

SEQ D&C Code
Total Asset Information Package
(Including Drawing Specification, ADAC schema and
Handover requirements)
(Version 1.5)

May 2012

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Part A – Introduction

1 Overview

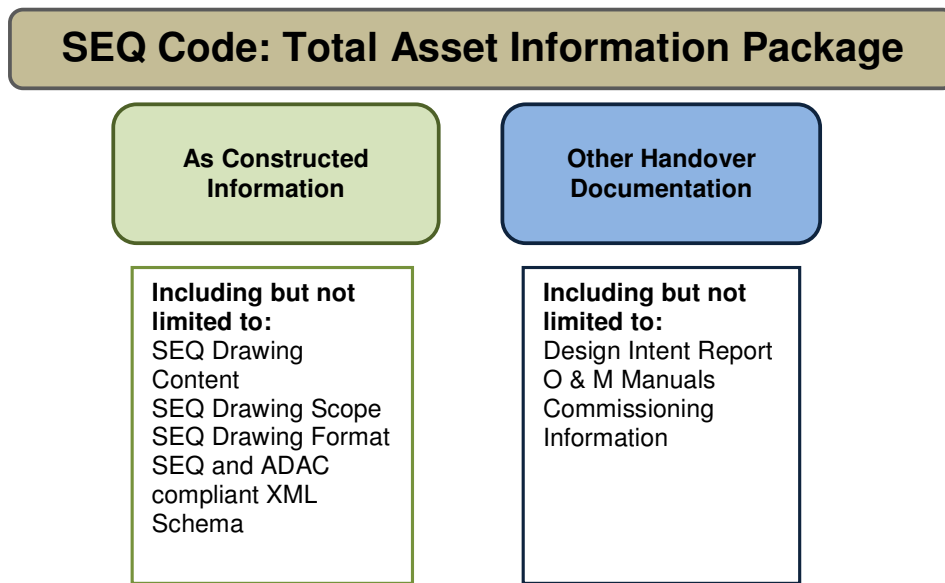
Chapter 4A of the “South-East Queensland Water (Distribution and Retail Restructuring) Act” requires Allconnex Water, Queensland Urban Utilities and Unitywater to develop a common set of Design and Construction (D&C) standards for water services infrastructure. It is envisaged that a consistent standard will reduce the cost of doing business across the water industry by

- Providing greater consistency in construction standards across the region;
- Ensuring greater standardisation of processes and DA assessment;
- Providing a common reference point for construction standards; and
- Providing a benefit to customers through better service and lower costs.

One of the key deliverables in the SEQ D&C Code is the need for a common standard for Design and “As Constructed” information across the SEQ Water Industry. This common standard will comprise the following elements:

- A package of As Constructed information, and
- Handover requirements (specifically for active assets).

Figure 1 – SEQ Code Total Asset Information Package



Such asset data is essential to the efficient operation of the SEQ Water industry as it underpins a range of financial, spatial, operational and asset management systems which aid in delivery of the utilities service outcomes.

2 Purpose of this document:

The purpose of this document is to briefly outline the asset data and drawing requirements of the SEQ Water and Sewer Service Providers (SPs).

The overall objective of this approach is to develop a standard approach to drawing and asset data management across the SEQ water industry.

2.1 Scope and Application:

This document establishes the minimum requirements for acceptance of data submitted to the SEQ-SPs. All data submitted to the SEQ-SPs has to be supplied in electronic format for the following services and items:

- All Sewer reticulations
- Potable Water reticulation and
- Recycled Water reticulation

All submitted data must clearly identify:

- Name of consultant/contractor
- Council approved Estate name and stage number (where applicable)
- Scale
- Date
- Name or number of service or item
- Amendment number (if applicable).

2.2 Structure of the Document:

This document has been structured to step through the key components of the SEQ-SPs data and drawing requirements as follows:

- **Part A: Introduction** – Summarises the overall context for development of the Drawing and data information package
- **Part B: As Constructed Information** – Summarises the drawing layout and format required by the SEQ-SPs
- **Part C: Other Handover Documentation**- summarises the additional asset data requirement's for assets

Part B – As Constructed Information

3 Introduction

On the completion of any construction work there is a requirement to submit completed “As Constructed” information as a permanent and accurate record for future use.

The final package of As Constructed information comprises the following:

- Site Mark-Ups of Issued for Construction Drawings
- ADAC data file
- Approved Design Change Notices
- As Constructed Drawings
- Certified Drawings
- Photos

4 Site Mark-Ups of “Issued for Construction” Drawings

The Constructor shall maintain 2 sets of Issued for Construction paper drawings (marked-up prints) to track changes, additions or deletions from the original design during construction. The working “As Constructed” marked drawings will be reviewed for accuracy and completeness by the Constructor.

Mark-ups must include:

- Where contract drawings or specifications nominate more than one option, only the option selected for construction shall be shown. Cross out such words and phrases as "optimal requirement," "or equal," etc., and list specifically the items of material provided,
- Diameter, material and class of each pipe,
- Location of change of pipe material,
- Types of bedding and limits thereof,
- Types of backfilling including road crossings,
- Invert level at inlet and outlet of each Maintenance Hole ,
- The level and location of all underground services located along the route of the new sewer,
- Maintenance holes and surface level shall be located centre of chamber and not centre of lid,
- Maintenance Hole Number as per the approved design drawings,
- Depth of chamber,
- The surface level at and the level of the cover of all Maintenance Hole s,
- Variations to the design including alterations to any structures,
- Unusual or uncharted obstructions that are encountered in the contract work area during construction should be marked accurately on drawings
- The topography, invert elevations and grades of drainage installed or affected as part of the project construction,
- Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water,
- Changes or modifications that result from the final inspection,
- All longitudinal sections shall have levels recorded at the time of construction by the Contractor to show all “As Constructed” information, and
- Buried items shall be measured prior to backfilling of excavation.

4.1 Mark-Up Standards

The following information is provided to improve the quality of the marked-up prints and thereby facilitate preparation of As Constructed drawings. Marked-up changes must be complete, legible and understandable:

- Three base colours in marking up the hard copy of the working “As Constructed”. If the base colours are deviated from, provide a legend indicating any special purpose of the colours used. Traditional base colours:

- Deletions OR Additions (Red) – Deleted or Added graphic items (lines) shall be coloured red with red lettering in notes and leaders; Special (Blue) – Items requiring special information, coordination, or special detailing or detailing notes shall be in blue, and
- Lead Pencil – Notes for draftspeople’s or checkers information not to be added to final drawing;
- Written explanations are to be used as necessary on “As Constructed” mark-up drawings to describe changes – do not rely totally on graphic means to convey the revision,
- Legibility of lettering and digit values shall be precise and clear when marking prints, and clarify ambiguities concerning the nature and application of change involved,
- Wherever a revision is made, make changes to affect related section views, details, legend, profiles, plans and elevation views, schedules, notes and call-out designations, and mark accordingly to avoid conflicting data on all other sheets,
- When changes are made, cross out all features, data and captions that relate to that revision,
- When changes are required on small-scale drawings and in restricted areas, suggest large-scale inserts be drawn or sketched, with leaders to the location where applicable,
- Be sure to add and denote in legend, any additional equipment or material facilities, service lines, etc., incorporated under “As Constructed” Revision if not already shown in legend,
- When attached prints (or sketches) are provided with marked-up print, indicate whether:
 - the entire drawing shall be added to contract drawings, or
 - the contract drawings shall be changed to reflect the attached print, or
 - for reference only to further details not required for initial design;
 - the comments on the drawing are to be made complete without reference to letters, memos, or materials that are not also a part of the “As Constructed”. Annotating the drawing, “Per Variation/ Design Change Order #42,” means nothing when the actual change order states, “added an additional 2 DICL Tees” or similar statements. The same is true when the drawing is marked, “changed per (*insert relevant SEQ-SP*) instructions.” This office and ultimately the using organisations must know what was changed, how it was changed, where the item(s) were relocated to and how the affected connections were altered. Variation/ Design Change Orders usually do not provide information as to how the facility was changed, only what was changed,
- The mark-ups shall be accomplished on black line prints of the most current sheet,
- Shop drawings are to be incorporated into the As Constructed drawings. They will be provided in electronic AutoCAD file format and conform to the SEQ Design and Construction Code CAD Drafting Standard. Hand drawn or plotted paper shop drawings will not be accepted.

4.2 Example of Modifications

There are some general items that need special attention to ensure that the marked-up prints are complete and accurate. The working “As Constructed” shall show, but shall not be limited to, the following:

- Actual location, type and size of all of existing and new utility lines, especially underground lines within the construction area,
- Measurements will be shown for all change of direction points and all surface or underground components such as valves, Maintenance Holes, drop inlets, clean outs, meters, etc.,
- Descriptions of exterior utilities including the actual quantity, size, and material of the utility lines,
- In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the “As Constructed” drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction,
- Valves splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point,
- The average depth below the surface of each run shall also be recorded,
- The location and dimensions of any changes within the building structure,
- Layout and schematic drawings of electrical circuits and piping,
- Correct dimensions and details transferred from shop drawings,
- Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans,
- Actual location of anchors, construction and control joints, etc., in concrete, and
- Changes in location of equipment and architectural features.

Form of Submission

Site mark ups will be submitted as scanned PDF files and submitted electronically with the final As Constructed package of Information.

5 ADAC Data File

5.1 General:

ADAC is a non-proprietary data specification and transport format (XML) for the description and transmission of asset data. Originally conceived and operated by several councils in South East Queensland and now a national initiative of the Institute of Public Works Engineers of Australia (IPWEA), ADAC has been designed to support the efficient transfer of asset information from the development industry to councils. The process is designed to capture detailed data on new civil infrastructure assets including water, sewerage, drainage, roads and open space as well as survey-accurate cadastral information.

In simple terms, the ADAC schema provides a mechanism for checking the validity of design and “as constructed” information submitted to the SEQ-SPs. The system will also facilitate the application of individual business “rules” which can facilitate data migration from the generic XML format into each businesses specific IT applications.

All developers contractors will need to add suitable software to their drawing applications to prepare an XML file in accordance with the ADAC specifications’ data schema. This file is a key component of the Total Asset Information Package and is a prerequisite for obtaining Operational Works approval

The ADAC data file must only be generated from accurate survey information as this data is imported into the relevant SEQ-SP’s GIS system.

Survey information supporting the development of the ADAC data file must be provided by a licensed surveyor.

All geometric features in ADAC xml and CAD drawings will be defined in GDA94 co-ordinates. This As-constructed data must be derived from at least two relatively well-spaced permanent survey marks with Map Grid of Australia (MGA Zone 56 –GDA 94) co-ordinates. Survey should be on true MGA not based on DCDB co-ordinates.

Tolerance for survey

- Alignment tolerance is 0.05 metre
- Level tolerance is 0.05 metre

Cadastre will be survey accurate based on Registered Plan data.

The Sewer and Water GIS environment is created from a series of lines (which make up the pipes) and points (which are; fittings & valves etc) therefore it is crucial that the pipe has been broken at every object insertion point for valuation and engineering flow purposes.

There are a number of benefits associated with the adoption of this process:

- It allows automation of the data validation and upload process, speeding up the plan sealing process;
- It greatly standardises the information, easing the "flavours" required to be produced by industry;
- It improves the management of assets, reducing costs;
- It aides in the provision of accurate data back to industry for subsequent work;
- There are significant efficiencies that can be gained by updating ADAC design plans with As-constructed information; and
- It provides a consistent base for future development in this area, allowing even more efficiencies and use of developing technologies.

Please check the ADAC website for current list versions of the ADAC Add-on and help files.

5.2 ADAC Data Collection Instructions

Pipes should be captured in the direction of flow. All features in the ADAC specification will be collected. Ends of line features are snapped to point features. Sewerage Pipe Pressure and Water Pipe elements should be broken at fittings, hydrants and valves and changes in pipe attributes. Sewerage Pipe Non Pressure elements will be broken by Maintenance Hole or maintenance shafts points or by changes in pipe attributes.

5.3 Form of Submission

ADAC files shall be submitted electronically in either .dwg or.xml formats according to the version of ADAC software. ADAC data will conform to the ADAC .xml data specification as published by the Institute of Public Works Engineering Australia. The ADAC xml file will include project cross reference metadata. All fields within ADAC are mandatory and shall be filled in with correct information and never left blank. Submitted XML files will also conform to further enumeration constraints detailed below. Pipe diameters are nominal diameters as specified in Australian Standards and ordered from manufacturers. PE-100, copper and Mild Steel pipe nominal diameters refer to outside diameters.

5.4 Sewer Reticulation ADAC Schema

The Asset data requirements for wastewater are set out within the ADAC sewerage schema specification in Appendix A. The data in these tables represent a snapshot of the ADAC schema in early 2012, however users of this document need to go to the ADAC website (<http://www.engicom.com.au/products/adac2/>) to get the current version.

Submitted XML files should also conform to with the further enumeration constraints detailed in the following table. Default values are highlighted in a tan colour.

Table 3.1 – Additional Attribute Enumeration Constraints – Sewer

Default:

Material	Diameter	Joint Type	Class	Lining	Protection
Sewerage Pipe Non-Pressure Feature Class					
PE_100	110	BW	SDR21	Unlined	Uncoated
	160	EFW	SDR17		
	250		SDR13.5		
	315		SDR11		
	400		SDR9		
	500		SDR7.4		
	630				
	800				
	1000				
	1200				
PVC_U	100	RRJ	SN8	Unlined	Uncoated
	150	SWJ	SN10		
	225		PN12		
	300		PN16		
	375		PN18		
			PN20		
GRP	300	RRJ	PN1	Unlined	Uncoated
	350		PN6		
	375		SN10000		
	400		SN5000		
	450				
	500				
	525				
	550				
	600				
	650				
675					
700					

	750				
	800				
	860				
	900				
	960				
	1000				
	1100				
	1200				
	1300				
	1400				
	1500				
	1600				
	1700				
	1800				
	1900				
	2000				
	2100				
	2200				
	2300				
	2400				
SWPP	150	RRJ	SN10	Unlined	Uncoated
	225				
	300				
	375				
	450				
	525				
	600				
	750				
	900				
VC-H	100	RRJ		Unlined	Uncoated
VC-N	150				
VC-K	225				
	250				
	300				
	350				
	375				
	400				
	450				
	500				
	525				
	600				
	700				
	750				
	800				
	900				
	1000				
	1200				
RCP	300	RRJ	4	Plastiline	Epoxy Paint
	375		6	Unlined	Uncoated
	450		8	Epoxy Paint	
	525		10		
	600				
	675				
	750				
	825				
	900				
	1050				
	1200				
	1350				
	1500				
	1650				
	1800				
	1950				
	2100				
DI	100	RRJ	PN20	CL	Wrapped
	150	RRRJJ	PN35	CL_SR	Concrete Encased
	200	FJ	FLCL	CL_AC	

	225				
	250				
	300				
	375				
	450				
	500				
	600				
	750				
PRC	200	RRJ		Unlined	Uncoated
	250				
	300				
	400				
	500				
	600				
	800				
	900				
	1000				
	1200				
	1400				
	1600				
	1800				
	2000				
	2200				
	2400				
	2600				

Material	Diameter	JointType	Class	Lining	Protection
Sewerage Pressure Pipe Feature Class					
DI	100	RRJ	PN20	CL	Wrapped
	150	RRRJ	PN35	CL_SR	Concrete Encased
	200	FJ	FLCL	CL_AC	Denso Taped Wrapped
	250				
	300				
	375				
	450				
	500				
	600				
	750				
PE-100	32	MCJ	PN12.5	Unlined	Uncoated
PE-80B	40	BW	PN16		Concrete Encased
	50	EFW	PN20		
	63		PN25		
	75				
	90				
	110				
	125				
	140				
	160				
	180				
	200				
	225				
	250				
	280				
	315				
	355				
	400				
	450				
	500				
	560				
	630				
	710				
	800				
	900				
	1000				
	1200				
	1400				
	1600				
	1800				
	2000				

Material	Diameter	JointType	Class	Lining	Protection
PVC_O	100	RRJ	PN12.5	Unlined	Uncoated
	150	SWJ	PN16		Concrete Encased
	200		PN20		
	225				
	250				
	300				
	375				
PVC_M	100	RRJ	PN12	Unlined	Uncoated
	150	SWJ	PN16		Concrete Encased
	200		PN18		
	225		PN20		
	250				
	300				
	375				
MS	114	RRJ	4.8mm	CL	Sintakote
	168	WJ	5mm	CL_SR	Sintakote - Concrete
	190	FJ	6mm	CL_AC	Denso Taped Wrapped
	219		7mm		
	240		8mm		
	257		9mm		
	273		10mm		
	290		11mm		
	324		12mm		
	337		16mm		
	356				
	406				
	419				
	457				
	502				
	508				
	559				
	610				
	648				
	660				
	700				
	711				
	762				
	800				
	813				
	914				
	960				
	972				
	1016				
	1035				
	1067				
	1085				
	1125				
	1200				
	1219				
	1283				
	1290				
	1404				
	1422				
	1440				
	1451				
	1500				
	1575				
	1600				
	1626				
	1750				

5.5 Water Reticulation ADAC Schema

The Asset data requirements for Water are set out within the ADAC schema specification. Appendix B summarises the data requirements for water supply. The data in these tables represent a snapshot of the ADAC schema in early 2012, however users of this document need to go to the ADAC website (<http://www.engicom.com.au/products/adac2/>) to get the current version.

Submitted XML files should also conform to with the further enumeration constraints detailed in the following table. Default values are highlighted in a tan colour.

Table 3.2 – Additional Attribute Enumeration Constraints – Water

Default:

Material	Diameter-mm	Joint Type	Class	Lining	Protection	Embedment
DI	100	RRJ	PN35	CL	Wrapped	AboveGround
	150	RRRJ	FLCL	CL_SR	Concrete Encased	Type 1
	200	FJ		CL_AC	Denso Taped	Type 2
	225			FBE	Wrapped	Type 3
	250					Type 4
	300					Type 5
	375					Type 6
	450					Type 7
	500					Type 8
	600					Type 9
	750					Type 10
						Type 11
						Type 12
						Type 13
						Type 14
					Type 15	
PE-100	16	MCJ	PN12.5	Unlined	Uncoated	AboveGround
PE-80B	20	BW	PN16			Type 1
	25	EFW	PN20			Type 2
	32		PN25			Type 3
	40					Type 4
	50					Type 5
	63					Type 6
	75					Type 7
	90					Type 8
	110					Type 9
	125					Type 10
	140					Type 11
	160					Type 12
	180					Type 13
	200					Type 14
	225					Type 15
	250					
	280					
	315					
	355					
400						
450						
500						
560						
630						
710						
800						
900						
1000						
1200						
1400						
1600						
1800						
2000						

Material	Diameter-mm	Joint Type	Class	Lining	Protection	Embedment
PVC-O	100	RRJ	PN12.5	Unlined	Uncoated	AboveGround
	150	SWJ	PN16			Type 1
	200		PN20			Type 2
	225					Type 3
	250					Type 4
	300					Type 5
	375					Type 6
						Type 7
						Type 8
						Type 9
						Type 10
						Type 11
						Type 12
						Type 13
						Type 14
						Type 15
PVC-M	100	RRJ	PN12	Unlined	Uncoated	AboveGround
	150	SWJ	PN16			Type 1
	200		PN18			Type 2
	225		PN20			Type 3
	250					Type 4
	300					Type 5
	375					Type 6
						Type 7
						Type 8
						Type 9
						Type 10
						Type 11
						Type 12
						Type 13
						Type 14
						Type 15
MS	114	RRJ	4.8mm	CL	Sintakote	AboveGround
	168	WJ	5mm	CL SR	Sintakote - Concrete	Type 1
	190	FJ	6mm	CL AC	Denso Taped Wrapped	Type 2
	219		7mm			Type 3
	240		8mm			Type 4
	257		9mm			Type 5
	273		10mm			Type 6
	290		11mm			Type 7
	324		12mm			Type 8
	337		16mm			Type 9
	356					Type 10
	406					Type 11
	419					Type 12
	457					Type 13
	502					Type 14
	508					Type 15
	559					
	610					
	648					
	660					
	700					
	711					
	762					
	800					
	813					
	914					
	960					
	972					
	1016					
	1035					
	1067					
	1085					
	1125					

Material	Diameter-mm	Joint Type	Class	Lining	Protection	Embedment
	1200					
	1219					
	1283					
	1290					
	1404					
	1422					
	1440					
	1451					
	1500					
	1575					
	1600					
	1626					
	1750					
Copper	10	WJ	Type B	Unlined	Uncoated	AboveGround
	15	MCJ				Type 1
	18					Type 2
	20					Type 3
	25					Type 4
	32					Type 5
	40					Type 6
	50					Type 7
	65					Type 8
	80					Type 9
	90					Type 10
	100					Type 11
	125					Type 12
	150					Type 13
	200					Type 14
						Type 15
SS	10	WJ		Unlined	Uncoated	AboveGround
	15	MCJ				Type 1
	20					Type 2
	25					Type 3
	32					Type 4
	40					Type 5
	50					Type 6
	65					Type 7
	80					Type 8
	90					Type 9
	100					Type 10
	125					Type 11
	150					Type 12
	200					Type 13
	250					Type 14
	300					Type 15
	350					
	400					
	450					

6 Approved Design Change Notices

Copies of approved design change notices should be included in the final package of As Constructed Information.

Approved (signed) Design Change Notices should be supplied electronically in PDF format.

7 As Constructed Drawings

The purpose of this part of the document is to specify the format of electronic Computer Aided Design (CAD) files for SEQ-SPs. This format will apply to work done both by external designers and internal resources of the SEQ businesses. Adherence to this Standard ensures that records of SEQ Water Distribution and Retail facilities are consistent and accessible.

The procedures described here apply to “Construction Plans” and “As Constructed” information lodged in compliance with development application conditions of approval.

The SEQ-SPs will provide For Construction CAD files to be used to prepare the As Constructed drawings.

7.1 General

All drawings prepared for SEQ-SPs shall be in AutoCAD 2008 or later drawing file format.

Methodology and practice in relation to AutoCAD usage shall conform to this document.

It is assumed that the reader of this document has a working knowledge of AutoCAD and understands the AutoCAD terms used. Please refer to the AutoCAD Users Guide or online help files within AutoCAD for information on terms used in this manual.

Changes to this specification can be made only by the appointed SEQ-SPs drafting manager or nominated representative.

Unless specified otherwise by this document, drawing practice shall conform to the relevant Australian Standards (AS-1100, AS-1101, AS-1102, AS-3702, AS-4383, AS-60417, etc.) and HB7: Engineering Drawing Handbook issued by Standards Australia.

All abbreviations and units shall be in accordance with AS 1000. Dimensions shall be in metric units. All drawings shall be prepared as A1 size drawings using the relevant supplied AutoCAD drawing template file and the title block information entered in accordance with this document.

All drawings issued by SEQ-SPs in electronic format shall be as PDF unless approved by a SEQ-SPs representative.

All engineering drawings prepared for SEQ-SPs shall conform to the requirements of this document. Non-compliant drawings shall be modified at consultant/contractor/developer’s own cost.

Final drawings clearly marked “As Constructed” and duly signed as required shall be issued to SEQ-SPs at the completion of the project both in A3 pdf files (landscape preferred) as well as in AutoCAD format with all xref and OLE files bound to final file.

7.2 Setting up Drawings

7.2.1 File naming convention

The file naming convention for equipment located at sewage treatment plants shall be in accordance with the relevant SEQ-SPs’ standard document numbering system for STP’s.

7.2.2 Drawing Number

The following drawing numbers are typical. Refer to the SEQ-SP for guidance on drawing numbers.

All drawings shall be on the approved SEQ-SPs title block and contain a unique drawing number as issued by SEQ-SPs. The File shall be provided in the following format:

- **W8443-1** **A** **WATER DIXON RD OPW10-1255.dwg**

SEQ Dwg Number Revision Description/Street Name OPW number

7.2.3 Drawing Environment

All drawings, other than electrical schematics, process & instrumentation drawings, and other similar unscaled drawings, shall be supplied as AutoCAD files utilising the "paper space/model space" feature of AutoCAD. Under this environment, all structures and details must be created in "model space" at a scale of one to one and displayed in "paper space" using suitably scaled AutoCAD "Viewports".

Where the "paper space/model space" feature of AutoCAD is utilised, the dimensions, labels and annotation text shall be scaled to suit and inserted in model space. However, the drawing frame, general notes, reference drawing list, material list, pipe work schedule and other notation shall be inserted as "paper space" entities at a scale of one to one on the drawing layout.

Electrical schematic drawings, process & instrumentation drawings and other similar unscaled drawings may be supplied entirely in "model space" (i.e. "Tilemode" one) with the drawing form, notes, dimensions, etc., scaled appropriately.

In order to ensure AutoCAD references metric line types, pattern hatches, etc. the AutoCAD system variable "Measurement" shall be set to "1".

7.2.4 Drawing Sets

SEQ-SPs require all sets of drawings to be set out in logical order as outlined below.

All sets shall contain a coversheet containing Drawing Index and Locality plans.

7.2.5 Typical Drawing Index

- W8443-1 DRAWING INDEX, PIPELINE LAYOUT & LOCALITY PLANS.
Lists all drawings in contract set
- W8443-2 NOTES (red line mark up)
General notes, Structural notes, Construction notes etc relevant to project including references to standards associated with the extent of works.
- W8443-3 PIPELINE ALIGNMENT PLAN & SETOUT DETAILS
Overview of extent of works in plan view
- W8443-4 PIPELINE LONGITUDINAL SECTION OVERVIEW
Profile of full long section (Used to assist in understanding the full hydraulic profile versus geographical profile)
- W8443-5 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 1 OF 5
- W8443-6 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 2 OF 5
- W8443-7 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 3 OF 5
- W8443-8 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 4 OF 5
- W8443-9 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 5 OF 5
Drawings to show pipe alignment plan top of sheet and longitudinal section bottom of sheet. It is preferable for there to be no more than 200m of chainage per sheet. All longitudinal sections to have chainage left to right with plan using viewport rotation corresponding and to the scale of the longitudinal section. The connection point to the existing system shall commence with chainage 00.000 and the main line shall be Line 1 with each successive new Line numbered sequentially from Line 1.
- W8443-10 TYPICAL DETAILS SHEET 1 OF 4 – TYPICAL TRENCHES & SCOUR DISCHARGE PUMP-OUT SUMP
- W8443-11 TYPICAL DETAILS SHEET 2 OF 4 – WATERMAIN CONNECTION ACCESS PIT
- W8443-12 TYPICAL DETAILS SHEET 3 OF 4 – SLUICE VALVES & AIR VALVES
- W8443-13 TYPICAL DETAILS SHEET 4 OF 4 – THRUST BLOCKS – VERTICAL & HORIZONTAL BENDS
- W8443-14 ADAC As-Constructed Plan

TOTAL NUMBER OF DRAWINGS IS DEPENDANT OF SIZE AND SCOPE OF PROJECT

7.2.6 Electrical drawing requirements

All electrical schematic diagrams are to be generated and submitted in model space ONLY. Other electrical drawings such as switchboard arrangements are acceptable in either paper or model space.

All site plans must be submitted utilising paper space (for title block) and correctly geo referenced lot plan in model space of the drawing.

In keeping with AS3000 AS/NZ 3000:2007 (Electrical wiring rules) any time a project contains any underground electrical conduits of ANY rating, a separate site plan MUST BE created showing all, but not limited to, electrical conduits, switchboards, pits earthing locations and isolation points and associated electrical infrastructure. These plans are to be accurate to enable future locations.

7.2.7 Materials list

Note: The following aspects apply to capital works projects for the relevant SEQ-SP only.

Projects containing assemblies must have itemised Materials list in standard format as per AS-1100.

Typically Item numbered Bubbles and corresponding Table format list

Tables are to contain the following fields:

Item Number	Quantity	Description	Length	Material	Standard
-------------	----------	-------------	--------	----------	----------

Alternatively:

Item Number	Description (including material and standard)	UNIT	Quantity
-------------	---	------	----------

7.2.8 Plan Drawings

All plan drawings to have a North orientation included (note – should be located at top of sheet for ADAC). North arrow shall not be rotated more than 45 degrees.

7.2.9 Vertical Datum

All levels should be reduced to Australian Height Datum (AHD). AHD levels to forth order standard as defined by the Department of Environment and Resource Management specification. Drawings shall show and detail the newly installed PSM's within the subdivision.

7.2.10 Horizontal Datum

This As-con data must be **derived from at least two relatively well-spaced permanent survey marks** with Map Grid of Australia (MGA Zone 56 –GDA 94) co-ordinates. Survey should be on true MGA not based on DCDB co-ordinates. Drawings shall detail the PSMs adopted along with Eastings, Northings and levels. The Surveyor's name and contact details shall be detailed on the drawings. Set up the drawing with MGA coordinates before entering asset information using ADAC.

7.2.11 Drawing Title Blocks

All drawings are to be produced on the SEQ-SPs title block. There is an allowance for the Consultants Logo and Information on the provided title block (this is the blank space to the left side the SEQ-SP Logo. Consultants logo and Information should not dominate the drawing).

The title block shall be inserted on paper space at insertion point 0,0.

No scaling of the title block is allowed.

The title block shall have an attributed block of text for the title. This can be accessed by using the command "DDATTE". DO NOT EXPLODE THIS BLOCK.

The title block sheet shall be in A1 Format allowing sheet print scale of 1:1 on A1 plot sheets and scale 1:2 at A3 size.

Title Block should not be renamed exploded or have any attribute tags modified.

The relevant OPW number shall be shown in the drawing title.

7.2.12 Naming External Reference Files

External reference files ("xref" files) are used for producing issuable drawings utilising paper space.

When “xref” files are required, they should be named using part of the job code with an “x” as a prefix and an alphanumeric suffix as a unique identifier.

For example, an external reference job created of the Inlet works at Maroochydore would be named:

Xmar INLET

Where: “X” – represents external reference

Mar – is part of the job code

Inlet – up to 6 digit ID code for item being drawn.

By having the “x” as a prefix, this allows the “xref” codes to be grouped automatically by the Operating System of your PC to the end of the directory, and identifies that file is an external reference used in the drawing set.

NOTE: AutoCAD does not like blocks with long file names especially if they are nested within other external reference files. Block names (other than Xref) should be between 8 to 10 characters.

7.2.13 External File Naming conventions

Drawings that are received from an external source will be stored in the appropriate drawing sub directory either under Vendors in the appropriate sub category (by vendor name) or under client subdirectory within the SEQ-SP database.

If the drawings received from Vendors are to form part of a drawing set then these are required to be provided using the approved project title block with appropriate unique drawing numbers.

7.2.14 Standard Layer Naming

Because drawing system uses external reference files for the creation of drawings in most cases then we do not use the bylayer method of colour & line type separation, which creates layers specific to a particular colour and line type.

Layer names in the system are created using a unique discipline code as the initial prefix letter followed by a subsequent unique name.

Discipline Code	Number	Unique Number
A – Architectural	01 – 99	Any name that identifies the layer to the use (i.e.: elec. for electrical, RAS for Ras lines, etc).
G – General		
C – Civil		
S – Structural		
M – Mechanical		
E – Electrical		
I – Process		
P – Piping		
T – Tankage		
X – Existing		

Layer names using the above table should look something like the list below:

C01-WALLS	Civil layer walls
P01-RAS	Piping layer RAS pipes
W-Existing Water Pipe	Water layer Existing Water Pipes
S-Existing Maintenance Hole	Sewer layer Existing Maintenance Hole

The above list is an example of the way layers should be named. This is convenient because AutoCAD will group layers by discipline code so they are easier to read. Also layers are named according to what they contain.

For convenience SEQ-SPs will supply on request a template drawing file.

This file contains preset Layers, dimension settings, and paper space setting.

7.2.15 List of Layers supplied in Civil Template

(Template file names are "DEFAULT.dwg" and "TEMPLATE.dwt")

CIVIL ONLY

LAYER NAME	COLOUR	LINE TYPE	COMMENT
0	WHITE	CONTINUOUS	Used for block creation. Refer Note.
1C	Red	CONTINUOUS	Outlines of existing items visible.
1D	Red	DASHDOT	Outlines of existing items invisible.
1H	(9) Light Grey	HIDDEN	Hidden details of visible items.
1P	(9) Light Grey	PHANTOM	AS REQUIRED FOR REPRESENTATION.
2C	Yellow	CONTINUOUS	MINOR ITEMS.
2CL	Red	CENTRELINE	ALL CENTRE LINES.
2H	White	HIDDEN	MINOR HIDDEN DETAIL.
2HH	White	HIDDEN2	SUB MINOR HIDDEN DETAIL.
2P	White	PHANTOM	AS REQUIRED FOR REPRESENTATION.
3C	Cyan	CONTINUOUS	MAJOR DETAIL REPRESENTATION.
5C	Green	CONTINUOUS	MAJOR DETAIL REPRESENTATION.
7C	Blue	CONTINUOUS	MAJOR DETAIL REPRESENTATION.
DIM	Yellow/RED	CONTINUOUS	DIMENSION TEXT/ LINEWORK.
HATCH	(8) Dark Grey	CONTINUOUS	HATCH.
REVISION	Red	CONTINUOUS	REVISION TRIANGLES AND CLOUDS.
TEXT-2	Y	CONTINUOUS	TEXT 2.5.
TEXT-3	Cyan	CONTINUOUS	TEXT 3.5.
TEXT-5	Green	CONTINUOUS	TEXT 5.
TEXT-7	Blue	CONTINUOUS	TEXT 7.
TEXT-BORDER	White	CONTINUOUS	Frozen for printing purposes.
VIEWPORTS	120 (Pale Cyan)	CONTINUOUS	Visible but set to not print.

7.2.16 List of Layers supplied in Electrical Templates

(Template names are A3 ELEC TITLE.dwt and A3 ELEC TITLE WITH GRID.dwt)

ELECTRICAL ONLY

LAYER NAME	COLOUR	LINE TYPE	COMMENT
E-TEXT- 25	Cyan	CONTINUOUS	TEXT electrical, weighting 0.25mm
E-TEXT- 35	Yellow	CONTINUOUS	TEXT electrical, weighting 0.35mm

LAYER NAME	COLOUR	LINE TYPE	COMMENT
E-TEXT- 50	Red	CONTINUOUS	TEXT electrical, weighting 0.50mm
E-TEXT- 70	Blue	CONTINUOUS	TEXT electrical, weighting 0.70mm
E-COMPONENT- 25	Cyan	CONTINUOUS*	Graphical element electrical, weighting 0.25mm
E-COMPONENT- 35	Yellow	CONTINUOUS*	Graphical element electrical, weighting 0.35mm
E-COMPONENT- 50	Red	CONTINUOUS	Graphical element electrical, weighting 0.50mm
E-COMPONENT- 70	Blue	CONTINUOUS	Graphical element electrical, weighting 0.70mm

* other acceptable line types are Hidden to denote shielding or links. Dashdot or Centre to denote a boundary line or enclosure

7.2.17 Use of Layer 0

Every drawing includes a layer named 0. Layer 0 cannot be deleted or renamed. It has two purposes:

Ensure that every drawing includes at least one layer; and provide a special layer that relates to controlling colours in blocks (refer section “Blocks and Block creation”).

7.2.18 Standard Colours

For AutoCAD – Civil (preferred):

Colour No.	Colour	Line Thickness (at A1 size plotted)	Line Thickness (at A3 size plotted)
1	Red	0.18	0.10
2	Yellow	0.25	0.13
3	Green	0.50	0.25
4	Cyan	0.35	0.18
5	Blue	0.70	0.35
6	Magenta	0.10	0.05
7	White	0.25	0.13
8	Dark Grey	0.05	0.00
9	Light Grey	0.05	0.00
10	Dark Red	1.00	0.50
253	Light Grey	0.09	0.05

Standard colours are to be in accordance with the following colour schemes.

Line thicknesses will change depending on plot size (i.e.: A1, A3, A4).

NOTE: These colours are default as specified by SEQ-SPs .

For AutoCAD – Electrical:

Colour No.	Colour	Line Thickness
1	Red	0.35
2	Yellow	0.25
3	Green	0.15
4	Cyan	0.15
5	Blue	0.50

6	Magenta	0.13
7	White	0.15
8	Dark Grey	0.15
9	Light Grey	0.15
10	Dark Red	0.15

7.2.19 Plot Configuration

All drawings must be created using the Layer control and colours defined in the standard and print / plot to the SEQ-SPs plot configuration.

It is a requirement that the supplied AutoCAD plot style tables supplied in this standard be used to ensure compliance with the above.

The line types representing 'design works shall be prominent and at least one or two thicknesses greater than lines for property boundaries.

7.2.20 Text

Excluding measurement unit designations, all text shall be in uppercase. For general usage, the text style shall be AutoCAD ISOCP. The text style shall be defined as follows:

Style Name	ISOCP
Font Name	ISOCP.shx
Height	0
Wight Factor	1.0
Obliquing Angle	0
Backwards	N
Upside-down	N
Vertical	N

It is recognised that occasions may arise where it is necessary to use other fonts. The practice will only be accepted when the desired result cannot be achieved using the ISOCP font. Where a substitute text font is used, the font shall be a standard AutoCAD text font or a font supplied in the SEQ-SPs ADAC As-Constructed package and the associated text style name shall match the font name.

Text height, line weight and typical usage for drawing annotation shall be as follows:

Text Height	Line Weight	Typical Usage
3mm	0.35mm	General notes, labels, materials list, dimensions, etc.
5mm	0.5mm	Minor view & section titles, minor headings etc.
7mm	0.7mm	Major view & section titles, Major headings etc.

Fonts shall remain legible and unambiguous in a direct photocopy print in a reduced copy. Fonts are to be legible at A3 size.

A minimum text height required for all text is 3mm (A1).

All characters in the drawing shall be kept clear of lines. Where a line precludes this requirement, the line may be interrupted sufficiently (e.g. break the line work) to accommodate the characters.

Generally, the Australian Standard AS-1100.101-1992 Technical drawing Part 101: General principles are to be followed.

7.2.21 Dimensioning Style

Dimensioning style shall be in accordance with the National Standard AS-1100 and HB7: Engineering Drawing Handbook issued by Standards Australia.

The AutoCAD dimension style used shall be as defined in the standard drawing template files (Electronic).

Each dimension shall be a single AutoCAD entity. "Exploded" dimensions are not acceptable.

Generally, line weight for Leaders, extension lines and dimension lines are one thickness lighter than dimension text thickness.

7.2.22 Standard Line types

Line types shall only be a standard AutoCAD line types or a line type supplied by SEQ-SPs.

The line types representing 'As Constructed' works shall be prominent and at least one or two thicknesses greater than lines for property boundaries and the like.

7.2.23 SEQ-SP Line types

The line type of the layer on which each AutoCAD drawing entity resides shall determine the entity's line type. This shall be achieved by setting the AutoCAD entity's "Linetype" property to "Bylayer".

Line types can be found in the standard ACAD.LIN file which is standard in AutoCAD.

The drawing template package will include the relevant linetype file, as noted below.

SERVICES LIN

Roadwork's and Earthworks	
Kerb_channel	Drainage
Kerb_median	Stormwater1
Bitumen edge	Stormwater2
Gravel	Subsoil 1
Crown	Subsoil_
Batter	Sidedrain
Bank_top	Tabledrain
Bank_btm	

Services – Utilities, etc.	
Drainage,	Ohelec (overhead electricity)
Stormwater,	Ohtel (overhead telephone)
Roofwater	Electrical,
Irrigation	Elect conduits,
Sewer,	Telstra, --- T --- T ---
Sewer_rising_main,	Optic_fibre, --- OF --- OF ---
Water_service_conduit	Coaxial, --- CX --- CX ---
Water,	Optus, ---O---O---
Water dia100,	Optus_vision, --- OV --- OV --
Water_dia150	Conduit, --- C --- C --- C ---

Services – Utilities, etc.	
Water_dia225	Gas, ---- G ---- G ---- G --
Water_dia300	Air, ---- A ---- A ---- A ---

Pavement Markings	
Giveway	Special_park,- - - - -
Continuity	Ped_xing,
Lane	Rrpm_lane,
Separation,	Rrpm_separation,
Pedestrian	Rrpm_barrier,
Turn_line	Rrpm_broken,
Barrier, =====	Rrpm_chevron,
Broken, broken on one side barrier line on other	

Fences, etc.	
Fence	Log Rail
Fence Acoustic	Handrail
Guardrail	

Miscellaneous	
Acquisition,	Retaining wall
Building,	Rock outcrop
Bike route	

Vegetation	
Treeline,	Grassed channels
Hedge	Grassed filter strips
Environmental	Limit_of_clearing
Batter chute (temporary)	Reinforced grassed channels
Catch drain	Rock lined channel
Diversion channel	Rock_mattress_channel,
Drop pipes	Sediment fence
Geosynthetic-lined channels	Straw bale sediment fence

7.2.24 Standard Scales

Standard scales for all drawings done electronically in AutoCAD.

Standard scales are listed below:

1:1	P & ID's, sketches, Figures
1:2	Structural, Mechanical & Piping Details
1:2.5	Structural, Mechanical & Piping Details

1:5	Structural, Mechanical & Piping Details
1:10,1:20,1:25	Sections, Details
1:50	Architectural & structure layouts
1:100	Site layouts
1:200	Site layouts
1:250	Site layouts
1:500	Site layouts
1:1000	Site layouts
1:1250	Site layouts
1:2000 to 1:25000	Key plans

7.2.25 Revisions

All drawings must indicate the current status of revision in both the revision table and status block (provided beside the drawing number) on the title block.

The format for revision follows.

7.2.26 Revision (Letter)

The first issue of a drawing is always Revision “A” and is usually the following as per the standard descriptions for certain important revisions:

Letter Category	A – Z, AA – etc
“Preliminary Issue”	First Issue
“Issued for Review”	Issued to SEQ-SP Project Manager/Engineer for Design Review
“Issued for Information”	Issued, But “Not for Construction”

7.2.27 Construction Issue (Number)

When a drawing has been checked post tender, it is then “issued for construction”. The number “0” is to be used when issuing a drawing for construction. This copy becomes the “wet” signature master. When this has been signed by all relevant parties, the drawing may be released for construction after all names of signatories & dates are typed into the relevant cells, checked approved etc of the electronic title block.

All subsequent revisions to construction issue are to be numbered in order from 1 upwards and a general description of the changes made to the drawing is included in the description section.

7.2.28 Revision Triangles and Clouds

After construction issue, subsequent revisions are to have revision clouds and triangles highlighting changes made to the drawing in each revision.

The changes made should be clouded and the triangle added inside the cloud. The rev triangle is an attributed block so the number can be changed using “DDATTE” command (attribute edit).

For each subsequent revision that is done, the changes are made to the drawing, the previous clouds are erased and new clouds and revision triangles with new revision numbers are added to the drawing and the drawing is issued as normal. Previous triangles are retained on the drawing.

7.2.29 “As Constructed” Drawings

The relevant SEQ-SP will provide For Construction CAD files to be used to prepare the “As Constructed” Drawings.

“As Constructed” Drawings must be prepared in accordance with the SEQ Design and Construction Code Drawing Standard.

SEQ-SPs require that standard professional engineering drafting practices be utilised in correcting the original electronic AutoCAD drawings to show “As Constructed” conditions. In general, the letter styles, line thickness, and scale will be the same as the original drawings. Any additional sheets added, shall conform to SEQ Design and Construction Code Drawing Standard.

The following specific requirements apply to the preparation of As Constructed drawings:

1. “As Constructed” Stamp: When final revisions have been completed, all drawings shall be marked in the bottom right-hand corner of each drawing either “As Constructed” drawing denoting the number of revisions on the sheet, or “REVISED As Constructed” denoting one or more revisions. Original drawings shall be dated in the revision block;
2. Revisions Block entries: Those sheets, which have no changes, will only be labelled “As Constructed” as described above. Those sheets which have changes shown on them will have “REVISED As Constructed” entered in the first available space. In the event the sheet has already been revised and a number and revision appear in the revision lines, the next sequential number will be used. Normally the first entry is made in the first line.
3. “As Constructed” Drawings should only contain final details of construction.
4. Deletions: to show an item was not installed, remove the item from the drawing along with any associated devices, connecting lines, ducts, pipes etc., including notes and dimensions. Draw a line through any line item in a table in lieu of erasing the line item or note.
5. Additions: show a new or additional item or items and associated connections made if the print indicates such connections.
6. Relocations: draw the item in the new location and erase it from the old location. All connections will be transferred if applicable, such as wiring, piping, and ducts.
7. Sentence Tense: Changes to “As Constructed” drawings shall include text changes that are tense changes, for example, “EXISTING GROUND LINE” to “ORIGINAL GROUND LINE”; “SHALL BE REMOVED” to “REMOVED”;
8. Shop drawings: When shop drawings are added to the original contract drawing set they need to be appropriately labelled with the SEQ-SP file number and discipline and sequence sheet number. The Index of Drawings will also need to be revised to show the additional sheet (s) with the appropriate sheet title. In the case where the shop drawing are smaller than the SEQ-SP standard sheet size (i.e. A4 or A3 etc.) the sheets will be cut into a standard SEQ-SP sheet size border sheet and appropriately labelled.
9. The sheet index shall be updated if any sheets are added or the sheet name has been modified.
10. Electrical Drawings – a set of up to date electrical drawings including mark ups (whilst back drafted drawings are prepared) must be kept in the local electrical cabinet at all times.

7.2.30 Blocks and Blocks Creation

If a new block is required to be created then it should be created on layer “0” (zero) with colour and line type of the entities within the block set to “byblock”. This allows the blocks colour & line type to be manipulated when inserted into a drawing. Also if blocks are always created on layer 0 then layers in drawings can be turned on & off without unwittingly losing information.

8 Use of “Paperspace”

8.1 External References

Externally referenced files promote coordination among different disciplines by making drawing information available simultaneously to different users. To assist in drawing preparation, where a major element within a project appears on more than one drawing, it may be drawn in a file that is attached to each drawing using the AutoCAD “Xref” command.

Drawings containing external references shall be considered as working drawings only and will not be accepted as final drawings.

Prior to submission of final drawings to SEQ-SP for archiving, all external references must be converted to AutoCAD “Blocks” in the drawing using the “Bind” subcommand of the AutoCAD “Xref Manager”.

Drawings containing unbound external references will not be accepted.

Xref drawings of structures do not contain text.

“Xref” drawings can be nested, which means one “xref” can be attached to another “xref” which can then be attached to a drawing. This is particularly useful when arranging structures on a site layout. Each structure as an individual “xref” is attached to the site “xref” and positioned according to design requirements and then the site “xref” is attached to another drawing with a drawing title sheet and drawing number to create a site layout drawing. Other individual structure drawings can be created using the original structure “xref” and appropriate scales. Any changes to individual structures automatically reflect in other drawings that have that “xref” attached.

Drawings may also be prepared utilising a layout tab for individual drawings. This means that an individual file may contain a number of drawings. In this instance the file should be named to indicate a multi drawing file.

Note: “paperspace” and xref files are the preferred method of drawing, but are not always applicable (i.e. P & ID’s) so model space drawings can be utilised.

9 Clean-up of Completed Drawings

Prior to submission of final drawings to the relevant SEQ-SP for archiving, all drawing files shall be edited to remove all entities which are not part of the final design.

Details used in the development of the drawing but which are not part of the final design shall be removed.

All drawings shall also be purged to remove all irrelevant blocks, layers, text styles, etc through use of the AutoCAD “Purge” command.

The final drawings shall also be checked for database errors using the AutoCAD “Audit” command and any encryption or passwords removed.

10 Summary

The SEQ-SPs strongly urge the lodging entity that has prepared the As Constructed Drawings and information to perform quality checks of the data within the As Constructed Drawing file, so as to avoid hold up of sealing of plans and to ensure that the following aspects have been clearly complied with.

All drawings shall be on the approved SEQ-SPs title block.

All drawings shall be A1 full size (paper space scale 1:1t).

All drawings shall be drawn at a suitable scale to be plotted at half scale (A3) and still be legible and at a workable scale (i.e. 1:5, 1:10, 1:25, 1:50, 1:100, 1:250, 1:500, 1:1000, 1:2500 at A1 preferred).

Vertical Datum on AHD.

All levels should be reduced to Australian Height Datum (AHD)

This As-Constructed data must be derived from at least two relatively well-spaced permanent survey marks with Map Grid of Australia (MGA Zone 56 –GDA 94) co-ordinates.

All drawings shall have a unique drawing number.

All drawings must have a revision number.

All layers should have the line weight set to the intended plot thickness even if plotting is controlled by colour.

AutoCAD line colour to line weight table:

- Red 0.18
- Yellow 0.25
- Green 0.5
- Cyan 0.35
- Blue 0.7
- Magenta 0.1
- White 0.25
- Dark Grey 0.05
- Light Grey 0.05
- "Dark" Red 1.0

All other colours should generally plot at 0.25 in the drawn colour.

All drawings shall also be provided to SEQ-SP as A3 PDF files (landscape preferred).

11 CAD Drawing Checklist

PROJECT NAME:	SEQ-SP PROJECT No.:
	JOB FILE No.:

Tick the box to indicate compliance with SEQ-SPs requirements.

<input type="checkbox"/>	Each revision i.e. "Issued for review", "As constructed" etc is clearly labelled as such in the title block in both revision box and revision description attributed record.
<input type="checkbox"/>	Drawing numbers have been obtained from SEQ-SP.
<input type="checkbox"/>	SEQ-SP standard drawing Title block has been used and not modified.
<input type="checkbox"/>	The SEQ-SP Drawing and Project No and other relevant information is entered into the Title Block.
<input type="checkbox"/>	All file names comply with the SEQ-SP drawing file naming convention.
<input type="checkbox"/>	All disks have been scanned for virus infections.
<input type="checkbox"/>	All drawings have been saved as AutoCAD 2008.
<input type="checkbox"/>	All drawings have been test plotted directly from the disks using AutoCAD 2008.
<input type="checkbox"/>	The current layer in all drawings is set to 0.
<input type="checkbox"/>	All of the viewports are locked.
<input type="checkbox"/>	The drawings are saved in paper space and zoomed extents of title block.
<input type="checkbox"/>	The drawing limits set to "OFF" where relevant.
<input type="checkbox"/>	All site plans and floor plans at 1:100 scale or smaller (1:200, 1:500, etc.) have their spatial coordinates set to match the GDA56 geographical grid system contained in the base site plan(s) supplied by SEQ-SP or, in case of all other drawings, the bottom left hand corner of each drawing is set to 0,0.
<input type="checkbox"/>	Vertical Datum on AHD. All levels should be reduced to Australian Height Datum (AHD).
<input type="checkbox"/>	Horizontal datum has been derived from at least two relatively well-spaced permanent survey marks with Map Grid of Australia (MGA Zone 56 –GDA 94) co-ordinates.
<input type="checkbox"/>	Scale bar/s shown as required.
<input type="checkbox"/>	Text styles, line types & hatchings and entity colours conform to the SEQ-SP Drawing Standard.
<input type="checkbox"/>	No special fonts or line types are to be used. Only standard fonts those are normally available in typical AutoCAD installations.
<input type="checkbox"/>	All entities are placed on their correct layer, using the SEQ-SP layering standard.
<input type="checkbox"/>	Water and Sewer pipe work segmented as per ADAC requirements
<input type="checkbox"/>	All X-ref drawing files used in the production of drawings have been supplied or inserted and bound into the model drawings.
<input type="checkbox"/>	All Water and Sewer Asset details are shown on face of plan as per Section 7.
<input type="checkbox"/>	All drawings have been purged of all unused layers, line types, blocks, text styles, etc, and all other extraneous and unnecessary information and entities have been erased.
<input type="checkbox"/>	CAD and PDF files supplied on correct media and clearly labelled with files included, date and company or contact name.
<input type="checkbox"/>	The Project Information sheet has been completed in collaboration with SEQ-SP.

NOTE: Your files may be checked for compliance. Drawing compliance checking/auditing may be conducted using the above checklist and some additional check points.

11.1 Form of Submission

As Constructed drawings shall be submitted for review and approval by the relevant SEQ-SP electronically in the following formats:

- AutoCAD.dwg format,
- PDF format using the AutoCAD DWG to PDF plot command to retain all layer information within

the PDF file.

12 Certified Drawings

Upon review and acceptance by the relevant SEQ-SP the Constructor is to supply “As Constructed” signed (scanned) PDF copy with “As Constructed” certifying Stamp to the relevant (see stamp below):

<u>AS CONSTRUCTED CERTIFICATION</u>	
I,
(Company’s representative Name)	(Signature)
.....	
(Date)	
Being a duly representative of:-	
.....	
(Company Name)	
Hereby certify that	
1. The information contained in this drawing / document is in compliance with approved drawings and design supplied under the terms of the contract.	
2. This represents an accurate “As constructed” record of works carried out and accept responsibility for the information contained in this drawing / document.	

13 Data Load Sheets –Active Assets

The constructor/consultant/developer needs to populate data load sheets for active assets in a format provided by the SEQ-SP.

14 Photo’s

During construction, digital photographs shall be taken of complex constructions or installations which will be below ground or not visible after construction completion. Such photos must be taken prior to backfilling. The photos must include a chainage or exact location reference in the title of the digital photo file.

14.1 Form of Submission

Photos shall be submitted electronically in .jpg format, no greater than 1MB per file.

15 Final Package of As Constructed Information

The final package of As Constructed Information shall be submitted to the relevant SEQ-SP and is summarised as follows:

Requirement	Form of Submission
Site Mark-Ups of Issued for Construction Drawings	Electronically scanned to .pdf format
ADAC data file	Electronically in either .dwg or.xml formats
Approved Design Change Notices	Electronically scanned to .pdf format
As Constructed Drawings	Electronically in both AutoCAD.dwg and .pdf formats
Certified Drawings	Electronically as a single .pdf file
Photo's	Electronically in .jpg format, no greater than 1MB per file

PART C - Other Handover Documentation

16 Introduction

In addition to the As Construction Information package outlined in Part B of this document, supplementary information must be provided in the form of an *Asset Manual*.

The Asset Manual is a compilation of design, construction, commissioning, operating and maintenance information related to an asset presented in a specified format.

In addition to providing information on operation and maintenance of an asset, the Asset Manual provides a reference inventory for any future augmentations or operational modifications.

The Asset Manual consists of two parts:

1. Part A – Design Information
2. Part B – Construction Information

Each part of the manual is to be provided in a single Portable Document Format (PDF) file unless specified otherwise.

Whilst the following outline provides for the fullest coverage of information required, the extent of inclusion in a specific Asset Manual will vary from project to project and will therefore be specified by the SEQ-SP at the time of request (refer to 18.2 below). **A typical submission for a sewage pumping station should be available from each SEQ-SP.**

16.1 Responsibilities

For separate Design and Construction Contracts

Asset Manual Part A shall be developed by the designer during the design phase of a project. Part B of the manual shall be developed by the Constructor during the construction phase and finalised upon completion of commissioning.

For combined Design and Construction Contracts

Asset Manual Part A shall be developed by the engaged Design and Construction contractor during the design phase of a project. Part B of the manual shall be developed by the engaged Design and Construction contractor during the construction phase and finalised upon completion of commissioning. Practical completion will not be granted to the Constructor under either contract type until Asset Manual Part B has been submitted to the satisfaction of the relevant SEQ-SP.

16.2 Applicable Sections

A completed Project Deliverables Checklist (Refer Appendix C) will be provided by the relevant SEQ-SP. The Project Deliverables Checklist will identify any sections or subsections which are not applicable to a particular Project and need not be included in the Asset Manual. The sections and subsections outlined in Clauses 19 and 20 below have been identified as the minimum requirements to be included in the Project Deliverables Checklist. A typical list is attached as Appendix C.

17 Asset Manual Part A Design Information

Asset Manual Part A shall be presented in the following format:

- A. Title Page, Table of Contents
- B. General Introduction (asset details, location, strategy, purpose of the project)
- C. Operating Philosophy
- D. Functional Description / Specification for Control System
- E. Relevant Reports and Studies
- F. Design Operational and Alarm Levels
- G. Design Calculations

18 Asset Manual Part B Construction Information

Asset Manual Part B shall be presented in the following format:

- A. Title Page, Table of Contents
- B. Manufacturer Supplied
 - (i). Pump & System curves
 - (ii). Vendor manuals (refer Clause 20.1)
- C. Factory Test Certificates
- D. Completed Inspection & Test Reports (ITPs)
- E. Commissioning Information
 - (i). Test records and certificates (RPZD, electrical, electromagnetic radiation etc.)
 - (ii). Calibration certificates for instruments
 - (iii). Radio survey data including signal strength
 - (iv). Completed commissioning Check Sheets
 - (v). Commissioning settings and performance test results
 - (vi). PLC software (annotated version)
- F. Warranties
- G. Operating Manual (refer Clause 20.2)
- H. Maintenance Routines (refer Clause 20.3)

18.1 Vendor Manuals

Vendor Manuals (Equipment Manuals) shall be provided for all equipment supplied under the Contract.

The information to be supplied includes, but is not limited to, the following (where applicable):

- Name of Supplier;
- Address and Telephone Numbers for Service Calls;
- Description – a full description of the equipment with a tabulation of dimensions and performance ratings;
- Technical Data – a copy of the Technical Data Sheet supplied by the manufacturer; reliability data (MTBF, MTTR and Reliability Block Diagram) shall be provided for each equipment type (where applicable);
- Instrument Data Sheets;
- Principles of Operation – a basic working description, including novel features and any automatic control;
- Installation and Commissioning Instructions – details of Standards and procedures for mounting or erecting, wiring and lubricating the equipment.

18.2 Operating Manual

The Operating Manual shall be site specific and include sufficient information for the operation of the asset in its entirety.

The information to be supplied shall include, but not be limited to, the following (where applicable):

- Site Specific Asset Operating Procedures;
- Acceptable ranges for operational control;
- Equipment settings – final commissioned settings.

18.3 Maintenance Routines

Maintenance Routines shall be developed with sufficient information for maintenance of all equipment. The information included in the Maintenance Routines shall consist of a summarised table of manufacturer recommended preventative maintenance routines for all equipment including spares, maintenance frequency, task and details on consumables (see example below):

Type	Model	Recommended Spares	Maintenance Frequency	Task	Other Details
KSB Submersible Pump	UPA 150C	Seal Bearing	4,000 hrs	Check motor resistance	
			10,000 hrs	Lubricate bearings	SAE 15W40
			5 Years	Overhaul	

The Maintenance Routines shall be a summary of maintenance related information extracted from Vendor Manuals. All equipment with Vendor recommended maintenance routines and/or spares shall be included in the summary table.

19 Due Diligence Requirements

As stated in other of sections of the SEQ Design and Construction Code, due diligence requirements are associated with the design and construction of water and sewer infrastructure. These include the undertaking of Environmental Impact Assessment and obtaining development/planning approvals under the *Sustainable Planning Act 2009* and environmental licence(s) under the *Environmental Protection Act 1994* for activities such building and operating sewage pumping stations.

The relevant SEQ-SP will be responsible for compliance with the conditions of the development permit and environmental licence after asset handover.

Where these permits and licences were obtained by the actions of a designer and/or a developer, it is therefore a requirement that all documentation associated with the obtaining of any development permit and/or environmental licence be provided to the relevant SEQ-SP as part of this total asset information package.

Appendix A – Sewer Reticulation ADAC Schema

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
Data structure constraining information relating to sewerage (waste water) features.	Manholes	Element representing the feature class of Sewerage Manholes	Manhole	Element representing a sewerage manhole (maintenance hole) or pit feature.	Use	Use or purpose of this pit	Overflow	Overflow Maintenance Hole	<< SHOULD MAINTENANCE HOLES & PUMPSTATIONS BE / SEPERATE CLASS TO MAINTENANCE HOLES?	
							Blank End	Blank End		
							Pumpstation	Sewer pump station		
							Valve Pit	Access Pit for a Sewer Valve		
							Grit Collector MH	Grit Collector Maintenance Hole		
							Outlet	Outlet		
							Rising Main Discharge MH	Rising Main Discharge Maintenance Hole		
							Vacuum Sewerage Pump Station	Vacuum Sewerage Pump Station		
							Vacuum Sewerage MH	Vacuum Sewer Maintenance Hole		
							Vacuum Lift	Vacuum Lift		
							Storage Tank	Storage Tank		
							Maintenance Hole	Maintenance Hole Default Value		
							Maintenance Shaft	Not for human access due to small diameter		
Chamber Size					Data structure describing the chamber configuration and dimensions.	Rectangular	Data container for rectangular dimensions	<< ADD ENUMERATION AS PEI WATER MAINTENANCE HOLE << ADD ENUMERATION AS PEI WATER MAINTENANCE HOLE		
						Circular	Data container for circular dimensions			
						Custom	Custom Shaped chamber. Such a feature should be associated with a plan or document describing its layout and dimensions			

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
					Surface Level_m	<i>The height of the top surface of the lid, hatch, rim or roof. Surface level in meters against the vertical datum for this project.</i>		float		
					Invert Level_m	<i>The height of the top surface of interior floor/bottom. Invert level in meters against the vertical datum for this project.</i>		float		
					Chamber Wall Construction	<i>Method of chamber wall construction.</i>	Prefabricated	<i>Prefabricated</i>		
					Floor Construction	<i>Method of floor construction.</i>	Insitu Prefabricated	<i>Built or poured in-situ Prefabricated</i>		
					Chamber Wall Material Type	<i>Material type for chamber construction</i>	Insitu Concrete	<i>Built or poured in-situ Concrete</i>		
							PVC	<i>Poly Vinyl Chloride</i>		
							GRP	<i>Glass Reinforced Plastic</i>		
							PE	<i>Polyethylene</i>		
							PP	<i>Polypropylene</i>		
					Floor Material Type	<i>Material type for floor construction</i>	PVC	<i>Poly Vinyl Chloride</i>		
							PE	<i>Polyethylene</i>		
							GRP	<i>Glass Reinforced Plastic</i>		
							Concrete	<i>Concrete</i>		
							PP	<i>Polypropylene</i>		
					Roof Material	<i>Material type for roof</i>	PVC	<i>Poly Vinyl Chloride</i>		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
					Type	<i>construction</i>	PE PP Concrete Mild Steel Stainless Steel Aluminium Cast Iron Frame Grid Mesh - GRP Grid Mesh - Aluminium No Roof	<i>Polyethylene</i> <i>Polypropylene</i> <i>Concrete</i> <i>Mild Steel</i> <i>Stainless Steel</i> <i>Aluminium</i> <i>Cast Iron Frame Assembly (e.g. Gatic roof)</i> Grid Mesh - GRP Grid Mesh - Aluminium <i>No Roof</i>		
					Lining	<i>Material type of chamber lining</i>	PVC Epoxy Polyurea	<i>PVC</i> <i>Epoxy</i> <i>Polyurea</i>		
					Lid Type	<i>Chamber lid configuration and material</i>	PE Cast Iron Aluminium CI Conc Infill Concrete PVC PE PP Mild Steel Stainless Steel	<i>Polyethylene</i> <i>Cast Iron</i> <i>Default Value</i> <i>Aluminium</i> <i>Cast Iron with Concrete Infill</i> <i>Concrete</i> <i>Poly Vinyl Choride</i> <i>Polyethylene</i> <i>Polypropylene</i> <i>Mild Steel</i> <i>Stainless Steel</i>		
					Drop Type	<i>Chamber drop type - based on WSAA standard types</i>	Straight Through MH Change In Direction Through MH	<i>WSAA - Straight through Maintenance Hole</i> <i>WSAA - Change in Direction through Maintenance Hole</i>		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
							External Drop	WSAA - External Drop type Maintenance Hole		
							Alternative External Drop	WSAA - Alternative External Drop type Maintenance Hole		
							Internal Drop	WSAA - Internal Drop type Maintenance Hole		
							Oblique 45deg Backdrop	WSAA - Oblique 45° Backdrop type Maintenance Hole		
					Catchment PS	The identifier of the pump station that this node flows to.		String_32		
					Line Number	The identifier of the line that this node connects to		String_32		
					MH Number	The identifier of this Maintenance Hole or pit.		String_32		
					Chainage_m	The distance upstream from end of line.		Float_Positive_NonZero		
					Tie Distance_m	The tie distance in meters to a cadastral corner		Float_Positive_NonZero		
					Offset Distance_m	The offset distance in meters from a cadastral boundary		Float_Positive_NonZero		
					Rotation	Rotation angle (cartesian - anti-clockwise 0 degrees = East)		Float_Direction		
					Geometry	The geometry representing this feature in coordinate space.		geometry_point_singlepoint		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
	Pipes Non-Pressure	<i>Element representing the feature class of Sewerage Pipes Non-Pressure</i>	Pipe Non-Pressure	<i>Element representing a sewer pipe non-pressurised. Includes all gravity reticulation and trunk gravity mains.</i>	Line Number	<i>The sewer line identifier</i>		String_32		
					Use	<i>The function of this pipe in the network.</i>	Conduit Pipe	<i>Conduit Pipe (enveloper)</i>		
							Disused Effluent Overflow	<i>Disused Non Pressure Pipe Treated Wastewater Pipe Directs excessive wastewater to another location</i>		
							Reuse	<i>Treated Wastewater Reuse Pipe</i>		
							Stub	<i>Stub Pipe</i>		
							Trunk	<i>Trunk Sewer</i>		
							Vent	<i>Ventilation Main</i>		
							Syphon	<i>Syphon Main</i>		
							Vacuum	<i>Vacuum Main</i>		
							Reticulation	<i>Reticulation Sewer Default Value</i>		
					Diameter_ mm	<i>Nominal pipe diameter in millimetres.</i>		Float_Positive_NonZero		
					Material	<i>Pipe material</i>	UPVC-U	<i>Unplasticised Poly-Vinyl Chloride Default Value</i>		
							ABS	<i>Acrylonitrile Butadiene Styrene</i>		
							Cast-Iron	<i>Cast-Iron</i>		
							Concrete	<i>Concrete</i>		
							DICL	<i>Ductile Iron</i>		
							FRC	<i>Fibre Reinforced Concrete</i>		
							GRP	<i>Glass Reinforced Pipe (includes Hobas)</i>		
							MS	<i>Mild Steel</i>		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
								<i>not used in sewerage gravity</i>		
							PE-100	<i>Polyethylene</i>		
							RCP	<i>Reinforced Concrete Pipe</i>		
							PRC	<i>Polyester Resin Concrete jacking pipe e.g. Iplex "Polycrete"</i>		
							SWPP	<i>Structural Wall Polypropylene Pipe (includes "SewerMax" and "SewerPro")</i>		
							BC	<i>Box Culvert</i>		
							HDPE	<i>High Density Poly-Ethylene(includes Haries Black Brute) no such pipe</i>		
							VC-H	<i>VC Hepworth</i>		
							VC-N	<i>VC Naylor</i>		
							VC-K	<i>VC Steinzeug Keramo</i>		
							VC	<i>Vitrified Clay</i>		
					Lining	<i>Pipe lining detail</i>	CL	<i>Cement Lined Normal(default for Ductile Iron and Mild Steel)</i>		
							CL_SR	<i>Cement Lined - Sulphate Resistant (DI and MS)</i>		
							CL_AC	<i>Cement Lined - Calcium Aluminate (DI and MS)</i>		
							Plastiline	<i>Plastiline</i>		
							Unlined	<i>Default for plastic pipes</i>		
							FBE	<i>Fusion Bonded Epoxy</i>		
					Class	<i>The pipe class as specified by the manufacture. Pipe class refers to the wall thickness and performance of the material.</i>	SN8	<i>Class SN8 Default Value</i>		
							SN10	<i>Class SN10</i>		



DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
							4	Class 4		
							6	Class 6		
							8	Class 8		
							9	Class 9		
							10	Class 10		
							12	Class 12		
							16	Class 16		
							18	Class 18		
							20	Class 20		
							PN1	PN1		
							PN6	PN6		
							PN6.3	PN6.3		
							PN8	PN8		
							PN10	PN10		
							PN12	Class PN12		
							PN12.5	PN12.5		
							PN16	PN16		
							PN18	PN18		
							PN20	PN20		
							PN35	Class PN35 (Standard for DI)		
							FLCL	Class FLCL (ductile iron flanged class)		
							SN4 (SH)	Class Sewer Heavy (Now SN4)		
							SN5000	SN5000		
							SN8000	SN8000		
							SN10000	SN10000		
							X	Class X		
							Y	Class Y		
							Z	Class Z		
							SDR21	SDR21		
							SDR17	SDR17		
							SDR13.5	SDR13.5		
							SDR11	SDR11		
							SDR9	SDR9		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
					Protection	<i>The protective material enveloping the pipe.</i>	SDR7.4	<i>SDR7.4</i>		
							FBE	<i>Fusion Bonded Epoxy</i>		
							Sintakote	<i>Sintakote</i>		
							Wrapped	<i>Plastic Wrapped</i>		
							Concrete Encased	<i>Concrete Encased</i>		
							Uncoated	<i>Uncoated</i>		
							Epoxy Paint	<i>Epoxy Paint</i>		
							Sheathed	<i>Sheathed</i>		
					Dimensions Invert Levels_m	<i>Calls in the standard elements for upstream and downstream invert levels</i>	US_InvertLevel_m	<i>Invert level in metres AHD of this pipe end.</i>		
							DS_InvertLevel_m	<i>Invert level in metres AHD of this pipe end.</i>		Float
					Dimensions Surface Levels_m	<i>Calls in the standard elements for upstream and downstream surface levels</i>	US_SurfaceLevel_m	<i>Surface level in metres AHD vertically above this pipe end.</i>		Float
							DS_SurfaceLevel_m	<i>Surface level in metres AHD vertically above this pipe end.</i>		Float
					Alignment_m	<i>Average offset distance in metres from cadastral boundary to the main.</i>		Float_Positive_NonZero		Float
					Average Depth_m	<i>Nominal depth in metres to the top of the pipe.</i>		Float		Float
					Embedment	<i>Embedment type from WSAA Sewerage Codes.</i>	Type 1	<i>Type 1 Sand Bed Only</i>		
							Type 2	<i>Type 2 Sand Bed Only</i>		



DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
							Type 3	Type 3 Sand Surround		
							Type 4	Type 4 Sand Surround Geotextile		
							Type 5	Type 5 Concrete Foundation		
							Type 6	Type 6 Concrete Foundation		
							Type 7	Type 7 Geotextile Pillow Foundation		
							Type 8	Type 8 Cement Stable Foundation		
							Type 9	Type 9 Concrete Encase		
							Type 10	Type 10 Cement Stable Encase		
							Type 11	Type 11 Piled Geotextile		
							Type 12	Type 12 Piled Concrete Encase		
							Type 13	Type 13 Piled Geotextile		
						Joint Type		Pipe to pipe join method.		
							RRJ	Rubber Ring Joint - default		
							RRRJ	Rubber Ring Restained Joint (Ductile Iron)		
							SWJ	Solvent Welded Joint (PVC)		
							WJ	Welded Joint (Mild Steel pipe)		
							FJ	Flanged Joint		
							MCJ	Mechanical Compression Joint (PE pipe and Copper)		
							BW	Butt Weld (PE pipe)		
							EFW	Electrofusion Weld (PE pipe)		
						Rock Excavated		Value indicating whether rock was excavated from the pipe channel.		boolean
						Pipe Grade		Pipe grade as a percentage. Derivable as the difference in invert levels divided by the horizontal length (not the		Float_Positive_NonZero

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
						length of pipe) multiplied by 100.				
					Pipe Length_m	Actual material length of the pipe. Not the horizontal length of the geometry.		Float_Positive_NonZero		
					Geometry	The linear geometry of the pipe feature in coordinate space. May only contain a single straight segment with two end points, representing a pipe section between pits without bends.		geometry_linear_segment_s imple		
	Pipes Pressure	Element representing the feature class of Sewerage Pipes Pressure	Pipe Pressure	Element representing a sewer pipe pressurised (rising main).	Use	The function of this pipe in the network.	Disused	Disused Pressure Pipe		
							Effluent	Treated Wastewater Pipe		
							Reuse	Treated Wastewater Reuse Pipe		
							Rising	Rising or Pressure Main Default Value		
							Scour	Scour Main		
							Pressure Sewer Collection	Pressure Sewer Collection system (e.g. eOne)		
					Alignmen t_m	Average offset distance from	Vacuum	Vacuum Main		
								Float_Positive_NonZero		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
					Diameter_ mm	<i>cadastre boundary to the main. Nominal pipe diameter in millimetres.</i>				
					Material	<i>Pipe material</i>	PE	<i>Polyethylene</i>		
							ABS	<i>Acrylonitrile Butadiene Styrene not available since 1976 create another attribute for lining (multiple lining types possible)</i>	DN Range	<i>OD 40 50 63 90 125 250 315</i>
							DI	<i>Ductile Iron</i>		
							GRP	<i>Glass Reinforced Plastic</i>		
							MS	<i>Mild Steel</i>		
							PE-100	<i>Polyethylene - polymer 100 (standard PE)</i>		
							PE-80B	<i>Polyethylene - polymer 80B</i>		
							BC	<i>Box Culvert</i>		
							PVC-M	<i>Poly Vinyl Chloride - Modified</i>		
							PVC-O	<i>Poly Vinyl Chloride - Oriented</i>		
							PVC-U	<i>Poly Vinyl Chloride - Unplasticised</i>		
					Lining	<i>Pipe lining detail</i>				
					Class	<i>The pipe class as specified by the manufacture. Pipe class refers to the wall thickness and performance of the material.</i>				
							SN5000	<i>SN5000</i>		
							SN8000	<i>SN8000</i>		



DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
							SN10000	SN10000		
							PN6.3	PN6.3		
							PN6	PN6		
							PN8	PN8		
							PN9	PN9		
							PN10	PN10		
							PN12	PN12		
							PN12.5	PN12.5		
							PN16	Class PN16 - default for PE_100, PVC_O and PVC_M		
							PN18	Class PN18		
							PN20	Class PN20		
							PN25	Class PN25		
							PN35	Class PN35 (Standard for DI)		
							FLCL	Class FLCL (ductile iron flanged class)		
							X	Class X		
							Y	Class Y		
							Z	Class Z		
							4.8mm	4.8mm wall thickness Class (Mild Steel)		
							5mm	5mm wall thickness Class (Mild Steel)		
							6mm	6mm wall thickness Class (Mild Steel)		
							7mm	7mm wall thickness Class (Mild Steel)		
							8mm	8mm wall thickness Class (Mild Steel)		
							9mm	9mm wall thickness Class (Mild Steel)		
							10mm	10mm wall thickness Class (Mild Steel)		
							11mm	11mm wall thickness Class (Mild Steel)		
							12mm	12mm wall thickness Class (Mild Steel)		
							16mm	16mm wall thickness Class (Mild Steel)		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
					Average Depth_m	<i>Nominal depth in metres to the top of the pipe.</i>				
					Protection	<i>The protective material enveloping the pipe.</i>	FBE	Float		
							Wrapped	<i>Plastic Wrapped</i>		
							Encased	<i>Encased</i>		
							Sheathed	<i>Sheathed</i>		
							Sintakote	<i>No description provided</i>		
							Uncoated	<i>Uncoated</i>		
					Embedment	<i>Embedment type from WSAA Sewerage Codes.</i>	Type 1	<i>Type 1 Sand Bed Only</i>		
							Type 2	<i>Type 2 Sand Bed Only</i>		
							Type 3	<i>Type 3 Sand Surround</i>		
							Type 4	<i>Type 4 Sand Surround Geotextile</i>		
							Type 5	<i>Type 5 Concrete Foundation</i>		
							Type 6	<i>Type 6 Concrete Foundation</i>		
							Type 7	<i>Type 7 Geotextile Pillow Foundation</i>		
							Type 8	<i>Type 8 Cement Stable Foundation</i>		
							Type 9	<i>Type 9 Concrete Encase</i>		
							Type 10	<i>Type 10 Cement Stable Encase</i>		
							Type 11	<i>Type 11 Piled Geotextile</i>		
							Type 12	<i>Type 12 Piled Concrete Encase</i>		
							Type 13	<i>Type 13 Piled Geotextile</i>		
					Joint Type	<i>Pipe to pipe join method.</i>	RRJ	<i>Rubber Ring Joint - default</i>		
							RRRJ	<i>Rubber Ring Restrained Joint (Ductile Iron)</i>		
							SWJ	<i>Solvent Welded Joint (PVC)</i>		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
							WJ FJ MCJ BW EFW	<i>Welded Joint (Mild Steel pipe)</i> <i>Flanged Joint</i> <i>Mechanical Compression Joint (PE pipe)</i> <i>Butt Weld (PE pipe)</i> <i>Electrofusion Weld (PE pipe)</i>		
					Rock Excavated Pipe Length_m Geometry	<i>Value indicating whether rock was excavated from the pipe channel.</i> <i>Actual material length of the pipe. Not the horizontal length of the geometry.</i> <i>The linear geometry of the pipe feature in coordinate space.</i>		boolean Float_Positive_NonZero geometry_linear_singlepath_simple		
	Valves <i>Element representing the feature class of Sewerage Valves</i>		Valve <i>Element representing a sewer valve fitting</i>		Use <i>The function of this valve in the network.</i>		Services Scour Air Reflux Overflow Control Stop Valve Gas Release	<i>Service Valve</i> <i>Scour Valve</i> <i>Air Valve</i> <i>Reflux Valve</i> <i>Overflow Valve</i> <i>Control Valve</i> <i>Stop valve - default</i> <i>Gas Release</i>		
					Type	<i>The physical configuration of the valve as ordered from a manufacturer. Not a function</i>				

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
						<i>or use</i>				
							Pressure Relief Gate	<i>Pressure Relief Gate Valve- Resiliant Seated</i>		
							Gate	<i>Gate Valve- Metal Seated</i>		
							Reflux	<i>Reflux</i>		
							Reflux – Flexible Rubber Gate	<i>Reflux Valve e.g. Val-Matic Swing-Flex</i>		
							Swing Check	<i>Swing Check</i>		
							Butterfly	<i>Butterfly</i>		
							Knife Gate	<i>Knife Gate</i>		
							Plug Valve	<i>Plug Valve</i>		
							Vacuum Release	<i>Vacuum Release</i>		
							Penstock Door	<i>Penstock Door</i>		
					Diameter_ mm	<i>The nominal bore diameter of the valve</i>				Positive Integer
					Protection	<i>The protective material enveloping the valve.</i>		FBE		<i>Fusion Bonded Epoxy</i>
					Manufacturer	<i>Manufacturers company or trading name.</i>		Wrapped Tyco		<i>Plastic Wrapped Tyco</i>
								Howle		<i>Howle</i>
								Turnflo		<i>Turnflo</i>
								Keystone		<i>Keystone</i>
								Watts		<i>Watts</i>
								Crevet		<i>Crevet</i>
					Rotation	<i>Rotation angle (cartesian - anti-clockwise 0 degrees = East)</i>				Float_Direction
					Geometry	<i>The geometry representing this feature in coordinate</i>				geometry_point_singlepoint

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
						space.				
	Fittings	<i>Element representing the feature class of Sewerage Fittings</i>	Fitting	<i>Element representing a sewer fitting other than a valve</i>	Type	<i>The physical configuration of the fitting</i>	Bend	<i>Bend</i>		
							Connector	<i>Connector</i>		
							Connector Thrust	<i>Connector Thrust</i>		
							Dismantling Joint	<i>Dismantling Joint</i>		
							Gibault	<i>Gibault</i>		
							Taper	<i>Taper</i>		
							Tee	<i>Tee</i>		
							Wye	<i>Wye</i>		
							Angled Branch	<i>Angled Branch</i>		
							Cathodic Protection Point	<i>Cathodic Protection Point</i>		
							Dead Plate	<i>Dead Plate</i>		
							External Dead End	<i>External Dead End</i>		
							Tee Branch Dead End	<i>Tee Branch Dead End</i>		
							Tee Branch Ext Dead End	<i>Tee Branch Ext Dead End</i>		
							Puddle Flange	<i>Puddle Flange</i>		
							Sampling Point	<i>Sampling Point</i>		
							Booster Pump	<i>Booster Pump</i>		
							Manhole Connector	<i>Manhole connector</i>		
							Junction Saddle	<i>Junction Saddle</i>		
							End cap	<i>End cap</i>		
							Coupler	<i>Coupler</i>		
							Flange adapter	<i>Flange adapter</i>		
					Material	<i>Fitting material</i>	DICL	<i>Ductile iron cement lined</i>		
							PVC	<i>Poly Vinyl Chloride</i>		
							PE-100	<i>Polyethylene - polymer 100 (standard PE)</i>		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
					Body Size_mm <i>The nominal diameter of the major connecting pipe.</i>		ABS <i>Acrylonitrile Butadiene Styrene</i>			
					Branch Size_mm <i>The nominal diameter of the minor connecting pipe.</i>		GRP <i>Glass Reinforced Plastic</i>			
					Rotation <i>Rotation angle (cartesian - anti-clockwise 0 degrees = East)</i>		Concrete <i>Concrete</i>			
					Geometry <i>The geometry representing this feature in coordinate space.</i>		VC <i>Vitrified Clay</i>			
							MSCL <i>Mild Steel Concrete Lined</i>			
								positive Integer		
								positive Integer		
								Float_Direction		
								geometry_point_singlepoint		
	Connection <i>Element representing the feature class of sewer property connections</i>		Connection <i>Element representing a sewer property connection</i>		Dimensions Point Levels_m <i>Call in standard elements for levels at the inspection opening. Level in meters against the vertical datum for this project.</i>		SurfaceLevel_m <i>Surface level in metres AHD of this feature.</i>			
					Use <i>The function of the house connection in the network.</i>		InvertLevel_m <i>Invert level in metres AHD of this feature.</i>			Float
					Diameter_mm <i>The nominal diameter of the connection</i>		House <i>House Drain</i> <i>Default Value</i>			Float
							Combined <i>Combined House Drain</i>			
								positive Integer		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
						conduit.				
					Material	The material of the connection conduit.	UPVC	Unplasticised Poly-Vinyl Chloride Default Value		
							Cast Iron	Cast Iron		
							Concrete	Concrete		
							DICL	Ductile Iron Concrete Lined		
							FRC	Fibre Reinforced Concrete		
							FRP	Fibre Reinforced Plastic		
							MPVC	Modified Poly-Vinyl Chloride		
							OPVC	Orientated Poly-Vinyl Chloride		
							PE	Polyethylene		
							VC	Vitrified Clay		
					Material Class	The pipe class as specified by the manufacture. Pipe class refers to the wall thickness and performance of the material.	SH	Sewer Heavy		
							SEH	Sewer Extra Heavy Default Value		
							SDR21	SDR21		
					HCB Length	The material length in metres of the house connection branch conduit.		Float_Positive_NonZero		
					Type	Physical configuration of connection - based on WSAA standard types.	Sloped Branch	WSAA - Sloped Branch connection		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
							Ramp Riser	WSAA - Ramp Riser connection		
							Jump Up	WSAA - Jump Up connection		
							Stub	WSAA - Connection straight into Maintenance Hole		
							Twin Jump Up	WSAA - Twin Jump Up connection		
							Twin Ramp Riser	WSAA - Twin Ramp Riser connection		
					Chainage_m	The distance in metres from the centre of the downstream manhole to the point of connection of the offshoot branch.		Float_Positive_NonZero		
					Offset_m	The distance measured square from the centre of the sewer main to the point of connection.		Float_Positive_NonZero		
					Line Number	The line identifier of the sewer main.		String_32		
					DSMHID	Downstream manhole identifier.		String_32		
					IO Distance_m	Distance from a point perpendicular to the inspection opening to the centre of the downstream manhole along the axis of the sewer main.		Float_Positive_NonZero		

DESCRIPTION	FEATURE	DESCRIPT.	DETAIL	DESCRIPT.	DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.	ENUMERATION \ DETAIL	DESCRIPT.
					SO Nearest	<i>Perpendicular distance from the inspection opening to the nearest cadastral boundary.</i>		Float_Positive_NonZero		
					SO Other	<i>Perpendicular distance from the inspection opening to the next nearest cadastral boundary.</i>		Float_Positive_NonZero		
					Geometry	<i>The linear geometry of the house connection feature in coordinate space. Digitise this line downstream from the inspection opening to the pipe or pit. If a point is desired, the inspection opening position may be taken as the start of the line</i>		geometry_linear_singlepath_simple		

Appendix B – Water Reticulation ADAC Schema

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
Water Supply	Data structure constraining the description of water supply features.	Pipes	Represents the feature class of water supply pipes	Pipe	Represents a water supply pipe feature.	Use	The purpose of this feature in the network.	Conduit	Service Conduit	PN20	Float_Positive_NonZero	positive Integer	Pressure class - 20 bar
								Fire Service	Fire Service				
								Raw Water	Raw Water Pipe				
								Reticulation	Reticulation Pipe. Default Value				
								Scour	Scour Main				
								Service	Domestic Service				
								Trunk	Trunk Water Main				
								Disused	Disused Main				
								Waste	Waste Pipe				
								Fire Domestic	Domestic Fire Service				
Fire Sprinkler	Fire Sprinkler Service												
Fire Service Thru Meter Irrigation	Fire Service Through Meter Irrigation Pipe												
Alignment_m	Offset from cadastral boundary to the main.												
Diameter_mm	Nominal diameter of the pipe in millimetres.												
Material	The pipe material.	DI	Ductile iron pipe										
		ABS	Acrylonitrile Butadiene Styrene										
		Copper	Copper										
		SS	Stainless Steel										



ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
								GRP	Glass Fibre Reinforced Plastic. Often centrifugally cast. E.g. HOBAS				
								MS	Mild Steel				
								PE-100	Polyethylene - polymer 100 (standard PE)	DN range	Range of diameter nominated in Products List	OD 25 32 63 90 125 180 250 315 355 450 630 800	Out of diameter
								PE-80B	Polyethylene - polymer 80B				
								PVC-M	Poly Vinyl Chloride - Modified				
								PVC-O	Poly Vinyl Chloride - Oriented				
								PVC-U	Poly Vinyl Chloride - Unplasticised				
								RCP	Reinforced Concrete Pipe				
						Lining	Pipe lining detail	CL	Cement Lined Normal(default for Ductile Iron and Mild Steel)				
								CL-SR	Cement Lined - Sulphate Resistant (DI and MS)				
								CL-AC	Cement Lined - Calcium Aluminate (DI and MS)				
								Unlined	Default for plastic pipes				
								FBE	Fusion Bonded Epoxy				
						Joint Type	Pipe Joint Type	RRJ	Rubber Ring Joint - default				
								RRRJ	Rubber Ring				



ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
								SWJ	Restained Joint (Ductile Iron)				
								WJ	Solvent Welded Joint (PVC)				
								FJ	Welded Joint (Mild Steel pipe)				
								MCJ	Flanged Joint				
								BW	Mechanical Compression Joint (PE pipe and Copper)				
								EFW	Butt Weld (PE pipe)				
								SN5000	Electrofusion Weld (PE pipe)				
								SN8000	Class SN5000				
								SN10000	Class SN8000				
								PN6.3	Class SN10000				
								PN8	Class PN6.3				
								PN9	Class PN8				
								PN10	Class PN9				
								PN12	Class PN10				
								PN12.5	Class PN12				
								PN16	Class PN12.5				
								PN18	Class PN16 - default for PE_100, PVC_O and PVC_M				
								PN20	Class PN18				
								PN25	Class PN20				
								PN35	Class PN25				
								FLCL	Class PN35 (Standard for DI)				
								Type A	Class FLCL (ductile iron flanged class)				
								Type B	Type A				
								4.8mm	Type B (copper)				
								5mm	4.8mm wall thickness Class (Mild Steel)				
									5mm wall thickness Class (Mild Steel)				

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
						Embedment	and fills have been applied. Embedment type from WSAA Sewerage Codes.	Type A Type B Type C Type D Type E Type F Type G Type H Type J Type K Type L Type M Above Ground Type 1 Type 2 Type 3 Type 4 Type 5 Type 6 Type 7 Type 8 Type 9 Type 10 Type 11 Type 12	WSSA - Type A WSSA - Type B WSSA - Type C WSSA - Type D WSSA - Type E WSSA - Type F WSSA - Type G WSSA - Type H WSSA - Type J WSSA - Type K WSSA - Type L WSSA - Type M Above Ground Type 1 Sand Bed Only Type 2 Sand Bed Only Type 3 Sand Surround Type 4 Sand Surround Geotextile Type 5 Concrete Foundation Type 6 Concrete Foundation Type 7 Geotextile Pillow Foundation Type 8 Cement Stable Foundation Type 9 Concrete Encase Type 10 Cement Stable Encase Type 11 Special Road Shoulder Type 12 Sealed Road				

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
						<p>Length_m <i>Material length of the pipe in metres.</i></p> <p>Geometry <i>Polyline representing the geometry of the feature in coordinate space.</i></p>		<p>Type 13 Crossing</p> <p>Type 14 Type 13 Sealed Road Along</p> <p>Type 15 Type 14 Sealed Road Kerb Along Type 15 Common Trench Float_Positive_NonZero geometry_linear_singlepath_simple</p>					
		Valves	<i>Represents the feature class of water supply valves</i>	Valve	<i>Represents a water supply valve feature.</i>	Use	<i>The function of the valve in the network.</i>	<p>Altitude <i>Altitude Valve</i></p> <p>Pressure Reducing <i>Pressure Reducing Valve.</i></p> <p>Pressure Sustaining <i>Pressure Sustaining Valve</i></p> <p>Pressure Relief <i>Pressure relief Valve.</i></p> <p>Stop <i>Used for the isolation of sections and branches in pipelines Default Value</i></p> <p>Reflux <i>Reflux Valve allows flow in only one direction</i></p> <p>Scour <i>Used to scour dirty water from a section of pipeline.</i></p> <p>Air Release <i>Used to remove air from high points of a pipeline</i></p> <p>Zone Boundary <i>Zone Boundary Valve. Defines the boundary of a pressure zone or distribution maintenance area (closed valve or</i></p>					



ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
						<p>Type The mechanical configuration of the valve as ordered from a manufacturer. Not a function or use</p> <p>Diameter_ mm The nominal bore diameter of the valve.</p> <p>Manufacturer The company or trading name of the manufacturer. REMOVE ENUMERATION</p> <p>Rotation Rotation angle (cartesian - anti-clockwise 0 degrees = East)</p>		<p>reflux valve).</p> <p>Service Service Valve used to isolated a property</p> <p>Air Air Valve</p> <p>Ball Ball Valve</p> <p>Ball Valve - Vee Ported Ball Valve - Vee Ported</p> <p>Reflux Reflux Valve - allows flow only in one direction.</p> <p>Reflux - Wafer Reflux Valve - Wafer</p> <p>Reflux - Flexible Rubber Gate Reflux Valve e.g. Val-Matic Swing-Flex</p> <p>Diaphragm Valve Can be configured for Use as PRV, Altitude etc</p> <p>Pressure Relief Gate Pressure relief Valve. Gate Valve- Resilient Seated</p> <p>Gate Gate Valve- Metal Seated</p> <p>Butterfly Butterfly Valve</p> <p>Eccentric Plug Eccentric Plug Valve</p> <p>Globe Globe Valve positive Integer</p> <p>Float_Direction</p>					

ASSET ELEMENT	DESCRIPTION	FEAT URE	DESCRIPTI ON	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERA TION \ DETAIL	DESCRI PTION	ENUMERA TION	DE
						Geometry	<i>Point geometry representing the feature in coordinate space.</i>		geometry_point_singl epoint				
		Hydra nts	<i>Represents the feature class of water supply hydrants</i>	Hydrant	<i>Represents a water supply hydrant feature.</i>	Use	<i>The purpose of the hydrant in the network.</i>	Spring	<i>Spring Hydrant.</i>				
						Diameter_ mm	<i>The nominal bore size of the hydrant.</i>		positive Integer				
						Rotation	<i>Rotation angle (cartesian - anti-clockwise 0 degrees = East)</i>		Float_Direction				
						Geometry	<i>Point geometry representing the feature in coordinate space.</i>		geometry_point_singl epoint				
		Meter s	<i>Represents the feature class of water supply meters</i>	Meter	<i>Represents a water supply meter feature.</i>	Serial Number	<i>The manufacturers serial number, as stamped or fixed on the meter.</i>		String_64				
						Type	<i>Configuration of the meter.</i>	Conventional	<i>Standard volumetric meter</i>				
								Manifold	<i>Meter with built-in valve</i>				
								Magflow	<i>Electronic Metering System</i>				
						Diameter_ mm	<i>The nominal bore diameter of the meter.</i>		positive Integer				
						Dials	<i>The number of dials on the reading face.</i>		positive Integer				
						Manufact urer	<i>The company or trading name of the manufacturer. Although not presently constraining any values, these enumerations</i>	ABB	<i>ABB Kent (Davies Shepherd, Kent)</i>				
								RMC	<i>Reliance Manufacturing Company</i>				
								Email	<i>Email</i>				

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
							<p>Installation Date Date of meter installation</p> <p>Lot Lot number of property associated with meter (number only)</p> <p>Plan Survey Plan of property associated with meter</p> <p>Initial Reading The reading on the meter face at the time of installation.</p> <p>Private Booster True indicates that the meter is associated with a private pressure boosting system.</p> <p>Offset Side Is the offset from the left or the right side boundary when looking from the road.</p> <p>Offset_m The distance in metres to measure along the frontage from the indicated side.</p> <p>Rotation Rotation angle (cartesian - anti-clockwise 0 degrees = East)</p> <p>Geometry Point geometry representing the feature in coordinate space.</p>	<p>Bermad Bermad</p> <p>ELS Elster Metering</p>	<p>Bermad</p> <p>Elster Metering</p> <p>e.g. 6</p> <p>e.g. SP23124</p> <p>positive Integer</p> <p>boolean</p> <p>Left Left hand side</p> <p>Right Right hand side</p> <p>Float_Positive_Zero</p> <p>Float_Direction</p> <p>geometry_point_singlepoint</p>				
		Fittin	Represents	Fitting	Represents	Type	The fitting type.	Bend	Bend				

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
		gs	the feature class of water supply fittings		a water supply pipe fitting, other than a valve, meter or hydrant			Connector	Connector				
								Cross Connection	Cross Connection				
								Connector Thrust	Connector Thrust				
								Dismantling Joint	Dismantling joints are designed to facilitate the removal of flanged valves from pipelines.				
								Gibault	Gibault				
								Taper	Taper. Joining pipes of unequal diameter.				
								Tee	T - Joint.				
								Wye	Y - Joint				
								Angled Branch	Angled Branch				
								Cathodic Protection Point	Cathodic Protection Point				
								Dead Plate	Dead Plate				
								External Dead End	External Dead End				
								Tee Branch Dead End	Tee Branch Dead End				
								Tee Branch Ext Dead End	Tee Branch Extended Dead End				
								Puddle Flange	Puddle Flange				
								Ready Tap	Ready Tap				
								Surge Vessel	Surge Vessel				
								Tapping Band	Tapping Band				
								Sampling Point	Sampling Point				
								Junction	Junction				
								Saddle	Saddle				
								End Cao	End Cao				
								Coupler	Coupler				
								Flange Adaptor	Flange Adaptor				

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
						Material <i>The fitting material.</i>		Booster Pump <i>Booster Pump</i> DICL <i>Ductile Iron Concrete Lined</i> PVC <i>Poly Vinyl Chloride</i> ABS <i>Acrylonitrile Butadiene Styrene</i> PE <i>Polyethelyene</i>					
						Body Size_mm <i>The nominal diameter of the largest pipe entering the fitting.</i>			positive Integer				
						Branch Size_mm <i>The nominal diameter of the smallest pipe entering the fitting.</i>			positive Integer				
						Rotation <i>Rotation angle (cartesian - anti-clockwise 0 degrees = East)</i>			Float_Direction				
						Geometry <i>Point geometry representing the feature in coordinate space.</i>			geometry_point_singl epoint				
		Maintenance Holes	<i>Represents the feature class of water supply maintenance access holes</i>	Maintenance Hole	<i>Represents a water supply maintenance access hole feature.</i>	Chamber Size	<i>Data structure describing the chamber configuration and dimensions.</i>	Rectangular	<i>Data container for rectangular dimensions.</i>	Length	<i>Internal length in millimetres for rectangular water maintenance holes.</i>		pos Inte
										Width	<i>Internal width in millimetres for rectangular water maintenance holes.</i>		pos Inte

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
						Surface Level_m	The height of the top surface of the lid, hatch, rim or roof. Surface level in meters against the vertical datum for this project.	Circular	Data container for circular dimensions. Internal diameter in millimetres for water maintenance holes. Float	Diameter_mm	Diameter in millimetres		positive
						Invert Level_m	The height of the top surface of interior floor/bottom. Invert level in meters against the vertical datum for this project.		Float				
						Construction	Method of chamber construction.	Prefabricated	Prefabricated				
						Floor Material	Material type for chamber floor construction.	Insitu	Built or poured in-situ				
								PVC	Poly Vinyl Chloride				
								PE	Polyethylene				
								GRP	Glass Reinforced Plastic				
								PP	Polypropylene				
						Wall Material	Material type for chamber wall construction.	Concrete	Concrete				
								PVC	Poly Vinyl Chloride				
								PE	Polyethylene				
								SWPP	Structural Wall Polypropylene Pipe				
								GRP	Glass Reinforced Plastic				
						Roof Material	Material type for chamber roof construction.	Concrete	Concrete				
								PVC	Poly Vinyl Chloride				
								PE	Polyethylene				
								PP	Polypropylene				

ASSET ELEMENT	DESCRIPTION	FEAT URE	DESCRIPTI ON	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERA TION \ DETAIL	DESCRI PTION	ENUMERA TION	DE
						Lid Material	Chamber material.	Concrete Concrete Mild Steel Mild Steel Stainless Steel Stainless Steel Aluminium Aluminium Cast Iron Frame Cast Iron Frame Assembly (e.g. Gatic roof) Grid Mesh - GRP Grid Mesh - GRP Grid Mesh - Aluminium Grid Mesh - Aluminium No Roof No Roof PVC Poly Vinyl Choride PE Polyethylene PP Polypropylene Mild Steel Mild Steel Stainless Steel Stainless Steel Aluminium Aluminium Cast Iron Concrete Concrete Cast Iron Concrete Infill Cast Iron, Concrete Infill Float_Direction					
						Rotation	Rotation angle (cartesian - anti-clockwise 0 degrees = East)						
						Geometry	Point geometry representing the feature in coordinate space. (Is this really a point not polygon?)		geometry_point_singl epoint				
		Service Fittings	Represents the feature class of water service fittings	Service Fitting	Represents a water service fitting feature.	Type	The type of service fitting	Drinking Fountain	Drinking Fountain				
								Fountain Decorative	A decorative fountain				
								Hot Water System	Hot Water System. Normally attached to				

ASSET ELEMENT	DESCRIPTION	FEATURE	DESCRIPTION	DETAIL	no longer available	DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION \ DETAIL	DESCRIPTION	ENUMERATION	DESCRIPTION
						Rotation	<i>Rotation angle (cartesian - anti-clockwise 0 degrees = East)</i>		Float_Direction				
						Geometry	<i>Point geometry representing the feature in coordinate space.</i>		geometry_point_singl epoint				
		Storage Tanks	<i>Represents the feature class of water storage points</i>	Storage Tank	<i>Represents a domestic storage tank feature. Includes roof water storage not fed from mains service. Not to be used for bulk storage features that are part of the mains distribution network.</i>	Material	<i>The material that the storage tank is made from.</i>	Plastic	<i>Plastic</i>				
						Source	<i>The source of water in the tank.</i>	Steel	<i>Steel</i>				
								Concrete	<i>Concrete</i>				
								Rain Water	<i>Roof water catchment</i>				
								Ground Water	<i>Ground water extracted from a bore</i>				
								Ponded Water	<i>Ponded water pumped from a surface water catchment</i>				
								Mains Service	<i>Drawn from a mains water supply service</i>				
						Rotation	<i>Rotation angle (cartesian - anti-clockwise 0 degrees = East)</i>		Float_Direction				
						Geometry	<i>Point geometry representing the feature in coordinate space.</i>		geometry_point_singl epoint				

Appendix C- TYPICAL “PROJECT DELIVERABLES CHECKLIST”

Project Title:		Finance No:	
Project Manager:		Date:	
RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
TO BE SUPPLIED BY DESIGNER (Provided in Asset Manual Part A)	1. Title Page and Table of Contents	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2. General Introduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	3. Philosophy		
	3.1 <i>Operating Philosophy</i>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2 <i>Functional Description</i>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Design Assumptions		
	4.1 <i>Detail assumptions used in design</i>	<input type="checkbox"/>	<input type="checkbox"/>
	5. Reports & Studies		
	5.1 <i>Geotechnical</i>	<input type="checkbox"/>	<input type="checkbox"/>
	5.2 <i>Odour</i>	<input type="checkbox"/>	<input type="checkbox"/>
	5.3 <i>Flood – (Q100 and/or Storm Tide Surge)</i>	<input type="checkbox"/>	<input type="checkbox"/>
	5.4 <i>Survey</i>	<input type="checkbox"/>	<input type="checkbox"/>
	5.5 <i>Telemetry</i>	<input type="checkbox"/>	<input type="checkbox"/>
	5.6 <i>Other (specify)</i>	<input type="checkbox"/>	<input type="checkbox"/>
	6. Levels		
	6.1 <i>Design Levels</i>	<input type="checkbox"/>	<input type="checkbox"/>
	6.2 <i>Design Operational and Alarm Levels</i>	<input type="checkbox"/>	<input type="checkbox"/>
7. Calculations			
7.1 <i>Odour</i>	<input type="checkbox"/>	<input type="checkbox"/>	

	7.2 Hydraulic	<input type="checkbox"/>	<input type="checkbox"/>
	7.3 Electrical	<input type="checkbox"/>	<input type="checkbox"/>
	7.4 Process	<input type="checkbox"/>	<input type="checkbox"/>
	7.5 Emergency Storage & Overflow	<input type="checkbox"/>	<input type="checkbox"/>
	8. Other (Specify)		

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
TO BE SUPPLIED BY DESIGNER	Design Drawings <i>(separate to Asset Manual Part A)</i>		
	• Mechanical "For Construction" Drawings	<input type="checkbox"/>	<input type="checkbox"/>
	• Electrical "For Construction" Drawings	<input type="checkbox"/>	<input type="checkbox"/>
	• P&ID "For Construction" Drawings	<input type="checkbox"/>	<input type="checkbox"/>
	• Civil "For Construction" Drawings	<input type="checkbox"/>	<input type="checkbox"/>
	• Mains "For Construction" Drawings (long sections on single page)	<input type="checkbox"/>	<input type="checkbox"/>
	• Mains "For Construction" Drawings (separate long sections)	<input type="checkbox"/>	<input type="checkbox"/>

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
TO BE SUPPLIED BY CONSTRUCTOR (Provided in Asset Manual Part B)	1. Title Page and Table of Contents	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	2. Manufacturer Supplied		
	<i>2.1 Pump & System curves</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>2.2 Vendor Manuals</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>2.3 Schematics</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>2.4 Electrical Drawings</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>2.5 MSDS for all chemicals, lubricants & additives</i>	<input type="checkbox"/>	<input type="checkbox"/>
	3. Factory Test Certificates		
	<i>3.1 Flow meters (NATA certification)</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>3.2 Pumps and Motors</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>3.3 Other (specify)</i>	<input type="checkbox"/>	<input type="checkbox"/>
	4. Construction		
	<i>4.1 Completed Inspection & Test Reports (ITPs)</i>	<input type="checkbox"/>	<input type="checkbox"/>
	5. Commissioning Information		
	<i>5.1 RPZD Test Certificate</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>5.2 Electrical Test Records & Test Certificates</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>5.3 Electromagnetic Radiation (EMR) Certificate</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>5.4 Calibration Certificates for Instruments</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>5.5 Radio Survey Data including Signal Strengths</i>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>5.6 Commissioning Worksheet</i> <i>To be provided in Excel format on digital media in addition to Asset Manual PDF</i>	<input type="checkbox"/>	<input type="checkbox"/>
<i>5.7 Completed Commissioning Check Sheets</i>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>5.8 Annotated Version of Software (for PLCs)</i> <i>To be provided on digital media</i>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Warranties	<input type="checkbox"/>	<input type="checkbox"/>	

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
	7. Operating Manual	<input type="checkbox"/>	<input type="checkbox"/>
	8. Maintenance Routines	<input type="checkbox"/>	<input type="checkbox"/>
	9. Other (Specify)		

RESPONSIBILITY	DELIVERABLE	FORMAT	REQUIRED	
			YES	N/A
TO BE SUPPLIED BY CONSTRUCTOR (Refer Specification for Preparing As Constructed Information)	“As Constructed” Information (for creation of “Passive” Assets) (separate to Asset Manual Part B)			
	• Site Mark-ups of “For Construction” Drawings	PDF	<input type="checkbox"/>	<input type="checkbox"/>
	• ADAC File	DGW or XML	<input type="checkbox"/>	<input type="checkbox"/>
	• Approved Design Change Notices	PDF	<input type="checkbox"/>	<input type="checkbox"/>
	• “As Constructed” Drawings	DWG and Smart PDF	<input type="checkbox"/>	<input type="checkbox"/>
	• Certified Drawings	PDF	<input type="checkbox"/>	<input type="checkbox"/>
	• Connection Photographs	JPG	<input type="checkbox"/>	<input type="checkbox"/>

RESPONSIBILITY	DELIVERABLE	FORMAT	REQUIRED	
			YES	N/A
TO BE POPULATED BY CONSTRUCTOR	Asset Template (for creation of “Active” Assets)			
	• Active Asset template (provided by Asset Management Officer) to be populated by Constructor	Excel (XLS)	<input type="checkbox"/>	<input type="checkbox"/>

PROJECT MANAGER	SIGNATURE	DATE
<Insert Name>		

ASSET MANAGEMENT OFFICER	SIGNATURE	DATE
<Insert Name>		

COMPLETIONS OFFICER	SIGNATURE	DATE
<Insert Name>		

