Local Government Infrastructure Plan

Sewerage Network Extrinsic Material Report

24/10/2024 – Version 4

Note: This Sewerage 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.

Table of Contents

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 Livingstone Shire Council LGIP. The report summarises the inputs and methodology used to prepare the **sewerage 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 sewerage 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 sewerage trunk infrastructure.
(2) Review and confirm trunk sewerage infrastructure types for the purpose of LGIP planning.
(3) Review and confirm sewerage network planning service catchments.
(4) Determine sewerage network demand within identified sewerage 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 sewerage 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 sewerage network are detailed in Table 1 (Sewerage network design criteria), Table 2 (Treated water quality) and Table 3 (Sewerage network desired standards of service). The trunk sewerage infrastructure aims to meet the standards to the greatest degree practicable.

1) The desired standards of service for the sewerage system are detailed in Tables 1, 2 and 3.
2) Livingstone Shire Council aims to provide reticulated sewerage to the consumer to meet the demands imposed upon it by the consumers and the Environmental Protection Agency.
3) The objective of the sewerage system is to transport sewage from domestic, commercial and industrial properties using gravity flow pipes and where this is uneconomical, by pumping to the treatment plant.

Table 1: Sewerage network design criteria

Column 1 Design criteria	Column 2 Measure
One (1) equivalent person (EP)	200 litres per equivalent person per day (L/EP/day)
Average Dry Weather Flow (ADWF)	200 litres per equivalent person per day (L/EP/day)
Peak Dry Weather Flow (PDWF)	2.5 x Average Dry Weather Flow (ADWF)
Wet Weather Flow (WWF)	Five (5) x Average Dry Weather Flow (ADWF)
Sewage pump station emergency storage	Four (4) hours minimum
Total sewage pump station pumping capacity	2 pumps required. 1 pump operates at PDWF, and 2 pumps together operate at WWF.
Gravity Main Flow Capacity	75% of full depth at Wet Weather Flow (WWF) capacity
Gravity Main Minimum velocity at Peak Dry Weather Flow (PDWF)	0.7 m/sec at Peak Dry Weather Flow (PDWF) capacity
Rising main minimum scouring velocity	0.7 m/sec
Rising main maximum velocity	2 m/sec
Planning Horizon	• Ultimate for reticulation (non-trunk) network • 20 years for trunk gravity mains, trunk sewage pump stations, trunk sewer rising mains, trunk effluent pressure mains
Odour Protection	• Required for new trunk sewage pump stations where initial loadings cause long detention times
Air Release and Air Scour	• Air Venting in all gravity sewer mains at locations of excessive turbulence – particularly where a steep (super-critical flow) meets a flat section (sub-critical flow), and discharge chambers • Air scours on rising mains where air lock is a risk

Table 2: Treated water quality

Column 1 Criteria	Column 2 Measure
Biological Oxygen Demand (BOD)	Less than 20 milligrams per litre
Dissolved Oxygen (DO)	Greater than 6 milligrams per litre
Suspended Solids (SS)	Less than 30 milligrams per litre
pH	6.5 – 7.5
Free chlorine residual	Less than 0.7 milligrams per litre

Table 3: Sewerage network desired standards of service

Column 1 Measure	Column 2 Planning criteria (qualitative standards)	Column 3 Design criteria (quantitative standards)
Reliability	Livingstone Shire Council is to provide prompt, courteous and effective sewerage services to its customers.	• Livingstone Shire Planning Scheme

Column 1 Measure	Column 2 Planning criteria (qualitative standards)	Column 3 Design criteria (quantitative standards)
	Staff make every effort to ensure the sewerage system operates adequately and with minimal disruption.	• Livingstone Shire Council – Sewer Asset Management 2024-2033
Quality of Treatment	Livingstone Shire Council uses every effort to continue to operate the sewerage system efficiently and effectively, ensuring the highest value for effluent is received for all sewerage treatment plants. The quality of treatment ensures the health of the community, the safe and appropriate level of treatment and proper disposal of treated effluent.	• Compliance with the requirements of the *Environmental Protection Act 1994* • Livingstone Shire Council – Sewer Asset Management 2024-2033
Environmental impacts	Livingstone Shire Council uses every effort to continue to operate the sewerage system efficiently and effectively and minimise sewage overflows and interruptions. The environmental impacts of the sewerage network are minimised in accordance with community expectations.	• Livingstone Shire Planning Scheme • Compliance with the requirements of the *Environmental Protection Act 1994*
Effluent reuse	Livingstone Shire Council reuses effluent wherever possible.	• Compliance with the requirements of the *Environmental Protection Act 1994* • Queensland Water Recycling Guidelines – December 2005
Infrastructure design/ planning standards	Design of the sewerage network will comply with the established guidelines, codes and standards.	• Capricorn Municipal Development Guidelines – Design Specifications and Standard Drawings • Sewerage Reticulation Code of Australia (latest version) • Sewage Pumping Station Code of Australia (latest version) • Planning Guidelines for Water Supply and Sewerage (latest version) • *Water Supply (Safety and Reliability) Act*

5.0 Sewerage network planning

The types of infrastructure listed in Table 4 may be considered to be trunk sewerage infrastructure for the purpose of LGIP planning. Planning for the sewerage network can include land acquisition when deemed necessary for the infrastructure provider.

Table 4: Trunk sewerage infrastructure types

Trunk sewerage infrastructure types
Gravity mains
Rising mains
Sewage pump stations
Sewage treatment plants

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 sewerage 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 SN-01a, SN-02a and SN-03a).

Prior to undertaking network planning, projections of dwellings and non-residential gross floor area (GFA) were converted into units of demand. Demand in the sewerage network is expressed in equivalent persons (EP) which represents an average daily wastewater load (litres per day). Residential and non-residential development was converted into number of EP using demand generation rates shown in Table 5.

Table 5: Demand generation rates used to convert development projections into sewerage 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 sewerage service catchment is provided in Table 6.

Table 6: Existing and projected demand (EP) for each sewerage service catchment

Column 1	Column 2				
Service catchment	Existing and projected demand (EP)				
	2021 (Existing)	2026	2031	2036	Ultimate development
Emu Park & Zilzie	6,927	7,985	9,058	10,411	19,566
Hidden Valley West	629	1,266	2,035	2,787	5,765
Kinka & Tanby	1,445	1,879	2,042	2,155	2,204
Taroomball	1,346	2,202	3,594	5,230	10,929
Lammermoor	9,051	10,028	10,912	11,485	13,692
Yeppoon	1,2727	13,815	14,470	15,081	20,407

The sewerage 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 sewerage 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 SN-01a, SN-02a and SN-03a), 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 PA 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 sewerage infrastructure has been calculated as follows.

8.1 Cost of land

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

Where land is required for future trunk sewerage 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 sewerage infrastructure (works) was obtained from the Livingstone Shire Council's asset register as at 2022.

The establishment cost of future trunk sewerage 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 sewerage 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 sewerage 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 sewerage 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 sewerage supply network.

9.0 Sewerage network schedule of works

Table 7 provides a list of trunk infrastructure planned for the trunk sewerage network and included in the LGIP.

Table 7: Future trunk sewerage infrastructure included in LGIP

Column 1 Map reference	Column 2 Trunk infrastructure	Column 3 Estimated timing	Column 4 Establishment cost[1]
SEW-N016	250mm RM - 625m - Old Scenic Hway RM extension - Scenic Hway, Taranganba	2031	$450,575
SEW-N019	150mm RM - 744 m - Macadamia Drive SPS RM extension, Hidden Valley	2026	$680,015
SEW-N040	450mm GM - 300m - Charles Street to New Arthur Street SPS, Yeppoon	2031	$560,118
SEW-N041	Wattle Grove SPS - Pumps and Wet Well Upgrade/ duplicate, Taranganba/Cooee Bay	2031	$957,757
SEW-N042	Old Scenic Hway SPS - Pump Upgrade, Lammermoor	2031	$109,200
SEW-49	CCEP 225 GM Brown St EA33 Augm (CCSEP Emu Park West)	2031	$300,557

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

Column 1 Map reference	Column 2 Trunk infrastructure	Column 3 Estimated timing	Column 4 Establishment cost[1]
SEW-50	CCEP 375 RM PS1 to STP Augm (CCSEP Emu Park West)	2025 - 2026	$814,141
SEW-51	CCEP 300 GM Hill St New (CCSEP West Emu Park)	2031	$1,035,684
SEW-52	CCEP 150 RM New (CCSEP West Emu Park)	2031	$547,665
SEW-53	CCEP 200 RM Augm (CCSEP Emu Park East)	2026	$332,186
SEW-55	CCEP 150 RM Augm mudflats (CCSEP Zilzie West)	2031 - 2032	$334,776
SEW-56	CCEP 200 RM Hartley St Augm (CCSEP GBRR Nth)	2032 - 2033	$2,015,286
SEW-58	CCEP 100 RM Reef St New (CCSEP Reef St)	2036	$487,422
SEW-60	CCY 450 RM Cordingley St Augm (CCSY Charles St)	2024 - 2025	$462,665
SEW-65	CCY 375 GM Ross Cr New (CCSY Tanby Sth)	2023 - 2024	$1,593,275
SEW-66	CCY 250 RM Tanby Rd Augm (CCSY Tanby Sth)	2023 - 2024	$1,109,441
SEW-67	CCY 300 GM Farnborough Rd Augm (CCSY Farnborough)	2026 - 2027	$997,012
SEW-68	CCY 300 RM Farnborough Rd Augm (CCSY Farnborough)	2026 - 2027	$1,444,404
SEW-69	CCY 225 GM Smith St Augh (CCSY Barlow's Todd)	2027 - 2028	$470,340
SEW-70	CCY 300 GM Smith & Farnborough Rd Augm (CCSY Pacific Hts)	2025 - 2026	$431,886
SEW-75	CSEP SPS 1 Rockhampton Rd Augm (CCSEP Emu Park West)	2026 - 2027	$468,000
SEW-76	CSEP SPS 2 Bell Park Augm (CCSEP Emu Park East)	2027 - 2028	$812,760
SEW-77	CSEP SPS 7 Hartley St Augm (CCSEP Zilzie West)	2033 - 2034	$812,760
SEW-78	CSEP SPS 13 Reef St New (CCSEP Reef St)	2036	$764,400
SEW-79	CSEP SPS Behind Big Whale New (CCSEP Kinka Beach)	2036	$934,284

Column 1 Map reference	Column 2 Trunk infrastructure	Column 3 Estimated timing	Column 4 Establishment cost[1]
SEW-81	CSY SPS 2 Farnborough Rd Augm (CCSY Farnborough)	2023 - 2024	$1,342,224
SEW-82	CSY SPS Tanby Rd (Yeppoon Cr) New (CCSY Hidden Valley)	2033 - 2034	$851,760
SEW-83	CSY SPS Shaw Ave Augm (CCSY Shaw Ave)	2026	$1,248,000
SEW-84	CSY SPS 15 Rosslyn St Augm (CCSY Statue Bay)	2026 - 2027	$812,760
SEW-86	CSY SPS Tanby Rd (Ross Cr) New (CCSY Tanby Sth)	2026	$851,760
SEW-96	CCEP 100 RM Stg 4 SPS New (CCSEP Kinka Beach)	2036	$325,038
SEW-102	CSEP SPS Emu Park Road New (CCSEP West Emu Park)	2032 - 2033	$819,000
SEW-121	CCSY 300 TGM Carige Boulevard (CCSY Tanby Sth)	2023 - 2024	$1,472,484
SEW-122	CCSY 300 TGM Taroomball (CCSY Tanby Sth)	2023 - 2024	$2,187,120
SEW-124	CCSEP 750 TGM Emu Park Rd (CCSEP Emu Park West)	2033 - 2034	$183,378
SEW-125	CCSEP 450 TGM Hartley St (CCSEP Emu Park West)	2031 - 2032	$558,870
SEW-128	CCSY 600 TGM Arthur St (CCSY Yeppoon Central)	2025 - 2026	$816,738
SEW-129	CCSY 300 TGM James St (CCSY Yeppoon Central)	2025 - 2026	$575,796
SEW-131	CCSY 375 TGM Hidden Valley (CCSY Hidden Valley)	2033 - 2034	$1,169,142
SEW-133	Arthur St SPS, New, civil 1 of 2	2024 - 2025	$1,027,962
TOTAL			**$33,168,640**

10.0 Supporting information

Various information sources assisted with the Sewerage Network Trunk Infrastructure Review. The key information sources are identified in Table 8 – Sewerage Network Information Sources.

Table 8 – Sewerage Network Information Sources

Background/Review Information Sources
The Capricorn Municipal Development Guidelines
Queensland Water Recycling Guidelines – December 2005
Sewerage Reticulation Code of Australia (latest version)
Sewage Pumping Station Code of Australia (latest version)
Planning Guidelines for Water Supply and Sewerage (latest version) *Water Supply (Safety and Reliability) Act*