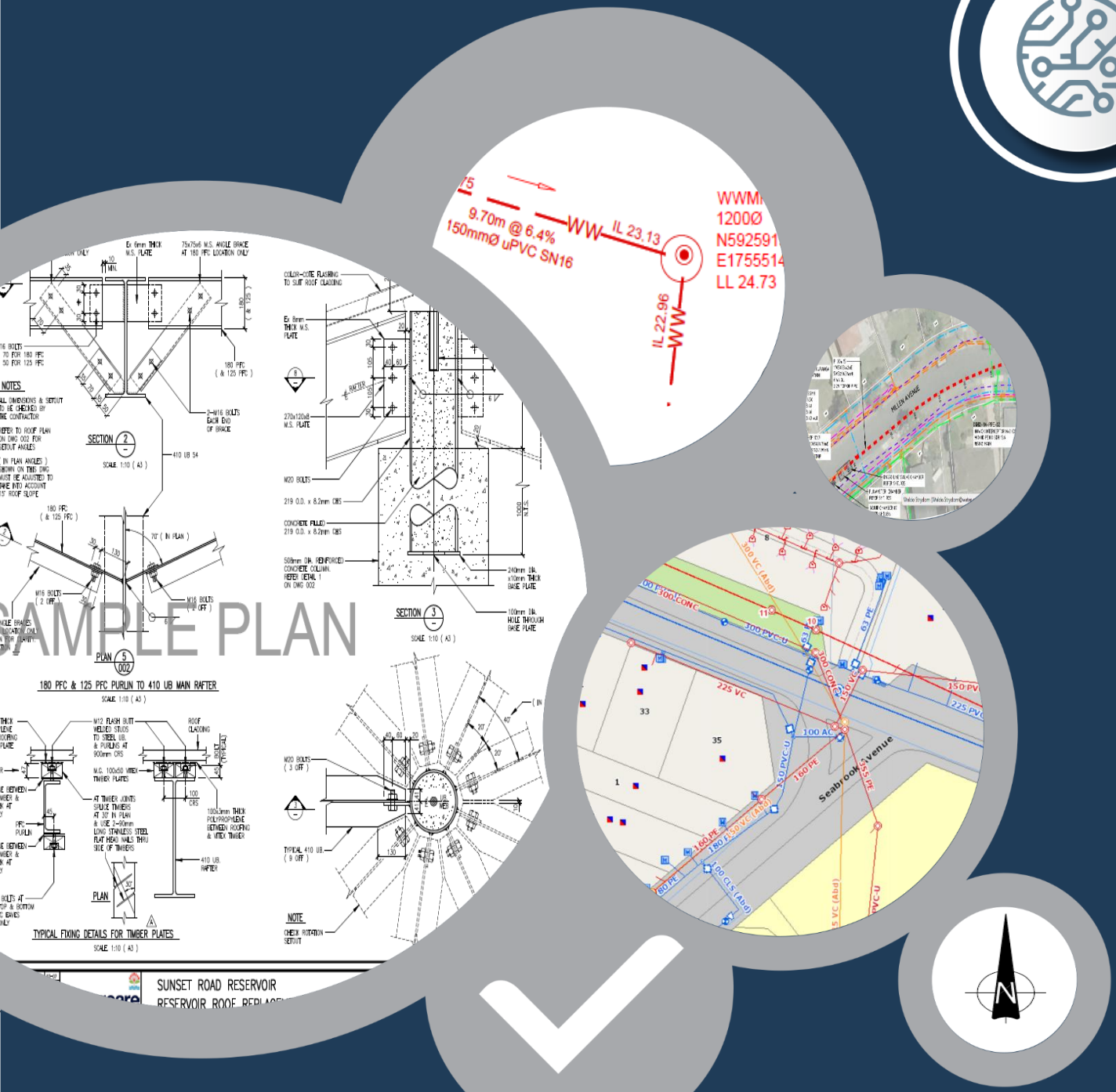

DIGITAL ASSET INFORMATION & MODELLING

STANDARD FOR PRODUCING CAD AND GEOSPATIAL DRAWINGS

Document No. ESF-500-STD-502

Version: 9.1

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Watercare

Copyright information

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More information

If you have further queries, please contact the Asset Lifecycle team at standards@water.co.nz

DOCUMENT CONTROL

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5	Minor amendments - Pages 9, 11, 25.	I Moses / G Stewart	24/04/15
6	Page 45, DTMAN group listing amended.	I Moses / G Stewart	08/05/15
7	Page 17 4.3.5, Page 30 section 8 amended.	I Moses / J De Villiers	25/08/15
8	Major changes to document format and layout. Included 3D, Geospatial and P&ID requirements. Standard template layout changes.	J de Villiers	10/02/2017
8.1	Minor changes to drawing frame, clarifications to unused external references and superseded drawings	J de Villiers	3/07/2017
8.2	Minor update to clarify final changes to drawings	J de Villiers	15/12/2017
8.3	Minor updates to CAD version numbers, red-line drawing process and drawing deliverables	J de Villiers	1/10/2018
8.4	Duplicated colour coding on line types and font styles	J de Villiers	22/03/2019
8.5	Updates to pdf document requirements, minor title updates and formats of CAD file submission	J de Villiers	30/09/2019
8.6	Updates to CAD title blocks. Update to deliverables and design model delivery	J de Villiers	19/11/2020
8.7	Minor update to remove references to Blackbox22	J de Villiers	1/07/2021
8.8	Minor updates to include table for data points and qualifications of person who can certify geospatial data	J de Villiers	10/01/2022
9	Document format updated and new sections added including QA/ AC Checklist	W Strydom	11/12/2023
9.1	Minor amendments to document and addition of certifier qualification for survey plans.	W Strydom	18/06/2024

This document takes effect on the date of release and supersedes all prior versions.

Summary of Changes

Version	Section	Description of revision
9.1	Document	Minor formatting and edits.
	4.1	Updated section to note consultant logo position on left side of Title 1.
	4.7	Added pipeline long section direction for wastewater rising mains.
	5.1.4	Added that electronic copies of as-builts shall include pdf copies supplied with all CAD files.
	5.5	Added reference to Watercare's Digital Engineering Execution Plan for 3D models file naming structure.
	6.1	Added Certified Professional Engineering Surveyor as an accepted certifier.
	8	Updated QA/QC template to include electronic copies of .pdf for submission

Table of Contents

Definitions

Cad File Number: A unique number that designates the AutoCAD file and its origin. The number shall be the same as the drawing number (i.e., 2001234.001B).

Drawing Number: The drawing number is allocated by Watercare's record management system through the Watercare Asset Information department (AssetInfo@water.co.nz). The drawing number comprises of two numbers. The first number is a 7-digit base number (e.g., 2001234). The second number is a 3-digit sheet number starting with .001 and continuing sequentially. **There shall be no gaps in the sheet numbering**. The full number is e.g., 2001234.001. *NOTE: Full stop, not underscore between plan number and sheet number. (The full file name will be 2001234.001.dwg)*

Drawings completed by developers or their agents, are assigned an "R" number as soon as the development or sub-division application is lodged. The drawing numbering conventions follow the same requirements as otherwise described in this standard.

Abbreviations

2D	Two dimensional
3D	Three dimensional
A1, A3	Paper size
AC	Asbestos cement (pipe)
BIM	Building information modelling
CAD or AutoCAD	Computer aided design
CI	Cast iron (pipe)
CLS	Concrete lined steel (pipe)
DN (PE Pipe)	Nominal outside diameter (as per AS/NZS 2033 and AS/NZS 4130)
DN (All other Pipe)	Nominal diameter
GIS	Geographic information system
GL	Ground level
ID	Internal diameter
IL	Invert level
LL	Lid level
LOD	Level of design
OD (Steel Pipe)	Outside diameter for steel pipe
P&ID	Piping and instrumentation diagram
PE	Polyethylene
PVC	Polyvinyl chloride (pipe)
X-ref	External reference

1. Introduction

This manual defines the standards and procedures to be followed by consultants, contractors and Watercare to produce:

- 2D Design drawings and 3D models (e.g. BIM)
- As-built drawings
- Survey drawings.

Watercare standardises on the drawing and model output so that the quality of the work is consistent with its data requirements.

This standard shall be read with Watercare's Data and Asset Information standards. The produced drawing deliverables are set out in Section 5.1.4.

2. Copyright

Where provided by Watercare, all software, drawings, symbol libraries, drawing setup and support files remain the property of Watercare and must be returned on completion of the project.

The use of unlicensed software on Watercare projects is not permitted.

3. Drawing setup

All drawings are to be registered in Watercare's record management system which is used to issue a drawing number for inclusion in the drawing title block. This number includes the sheet number.

The process for drawing registration is described in the Watercare Data and Asset Information standards.

The CAD file number is always displayed on the drawing. Template drawings may be copied but must be allocated a new drawing number by Watercare Asset Information, and the CAD file reference on the drawing amended accordingly.

The Watercare CAD file number shall be the same as the drawing and sheet number, including the revision from issue A onwards e.g. 2001234.001A.

Refer to Section 4.2 for details of the drawing and CAD file numbering requirements.

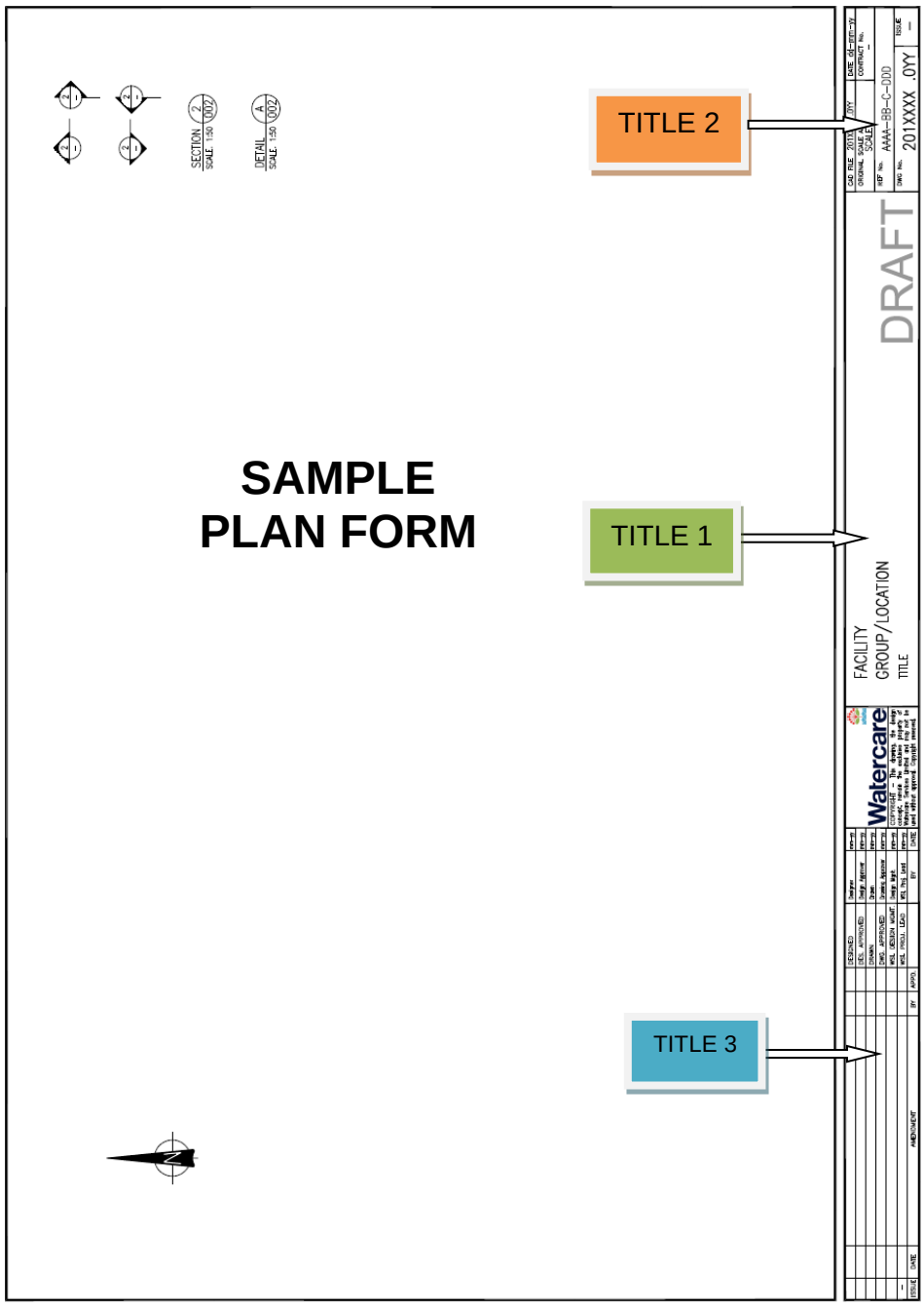
3.1 Menus

The standard AutoCAD menu is used. All customised menus shall be based on the standard AutoCAD menu. Any non-standard shape files, scanned images or company logos must be provided with the drawing files.

3.2 Support files

To standardise the production of drawings Watercare provides the files for the standard planform template, north point and section marks, electrical symbol libraries and P&ID symbols and standard plot style (WSLStdColour.ctb).

The standard title block template drawing in use throughout Watercare is **WSL-A3-2023.dwg** (A3 sized drawing). The standard template shall not be amended. Approval from Watercare is required to use the. **WSL-A1-2023** planform (A1 sized drawing). The standard planform is shown:



3.3 Paperspace / Modelspace on drawings

The template **WSL-A3-2023** or **WSL-A1-2023** (in AutoCAD's paper space) must be re-saved with the drawing number issued by Watercare (e.g. 2001234.001). Basic layers and styles are included in the file. Engineering detail drawings shall be prepared in model space at full size in millimetres and with viewports in paper space. Plan and layout drawings shall be prepared in model space at full size in metres and with viewports in paper space.

3.3.1 Viewports

All rectangular viewports in paper space shall have the display 'LOCKED' and the viewport layer 'TURNED OFF'.

Non-rectangular viewports in paper space shall have the display 'LOCKED' and the viewport layer may be 'TURNED ON' and shall be colour 250 when the as-built AutoCAD drawing is submitted to Watercare.

3.4 AutoCAD X-Ref Management

3.4.1 Purpose and Overview

This section outlines the procedures and requirements for managing X-refs in AutoCAD to maintain data integrity, eliminate unresolved references, and streamline the drawing delivery process.

3.4.2 Unresolved and Superfluous References

It is mandatory that all DWG (Drawing) files undergo a comprehensive clean-up to address unresolved and superfluous references. These references can lead to drawing errors and inconsistencies. To ensure the quality and reliability of CAD drawings:

- All X-refs must be properly overlayed (not attached) and resolved before saving or transmitting any CAD files.
- Eliminate any unnecessary, unused, or redundant X-refs from the drawing.
- Ensure that all attached X-refs are up to date and correctly located.
- X-ref's shall not be nested by circular attachment i.e. x-ref's attached within an x-ref for use on a drawing.

3.4.3 Purging and Auditing

Prior to delivering any CAD drawing files, a thorough purging and auditing process is required to minimize file size and optimize performance:

Run the "PURGE" command to remove unused objects, layers, and other unnecessary data.

Perform an "AUDIT" to correct errors in the drawing database.

3.4.4 3D Model and 2D Drawing Integration

Where large size 3D models are developed the relevant X-ref files may be supplied separately on approval from Watercare. For all 2D drawings with data linking to 3D models, the data shortcuts are to be broken and supplied as a standard AutoCAD x-ref's.

3.4.5 AutoCAD Native File Handover

Following the organization of individual design/discipline elements into separate X-ref files, the AutoCAD X-ref management process, as described in Section 5.1.4, must be applied. This process ensures that references relevant to drawings are included in the zip file up using e-transmit.

3.5 Non-AutoCAD Program Data to DWG

3.5.1 Purpose and Overview

This section outlines the necessary procedures and standards for incorporating drawings created in programs other than AutoCAD into DWG format, ensuring consistency with Watercare AS1100 standards and maintaining data integrity.

3.5.2 Conversion to DWG Format

When drawings are created using software other than AutoCAD, it is mandatory to convert them into the DWG format to ensure compatibility and compliance with established standards. The following guidelines must be adhered to:

All drawings produced in non-AutoCAD software should be exported to the DWG file format.

3.5.3 Application of Watercare AS1100 Standards

Once the data is converted to DWG format, it must adhere to the Watercare AS1100 standards, ensuring consistency and compliance. This includes standards related to line styles, text styles, symbols, and other drawing elements.

3.5.4 Handling of References

In cases where the information is not exported as separate references, each individual design or discipline element must be organized into separate X-ref (External Reference) files. This practice ensures efficient management and the application of standard layering conventions.

3.5.5 AutoCAD Native File Handover

Following the organization of individual design/discipline elements into separate X-ref files, the AutoCAD X-ref management process, as described in Section 5.1.4, must be applied. This process ensures that references relevant to drawings are included in the zip file up using e-transmit.

4. Drawing conventions and standards

Unless noted otherwise, drawing standards shall comply with AS1100. This standard shall take precedence where there is variance to AS1100.

Watercare requires all drawings to be drawn to full size in AutoCAD model space and the planform on the layout tab (paper space). A3 output governs minimum text size, ensuring a high-quality hardcopy. The drawing file when supplied needs to be zoomed to the extents on the layout tab. The paper size must be set to A3 or A1 in the “Page Setup” manager.

4.1 Plan titles

The standard Watercare planform has three attribute blocks included in the .dwg file. The attributes are edited as required. The three blocks are:

- Block **Title 1** –the main title comprising: line 1 - the name of the facility, line 2 – group location and line 3 - title or description. Consultants may use the left-hand end of **Title 1** to insert their logo.
- Block **Title 2** – Cad file, date, scale, contract number, drawing number and version.
- Block **Title3** – Amendment details, version, date, amendment by and approved.

The platforms are available from Watercare Asset Information on request.

4.2 Drawing numbers

Drawing numbers are entered in the drawing number box on the right-hand side of the title block drawings and inserted as an attribute within the **Title 2** block. (Similar for A1 size planform)

For subsequent revisions to the drawings, electronic copies (pdf) are to be forwarded to Watercare for updating the entries in the record management system. (Refer **Amended drawings** in Section 4.2.1.3).

Where drawings are prepared by external parties, drawing numbers are obtained from Watercare Asset Information. The consultant’s CAD file number or reference number may be shown on the drawing (in the box reserved for Process Numbering where non-Process plans are involved). The CAD file box is reserved for the Watercare CAD file number.

Where drawings are collated into project sets, sequential numbering of sheets is mandatory. Spare drawings within the set not allowed.

4.2.1 Drawing development process

Drawings follow the below sequence during drawing development:

1. **PRELIMINARY** — Preliminary versions when the concept or details are being developed - prior to entry into the record management system**. (Issue 1,2,3** etc.) The preliminary version entries may be removed from the plan at the approved issue.

2. **APPROVED** — First entry into Watercare's record management system. This may be a signed or unsigned Issue – e.g. issued for Tender (**version "–" hyphen in the Issue box**).

3. **AMENDED** — Amendments to approved plans (**version A, B, C**, etc.).

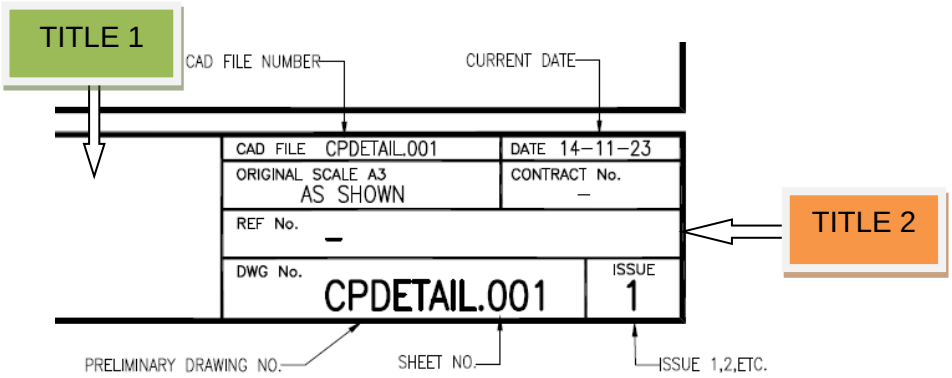
4. **AS-BUILT** — As-built amendments (**the next available version A, B, C**, etc.).

***Note** – version letters I and O are not to be used for issuing.*

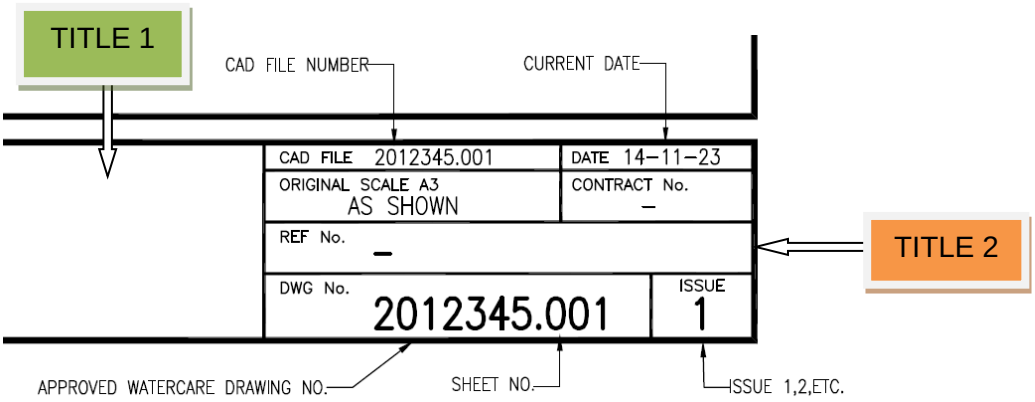
All plans from approved stage up to the as-built stage must be submitted to Watercare for record keeping in pdf or CAD format. The as-built stage drawings must all be in CAD format.

4.2.1.1 Preliminary drawings

Prior to allocating a drawing number by Watercare, an "identifier" may be used in the 'Drawing No.' attribute in the **Title 2** block.



For **preliminary issue** external parties may use their own convention for revisions but must use a Watercare drawing number. In example, Watercare uses version numbers 1, 2, 3 etc. for preliminary revisions. These revisions are for production record only and are not to be offered for record keeping. The version identifiers (e.g. 1,2,3) must be removed at the approved issue.

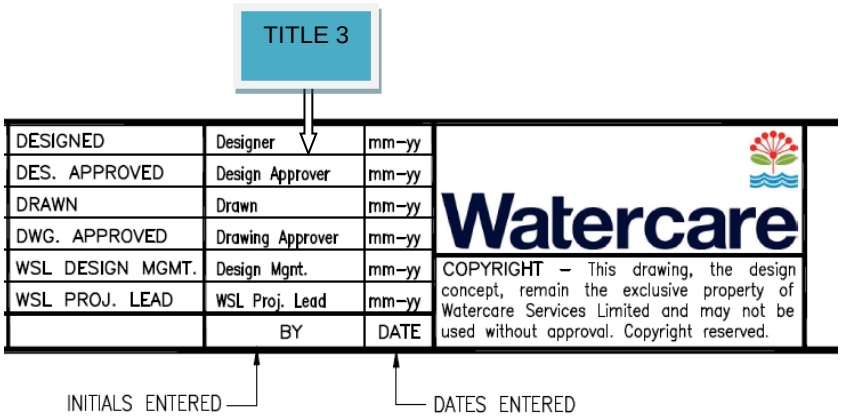


4.2.1.2 Approved drawings

The allocated drawing number shall be displayed in the 'Drawing No.' area of the **Title 2** attributes block on approved drawings.

At tender stage the **Title 2** block is edited to issue "–" hyphen (and the amendment attributes **Title 3** attributes block edited to "**ISSUED FOR TENDER"**.

Drawings for tender must have been reviewed by the relevant stakeholders before release. The approval sections in **Title 3** must be completed and the review process in accordance with Watercare's Project Management Framework followed.

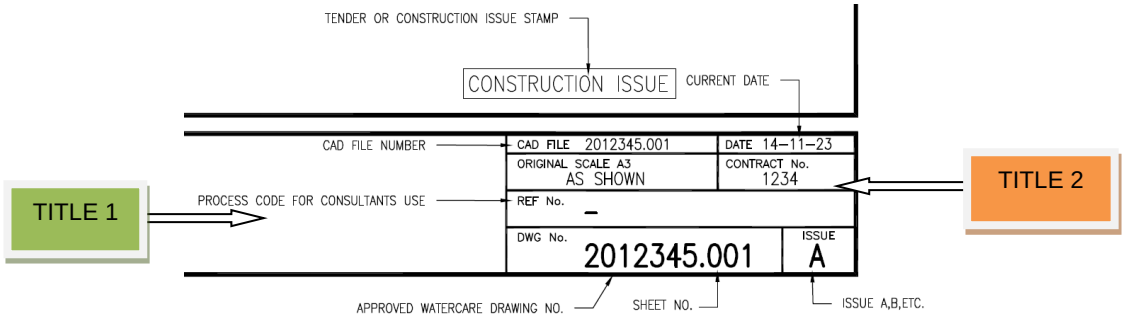


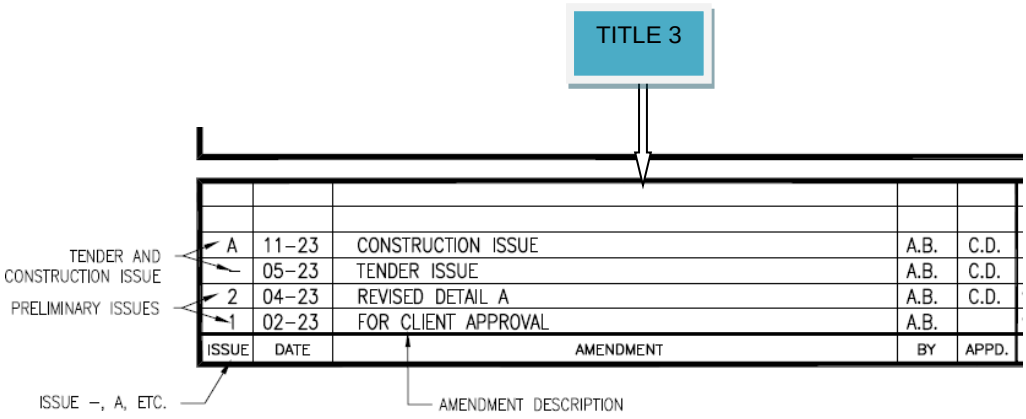
For land developers this drawing set must be accepted and stamped by Watercare. A "Tender issue" stamp must be added above the **Title 2** block when ready for issuing.

4.2.1.3 Amended drawings

An amended drawing is any approved change to a drawing that has previous approval for release. (i.e. Tender Issue, Construction Issue). A cloud (refer Section 4.12) shall be drawn around the amendment. The clouds must be removed with subsequent issues. No clouds shall be added for the as-built issue and any existing clouds are to be removed. A "Construction issue" stamp must be added above the **Title 2** block when ready for issuing.

Edit block **Title 2** with the new CAD file number (i.e. 2001234.001A), insert the current date and new version (A). Amendment details are entered in the appropriate attribute within the **Title 3** block. Where amendments are numerous an overall description such as "Minor revisions" or "Reinforcement amended" will be sufficient.





For review of plans a hard copy will be distributed. Watercare has an internal review process described in its Project Management Framework.

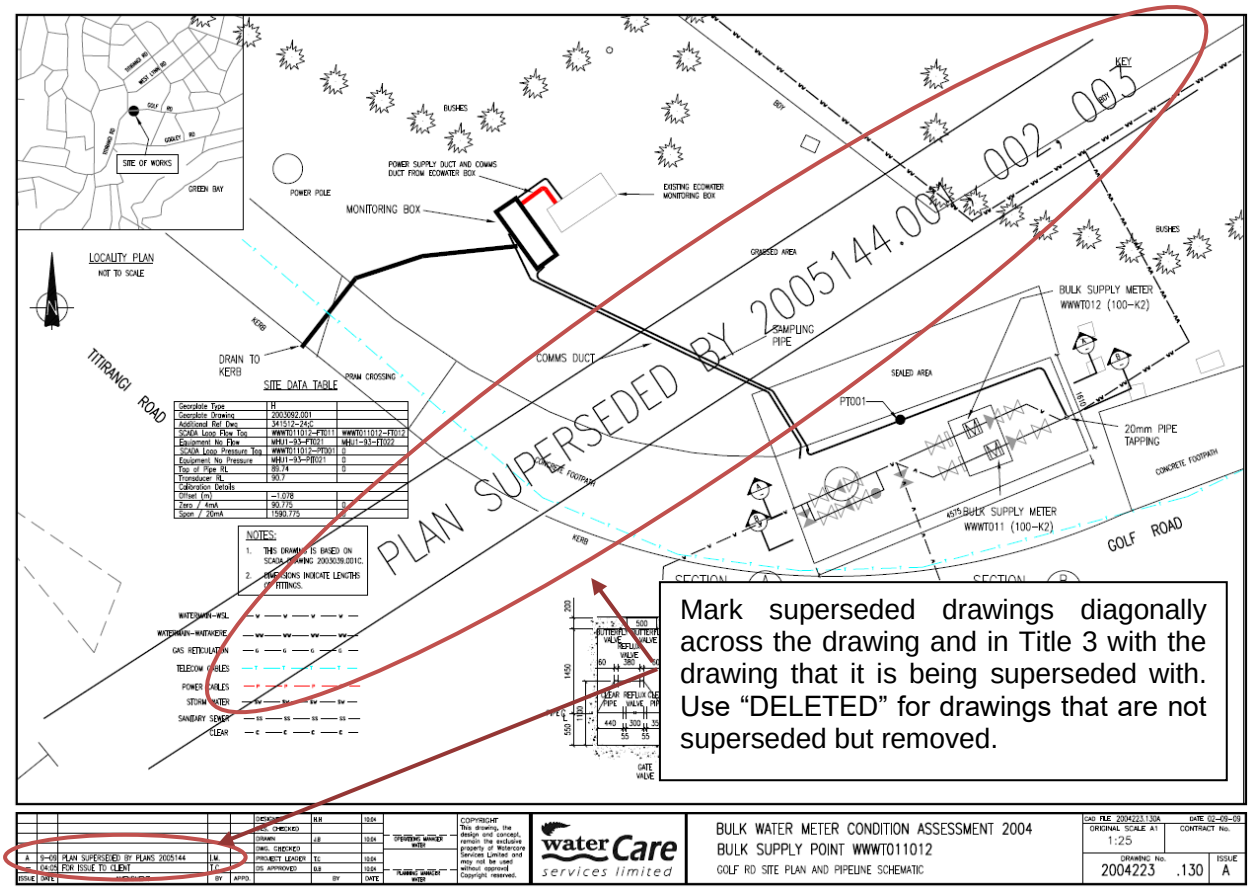
For every issue of the drawing an electronic copy must be forwarded to Watercare Asset Information for record keeping.

4.2.1.4 Cross references and superseded drawings

Drawings must be cross referenced to other drawings or information that it must be read in conjunction with, including relevant drawings of existing facilities adjacent to it. Where plans and long sections are on separate sheets, they must be cross referenced.

Where new works are added, or amendments made to facilities on existing drawings, the original and superseded drawings shall be marked diagonally across the drawing and updated in **Title 3** with the cross reference of the drawings that it is being replaced with.

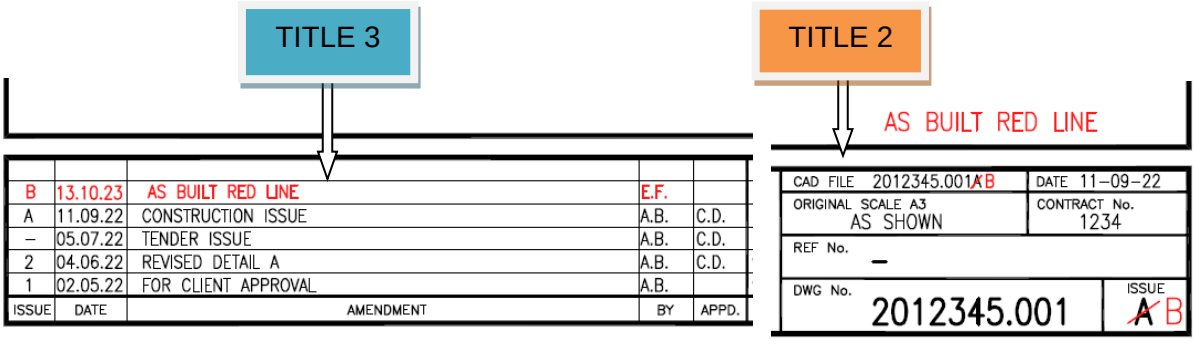
When the drawing is not superseded but deleted, “DELETED” shall be written diagonally across the drawing and noted in **Title 3** and the amended update. See below example.



4.2.1.5 As-built red line drawings

Red line mark-ups may only be used when constructed sections are being placed into operation and the final as-built drawings are being prepared. Watercare's preference is for the final as-built drawings in CAD to be available before placing assets into service. For developers installing linear assets the final CAD version is a requirement and redline drawings won't be accepted.

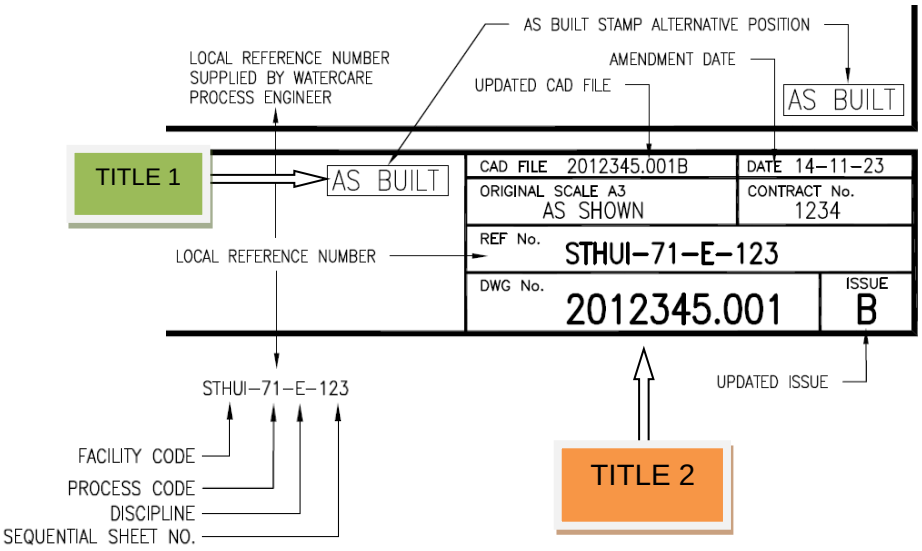
As-built red line drawings are to be hand marked-up to the next amendment letter and identified as "As-built red line" in the amendment box **Title 3** and on the drawing pane above **Title 2**. The issue number in **Title 2** is also amended and an "As built redline" stamp added above the title block. As shown in the example below, if the preceding issue noted on the drawing is issue 'A', then the "As-built Red Line" version to be issued as a 'B', and the final as-built in CAD will become issue 'C'.



As-built red line drawings are to be provided as a high-quality scanned colour pdf. Any additional vendor drawings, notes or sketches required to produce the final as-built drawing shall be included as additional pages to the corresponding as-built red line drawing. Red line drawings must be finalised with an **as-built CAD drawing within 3 months of the asset/infrastructure being constructed**.

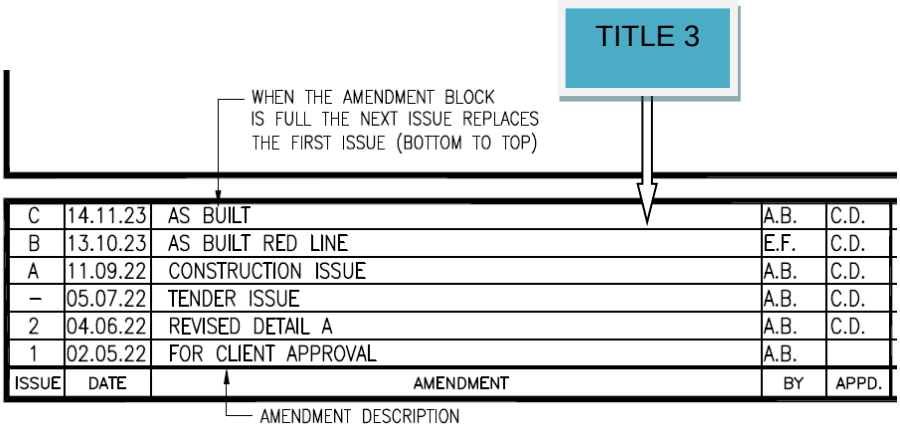
4.2.1.6 As-built drawings

When drawings are recorded as as-built records, the drawing is updated with the next amendment issue regardless of any physical changes to the drawing or not. An "**AS-BUILT**" stamp is added to the **Title 1** block, next to the **Title 2** block. The **Title 2** block has the CAD file name, date and issue updated as shown below with all amendment clouds removed:



All X-ref's, image files, plot styles, shape files and non-standard fonts shall be supplied to Watercare. Where tabbed CAD files are used, pdf copies of all sheets must be supplied as well. Refer to Section 5.1.4 for delivery handover process and the use of e-transmit function in AutoCAD.

The amendment box, **Title 3** on the title block drawing is also updated to reflect the "As-built" amendment as shown below:

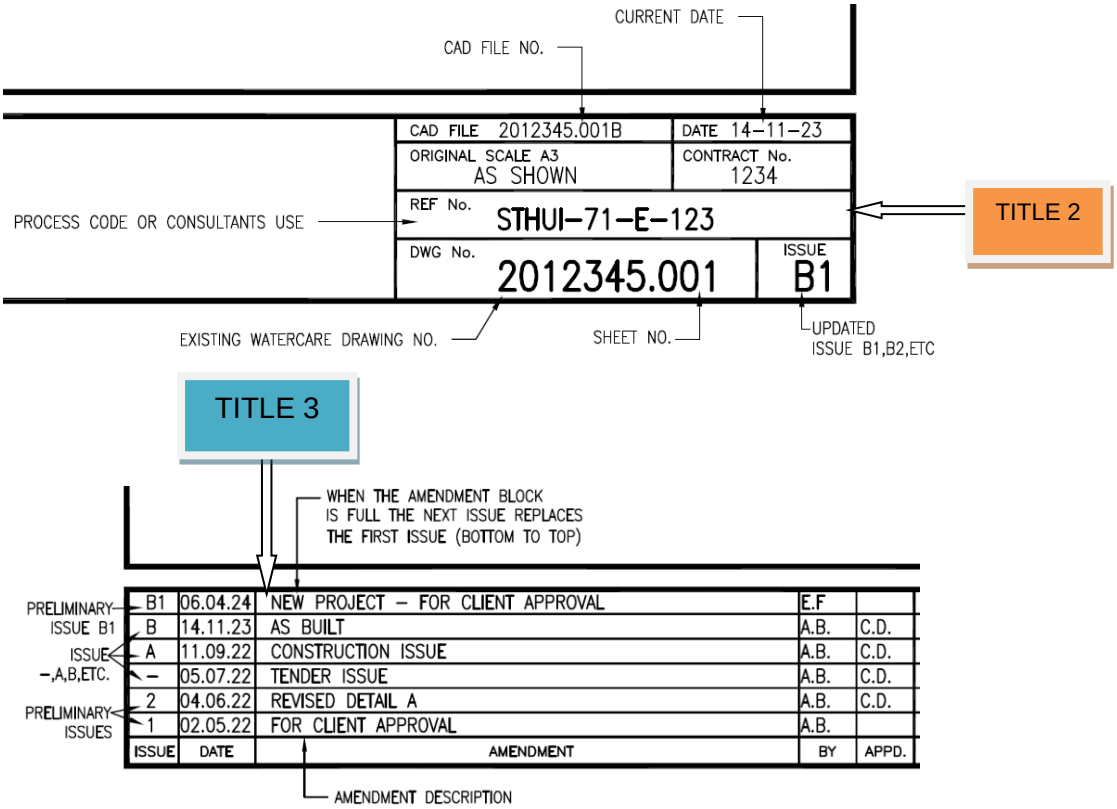


The quality of as-built drawings needs to be considered for clarity of the output drawing. The assets and services must be dominant over any background image.

4.2.1.7 New projects using existing plans

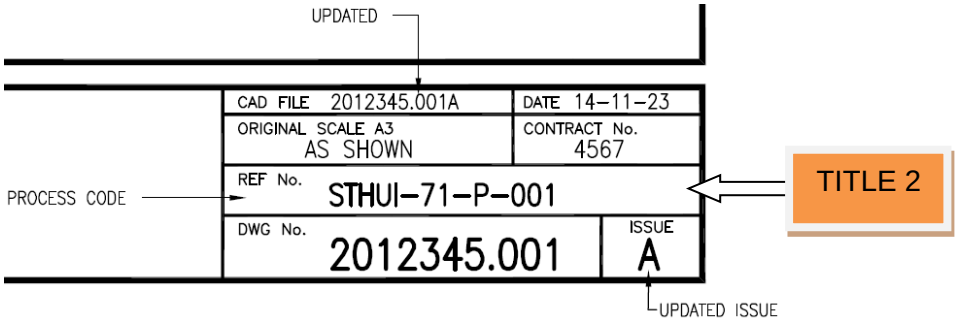
When existing plans are used for a new project and requires a round of preliminary revisions before being approved for tender, the drawings and records must be amended. Old logos may be removed and replaced with the logo of the latest party to complete the drawing.

The existing as-built plan for example may be 2001234.001B. The preliminary versions as they are being developed shall be 2001234.001B1, 2001234.001B2, etc. See **Title 2** block below for version update and **Title 3** for the description update. These issues are not required for Watercare's record management. When the preliminary development of the plan is completed, the plan must be versioned up and the tender version will be 2001234.001C. A pdf copy shall be forwarded to Watercare Asset Information for updating the record. Future versions of the drawing follow the standard procedure in the preceding section.



4.2.1.8 Process/Facility drawings

When plans are prepared for infrastructure that is created as part of a facility, the title block **Title 2** is to be completed as below. Refer to Watercare's Data and Asset Information standards for information on how the functional location is created. The process code will be supplied by the Watercare process engineer. For larger facilities there may be multiple process codes relevant to the specific activity of the site.



4.3 Section marks and titles

Section marks on drawings are standardised and included in the planforms. There are separate section marks for the four directions (up, down, left & right)

Plans, sections, details and elevations may be identified using the examples included on the A3 and A1 planforms.

The alpha/numeric convention to be followed for identifying sections and details on the plan are as follows:

For **Sections**: **1, 2, 3**

etc.

For **Details**: **A, B, C**

etc.

4.4 North points

The standard North Point, **A1NP** is located on layer NP in the planforms. It may be re-scaled to suit the required output, or the layer frozen-off where not required for long sections. Plan drawings should be orientated with the north point towards the top of the drawing page.

4.5 Symbol libraries

Only standard symbol libraries are to be used in the preparation of Watercare drawings. Commonly used blocks and diagrams are incorporated into the Watercare symbol library. The symbol library includes two disciplines: Electrical and Piping & Instrumentation Diagrams (P&ID).

For Standard P&ID Symbols (ISA-5) refer to Section 5.3.

For Standard Electrical Symbols (IEC-617) refer to Section 5.4.

4.6 Hatching

Solid Hatching shall not be used unless demonstrated not to be affected with monochrome printing.

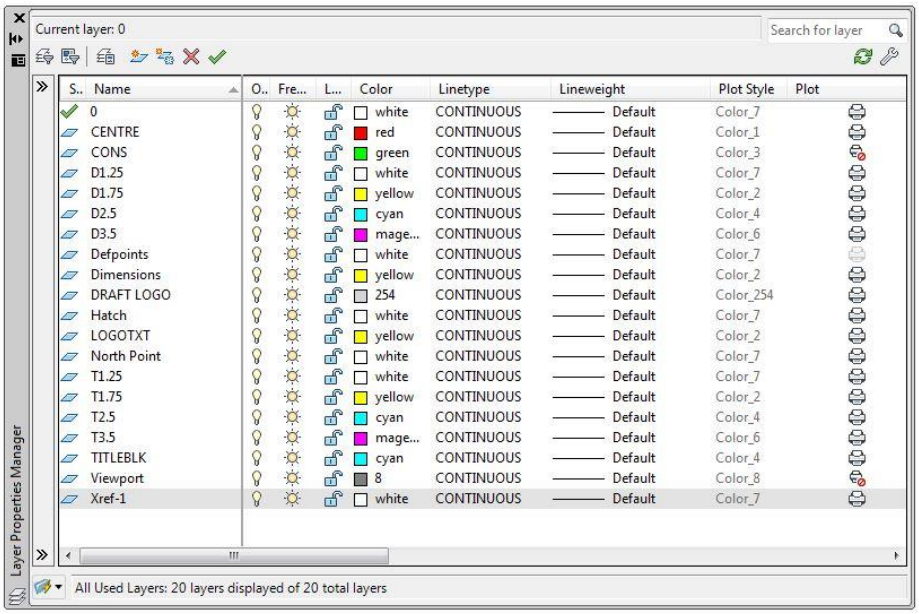
4.7 Pipeline long sections

The fluid flow direction of pipelines must be shown on the drawings.

For water projects – Drawings are to have the plan and longitudinal section on the same sheet at a suitable scale (1:500 on an A3 sheet) with the direction of flow on the sheet from **left to right**.
For wastewater gravity projects – Drawings are to have the plan and longitudinal section on the same sheet at a suitable scale (1:1000 on an A3 sheet) with the direction of flow from **right to left**.
For wastewater pressure projects (rising mains) – Drawings are to have the plan and longitudinal section on the same sheet at a suitable scale (1:1000 on an A3 sheet) with the direction of flow from **left to right**.

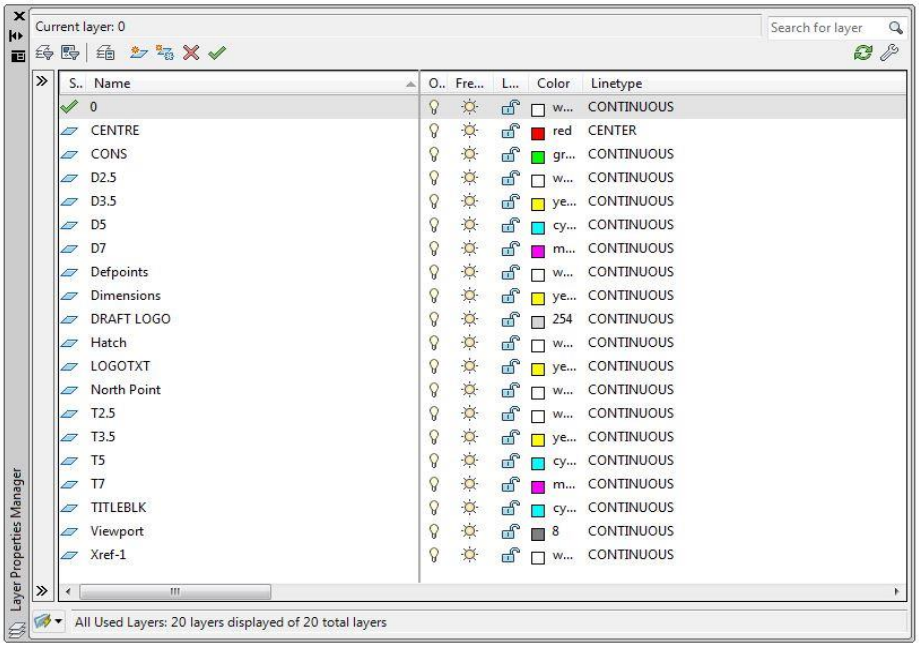
4.8 Layers

The A3 title block template drawing has the following layers defined. Additional layers may be added as required:



S..	Name	O..	Fre...	L...	Color	Linetype	Lineweight	Plot Style	Plot
✓	0				white	CONTINUOUS	Default	Color_7	
	CENTRE				red	CONTINUOUS	Default	Color_1	
	CONS				green	CONTINUOUS	Default	Color_3	
	D1.25				white	CONTINUOUS	Default	Color_7	
	D1.75				yellow	CONTINUOUS	Default	Color_2	
	D2.5				cyan	CONTINUOUS	Default	Color_4	
	D3.5				mage...	CONTINUOUS	Default	Color_6	
	Defpoints				white	CONTINUOUS	Default	Color_7	
	Dimensions				yellow	CONTINUOUS	Default	Color_2	
	DRAFT LOGO				254	CONTINUOUS	Default	Color_254	
	Hatch				white	CONTINUOUS	Default	Color_7	
	LOGOTXT				yellow	CONTINUOUS	Default	Color_2	
	North Point				white	CONTINUOUS	Default	Color_7	
	T1.25				white	CONTINUOUS	Default	Color_7	
	T1.75				yellow	CONTINUOUS	Default	Color_2	
	T2.5				cyan	CONTINUOUS	Default	Color_4	
	T3.5				mage...	CONTINUOUS	Default	Color_6	
	TITLEBLK				cyan	CONTINUOUS	Default	Color_4	
	Viewport				8	CONTINUOUS	Default	Color_8	
	Xref-1				white	CONTINUOUS	Default	Color_7	

The A1 title block template drawing has the following layers defined. Additional layers may be added as required:



S..	Name	O..	Fre...	L...	Color	Linetype
✓	0				w...	CONTINUOUS
	CENTRE				red	CENTER
	CONS				gr...	CONTINUOUS
	D2.5				w...	CONTINUOUS
	D3.5				ye...	CONTINUOUS
	D5				cy...	CONTINUOUS
	D7				m...	CONTINUOUS
	Defpoints				w...	CONTINUOUS
	Dimensions				ye...	CONTINUOUS
	DRAFT LOGO				254	CONTINUOUS
	Hatch				w...	CONTINUOUS
	LOGOTXT				ye...	CONTINUOUS
	North Point				w...	CONTINUOUS
	T2.5				w...	CONTINUOUS
	T3.5				ye...	CONTINUOUS
	T5				cy...	CONTINUOUS
	T7				m...	CONTINUOUS
	TITLEBLK				cy...	CONTINUOUS
	Viewport				8	CONTINUOUS
	Xref-1				w...	CONTINUOUS

4.9 Fonts and text styles

All text shall be in UPPER CASE (except for standard abbreviations e.g. kW).

Text on the full size **A3 Watercare planform** hardcopy shall be a minimum of **1.25mm** high (width factor **0.8mm**).

Text on approved **A1 sized drawing planform** shall be a minimum of **2.5mm** (width factor **0.8mm**)

Four defined text styles are loaded with the standard A3 template. These text styles use the **RomanS** font. Any additional styles created must use standard AutoCAD fonts. Arial font may also be used when confirmed with Watercare.

Style	A3 Plot Size (mm)	Width Factor	Layer	Colour
T1.25	1.25	0.8 to 1.0	T1.25	White
T1.75	1.75	0.8 to 1.0	T1.75	Yellow
T2.5	2.5	0.8 to 1.0	T2.5	Cyan
T3.5	3.5	0.8 to 1.0	T3.5	Magenta

Four defined text styles are loaded with the standard A1 template. These text styles use the **RomanS** font. Any additional styles created must use standard AutoCAD fonts. Arial font may also be used when confirmed with Watercare.

Style	Plot Size (mm)	Width Factor	Layer	Colour
T2.5	2.5	0.8 to 1.0	T2.5	White
T3.5	3.5	0.8 to 1.0	T3.5	Yellow
T5	5.0	0.8 to 1.0	T5	Cyan
T7	7.0	0.8 to 1.0	T7	Magenta

Non-standard AutoCAD fonts must be supplied to Watercare where required for areas such as logos.

4.10 Line types

Standard AutoCAD line types and hatch patterns are to be used.

Standard line types:

Border, Border2, BorderX2
Center, Center2, CenterX2
Dashdot, Dashdot2, DashdotX2
Dashed, Dashed2, DashedX2
Divide, Divide2, DivideX2
Dot, Dot2, DotX2
Hidden, Hidden2, HiddenX2
Phantom, Phantom2, PhantomX2
The Ltscale should be set to 10X Plot Scale unless otherwise approved by Watercare.

Defined line thickness loaded with the standard **A3 template**:

Layer	Line thickness	Colour
D1.25	1.25	White
D1.75	1.75	Yellow
D2.5	2.5	Cyan
D3.5	3.5	Magenta

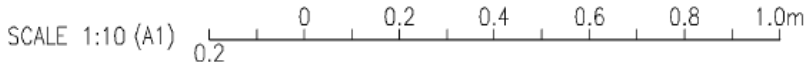
Defined line thickness loaded with the standard **A1 template**:

Layer	Line thickness	Colour
D2.5	2.5	White
D3.5	3.5	Yellow
D5	5.0	Cyan
D7	7.0	Magenta

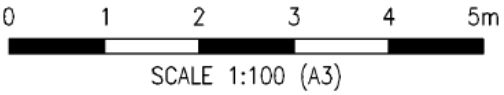
4.11 Bar scales

Bar scales shall be used on all drawings except for electrical and Piping and Instrumentation Diagram drawings. The scale bars must be located on the right-hand side of the drawing sheet, directly above the title block.

For drawings (with appropriate scale):

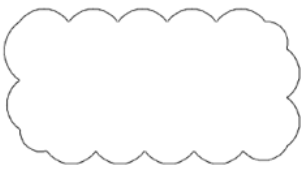


For sketches or aerial overlays (with appropriate scale):



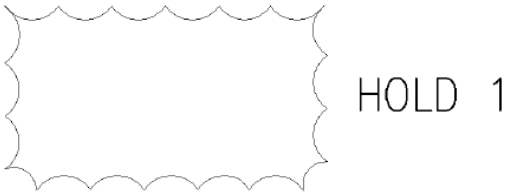
4.12 Drawing revisions / clouds

Drawings issued with revisions shall where practical be clouded. Clouds must be removed for the as-built issue, refer to Section 4.2.1.3.



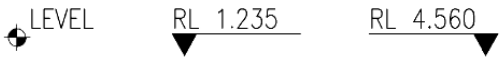
4.13 Drawing holds

Where drawing information cannot be checked against certified data, or areas on the drawings are considered incomplete, then these areas should be clouded and labelled HOLD with a hold number. The drawing cannot be issued for external or formal use. Holds may only be removed, and the drawing issued once the outstanding information is available.



4.14 Levels

Show elevations in metres and decimals of a metre. Reduced levels (RL) shall be used when dealing with actual surveyed levels derived from a regional height datum. RL's shall be expressed to the nearest multiple of 5mm or 0.005m and to 3 decimal places.



4.15 System and dimensioning variables

The system variables set within the standard template drawings may be reset to suit individual users provided that the hardcopy output is not affected.

It is preferred that PSLTSCALE = 0. This allows the view in paperspace to look the same as the portion of the drawing in modelspace. The PSLTSCALE should not be set to 1.0 as all the underground service line types will look different when viewed in paperspace.

Watercare system variables are:

PSLTSCALE = 0.0 (do not use 1.0)

LTSCALE = 10.0

DIMSCALE = 1.0

4.16 Plot styles

Two Watercare plot styles are available. Contact Watercare Asset Information for the latest plot style version. Watercare standard plot styles (WSL STD Colour.ctb) must be used to produce pdf copies of the CAD drawings. Note that the standard colours used by Watercare shown in sections 4.8 and 4.9 of the CAD manual will produce black lines and text.

5. Design drawings

5.1 General requirements

5.1.1 Datum Levels

- Generally, all levels indicated on metric drawings shall refer to LINZ and Auckland 1946 MSL Datum.

> **Note**: It is planned that the vertical datum requirements will transition to New Zealand Vertical Datum 2016 (NZVD 2016) in July 2024. During this period both Auckland1946 MSL Datum and NZVD 2016 will be accepted with the intention that from 1 July 2025 only NZVD2016 will be accepted.

- The vertical datum for all dams shall be to New Zealand Vertical datum 2009 (NZVD2009) until datum transitions to NZVD 2016 (July 2024).

- Projects at the Mangere Wastewater Treatment Plant are to adopt a local datum that is 50m below the Auckland Datum.

5.1.1.1 Relationship with Other datum's

The relationships between datum's can be determined through the LINZ online coordinate converter (https://www.linz.govt.nz/products-services/geodetic/online-coordinate-converter).

5.1.1.2 Use of Drawing Datum

The level measurements given on all existing drawings must be verified by site measurement.

5.1.1.3 Imperial Measurement Drawings

The datum for all existing drawings which were produced prior to metrication was to 3.94ft (1.2m) above Lands and Survey Department Auckland Datum 1946.

5.1.2 Survey co-ordinate systems

The survey co-ordinate system currently in use by Watercare (post 1 July 2012) is the New Zealand Transverse Mercator (NZTM) co-ordinate system documented in the LINZ Geographic Standards.

5.1.3 New drawings and Watercare standard designs

Watercare standard design drawings shall take precedence. Where impracticable due to specific constraints or as required by the designer, specific drawings detailing the work shall be completed. Reproduction of Watercare standard detail is not accepted. Electronic copies of standard P&ID symbols, abbreviations and legend sheets are available from Watercare.

5.1.4 Deliverables

Where applicable (excluding land development projects) the deliverables must be read in conjunction with the Exchange of Information Requirements (EIR) for the project.

- **Electronic** copies of approved drawings for Tender and Construction. The electronic copies must be in pdf for all versions including the last (as-built) version which must also be supplied with AutoCAD files. Drawings are to be packaged using the e-transmit function in Autocad, refer the below for further details.

- **Electronic** copies of all as-built amendments. Electronic copies of as-builts shall be AutoCAD files. AutoCAD files shall be split into individual drawings, but the original Tabbed AutoCAD files containing a number of drawings must not be split into individual drawings. A copy of all tabbed CAD files with multiple layouts shall also be included and the correct Watercare drawing numbering placed on all AutoCAD files. Drawings are to be packaged using the e-transmit function in Autocad, refer the below for further details.

- **AutoCAD E-Transmit Packaging**

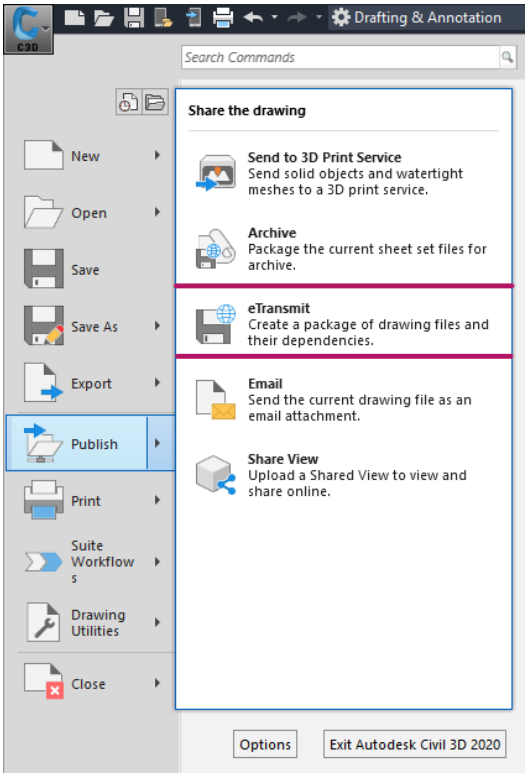
  - To ensure that all references and information related to the drawings are retained and easily accessible, the use of AutoCAD's E-Transmit feature is mandatory:

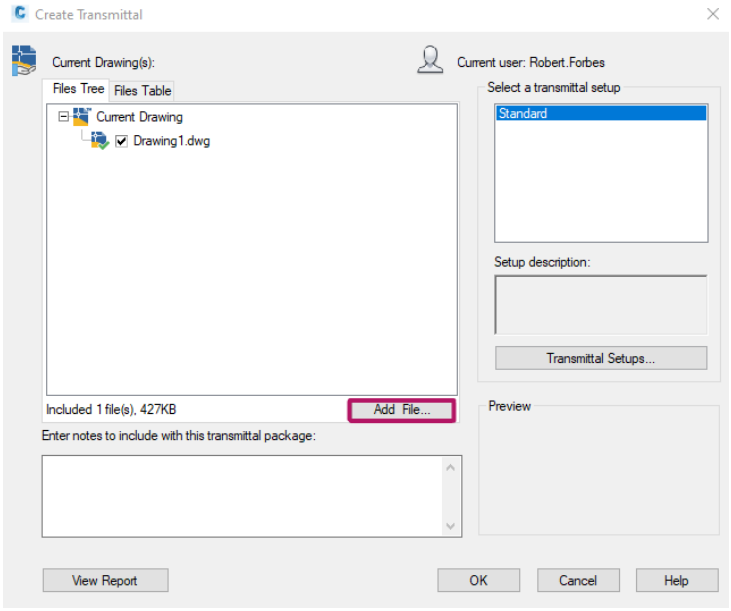
  - Utilize the "E-Transmit" tool to package CAD drawings for delivery.

  - Include all relevant files, such as dependent X-ref's and support files, within the E-Transmit package.

  - The packaged files should encompass the complete set of drawings, ensuring that no essential references or data are omitted.

  - Refer below images relating to the e-transmit process.





- **Red line mark-ups**. Only to be used in anticipation of final AutoCAD files. Red line drawings are for interim use when works are placed in operation. A CAD as-built set must follow.
- **As-built amendments** refer to Section 4.2.1.6.
- A **drawing register** in MS Excel is to be completed when more than 10 drawings are submitted.
- **QA/QC** template completed – refer to Section 8.

5.2 Drawings in 2D

All drawings shall be prepared on the Watercare planform to the standards and conventions as detailed in Section 4.

5.2.1 Compatibility

AutoCAD 2021 is the software currently in use by Watercare for 2D drawings. All electronic drawing files prepared with any other software shall be compatible with this version.

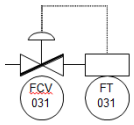
5.2.2 Specific requirements

- Obtain from Watercare Asset Information a block of drawing numbers to cover the disciplines of drawings produced for the project (i.e. Civil, Structural, Mechanical, Electrical & Control). As a minimum one base number is required for each discipline (with up to 999 sheets available for each base number). Contact AssetInfo@water.co.nz
- All plans shall be prepared using licenced AutoCAD software. The AutoCAD Tools-Options-Open/source shall be set to save to AutoCAD 2021. Alternative software may be used when approved by Watercare. The planform templates are obtainable from Watercare.

5.3 Piping and Instrumentation Diagrams (P&ID) and process drawings

The facility code and process area are not required to be shown on the equipment numberings if a drawing covers a specific facility and process area. However, these should be covered in the drawing notes and title. Where more than one process is covered by the drawing, the process code shall be included in the number. In text the full number including the facility code and process area code shall be used.

- Primary equipment number shall be underlined e.g.: 05-TK-03
- Instruments or controlled valves (part of a loop) shall be enclosed with a circular border.



- Other equipment shall have no borders or underlining:

92-HV-014

Drawings shall show the process flow and services running **left to right** across the page. Flow direction shall be indicated by arrows.

Where process flows, and services enter or leave a sheet links to related drawings shall be given. The related drawing shall be by indicated in arrow boxes with descriptive texts above the boxes.

The indication arrow boxes shall be vertically aligned at the left-hand side of the sheet for flows and services entering the page and at the right-hand side of the sheet for those leaving the sheet.

Drawings shall be overlain with a grid for referencing purposes. Numbers 1 to 9 spaced at 40 mm intervals at the top border and letters A to J spaced at 25 mm intervals shall be used down the left-hand border.

The drawing layout shall be:

Location on drawing	Requirement
Above grid line A	Shall indicate the primary equipment items in text form, e.g. description, equipment no., capacity.
Between grid lines A and B	Shall indicate the electronic control interface to the DCS/PLC.
Between grid lines B and J	Shall show the process piping, instruments etc.
Below grid line J	Shall be for notes.
0 to 1	Inputs to sheet
9 to 10	Outputs from sheet

The standard P&ID symbol library is available on drawing 2009193.003 available from Watercare. Contact Asset Information to obtain the latest AutoCAD file version. ***Note:*** This drawing should be included in the drawing set with any greed project specific updates.

5.4 Electrical CAD plan requirements

All electrical drawings must be drawn with a snap setting of 2.5 and a grid setting of 10. Cross references shall be with Watercare's line reference of numbers 1 to 39 across the top of all drawings. All single line diagram drawings shall be lined up under reference numbers across the top of the drawing.

Electrical symbols are generally to IEC-617 and as amended in drawing 2004219.002, the latest AutoCAD file version is obtainable from Watercare Asset Information.

5.5 Advanced drawing models and 3D drawings

Modelling and BIM (building information modelling) systems:

- All models are to be prepared using industry standard software and best practice protocols as set out in ISO19650). The below table sets out the document delivery that describes and agrees to the model delivery:

Appointment level		Prepared by Watercare	Prepared by the appointed party
Project level	Asset information requirements (AI)	✓	-
	Asset Creation Sheet	✓	
	Organisational requirements (OR)	✓	-
	Exchange information requirements	✓ can be requested to be delivered by a consultant	-
	Digital Engineering Execution Plan	✓ can be requested to be delivered by a consultant	
	As-built 3-D Model Specification	✓	
	Level of Development Specification	✓	
Appointment level	Project BIM Execution Plan	-	✓
	Information delivery plan	-	✓

- The model shall be structured around the Watercare Data and Asset Information standards to allow the data outputs to be captured by Watercare's current systems.
- Watercare provides the organisational information requirements and its strategical drivers in the OR document and is to be used to understand and frame the delivery of the digital outcomes.
- The model must demonstrate compliance with Watercare's design criteria and referenced standards.

- A Project BIM Execution Plan and Information Delivery Plan shall be prepared by the appointed party to formalise the integration into the project, unless an existing Project BIM Execution Plan exists.
- The Watercare common data environment (CDE) shall be used except for land development projects or as otherwise agreed.
- The model's file naming structures shall be in accordance with Watercare's Digital Engineering Execution Plan.

Three dimensional (3D) drawings:

- 3D entities must be set to "Colour ByLayer" and "Linetype ByLayer" where the software allows.
- 2D AutoCAD outputs shall be created from the 3D drawing.
- All 2D plans using 3D modelling techniques shall comply with the other sections of this manual.
- Electronic copies of any 3D modelling shall be supplied along with all 2D documentation files that have been derived from the model for future use.
- The software's "Object Enabler" for the current version of Watercare's AutoCAD software shall be supplied.
- All 3D, 2D outputs and associated files shall be provided to Watercare Asset Information for record keeping.

6. Geospatial drawings (GIS)

6.1 General requirements

Drawings shall show the whole of the works as completed. The minimum accuracy shall be to 0.05m in the X, Y, and Z direction, but additionally for pipe inverts to 0.01m in the Z direction.

Geospatial point should be provided in Excel following the below format.

Point	Northing	Easting	Reduced level
A			
B			
C			
D			
E			
F			

Primary geospatial data

The following minimum general information and requirements apply:

- Project name or plan title.

- Drawing number.
- North point.
- Legal boundaries, legal descriptions of parcels, road names and property address numbers.
- Produce plans at a suitable scale for clarity. Show a separate service per plan if necessary. Use general notes to reduce clutter on plans.
- All levels are to be in Orthometric Heights related to Auckland 1946 Height Datum. Vertical datum requirements will transition to New Zealand Vertical Datum 2016 (NZVD2016) in July 2024.
- Assets should be classified as Point, Line or Polygon features.
- Each DWG file should represent a continuous network of an area of interest and should not be split into multiple files.
- Wastewater – coloured red.
- Water – coloured blue.
- Existing assets to be identified as “Existing”.
- Private assets to be identified as “Private”.
- Removed assets to be identified as “Removed”.
- Abandoned assets to be identified as “Abandoned”.
- Found assets (not shown on existing records) to be identified as “Found” e.g. power, gas, telephone that cross over or run parallel to within 1m of a Watercare pipe or chamber and that has been exposed during construction.
- Connections to existing networks.
- Topographical features, fences kerbs etc. (at least one).
- Date of installation.
- Geospatial survey data may only be surveyed and certified by a ***registered professional surveyor*** or ***licensed cadastral surveyor***.
- Final copies of the as-built plan must include a signed certification statement by the Registered Professional Surveyor, Licensed Cadastral Surveyor, or Certified Professional Engineering Surveyor responsible for the as-built, in the following format:

  I certify that these As-built Plans are an accurate record of the works undertaken and that:

  - *The **Coordinates** (X, Y) are in terms of NZTM on NZGD (2000)), and are within ± 50mm.*
  - *The **Levels** (Z) are in terms of the NZVD2016 and Auckland 1946 (MSL) LINZ datum (DOSLI datum), and are within the following tolerances:*
    - *For all pipe inverts & roadside channels to be within +/- 10mm (local circuit i.e. internal/relative consistency required only)*
    - *For all other assets +/-20mm (e.g. Manhole covers, Earthworks)*

Name: _____

Signed: _____

Registered Professional Surveyor / Licensed Cadastral Surveyor/

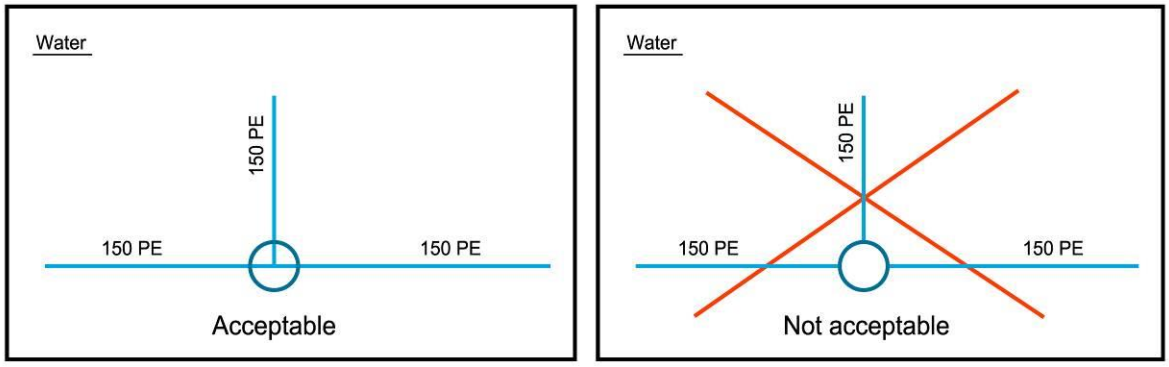
Certified Professional Engineering Surveyor

Registration Number: _____ Date: _____

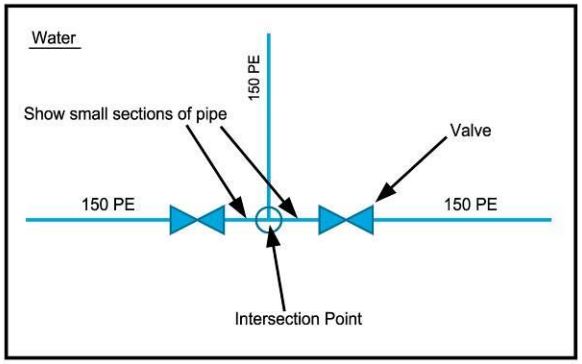
Contact Phone: _____

Email: _____

- To ensure connectivity between networks, all features must be snapped to the object that they intersect by using CAD snapping tools. Pipes must snap to the center of a point and not to the edge of an asset. Refer to the diagram below.



- Where two separately categorized point assets are joined together, e.g. a Tee with a valve or blank/end cap on its connections, a very small section of pipe must be drawn so that both assets can be represented in the GIS and maintain network connectivity. Refer to the diagram below.



- Pipes must be represented as a single continuous line or polyline which represents the pipe centerline. There shall be no other line types used such as dotted, dashed etc.

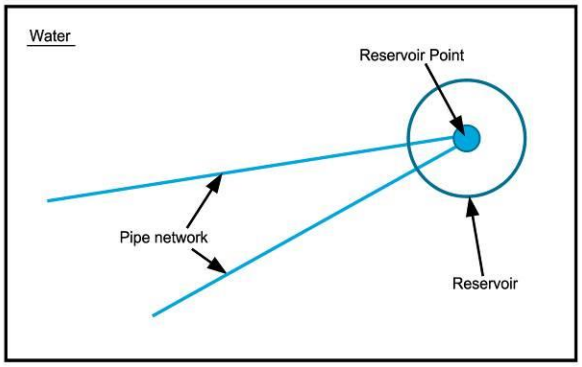
- Pipes must be continuous between intersections with point assets. At these points they must be split into new pipes, except for main pipes that should not be split at the intersection with service connections.

- Pipes should not be broken at bends or any other places where point features are absent.

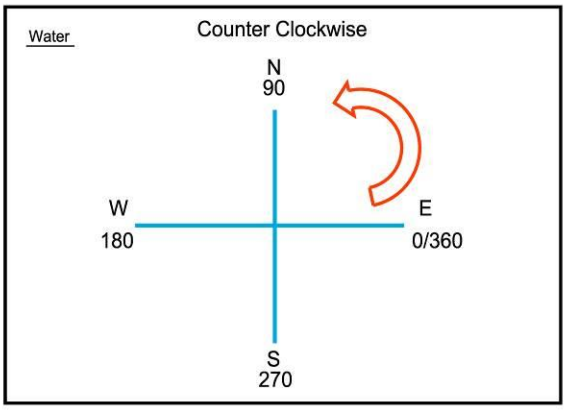
- The pipe line representation is drawn to the centre of the manhole lid, upstream and downstream. Invert levels for the pipe represent the **z values** of the pipe at the point of exit and entry at the manhole.

- Structures like pump stations, reservoirs, treatment plants, chambers etc. are to be represented as a point feature as well as a polygon feature. For polygon features (squares, rectangular, circular etc.) the point must be the centroid (centre) of the facility. For irregular

shaped structures, this shall be where the inlet and outlet pipe network intersect. Refer to the diagram below.



- Any inset drawn in a CAD file must be on a separate layer.
- Every point asset must rotate **counterclockwise,** and the rotation value must be recorded in the CAD file under “Rotation Field”. Refer to the diagram below.



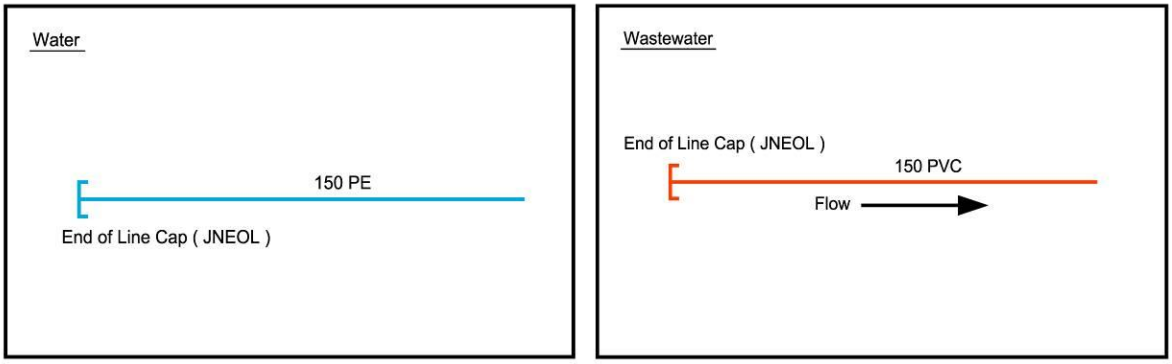
- All mandatory attributes such as nominal diameter, material type etc. shall be shown for each pipe.

6.1.1 Diagrams

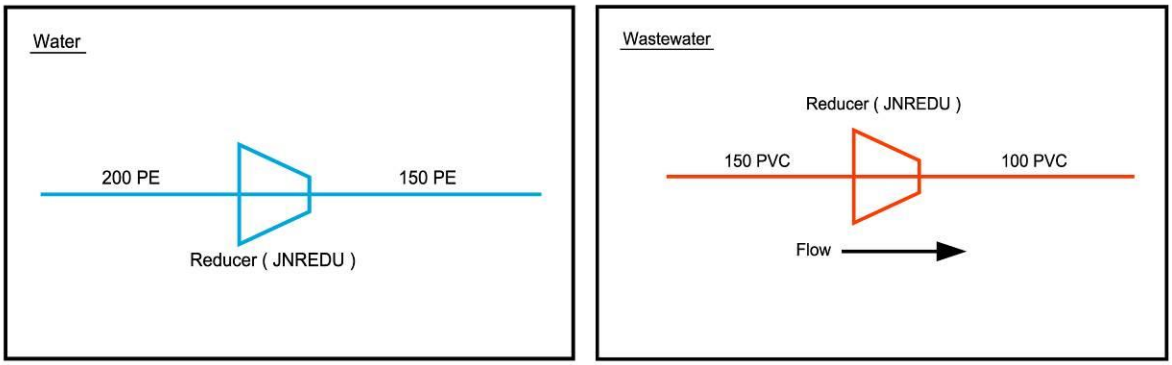
This section shows diagrams for water and wastewater assets and their snapping requirements.

6.1.1.1 General assets for both water and wastewater

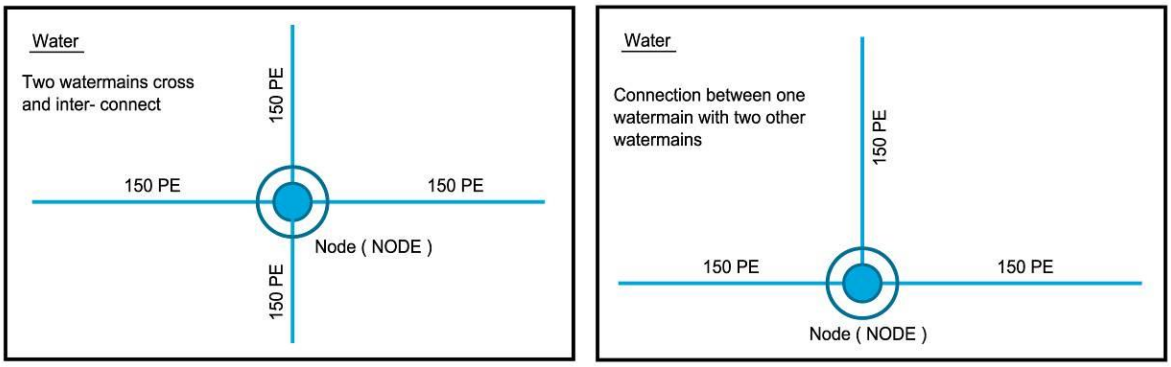
- Diagram 1: End cap.

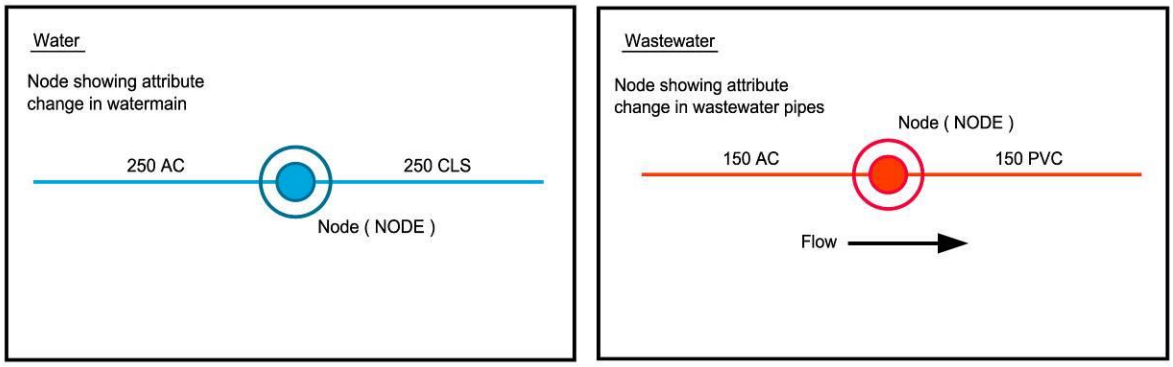


- Diagram 2: Showing pipe reducer.

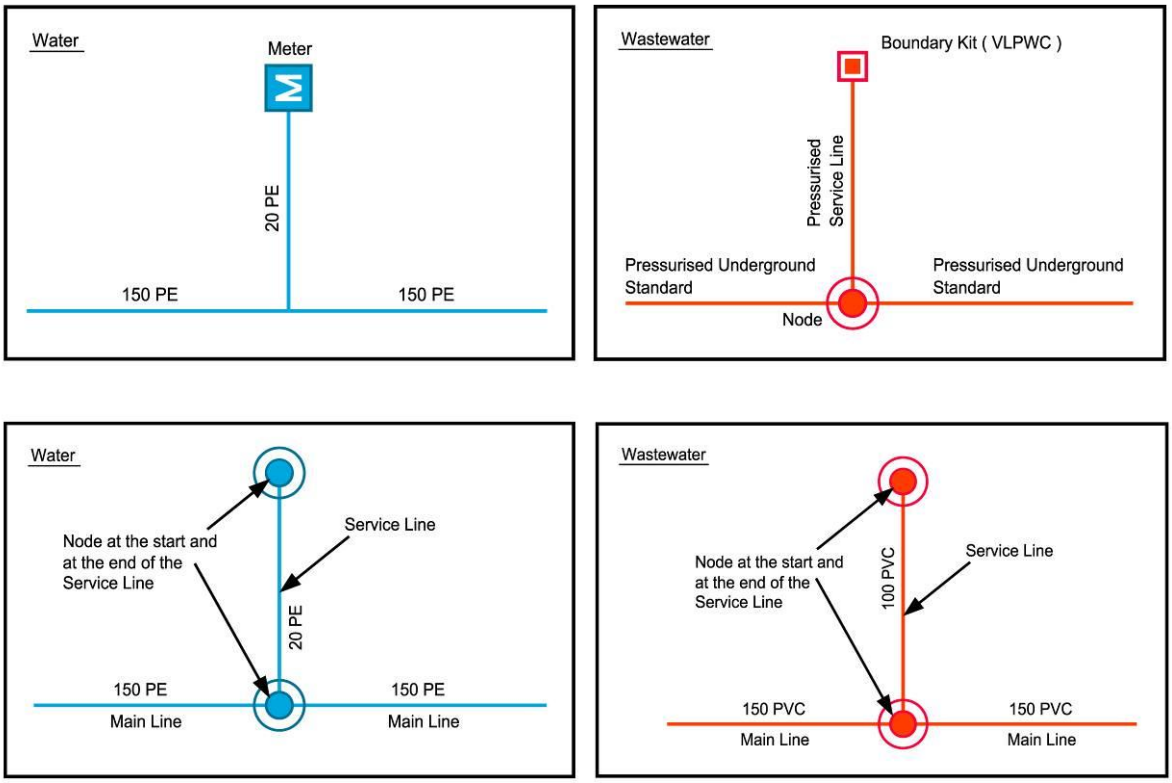


- Diagram 3: Showing nodes.

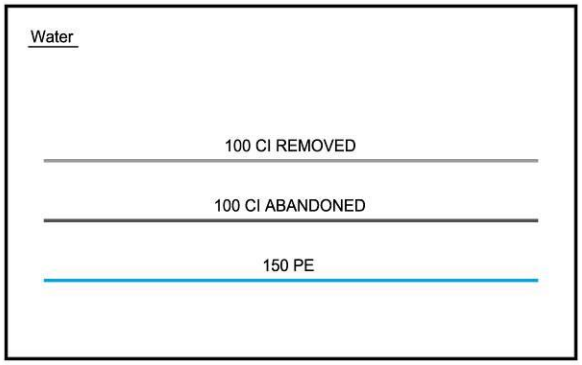




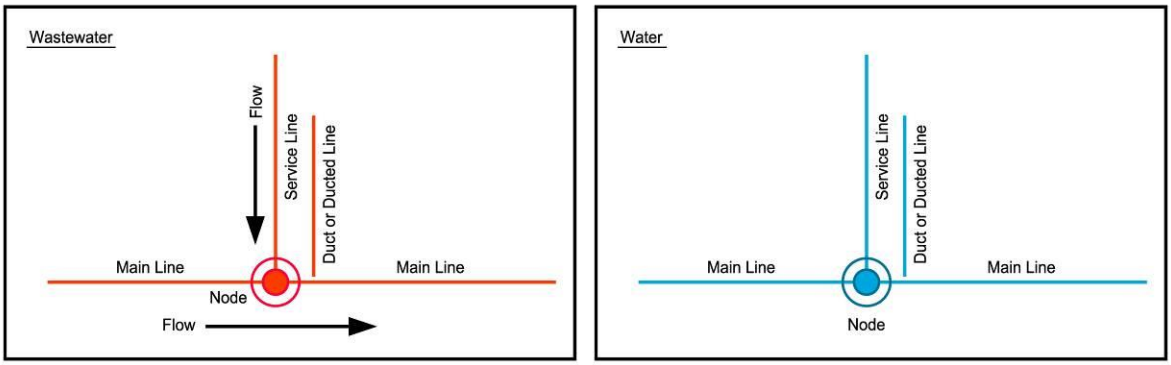
- Diagram 4: Service connections for water and wastewater.



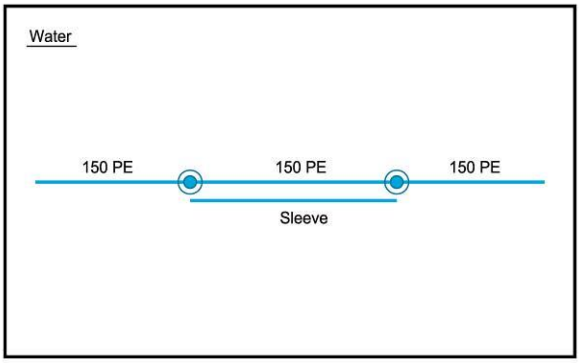
- Diagram 5: Abandoned or removed pipe.



- Diagram 6: Showing Ducted Connection.

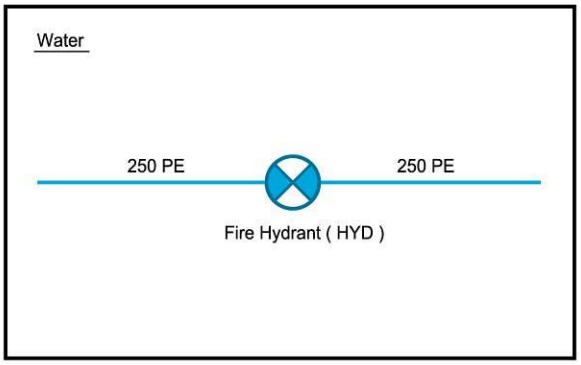


- Diagram 7: Showing sleeved or protected pipe.

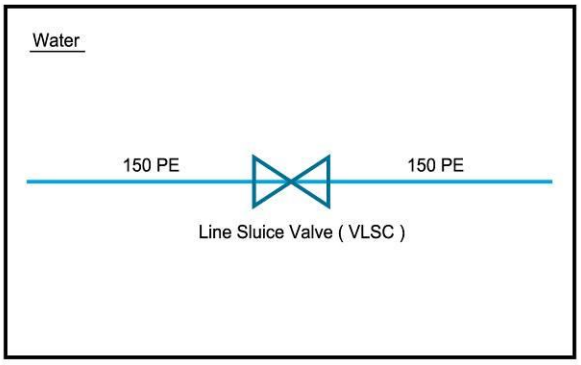


6.1.1.2 Water specific assets

- Diagram 8: Showing fire hydrants.

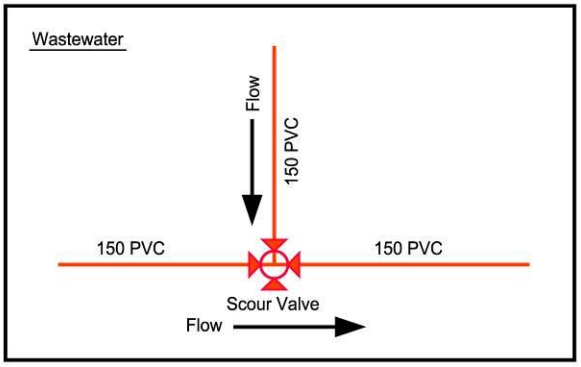


- Diagram 9: Showing isolation valves.

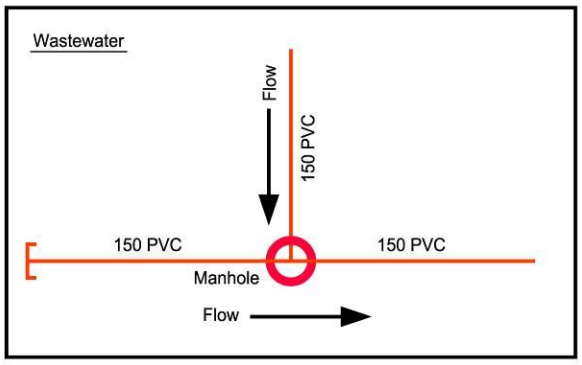


6.1.1.3 Wastewater specific assets

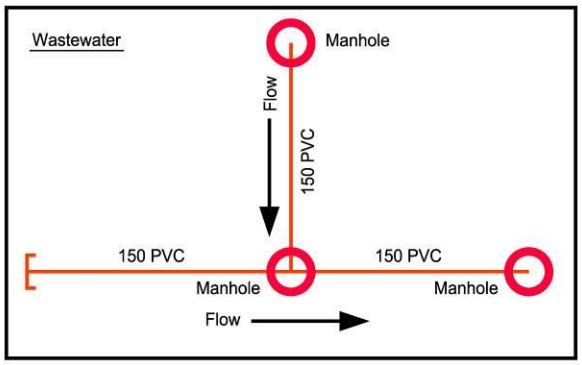
- Diagram 10: Wastewater Scour Valve.



- Diagram 11: Showing Wastewater Network Flow.



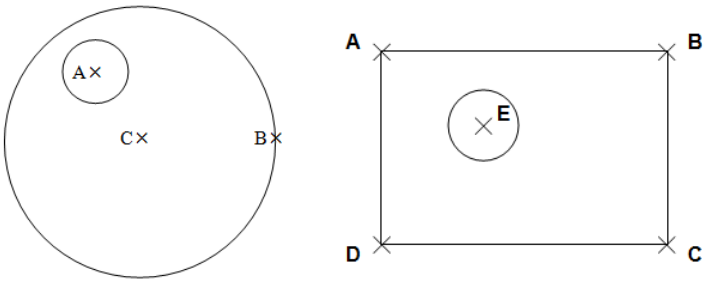
- Diagram 12: Showing Wastewater manholes.



6.2 Transmission linear systems specific requirements

6.2.1 Structures including chambers and manholes

- Position, dimensions, construction details, and equipment information.
- Coordinates and general information for all connected pipework and services.
- Floor levels and soffit levels.
- Chamber and manhole position (external extends), dimensions, and lid coordinates:
  - i. for straight edged chambers, the external walls and corners.
  - ii. for circular chambers, the centre and one point on the circumference.
  - iii. The centre of chamber access lids.

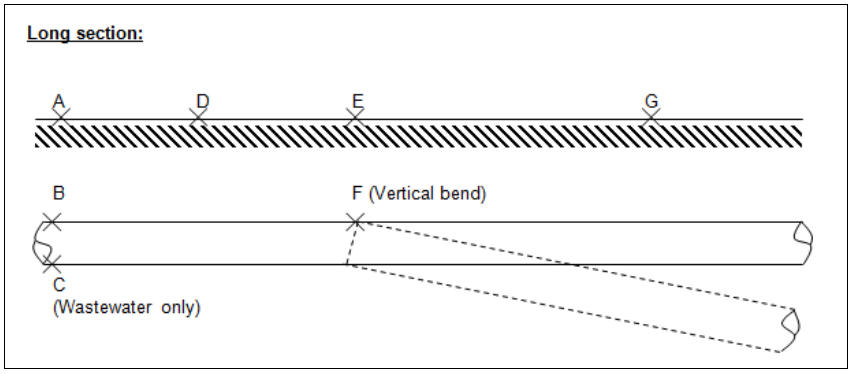


- Ground levels and cover over underground services.

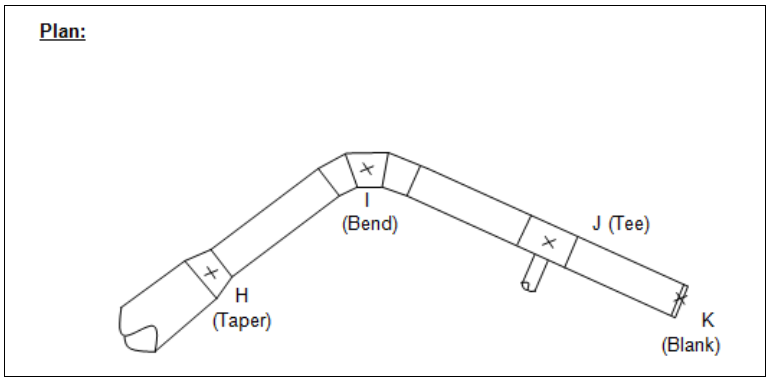
- Abandoned or decommissioned structures associated with the contract works.
- External extents of any other structure above or below the ground that is deemed to be part of the construction.

6.2.2 All pipelines

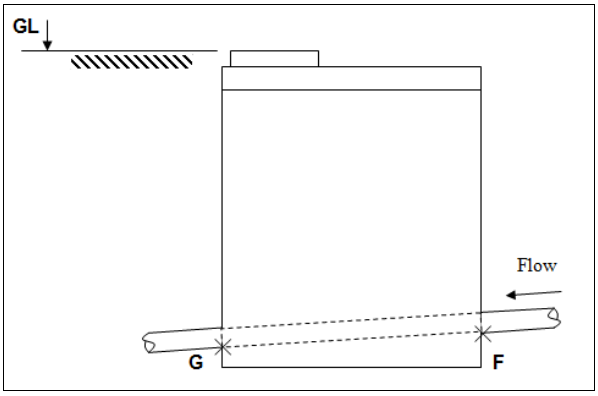
- Pipeline plan and longitudinal section, including ground levels between significant changes in grade.



- Reduced level of top of pipe.
- Invert level – wastewater only.
- Location of pipe centre line by coordinates.

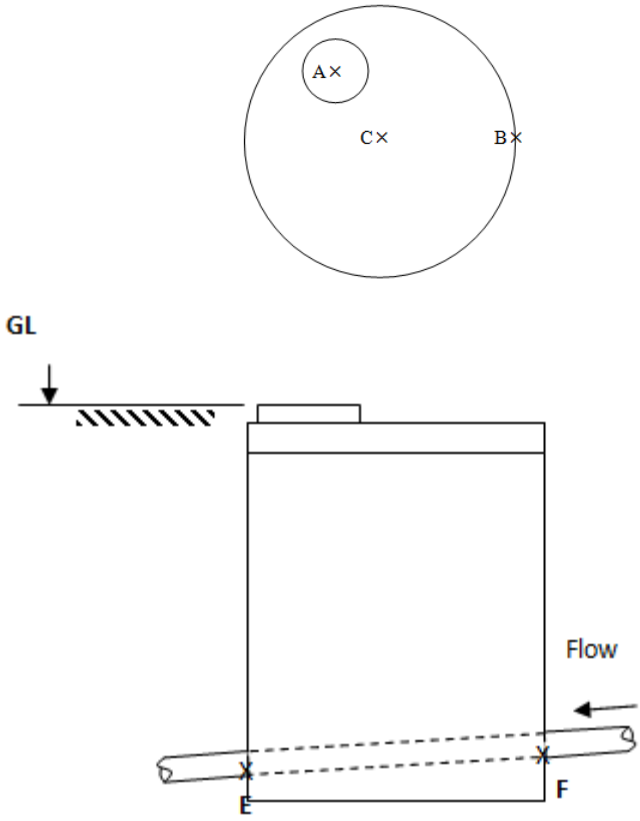


- Pipe **internal** and **outside** diameter, class, pressure rating (or stiffness rating).
- Valve and other fitting positions and functions.
- Pipe bend positions and angles.
- Thrust block dimensions.
- Position, size and level of all connections into and out of manholes.
- Pipe invert levels inside chamber.



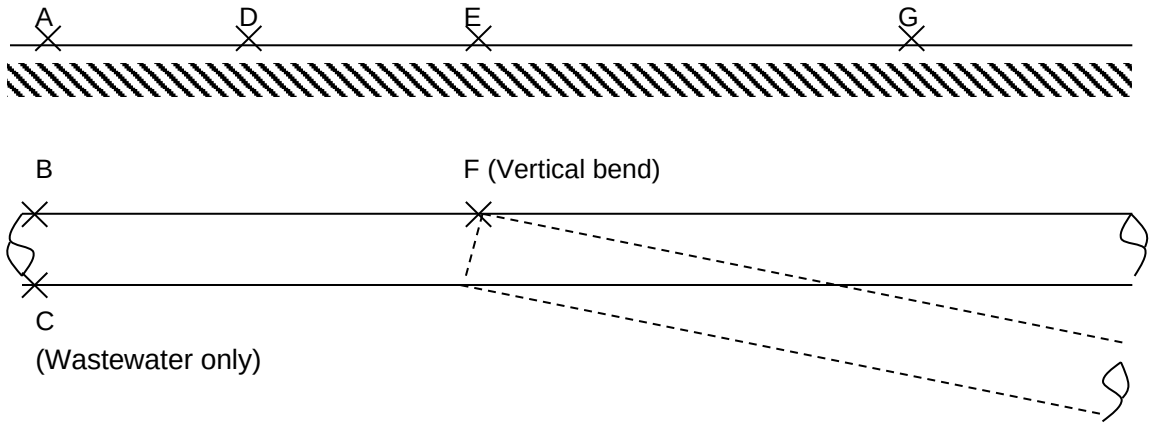
- Depth from ground level to top of pipe.

6.2.3 Example of wastewater manhole survey

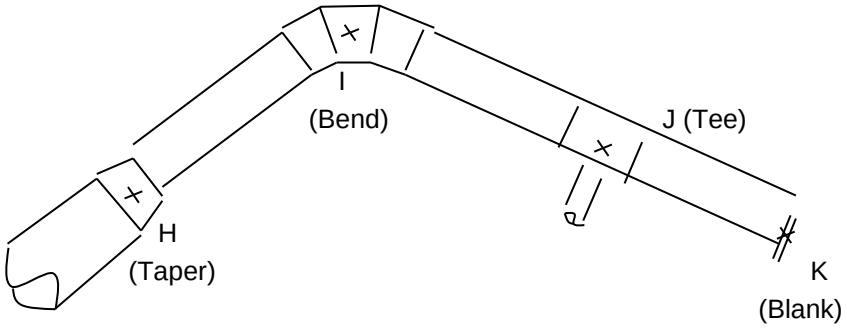


6.2.4 Example of survey for pipework

Long section:



Plan:



6.3 Local networks specific requirements

As-built drawings shall show the following minimum information:

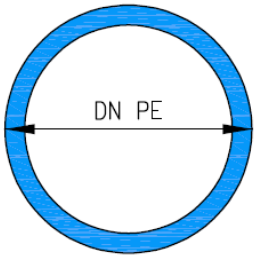
6.3.1 Water supply

6.3.1.1 Pipes

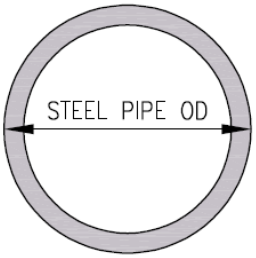
- Outside diameter for all PE and steel pipe and Nominal diameter (DN) for other pipe material type and class of pipes laid including road crossings and house connections.
- Internal diameter (I.D.) of pipes shall also be documented on drawings.
- Note: For labelling of pipes use general notes where possible e.g. “All Water Supply pipes are DN110 (I.D. 92.9) PE100 PN12.5 SDR13.6 unless noted otherwise”.
- Bends (angle) or change of direction to be coordinated.
- Pipes removed, abandoned or found.

Example of relevant diameters to be captured based on pipe material type.

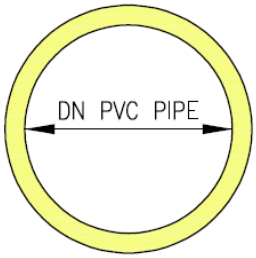
PE (Nominal outside diameter)	CLS Pipe (DN)	PVC (DN)	GRP (DN)	Ductile Iron (DN)
63	168	80	300	100
90	219	100	375	150
125	257	150	450	200
140	356	175	525	225
160	406	225	600	250
200	508	300	675	300
225	610	375	750	375



DN PE – NOMINAL OUTSIDE DIAMETER



STEEL PIPE – OUTSIDE DIAMETER



DN PVC – MEAN INSIDE DIAMETER

6.3.1.2 Fittings

- Valves (noted for type), hydrants, tees, branches, reducers, backflow devices, thrust blocks, blank caps, meters etc. Show enlarged details where necessary.
- Fittings removed, abandoned or found.

6.3.1.3 Service connections

- Internal and outside diameter, material type, length and class of pipes laid.
- Service connections removed, abandoned or found.

6.3.1.4 Lining of Pipes (Pipe Rehabilitation)

- Nominal (internal) diameter (DN) of pipe liner (new internal diameter).
- Material type and class of liner installed, pressure rating (if applicable), length of liner, direction of flow.

6.3.2 Wastewater

6.3.2.1 Pipes

- Outside diameter for all PE and steel pipe or Nominal diameter (DN) for other pipe material type and class of pipes laid, length, direction of flow, bedding & backfill type and if directional drilled.
- Internal diameter (I.D.) of pipes shall also be documented on drawings.

- Note: For labelling of pipes use general notes where possible e.g. All Wastewater pipes are PVC SN16 unless noted otherwise. Alternatively use this format: DN150 PVC SN16 “and length” DN160 (I.D. 140) PE80B SDR17 “and length”.
- Pressure/rising mains and siphons (nominal diameter, material type, class of pipes laid, length, position, bends, levels, anchor/thrust blocks, flushing valves & air valves).
- Encased protected pipes (position, length & type of protection).
- Pipes removed, abandoned or found.

6.3.2.2 Structures and Fittings

- Manhole cover/lid level (LL) and invert level of inlet and outlet pipe (IL); invert level of drop connections.
- Label manholes with diameter and material type.
- Location and extent of pump stations, inspection chambers, dry chambers, blank caps/plates and any other node point e.g. valves (PWC systems).
- Structures removed, abandoned or found.
- Fittings removed, abandoned or found.

6.3.2.3 Lining of Pipes (Pipe Rehabilitation)

- Nominal (internal) diameter (DN) of pipe liner (new internal diameter).
- Material type and class of liner installed, pressure rating (if applicable), length of liner, direction of flow.

6.3.2.4 Service connections for gravity pipe

- Nominal diameter, material type, length and class of pipes laid.
- Show connection length of pipe to main in accordance with the point of supply.
- A connection greater than 5m in length should be coordinated and invert levels provided.
- Service connections removed, abandoned or found.

6.3.2.5 Service connections for pressurised pipe

- Nominal diameter, material type, length and class of pipes laid.
- For connection boundary kits connecting to a pressurised system show the distance from the centre of the boundary kit box cover to the connection point on the main pipe. Provide length of pipe.
- For connection boundary kits connecting into a gravity system show the distance from the centre of the downstream manhole cover to the centre of the boundary kit box cover. Provide length of pipe.
- For connection into a vacuum system show the distance from the vacuum valve in the onsite vacuum vault to the main pipe.
- Service connections removed, abandoned, or found.

6.4 Electrical and control

- Electrical cable and fitting positions and functions including cathodic protection and telemetry.
- Pipeline electrical isolation points such as insulated flanges.
- Cabinetry positions, dimensions and coordinates.
- Duct size, wall thickness and reduced level of top of duct/cable.
- Location of ducting/cable centre line by coordinates.

6.5 Plants, pump stations and associated electrical – All areas

Details shall comply with requirements as set out for transmission, see section 6.2 and 6.4.

6.6 Vested assets

Where any external party constructs new developments or subdivisions not contracted by Watercare the final survey as-builds in CAD and a pdf of the as-build shall be supplied before the assets are connected and vested to Watercare.

7. As-built metadata

Refer to Section 5.5 when this data is included in the drawing model.

8. QA/QC template

The quality control checks shall be completed before submitting drawings to Watercare to prevent re-work and delays in drawings being accepted.

Project name	**Project name**	Verification Form No.	**1**
Project Director		Deliverable/Package Owner	
Date	Select Date		
* Reviewer and Verifier nominated by Author/Designer with approval from Project Director			

Document No.	Description	Revision No.	Date
TBC	TBC	TBC	TBC

1. Self-Check

Drafting Checklist (For drawings only)	Yes	No	N/A	Comments
Current Watercare CAD manual, planforms and associate files – obtained from Watercare.	☐	☐	☐	
Project Number obtained from Watercare.	☐	☐	☐	
Contract Number obtained from Watercare.	☐	☐	☐	
Drawing Number obtained from Watercare.	☐	☐	☐	
Watercare CAD Manual - obtained from Watercare.	☐	☐	☐	
File Setup				
Ensure that the drawing units and coordinate systems used are set as per the CAD Manual.	☐	☐	☐	
DRAFT Planform forwarded to Watercare for approval.	☐	☐	☐	
Verify that all text styles and dimensions styles are loaded as per Watercare CAD Manual	☐	☐	☐	
Page paper size set to A3 or A1	☐	☐	☐	
Where tabbed CAD files are used for as-builts, pdf copies of all sheets are required. Tabbed CAD files must not be split into individual drawings, refer Section 5.1.4 in the CAD Standards.	☐	☐	☐	
Viewport's to be ` Display Locked 'and turned off except for polygons. Viewport colour to be dark grey and set to ` Non plot '	☐	☐	☐	
AutoCAD files saved to AutoCAD 2021	☐	☐	☐	
Drawing Content				

Check all design elements are accurately represented in the drawing.	☐	☐	☐	
Ensure that all dimensions and text are legible and correctly scaled as per the CAD Manual.	☐	☐	☐	
Check correct linetypes and lineweights are used as per CAD Standards.	☐	☐	☐	
Verify that all necessary symbols, blocks, and hatches are included.	☐	☐	☐	
Make sure that all viewports and layouts are properly setup.	☐	☐	☐	
Confirm that the drawing is properly georeferenced (if applicable).	☐	☐	☐	
Verify that the drawing origin and coordinate system are accurate and as per the CAD Manual.	☐	☐	☐	
Bar scales to be shown on all plans.	☐	☐	☐	
North point shown on all plan views.	☐	☐	☐	
Sheet names and numbers to all plans.	☐	☐	☐	
Service plans have a legend on each sheet.	☐	☐	☐	
Sheet joining lines shown.	☐	☐	☐	
Watercare standard symbols library used to prepare the plans.	☐	☐	☐	
Other/adjacent Watercare assets labelled.	☐	☐	☐	
Manhole numbering as approved by Watercare.	☐	☐	☐	
Asset identification added to plans where required.	☐	☐	☐	
Survey CAD file of newly constructed assets to NZTM projection format.	☐	☐	☐	
For water and wastewater longitudinal sections the direction of flow shall be indicated as: water pipework – flow left to right on the sheet; wastewater pipework – flow right to left towards. Flow directions are shown on the plans.	☐	☐	☐	
Remove “clouds” from as-built drawings; no new triangles to be added	☐	☐	☐	
3rd Party reference number added to plan where required.	☐	☐	☐	
Layers and Properties				
Organize and standardize layer names and properties.	☐	☐	☐	
Ensure that layers are correctly color-coded and linetype-assigned as per CAD Support Files and CAD Manual.	☐	☐	☐	
Blocks and X-refs				
Ensure all blocks and X-refs are correctly named and linked.	☐	☐	☐	
Verify that any externally referenced files are also included in the drawing.	☐	☐	☐	

Metadata and Title Block				
Update and verify the drawing's metadata (author, date, etc.)	☐	☐	☐	
Check that the title block is filled out with the correct project information – Obtained from Watercare	☐	☐	☐	
Plan Title and Group Code received from Watercare.	☐	☐	☐	
Facility Code provided by Watercare and added to the top line of the plan title.	☐	☐	☐	
CAD File number on the plan to be the same as the drawing number including the revision issue (e.g. 2010123.001A)	☐	☐	☐	
Sheet numbers start at 001. The series has no gaps unless approved by Watercare.	☐	☐	☐	
Watercare Specific Requirements				
Review any specific requirements or standards provided by the Watercare.	☐	☐	☐	
Ensure the drawing adheres to the client's file naming conventions.	☐	☐	☐	
File Transfer				
Confirm that all x-refs are attached and up to date.	☐	☐	☐	
Detach unnecessary x-refs and purge unnecessary layers	☐	☐	☐	
E-transmit the DWG file into a zip archive for easy transfer as per Watercare CAD Manual.	☐	☐	☐	
Watercare plot styles used to produce pdf copies of all CAD drawings, refer Section 4.16 in the CAD Manual.	☐	☐	☐	
Electronic .pdf copies shall be supplied for all tender, construction and final as-built drawings.	☐	☐	☐	

Title	Name	Signature / Digital Initials in Bluebeam	Date
Drafter			Select Date
Lead Drafter/CAD Manager			Select Date

Approval for Release

Checklist	Yes	No	N/A	Comments
QA process below has been undertaken as per below, by appropriate personnel.	☐	☐	☐	

Title	Name	Signature	Date
Approved by Design Manager			Select Date
Approved by: Project Director			Select Date

2. Document Control check

Checklist	
QA process complete and all evidence provided	☐
Revision number and date correct	☐
Deliverables Register updated	☐

Document Controller	Signature	Date
TBC		Select Date