

Further details of each cost component are provided in Section 4 of this report.

**4. Make a judgement as to whether a nexus has been established in both plans (i.e. whether the proposed infrastructure is required as a result of the planned development).**

The proposed development in the ALN precinct will result in a significant increase in impervious areas resulting in an increased rate of stormwater runoff, the concentration of runoff and the deterioration in water quality. These changes necessitate additional stormwater infrastructure to ameliorate the impacts. The cost of delivering the required infrastructure should be part of a contributions plan so that its cost is more equitably shared by the new community.

The urban development will increase the demand on stormwater infrastructure, and it is noted that the amount of the contribution for stormwater infrastructure is calculated based on the equivalent net developable area (ha) that will generate demand for the facilities. While the EL CP21 plan does not justify the need for stormwater management infrastructure, we believe that a nexus for the stormwater management infrastructure for the East Leppington Precinct exists.

## 2 INTRODUCTION

The East Leppington (EL) precinct is part of the Southwest Priority Land Release Area and was rezoned in March 2013 to support urban development. As part of the precincts' development, a series of public infrastructure items including roads, parks, culvert crossings, stormwater quantity and quality (Water Sensitive Urban Design – WSUD) management devices are needed to support the precincts' development. These public infrastructure devices are to be funded through a Local Infrastructure Contributions Plan under Section 7.11 of the *Environmental Planning and Assessment Act 1979 No 203*.

Preliminary costing for the stormwater management devices was prepared to inform the *Liverpool Contributions Plan 2014 East Leppington Precinct* which listed a cost in the order of \$11.7M for drainage works. Land acquisition cost for these devices across the precinct was also considered.

The draft *Liverpool Contributions Plan 2021 East Leppington Precinct* now includes a cost for drainage works of more than \$35M (an increase in the cost of over 200%).

The change in stormwater management costs is summarised in Table 2-1 below. It has been noted that the number of lots delivered does vary between the plans. However, this is not a significant factor in the cost calculations.

*Table 2-1 – Contributions Plan Drainage Cost Changes*

<b>Drainage Item</b>	<b>Current EL CP 2014 (1,143 lots)</b>	<b>Proposed EL CP 2021 (1,128 lots)</b>
Works	\$11,720,920 (\$10,255 per lot)	\$35,164,370 (\$31,174 per lot)
Land	\$8,866,385 (\$7,757 per lot)	\$15,999,950 (\$14,184 per lot)
<b>Total</b>	<b>\$20,587,305</b> <b>(\$18,011 per lot)</b>	<b>\$51,164,320</b> <b>(\$45,358 per lot)</b>

Due to these significant increases in stormwater infrastructure costs, the Independent Pricing and Regulatory Tribunal (IPART) has sought assistance from J. Wyndham Prince to assess and respond to the following four key questions:

1. Review the stormwater works schedules in the plan and establish whether the costs from this list are reasonable.
2. Review whether the costs are consistent with the respective plan's stormwater technical studies.
3. If a cost is not reasonable, recommend an alternative cost.
4. Make a judgement as to whether a nexus has been established in both plans (i.e., whether the proposed infrastructure is required because of the planned development).

Details of our investigation are provided below.

## 3 SUMMARY OF TECHNICAL STUDIES

### 3.1.1 Water Cycle Management Report East Leppington (Cardno, May 2013)

The Water Cycle Management Report East Leppington (EL WCM) report was prepared for the Department of Planning & Infrastructure by Cardno in June 2012 to support the rezoning of the precinct. The report was updated in May 2013 to address some recommendations as part of a requested peer-review process by the DPI.

The stormwater quality and quantity management adopted an 'end of pipe' approach. Stormwater is delivered to the bottom of the catchment via the street drainage network to neighbourhood scale GPTs before discharge to secondary treatment devices such as stormwater quality ponds or raingardens. Peak storm flows are collected in detention basins that ensure peak flows in the receiving watercourses are no greater than existing conditions peak flows.

The stormwater quality modelling documented in Section 5 and Table 5-2 of the EL WCM report indicated that the raingarden filter areas would need to be 0.3% of the catchment they are servicing. Whilst Appendix C2 suggests a filter area of approximately 0.5% catchment would be required. Both values are less than our experience of 0.7% - 1.0% of catchment within the Sydney Growth Centre precincts where vortex-style GPTs are provided upstream of the raingarden. The strategy proposed a total of 20 raingardens with a combined filter area of 10,263 m<sup>2</sup>. The modelling appears to be very high level, with a single node representing each urban catchment which does not align with modern modelling techniques. It is also noted that Figure C.3 (MUSIC model layout) indicates GPTs were not considered in the modelling, which is inconsistent with Table 5-1 which suggests that GPTs that provide nutrient removal are to form part of the stormwater treatment train.

It is noted that the recommended area to be set aside in the ILP for the stormwater quality bio-filter devices was 3% of the catchment to account for batters, inlet/outlet structures, design tolerances and maintenance access. In our experience, this would appear reasonable.

Unfortunately, no catchment information was available to compare the proposed detention basin volumes listed in Table 3-3 of the EL WCM report with the catchments they are servicing. However, Appendix A does indicate that detention volumes in the order of 370 m<sup>3</sup>/ha were adopted, which is in line with our expectations for detention within Western Sydney. Section 3.3 of the report notes that some basins had to over-attenuate flows to ensure that flood levels within the receiving watercourses were not increased.

There is concern that if the detail design of these devices is undertaken using the current Council standards for stormwater quality modelling (Council MUSIC-Link parameters), the bio-filters would need to increase in size to meet DCP pollutant reduction targets. However, it does appear that sufficient land (3% catchment) should have been set aside which should be sufficient to cater for larger bio-filters in the order of 0.7% to 1.0% of the total catchment if required.

## 4 COST REVIEW

This cost review does not undertake a detailed review of all the cost calculations that supported the Contributions Plans as that was beyond the scope of this assessment. Alternatively, we have focused on costs for average or typical devices in each category across the EL Contributions Plan as being representative of the likely impact across the precinct. In deriving totals, we have applied the estimated cost variances we have derived for each typical device across all the line items in the primary cost schedule.

A review and commentary are provided that considers whether CPI increases adequately account for the recent increases in the cost of stormwater works. It also considers the cost implication of ensuring the proposed raingardens are sized adequately to meet Council and best practice modelling techniques for these systems.

In addition to the noted key aspects, the cost review considers a range of other factors that impact the cost of the stormwater works within the respective Contributions Plans. These are presented utilising responses to the specific questions raised by IPART which represent the scope of this review.

### 4.1 Establish whether the costs from work schedules are reasonable

As mentioned previously the draft *Liverpool Contributions Plan 2021 East Leppington Precinct* now lists a cost of \$35,164,370 (+ 200%) for drainage works.

The information provided for the stormwater costs review was limited to only the total costs for each basin, drainage infrastructure, and drainage lands. No cost breakdown spreadsheets were available for review of construction costs for each drainage item and no concept design plans were available. The original costs of stormwater items were determined by Cardno via the Water Cycle Management Report East Leppington report which was finalised in May 2013 to support the rezoning of the precinct.

To reflect present-day costs, Council has indexed the costs from the base date of 2013 to 2021 by ABS price indexes. While this approach has appropriately considered broader inflationary pressures across the economy, it may not accurately present the increases in the cost of stormwater works across this period.

To assess whether the increase in stormwater works costs are adequately reflected by CPI increases we undertook a comparison of the growth in actual construction costs for raingardens over the same period. Raingardens represent 37% of the overall stormwater works costs of the adopted EL contributions plan. The estimates of raingarden media bed works provided by Cardno for the nearby Austral and Leppington North (ALN) Precinct in 2013 indicated that raingardens cost **\$355/m<sup>2</sup>**. Data from the JWP Cost database confirms this is a reasonable estimate for these works in 2013. Recent raingarden works undertaken across Sydney and elsewhere are costing **\$500/m<sup>2</sup>**. This information is summarised in Table 4-1 below which shows that raingarden cost increases (+40.8%) significantly outpaced CPI (+18.4%) over the period between March 2013 to December 2021.

In addition, Council also indicates in their submission to IPART that:

*Water management costs have reflected the largest increase the original CP estimated works costs which is largely resulting from the need to prepare more detailed design elements for drainage as development of the East Leppington precinct evolves.*

Unfortunately, there is no specific discussion in Council's submission that explains what is meant by "the need to prepare more detailed design elements". In Section 3.3 above, we note that the raingarden bed sizes presented in the 2013 Cardno strategy represent around 0.3% of the catchment areas. Our experience in, using the latest water quality modelling approaches and parameters, is that it is necessary to provide raingarden beds that have an area of around 0.7% to 1.0% of the catchment to meet water quality performance objectives applicable to growth centre developments. Consequently, we have assessed the potential cost increases applicable if raingarden bed areas are required to be 0.7% of the catchment and this is also presented in Table 4-1 below.



Table 4-1 – EL CP21 – Comparison of Various Increases in Stormwater Works Cost

Item	Current EL CP 2014 (1,143 lots)	Adjusted CP 2014 (Bigger R/G)	Proposed EL CP 2021 (1,128 lots)	Cost Increase	Cost Increase /lot
Cost of Stormwater Works	\$11.721 M (a)		\$35.164 M	\$23.443 M (200%)	\$20,783
Cost of Increasing 'end of pipe' raingardens from 0.3 to 0.7 % of catchment (in 2013 dollars)	\$3.643 M (10,263 m <sup>2</sup> @ \$355/m <sup>2</sup> )	\$8.500 M (23,947 m <sup>2</sup> @ \$355/m <sup>2</sup> )		\$4.857 M (b)	\$4,306
Adjusted CP 21 to account for larger Raingardens (2013 dollars) (a+b)	\$16.579 M				
Estimated cost increase for raingardens (10,263 m <sup>2</sup> bed areas from 2013 to 2021)	\$3.643 M ((\$355/m <sup>2</sup> ))		\$5.131 M ((\$500/m <sup>2</sup> ))	\$1.488 M (40.8%) (c)	\$1,319
Apply 40.8%(c) cost increase to all Stormwater Works	\$16.579 M		\$23.343 M	\$6.764 M (40.8%)	\$5,996
Combined larger raingardens and works cost increases (2013 to 2021)	\$11.721 M		\$23.343 M	\$11.622 M	\$10,303

#### Blue text - JWP estimated costs

When combining the costs associated with increasing raingarden bed areas to align with best practice water quality modelling and applying a 40.8 % increase in the cost of providing all stormwater works, the estimated additional cost to the plan is \$11.622 M, which is significantly less than the \$23.443 M increase proposed by Council.

The previous technical discussion on East Leppington highlighted the concern that if the detail design of biofilter devices was undertaken using the current Council standards, the bio-filters would need to increase in size. This would increase construction costs.

To provide a more appropriate estimation of costs for stormwater items it is suggested that consideration be given to the following actions:

- Undertake a review of the water quality modelling that underpins the Contribution plan to confirm that the proposed raingarden bed areas are adequate to achieve the required performance objectives specified in the Liverpool Growth Centres Precincts DCP (2021) using current best practice modelling methods and parameters. Update the water quality modelling if required to reflect current modelling best practices.
- Update the cost estimates (if any) that informed the draft contributions plan to incorporate amended quantities and up-to-date cost rates for the works. [It is noted that item b) would improve confidence in the estimates even if a) were not undertaken].

## 4.2 Are costs consistent with contributions plans technical studies

A review of the following key documents relating to the EL stormwater works was undertaken to confirm consistency with the EL CP21:

- Water Cycle Management Report – East Leppington (Cardno 2013)
- EL D21 24060 IPART submission works tables – (Excel) (LCC 2021) – “Water Management” worksheet

While costs are not reported in the Water Cycle Management Report (Cardno 2013) we note that there is consistency in the nomenclature applied to the drainage works components and the mapping of the works across both the CP and the supporting technical studies and cost schedule. This suggests that there is alignment between the strategy and the costings undertaken separately by Council eight years later.

## 4.3 If a cost is not reasonable, recommend an alternative cost

### 4.3.1 Undersized raingardens

The raingarden bed sizes presented in the 2013 Cardno strategy represent around 0.3% of the catchment areas (refer to Sections 3.3 and 4.1.3 for further discussion). Applying the latest water quality modelling approaches and parameters, it is typically necessary to provide raingarden beds that have an area of around 0.7% of the catchment to meet the water quality performance objectives applicable to growth centre developments.

We have assessed the potential cost increases applicable if raingarden bed areas are 2.3 times (i.e. 0.7/0.3) the size allowed for in the 2013 plan. When combining this with a 40.8 % increase in the cost of providing all stormwater works, the estimated additional cost to the plan is \$11.621M, which compares to the \$23.443M proposed.

Given the potential cost increases, it may be warranted to undertake a detailed review of both the water quality modelling and the associated costs that underpin the 2013 Contributions Plan.

### 4.3.2 Evolving raingarden design specifications

Another cost consideration is the increased construction cost associated with compliance with the standardised engineering design and construction specifications, published in the Western Sydney Engineering Design Manual (WSEDM) in 2020. This was prepared in collaboration with nine Western Sydney councils, including Liverpool Council, and we understand may be applied as a new design and construction specification by each Council as part of the next round of updates to LEP's and DCP's.

[Refer to <https://www.wscd.sydney/planning-housing> under the heading of "P4 - Uniform local government engineering design standards and telecommunications planning"]

For Raingardens, the WSEDM adopts Blacktown City Council's recently revised standard specifications for these works. This involves the provision of a complex inflow and outflow drainage system, provides a full perimeter paved maintenance access road, and adopts a 3-phase construction process that will likely take many years to implement. Our recent experiences with end-of-pipe raingarden construction in Sydney's Northwest Growth Centre precincts within the Blacktown LGA have found that the costs of meeting this specification are in the order of \$1,400 to \$1,500 per sqm on average. This is around 3 times higher than the costs of raingardens in other western Sydney LGAs and those from other Australian jurisdictions.

It is unclear at this stage whether Liverpool Council will require this standard of construction for systems to be implemented across the EL precinct as development proceeds over the next decades. It is important to note that this potential cost increase was not allowed in this cost review.

## 5 NEXUS

Nexus refers to the connection between the development and the demand created by that development. The requirement to satisfy nexus is based on ensuring that there is a link between the development and increased demand and cost for infrastructure.

In greenfield development areas which generally typifies the East Leppington Precinct, the new development results in an increase in the impervious area resulting in an increased rate of stormwater runoff, a concentration of runoff and deterioration in water quality. These changes necessitate additional stormwater infrastructure to ameliorate the impacts and specifically to meet the Development Control Plan water quality targets. The need for infrastructure is supported by technical studies which both establish and map the infrastructure items. There is consistency between the Contributions plan and the supporting technical study. Together it is a clear nexus.

Section 3 of the *Liverpool Contributions Plan 2021 – East Leppington* (Liverpool City Council, EL CP21) provides an outline of the demand for public amenities and public services. Table 3.2-2 refers to the East Leppington WCM report (Cardno, 2013), however, there is no discussion regarding any increased demands on the stormwater infrastructure due to increased development. Section 4.3 of EL CP21 provides a discussion on Water Cycle Management Infrastructure, with Section 4.3.1 discussing existing watercourses and water management, and Section 4.3.2 discusses the proposed water cycle management infrastructure. However, it does not articulate that the proposed stormwater infrastructure is needed due to a proposed increase in development.

Nevertheless, it is evident from the supporting East Leppington Water Cycle Management Strategy (Cardno, May 2013) that the urban development of East Leppington will increase the demand on stormwater infrastructure, and it is noted that the amount of the contribution for stormwater infrastructure in Section 4.3.3 is calculated based on the equivalent net developable area (ha) that will generate demand for the facilities. While the EL CP21 does not justify the need for stormwater management infrastructure, our view is that a nexus for the stormwater management infrastructure for the East Leppington Precinct does exist.

## 6 CONCLUSIONS

This review of stormwater infrastructure costs with the draft contributions plan for EL has considered cost, underlying assumptions, the adopted stormwater management strategy approach, and identified a few technical issues. The key conclusions drawn from this review are summarised in the following groupings:

### Key cost issues:

- Council has indicated the cost increases arise from the need to index the costs from the base date of 2013 to 2021 and are also due to the need to prepare more detailed drainage design elements for drainage as the development of the East Leppington precinct evolves. However, indexing represents an increase of 18.4 % since 2013, whereas Council is seeking a 3-fold cost increase in the draft Contributions plan for stormwater works.
- CPI increases over the last 9 years do not accurately present the true cost of stormwater works. Many construction rates have risen dramatically over this period. As an example, the cost of constructing a raingarden has increased by 40.8 % over this period.
- If the detail design of biofilter devices is required by approval agencies to be undertaken using the current Council and best practice modelling standards, the bio-filters would need to increase in size by around 2.3 times (from 0.3% to 0.7% of catchment). The significant impact on construction costs for these devices would result in a significant funding gap in the Contribution plan rates for these works.

The net cost impact of these factors represents an **\$11.8 M excess** in the proposed CP21 rates for stormwater works. This equates to a \$10,480 /lot saving on the increases proposed by Council in the draft Contributions Plan.

Considering the above, the total costs for EL can unfortunately not be considered as a reasonable representation of likely costs.

### Other Cost Considerations

The evolving design and construction specifications for raingardens embodied by the new Western Sydney Engineering Design Manual have the potential to double or even triple construction costs

### Nexus

The new development in the EL precinct will increase impervious areas resulting in an increased rate of stormwater runoff, a concentration of runoff and deterioration in water quality. These changes necessitate additional stormwater infrastructure to ameliorate the impacts.

The urban development of East Leppington will increase the demand on stormwater infrastructure, and it is noted that the amount of the contribution for stormwater infrastructure is calculated based on the equivalent net developable area (ha) that will generate demand for the facilities. While EL CP21 does not justify the need for stormwater management infrastructure, our view is that a nexus for the stormwater management infrastructure for the East Leppington Precinct does exist.