

Towards a National Standard for Non-Metropolitan Wastewater System Design

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Presentation Outline

- The Challenge
- Basis for Design – Asset Design Life and Risk Management
- Comparison of Technical Standards
- Comparison of Construction Cost
- A Possible Solution – If Sufficient Political Willpower Exists

The Challenge – A National Non-Metro CWMS Standard

- Metropolitan standards historically based on state water authority standards, now gradually moving to WSAA code
- For small towns, applying same standards results in over engineered systems for the population size
- Management & regulation of rural township wastewater systems varies throughout Australia

Victoria – Regional Water Authorities

SA – Local Government

WA – Once under Water Corporation management, may soon be again,
requiring rural schemes to be built to metropolitan standards

Basis for Design

- Design Life
 - Metropolitan standard: 100+ year design life for collection system infrastructure due to very high cost of replacement and significant interference to community amenity; Higher water usage; Higher residence occupancy, Allowance for urban in-fill development
 - Non-metro standard: 50-70 year design for collection system infrastructure due to easier access for replacement/renewal; Lower water usage; Lower residence occupancy, Lower population growth (mostly new subdivisions, not in-fill)
- Risk Management
 - Metropolitan standard: Very low (0%) risk of failure, e.g. collection pipe blockage, pump system failure, rising main break or blockage, resulting in overflow
 - Non-metro standard: Low (5-10%) risk of failure, managed through contingency planning and emergency response plans

Basis for Design

- Effluent vs Sewer
 - Metropolitan standard: Only consider sewer due to residential block size limitations for on-site treatment
 - Non-metro standard: Effluent option available where septic tanks (or other on-site wastewater treatment e.g. Enviroflow) exist and remain in serviceable condition; otherwise sewer
- Reclaimed Water Re-Use
 - Metropolitan standard: Very large scale wastewater treatment plants provide reclaimed water for large scale irrigation opportunities (often to “Class A, A+” water quality)
 - Non-metro standard: Small to medium sized wastewater treatment plants, and tertiary treatment of wastewater treatment lagoons, provide localised small scale irrigation opportunities such as town ovals, municipal gardens, golf courses (usually to “Class B” water quality)

Codes vary across the country: Example – Maintenance Hole Spacing

Authority	MAXIMUM SPACING	
	Between Maintenance Holes (MH)	Between Maintenance Shaft (MS) and MS (or MS and MH)
STEDS (Effluent) Design Criteria, LGA (SA)	Not specified – required only at collection pipe junctions	120m (between Flushing Point (FP) & FP (or FP and MH))
SA Water	400m	120m
WSAA Sewerage Code (Melbourne Retail Water Agencies (MRWA) edition)	300m	150m
Barwon Water, VIC	150m (with intermediate MS) 100m (without intermediate MS)	100m (only one MS is allowed between two MH)
South East Queensland	480m	150m

Example – Minimum Grades

	ABSOLUTE MINIMUM GRADES FOR RETICULATION SEWERS			
Authority	DN 100	DN 150	DN 225	DN 300
STEDS Design Criteria, LGA (SA)	1 in 250 (0.4%)	1 in 400 (0.25%)	1 in 666 (0.15%)	Not specified
SA Water	Not allowed	1 in 200 (0.5%)	0.3% (residential) 0.5% (industrial)	1 in 500 (0.2%)
WSAA Sewerage Code (MRWA edition)	1 in 80 (1.25%, residential only)	1 in 150 (0.67%)	1 in 300 (0.33%)	Not specified
Barwon Water, VIC	Not allowed	1 in 180 (0.56%)	1 in 300 (0.33%)	1 in 400 (0.25%)
Calliope Shire, QLD	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code
Pine Rivers Shire, VIC	Not allowed	1 in 150 (0.67%)	1 in 290 (0.34%)	1 in 420 (0.24%)

Example – Pipe Cover

	COVER OVER SEWERS					
Authority	Private residential property and public land not subject to vehicular loading	Private property subject to vehicular loading	Footpaths / frontage	Sealed road pavement	Unsealed road carriageways	Arterial road carriageways
STEDS Design Criteria, LGA (SA)	0.50m	0.60m	Not specified, but 0.60m is assumed	0.75m	0.75m	0.75m
SA Water	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code
WSAA Sewerage Code (MRWA edition)	0.60m (new) 0.45m (existing)	0.75m	0.90m	0.90m	1.2m	1.2m
Barwon Water, VIC	0.75m	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code	See WSAA Sewerage Code
Calliope Shire, QLD	0.60m	0.60m	0.75m	0.75m	0.75m	1.2m
Pine Rivers Shire, VIC	0.60m	0.60m	0.90m	1.2m	1.2m	1.2m
South East Queensland	0.60m (new) 0.45m (existing)	0.75m	0.90m 1.15m (QUU only)	0.90m 1.15m (QUU only)	1.2m	1.2m
Western Water, VIC	0.60m	0.60m	0.60m	0.90m	0.90m	1.2m

Along with variations in:

- Design drawing standards;
- Pump station design requirements;
- Material supply;
- Contract documentation;
- Contingency plans; and
- Operations/maintenance manuals.

South Australian Experience

- SA Water does not manage non-metropolitan wastewater systems
- 1962- SA LGA collaborated with Department of Health, resulting in a design criteria suitable for small townships -

Initially	Common Effluent Drainage Schemes (CEDs);
Then	Septic Tank Disposal Schemes (STEDs);
Now	Community Wastewater Management Systems (CWMS).

- Local Government now owns & operates 170 CEDs/STEDs/CWMS
- Across 45 Councils
- Serving 10% (approx 150,000) of state population

SA STEDS / CWMS Design Criteria

- Principle construction savings achieved through –
 - Simplification of collection network
 - Reduced pipe sizes and grades
 - Use of flushing points, rather than maintenance shafts, and less frequent maintenance holes
- Unnecessary complexity & over engineering is avoided
- **Costs** are kept well below similar schemes built to metropolitan standards

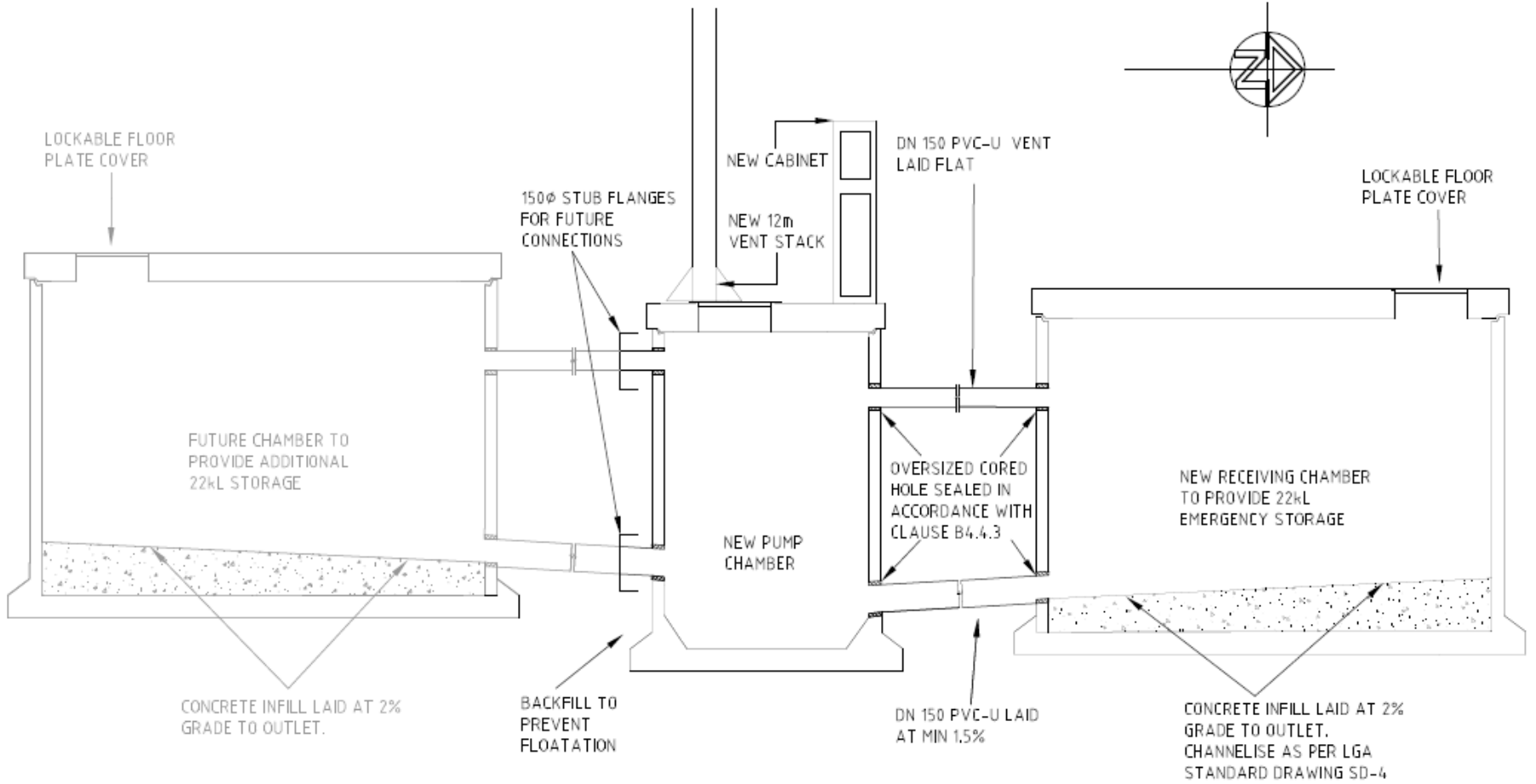
Case In Point – Western Australia

- Brief was to upgrade a Northern WA indigenous community's water supply and septic tank wastewater system
- Extra cost when applying WSAA or WA Water Corp code reduced project to upgrading water supply **only!**
- For wastewater component alone -
 - 100%+ increase** in cost using Water Corp Standards rather than SA LGA CWMS design criteria

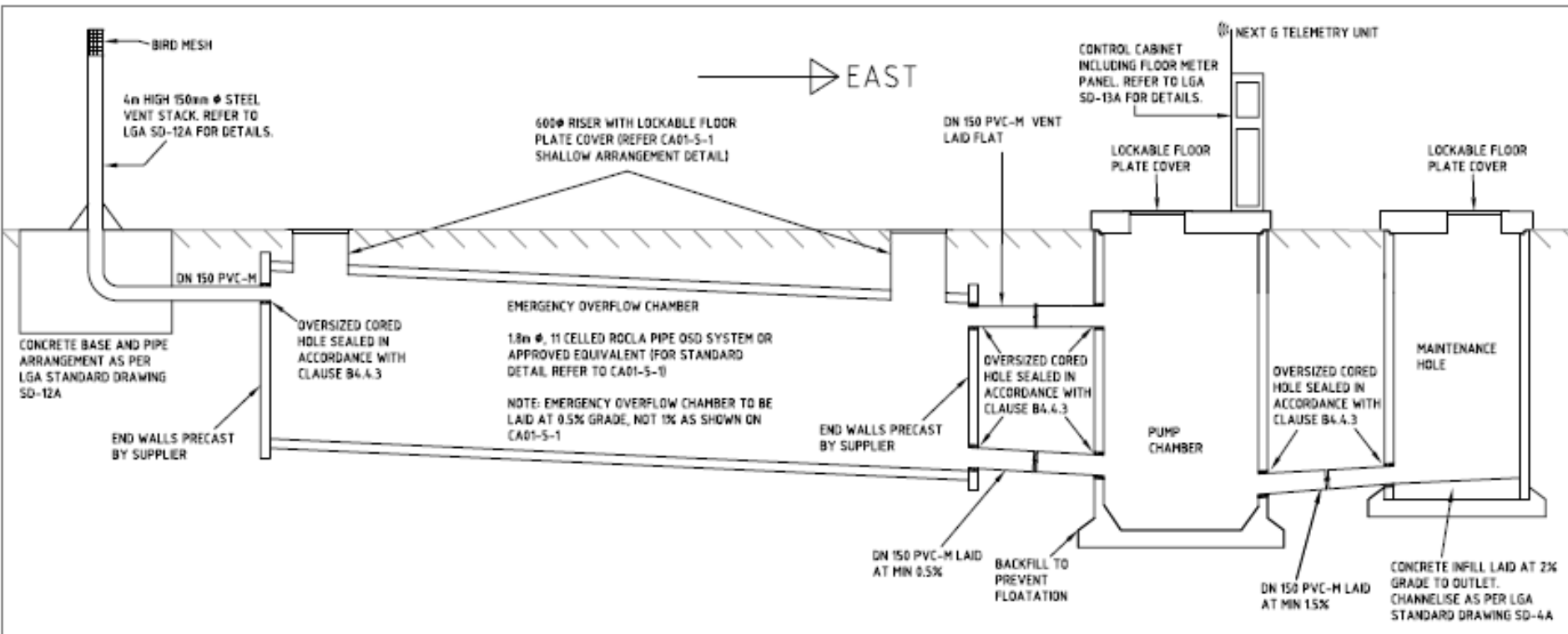
From SA LGA to WaterCorp Code

Examples contributing to cost increase

- More cover over pipes – deeper trenches
- Extensive use of Maintenance Holes (Access Chambers) rather than Maintenance Shafts and Flushing Points
- Extensive detailing of pump station design
- Forced to use higher flow rates for pump station design rather than choosing a pump/rising main combo to deliver daily flow in 6 to 8 hours
- Minimum rising main size required, therefore increased pump size to obtain scouring flows
- Overall much more drawing detail required and therefore cost.



PUMP CHAMBER CONNECTION SCHEMATIC



PUMP CHAMBER CONNECTION SCHEMATIC
(NOT TO SCALE)

Therefore

- With such a costly mismatch between typical water authority codes and an **appropriate** design suitable for small towns available -

What is required for approving authorities in all states to accept a more appropriate, realistic standard for rural communities?

Positive development in South East Qld

(refer www.seqcode.com.au)

Information also provided by Elizabeth Black, Unitywater

- By July 2013, there will be one consolidated set of sewer standards
- The SEQ Design and Construction Code (**SEQ D&C Code**)
- This Code, required by state legislation, is being developed cooperatively between three water and sewerage authorities; namely **Allconnex Water, Queensland Urban Utilities & Unitywater**
- One consolidated set of technical standards will streamline the design process for all SEQ resulting in a much simpler design process, reducing time and subsequently **COST** for developers, engineers, consultants and authorities.

SEQ (D&C) Code Structure

- The core of the code is based on Water Services Association of Australia (WSAA).
- The SEQ water service providers have developed supplementary requirements and technical variations to suit the SEQ water supply and sewerage systems.
- The need for a SEQ version of the National Codes is further reinforced by the fact that (since 2011) WSAA are no longer including standard drawings with any new National Code.
- Service Providers will be responsible for their own standard drawings.

Basis of the SEQ (D&C)

Five core National Codes that form the basis of the SEQ D&C:

- WSA 02-2002 Sewerage Code of Australia;
- WSA 03-2011 Water Supply Code of Australia;
- WSA 04-2005 Sewage Pumping Station Code of Australia;
- WSA 06-2008 Vacuum Sewerage Code of Australia and
- WSA 07-2007 Pressure Sewerage Code of Australia.

With addendums and supplementary notes for issues specific to the SEQ area – from the Brisbane River to the NSW border.

How was this progress achieved?

- The three water and sewerage authorities wanted to streamline;
 - design;
 - construction;
 - system and business operations;
 - contractor relationships;
 - specifications and material supply.
- Challenge to find common ground between the three with authorities

Benefits of the SEQ D&C Code

- Greater consistency of standard for planning, design and construction across the SEQ region;
- Common reference point for the industry and regulators; and
- Improved long term service and lower overall costs.

BUT – mainly for Metropolitan / high population areas

Rural systems would be unnecessarily complex, over engineered and too costly if built accordingly.

Can we hope to follow SEQ's example for rural wastewater systems?

- The area is vast
- There is the tyranny of distance
- Immense climate differences
- Varying soil types, geography and topography
- The challenge is great

Yet small communities in Rural Australia should be able to expect the provision of wastewater systems which are effectively “fit for purpose” at reasonable cost - as is the case in rural South Australia

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Questions?