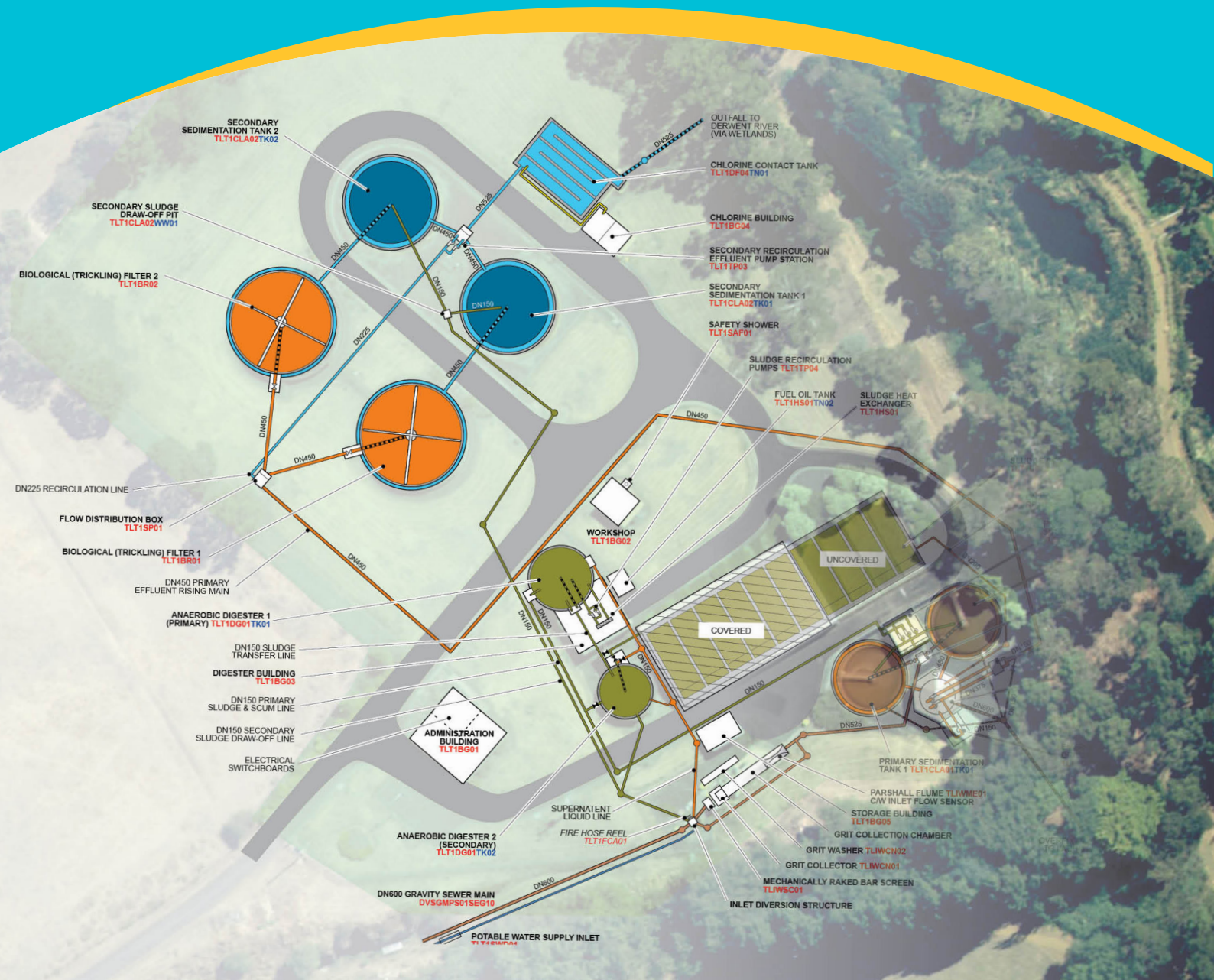
Asset Spatial Data Specification

August 2015, version 1.2



Document Approval and Issue Notice

This is version 1.2 of the TasWater Asset Spatial Data Specification (ASDS).
This document is authorised for release once all signatures have been obtained.

Approval type	Name and position	Signature	Date
Prepared for acceptance	Luke Paine Senior Asset Information Analyst		13/08/2015
Accepted for approval	Ross Luttrell Department Manager Asset Information Management		13/08/2015
Approved for release	Andrew Moir General Manager Asset & Product Management		20/08/2015

Build Status:

Version	Date	Author	Reason	Sections
1.0	02/03/2015	Ross Luttrell	To outline the requirements for providing "as constructed" asset data to TasWater	All
1.1	10/06/2015	Ross Luttrell	Minor changes to asset types and connectivity rules, inclusion of recycled water and stormwater asset data classification	3, 7, 8
1.2	03/08/2015	Luke Paine	Removal of content used for internal purposes only (added to an internal supplement)	7, 8, Appendices

Amendments in this release:

Section	Amendment summary
7.1	Removed reference to dummy connectors, water sample points, water supply zones and water pressure zones
7.2	Removed reference to sewer catchments and sewer sample points, added sewer pressure units, moved boundary kits from valves to sewer pressure units
7.3	Removed some recycled water asset features that are not required
7.4	Removed some stormwater asset features that are not required
8	Removed reference to dummy connectors
Appendices	Removed

Amendments in Previous Release (version 1.1):

Section	Amendment summary
3.2	Additional abbreviations (units of measurement)
7.1	Inclusion of water filling points feature
7.2	Merging of sewer pressurised mains, sewer gravity mains and siphons into a new feature called “sewer mains”
7.2.2 & 7.2.3	Correction regarding ownership of sewer connection point
7.3	Inclusion of recycled water (reuse) asset data classification
7.4	Inclusion of stormwater asset data classification
7.5	Generalisation of site boundaries of asset structures
8.1	Modification of connectivity rules relating to fire hydrants

Distribution:

Copy No	Version	Issue Date	Issued To

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1 Purpose of this Document

1.1 Preface

The purpose of this specification is to provide guidance and reference for:

- the management of asset spatial data by TasWater, and
- the creation and supply of asset spatial data in a standard, consistent format.

This specification applies regardless of the source of the asset spatial data. Ultimately it will aid in the improvement of TasWater's asset data and knowledge to enable informed decision making.

1.2 Scope

This specification covers only major asset categories of water and sewerage infrastructure. It is recognised that other asset classes will need to be included within this specification in time.

This specification references the national codes by the Water Services Association of Australia (WSAA). These codes are used to ensure consistent terminology for the development of asset data schemas and definitions used by TasWater.

2 Contact Details

2.1 Obtaining a copy of this document

The latest version of this specification will be made available on our website www.taswater.com.au under the **Development** > **Development Standards** section.

2.2 Enquiries and feedback regarding this specification

Please direct any enquiries or feedback relating to this document to:

Attention: Department Manager Asset Information Management

Email: assetinfo@taswater.com.au

Additional contact details can be found via our web site:

URL: http://www.taswater.com.au/About-Us/Contact-Us

2.3 Supply of asset data

The supply of asset data that meets the requirements of this specification should be issued to assetinfo@taswater.com.au

The asset data supplied to TasWater must be in a GIS-ready format utilising real-world coordinates (refer to Section 4).

GIS-ready format means that each spatial/geometric feature representing an asset (i.e. point, polyline, polygon, etc.) must have corresponding tabular data linked to the feature. The tabular data will need to contain all the associated non-spatial attributes required for the asset class.

For example, there must be a unique linking identifier/key between the spatial feature (i.e. a polyline representing a pipe) and the non-spatial attributes (i.e. diameter, material, etc.). TasWater refers to this identifier as an “asset number”.

Please note that text annotation (labels) will not be accepted as a substitute for tabular data.

TasWater will accept any industry recognised GIS-ready format including:

- ESRI file geodatabases or shapefiles (preferred)
- MapInfo TAB or MID/MIF files
- AutoCAD DWG files with associated CSV/TXT for the asset attributes
- (for point features only) CSV file with Eastings/Northings coordinates, reduced levels and associated asset attributes.

3 Glossary of Terms, Abbreviations and References

3.1 Abbreviations (general)

Abbreviation	Definition
AMIS	Asset Management Information System
CCTV	Closed Circuit Television (video for pipeline inspection)
DLP	Defects Liability Period (warranty period for assets; usually 12 months)
FA	Final Acceptance (occurs after defects liability period)
GIS	Geographic Information System
IO	Inspection Opening
MH	Maintenance Hole, or Manhole
PC	Practical Completion (hand-over of assets and start of defects liability period)
SPS	Sewage Pumping Station
STP	Sewage Treatment Plant (also referred to as Wastewater Treatment Plant)
TW	Tasmanian Water and Sewerage Corporation known as TasWater
WPS	Water Pumping Station
WTP	Water Treatment Plant

3.2 Abbreviations (units of measurement)

Abbreviation	Definition
DN	*Diamètre Nominal* (nominal diameter or pipe size in mm)
km	Kilometre
kPa	Kilopascal (unit of pressure)
L/s	Litres per second
m	Metre (default unit of measure for position, lengths and heights)
m^2	Square metre (default unit of measure for areas)
m^3	Cubic metre (default unit of measure for volumes)
ML	Megalitre (default unit of measure for capacity)
mm	Millimetre (default unit of measure for positional accuracy and diameters)
RL	Reduced level (default unit of measure is metres)

3.3 Glossary of terms (key dates)

Term	Definition
Installation date	Date that the assets were installed
PC date	Date of Practical Completion; also referred to as commission date
FA date	Date of Final Acceptance; typically date of PC + DLP (12 months)

3.4 Referenced documents

Standard or legislation	Title
AS 5488 – 2013	Classification of Subsurface Utility Information (SUI)
WSA 02 – 2002 – 2.3 MRWA Edition v1.0	Sewer Code of Australia WSA 02 – 2002 Second Edition Version 2.3 Melbourne Retail Water Agencies Edition – Version 1.0
WSA 03 – 2011 – 3.1 MRWA Edition v2.0	Water Supply Code of Australia WSA 03 – 2011 Third Edition Version 3.1 Melbourne Retail Water Agencies Edition – Version 2.0
TW Supplement to WSA 03 – 2011 – 3.1 MRWA Edition v2.0	TasWater Supplement to Water Supply Code of Australia WSA 03 – 2011 Third Edition Version 3.1 Melbourne Retail Water Agencies Edition – Version 2.0
Water Management Act 1999	An Act to provide for the management of Tasmania's water resources and for other purposes
WSA 07 – 2007 – 1.1	Pressure Sewerage Code of Australia WSA 07 – 2007 First Edition Version 1.1

3.5 Accompanying documents

Reference no.	Title
14/77256	Asset spatial data structure for external stakeholder use

4 Datum and Map Projection

4.1 Coordinate system

All data must be supplied in the **Geocentric Datum of Australia 1994** (GDA94).

The map projection to be used is **Map Grid of Australia Zone 55** (MGA Zone 55).

Note that even though King Island straddles MGA Zones 54 and 55, TasWater utilises just MGA Zone 55 for the entire island for administrative efficiency purposes.

4.2 Height datum

Where required heights must be supplied using the **Australian Height Datum (Tasmania) 1983** (AHD83).

Flinders Island utilises a local height datum (**Flinders Island Local Datum**). The datum used for topographic mapping of the Furneaux Group carried out in 1972 is mean sea level as advised by the Division of National Mapping.

5 Data Accuracy and Quality Principles

5.1 General horizontal and vertical accuracy requirements

TasWater utilises absolute spatial positions for its asset locations rather than relative/offset positions. TasWater aspires to have its entire spatial data meeting Data Quality Level A as per AS 5488 – 2013.

The location of points surveyed on surface and surface features are to be measured in terms of absolute spatial positioning with a maximum **horizontal** and **vertical tolerance** of **± 50 mm**. Horizontal measurements are to be taken from the centre of the pipe work or point feature. Vertical measurements are to be taken from the top of water pipes, and the invert of sewer pipes.

5.2 Sewer invert levels

The required minimum vertical accuracy for sewer invert levels is 30 mm. In the event of flat sewers (i.e. 1 in 200 grades) an increased level of survey accuracy will be required.

5.3 Emergency relief overflow structures (EROS)

Refer to Section 7.2.6 below for details regarding emergency relief overflow structures. Full engineering survey vertical control (± 10 mm) is required for the survey of local fittings and setting the control level at which the EROS begins to overflow.

6 Project Metadata

The supply of asset data is to be accompanied with project information, specifically:

1. A polygon representing the area of the work extent, and
2. Tabular information providing details about the asset creation project as per Table **1** below.

Table 1: Required details about the asset creation project

Field name	Description
ServiceActivityRef	Project reference, either a TasWater job/project reference, a development application reference, or an internal service order reference
DocReference	To be provided by TasWater (reference to documents within HP TRIM)
ProjectTitle	The title of the project
DataAuthor	The person who created the asset data
DataSupplyDate	The date that the data was supplied

7 Asset Data Schema

Listed below are the asset data classifications with individual schemas that have been currently developed:

- Water asset data schema (Section 7.1)
- Sewer asset data schema (Section 7.2)
- Recycled water (reuse) asset data schema (Section 7.3)
- Stormwater asset data schema (Section 7.4)
- General asset data schema (Section 7.5).

The above data classifications incorporate assets that TasWater owns and/or maintains. They do not incorporate privately owned/maintained assets – these assets will be presented in separate feature classes.

In time additional asset data classifications will be prepared for additional asset classes including:

- Serviced land
- TasWater land, property and easements
- Roads and accesses to TasWater sites
- Network communications infrastructure
- Buildings and heritage-listed assets.

7.1 Water asset data schema

Table **2** below outlines the feature classes that TasWater categorises as water asset data.

Table 2: List of water asset feature classes

Feature class	Description	Feature type	Section
wMain	Water mains (pipelines and channels)	Polyline	7.1.1
wPropertyService	Water property services	Polyline	7.1.2
wCustomerConnectionPoint	Water customer connection points	Point	7.1.3
wValve	Water valves	Point	7.1.4
wAirValve	Water air valves	Point	7.1.5
wFillingPoint	Water filling points	Point	7.1.6
wHydrant	Fire plugs and hydrants	Point	7.1.7
wNetworkMeter	Water network meters	Point	7.1.8
wPit	Water pits	Point	7.1.9
wTank	Water tanks	Point	7.1.10
wReservoir	Water reservoirs	Point	7.1.11
wPumpingStation	Water pumping stations	Point	7.1.12
wBreakPressureTank	Break pressure tanks	Point	7.1.13
wIntake	Water intakes	Point	7.1.14

Feature class	Description	Feature type	Section
wTreatmentPlant	Water treatment plants (WTP)	Point	7.1.15
wSamplingPoint	Water sampling points	Point	7.1.16
wSupplyZone	Water supply zones	Polygon	7.1.17
wPressureZone	Water pressure zones	Polygon	7.1.18

7.1.1 Water mains (pipelines and channels)

Mains distribute water throughout the network (water supply system). They are usually pressurised with the exception of channels and water races.

There are a number of water main types, as follows:

Type	Explanation
Raw water main	Raw water mains are pipes that transport untreated water, typically from the water source/catchment to the treatment site. Raw water mains are excluded from National Performance Indicator A2 (Length of water mains). Raw water mains are also referred to as “intakes”. Note that some towns are supplied with non-treated water (e.g. Mole Creek and Winnaleah). These assets are not considered as raw water mains, rather they are distribution and reticulation mains carrying non-potable water.
Bulk transfer main	*A water main that interconnects source(s), treatment works, reservoir(s) and/or supply areas, normally without direct consumer connections.*[1] Transfer mains were historically termed “trunk mains” along with distribution mains.
Distribution main	*A water main serving as the principal distributor within the supply area, normally without direct consumer connections.*[1] Distribution mains were historically termed “trunk mains” along with transfer mains.
Reticulation main	*A water main that connects a distribution main with service pipes. Reticulation mains are generally sized DN100 to DN375.*[1]

[1] WSA 03 – 2011 – 3.1 MRWA Edition v2.0

Type	Explanation
Reticulation sub-main	*A water main that connects a reticulation main with service pipes within discrete areas where the number of consumers is small, thereby minimising deterioration of water quality. Reticulation sub-mains are generally sized DN40 to <DN100.*[1] Reticulation sub-mains can also be referred to as rods, rider mains (connecting properties on the opposite side of a road) and loop mains (connecting properties in a cul-de-sac at the end of a road). A rider main (or duplicate main) is *an additional main, laid parallel to the original main (usually on the other side of the road), to service allotments that cannot be easily serviced from the original main*[1]. If a main connects three or more properties then it should be classified as a reticulation sub-main, rather than as a property service pipe[2]. Figure **2** below provides some examples of rider and loop mains.
Scour pipe	An assembly of valves and fittings installed at low points in the network and used for dewatering a portion of pipeline for operational or maintenance purposes.
Overflow pipe	Overflow pipes are connected to a reservoir or tank for the carriage of surplus water from the storage to a stormwater system or other watercourse.
Channel	Channels are open furrows that form part of the water supply network and can include aqueducts (elevated channels), races, tunnels and natural waterways that form part of the water supply network (such as creeks). They do not include hard water channels or catch drains which are used to prevent rainwater running into a reservoir.

[2] Note that WSA 03 – 2011 – 3.1 MRWA Edition v2.0 defines *a service pipe that bifurcates into two services to provide on-property connection points for two properties from a single connection at the water main* as a "split service".

A typical schematic of a water supply system is shown in Figure **1** below and identifies some of the different types of water mains.

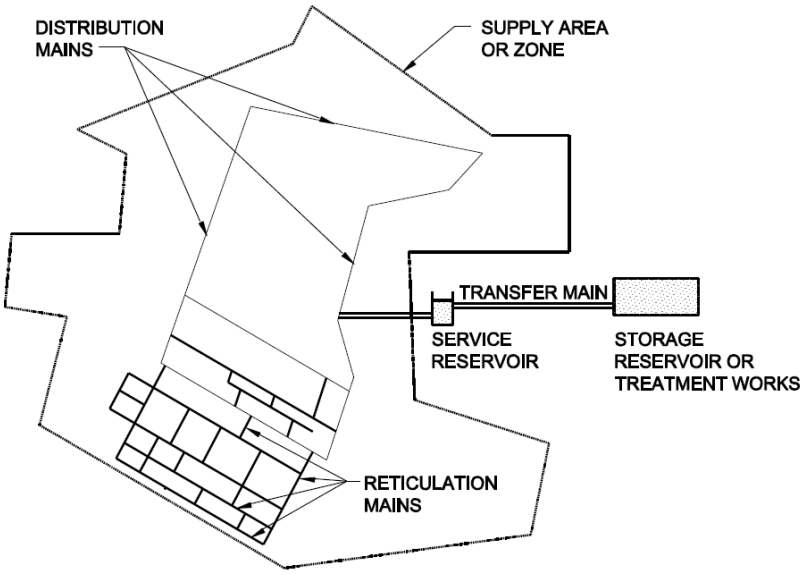

Figure 1: Typical water supply system (source: WSA 03 – 2011 – 3.1 MRWA Edition v2.0)

Figure **2** below provides some examples of reticulation mains, sub-mains and property service pipes.

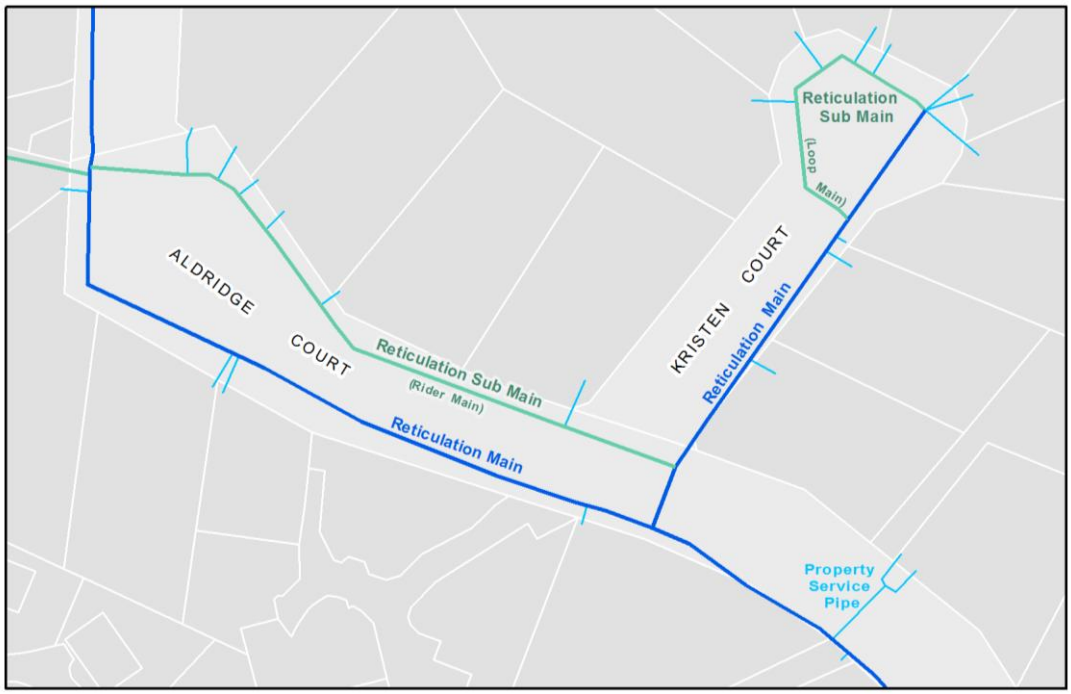

Figure 2: Examples of reticulation sub-mains and property service pipes

7.1.2 Water property services

A property service is *a water pipe that supplies water from the reticulation main to the consumer* (see Figure **3** below). *The portion of the service pipe under the control of* (TasWater) *generally terminates at the water meter* (customer connection point – see Section 7.1.3 below)*, or in the case of fire services, the isolating valve of the fire protection system at the main.*[3]

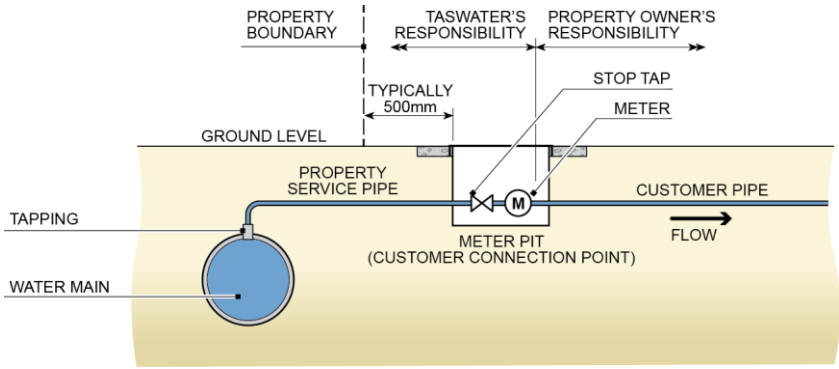

Figure 3: A diagram of a typical residential water property service and customer connection point

Figure 2 above provides an example of a property service pipe servicing two properties. Please note that if a pipe connects three or more properties then it should be classified as a reticulation sub-main, rather than as a property service pipe[4].

7.1.3 Water customer connection points

A water customer connection point represents the location of the stop tap and water meter that separates the property service pipe and the customer private pipe.

Note that the details of the water meter are not stored within the asset information system rather they are managed within TasWater's customer and billing information system. However there is an exception to this rule – details for water network meters (refer to Section 7.1.8 below) are recorded in the asset information systems.

Based on the purpose of the water used from the customer connection point, the point is classified as follows:

Service type	Explanation
Standard service connection	A standard service connection is the connection point to a property where water is used for domestic, commercial or small industrial purposes. It collectively includes the meter, stop tap and backflow prevention device (where available) for the property.

[3] WSA 03 – 2011 – 3.1 MRWA Edition v2.0

[4] Note that WSA 03 – 2011 – 3.1 MRWA Edition v2.0 defines *a service pipe that bifurcates into two services to provide on-property connection points for two properties from a single connection at the water main* as a "split service".

Service type	Explanation
Designated fire service	A designated fire service is a connection that certain businesses require under legislation. Under the Building Code of Australia it is a requirement for buildings/properties running certain activities to have fire protection on their own property (for example: schools, hospitals and other high risk businesses). The connection may include a stop tap and a meter of some description with either a single or double detector check valve.
Capped service	This is a service which is disconnected, and for which the property service has been closed off by capping.
Fire/standard combined service	A fire/domestic combined service is a connection that combines (physically) a designated fire service (fire protection on the property) and a domestic connection for domestic water usage purposes. However under current regulations these fire/ domestic combined services are no longer allowed in development applications – these two services must be separate.

7.1.4 Water valves

Water valves control the flow of water within a pipeline. There are four primary classifications of valves, as follows:

Type	Explanation
Non-return valve	A non-return valve permits the flow of water in only one direction. As they prevent the reverse flow of water from the downstream section of a pipe to the pipe upstream of the valve, they are used for example, on a connection to a farmer's irrigation supply to prevent any contamination from the irrigation supply to the primary water supply (back flow prevention). Non-return valves work automatically (therefore they don't require an external power source) and are also known as check valves or reflux valves. A non-return valve can have one of two functions: • Non-return: used as a component in our water system • Backflow prevention: prevents backflow from a customer service and includes RPZDs (Reduced Pressure Zone Devices).
Isolation valve	Isolation valves are designed to start and stop the flow of water within the network to isolate portions of the network for maintenance or repair. Isolation valves can be further classified according to the function they perform. • Isolation valve: dictates water flow along a pipe in system • Scour valve: allows water to be drained from the pipe • Ferrule: used to control the flow of water into a connection line or reticulation sub-main – also referred to as a maintap or maincock.
Zone valve	Zone valves are a type of isolation valve and are used to prevent the flow of water from one zone to another. These valves are normally closed. Zone valves have been separated from other isolation valves due to connectivity rules (refer to Section 8 below).

Type	Explanation
Control valve	A valve that controls the flow of water through the pipe by reducing, relieving or maintaining the water flow. There are four types of control valves: • A pressure reducing valve automatically reduces the pressure to a predetermined value on the downstream side of the valve. • A pressure sustaining valve automatically maintains the pressure to a predetermined value on the upstream side of the valve. • A pressure relief valve automatically opens to relieve pressure in the pipeline, which keeps pressure at a predetermined level. It is designed to re-set itself once excess pressure has been relieved. • A flow control valve regulates the flow or pressure of the water. Flow can either be increased or decreased. Flow control valves are usually automated and are used for example, to control the flow of water into a reservoir. Altitude valves and float valves that control the level of a tank are types of flow control valves.

Note that air valves and fire hydrants are managed as separate feature classes (see Sections 7.1.5 and 7.1.7 respectively) as they do not control the flow of water within a water main.

7.1.5 Water air valves

Air valves relieve the pipe system of trapped air or allow air into the pipe during draining maintenance. They include breather vents and also maintenance valves used to isolate the air valve for maintenance purposes.

These features are represented as a point capturing the centre of the valve.

7.1.6 Water filling points

A filling point is essentially a valve that allows for the collection of water, for example, by water cartage trucks.

These features are represented as a point capturing the centre of the valve.

7.1.7 Fire plugs and hydrants

There are two types of assets in this category, as follows:

Type	Explanation
Fire plug	Fire plugs are a special type of in ground connection on distribution and reticulation mains that provide access to water supply for the purpose of fighting fires.
Fire hydrant	Fire hydrants are similar to a fire plug but provide above ground access via a standpipe.

7.1.8 Water network meters

A network meter (or flow meter) is used in field operations to measure water flow at a particular location on the network.

These features are represented as a point capturing the centre of the meter.

7.1.9 Water pits

Pits are used to house infrastructure (valves, etc.) that are required to be accessed for operations or maintenance. They can be either under or above ground.

The centre of these pits is recorded as a point within this feature class; however the footprint of larger pits (e.g. major pits) may be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

7.1.10 Water tanks

Water tanks, also referred to as service reservoirs, are typically cylindrical water storage structures that supply water to the water supply zone.

For tanks and similar storages, the centre of the storage is recorded spatially as a point. The footprint of the tank will be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

The common measurements and other attributes associated with water tanks that are needed to be captured and recorded are indicated in Figure **4** below.

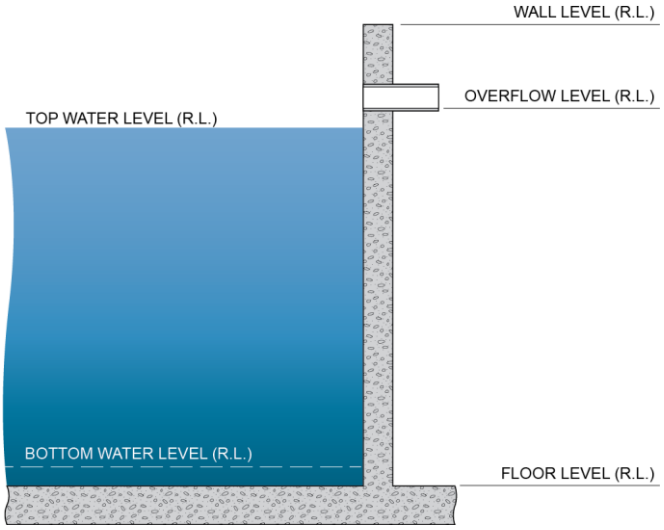

Figure 4: A cross section of a water tank showing some of the required fields for data collection

7.1.11 Water reservoirs

Water reservoirs are large bodies of water, either a natural lake, or artificially created using a dam wall to impound the water.

For water reservoirs, the centre of the storage is recorded spatially as a point. The footprint of the reservoir will be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

Refer to Section 7.5.1 below for details about the actual embankment that is used to impound the water.

7.1.12 Water pumping stations

Water pumping stations are facilities that house pumps and equipment for moving water from a lower location on the network to a higher location or for boosting water pressure. A water pumping station is represented by the centroid of the water pumping station building, which is useful when viewing water pumping stations over a large geographic area.

The centre of these water pumping stations is recorded as a point within this feature class; however the footprint of the water pumping station building (or the pump itself for small booster pumping stations) will be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

7.1.13 Break pressure tanks

Break pressure tanks are structures that limit the amount of pressure that can be transferred to downstream sections of the pipe.

The centre of these break pressure tanks is recorded as a point within this feature class.

7.1.14 Water intakes

A water intake is the location that the natural water enters the water system. They can consist of:

Type	Explanation
Bore	A bore is a vertical drill shaft, used to either provide a monitoring function, or to allow access to groundwater aquifer for supply of raw water.
Weir	A point where raw water from a river or drinking water catchment is channelled to enter the water system. Refer to Section 7.5.1 below for details about the actual embankment that is used to impound the water.

7.1.15 Water treatment plants (WTP)

Water treatment plants treat raw water prior to distribution into the water network.

Type	Explanation
Treatment plant	Treatment plants perform the full water treatment process.
Primary disinfection dosing station	Primary disinfection (via typically either chlorine or ultraviolet radiation) kills or inactivates bacteria, viruses, and other potentially harmful organisms in drinking water. Primary disinfection may also include fluoride dosing.
Secondary disinfection dosing station	Secondary disinfection provides longer-lasting water treatment as the water moves through pipes to consumers (maintains the chlorine residual). Secondary disinfection may also include fluoride dosing.
Screen	A screen is used to remove large objects from the water supply.

The centre of these water treatment plants is recorded as a point within this feature class; however the footprint of the water treatment plant building/site will be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

7.1.16 Water sampling points

For internal use only.

7.1.17 Water supply zones

For internal use only.

7.1.18 Water pressure zones

For internal use only.

7.2 Sewer asset data schema

Table **3** below outlines the feature classes that TasWater categorises as sewer asset data. This schema includes assets that provide combined sewer/stormwater services, but excludes stormwater-only assets.

Table 3: List of sewer asset feature classes

Feature class	Description	Feature type	Section
sMain	Sewer mains (pipelines)	Polyline	7.2.1
sPropertyService	Property connection sewer	Polyline	7.2.2
sCustomerConnectionPoint	Sewer customer connection points	Point	7.2.3
sPressureUnit	Pressure sewer units	Point	7.2.4
sMaintenanceHole	Sewer maintenance (man) holes	Point	7.2.5
sValve	Sewer valves	Point	7.2.6
sAirValve	Sewer air valves	Point	7.2.7
sVent	Sewer vents	Point	7.2.8
sInspectionPoint	Sewer inspection points	Point	7.2.9
sNetworkMeter	Sewer network meters	Point	7.2.10
sPit	Sewer pits	Point	7.2.11
sPumpingStation	Sewage pumping stations (SPS)	Point	7.2.12
sSamplingPoint	Sewer sampling points	Point	7.2.13
sTreatmentPlant	Sewage treatment plants (STP)	Point	7.2.14
sSystem	Sewer systems	Polygon	7.2.15
sCatchment	Sewer catchments	Polygon	7.2.16

7.2.1 Sewer mains (pipelines)

Sewer mains transport sewage throughout the network (sewerage system). Typically the mains are either pressurised or rely on gravity to move the sewage to a treatment plant. Sewer mains are categorised as follows:

- Sewer pressurised mains (either rising sewer mains or pressure reticulation sewer mains)
- Sewer gravity mains (either trunk sewer, reticulation sewer, overflow mains or outfall pipes)
- Siphons.

Type	Category	Explanation
Rising main	Pressurised main	*Sewer mains that are pressurised by sewage pumping stations.*[5] Rising sewer mains are sealed pipes that convey sewage via pumps at pumping stations that lift and push the sewage along.
Pressure reticulation main	Pressurised main	*A common main which transfers sewage from a number of properties to a downstream point in a pressure sewer system i.e. a component of pressure sewer reticulation.*[6] This type of system may be adopted where there is insufficient fall for traditional gravity systems.
Scour pipe	Pressurised main	A section of pipe leading to a scour.
Gravity trunk main	Gravity main	*Principal sewer of a catchment system that drains to the point of treatment.*[5] This type also includes "branch sewers"; that are *a network of pipes nominally DN375 to DN600 that connects reticulation sewers.*[5]
Gravity reticulation main	Gravity main	*A sewer, generally DN100 to DN300, for the collection of wastewater from individual properties and conveyance to branch and trunk sewers or to a point of treatment.*[5] Note that where a reticulation sewer serves more than one property, it will be classed as a gravity main, up to the point where it separates to the individual Property connection sewer (see Section 7.2.2 below).
Overflow pipe	Gravity main (or pressurised main in some instances)	Overflow mains discharge untreated, raw sewage into local waterways or stormwater to relieve excess flows within the system.
Outfall pipe	Gravity main (or pressurised main in some instances)	Outfall pipes convey treated water from a sewer treatment plant to the environment, such as a river.
Vent pipe	Gravity main	A section of pipe leading to a sewer vent.
Emergency storage pipe	Gravity main	A section of pipe used for the purpose of emergency sewage storage.

[5] WSA 02 – 2002 – 2.3 MRWA Edition v1.0
[6] WSA 07 – 2007 – 1.1

Type	Category	Explanation
Siphon	Hybrid	A siphon is a gravity main where a section in the middle of the siphon is lower (or higher) than its outlet. Siphons are usually used where a gravity sewer on grade (straight line between up and downstream ends) would be above ground, e.g. to cross other drainage features without having an elevated pipe where it could be damaged by flood. In some cases they can be used to convey sewage across long distances by using the significant gravity head available on the upstream end to overcome the friction of long flat pipe grades.

Figure **5** below outlines the different types of pipelines within a gravity sewerage system.

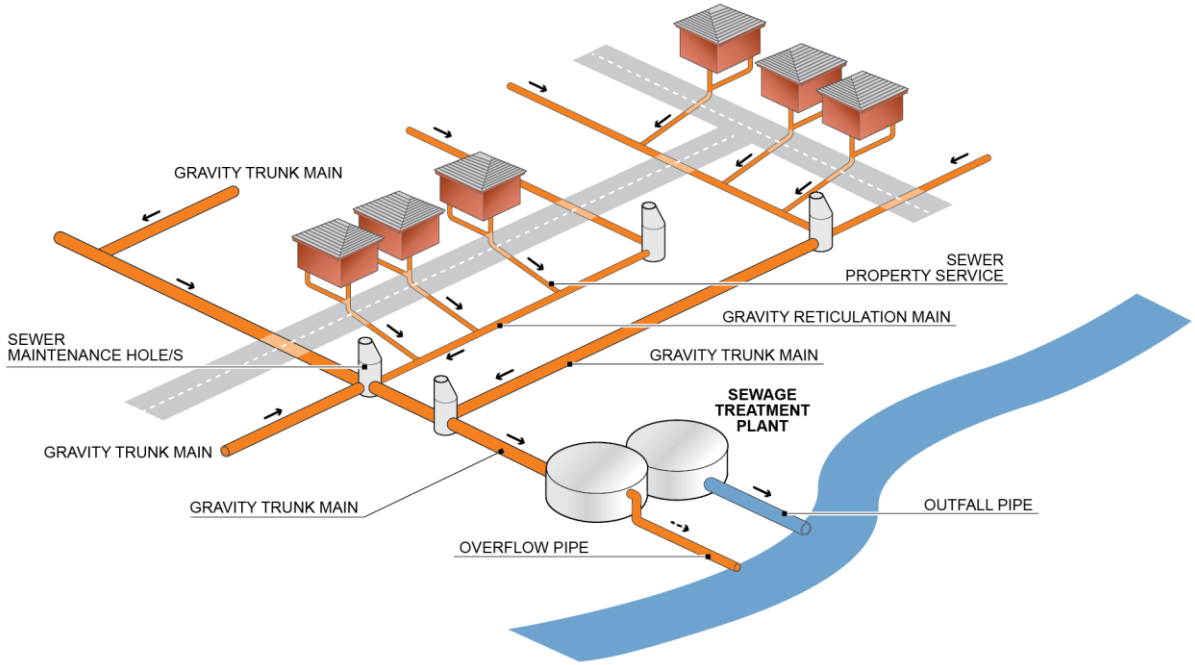

Figure 5: Typical gravity sewerage system

7.2.2 Property connection sewer

A property connection sewer is *a short sewer* (less than DN300), *owned and operated by* (TasWater), *which connects the main sewer and the customer sanitary drain; it includes a junction on the main sewer, a property connection fitting, in some cases a vertical riser, and sufficient straight pipes to ensure the property connection fitting is within the lot to be serviced.*[7]

There are three types of property connection sewers, as follows:

[7] WSA 02 – 2002 – 2.3 MRWA Edition v1.0

Type	Explanation
Gravity sewer	An unpressurised property connection sewer that feeds into a gravity reticulation sewer – refer to Figure **6** below.
Pressure sewer	A property connection sewer connected to a pressure sewer system (and includes the pressure sewer lateral – typically *a main that connects a pressure reticulation sewer to a property boundary assembly*[8]) – refer to Figure **7** below.
Blank pressure sewer lateral	A capped DN40 stub pipe along the pressure reticulation sewer main to allow for future property connection – refer to Figure **7** below.

The property connection sewer does not include the pipe connecting the house to the customer connection point.

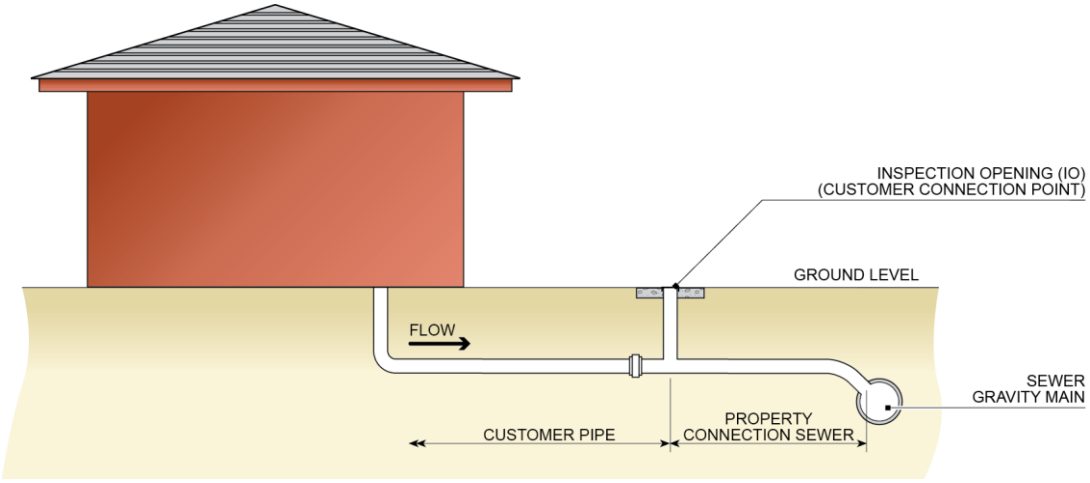

Figure 6: A diagram of a typical sewer (gravity) customer connection point (note that a similar arrangement occurs when a boundary trap is used instead of the IO)

[8] WSA 07 – 2007 – 1.1

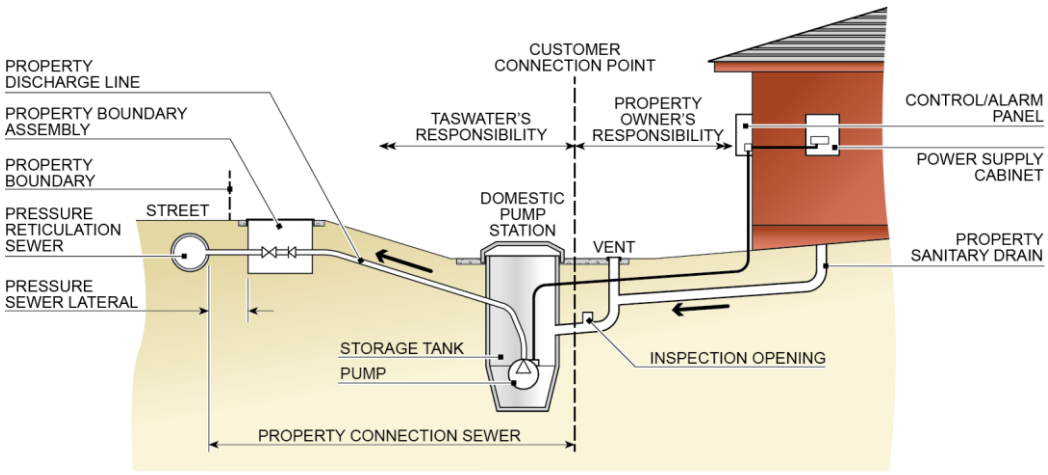

Figure 7: A diagram of a typical sewer (pressure) customer connection point

7.2.3 Sewer customer connection points

A sewer customer connection point is the *point of connection between the property connection sewer and the customer sanitary drain*[9]. As the IO it is an above ground feature, it is used to identify the general location of the connection point.

For a pressure sewer system the connection point is between the collection tank and the customer sanitary drain.

For a combined sewer system (including stormwater) the connection point is at the back of the sealed gully pit. The gully pit itself, and the inspection opening at the back of the gully pit, are owned by Council.

A sewer service customer connection point represents the location of the connection between the customer and the sewerage system. It includes the pipework, inspection opening (IO), and any other fittings on the pipe. Refer to Figure **6** and/or Figure **7** above for the asset/location that is referred to as the customer connection point.

7.2.4 Pressure sewer units

Within a pressure sewer system there are a number of assets to be recorded, as follows:

[9] WSA 02 – 2002 – 2.3 MRWA Edition v1.0

Type	Explanation
Boundary assembly	Boundary assemblies act broadly as a non-return valve when installed as a placeholder for a future sewer customer connection on the end of a blank lateral, but then acts as a non-return/isolation valve for the property connection. These are located on property connection sewers, usually at the boundary to the property. Refer to the component labelled "Property Boundary Assembly" in Figure **7** above.
Collection tank	Refer to the component labelled "Storage Tank" in Figure **7** above.
Control panel	Refer to the component labelled "Control/Alarm Panel" in Figure **7** above.

7.2.5 Sewer maintenance (man) holes

A maintenance hole is *a chamber with a removable cover which allows human and machine access to a (typically buried) sewer; abbreviation MH retains the traditional abbreviation for "manhole"*[9].

They are protected by a cover designed to prevent unauthorised access to the maintenance hole and seal in any gases.

The common measurements and other attributes associated with maintenance holes that are needed to be captured and recorded are indicated in Figure **8** below.

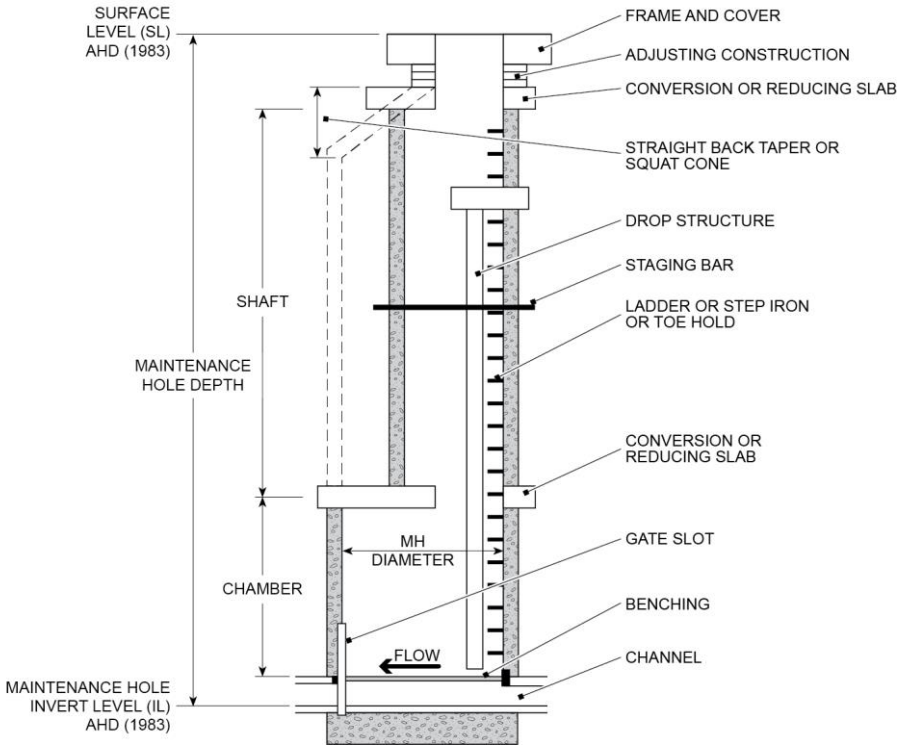

Figure 8: A diagram of a typical maintenance hole

With respective to invert levels (ILs), the IL of all inlets and the outlet are required to be captured.

7.2.6 Sewer valves

Sewer valves control the flow of sewage within a pipeline. The classification of valves is as follows:

Type	Explanation
Isolation valve	Isolation valves are designed to start and stop the flow of sewage within the network to isolate portions of the network for maintenance or repair. Depending on its location and configuration in the network, an isolation valve (also known as a stop valve, gate valve or penstock valve in the combined system) can perform different functions and can be referred to as: • Isolation valves: dictate whether sewage continues along a pipe in the system • Scour valves: dictate the flow of sewage into scouring pipes or flushing points.
Non-return valve	A non-return valve permits the flow of sewage in only one direction. A tide flap is treated as a non-return valve.
Scour	A scour valve to allow wastewater to be drained from the pipe.
EROS	An Emergency Relief Overflow Structure permits a sewer to overflow in a preferred location where the consequences of sewage overflow have a reduced impact on public or environmental health. EROS are used in situations where private fittings are low in relation to manhole lid levels and a risk of house flooding exists. Full engineering survey vertical control (± 10 mm) is required for the survey of local fittings and setting the control level at which the EROS begins to overflow.

7.2.7 Sewer air valves

Sewer air valves passively regulate the input or build-up of air in a sewerage rising main. They do not regulate the flow of sewage though the pipe system.

7.2.8 Sewer vents

A sewer vent or vent shaft is *a structure provided to limit pressure fluctuations within the sewerage system, for air to enter the system and for sewer gases to escape from the system*[10].

A sewer vent is a facility (usually a vent pole or larger stack) to allow potentially dangerous gases to escape (educt) from the sewer network and/or for fresh air to enter the sewer (induct). Vents are usually installed on sewerage treatment plants, trunk sewers and sewage pumping stations. Their principal function is to promote aerobic conditions which limits the generation of dangerous levels of hydrogen sulphide which is a lethal gas and precursor of sulphuric acid which attacks sewer pipes and systems. Vents also have the function of removing any pressure in the air space above sewers or pump wells: in broad terms every litre of sewage delivered to a sewage pumping station must displace a litre of gas from the pumping station sewer vent.

[10] WSA 02 – 2002 – 2.3 MRWA Edition v1.0

Large vents have been constructed in the Launceston city area due to large volumes of air in the combined system when stormwater floods in.

7.2.9 Sewer inspection points

Sewer inspection points include the following types:

Type	Explanation
System inspection opening	System inspection openings (that are located on the sewer mains and not referring to the IOs as part of the sewer customer connection point), including lamp holes, are a fitting with provision for visual inspection and limited access to facilitate inspection and testing and/or clearing of obstructions, but not human access.
Maintenance shaft	Maintenance shafts are structures on a sewer between maintenance holes (MH), larger than an inspection opening, which provides equipment access but not person access to the sewer and which allows limited change of grade and/or direction; used where appropriate as an alternative to MHs.
Terminal maintenance shaft	Terminal maintenance shafts are an end of line access point to insert cleaning rods into (also referred to as “rod eyes”).

7.2.10 Sewer network meters

Network meters are used in field operations to measure sewage flows at a particular location. They can be used to measure system flows, particularly to identify localised issues of infiltration or inflow.

7.2.11 Sewer pits

Pits are used to house infrastructure (valves, etc.) that are required to be accessed for operations or maintenance. They can be either under or above ground.

The centre of these pits is recorded as a point within this feature class; however the footprint of larger pits may be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

7.2.12 Sewage pumping stations (SPS)

Sewage pumping stations are facilities that house pumps and equipment for pumping sewage from a lower location on the network to a higher location. A sewage pumping station is represented by the centroid of the sewage pumping station building, which is useful when viewing sewage pumping stations over a large geographic area.

The centre of these sewage pumping stations is recorded as a point within this feature class; however the footprint of the sewage pumping station building will be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

7.2.13 Sewer sampling points

For internal use only.

7.2.14 Sewage treatment plants (STP)

Sewage treatment plants are facilities designed to remove the wastes from the sewage to make it safe to release to the environment through a number of processes.

Type	Explanation
Level 1 STP	A classification from Environmental Management and Pollution Control Act 1994 (EMPCA) for a STP that has an influent volume of less than 100kL/day and is regulated by local government (Councils).
Level 2 STP	A classification from Environmental Management and Pollution Control Act 1994 (EMPCA) for a STP that has an influent volume of greater than 100kL/day and is regulated by the EPA

The centre of sewage treatment plants is recorded as a point within this feature class; however the footprint of the sewage treatment plant building/site will be available in the Site boundaries of asset structures feature class (see Section 7.5.2 below).

7.2.15 Sewer systems

For internal use only.

7.2.16 Sewer catchments

For internal use only.

7.3 Recycled water (reuse) asset data schema

Table **4** below outlines the feature classes that TasWater categorises as recycled water asset data. Please note that recycled water assets are similar in nature to water assets, therefore the same details also apply.

Table 4: List of recycled water asset feature classes

Feature class	Description	Feature type	Section
rMain	Recycled water mains	Polyline	7.1.1
rPropertyService	Recycled water property service	Polyline	7.1.2
rCustomerConnectionPoint	Recycled water customer connection points	Point	7.1.3
rValve	Recycled water valves	Point	7.1.4
rAirValve	Recycled water air valves	Point	7.1.5
rHydrant	Fire plugs and hydrants within a recycled water system	Point	7.1.7
rNetworkMeter	Recycled water network meters	Point	7.1.8
rPit	Recycled water pits	Point	7.1.9
rTank	Recycled water tanks	Point	7.1.10
rReservoir	Recycled water reservoirs	Point	7.1.11
rPumpingStation	Recycled water pumping stations	Point	7.1.12

7.4 Stormwater asset data schema

Table **5** below outlines the feature classes that TasWater categorises as stormwater asset data. Please note that stormwater assets are similar in nature to sewer assets, therefore some of the same details also apply.

Table 5: List of stormwater asset feature classes

Feature class	Description	Feature type	Section
dMain	Stormwater mains (pipelines) *limited to the following types:* • *Gravity main* • *Rising main* • *Outfall pipe*	Polyline	7.2.1
dPropertyService	Stormwater property connection pipe	Polyline	7.2.2
dMaintenanceHole	Stormwater maintenance (man) holes *inclusive of the following types:* • *Maintenance hole* • *Side entry pit (also referred to as gully pit)* • *Gross pollutant pit (also referred to as gross gully trap)*	Point	7.2.5
dValve	Stormwater valves *limited to the following types:* • *Air valve* • *Penstock* • *Tide flap*	Point	7.2.6 7.2.7
dInspectionPoint	Stormwater inspection points	Point	7.2.9
dPumpingStation	Stormwater pumping stations (SPS)	Point	7.2.12

7.5 General asset data schema

Table **6** below outlines the feature classes that TasWater categorises as general asset data. It currently used specifically dam assets at this point in time.

Table 6: List of general asset feature classes

Feature class	Description	Feature type	Section
DamWall	Dam walls and embankments	Point	7.5.1
AssetBoundary	Site boundaries of asset structures	Polygon	7.5.2

7.5.1 Dam walls and embankments

Dam walls are used to either impound water or alter its flow characteristics. The purpose of this asset data class is to identify the dam wall structure and similar assets that need to be managed in accordance to dam safety management guidelines. This applies to dams that can impound 1 ML or greater of water or waste, or is on a watercourse (Water Management Act 1999).

Type	Explanation
Water reservoir embankment	An embankment that impounds raw or drinking water creating a water reservoir (refer to Section 7.1.11 above). This also includes “turkey nest” dams.
Water weir embankment	Weirs are a wall placed in an open channel used to measure the flow of water, or a large structure in a river or stream to impound water (refer to Section 7.1.14 above).
Sewage lagoon embankment	A sewage lagoon is typically part of a sewage treatment plant used for the treatment of raw sewage. The embankment is used to impound the sewage in the lagoon.
Sewage detention basin embankment	A sewage detention basin is used to store excess sewage beyond the capacity of the sewage treatment plant, preventing sewage overflow into the natural environment. The embankment is used to impound the sewage in the detention basin.
Reuse reservoir embankment	An embankment that impounds reuse water creating a reuse reservoir.

To reiterate, this feature class is representing the actual dam wall structure, or embankment, and not the water body. Separate feature classes are also used to represent the actual water body (i.e. water reservoir).

A point, representing the centre of the dam wall or weir, is recorded spatially for this feature class.

In the event that two (or more) embankments are used to impound the same water body[11], multiple points are to be used, one for each embankment (refer to Figure **9** below).

[11] Parting Creek Lake and Swansea Dam are two examples where two separate embankments are used to impound the same water body.

Figure 9: Example of two embankments to impound the same water body

For “turkey nest” dams, the point should be placed where the wall height is the greatest.

7.5.2 Site boundaries of asset structures

Site boundaries of water, sewer and recycled water structures include the footprints for:

- Water treatment plants (WTP) – refer to Section 7.1.15
- Water pumping stations – refer to Section 7.1.12
- Water tanks – refer to Section 7.1.10
- Water reservoirs – refer to Section 7.1.11
- Water pits that are significantly large – refer to Section 7.1.9.
- Sewage treatment plants (STP) – refer to Section 7.2.14
- Sewage pumping stations (SPS) – refer to Section 7.2.12
- Sewer pits that are significantly large – refer to Section 7.2.11.

While these structures are recorded as points, many of these features are also presented as polygons in this feature class layer to allow the footprint of the structure to be recorded.

8 Spatial Data Connectivity Rules

All spatial information submitted to TasWater is expected to be connected together (snapped). It is also expected that new water or sewer assets are connected to the existing network where appropriate.

8.1 Water mains (pipelines and channels)

A water pipe is represented by a single, continuous polyline and is assigned with a unique asset number/identifier. Bends within the pipeline are represented using vertices. A pipe feature is broken when the following scenarios occur:

1. The installation dates differ between the two sections of pipe
2. The material type changes between the two sections of pipe
3. A tee fitting is used to connect three sections of pipe
4. The size/diameter changes between the two sections of pipe
5. In instances when a non-return valve, control valve or zone valve separates the two sections of pipe (see Section 7.1.4 above for definitions of these types of valves)
6. When a pumping station, tank, dam or treatment plant separates the two sections of pipe
7. When a reticulation sub-main separates the two sections of pipe.

A pipe feature is **not** broken when the following scenarios occur:

8. Air valves do not split a pipe into two features
9. Isolation valves do not split a pipe into two features, but should still be “snapped” to the line segment
10. Fire hydrants, plugs or water points do not split a pipe (see Section 7.1.7 above for the definitions), but should still be “snapped” to the line segment
11. An individual property service does not separate a pipe into two sections.

8.2 Water valves

When a water valve separates the two sections of pipe (as per the scenarios outlined in Section 8.1 above), the ends of the two pipeline segments must be snapped to the water valve point feature.

8.3 Water property services

A property service extends from the water reticulation main to the service connection point. The property service is to be represented by a polyline indicating the centreline of the pipe section.

Note that:

- a property service does not break the water reticulation main pipeline, and
- the ends of the property service are snapped onto the water reticulation main pipeline and service connection point respectively.

8.4 Sewer mains (pipelines)

8.4.1 Sewer gravity mains

A sewer gravity main (pipeline) is represented by a single, continuous polyline and is assigned with a unique asset number/identifier. The beginning of the pipe is defined as the starting point of the sewage flow, and the end of the pipe is the ending point of the flow (in gravity sewer mains, the start is always uphill of the end). Bends can occur along pipes and are represented using vertices.

In the majority of cases, a single sewer gravity main feature (asset) is the pipe section between two adjacent maintenance holes.

Connectivity of sewer gravity mains is defined by the following scenarios:

1. No other sewer gravity main can connect at anywhere but the beginning or end of the pipe
2. Wherever one sewer gravity main ends and another begins, they are connected through a maintenance hole[12]
3. Wherever a sewer gravity main begins but does not have another sewer gravity main connecting at the beginning, it may either have a maintenance hole at its beginning or an 'end', which is simply a terminating fixture on the pipe (ends will not be represented in the GIS but are assumed to exist in this scenario when there is no maintenance hole)
4. Wherever a sewer gravity main ends but does not have another sewer gravity main connecting at its end, it must have a sewer pumping station or sewer treatment plant at its end.

There are no valves or fittings that apply to sewer gravity mains, so no connectivity rules are required in this regard.

8.4.2 Sewer pressurised mains (including rising mains)

A sewer pressure main feature is split when the following scenarios occur:

1. The installation dates differ between the two sections of pipe
2. The material type changes between the two sections of pipe
3. Diameter of the pipe changes between the two sections of pipe.

In reality these two separate pipe segments are joined at a fitting asset, however, fittings are not represented in the GIS so the pipes are simply split and left connecting, each with their own asset number and set of attributes.

[12] There are some exceptions to this rule with respect to older sewer systems where maintenance holes do not exist at connecting sewer gravity mains.

There is one other circumstance in which pipes are considered separate:

4. When a pumping station or treatment plant separates the two sections of pipe.

8.5 Sewer maintenance (man) holes

Maintenance holes are defined as a point with all information about the lid, shaft, lining recorded against it, and are assigned a unique asset number. The following rules apply to MHs:

- A MH can only be located at the beginning or end of at least one sewer gravity main (not including property connection sewer pipes). Following the rules of the pipes, it cannot be located anywhere else along the pipe, and by definition it cannot exist if it is not connected to any pipe. If a MH is found to genuinely exist at a location along a gravity pipe (i.e. when a MH is found after being buried for many years), that pipe must be split at the location of the MH.
- More specifically, a MH must be located at the beginning of at least one sewer gravity main (not including property connection sewer pipes). This is because every MH must have at least one pipe flowing out of it.

8.6 Sewer inspection points

Inspection points are represented as a point assigned with a unique asset number. Inspection points must be located (snapped) on a sewer gravity main or property connection sewer, but they can be placed anywhere along the pipe as they are merely an opening to view the pipe rather than a point at which the pipe changes direction or grade. No splitting or vertices are required for inspection points.

8.7 Sewer valves

Isolation valves are represented as a point with a unique asset number. Like all valves, they are attached (snapped) to a sewer pipe.

Isolation valves may be located anywhere along a sewer pressurised main or property connection sewer. The pipe does not need to be split at the isolation valve.

8.8 Sewer air valves

Air valves are represented as a point with a unique asset number. Like all valves, they are attached (snapped) to a sewer pipe.

Air valves may be located anywhere along a sewer pressurised main. The pipe does not need to be split at the air valve.

8.9 Property connection sewer

A connection line is represented as a single, continuous polyline and is assigned with a unique asset number.

The beginning of the pipe is defined as the starting point of the sewage flow (from the customer connection point), and the end of the pipe is the ending point of the flow (to the sewer main). Bends can occur along pipes and are represented using vertices.

There are two types of property connection sewer pipes:

- Gravity sewer (refer to Section 8.9.1)
- Pressure sewer (refer to Section 8.9.2).

8.9.1 Gravity sewer

The beginning of the property service pipe is coincident with the location of the service connection point (it should have the same asset number).

The end of the pipe must connect to a sewer gravity main. The connection line may connect at any point along the gravity main (including the beginning or end) and no vertex is required.

Note: some property service pipes come out directly into a manhole.

8.9.2 Pressure sewer

The beginning of the pressure sewer lateral is coincident with the location of the property boundary assembly (it should have the same asset number).

The end of the lateral must connect to a sewer pressurised main. The lateral may connect at any point along the sewer pressurised main (including the beginning or end) and no vertex is required.

8.10 Pumping stations, storages and treatment plants (both water and sewage)

Please note that “storage” refers to the following feature classes:

- Water tanks
- Water reservoirs.

The feature classes for pumping stations, storages and treatment plants are represented as point features for hydraulic modelling purposes. The point is located at the centroid of the feature. A secondary layer (Site boundaries of asset structures feature class – see Section 7.5.2 above) is to be represented by a polygon indicating the boundary/extent/edge of the feature.

These features classes define a pipe section and pipe features should be broken at these locations.

Asset Spatial Data Specification

August 2015, version 1.2