Local Government Infrastructure Plan

Water Supply Network Extrinsic Material Report

24/10/2024 – Version 4

Note: This Water Supply Network Extrinsic Material Report (Version 4) is endorsed by relevant officers of Council's Growth Management and Engineering Services teams to be submitted to Council's Appointed Reviewer as part of the mandatory Compliance Check Process.

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1.0 Background

Livingstone Shire Council has prepared a Local Government Infrastructure Plan (LGIP) in accordance with the *Planning Act 2016* (PA) and associated rules. The LGIP identifies the type, scale, location and timing of development within the Livingstone Shire Council for the period of fifteen (15) years. It also identifies trunk infrastructure to service that growth at the desired standard of service.

The following trunk infrastructure networks are included within the LGIP:

(a) Water supply network
(b) Sewerage network
(c) Transport network
(d) Public parks and land for community facilities network.

The Livingstone Shire Council LGIP is Part 4 and Schedule 3 of the Livingstone Planning Scheme 2018.

2.0 Purpose of report

This extrinsic material report has been prepared to assist in the interpretation of the Livingstone Shire Council LGIP. The report summarises the inputs and methodology used to prepare the **water supply network** component of the LGIP and references all background studies and reports relevant to its preparation. The report should be read in conjunction with the document titled *Livingstone Shire Council Local Government Infrastructure Plan Planning Assumptions Report 2023* and other extrinsic material outlined in this document.

3.0 Review methodology

With regard to the review of the water supply network component of the LGIP, the following is a broad outline of the process undertaken:

(1) Review and confirm the suitability of the desired standards of service for water supply trunk infrastructure.
(2) Review and confirm trunk water supply infrastructure types for the purpose of LGIP planning.
(3) Review and confirm water supply network planning service catchments.
(4) Determine water supply network demand within identified water supply network service catchments.
(5) Review and confirm the need for plans for trunk infrastructure to ensure desired standards of service can be achieved.
(6) Estimate the timing and establishment cost of the plans for trunk infrastructure, and include this in a schedule of work.

4.0 Desired standards of service

Planning of the water supply network required the Desired Standards of Service (DSS) to be applied to the forecast demand (EP) in each service catchment. The desired standards of service for the water supply network are detailed below and Table 1 (Water supply network design criteria). The trunk water supply infrastructure aims to meet the standards to the greatest degree practicable.

1) The key desired standards of service for the water supply network are detailed in Table 1.
2) Livingstone Shire council aims to design the water supply network in accordance with Council's adopted guidelines, standards and codes.
3) Livingstone Shire Council aims to achieve the legislative requirements set by the Water Supply (Safety and Reliability) Act 2008 and the Water Supply Act 2000.
4) Livingstone Shire Council aims to provide consumers with a continuous reliable supply, noting that interruptions and / or reduced service may be necessary when essential repair and maintenance work is being carried out.
5) Ensure environmental impacts of the water supply network are minimised in accordance with legislative requirements and community expectations.

6) Ensure the water supply network is able to provide a potable water supply to meet the demands imposed upon it by both the consumer and firefighting requirements.

Table 1: Water supply network design criteria

Column 1 Design criteria	Column 2 Measure
Average Day (AD) Demand	500 litres per equivalent person per day (L/EP/Day)
Maximum Day (MD) Demand	1.9 x average day (AD) demand
Maximum Hour (MH) Demand	1/12 x maximum day (MD) demand
Minimum Service Pressure	22 metres at finished surface/ street elevation at the main location, building pad level or at the mean lot level, whichever is the highest.
Desirable Upper Service Pressure	50 metres head at the centroid of the residential lot during normal diurnal flow in the reticulation non-trunk network
Maximum Service Pressure	• 80 meters head at the centroid of the residential lot in the reticulation non-trunk network • 90 meters head for the trunk network
Fire Fighting Pressure	12 metres minimum in the reticulation non-trunk water supply network
Fire Flow for residential area in the reticulation non-trunk network	15 litres per second for a duration of two (2) hours at minimum pressure of 120 kilopascals (kPa)
Fire Flow for industrial/commercial area in the reticulation non-trunk network	30 litres per second for a duration of four (4) hours at minimum pressure of 120 kilopascals (kPa)
Pipeline design maximum velocity	two (2) metres per second (1.5m/sec desirable for optimum energy useage)
Reservoir Capacity	one (1) Maximum Day (MD) demand for the supply zone
Trunk Water Main sizing	• Average Day (AD) supply to Trunk Dams • Maximum Day (MD) supply to Reservoirs • Maximum Hour (MH) supply to reticulation mains

5.0 Water supply network planning

The types of infrastructure listed in Table 2 may be considered to be trunk water supply infrastructure for the purpose of LGIP planning. Planning for the water supply network can include land acquisition when deemed necessary for the infrastructure provider.

Table 2: Trunk water supply infrastructure types

Trunk water supply infrastructure types
Water mains
Bulk supply mains
Water treatment plants
Dams
Pump stations
Reservoirs

6.0 Planning assumptions

6.1 Development projections

Projections of dwellings and non-residential gross floor area (GFA) provide a basis for the planning of water supply network infrastructure within each service (planning) catchment.

Development projections for the Livingstone Shire Council local government area were undertaken and they are documented in the report titled Livingstone Shire Council LGIP Planning Assumptions Report 2023.

6.2 Demand assumptions

Service catchments were determined, and they are identified in Column 1 of Table 4 below and on service catchment maps (refer to service catchment maps WSN-01a, WSN-02a, WSN-03a, WSN-04a and WSN-05a.

Prior to undertaking network planning, projections of dwellings and non-residential gross floor area (GFA) were converted into units of demand. Water demand is expressed in equivalent persons (EP) which represents an average daily water consumption (litres per day). Residential and non-residential development was converted into number of EP using demand generation rates shown in Table 3.

Table 3: Demand generation rates used to convert development projections into water supply demand (EP)

Column 1 **Development**	**Column 2** **Demand generation rate**
Residential	
Single Dwelling	2.7 EP/Dwelling
Multiple Dwelling	1.6 EP/Dwelling
Other Dwelling	1.6 EP/Dwelling
Non-residential	
Commercial	0.004 EP/m^2 GFA
Retail	0.008 EP/m^2 GFA
Industry	0.0035 EP/m^2 GFA
Community	0.0065 EP/m^2 GFA
Other	0.015 EP/m^2 GFA
Major Centre	0.0069EP/m^2 GFA
Minor Centre	0.0077EP/m^2 GFA

A summary of total demand for each water supply service catchment is provided in Table 4.

Table 4: Existing and projected demand (EP) for each water supply service catchment

Column 1 **Service catchment**	**Column 2** **Existing and projected demand (EP)**				
	2021 (Existing)	**2026**	**2031**	**2036**	**Ultimate development**
Boundary Reservoir	498	1,140	1,909	2,661	5,379
Caves Reservoir	127	130	130	130	138
Hawke Street Reservoir	6,957	8,014	9,087	10,440	19,315
Keppel Sands Reservoir	704	774	774	774	774
Lammermoor Reservoir	2,302	2,799	3,300	3,732	5,806

Column 1 Service catchment	Column 2 Existing and projected demand (EP)				
	2021 (Existing)	2026	2031	2036	Ultimate development
Meikleville Hill Reservoir	1,171	1,235	1,288	1,319	1,431
Mount Charlton Reservoir	3,555	4,011	4,400	4,778	7,092
Nerimbera Reticulation*	3,969	4,833	4,833	4,995	4,995
Pacific Heights Reservoir	2,183	2,686	2,859	3,183	3,438
St Faiths Reservoir	10,873	11,589	12,106	12,514	17,882
Taranganba Reservoir	9,636	11,405	13,344	15,234	21,594
Woodbury Heights Reservoir	108	149	149	149	189

*Note: Figures have converted high water usage from land uses into EP.

The water supply service catchments were identified as either 'Urban' or 'Non-Urban.' The 'Urban' catchments were aggregated to calculate the total 'Urban' demand. This total was then incorporated into the Schedule of Works Financial Model, enabling the calculation of 'urban development costs' for the water supply network in accordance with the Minister's Guidelines and Rules. It is noted that some 'Urban' catchments include 'Non-Urban' areas; however, the minimal demand from these areas is considered acceptable for the purpose of calculating 'urban development costs'.

7.0 Plans for trunk infrastructure

Where it has been assumed that the Desired Standards of Service are unlikely to be achieved, a plan for trunk infrastructure has been identified to rectify the situation. All plans for trunk infrastructure have been identified and mapped (refer to maps WSN-01a, WSN-02a, WSN-03a, WSN-04a and WSN-05a), and they are included in a schedule of work along with estimates of timing and cost (refer Section 9 of this document).

8.0 Infrastructure costs

The *Planning Act 2016* defines establishment cost of trunk infrastructure to be-

(a) For existing infrastructure –
  i. The current replacement cost of the infrastructure as reflected in the relevant local government asset register; and
  ii. The current value of the land acquired for the infrastructure
(b) For future infrastructure – all the costs of land acquisition, financing, and design and construction, for the infrastructure

The establishment cost of trunk water supply infrastructure has been calculated as follows.

8.1 Cost of land

The establishment cost of existing land used for trunk water supply infrastructure was obtained from Livingstone Shire Council's asset register as at 2022.

Where land is required for future trunk water supply infrastructure, the establishment cost has been calculated using empirical rates of previous land acquisitions by Council. However, the actual pricing is subject to market variability, reflecting changes in the real estate market conditions and property values.

8.2 Cost of works

The establishment cost of existing trunk water supply infrastructure (works) was obtained from the Livingstone Shire Council's asset register as at 2022.

The establishment cost of future trunk water supply infrastructure (works) was calculated in June 2022 dollars using Council's design estimation template which utilises current established costs and unit rates.

The use of a design estimation template is a common practice in project management. Such templates typically include predefined unit rates, cost factors, and other variables to assist in calculating the total project cost based on the design specifications. By utilising current established costs, the Council ensures that the estimation reflects the most up-to-date pricing for materials, labour, and other resources.

8.3 On-cost allowance

On-costs represent the owner's project costs and may include master planning, survey, geotechnical investigations, design, project management, contract administration and environmental investigations. An on-cost allowance of 20% has been applied to future projects within the trunk water supply network. This on-cost is consistent with the allowance specified in the Minister's Guidelines and Rules.

No on-cost allowance was applied to land costs within the trunk water supply network.

8.4 Contingency allowance

A contingency allowance is included in the establishment cost of future trunk infrastructure to deal with known risks. A contingency allowance of 30% has been applied to future projects within the trunk water supply network. This contingency is consistent with the allowance specified in the Minister's Guidelines and Rules.

No contingency allowance was applied to land costs within the trunk water supply network.

9.0 Water supply network schedule of works

Table provides a list of projects planned for the trunk water supply network and included in the LGIP.

Table 5: Future trunk water supply projects included in LGIP

Column 1 Map reference	Colum 2 Trunk infrastructure	Column 3 Estimated timing	Column 4 Establishment cost1
WAT-9	375mm - Carige Boulevard, new, 2100m.	2031	$2,078,076
WAT-10	375mm - Tanby Road, new, 1620m.	2026	$1,806,246
WAT-16	375mm - Hartley Street/Svendsen Road, new, 2900m.	2031	$2,059,200
WAT-23	Zilzie reservoir, new, 4ML.	2035 - 2036	$4,894,520
WAT-28	Emu Park BPS upgrade.	2031	$1,438,554
WAT-29	Zilzie lifting pump station, new.	2036	$2,059,000
WAT-33	Pacific Heights BPS upgrade.	2025 - 2026	$585,000
WAT-54	375mm - Chandler Road, new, 770m.	2031	$815,412
WAT-54B	375mm - Clayton Road, new, 420m.	2031	$606,013
WAT-60	Yeppoon West Reservoir, new, 4ML. Strategy not finalised.	2031	$3,881,280
WAT-61	Yeppoon West BPS, new. Strategy not finalised.	2035 - 2036	$1,787,760
WAT-62	300mm - Yeppoon West Pines, new, 1400m	2031	$1,040,832
WAT-63	300mm - Dawson Road, new, 2700m.	2031	$1,939,080
WAT-64	300mm - McLaughlin Street, new, 2700m	2036	$2,570,880

[1] The establishment cost is expressed in cost terms as at June 2022 dollars.

Column 1 Map reference	Colum 2 Trunk infrastructure	Column 3 Estimated timing	Column 4 Establishment cost1
WAT-68	300mm - Vin E Jones Drive, upgrade, 640m.	2026	$583,596
WAT-N1	250mm - Henry Street, new, 630m.	2031	$522,054
WAT-N2	200mm - Henry Street, new, 420m.	2035 - 2036	$312,468
WAT-N3	Henry Street BPS	2035 - 2036	$1,591,000
WAT-N4	Lammermoor Lifting PS	2031	$1,713,880
WAT-N5	375mm - Chandler Road, new, 1280m.	2036	$1,307,514
WAT-N6	375mm - Adelaide Park Road, upgrade	2026	$643,438
WAT-N7	St Faiths BPS upgrade.	2026	$252,876
WAT-N8	200mm - Buccaneer Avenue, new, 270m.	2031	$377,130
WAT-N9	300mm, Pines Boulevard, new, 960m.	2026	$765,492
WAT-N10	375mm, Pines reservoir inlet, new, 3150m.	2036	$3,186,768
WAT-N11	375mm, Pines reservoir outlet, new, 3150m.	2036	$3,186,768
WAT-N12	375mm, Tanby Road, new, 2400m	2031	$2,192,112
WAT-N13	375mm, Tanby Road, new, 4000m	2031	$3,577,392
TOTAL			**$47,774,341**

10.0 Supporting information

Various information sources assisted with the Water Supply Network Trunk Infrastructure Review. The key information sources are identified in Table 6 – Water Supply Network Information Sources.

Table 6 – Water Supply Network Information Sources

Background/Review Information Sources
The Capricorn Municipal Development Guidelines
The Australian Drinking Water Guidelines (the Guidelines)