SEQ Water Supply and Sewerage Design & Construction Code (SEQ WS&S D&C Code)
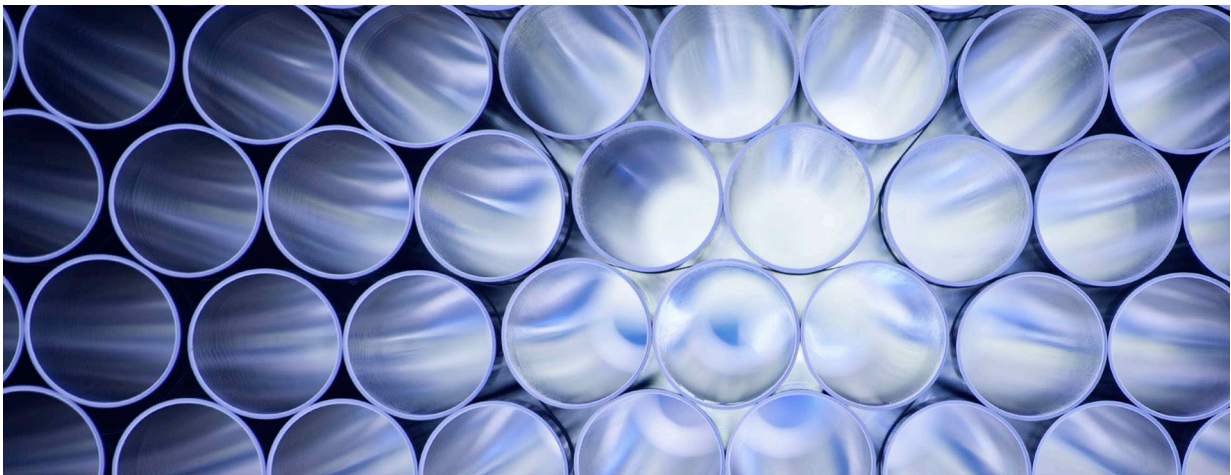
ASSET INFORMATION SPECIFICATION

20 April 2023

Document History

Version	Description	Date
1.0	Initial publication	1 July 2013
2.0	Complete rewrite with increased information about ADAC XML	20/10/2015
3.0	Revised to accord with ADAC version 5.01	01/11/2019
3.01	Revised Table 1	20/01/2020
3.02	Updated Abbreviations (GNSS and IGS), clause 4.9.2, references to GDA2020, clause 3.3 (included Registered surveyor (QLD)), clause 11 (replaced GPS with GNSS and spheroidal with ellipsoidal), and corrected typo errors.	20/04/2023

References

Reference	Title
The Act	South-East Queensland Water (Distribution and Retail Restructuring) Act 2009
ADAC standards	https://www.ipweaq.com/ADAC_v501_XSD.zip https://www.ipweaq.com/asset-owners
Accepted Infrastructure Products and Materials	www.seqcode.com.au
AS1100	Australian Standard, Technical Drawings – General Principles
AS3000	Australian Standard, Australia/New Zealand Wiring Rules
AS60417	Australian Standard, Graphical Symbols for use on Equipment
HB7	Australian Standard Handbook, Engineering Drawing Handbook
AS5488	Classification of Subsurface Utility Information (SUI)

Contents

Tables of Detailed ADAC Schema Requirements 16

11   Project Level Data Entry 16

12   Interpretation of the Schema Requirement Tables 23

13   Attributes Inherited by all Feature Classes 24

14   Sewerage Feature Classes 29

Enumerated Values or attributes shown in italics are new in v 5.0.1 and not available in v 4.2 29

15   Water supply Feature Class 73

Enumerated Values or attributes shown in italics are new in v 5.01 and not available in v 4.2. 73

I - Glossary of Terms

Term	Definition
Active Assets	Assets other than pipelines, which contain electrical or mechanical equipment such as pumping stations, treatment plants, reservoirs and the like.

II - Abbreviations

Abbreviation	Meaning
ADAC	Asset Design and As Constructed
AHD	Australian Height Datum
AIS	Asset Information Specification
APL	Approvals, Permits and Licences (appropriate to the submission stage)
AutoCAD	Automated Computer Aided Design
BCSG02	Brisbane City Survey Grid 02
CAD	Computer Aided Design
CCTV	Closed Circuit Television
CoGC	City of Gold Coast Council
DCDB	Digital Cadastral Data Base

EMR	Electromagnetic Radiation
ETL	Extract-Transfer-and-Load software
GDA	Geocentric Datum of Australia
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
IGS	International GNSS Service
I/O	Input/ Output
JPEG	Joint Photographic Experts Group
IPWEA	Institution of Public Works Engineering Australasia
ITPs	Inspection & Test Plans/Reports
LCC	Logan City Council
MGA	Map Grid of Australia
MPEG	Motion Picture Experts Group
MTBF	Mean Time Between Failures
MTTR	Mean Time to Repair
NATA	National Association of Testing Authorities
O&M Manual	Operation and Maintenance Manual
OEM	Original Equipment Manufacturer
P&ID	Process and Instrumentation Diagram
PDF	Portable Document Format
PLC	Programmable Logic Controller
PSM	Permanent Survey Mark
RCC	Redland City Council
RPEQ	Registered Professional Engineer Queensland
RPZ	Reduced Pressure Zone
RTU	Remote Terminal Unit
SEQ Code	South East Queensland Water Supply and Sewerage Design and Construction Code
SEQ-SP	South East Queensland Water Service Provider
SRG	Strategic Reference Group
UU	Urban Utilities (previously called Queensland Urban Utilities)
UW	Unitywater
WSAA	Water Services Association of Australia
XML	Extensible Markup Language

1   Introduction and Context

Chapter 4A of the *South-East Queensland Water (Distribution and Retail Restructuring) Act* requires the subject water service providers to develop a common set of design and construction standards for water supply and sewerage infrastructure. It is envisaged that a consistent standard (hereinafter referred to as the *SEQ Code*) 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 including development assessment

- Proving a common reference point for construction standards

- Providing a benefit to customers through better service and lower costs.

One of the key deliverables of the *SEQ Code* is the need for a common standard for the submission of design and as-constructed information. This Asset Information Specification details the requirements of the SEQ Service Providers (SEQ-SPs) with respect to the quality, type, format and completeness of information to be submitted by project proponents and their agents.

Figure 1 – Scope of SEQ Code Asset Information Specification
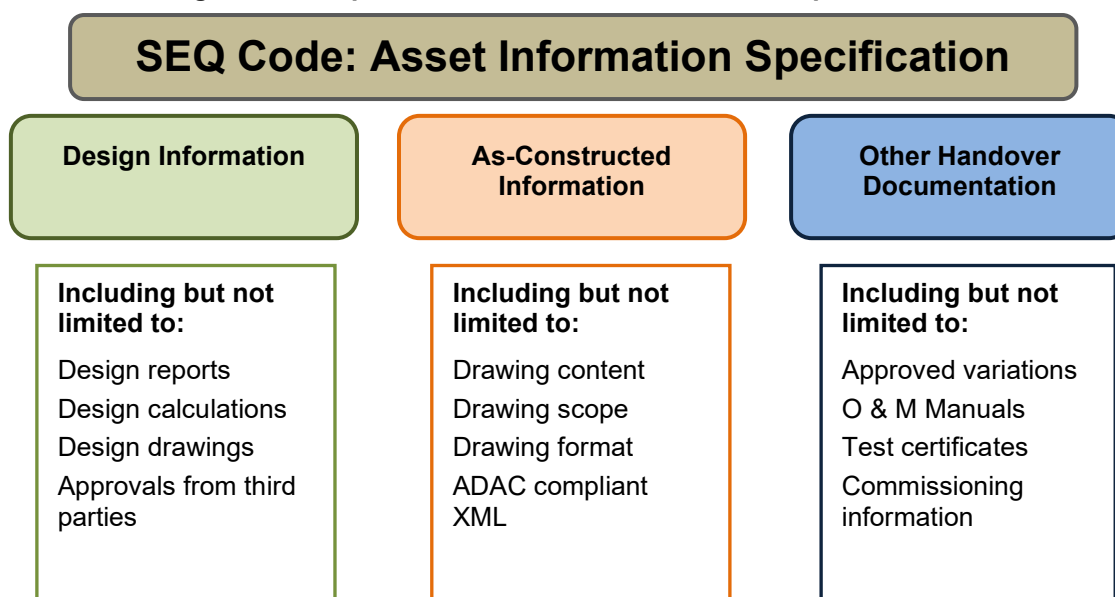
The provision of accurate asset data is essential for design approval and for the efficient operation of the water industry as it underpins a range of financial, spatial, operational and asset management systems which aid the efficient and cost-effective delivery of the SEQ-SPs' services.

This Specification augments the design and as-constructed information provision requirements of the five WSAA National Codes as amended to suit SEQ conditions. (Refer to www.seqcode.com.au).

References in this Specification to AutoCAD include references to other similar proprietary computer-aided design software packages. This document assumes that the readers have a knowledge of AutoCAD sufficient to understand the AutoCAD terms used.

1.1 Purpose

The five SEQ-SPs have different management structures with respect to their owner councils, and maintain different asset management and mapping systems that are ever evolving. The purpose of this document is to outline in one consolidated document the SEQ-SPs' technical requirements for asset data and drawings submission. The target audiences for this specification are software developers, the development industry, and the SEQ-SPs' own staff, which undertake development assessment, connection approval, asset management and infrastructure delivery.

1.2 Scope and Organization

This Specification sets the requirements for the information that project proponents must submit to the SEQ-SPs to gain approval to construct infrastructure that the SEQ-SPs will ultimately own or operate. This includes all the infrastructure to which the SEQ Code for water supply, sewerage, pressure sewerage, sewage pumping stations and vacuum sewerage applies. This includes, but is not limited to the following:

- All sewerage infrastructure including sewers, rising mains, pumping stations, appurtenances and the like.

- All drinking-water infrastructure including reticulation, pumping stations, appurtenances and the like.

- All non-drinking (recycled) water infrastructure including reticulation, pumping stations, appurtenances and the like.

Where the other individual elements of the SEQ Code contain requirements and advice relating to the matters contained in this Specification, the requirements in this Specification are in addition to, and, in the case of any conflicts, take precedence over, the other elements of the SEQ Code. This specification is organized so that general information is contained at the beginning of the main document, more specific requirements are in the main body of the document and detailed requirements are given in the various appendices.

Users should always access this Specification on-line at www.seqcode.com.au to ensure that they are using the latest version of this Specification and consult with the relevant service provider for any specific requirements.

1.3 Submission and Approval Process

Figure 2 below gives a generic overview of the typical process for information submission and SEQ-SP approval for development. Readers should refer to the relevant SEQ-SP's connections policies (UU & UW) or planning schemes (CoGC, LCC, RCC) for the specific requirements of the approval process for each SEQ-SP.

The process followed internally by the SEQ-SPs in constructing their own infrastructure will follow a different process from that illustrated below.

Figure 2 - Generic Submission and Approval Process
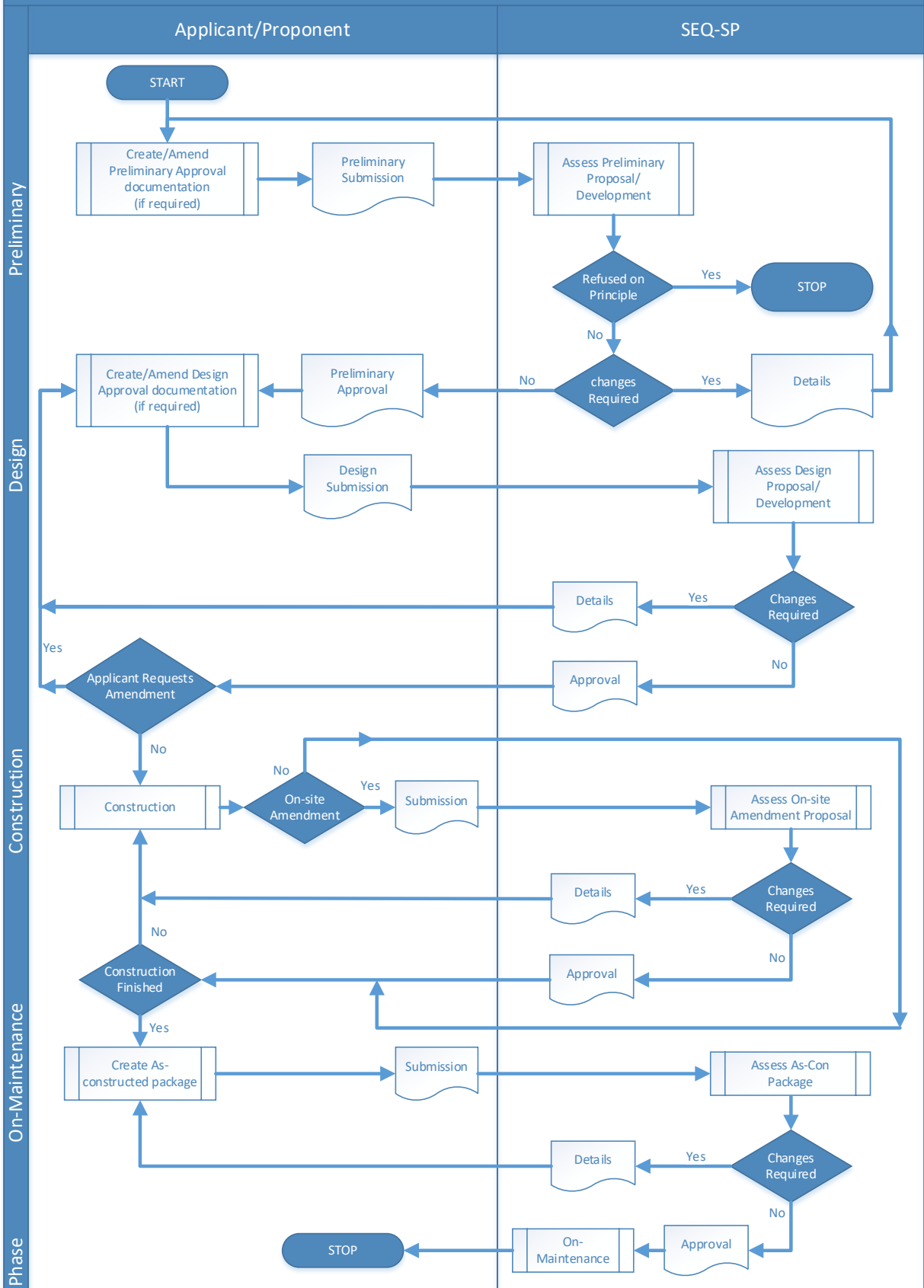
2   Survey Conventions

2.1   Survey Tolerance and Confidence Levels

The Australian Standard AS5488-2013 "Classification of Subsurface Utility Information (SUI)" describes a classification system for the quality of the location and attribute data of buried infrastructure. It specifies four quality levels with level A being the highest quality and level D the lowest. This Specification also prescribes a higher quality level than level A, which is designated level A+. For convenience, this Specification applies the principles of AS5488 to both surface features and buried features.

The quality-level required for information submitted in accordance with this Specification varies according to the stage of a project and the status and type of the infrastructure. The accuracy required increases as the project progress through planning, design and construction. The accuracy required for proposed water and sewerage infrastructure, is also higher than it is for infrastructure of other types.

These requirements are shown in Table 1 below.

PROJECT STAGE	AS 5488 Quality Levels		
	Existing Buried Infrastructure	Existing and Proposed Surface Features and Boundaries	Proposed/ Designed/ As-Constructed water and sewerage Infrastructure
Preliminary Approval/ Pre-lodgement	D	C	N/A
Design Approval / Development Approval	C	B	Use the actual design values.
As-constructed (Except as described in the next row)	C for those parts where no additional information was gathered during construction. B for those parts where additional information was gathered.	A	A X, Y & Z coordinates of water mains and sewer pressure mains and XY coordinates of gravity sewerage pipes and maintenance structures.
As-constructed gravity sewerage	As above	A	A+ Z ordinates of the invert of gravity sewer pipes and the invert and cover level of gravity sewerage maintenance structures

Table 1 – Modified AS5488 Quality Levels

The AS5488 classification determines both the sources of information that may be used to determine the position of assets, the level of survey required and the spatial tolerances. These are summarised in Table 2 below:

AS5488 Quality Level	Information Sources/ Survey Requirements	X/Y Tolerance	Z Tolerance
D	Existing Records, cursory site inspection, anecdotal Evidence	N/A	N/A
C	As for D plus Site Survey of visible evidence that may use relative or absolute positioning.	±300mm	N/A
B	As for C, but must include a survey of both the surface and buried features. Buried features of existing infrastructure may be carried out by no-dig survey techniques.	±300mm	±500mm
A	Positive identification of attributes and the absolute location of subsurface and surface features in three dimensions.	±50mm	±50mm
A+	Positive identification of attributes and the absolute location of subsurface features in three dimensions.	±50mm	±10mm

Table 2 – Modified AS5488 Information sources and tolerances.

For quality level A, AS 5488 specifically states that where a whole line segment cannot be checked by line of sight (before backfilling), quality level A, and by extension level A+, shall not be attributed to the line segment between validating points. For example, it is not a valid assumption to assume a gravity sewer pipe is laid in a perfectly straight line between its recorded invert positions as surveyed in the maintenance structures at either end. Nevertheless, for the purposes of this Specification, the whole line segment shall be deemed to satisfy level A (and A+) where the maximum distance between survey points on a gravity sewer is less than 25 metres or some other means of verification, such as photographs, CCTV or site records, can be used to verify intermediate points. For pressure pipelines, the whole line segment shall be deemed to satisfy level A where the surveyor has picked up every change of direction and gradient and either the maximum distance between survey points is 50 metres or some other means of verification has been used and recorded.

The tolerances in table 2 above should not be used to round the survey data. The data given in an ADAC XML should be that shown on the drawings where an XML is submitted at some stage prior to the As-constructed stage, or the actual values surveyed when the XML is submitted as an As-constructed record.

2.2 Coordinate Base

The minimum requirements for the coordinate base are commensurate with the AS5488 quality level.

Quality Level	Requirement Horizontal Datum	Vertical Datum
C & D	A temporary traverse may be used and positions may be fixed by offset from existing features.	Temporary Bench Marks may be used to provide relative levels
A+, A & B	The horizontal position of the assets must be derived from at least two relatively well-spaced permanent survey marks with Map Grid of Australia (MGA Zone 56 –GDA2020) coordinates. Survey shall be based on true MGA not on DCDB coordinates.	All levels should be reduced to Australian Height Datum (AHD) to a fourth order standard. Drawings shall show and detail any newly installed Permanent Survey Marks (PSMs) within the area of the works.

Table 3 – AS5488 Information sources and tolerances.

Typically at the preliminary stage of planning for a new estate, a surrounding traverse may be required to confirm the coordinate system to be used. This adjusted traverse may then be used to determine control coordinates in the estate. The ADAC XML header contains the description of the coordinate system used, so that surveyors or GIS practitioners may:

- Use MGA coordinates as the XYZ reference and then do a scale and rotate to move the MGA coordinates to the SEQ-SP's coordinate system;
- Correct coordinates in an earlier ADAC XML file that used temporary benchmarks; and
- Convert coordinates-based systems to alignments and offsets for the benefit of operational staff and trades persons connecting to sewerage connections or water services.

3 Requirements for Submission of Information

3.1 Information Package Contents

Information must be submitted to the relevant SEQ-SP in a timely manner appropriate to the project stage and the approval sought. This Asset Information Specification prescribes the format for most information package elements. Where no specific format is prescribed, the format used shall be agreed with the SEQ-SP and shall be both suitable and sufficient for assessment against the technical standards of the SEQ Code. The content of the information package that must be submitted at each stage is shown in table 4 below.

STAGE	Information Package Content Requirement		
Preliminary Approval/ Pre-lodgement	• Preliminary Drawings*	• Preliminary Reports	• Concept plans*
Design Approval / Development Approval	• Key Design Calculations* • Certified Design Drawings* • Design Reports* • Survey Data⁺	• Planning Reports* • APLs* • ADAC XML∞	• Specialist Technical Reports* (geotechnical, odour, flooding, environmental impact and the like) as required
As-constructed information Package	• Certified as-constructed drawings* • Schedule of approved changes* • CCTV videos^	• Marked-up "for construction" (approved design) drawings# • Photographs* • Test Results*	• APLs* • ADAC XML* • Asset Data Loading Sheets@ and Asset Manual@
KEY **APL Means approvals, permits and licences appropriate to the submission stage**	*** Means compulsory for the stage shown.** **^ Means compulsory for gravity sewerage only.**	**@ Means compulsory for active assets such as pumping stations.** **∞ Means strongly recommended, but not compulsory.**	**# Means required for audit purposes upon request of SEQ-SP.** **+ Means required for design only projects where the SEQ-SP is the client**

Table 4 – Information Package Contents at various stage of a Project or Development.

Proponents should check with the relevant SEQ-SP whether the package contents can be reduced in specific cases, particularly where projects involve no, or very little, construction of new water mains or sewer, but require only a simple connection to existing infrastructure.

3.2 Document Identification

All submitted documents, drawings and data must include sufficient information for the receiving SEQ-SP to identify what, where and why the information is being submitted. The relevant SEQ-SP should be consulted in relation to any pro-forma cover sheet or similar requirements. Identification shall usually include the following as a minimum:

- Name of consultant/contractor

- Project name, e.g. Estate name and stage number; contract number; and so on.

- Date

- Unique name or number of item

- Amendment number (if applicable).

Where the receiving SEQ-SP maintains its own file or drawing naming and numbering convention, this shall be used for any submission.

3.3 Document Certification

Surveying information shall be certified for accuracy by a Registered Surveyor (QLD) either by individual certification on each drawing or by a covering letter detailing the documents covered by the certification. Certification shall include the name and registration number of the certifying surveyor. The details of the certifying surveyor shall be included also in the ADAC XML file according to the ADAC schema.

REGISTERED SURVEYOR'S CERTIFICATION

I, ..., hereby certify that the vertical and horizontal locations and dimensions shown on this plan are a true and correct record and were located by survey.

_ _ _ _ _ _ _ _ _ _
Registered Surveyor (QLD) (sig.)   Reg. Surveyor No._ _ _ _ _ _   Date:

Design drawings, as-constructed drawings, test results, structural calculations, hydraulic calculations, and electrical calculations shall be certified as correct, complying with the requirements of the SEQ Code and, for as-constructed drawings, accuracy, by a Registered Engineer Queensland (RPEQ), registered for the appropriate professional discipline for each part of the works. For example, an RPEQ (Civil) cannot certify electrical work. Documents and drawings shall be certified as accurate and complying with the requirements of the SEQ Code either by individual certification on each document or drawing or by a covering letter detailing the documents and drawings covered by the RPEQ's certification. Certification shall include the name and registration number of the RPEQ. The details of the certifying RPEQ shall be included also in the ADAC XML file according to the ADAC schema.

Specialist technical reports shall be certified as having been checked by a person with the tertiary qualifications and experience appropriate to the subject of the report. The signed certification is to be incorporated into the text of the report by detailing the name, position and qualifications of the certifier.

Where certification of drawings is to be directly on the drawings themselves rather than in a covering letter, the constructor shall supply signed as-constructed drawings (scanned PDF) with an 'As Constructed' certifying stamps in the form given below.

<div style="border:1px solid black; padding:10px;">

ENGINEER'S CERTIFICATION

I, ..., hereby certify that:

1. The information contained in this drawing / document is in compliance with approved drawings and design.
2. The new water and sewerage works defined by this drawing have been designed and constructed in accordance with the SEQ Code.
3. This represents an accurate record of as-constructed works
4. I accept responsibility for the information contained in this drawing / document.

_ _ _ _ _ _ _ _ _ _ _
RPEQ (signature)   RPEQ No._ _ _ _ _ _   Date:

</div>

Where certification is by covering letter, the wording must include wording similar to that used in the stamp. Where the certified drawing is for design purposes only, the words, "and constructed" in point 2 and all of point 3 of the Engineer's certification can be struck out.

The RPEQ certification is deemed to include an assurance that the survey data certified by the surveyor has not been amended or manipulated.

4 Detailed Requirements for Information Package

4.1 Drawings

As confidence in the XML capability improves, the SEQ-SPs intend to transition towards accepting paperless submissions. As a first step, where "for construction" drawings marked up with as-constructed details are required on request for audit purposes, these need only be submitted either as paper copies or as pdf scans of the original paper drawings when requested. Unless otherwise agreed with the relevant SEQ-SP, all other drawings must be submitted as A3-sized paper copies, and digitally in both .dwg and .pdf format. For active assets, such as sewage treatment plants, pumping facilities, reservoir sites, dosing installations and the like, AutoCAD file submissions shall be provided unbound in AutoCAD's eTransmit file format and pdf files created using Autocad's printer "DWG to PDF.pc3", so that the individual Autocad layers can been accessed separately in the resulting pdf. Passive (pipeline) assets shall be provided in a bound format utilising Autocad's "bind" command as Autocad format (AutoCAD 2008 or later) with all XREF and OLE files bound to the final file and in normal pdf format. Drawings shall be marked with their purpose or status as appropriate using such terms as "Draft", "For Approval", "Approved", "As-constructed" and the like. Drawings for the as-constructed information package shall be based on the drawings approved for construction; that is the approved design drawings and approved changes. Drawing style shall be modelled on the style of the typical drawings contained in the SEQ Code's SEQ-GEN, SEQ-WAT, SEQ-SEW, SEQ-SPS, SEQ-VAC and SEQ-PSS series of drawings. The type and number of drawings that are required for the information packages submitted at the design-stage and subsequent stages depends upon the nature of the project and shall generally be as described below. For specialist projects such as Sewage Treatment Plants refer to the individual SEQ-SP for additional or varied drawing requirements.

4.1.1 Plans

All projects shall include location plans and one or more general arrangement plans of the proposed pipelines and other proposed infrastructure that is consistent in style and content with the latest version of the following SEQ Code drawings: SEQ-GEN-1100-1, SEQ-WAT-

1100-1, SEQ-WAT-1100-2, SEQ-WAT-1101-2, SEQ-WAT-1101-3, SEQ-SEW-1100-1, SEQ-SEW-1100-2, SEQ-SPS-1100-1, SEQ-SPS-1300-1, SEQ-VAC-1103-1, SEQ-VAC-1103-2 and SEQ-PSS-1100-1, as appropriate for the infrastructure type.

Generally, the minimum scale used on general arrangement plans for water mains, gravity sewers and sewer rising mains shall be 1:500 at A1 size. Where a project has a large number of existing services to contend with, crossings of water courses or other complexities, the minimum scale shall be increased to 1:250 at A1 size. For trunk pipelines the minimum scale may be decreased to 1:1000 with the prior approval of the SEQ SP.

In addition to the proposed infrastructure, plans shall show:

- A north pointer;
- Municipal boundaries
- Major features such as existing structures, creeks, railway lines, power transmission lines and the like;
- Lot boundaries and road reserves;
- Demarcation of areas with special safety, geological or environmental requirements; and
- Existing services and features.
- Removed, retired, disused and abandoned infrastructure.

4.1.2   Longitudinal Sections

Projects shall include longitudinal sections as required by the SEQ Code for the type of infrastructure concerned. For water mains, the requirements are in clause 5.1.2 and clause 9.2.2 of the SEQ Water Supply Code. For gravity sewerage, the requirements are in clause 5.6.2 and clause 10.2.2 of the SEQ Gravity Sewerage Code. For sewage rising mains, the requirements are in clause 3.1 and clause 15.2.1 of the SEQ Sewerage Pumping Station Code.   Longitudinal sections shall be consistent in style and content with the latest version of the following SEQ Code drawings: SEQ-SEW-1101-1, SEQ-SEW-1101-2, SEQ-SPS-1100-2 and SEQ-VAC-1100-1, as appropriate for the infrastructure type. In addition to the requirements for longitudinal sections stated in the relevant SEQ Code for the proposed infrastructure, longitudinal sections shall show crossings of and clearances from existing services, structures, creeks, railway lines, power transmission lines and the like. Removed, retired, disused and abandoned services shall be shown and labelled. Bedding types and the position of trench stops and bulkheads shall also be shown.

Horizontal scales for longitudinal sections shall be the same as those specified in Clause 4.1.1 for general arrangement plans. The vertical scale shall be 5 or 10 times the horizontal scale used, depending upon the complexity of the situation (if the horizontal scale is 1:500, the vertical scale should be 1:100 for situations of average complexity or 1:50 for situations that are more complex).

4.1.3   Electrical and telemetry drawings

Drawings shall include the following:

- General arrangement and site layout, showing all cable routes cable pits, and earth pits
- Pumping station layout, showing all electrical and mechanical plant
- Single line diagram, showing fuse or circuit breaker ratings and cable sizes
- Common control diagram

- Detailed switchboard drawings, showing equipment layout, circuit-diagrams c/w terminal and cable numbers, manufacturing details and materials and equipment schedules
- Cable schedules
- PLC or RTU Logic diagrams
- Piping and instrumentation diagrams
- Alarm and RTU I/O diagram

All circuit and control diagrams (excluding logic diagrams) shall use a grid referencing system to associate pieces of information in and between power diagrams. The PLC/RTU ladder diagrams or logic coding shall be provided as a separate document, using the proprietary software associated with the equipment.

In keeping with AS3000 *Australian/New Zealand Wiring Rules*, when a project contains underground electrical conduits of any rating whatsoever, separate, spatially accurate site plans shall be created to enable future location and maintenance. These plans shall show all electrical conduits, switchboards, pits, earthing locations, isolation points, associated electrical infrastructure and any other pertinent details.

Throughout the on-maintenance period, an additional set of electrical and telemetry drawings printed on water resistant paper and protected in plastic binder pocket books shall be placed in the appropriate switchboard cabinets.

4.1.4   Structural details of water and sewerage infrastructure

Design Drawings shall include at least the following information in respect of all structures:

- Details of structures, e.g., pump wells, collection chamber number/description, location, surface level, size, cover type;
- Position of structures relative to property boundaries.
- Survey level control points.
- Ties and/or downstream distance.
- Type of structure.
- Details of all inlets and property connection sewers.
- Water seal requirements.
- Ties to additional structures.
- IGS coordinates.
- Vent shafts showing size, type and height.
- Supporting piers for above ground pipes.

4.1.5   Other drawings

Other drawings shall be submitted as required to fully detail the infrastructure.

4.1.6   Typical drawing index

The first drawing of any submission shall be a drawing index in a form similar to the example below. The actual drawings required will depend on the complexity of the project and the type of infrastructure to be constructed.

W8443-1	DRAWING INDEX, PIPELINE LAYOUT & LOCALITY PLANS.
W8443-2	NOTES
W8443-3	PIPELINE ALIGNMENT PLAN & SET-OUT DETAILS
W8443-4	PIPELINE LONGITUDINAL SECTION OVERVIEW
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
W8443-10   TYPICAL DETAILS SHEET 1 OF 4 – TYPICAL TRENCHES & SCOUR DISCHARGE
           PUMP-OUT SUMP
W8443-11   TYPICAL DETAILS SHEET 2 OF 4 – WATER MAIN 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

4.1.7   Site mark-ups of issued-for-construction drawings

The submission of an ADAC XML file detailing the approved design is advantageous to both the relevant SEQ-SP and to the project proponent alike. For the SEQ-SP, it enables the entry of the design information into a proposed-works layer of its Geographical Information System (GIS) and when the as-constructed ADAC XML file is subsequently submitted, it permits checking by comparing the drawings produced from the two XML files. For the project proponent, it reduces the likelihood that problems with the as-constructed XML will delay acceptance of the infrastructure upon completion. The SEQ-SPs reserve the right to check both the existence and quality of mark-ups where the quality of the as-constructed drawings and XML file appears to be lacking, or for random auditing purposes. The submission of a design-stage XML will reduce the likelihood that the marked up paper copies of the "approved for construction" drawings will be requested by the relevant SEQ-SP.

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-up drawings will be reviewed for accuracy and completeness by the Constructor and shall be retained for a period of 3 years post-handover.

Mark-ups shall include:

- Where the contract drawings or specifications nominate more than one option, only the option selected for construction shall be shown. Cross out such expressions as "optimal requirement," "or equal" and list specifically the items of material provided
- Diameter, material and class of each pipe
- Location of change of pipe material
- Location of maintenance holes and pipeline fittings such as bends, tees, valves, etc.
- 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 asset
- The surface level of the centre of maintenance structure covers.
- Changes to maintenance hole numbering where this differs from the design drawings
- Depth of chamber
- The surface level at and the level of the cover of all maintenance holes
- Variations to the design including alterations to any structures
- Unusual or uncharted obstructions that are encountered in the work area during construction
- 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 to show all as-constructed information. Buried items shall be surveyed and measured prior to backfilling of the excavation.

4.1.8 Drawing format and Autocad settings

The detailed requirements for drawing formatting, style, content, Autocad settings and Autocad file requirements are specified in **Appendix C - Drawing format and AutoCad settings**.

4.2 CCTV data

All CCTV inspections reports shall be prepared in accordance with the requirements of the relevant SEQ-SP, the SEQ Sewerage Code and the latest version of the WSAA Conduit Inspection Reporting Code of Australia WSA05. The report shall use Appendix F of the WSAA Reporting Code to highlight all unacceptable defects in the CCTV report. CCTV surveys shall be accompanied by an inclination report in the form of a scaled graph that plots the pipe's altitude over the distance travelled.

The following digital information shall be provided on portable storage or optical media (for example USB memory stick, CD or DVD):

- A digital video file (MPEG 1 or MPEG 2 format) for each sewer segment (Maintenance shaft/hole to Maintenance shaft/hole),

- Digital photographs (in JPEG format) of certain defects as stated in Appendix F of WSA 05 and as detailed in the SEQ Code for sewerage.

- One digital file with the asset information, coding information and Inclinometer readings (to an acceptable version of the WinCan software or other digital formats stated in future editions of the WSA 05 standard)

Note: The *.vob format is unacceptable.

Hardcopies of the following shall be provided to the relevant SEQ-SP:

- The WinCan report with the coding information including the photographs taken

- The inclination report as requested.

4.3 Data loading sheets for active assets

The project proponent or proponent's agent shall request asset templates from the relevant SEQ-SP for all newly created or modified active assets. These templates may be provided by the SEQ-SP in hard copy or digital format. The populated templates shall be returned in the same format in which they were received.

4.4 Photographs

During construction, digital photographs shall be taken of complex constructions or installations which will be below ground or not visible after construction completion. Such photographs shall be taken prior to backfilling. Photographs shall be submitted electronically in .jpg format, and pre-processed so that their size does not exceed 5Mb. The title of the jpeg file shall include a reference to the chainage or exact location of the subject photograph. Examples of "complex constructions" include, but are not limited to, the following:

- Connections / tie-ins
- Tees / wyes / branches
- Buried equipment (valves, flow meters)
- Diameter changes (expansions / reductions)
- Terminations (end caps)
- Significant service crossings
- Buried thrust restraints (anchors and thrust blocks)
- Pipe work in shafts either side of trenchless construction (bends, vertical pipe work)
- Reinforcement cage assemblies
- Post construction photographs of reinstatement and finished work

Photographs may also be used to demonstrate compliance with AS5488 for quality levels A and A+ where no intermediate points are surveyed on pipelines.

4.5   Documentation of approved design changes

Copies of documentation of approvals for changes to the approved design shall be included in the final package of work as-constructed information. The signed documentation shall be supplied digitally in PDF format.

4.6   Asset Manual

The information package submitted at the as-constructed/on-maintenance stage shall include an asset manual for all active assets such as pumping stations. The asset manual shall be a compilation of design, construction, commissioning, operational and maintenance information provided to facilitate the operation, maintenance, augmentation and modification of the asset.

The Asset Manual consists of several parts and sub-sections:

- Part A
  - Design Information
- Part B
  - As-Constructed Information
  - Vendor Manuals
  - Operating Manual
  - Maintenance Requirements

Unless directed otherwise, each part of the Asset Manual is to be provided both as a single pdf file and as the editable component files that were used to create the pdf file.

4.6.1   Responsibility for Asset Manual

For projects where the design and the construction were done as separate contracts, Part A shall be developed by the designer during the design phase of a project and Part B by the constructor during the construction phase and finalised upon completion of commissioning. For projects provided through a combined design-and-construction contract, Part A shall be developed by the engaged design-and construct-contractor, during the design phase of a project and Part B by the engaged design-and-construct contractor during the construction phase, and finalised upon completion of commissioning.

4.6.2   Content

Typical requirements for the information content are detailed below. The asset manual shall contain all the information specified unless the relevant SEQ-SP identifies an item, section or subsection as unnecessary. Should the SEQ-SP require additional information to be included the SEQ-SP shall stipulate any additional requirements at the design-approval stage.

Asset Manual Part A shall contain the following:

- Title Page, Table of Contents
- General Introduction (asset details, location, strategy, purpose of the project)
- Operating Philosophy
- Functional Description / Specification for Control System
- Relevant Reports and Studies
- Design Operational and Alarm Levels
- Design Calculations
- Additional requirements stipulated at the design-approval stage

Asset Manual Part B shall contain the following:

- Title Page, Table of Contents
- Manufacturer Supplied
  - Pump & System curves
  - Vendor manuals
- Factory Test Certificates
- Completed Inspection & Test Plans/Reports (ITPs)
- Commissioning Information
  - Test records and certificates (RPZ device, electrical, electromagnetic radiation etc.)
  - Calibration certificates for instruments
  - Radio survey data including signal strength
  - Completed commissioning check sheets
  - Commissioning settings and performance test results (work sheets)
  - PLC software (annotated version) to be supplied on digital media
  - Warranties
- Operating Manual
- Maintenance Routines
- Schedules of emergency spares for unusual or specialist installations
- Additional requirements stipulated at the design-approval stage

4.6.3   Vendor manuals

Vendor Manuals (Equipment Manuals) shall be provided for all electro-mechanical, hydraulic, pneumatic and digital equipment installed in the project.

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

- A full description of the equipment with a tabulation of dimensions and performance ratings

- A copy of the Technical Data Sheet supplied by the manufacturer; reliability data (MTBF, MTTR and Reliability Block Diagram) 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.

4.6.4 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

4.6.5 Maintenance schedules

Maintenance schedules shall be developed for the routine maintenance of all proprietary equipment for which manufacturer or vendor maintenance recommendations exist. The schedules shall consist of a summarised table of the manufacturer-recommended preventative maintenance activities detailing the tasks, task frequency, and the spares and consumables required. A typical extract from an example schedule is shown in Table 5 below.

Type	Model	Pump Size	Motor Size	Other details as per name plate
ABC Submersible Pump	Amaze XYZ	DN 40 to DN 300	2 - pole: 5 2 to 55 2	as per name plate
			4 - pole: 4 4 to 65	
			6 - pole: 4 6 to 50 6	
			8 - pole:10 8 to 35 8	
Maintenance Interval	**Maintenance Task**			**Other Details**
4,000 hrs or at least once per year	Insulation resistance test Check the power cables Visually inspect the lifting chain/rope			Procedure as per OEM Installation/Operating Manual
10,000 hrs or at least every three years	Check the sensors Check the mechanical seal leakage Change the lubricant Lubricate the bearings			
5 Years	Refurbishment or replacement			

Table 5 – Example of a Maintenance Schedule

4.6.6 Checklists for design and handover

Typical checklists for projects that require an asset manual are at **Appendix A – Checklist of typical design stage deliverables** for the design stage and **Appendix B – Checklist of typical final handover deliverables** for the construction-handover stage.

4.7 Approvals Permits and Licences

Water and sewerage infrastructure may require planning and development approval under the Sustainable Planning Act 2009 and environmental licences issued under the Environmental Protection Act 1994. Where approvals, permits or licences are obtained by a party other than the relevant SEQ-SP, (such as by the project proponent, developer, designer or constructor) all documentation associated with the said approvals, permits and licences shall be provided to the relevant SEQ-SP.

4.8 Survey Data

Where survey data is submitted, which is usually only for design only projects for which the SEQ-SP is the client, the survey data package shall accord with the following requirements:

- Drawings in DWG file format that include on individual layers, Points 3D, Lines 2D, Symbols, 3D triangle lines & 3D Faces, 3D contours to 0.5m intervals including contour labels, and potholing information, with points connected with appropriate line types as described in Appendix C.

- A separate DXF file of 2D contours at 0.5m interval including label

- A separate DWG file of pothole data.

- A CSV file format of all survey points and a separate CSV file of potholing data. (The spreadsheets in the CSV format shall have columns for: Point No., Easting, Northing, Height and Code)

- Survey drawings and survey points shall include all existing aboveground and surface features, all existing underground services and any trees to their full canopy width, where the girth of the tree measured at 1.3m above the ground surface exceeds 200 mm

- Survey field codes and point numbers in text format shall be added to the individual layers of the survey drawings

4.9 ADAC XML File

4.9.1 Introduction and Function

The ADAC XML format (Schema) is a non-proprietary data specification and data transport tool written in the XML language. It can be considered as a "data dictionary" containing a library of asset data, which comprises attributes, spatial information and metadata.   This AIS is written to accord with version 5.01 of the Schema. XML files produced to version 4.2 or version 5.01 will be accepted until 31/10/2020. After 31/10/2020 ADAC XML files must comply with ADAC version 5.01 and files to the 4.2 standard shall no longer be accepted.

The formal owner of the Schema is the ADAC Strategic Reference Group (SRG). The SRG makes the Schema available for public use through a Creative Commons licence. The Institution of Public Works Engineering Australasia (IPWEA) provides administrative support to the SRG. Full details of the Schema are available from the IPWEA website at https://www.ipweaq.com/ADAC_v501_XSD.zip . The ADAC Schema is used to facilitate the

collection, lodgement and retrieval of detailed cadastral and other asset information for both developer-contributed and utility-provider constructed infrastructure assets relating to water, sewerage, drainage, roads and open space. For assets to be donated to, built for, or built by, the SEQ-SPs, the ADAC schema facilitates the semi-automatic checking, validation and uploading of asset information into the receiving entities' computerised asset-management systems using (ETL) software. The generalised process for data transfer is depicted in Figure 3 below.
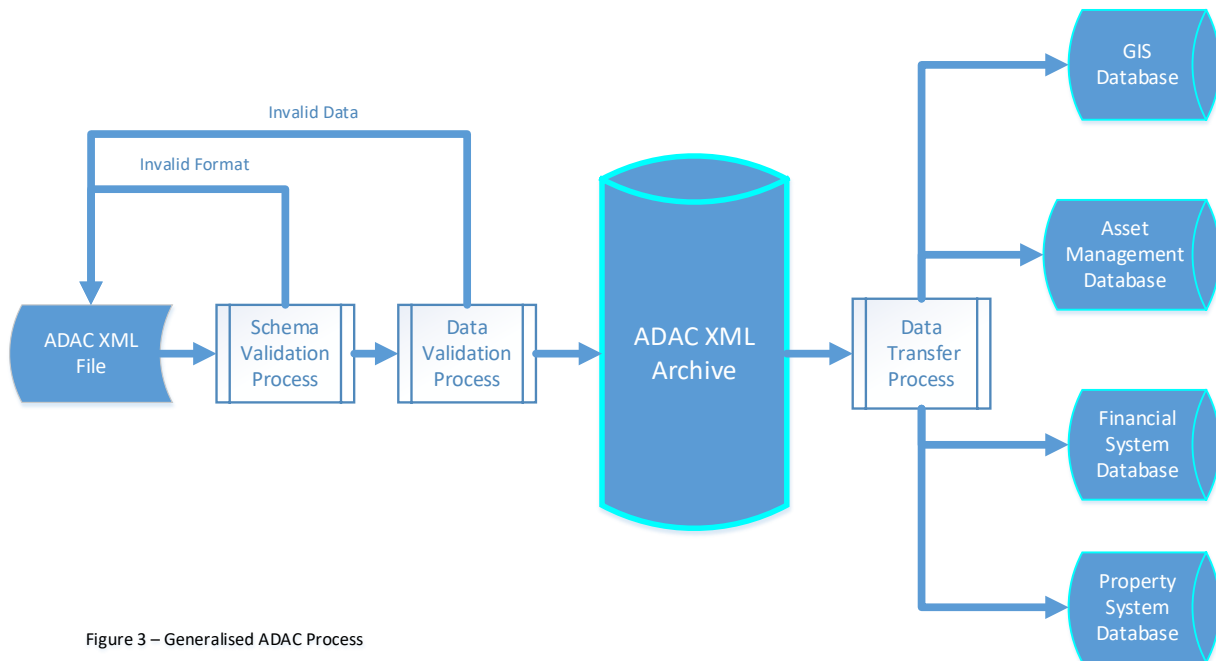
Figure 3 – Generalised ADAC Process

As the Schema facilitates data migration across many types of proprietary software applications, which may run on differing hardware platforms, it shall be both machine and system independent. This independence allows the XML file generator to reside within the engineering drawing software, the surveying software, in a stand-alone system, or in some combination of all these, as shown in Figure 4 below, to produce the final XML data file.
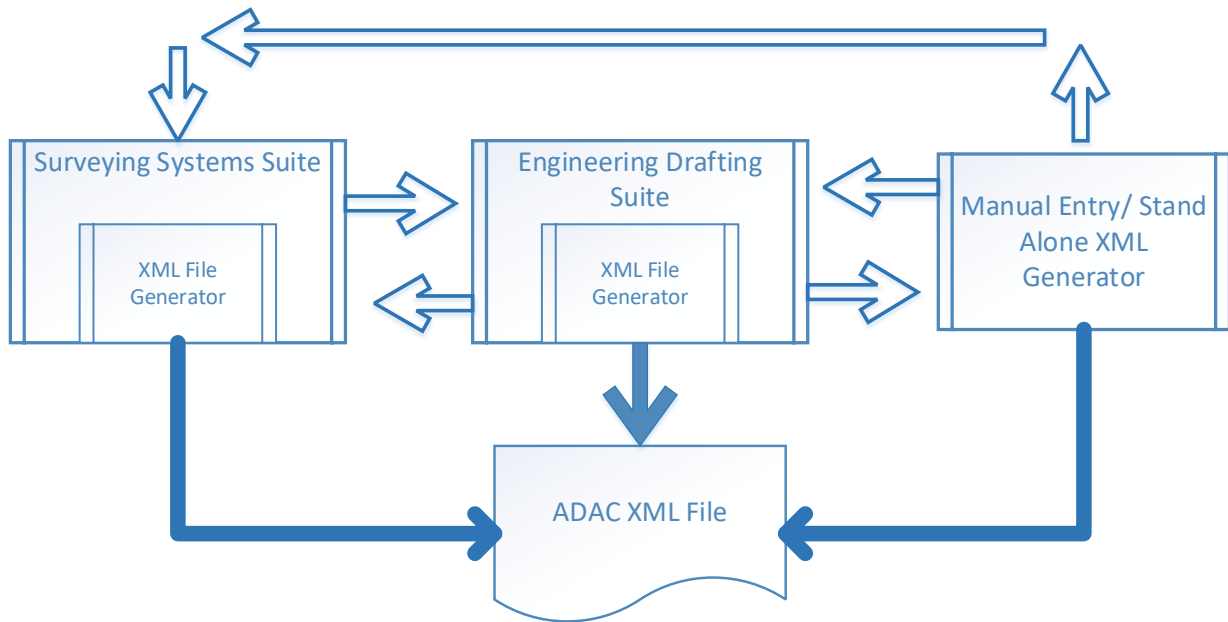
Figure 4 – ADAC XML File Generation Schematic

Software developers are routinely provided with updates to the ADAC schema free of charge and proprietary commercial products are available to surveyors and engineers to produce a valid XML.

Whilst the Schema and additional requirements of this Specification are the same for all the SEQ-SPs, the asset-information systems used in each SEQ-SP and the tools (ETLs) they use to check and populate their asset management systems differ. Moreover, the SEQ-SPs may require the inclusion of data that, whilst not used immediately, will allow future enhancement. Accordingly, this Specification specifies the content and format of the data to be submitted to all the SEQ-SPs, but not how individual SEQ-SPs will extract or use the data. The relationships between the ADAC Schema, this SEQ Code Asset Information Specification and the receiving entity's ETL and Databases is shown schematically in figure 5 below:

Figure 5 – Data Transformation and Relationship to the SEQ-Code AIS

DATA FORMAT	DATA TRANSFORMATION AGENT

Creation

Full ADAC Schema

ADAC Compliant Data

Requirements of this SEQ Asset Information Specification

AIS Compliant Water and Sewerage Data

Transfer

Abstraction of Full ADAC Schema for water and sewerage infrastructure and common to all SEQ-SPs

Sub-set of Data Extracted by a specific SEQ-SP

Population

Data to populate existing system

ETL rules of the receiving SEQ-SP

Phase

Current Asset Databases

Future Asset Databases

Data to populate future enhancement or future database

4.9.2 Limits

For CoGC, LCC, RCC and UW, all pipework and appurtenances both internal and external to pumping stations, treatment plants, reservoirs and the like shall be included in the ADAC XML. For UU, all pipework and appurtenances internal to pumping stations and reservoir sites shall be included in the ADAC XML with the exception of sewage treatment plants, unless contractual arrangements require it.

4.9.3 Data Sources

The data contained in an ADAC XML at any stage is generally the same information that is required to produce the project drawings for that stage. In the case of the as-constructed XML, this is the information contained on the marked-up "for construction" design drawings, which shall comply with the requirements of 2.1 of this Specification and be derived directly from surveys and inspections carried out prior to backfilling.

4.9.4 Responsibility for accuracy

The overall responsibility for the accuracy of the XML file rests with the RPEQ supervising the project with a Registered Surveyor (QLD) taking responsibility for the cadastral survey information. This does not prevent internal contractual arrangements whereby survey staff collect some or all of the required attribute data simultaneously with the cadastral information. Where the Schema prevents the input of a null value, the surveyor may be forced to enter dummy or default value during the field survey, which will subsequently be corrected by the engineering staff and certified by the RPEQ. Photographs, site records and delivery dockets may be used as evidence that non-spatial attributes have been recorded to the required AS5488 quality-level.

4.9.5 Confidentiality and XML file Content

The Schema can contain information on water supply, sewerage, transport systems, stormwater drainage, open space and a number of other infrastructure types, and further infrastructure sets may be added in future. Except for basic cadastral and surface feature information (defined in the ADACCadastre.xsd file and ADACSurface.xsd file), where an XML file contains information on multiple infrastructure sets, approval may be required from the data-set owner, before the data can be provided to a third party. Table 6 below indicates where approval from the infrastructure owner is required.

Entity Receiving the Data	Water or Sewerage Infrastructure	Other Local Government Infrastructure	Other infrastructure owned by others
UU and UW	No approval required	Owner's approval[1] required	Owner's approval required
CoGC, LCC & RCC	No approval required	No approval required (Within the same Council)	Owner's approval required
Other entities that are not SEQ-SPs	Owner's approval required	Owner's approval required	Owner's approval required unless the Data Recipient and owner are the same entity.

Table 6 – Confidentiality Permutations.

Note 1: UU and UW have agreements in place to exchange this data with the local governments within their service areas.

The SEQ-SPs require full details of all the existing services in and around proposed water or sewerage infrastructure and the submitter is responsible for obtaining the necessary approval from the owners of other types of infrastructure as specified in Table 6 above. Similarly, the

approval of the owning SEQ-SP may be required before data on existing sewerage or water-infrastructure is passed to other entities.

4.9.6 ADAC Customisation and Conventions for the SEQ Code AIS

Details of the customisation and conventions to be applied to the ADAC Schema when submitting water supply and sewerage data to the SEQ-SPs are contained in **Appendix D – ADAC XML SEQ Code Requirements** of this Specification.

Appendix A – Checklist of typical design stage deliverables

Project Title:		Finance No:	
Project Manager:		Date:	

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	**N/A**
TO BE SUPPLIED BY DESIGNER (Provided in Asset Manual Part A)	**Title Page and Table of Contents**	☒	☐
	General Introduction	☒	☐
	Philosophy		
	Operating Philosophy	☐	☐
	Functional Description	☐	☐
	Design Assumptions		
	Detail assumptions used in design	☐	☐
	Reports & Studies		
	Geotechnical	☐	☐
	Odour	☐	☐
	Flood – (Q100 and/or Storm Tide Surge)	☐	☐
	Survey	☐	☐
	Telemetry	☐	☐
	Other (specify)	☐	☐
	Levels		
	Design Levels	☐	☐
	Design Operational and Alarm Levels	☐	☐
	Calculations		
	Odour	☐	☐
	Hydraulic	☐	☐
	Electrical	☐	☐
	Process	☐	☐

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
	Emergency Storage & Overflow	☐	☐
	Other (Specify)		

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
TO BE SUPPLIED BY DESIGNER	**Design Drawings** *(separate to Asset Manual Part A)*		
	Mechanical "For Construction" Drawings	☐	☐
	Electrical "For Construction" Drawings	☐	☐
	P&ID "For Construction" Drawings	☐	☐
	Civil "For Construction" Drawings	☐	☐
	Mains "For Construction" Drawings (long sections on single page)	☐	☐
	Mains "For Construction" Drawings (separate long sections)	☐	☐

PROJECT MANAGER	SIGNATURE	DATE
<Insert Name>		

ASSET MANAGEMENT OFFICER	SIGNATURE	DATE
<Insert Name>		

COMPLETIONS OFFICER	SIGNATURE	DATE
<Insert Name>		

Appendix B – Checklist of typical final handover deliverables

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
TO BE SUPPLIED BY CONSTRUCTOR (Provided in Asset Manual Part B)	**Title Page and Table of Contents**	☒	☐
	Manufacturer Supplied		
	Pump & System curves	☐	☐
	Vendor Manuals	☐	☐
	Schematics	☐	☐
	Electrical Drawings	☐	☐
	MSDS for all chemicals, lubricants & additives	☐	☐
	Factory Test Certificates		
	Flow meters (NATA certification)	☐	☐
	Pumps and Motors	☐	☐
	Other (specify)	☐	☐
	Construction		
	Completed Inspection & Test Reports (ITPs)	☐	☐
	Commissioning Information		
	RPZD Test Certificate	☐	☐
	Electrical Test Records & Test Certificates	☐	☐
	Electromagnetic Radiation (EMR) Certificate	☐	☐
	Calibration Certificates for Instruments	☐	☐
	Radio Survey Data including Signal Strengths	☐	☐
	Commissioning Worksheet To be provided in Excel format on digital media in addition to Asset Manual PDF	☐	☐
	Completed Commissioning Check Sheets	☐	☐
	Annotated Version of Software (for PLCs) To be provided on digital media	☐	☐
	Warranties	☐	☐
	Operating Manual	☐	☐

RESPONSIBILITY	DELIVERABLE	REQUIRED	
		YES	N/A
	Maintenance Routines	☐	☐
	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	☐	☐
	ADAC File	XML	☐	☐
	Approved Design Change Notices	PDF	☐	☐
	"As-Constructed" Drawings	DWG and Smart PDF	☐	☐
	Certified Drawings	PDF	☐	☐
	Connection Photographs	JPG	☐	☐

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)	☐	☐

PROJECT MANAGER	SIGNATURE	DATE
<Insert Name>		

ASSET MANAGEMENT OFFICER	SIGNATURE	DATE
<Insert Name>		

COMPLETIONS OFFICER	SIGNATURE	DATE
<Insert Name>		

Appendix C - Drawing format and AutoCad settings

5   Introduction and Context

This Appendix specifies the format of electronic Computer Aided Design (CAD) files created for the SEQ-SPs. Readers should refer to the AutoCAD Users' Guide or online help files within AutoCAD for definitions of and information on the Autocad terms used in this document. Unless specified otherwise, drawing practice shall conform to the relevant Australian Standards (AS1100, AS1101, AS1102, AS3702, AS4383, AS60417, etc.) and HB7: *Engineering Drawing Handbook*. All abbreviations and units shall be in accordance with AS1000. Dimensions shall be in metric units. Upon, request, each SEQ-SP will supply its civil and electrical template drawing file. This file contains pre-set layers, dimension settings, and paper space settings.

6   Setting up drawings

6.1   Drawing size

All drawings shall be prepared (but not submitted) as A1-sized drawings using the relevant supplied AutoCAD drawing template file. This will permit a print scale of 1:1 on A1 plot-sheets and scale 1:2 on A3-sized sheets.

6.2   Drawing sets

The drawings set shall follow a logical order and begin with the Drawing Index and Location Plan

6.3   Drawing numbers

Drawing submitters shall check with the relevant SEQ-SP and use its standard drawing-numbering system as required. A typical drawing number schema is shown in table C1 below:

SEQ-SP	Dwg #	Rev	Description	Location	OPW/DA #
ABC	W8443-1	A	Water plan	Easy Street, Utopia.	OPW 1234/2014

Table C1 – Drawing Number Schema.

6.4   Drawing environment

All drawings, other than electrical schematics, process and instrumentation drawings, and other similar unscaled drawings, shall be supplied as separate AutoCAD files (not layout tabs) utilising the "paper space/model space'" feature of AutoCAD with names based on the drawing number and revision. Under this environment, all structures and details shall 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, all text, dimensions, tables, lists and notes shall be drawn or inserted as paper space entities at a scale of one to one on the drawing layout.

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

To force AutoCAD to reference metric drawing objects such as line types and pattern hatches, the AutoCAD system variable "Measurement" shall be set to 1.

6.5   Electrical drawing requirements

All electrical site plans shall be submitted in accordance with Clause 6.7 below. Schematic diagrams shall be generated and submitted in model space. Other electrical drawings, such as switchboard arrangements, may be submitted in either paper space or model space.

6.6   Materials lists

Where itemised material-lists are required on drawings, these shall be in the standard format as prescribed by the AS1100 Technical Drawings General Principles. Items shall be identified with numbered bubbles or an equivalent method with the item numbers cross-referenced in tabular lists in one or both of the formats below.

Item Number	Quantity	Description	Length	Material	Standard

Item Number	Description (including material and standard)	UNIT	Quantity

6.7   Plan drawings

All site plans shall be submitted utilising paper space (for title block) and correctly geo-referenced lot plan in the model space of the drawing.   All plan drawings shall have a north-point orientation included at the top of the sheet. The plan shall be arranged such that an imaginary line produced along the direction of the north point intersects the top horizontal edge of the drawing at an angle between 45 degrees and 135 degrees.

6.8   Drawing title blocks

All drawings shall use the relevant SEQ-SP's title block. The title block shall not be renamed, exploded, scaled or have any of its attribute tags modified. An allowance has been made in the SEQ-SPs' title boxes for the consultant's logo and contact information. The allowance is the blank space to the left side of the SEQ-SP's logo.

The consultant's logo and information shall not dominate the drawing title.

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

The title block shall have an attributed block of text for the title. This can be accessed by using the command "DDATTE".

6.9 Naming of external reference files

External reference XREF files are used to produce issuable drawings utilising paper space.

XREF files should be named using a short but significant part of the job code with an 'X' as a prefix and an alphanumeric suffix to create a unique identifier for the file. For example, an external reference job created of the inlet works at Maroochydore could be named "XMAR INLET"

Where:'X' represents external reference;

'MAR' is part of the job code; and

'INLET' is an ID code (up to 6 digits) for the item being drawn.

Using an 'X' as a prefix allows the XREF codes to be grouped automatically by the Operating System to the end of the containing folder and identifies that the file is an external reference used in the drawing set. It should be noted that the use of blocks with long file names in AutoCAD is problematic especially where they are nested within other external reference files. Block names (other than XREF) should be no longer than 8 to 10 characters.

6.10 Use of 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. 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 to which that XREF is also 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.

Notes:
- XREF drawings of structures do not contain text.
- Paperspace and XREF files are the preferred method of drawing, but are not always applicable (i.e. P&IDs) so model space drawings can be utilised.

6.11 Layer naming

The 'ByLayer' method creates layers specific to a particular colour and line type combination. The SEQ-SPs do not use the 'ByLayer' method of colour-and-line-type separation, because in most cases the drawing system uses XREF files for the creation of drawings.

Layer names in the system shall be created using a one or two character mandatory discipline code (D) followed by a two-digit layer number (NN) and unique name based on the drawing description or ADAC feature class (-XXXXXX….X). Layer naming using this naming-convention forces AutoCAD to group layers by names based on discipline codes so they are easier to access. Table C2 below lists the standard discipline codes and others may be used by agreement with the relevant SEQ-SP. See also Appendix D paragraph **10.15** for ADAC XML considerations.

Discipline Code	Discipline Code
A – Architectural	P – Piping
G – General	SE – Sewerage
C – Civil	SW – Stormwater
S – Structural	T – Tankage
M – Mechanical	W – Water
E – Electrical	X – All Existing of any type
I - Process	

Table C2 – Discipline Codes

Table C3 below illustrates valid examples of layer names constructed as in accordance with the standard naming convention.

Layer Name	Drawing Description
C01-WALLS	Civil layer walls
P01-RAS	Piping layer RAS pipes
X01-Existing Water Pipe	Water layer Existing Water Pipes
X04-Existing Maintenance Hole	Sewer layer Existing Maintenance Hole

Table C3 - Layer Names

6.12 Use of layer zero blocks and block-creation

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

- To ensure that every drawing includes at least one layer; and
- To provide a special layer that relates to controlling colours in.

Should a new block be required it should be created on layer 0 with the colour and line type of the entities within the block set to "byblock" This allows the blocks colour and line type to be manipulated when inserted into a drawing. Where blocks are always created on layer 0, layers in drawings can be turned on and off without unwittingly losing information. Blocks shall be "inserted", not pasted into drawings.

6.13 Standard colours and line thicknesses

Standard colours and line weights shall be in accordance with the relevant SEQ-SP's schema, which will be provided upon request. Line thicknesses will scale automatically in the same ratio as plotting sheet size. For the A-series of plotting sheets moving two sizes in the series causes a twofold increase or reduction in line thickness (for example, moving from A1 to A3 halves line thickness; moving from A4 to A2 doubles line thickness). The line types used to represent designed and as-constructed works shall be more prominent than those used for existing works and property boundaries by at least one, and preferably two, line-thicknesses.

6.14 Standard line types

Line types shall be standard AutoCAD line types or a line types supplied by the relevant SEQ-SP. The line types representing as-constructed works shall be prominent and at least two thicknesses greater than lines used for property boundaries and the like.

6.15 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 an AutoCAD standard configuration file. The drawing template package will include the relevant linetype file (SERVICES LIN), as noted below in Table C4 below.

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 ---
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

Table C4 – Line Types

6.16   Plot configuration

Plot configuration shall be in accordance with the relevant SEQ-SP's schema, which will be provided upon request as a plot-style table to set colour standards for printing and plotting.

6.17 Text

At the planning and design stages, usage of the word "Proposed" on drawings should be avoided, because these instances will need to be altered at the as-constructed stage. Using the word "New" avoids this pitfall.

Excluding measurement unit designations, all text shall be in uppercase. For general usage, the text style shall be AutoCAD ISOCP with the properties as shown in table C5

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

Table C5 – Text Styles

Where a desired outcome cannot be achieved using the ISOCP font, the relevant SEQ-SP may give approval to use another AutoCad text font or a font that it supplies. In all cases the associated text style name shall match the font name.

Text height, line weight and typical usage for drawing annotation shall be as table C6:

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.

Table C6 – Layer Names

Text shall remain clear and easily legible when a drawing is reduced to A3 size either by plotting or by a direct photocopier print. A minimum text height required for all text is 3mm on an A1-sized plot. All characters in the drawing shall be kept clear of lines, but where this is unavoidable, the line shall be interrupted sufficiently (e.g. break the line work) to accommodate the characters.

6.18 Dimensioning style

Dimensioning style shall be in accordance with the AS1100 and HB7: Engineering Drawing Handbook issued by Standards Australia. The AutoCad-dimension style used shall be as defined in the standard drawing template files. Each dimension shall be a single AutoCad entity. "Exploded" dimensions are not acceptable. The line weight for leaders, extension lines and dimension lines shall one thickness lighter than the corresponding dimension text thickness.

6.19 Standard scales

For A1 size drawings, the standard scales for all drawings shall be set within AutoCAD as shown below in Table C7.

Scale	Comment
1:1	P&IDs, sketches, figures
1:2.5,1:5	Structural, Mechanical & Piping Details
1:10,1:25	Sections, Details
1:50	Architectural & structure layouts
1:250, 1:500, 1:1000	Pipeline General Arrangement Plans (See Clause 4.1.1)
1:250, 1:500, 1:1000 horizontal	Pipeline Longitudinal Sections with 5x or 10x vertical scale (See clause 4.1.2)
1:100, 1:250, 1:500, 1:1000, 1:2500	Site layouts, as appropriate for area of site.
1:2500 to 1:25000	Locality plans and Key plans

Table C7 – Standard Scales

6.20 Revisions

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

6.20.1 Revision Status Letter

The first issue of a drawing is always Version A and is usually the following as per the standard descriptions for certain important revisions are shown in Table C8:

Issue type, etc.	Description
A – Z, AA – etc.	Letter Category
'Preliminary Issue'	First Issue
'Issued for Review'	Issued to SEQ-SP Project Manager/Engineer for design review
'Issued for Information'	Issued for information purposes but not for construction
0,1,2,3 – etc.	Number Category for construction and as constructed drawings

Table C8 – Revisions

The version will be version A and the first revision will be Revision B creating Version B and so on.

6.21 Construction issue number

The number '0' revision shall be used when a drawing is 'issued for construction'. This copy becomes the 'wet' signature master. It shall not be released for construction until all names of signatories and dates are typed into the relevant cells of the electronic title block relating to checking, approval and the like, and it has been signed and initialled as required. All subsequent revisions to construction issues shall be numbered in order from '1' upwards and a general description of the changes made to the drawing shall be included in the description section.

6.21.1 Revision triangles and clouds

After the for-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

This document contains information which is proprietary to the SEQ service providers and may not be used for purposes other than those intended without written consent from the SEQ service providers

Version 3.02 – 04/2023   SEQ WS&S D&C Code –AIS   Appendix C Drawing Standards   C8

clouded and the triangle added inside the cloud. The revision triangle is an attributed block so the number can be changed using the DDATTE command (attribute edit).

For each subsequent revision, the following steps should be followed.

- 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.
- Previous triangles are retained on the drawing.
- The drawing is issued as normal.

6.22   Additional requirements for as-constructed drawings

Whether as-constructed drawings are created anew or by amending the AutoCad drawings approved for construction, the SEQ-SPs require that standard professional engineering drafting practices be used. The letter styles, line thickness, and scale shall be the same as the original drawings unless the relevant SEQ-SP approves otherwise. Any additional sheets added shall conform to the general requirements of this Asset Information Specification.

The following specific requirements shall apply to the preparation of work 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. Revision 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. Final details: As-constructed drawings shall be submitted only when the construction is both finalised and approved. As-constructed drawings shall reflect the actually physical situation of the constructed assets, not a simple representation of the design drawings.

4. Deletions: To show an item was not installed, remove the item from the drawing along with any associated devices, connecting lines, ducts, pipes and the like as well as any associated notes or dimensions. Line items and notes in tables shall be erased by drawing a line through them not by erasing the text.

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, change "EXISTING GROUND LINE" to "ORIGINAL GROUND LINE"; change "SHALL BE REMOVED" to "REMOVED".

8. Shop drawings: When shop fabrication drawings are added to the original contract drawing set they need to be appropriately labelled with the SEQ-SP file number, discipline code 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 drawings are smaller than the SEQ-SP standard sheet size (i.e. A4 or A3 etc.) the sheets shall be cut into a standard SEQ-SP sheet size border sheet and appropriately labelled.

9. <u>Sheet index:</u> The sheet index shall be updated <u>if any</u> sheets are added or the sheet name has been modified.

10. <u>Electrical drawings:</u> A set of up-to-date electrical drawings including mark-ups (whilst back drafted drawings are prepared) shall be kept in the local electrical cabinet at all times.

6.23   Mark-up standards

Good practice in recording as-constructed information facilitates the production of good quality as-constructed drawings and an accurate ADAC XML. Marked-up prints of "for-construction" drawings shall meet the following requirements.

Should a mark-up system other than the traditional three-colour system described below be used the marked-up drawings shall include a legend indicating what the colours mean. The traditional base colours are:

- Red – for deletions OR additions (Deleted or added graphic items (lines) shall be coloured red with red lettering in notes and leaders)

- Blue – for items requiring special information, coordination, or special detailing or detailing notes

- Lead pencil – for notes for draftsperson's or checkers information not to be added to final drawing;

There is an overriding requirement that marked-up changes shall be complete, legible and understandable. In addition to this general requirement, the following requirements shall be met:

- Except where changes are simple and self-evident from the drawing alterations, written explanations shall be provided on as-constructed mark-up drawings to describe the changes.

- All changes to the original text and dimensions and any new explanatory notes shall be clear, precise and easily legible.

- Wherever a revision is made on one drawing, consequential changes shall be made on related drawings such as sectional views, details, legend, profiles, plans, elevations, schedules, notes and call-out designations.

- When changes are required to areas of a drawing where the space available is insufficient to detail the changes clearly to a large enough scale, details shall be drawn, or sketched, elsewhere with leaders to their point of application.

- Additional equipment, material facilities, service lines, and the like not shown on the construction drawings shall be added in the appropriate line style and with an addition to the legend where this is not already included.

- When attached prints (or sketches) are provided with a marked-up print, indicate whether:
    - the entire drawing shall be added to the drawing set, or
    - the drawing set shall be changed to reflect the attached print, or
    - the print is for reference only.

- The comments on drawings shall be self-explanatory and not simply references to letters, memos, or materials that are included elsewhere in the total information package. For example, annotating a drawing with "*Per Variation/Design Change Order #42*" is not acceptable should the actual Change-Order state, "*added an additional two DICL Tees*". However, where a fully descriptive comment refers to a complex change, which would require an excessively wordy comment on a drawing, the comment can be in the form of a detailed summary of a change that is documented in full elsewhere with a reference to the other document. Catch-all phrases that convey no information such as "*changed per Service Provider's instructions*" shall not be used. The overall requirement is for anyone reading the drawing in the future to readily know what, how and why a change was made and what consequences the change had on a design.

- The mark-ups shall be made on the black line prints of the most current sheet.

- Shop drawings (e.g. fabrication drawings for non-standard elbows) are to be incorporated into the as-constructed drawing set and also provided digitally in AutoCAD file format. Providing hand-drawn or plotted paper shop drawings without the digital file is unacceptable.

6.24 Check-list for Mark-ups

- Location, type, material and size of all existing and new utility lines including all fittings and appurtenances, buried, at the surface or above ground that are situated within the construction area where these are different from those shown on the approved design drawings. This includes valves, maintenance holes, drop inlets, wash-outs, air valves, meters, valve splice boxes, hydrants and the like

- Changed location measurements for all change of direction points

- Re-surveyed dimensional offsets to two permanently fixed surface features at the end of each run including each change in direction

- The average depth of water mains below the surface where this has changed from the design drawings

- The location and dimensions of any changes within a building structure

- Layout and schematic drawings of electrical circuits and piping altered or not detailed on the design drawings

- Correct dimensions and details transferred from shop fabrication drawings

- Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from the design plans

- The actual location of anchors, construction, control joints and the like where these are changed from the design plans

- Changes to the location of equipment and architectural features

7 Clean-up of completed drawings

Prior to submission of the final design drawings to the relevant SEQ-SP, drawing files shall be edited to remove all details, entities and artefacts that are not part of the final design.

Drawings must be purged to remove all irrelevant blocks, layers, text styles and the like through use of the AutoCAD "Purge" command.

The final drawings shall be checked for database errors using the AutoCad "Audit" command.

Any encryption or passwords shall be removed.

8 Quality Checks

The SEQ-SPs strongly urge the lodging entity to perform quality checks of the data within drawing files so as to avoid holding up design approval and the sealing of plans. The following points act as a reference for quality control:

- All drawings shall be on the approved SEQ-SPs title block.
- All drawings shall be A1 full size (paper space scale 1:1), except that electrical and P&ID drawings can be size A3.
- 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).
- All levels should be reduced to Australian Height Datum (AHD).
- The as-constructed cadastral data is derived from at least two relatively well-spaced permanent survey marks with Map Grid of Australia (MGA Zone 56 –GDA2020) coordinates.
- All drawings shall have a unique drawing number.
- All drawings shall have a version number.
- All layers have the line weight set to the intended plot thickness even if plotting is controlled by colour.
- The AutoCAD line colour to line weight table is as follows.
  - 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.
- As stated in clause 4.1, all drawings are to be provided to the SEQ-SP as A3 prints and digitally as A3-sized PDF files (landscape preferred). And as Autocad *.dwg files. Refer clause 4.1.

8.1   CAD drawing checklist

The following checklist provides a useful, but not exhaustive check for compliance against this Specification.

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

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

☐	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.
☐	Drawing numbers have been obtained from SEQ-SP.
☐	SEQ-SP standard drawing title block has been used and not modified.
☐	The SEQ-SP Drawing and Project No and other relevant information is entered into the title block.
☐	All file names comply with the SEQ-SP drawing file naming convention.
☐	All disks have been scanned for virus infections.
☐	All drawings have been saved as AutoCAD format DWG.
☐	All drawings have been test plotted directly from the disks using AutoCAD format DWG.
☐	The current layer in all drawings is set to '0'.
☐	All of the viewports are locked.
☐	The drawings are saved in 'paper space' and zoomed extents of title block.
☐	The drawing limits set to 'OFF' where relevant.
☐	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 MGA Zone 56 –GDA2020 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.
☐	Vertical Datum on AHD. All levels should be reduced to Australian Height Datum (AHD).
☐	Horizontal datum has been derived from at least two relatively well-spaced permanent survey marks with Map Grid of Australia (MGA Zone 56 –GDA2020) coordinates.
☐	Scale bar/s shown as required.
☐	Text styles, line types & hatchings and entity colours conform to the SEQ-SP drawing standard.
☐	No special fonts or line types are to be used. Only standard fonts that are normally available in typical AutoCAD installations.
☐	All entities are placed on their correct layer, using the SEQ-SP layering standard.
☐	Water and Sewer pipe work segmented as per ADAC requirements
☐	All XREF drawing files used in the production of drawings have been supplied or inserted into the model drawings.
☐	All water and sewer asset details (including those retired, abandoned or removed) are shown on face of plan.
☐	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.
☐	CAD and PDF files supplied on correct media and clearly labelled with files included, date and company or contact name.
☐	The Project Information sheet has been completed in collaboration with SEQ-SP.

NOTE:
1. The SEQ-SP may check the files for compliance. Drawing compliance checking may be conducted using the above checklist with additional checks as required.
2. For specialist projects such as Sewage Treatment Plants refer to the individual SEQ-SP for additional or varied drawing requirements.

Appendix D – ADAC XML SEQ Code Requirements

9   General Information

9.1   The ADAC Schema

The full Schema is defined in a series of *.xsd files that are available to software developers from the IPWEA. An ADAC XML file comprises a "root, branch and leaf" hierarchy of data elements arranged according to the ADAC schema, the top levels of which are shown below in figure D1.

The level-zero (root) element is called ADAC and contains only the identifying text "ADAC". It contains a level-1 element called Project. The Project element contains a hierarchy of sub-elements that describe information pertinent to the project as a whole and one further element called ProjectData, which contains a hierarchy of infrastructure types and their associated sub-elements to describe the individual feature classes such as pipes, fittings and manholes.
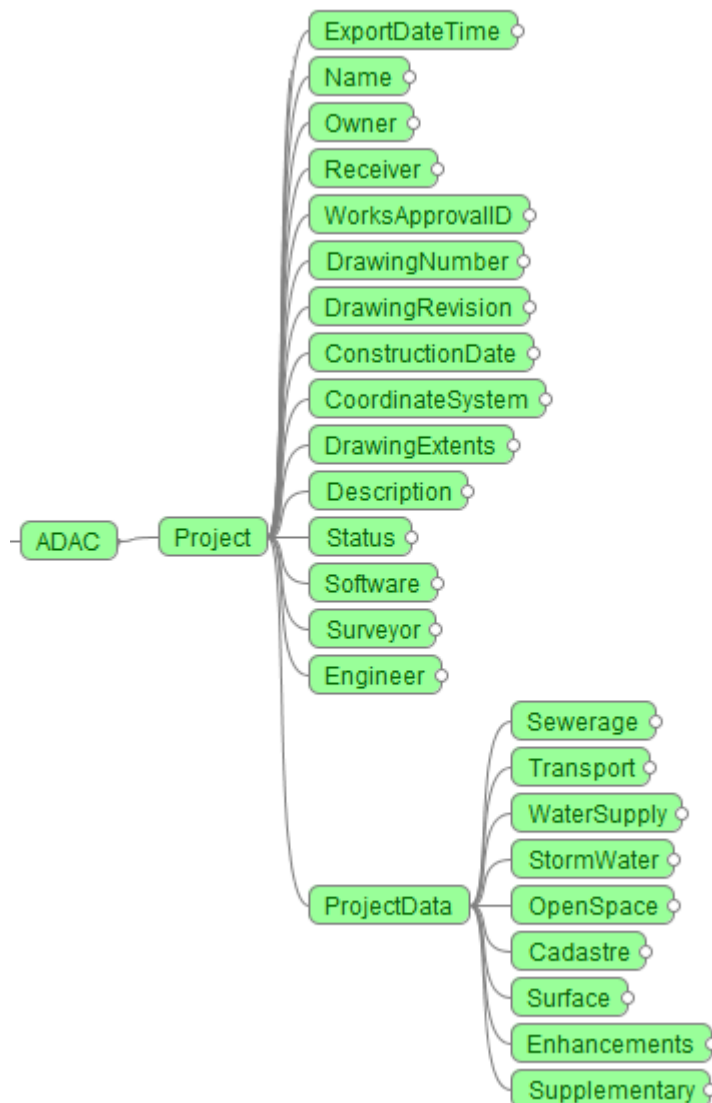
Figure D1 – Top-level "Root" of the ADAC Schema

Diagram D2 below shows the next level of the Schema with the water supply and sewerage elements opened and one feature class in each of these (Fittings) opened further to the next level to show the attributes of the feature classes. Each of the other water supply and sewerage elements opens similarly.
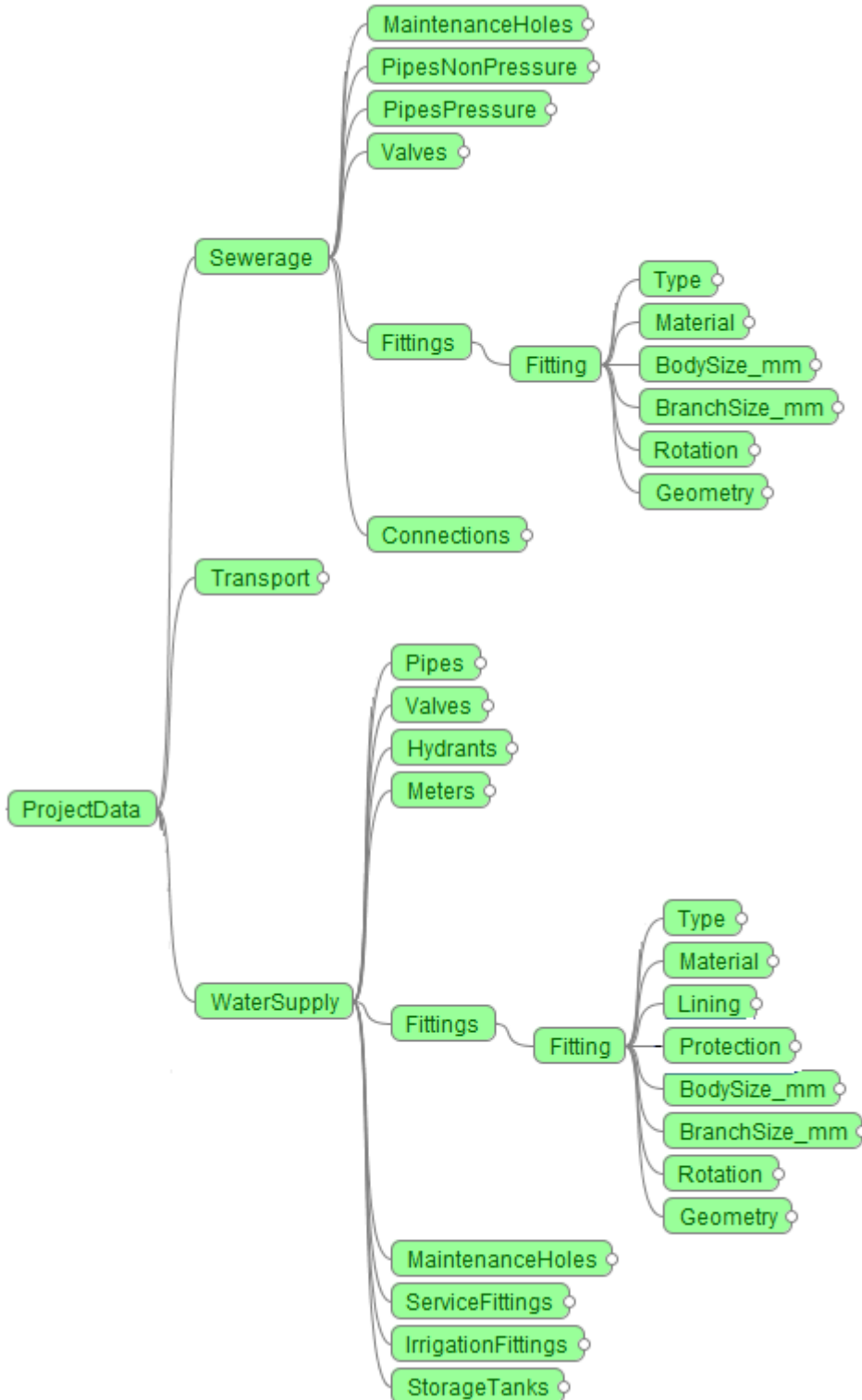
Figure D2 – Middle level of ADAC Schema for water supply and sewerage.

The final level of the Schema in relation to one feature, sewerage-fittings geometry, is shown below in diagram D3. The mind-map on the ADAC website provides information on every element within the Schema, which may be viewed at

https://www.ipweaq.com/ADAC_v501_XSD.zip
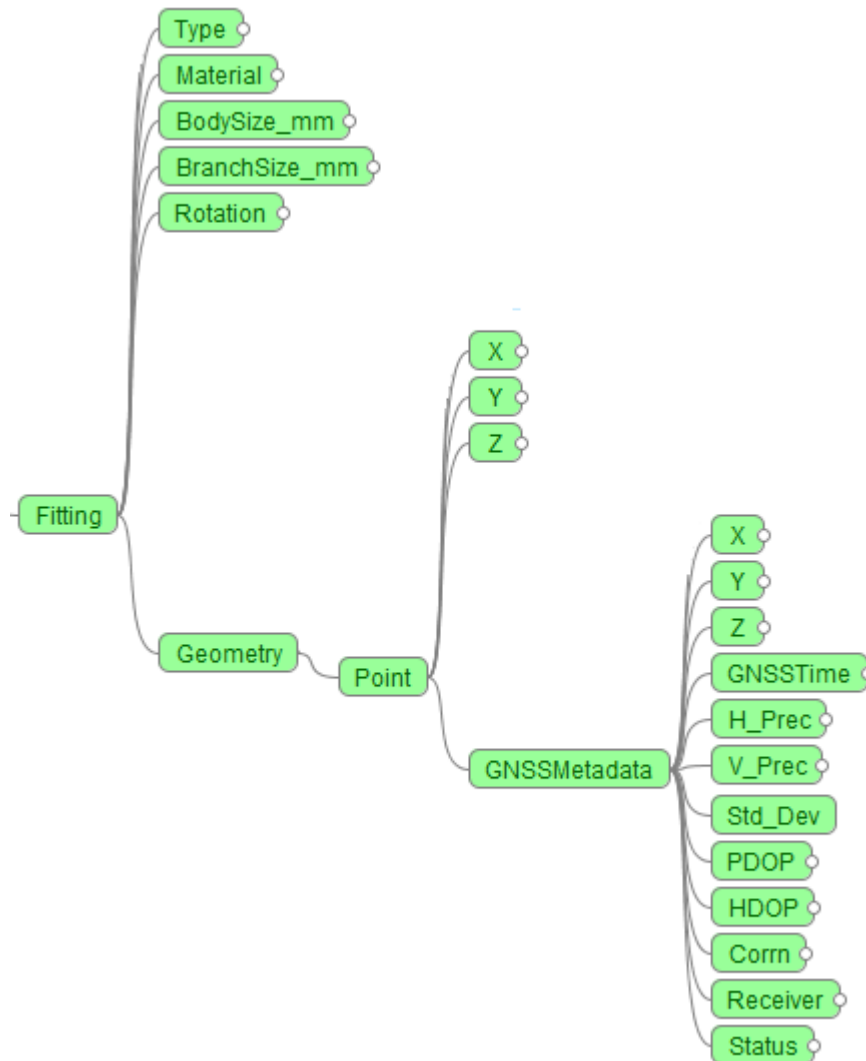
Figure D3 – Lowest level "Leaves" of the Schema.

One ADAC XML file is able to simultaneously contain municipal infrastructure of many types. For conceptual convenience in diagrammatic representations, like the one used above, and to aid the maintenance of the schema program code, these are separated into the different types of infrastructure. However, infrastructure from one area can be a used in another area. For example, the storm water end structures can be used for sewerage outfalls and water main scour headwalls, and roads might feature in a sewage treatment plant. Moreover, certain water-related customer-owned infrastructure such as drinking fountains and irrigation systems are described in the water supply area despite not being part of the mains supply system. For these reasons, the Owner and Department attributes associated with every asset are used by the receiving entities' ETL software to select and group assets into the appropriate area of their asset management systems and GIS layers.

9.2   Data Types

The Schema defines data types for each element such as integer, floating point, date, string and complex types made up of a several simple types. For numerical types the Schema sometimes restricts the maximum or minimum values that can be entered. For some string types called enumerated types, the Schema restricts entry to a list of permitted values. Special requirements for these data types are given in the tables included at the end of this appendix.

9.3   Null Values

The Schema defines which items can be left blank, that is may take a null value, and which items require a valid value to be input. In some cases, an element which cannot take a null value according to the Schema is of no particular interest to the SEQ-SPs. In these cases, the tables included at the end of this appendix detail default values that may be used as an alternative to the actual values. Conversely, there are instances where the Schema may allow a field to be left blank, but the SEQ-SPs require a value to be entered. These instances are also indicated in the tables.

9.4   Schema not a vehicle for approval

The fact that a particular feature, attribute, material class or material type is included in the Schema does not signify that it is approved for use by the SEQ-SPs.   Should there be any discrepancy between the description of the Schema in this Specification and the ADAC Schema itself, the Schema shall prevail.

9.5   Recycled Water

From schema version 4.2 onwards, all water related pipework elements include a water-quality attribute that cannot take a null value. For infrastructure that is, or will be, owned and operated by the SEQ-SPs as part of their municipal mains water reticulation, the usual value to be entered in this attribute is "Drinking Water".   Recycled water classification is described in the Queensland Recycled Water Guidelines.   In areas served by dual reticulation, "Drinking Water" shall be used for the assets providing potable water. Dual reticulation assets conveying recycled water shall use "Recycled Aplus" for situations where the recycled water is used both internally and externally to the premises or "Recycled A" for external use only. The other permitted values for this attribute, such as "Rain Water" and "Treated Effluent", are provided for those needing to describe water-related infrastructure, such as irrigation systems fed from sources other than the municipal water mains.

Where irrigation systems use recycled water of a lower quality than Class A (that is class B, C or D), the following applies:

- Pipework elements such as pipes, valves and fittings shall use the feature classes related to sewage, not water supply, and have the use attributes for the sewer pipes set to "Reuse".
- The irrigation system components, which are included in the water part of the schema such as sprinklers and storage tanks, shall have their water quality attribute set to "Treated Effluent".

9.6 General Requirements for the Project Element

The Project Element of an XML stores top-level data such as the project name, the file creation date, and the coordinate system, which are valid for the entire file. Some of the attributes at the project level are duplicated at the asset level. The purpose of this duplication is to minimise data entry whilst catering for exceptions.

The SEQ Code requirements for data input to the "Project" elements are described below and amplified in the first part of the tables at the end of this appendix.

9.6.1 Duplicated Elements

The Schema duplicates the following project-level attributes at the asset-level: Owner, Drawing Number, Drawing Revision, Construction Date, The Surveyor Group and the Engineer Group. See section **13.**

Where an attribute, which appears both at the project level and at the asset level, is the same for all assets in the XML (Examples: the same Engineer certified all the assets, the assets appear on only one as-constructed drawing, the asset construction/handover date was the same for all the assets, or the owner is the same entity for all the assets), then this data can be supplied once at the project level and take null values at the asset level. Where any of these duplicated attributes varies across the data set, the most common values should be entered at the project level and where the global value is different for a particular asset, an exceptional value must be entered for the attribute at the asset level. The ETL software will assign the project-level value to the corresponding attribute at the asset level if it is set to a null value; that is unless an override value has been entered. In relation to the special requirements the duplicated elements for existing, removed or retired infrastructure see **10.14**.

9.7 Use of Generic Values

The Schema allows the input of generic values such as "Unknown" and "Other" for such attributes as pipe material. "Unknown" may be used for submissions made up until the design approval stage and particularly for existing infrastructure. It is not an acceptable value in an XML file submitted as an as-constructed record of newly constructed infrastructure. "Other" is to be used only where a material is genuinely something other than the materials that the Schema currently provides. Many enumerated lists for materials also include codes such as "M_1". These are to be used only by prior agreement between the submitter and the receiving entity to signify a new material that is not yet included in the Schema.

9.8 Infrastructure owned or operated by others

There are circumstances when an XML file submitted to an SEQ-SP might contain information on assets owned by others or where the owner of all the assets is the receiving SEQ-SP, but there is a need to differentiate between assets operated, or attributed, to a different area of the SP's business. The first instance arises because the asset management systems of the SEQ-SPs might include infrastructure owned by SEQWater, a neighbouring service provider, a council or a private owner. The second instance arises because some asset classes, outfalls for example, can be part of the stormwater system or the water supply or sewerage system. Conversely, the ADAC Schema places irrigation system components and some water service fixtures such as water fountains, taps and dog drinking bowls in the water supply part of the Schema, but these will usually be allocated within a Council SP, by a department other than that responsible for water supply.

To facilitate these requirements every asset has both an Owner attribute and a Department attribute. The tables at the end of this appendix provide the necessary owner and department codes that allow the receiving entity to differentiate between the various possible owners and internal operators for every individual asset described.

10 Capture Conventions

10.1 General Advice

General advice on data capture for the ADAC XML Schema is available in the guides published by the IPWEA and the various software providers.

10.2 Survey Management

To meet the requirements of **2.1 Survey Tolerance and Confidence Levels**, pipes shall not be covered before the as-constructed detail is collected. Typically, once a pipe invert level has been collected it is marked with a paint spot to show that the pipe can be buried. An alternative is to put a standpipe on the crown of the pipe so that the surveyor can measure the crown level after the pipe has been covered. It may be necessary for deep structures or structures that are difficult to access once completed to survey invert levels prior to the construction of the walls or roof.

10.3 Pipe Diameters

Pipe diameters are nominal diameters as specified in Australian Standards and ordered from manufacturers. PE, copper and mild steel pipe nominal diameters refer to outside diameters.

10.4 Direction of flow

Sewerage pipes (both gravity and pumped) should be captured in the direction of flow; that is from upstream towards downstream for gravity sewers and from pumping station to outlet for pumped systems. For water mains, the direction of flow is often indeterminate and the direction of capture does not matter.

10.5 Levels for pipes and pipe fittings

Except where logically required otherwise by the nature of an attribute, the key level (Z-value) recorded for all types of pipes including water supply, gravity sewers, and sewer pressure mains, pressure sewers and vacuum sewers, shall be the invert level. The invert level may be surveyed directly or calculated by, for example, surveying the crown of the pipe and deducting the wall thickness and actual (not nominal) internal diameter of the pipe. Fittings may have different wall thickness and other characteristics to those of the pipes they join. Accordingly, the invert levels used for fittings such as bends, valves and tees may be surveyed directly or calculated as above for pipes, but using the fitting wall thickness, or alternatively from the invert levels of the pipes they join by notionally connecting the inverts of the ends of the pipe they join and taking the level at the half-way point.

10.6 Location point for maintenance structures and fittings

The ADAC Schema generally stores only one set of location (X, Y) attributes for fittings such as maintenance structures, tees and bends. The SEQ-SP conventions for determining the location point are:

- For pumping stations, maintenance structures, maintenance shafts, valve chambers, and similar features, the point on the top slab or cover that is vertically above the centroid of greatest plan area;
- for tees, Y-junctions and cross-connections, for X and Y connectors, the point where the centreline of the branches of the fitting intersect and for Z the invert directly below the X-Y point;
- for two-ended fittings such as bends, vertically-placed hydrant tees, gibaults, tapping bands, and valves, the point half way along the main axis of the fitting at invert; and
- for outfall headwalls, the point above the position where the outfall pipe exits the discharge face of the wall.

Location points may be surveyed directly, or calculated by, for example, surveying the coordinates of the ends of the branches on a tee and then calculating the point of intersection of the centrelines of its branches.

10.7   Rotations

The spatial coordinates for a feature, such as a pipe fitting, allow the item to be located in 3-dimensional space. Adding the information contained in the rotation (orientation) attribute permits the feature to be shown correctly both in position and direction. Rotation in the Schema is measured anti-clockwise from the X-axis (East), which is taken as rotation value zero. This is not the same as the standard surveying convention, which measures angles clockwise from north. The rotation can be determined directly by field survey or by calculation from the orientation of the pipe-elements that the feature joins or connects. The indirect method requires the surveyor to first enter a default value of zero and then add the orientation as calculated within AutoCad using the as-constructed survey information.

The tables at the end of this appendix show for each feature class whether the rotation attribute may take a null value or not.

10.8   Pipe Breaking

"Pipe breaking" refers to the notional breaking of a hydraulically continuous pipeline into sections, so that the attributes that vary along its length for each section can be entered separately. It is closely associated with the concept of snapping, which is described in **10.9** below. Breaking is necessary for meaningful financial models and hydraulic models to be created from the data and for the pipeline network to be shown accurately in a GIS. It should be noted that although some actual physical breaks in a pipeline also require breaking a pipe into sections for XML input, this is by no means always the case. For example, a pipeline built from spigot and socket pipes is comprised of physically separate pipes, but it is unnecessary to break the pipe for XML purposes at these internal joints unless a break is required for another reason   Also, although all fittings are included in an XML, only certain kinds of fittings that do, or could, cause a substantial change in the hydraulic flow regime require the pipeline to be broken at the fitting. Breaks fall into 4 categories:

- Natural breaks – these are points in the pipeline where a pipeline physically ends. These include stop ends of pipelines, entries into maintenance holes, maintenance shafts and the like, outfalls, reservoir entries and exits, pumping station entries and exits and any other situation where a run of pipeline physically ends.

- Changes to the attributes of a pipeline – these are points where one or more physical attributes of the pipes in a hydraulically continuous pipeline change, and therefore either the monetary value of that pipeline, its hydraulic characteristics or both change. These include a change of pipe diameter, pipe material, pipe material class, pipe lining, pipe protection, the embedment type of the pipe, whether or not rock excavation was used to install the pipe and where the pipe jointing method changes.

- Breaks at Fittings - Where a fitting on a pipeline materially affects or has the potential to materially affect the hydraulics of the pipeline in its common modes of operation, the pipeline shall be broken and snapped to the fitting. These fittings include bends (with the exception of manufactured long-radius bends or long radius bends in PE pipe that are pulled during construction, which are entered not as fittings, but as lengths of pipe), crosses, tees (with the exception of scour tees and water service connection tees), wye branches, crosses and combi-valves, and all valves except service pipe valves. Where a fitting does not affect the hydraulics of a pipeline in normal operation, there is no need to break the pipeline and snap to the fitting unless a break is needed for

another reason.   Such fittings include connectors, gibaults, tapping bands, dismantling joints "ready tap" service connectors, inspection points, pressure or other monitoring points, sampling points and the like.   A GIS will treat these fittings as "floating" coincidently in space with the pipes they are associated with.

- Breaks for other reasons – the value of a pipeline is associated with its depth, and the depth of a pipeline may vary considerably over a length of pipeline that does not need to be broken for any of the above-stated reasons.   Therefore wherever a section of pipeline is laid at a depth that is considerable different (plus or minus 20% from the average for the length or 1 metre whichever is the greater) from the depth of the sections it is included within, it shall be broken at the start and the end of the section that departs from the typical depth of the pipeline as a whole.

Where a fitting or valve does cause a break in the pipeline, the pipes and associated fittings shall obey the cardinality of the fitting. For example, a cross must connect to 4 objects (an object is usually a pipe but could be a fitting like a valve or a blank end), a tee or wye must connect to 3 objects and a bend, taper or valve to 2 objects.

To assist with the development of standardised XML file generation software and given that the SEQ-SPs can manipulate the XML file to "stitch together" pipe breaks prior to data-entry into their asset management systems, the XML file may include additional breaks, to those required by this specification.

The Surveyor has the responsibility to determine with the assistance from the Engineer where break points exist and to provide the necessary survey data accordingly.

10.9   Snapping

All pipe elements in an XML file should either run between terminating features, such as a headwall, fitting, maintenance structure, pumping station, bend, tee and the like, or run between pipe breaks as described in paragraph **10.8** above. To assist with the development of standardised XML file generation software, where no break is prescribed by paragraph **10.8**, but breaks have been included, the XML file generator may opt to pre-snap contiguous, but separately surveyed, pipe runs together. See **Clause 4.9.2** for the limits of the pipework to be included in an XML.

Snapping refers to the way that the receiving SEQ-SP's ETL software connects the various discrete pipeline elements described in an XML file into a meaningful hydraulic network. An example would be how a series of gravity sewer pipes and maintenance structures are snapped together to form a sewerage network when the XML data is imported into a GIS system or hydraulic modelling system. For as-constructed XML data, the surveyor need not be concerned with snapping requirements and should simply record the actual positions and levels of the various pipe ends and location points of such elements as maintenance structures. The SEQ-SPs ETLs will use logic-based and proximity-based rules to determine which elements are connected to each other in a coherent network.
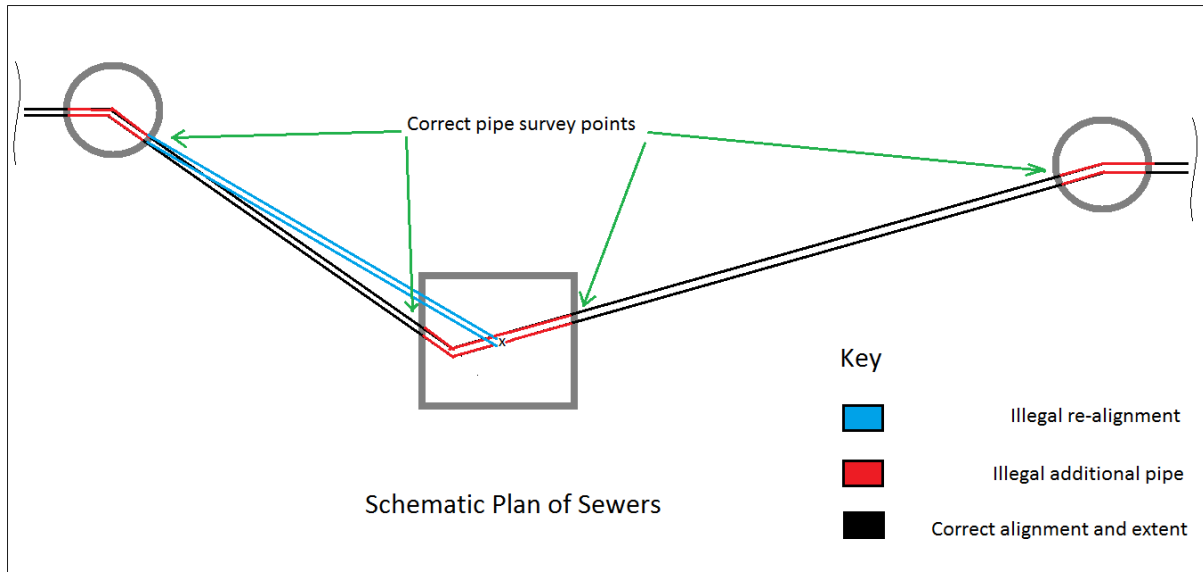
Figure D4 – Survey points related to snapping.

As shown diagrammatically in the plan in figure D4 above, when inputting the length of a sewer pipe, the surveyor should not add on an allowance for the distance from the point that a pipe penetrates the wall of the maintenance structure to the centre of that structure and then use that extended length to calculate a notional slope. Neither should the surveyor change the alignment to force pipe intersection. Hydraulic modellers may subsequently adopt the "blue" solution of adjusting the true alignment of the pipes or the "red" solution of extending the pipes by a notional amount, or whatever other solution might suit their purpose, but all such data manipulation will be carried out by the receiving SEQ-SPs.

For a design-stage XML, where no infrastructure survey has been carried out, provided a convention is applied consistently, the submitter my adopt any of the solutions (black, red or blue) shown in diagram D4 above.

Further clarification is provided in figure D5 below. This shows a water main with a T-junction, a tapping band and water service. Note that the tapping band does not "break" the pipe and the pipe itself does not need to be surveyed at the tapping band location only at the T-junction.
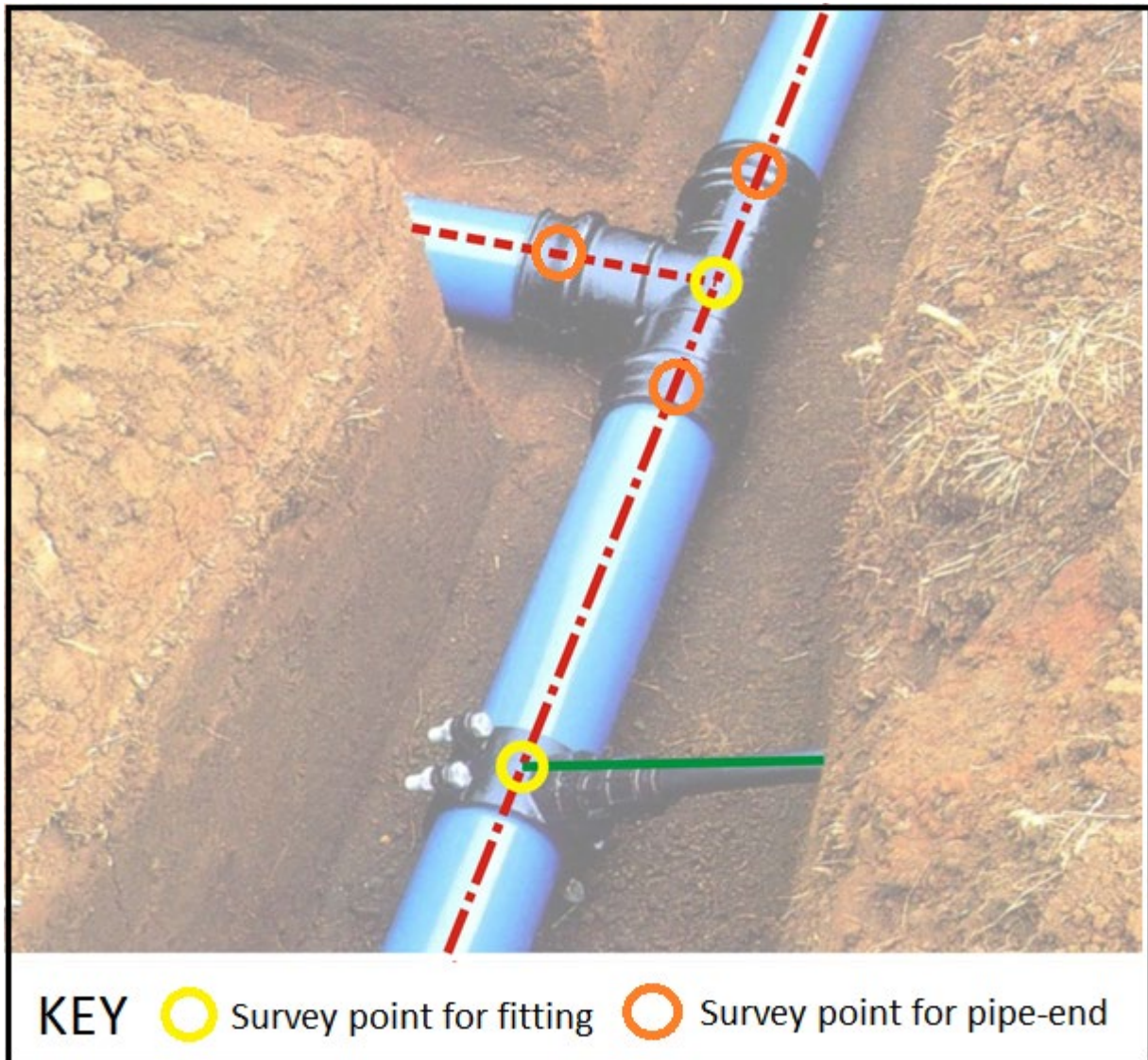
Figure D5 – Typical arrangement for water main survey/snapping points

10.10 Drop Pipes into Sewerage Maintenance Structures

Where an incoming sewer enters a maintenance structure via a drop arrangement, the pipes and fittings that are used to make the physical drop and associated rodding arms shall not be included in the pipeline elements submitted in the XML file, rather the end of the incoming sewer pipe shall be taken as the point where the main run of pipe would have entered the maintenance structure had there been no drop present.[1]

The maintenance structure feature class in the ADAC schema has an attribute "sewer_mh_droptype" to record the type of backdrop that a maintenance structure

---

[1] In ADAC the physical position in 3-dimensional space of gravity sewer pipes is determined by entering sufficient coordinates into a polyline data structure. ADAC also provided for pipe fittings such as bends, tees, and Y-junctions that might be incorporated into MH drop pipes.   ADAC could therefore be used to fully describe drop pipe configurations, but this would lead to undue complexity for little benefit, as the hydraulic modelling and total value of a project will not be materially affected by the simplification adopted above.

The permitted values where there are no drops, are "Straight Through MH" or "Change In Direction Through MH". "Straight Through MH" shall only be used where the situation strictly adheres to its ADAC definition as stated in Table D1 below.   For all other cases where there are no drop connections into the maintenance structure, the value "Change In Direction Through MH" shall be used[2].

If a Maintenance Hole has any incoming sewers or sewer that enter it via an internal drop pipe, or a maintenance structure other than a MH, such as a maintenance shaft, has an entry into its riser, then the drop pipe attribute shall take the value "Internal Drop".[3]

For Maintenance Holes with external drops, the appropriate value from the options in Table D1 are: "External Drop", "Alternative External Drop" or "Oblique 45deg Backdrop". The appropriate choice shall be determined by comparing the actual physical situation of the maintenance structure to the SEQ Code Standard Drawings and the descriptions in Table D1. The SEQ Maintenance Hole types in the Standard Drawings vary according to whether the NuSewers or RIGSS sewerage systems (refer to the SEQ Gravity Sewerage Code for definitions) are being used and according to the SEQ-SP concerned. The first column of Table D1 only gives possibilities. So for example, it is not possible for a "type A" MH to have a drop of any kind, but a type X could have an internal or external drop, and which of these to use depends on the actual physical situation concerned.

---

[2] According to the official schema definition of "Change In Direction Through MH" (See Table D1), there can be only one incoming and one outgoing sewer for this value to be used. So, theoretically there is no permitted value for the attribute "sewer_mh_droptype" that is applicable to the common case of more than one incoming pipe entering a maintenance structure at or near its invert level. To overcome this schema deficiency, the AIS requires "Change In Direction Through MH" to be used for such cases, because, if there is more than one incoming sewer, then the flow in at least one of them must experience a change of direction.

[3] For Maintenance Shafts and other maintenance structures other than Maintenance Holes, any drop will usually be an "Internal Drop", and any kind of external drop would be unusual, but as the available types are increasing and evolving, the SEQ Code Standard Drawings should be consulted to check this.

SEQ Code MH Type	ADAC Schema drop-type Code	ADAC Schema Description
P1,P2,P3,V, A	Straight Through MH	Straight through MH with one entry, one exit, no change of direction, no backdrop but may have change of grade
P1,P2,P3,V	Change In Direction Through MH	Straight through MH with one entry, one exit, no backdrops, a change of direction and may also have change of grade
D, X, Y	External Drop	MH with one or more external backdrop vertical entries
Y	Alternative External Drop	Alternative drop type with complex access arrangement or modified benching as shown on Standard Drawing SEQ-SEW-1306-1 for external drop type.
X	Internal Drop	MH with one or more internal backdrop vertical entries
C W	Oblique 45deg Backdrop	MH with an oblique 45° backdrop entry

Table D1 Relationship between SEQ Code MH types and the ADAC 5.01 Schema

10.11 Envelopers and Conduits

Enveloper pipes enveloping both pressure and gravity sewerage infrastructure shall be entered as gravity sewer pipes with the use set to "Conduit Pipe". Enveloper pipes enveloping water infrastructure should be entered as water pipes with the use set to "Conduit". For enveloper pipes, the bedding, protection, lining and other attributes should be entered as they apply to the enveloper pipe not to the pipe being enveloped. The embedment type attribute for pipes running through an enveloper shall be set to "Enveloped". All attributes for pipes within an enveloper-pipe should be those relating to enveloped pipe not the enveloper pipe.

10.12 ADAC and the SEQ-Code Pipe Bedding Types

Submissions in ADAC 4.2 should submit as described in the Tables of detailed ADAC Schema Requirements detailed later in this document.

ADAC Version 5.01 no longer uses input codes for bedding types based on those used in the WSAA codes or the SEQ Codes for Sewerage and Water Supply derived from them. For pipes installed by open-cut methods, the SEQ Code Standard Drawings SEQ-SEW-1201-1 through SEQ-SEW-1204-1 show the permitted bedding types for sewerage, and Standard Drawings SEQ-WAT-1201-1 through SEQ-WAT-1203-1 show the permitted bedding types for water supply. And, were it ever to become necessary, and the SEQ-SP were to permit it, there is no reason why the types used for sewerage installed by open-cut, but supported on piles (Types 11, 12 and 13) could not be used for water mains also. The ADAC 5.01 schema allows also for other types of bedding situation to accommodate situations such as pipes above ground on piers, pipes installed in an enveloper pipe, pipes installed by trenchless methods, all of which shall be used as appropriate. Table D2 below translates the SEQ Code bedding types into the appropriate ADAC 5.01 pipe bedding attribute codes.

SEQ Code Type Sewerage//Water	ADAC Schema Code	ADAC Schema Description
Type 1/Type A	GBH	Granular bed and haunch
Type 2/Type B	GBH	Granular bed and haunch
Type 3/Type C	GBS	Granular bed and surround
Type 4/Type D	GBSonGTP	Granular bed and surround on geo-textile pillow
Type 5/Type E	GBSonConc	Granular bed and surround on concrete support
Type 6/Type F	GBSonConc	Granular bed and surround on concrete support
Type 7/Type G	GBSonGTP	Granular bed and surround on geo-textile pillow
Type 8/Type H	GBSonCSS	Granular bed and surround on cement stabilised support
Type 9/Type I	ConcBS	Concrete bed and surround
Type 10/Type J	CemStabBS	Cement stabilised bed and surround
Type 11	GBSonPiles	Granular bed and surround on piles
Type 12	ConcBSonPiles	Concrete bed and surround on piles
Type 13	GBSonPiles	Granular bed and surround on piles
	Natural	Pipe laid directly on natural in-situ material
	Above Ground	Pipe is above ground on piers or a bridge deck
	None	Pipe installed by Thrust bored or Trenchless method
	Enveloped	Pipe is within an enveloper pipe
	Other	Another type of embedment type that is not already included in the standard types
	Unknown	Embedment Type unknown at time of data submission
	EB_2	A non-standard or new type of embedment as agreed with the data receiving entity
	EB_2	A non-standard or new type of embedment as agreed with the data receiving entity

Table D2 Relationship between SEQ Code bedding types and the ADAC 5.01 Schema

10.13 Water services

The Schema includes a separate feature class for water services up to and including 63mm diameter. Larger diameter services shall be entered as separate components with water pipelines starting at a ready-tap or tapping band and terminated with a ball valve or meter.

10.14 Existing removed or retired assets

ADAC XML files shall include the existing infrastructure in the immediate vicinity of any connection points between the new infrastructure and existing infrastructure. For newly constructed infrastructure described in the XML file, the status attribute for each object shall be set to "Newly Constructed". Any existing infrastructure included in the XML file that is not removed or retired shall have its status attribute set to "Existing". Where a project involves the removal or retirement of an asset, the asset shall be included in the XML file with its status attribute set to "Removed" or "Retired" respectively. Those fields provided at both project level and asset level (See **Section 9.6.1 and Section 13**) shall have values entered at the asset level to override the project-level default values for existing, retired and removed assets. This will ensure the data such as construction date, drawing number and certifying engineer for

existing, retired or removed assets are not over written by the values pertaining to the new assets.

10.15 Organisation and naming of AutoCad layers

The automated production of the ADAC XML file within an engineering drawing package may be facilitated by providing a separate layer for each of the water supply and sewerage feature types and where necessary these may be further subdivided according to material type or size. So, for example if all the water mains are the same diameter there may be one layer for water mains, but if there are pipes of more than one diameter, there may be a layer for each diameter. The general format of the layer naming convention is specified in clause 6.11 of Appendix C. The free text section of the layer name may include the Scheme feature names, either in full or abbreviated, as detailed in table D3 below.

ADAC Schema name	
WaterSupplyFittings	SewerageConnections
WaterSupplyHydrants	SewerageFittings
WaterSupplyMaintenanceHoles	SewerageMaintenanceHoles
WaterSupplyMeters	SeweragePipesNonPressure
WaterSupplyPipes	SeweragePipesPressure
WaterSupplyServiceFittings	SewerageValves
WaterSupplyStorageTanks	
WaterSupplyValves	

Table D3 Schema names for drawing layers

The inclusion in the text part of the name of such identification prefixes such as 'Designed", "Surveyed" and "As-Con" is recommended also.

10.16 Surveying Field Codes

Good field codes provide a natural way for describing objects so that the surveyor can recall the field code without reference to a reference manual. Typically the allowable codes would be pre-loaded up on the data logger to prevent the use of invalid codes.

Each surveying organization may adopt its own system of coding that its proprietary software converts into an ADAC compliant XML file. It is good practice for all the surveyors working on a specific project use the same codes.

Attributes can be attached to the field codes based on the Schema to indicate type, diameter, material, class and the like.

A typical field-code system would code each feature something like the following possibility for a water supply fitting:

- WFIT_Mat_B100B200V123

Where:

WFIT= field-code fragment indicating a water supply fitting

Mat = material lining and protection code that gets translated to the ADAC fields.

B100 = the BodySize (diameter)

B200 = the BranchSize (if it exists)

V123 is the measured depth to the crown of the pipe fitting, which will be converted to an invert level.

10.17 Survey to AutoCad Conversion

It is normal practice to convert the field measurements to an XYZ coordinate held within model space in AutoCAD. The field codes are converted to points, lines and polylines held in specific AutoCAD layers (see **10.15** above). Where some of the attribute data is apparent from the field codes (for example the pipe diameter might be part of the code) that information can be included in the AutoCAD layer-name by adding the attribute value at the end of the layer names described previously.

The Autocad survey drawing should be retained as part of the audit trail

10.18 AutoCad to ADAC Conversion

The IPWEA maintains a list of suppliers of software that will create a valid ADAC XML from AutoCad or similar engineering drawing software. It is good practice for such software to be able to redisplay the resulting XML in the drawing package under a different file name (so that the original survey data is preserved). This practice facilitates the detection of anomalies by comparing the original AutoCad file with that created from the XML file's conversion.

11 Project Level Data Entry

Level-3 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description	SEQ-Code Specific Requirement	Notes
ExportDateTime	Yes	Yes	Date and time of File Creation		Created automatically by software
Name	Yes	Yes	The name of the Development or Infrastructure project.		Free text up to 254 characters
Owner	Yes	Yes	The intended or actual owner of the assets as they exist or are to be built	Free Text Input The owner of the majority of the assets in the XML. The following owner codes to be used: LCC for Logan City Council COGC for City of Gold Coast UU for Urban Utilities UW for Unitywater RCC for Redland City Council SEQ for SEQwater MBRC for Moreton Bay RC SCC for Sunshine Coast Noosa for Noosa Council P for Private UKN for Unknown	
Receiver	Yes	No	Name of person or department receiving the file as preferred by the receiving entity.	Input actual name or "Not Supplied"	

Level-3 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description	SEQ-Code Specific Requirement	Notes
WorksApprovalID	No	Yes	Connections approval reference (UU UW) or DA approval reference (CoGC, LCC, RCC) as given by the relevant SEQ-SP		Input "not Applicable" if approval has not been given.
DrawingNumber	Yes	Yes	Drawing number up to 64 Characters.	Number of the plan which shows the majority of assets in the XML. This may be overridden at the asset level for specific assets that are shown on other plans.	Use "Not Supplied" if unknown at time of file submission.
DrawingRevision	No	No	Date of last revision of the drawing number noted above.	This may be overridden at the asset level where the drawing number has also been overridden.	
ConstructionDate	Yes	Yes	The date the asset was/will be constructed.	The date that most of the infrastructure in the XML was/will be constructed. This must be overridden at the asset level for assets that were constructed at other times.	
Description	Yes	Yes	A description of the project in terms of what is being built, where and for whom and staging and phasing.		254 character limit.\
\
Default value, repeat the "Name" element

Level-3 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description	SEQ-Code Specific Requirement	Notes
ProjectStatus	Yes	Yes	Status of the ADAC information as submitted. Extensions to the standard Schema	Preliminary (submitted for preliminary approval) For Approval (submitted for final approval) As Approved (submitted as record of what was finally approved) For Amendment (submitted for approval of changes to as-approved design) As Amended (submitted as a record of what was approved after amendment) As-Constructed (submitted as a record of what was actually built) Archive (submitted as an archive or back-up) Transfer (For data transfer between systems or organisations)	

Level-3 Element Name	Level-4 Element Name	Level-5 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description and SEQ Code requirement	Notes
CoordinateSystem					Data set containing horizontal and vertical coordinate systems for the water and sewerage infrastructure	See also Survey Tolerance and Confidence Levels
	Horizontal CoordinateSystem		Yes	Yes	Specify horizontal coordinate system used for the water and sewerage infrastructure.	Mandatory value of MGA56 unless given special approval by relevant SEQ-SP. .

Level-3 Element Name	Level-4 Element Name	Level-5 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description and SEQ Code requirement	Notes
	HorizontalDatum		Yes	Yes	Specify the datum for horizontal coordinates	Mandatory value of GDA2020 unless given special approval by relevant SEQ-SP
	VerticalDatum		Yes	Yes	Specifies the datum for levels	Mandatory value of AHD unless given special approval by relevant SEQ-SP
	IsApproximate		Yes	Yes	Is data accurate to the required coordinate system horizontal datum and vertical datum or is it approximate?	Mandatory value of FALSE unless given special approval by relevant SEQ-SP
	OriginMark		No	No	Name or description of the Permanent Survey Mark used as the origin.	
	Notes				Additional textural date to explain or specify coordinate system.	May use Well Known Text (WKT) strings to define coordinate system
DrawingExtents			Yes	Yes	Complex element describing the geographical extent of the area where the infrastructure is situated	Generally taken as the area covered by the location or location plans.
	SouthWest				Properties at the SW corner of the drawing extent	
		X	Yes	Yes	X ordinate in a Cartesian system; easting in a UTM plane or longitude in an ellipsoidal system	
		Y	Yes	Yes	Y ordinate in a Cartesian system; northing in a UTM plane or latitude in an ellipsoidal system	

Level-3 Element Name	Level-4 Element Name	Level-5 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description and SEQ Code requirement	Notes
		Z	No	No	Z ordinate in a Cartesian system; elevation above geoidal height datum or ellipsoidal height in an ellipsoidal system.	
		GNSSMetadata			GNSS survey parameters	See separate table below
	NorthEast				Properties at the NE corner of the drawing extent	
		X	Yes	Yes	X ordinate in a Cartesian system; easting in a UTM plane or longitude in an ellipsoidal system	
		Y	Yes	Yes	Y ordinate in a Cartesian system; northing in a UTM plane or latitude in an ellipsoidal system	
		Z	No	No	Z ordinate in a Cartesian system; elevation above geoidal height datum or ellipsoidal height in an ellipsoidal system.	
		GNSSMetadata			GNSS survey parameters	See separate table below
Software			Yes	No	Details of the software used to create the XML file	May be created automatically by software.
	Product		Yes	No	Name of software	May use value "Not Supplied"
	Version		Yes	No	Version of software	May use default value of "Not Supplied"

Level-3 Element Name	Level-4 Element Name	Level-5 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description and SEQ Code requirement	Notes
Surveyor						Enter default values for the majority of data at this level and override values at the asset level as required.
	Name		Yes	Yes	Name and Registration number of the Surveyor certifying the accuracy of the cadastral data	
	DateFinalSurvey		Yes	Yes	Date that survey was made.	May be created automatically by software.
	DateApproved		Yes	Yes	Date the certifying surveyor certified the data as correct	
Engineer						Enter default values for the majority of data at this level and override values at the asset level as required.
	Name		Yes	Yes	Name and RPEQ number of the Engineer certifying the accuracy of the data as a whole	
	DateApproved		Yes	Yes	Date the certifying engineer certified the data as correct	

11.1 GNSSMetadata

This data is not mandatory input and is related to data collected by GNSS positioning systems.

Element	Sub-Element	Description
GNSSTime		The GNSS date and time of capture
H_Prec		Horizontal precision
V_Prec		Vertical precision
Std_Dev		Standard deviation
PDOP		Positional dilution of precision
HDOP		Horizontal dilution of precision
Corm		Complex type geometry_gnss_correctionstatus
	Uncorrected	The uncorrected position
	P-Code	Position collected using the P-Code or pseudorandom noise signal
	Y-code	Position collected using the Y-Code, which is an encryption of the P-Code and only useful on military systems
	Real-time SBAS	Position that has been corrected using real-time SBAS
	Real-time Code	Position collected using real-time differential GNSS and computed using a code phase solution.
	Postprocesssed Code	Position has been differentially corrected using code processing.
	Real-time carrier Float	Position collected using real-time differential GNSS and computed using a carrier float solution.
	Postprocessed Carrier Float	Position that has a carrier float position.
	RTK fixed	Position collected using real-time kinematic techniques and computed using a carrier fixed solution.
	Postprocessed Carrier Fixed	Position has been differentially corrected using code processing and has a carrier fixed solution.
Receiver		The manufacturer and model of GNSS receiver used. While there are no restrictions on this element, the length of this string should be minimised to control data volumes as every vertex may receive it.

Element	Sub-Element	Description
Status		complex type = geometry_gnss_editstatus
	New	A new feature is one that has been added to a data file in the most recent session. A new data file will only contain new features.
	Updated	An updated feature is one that previously existed in a data file, but has been edited or updated in the most recent session.
	Imported	An imported feature is one that previously existed in a data file and has not been edited or updated in the most recent session. When data is imported from a GIS or CAD system, all features are considered to be imported.

12 Interpretation of the Schema Requirement Tables

XML validation is a two-step process. Firstly, the XML file is validated against the ADAC schema requirements and then the SEQ-SP's ETL software will validate the XML against the additional requirements imposed by this AIS.

Where an attribute is marked as "Yes" in the Mandatory in ADAC" column, this means that an XML file that contains elements that include this attribute will fail the first stage of validation if valid data value is not entered or the attribute remains set to null. Where "No" is entered in this column, it means the schema will be satisfied if the attribute is set to null and the XML will pass the first stage of validation. However, for that case, if the "Mandatory in SEQ Code" column is marked "Yes" then a valid data value shall be entered notwithstanding that the schema itself does not require it. Failure to enter valid value in these cases will cause the ETL to fail the XML on the second validation check.

Occasionally, the schema requires a valid value to be entered but the SEQ-SPs have no interest in the attribute. In such cases an attribute is marked as "Yes" in the Mandatory in ADAC" column, but marked "No" in the "Mandatory in SEQ Code" column. In these cases, entering nothing will cause a first stage validation failure, so the attribute should be filled with a valid real or a dummy value.

The "Mandatory in SEQ Code" column is Marked "Yes*" when 2 situations occur. Firstly, it means a value shall be entered if the attribute for the asset differs from the global value set for the corresponding project-level attribute. Secondly, it means a value shall be entered in certain circumstances. For example, it is not necessary to enter a value for the model of a gate valve, but it is necessary to enter a value for the model for a gas-release valve.

13 Attributes Inherited by all Feature Classes

All assets in the Scheme inherit a common set of attributes that describe a basic set of asset management data.

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandat ory for ADAC	Mandat ory for SEQ Code
InfrastructureCode	String64	The code or number of an Infrastructure Charges Plan, any asset feature codes; any ETL software codes.			No	No
Owner	String32	This is a repeat at the asset level of the global attribute of the same name entered at the Project level. Where the owner of a particular asset is different from the global value, it is compulsory to override it at the asset level	LCC COGC UU UW RCC SEQ MBRC SCC Noosa P UKN	For infrastructure Owned by Logan City Council For City of Gold Coast For Urban Utilities For Unitywater For Redland City Council For SEQWater For Moreton Bay Regional Council For Sunshine Coast Regional Council For Noosa Council Privately owned Unknown Owner	No	Yes*

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Department	String 32	Department is used to differentiate between assets with a common owner that need to go into separate GIS layers or asset registers	Water Sewerage Other	Water is used for water assets. Sewerage is used for sewerage assets. Specifications outside the SEQ-Code relating to roads, drains and open space may specify other codes for those types of infrastructure.	No	Yes
Data_Quality	Enumerated list	Data Quality based on AS5488-2013. Classification of Subsurface Utility Information.	A, B, C, D, APlus, Other and Unknown.	See section **2.1**	No	Yes
Status	Enumerated list	The operational or existential status of the asset at the time the file is submitted. A Project may contain a mix of planned and existing assets as well as operational and retired assets.	Newly Constructed Existing Designed Planned Removed Retired Rehabilitated	A newly constructed asset being passed to the receiving entity An existing asset A future asset as designed A future asset as planned A previously existing asset that has been removed An existing asset not in use, but left in place An existing asset that has been repaired, refitted or refurbished as part of the project for which the XML is submitted.	Yes	Yes
Notes	String_254	Free text notes particular to a particular asset.			No	No

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
SupportingFiles	String 254	Full path and filename of supporting information (e.g. drawing file, document file or image). It is recommended that the filename is relative to the URI of the ADAC XML document, E.g: ./images/image1.jpg		Dummy values accepted.	Yes	No
DrawingNumber	String_64	This is a repeat at the asset level of the global attribute of the same name entered at the Project level. Where an asset is shown on a different plan to that entered as the global value, it is compulsory to override it with the appropriate plan number at the asset level		This will be used to link the asset as displayed on GIS systems to the as-constructed drawings.	No	Yes*
DrawingRevDate	Date	This is a repeat at the asset level of the global attribute of the same name entered at the Project level. Where drawing number override has been entered at the asset level (as above), it is compulsory to provide a date for the substituted drawing.			No	Yes*

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
ConstructionDate	Date	This is a repeat at the asset level of the global attribute of the same name entered at the Project level. Where an asset has a construction date different from that which was entered as a global value, it must be overridden at the asset level		Date may be used to calculate remaining life in an asset management system.	No	Yes*.

StatusLevel-3 Element Name	Level-4 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description and SEQ Code requirement	Notes
Surveyor					This is a repeat of the global Surveyor information entered at the Project level for assets that were surveyed by another surveyor or on a different date. Where an asset has survey details different from those which were entered as a global value, it must be overridden at the asset level
	Name	No	Yes*	Name and Registration number of the Surveyor certifying the accuracy of the cadastral data	
	DateFinalSurvey	No	Yes*	Date that survey was made.	May be created automatically by software.
	DateApproved	No	Yes*	Date the certifying surveyor certified the data as correct	

StatusLevel-3 Element Name	Level-4 Element Name	Mandatory for ADAC	Mandatory for SEQ Code	Description and SEQ Code requirement	Notes
Engineer					This is a repeat of the global Engineer information entered at the Project level for assets that were certified by another engineer. Where an asset has certification details different from those which were entered as a global value, it must be overridden at the asset level
	Name	No	Yes*	Name and RPEQ number of the Engineer certifying the accuracy of the data as a whole	
	DateApproved	No	Yes*	Date the certifying engineer certified the data as correct	

14 Sewerage Feature Classes

Enumerated Values or attributes shown in italics are new in v 5.0.1 and not available in v 4.2

14.1 Gravity (Non-pressure) Sewer Pipes

SeweragePipeNonPressure

14.1.1 Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
US_InvertLevel_m	Yes	Yes
DS_InvertLevel_m	Yes	Yes
US_SurfaceLevel_m	Yes	Yes
DS_SurfaceLevel_m	Yes	Yes
Alignment_m	No	No
AverageDepth_m	Yes	Yes
PipeGrade	No	No
Length_m	No	No
Geometry Polyline	Yes	Yes
Diameter_mm	Yes	Yes

Pipe extends between terminating features or pipe-breaks. A simple straight sewer is picked up using two points, as the start and end of the sewer gravity line, but see the main specification section **2.1**. If the line is not straight add more points to indicate the curvature of the line (For example long-radius bends in PE pipe). Circular bends can be simulated by a series of straight lines. The number of points in a sewer pipe line is unlimited.

The sewer pipe line is defined as a horizontal alignment. The Z coordinate of the alignment is recorded as the invert level of the pipe.

14.1.2 Other Attributes

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
LineNumber	String32	Gravity Line Identifier			No	Yes
Use sewer_pipe_nonpressure_use	Enumerated list	The use for the line			Yes	Yes
			Conduit Pipe	Used for envelopers separately from the pipes the enveloper contains See 10.11		
		If this value is selected status should be "Retired"	Disused	Disused or Abandoned line		
			Effluent	Treated Effluent line to disposal		
			Other	Use that does not comply with any of the values listed herewith.		
			Overflow	Sewage Overflow line		
			Reticulation	A sewer that is not a trunk sewer (Usually less than a diameter set by the SP)		
			Reuse	Treated Effluent line for reuse. Recycled water of lesser quality than class A		
			Stub	Stub left for a future extension		
			Syphon	A gravity sewer operating under less than atmospheric pressure.		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
		Not used in submissions under the SEQ Code. Use "Reticulation"	Trunk	A sewer of diameter greater than the limit for a reticulation sewer.		
			Unknown	Use is unknown at time of submission		
			Vacuum	A sewer in a vacuum sewerage system. Not used in SEQ Code For gravity pipes use reticulation and for the vacuum sections use pressure sewer pipe instead.		
			Vent	Connection from sewer to a vent stack.		
Pipe Material sewer_pipe_nonpressure_material	Enumerated list	Pipe wall material		See pipe breaking rules	Yes	Yes
			ABS	Acrylonitrile Butadiene Styrene		
			AC	Asbestos Cement (Legacy Systems only not for new infrastructure)		
			DI	Ductile Iron		
			FRC	Fibre Reinforced Concrete		
			GRP	Glass Fibre Reinforced Plastic (Hobas)		
			HDPE	High Density Polyethylene (Black Brute and the like)		
			MS	Mild Steel		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE-100	Grate 100 Polyethylene		
			PRC	Polyester Resin Concrete (Jacking pipes such as Iplex Polycrete)		
			PVC-U	Unplasticised Polyvinylchloride		
			RCP	Reinforced Concrete Pipe		
			SWPP	Structural Wall Polypropylene pipe (such as SewerMax, SewerPro and the like)		
			Unknown	Material unknown at time of submission.		
			VC	Vitrified Clay		
Pipe Class sewer_pipe_nonpressure_class	Enumerated list	The class of pipe relevant to the material type		See pipe breaking rules	Yes	Yes
			4,6,8,9,10,12,16,18,20	Classes 4,6,8,9,10,12,16,18,20 refers to maximum working pressure. Eg class 4 = 400 kPa. Used for a variety of pipe materials.		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			SN4, SN8 SN12	Class SN4 (formerly SH) Class SN8 (formerly SEH) Class SN12 Refers to ring stiffness in KN/m2 Used primarily for SWPP pipes		
			Other	Another (non-standard) class		
			SN5000, SN8000, SN10000	Used for GRP pipes		
			PN1, PN6, PN6.3, PN8, PN10, PN12, PN12.5, PN16,PN18,PN20, PN35	Used for flanged pipes and some pipes without flanges. PN35 (35 Bar pressure) is equivalent to the standard class for Ductile Iron. Also used for HDPE, PE-100, PVC-U and other types.		
			FLCL	Class for Flanged Ductile Iron. . Use flange class for SEQ-Code. Usually PN35		
			X,Y,Z	Used for RCP and FRC concrete pipes class 2, 3 & 4		
			SDR 7.4, SDR9, SDR11, SDR13.5, SDR17, SDR21,	Used for HDP, PVC-U, PE-100 Standard Dimension Ration describes the wall thickness relative to the nominal diameter and hence is a measure of allowable working pressure.		
			Unknown	Class unknown at time of submission		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Lining sewer_pipe_nonpressure_lining	Enumerated List			See pipe breaking rules.	No	Yes
		The internal protection material used to protect or support the inside of the pipe	CL	OPC Cement Lined		
			CL_SR	Sulphate Resistant Cement Lined		
			CL_AC	Calcium Aluminate Cement Lined		
			FBE	Fusion Bonded Epoxy		
			L_1	Non-Standard lining type with a meaning agreed with the receiving entity		
			L_2	Non-Standard lining type with a meaning agreed with the receiving entity		
			Other	Another type of lining not covered elsewhere.		
			PVC	PVC lining such as Humes Plastiline and the like.		
			Rehab-NS	Post-construction rehabilitation liner that does not provide structural support to an existing pipe.		
			Rehab-ST	Post-construction rehabilitation liner that provides structural support to an existing pipe.		
			Unknown	Lining type unknown at time of submission		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Unlined	No internal lining		
Protection sewer_pipe_nonpressure_protection	Enumerated List	External protection to the pipe. This is not the embedment type.		See pipe breaking rules	Yes	Yes
			Concrete Encased			
			Epoxy Paint			
			FBE	Fusion Bonded Epoxy		
			FBPE	Fusion Bonded Polyethylene (Sintakote)		
			Plastic Wrapped	Wrapped in plastic tape		
			P_1	Non-Standard protection type with a meaning agreed with the receiving entity		
			P_2	Non-Standard protection type with a meaning agreed with the receiving entity		
			Sheathed	Sheathed in a protective non-structural tube (usually polyethylene)		
			Tape Wrapped	Wrapped in protective tape impregnated with waterproofing compounds. (Denso Tape and the like)		
			Unknown	Unknown protection type at time of submission		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Uncoated	No protective coat		
Joint Type sewer_pipe_jointtype	Enumerated List	The way the sewer pipe is joined		See pipe breaking rules	Yes	Yes
			BW	Butt Weld (PE pipes)		
			EFW	ElectroFusion weld (PE pipes)		
			FJ	Flanged Joint (DI, PE, GRP & MS)		
			MCJ	Mechanical compression Joint. Mainly used on copper and PE		
		For v 4.2 use "RR"	*RRJ*	Rubber Ring Joint		
			RRRJ	Rubber Ring Restrained (Tyton-Lok) Joint		
			SWJ	Solvent Welded Joint (PVC ABS)		
			JT_1	*Non-Standard joint type with a meaning agreed with the receiving entity*		
			Other	Some other type of joint not provided for in the Schema		
			Unknown	Unknown type of joint at time of submission		
			WJ	Welded Joint (Steel & PE)		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
sewer_pipe_embedment	Schema Defined Complex	The embedment type (bedding and surround) to the pipe based on the WSAA sewerage codes		See pipe breaking rules.	Yes	Yes
		For version 4.2. ONLY	Type 1 through Type 13	Correspond to the WSAA bedding types shown on drawings SEQ-SEW-1201-1 to SEQ-SEW-1204-1 Do not use types 14-17 shown on drawing SEQ-SEW-1205-1 for road crossings. These are elaborations on the basic types that provide further detail for backfill above the level of the pipe. Use equivalent basic types as appropriate.		
		Version 5.01 onwards	*Natural*	*Pipe laid directly on natural in-situ material*		
		Version 5.01 onwards	*GBH*	*Granular bed and haunch*		
		Version 5.01 onwards	*GBS*	*Granular bed and surround*		
		Version 5.01 onwards	*GBSonConc*	*Granular bed and surround on concrete support*		
		Version 5.01 onwards	*GBSonGPT*	*Granular bed and surround on geo-textile pillow*		
		Version 5.01 onwards	*GBSonPiles*	*Granular bed and surround on piles*		
		Version 5.01 onwards	*CemStabBS*	*(Cement) stabilised bed and surround*		
		Version 5.01 onwards	*ConcBS*	*Concrete bed and surround*		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute / Comments	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
		Version 5.01 onwards	*ConcBSonPiles*	*Concrete bed and surround on piles*		
		Version 5.01 onwards	*Enveloped*	*Within an enveloper pipe*		
			EB_1	Non-Standard embedment type with a meaning agreed with the receiving entity		
			EB_2	Non-Standard embedment type with a meaning agreed with the receiving entity		
		Version 5.01 onwards	*None*	*Thrust-bored or trenchless*		
			Above Ground	Pipe is not buried; it is on piers or attached to a structure such as a bridge deck.		
			Unknown	Unknown type of embedment at time of submission		
			Other	Another type of embedment not specified in the schema,		
Rock Excavation RockExcavated	Boolean		TRUE/FALSE	See pipe breaking rules.	No	Yes

Note. Not all combinations of pipe attributes exist for example a reinforced concrete pipe would not have a concrete protective liner. Particular attention should be given to the material type and pipe class combinations.

14.2   Pressure Sewer (Rising Main) Pipes

SewerPipePressure - Pipe extends between terminating features and/or pipe-breaks

14.2.1 Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Diameter_mm	Yes	Yes
Alignment_m	No	No
AverageDepth_m	Yes	Yes
PipeGrade	No	No
Length_m	No	No
Geometry_fragment_complex	Yes	Yes

Collected at real pipe ends and all pipe-breaks.

The ADAC Schema requires a single polyline to locate a sewer pressure pipe. If the line is not straight, for example in the case of a long-radius bend created by successive joint displacement on a spigot-socket pipeline, add more points to indicate the curvature of the line (bends at fittings terminate the pipe run). See also the main specification section 2.1 on the number of points to be surveyed. Even though invert level is less relevant to pressure pipelines, the Z coordinate of the alignment is recorded as the invert level not the centre line of the pipe.

14.2.2 Other Attributes

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Use sewer_pipe_pressure_use	Enumerated List	The use for the line		See pipe breaking rules	Yes	Yes
		If this value is selected status should be 'Retired"	Disused	Disused or Abandoned line that remains in place		
			Effluent	Pressure pipe conveying treated effluent usually from a treatment plant		
			Other	Use that does not comply with any of the values listed herewith.		
			PressureSewerCollection	The connection pipe from a household proprietary pressure grinder pump unit to the external pressure main		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandat ory for ADAC	Mandat ory for SEQ Code
			Rising	A standard rising main or pressure sewer		
			Reuse	Treated Wastewater Reuse Pipe for class B and below. Class A and A+ should use the water supply feature classes		
			Scour	A pipe maintained under pressure to scour a pressure main to a discharge point. Gravity scours should use the non-pressure pipe		
			Unknown	Use is unknown at time of submission		
			Vacuum	A sewer in a vacuum sewerage system.		
Pipe Material sewer_pipe_pressure_ material	Enumerated List	Pipe wall material		See pipe breaking rules	Yes	Yes
			ABS	Acrylonitrile Butadiene Styrene		
			AC	Asbestos Cement (Legacy Systems only not for new infrastructure)		
			DI	Ductile Iron		
			FRC	Fibre Reinforced Concrete		
			GRP	Glass Fibre Reinforced Plastic (Hobas)		
			MS	Mild Steel		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE-100	Grate 100 Polyethylene		
			PE-80B	Grade 80B Polyethylene		
			PVC-M	Modified Polyvinyl Chloride		
			PVC-O	Oriented Polyvinyl Chloride		
			PVC-U	Unplasticised Polyvinyl Chloride (gravity mains only in SEQ-Code)		
			Unknown	Material unknown at time of submission.		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Class sewer_pipe_pressure_ class	Enumerated List	The class of pipe relevant to the material type		See pipe breaking rules	Yes	Yes
			4.8mm, 5mm, 6mm, 7mm, 8mm, 9mm, 10mm,11mm, 12mm,16mm	Wall thickness for mild steel and *stainless steel pipes*		
			SN5000, SN8000, SN10000	Used for GRP pipes		
		PN1 is not valid in v 4.2	PN1, PN6, PN6.3, PN8, PN9, PN10, PN12, PN12.5, PN16,PN18,PN20, PN35	Used for flanged pipes and some pipes without flanges. PN35 (35 Bar pressure) is equivalent to the standard class for Ductile Iron. Also used for PE-100, PVC and some other types.		
			FLCL	Flanged Ductile Iron. . Use flange class for SEQ-Code. Usually PN35		
			X,Y,Z	Used for RCP and FRC concrete pipes class 2, 3 & 4		
			Other	A Class Other than those currently provided for in the Schema		
			Unknown	Class unknown at time of submission		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Lining sewer_pipe_pressure_lining	Enumerated List			See pipe breaking rules	No	Yes
		The internal protection material used to protect or support the inside of the pipe	CL	OPC Cement Lined		
			CL_SR	Sulphate Resistant Cement Lined		
			CL_AC	Calcium Aluminate Cement Lined		
			FBE	Fusion Bonded Epoxy		
			Other	Another type of lining not listed herewith.		
			PVC	PVC lining such as Humes Plastiline and the like.		
			Unknown	Lining type unknown at time of submission		
			Unlined	No internal lining		
External Protection sewer_pipe_pressure_protection	Enumerated List	External protection to the pipe. This is not the embedment type.		See pipe breaking rules	Yes	Yes
			Concrete Encased			
			Epoxy Paint			
			FBE	Fusion Bonded Epoxy		
			FBPE	Fusion Bonded Polyethylene (Sintakote)		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Other	A protection method other than those included in the current schema.		
			Plastic Wrapped	Wrapped in plastic tape		
			P_1	Non-Standard protection type with a meaning agreed with the receiving entity		
			P_2	Non-Standard protection type with a meaning agreed with the receiving entity		
			Sheathed	Sheathed in a protective non-structural tube (usually polyethylene)		
			Tape Wrapped	Wrapped in protective tape impregnated with waterproofing compounds. (Denso Tape and the like)		
			Unknown	Unknown protection type at time of submission		
			Uncoated	No protective coat		
			Zinc	Galvanised or zinc painted		
		In v4.2 use "Zinalium"	*Zinc-Aluminium Alloy*	Zinc Aluminium alloy coating (Petair Saint-Gobain) or similar		
Joint Type sewer_pipe_jointtype	Enumerated List	The way the sewer pipe is joined		Se pipe breaking rules	Yes	Yes
			BW	Butt Weld (PE pipes)		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			EFW	ElectroFusion weld (PE pipes)		
			FJ	Flanged Joint (DI & MS)		
			MCJ	Mechanical compression Joint. Mainly used on copper and PE		
		For v 4.2 use "RR"	*RRJ*	Rubber Ring Joint		
			RRRJ	Rubber Ring Restrained Joint (Tyton-Lok)		
			SWJ	Solvent Welded Joint (PVC ABS)		
			J_T1	Non-Standard joint type with a meaning agreed with the receiving entity		
			Other	Another type of joint not in the schema		
			Unknown	Unknown joint type at time of submission		
			WJ	Welded Joint (Steel & PE Pipes)		
Embedment type sewer_pipe_embedment	Enumerated List	The embedment type (bedding and surround) to the pipe based on the WSAA sewerage codes		See pipe breaking rules.	Yes	Yes

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
		For version 4.2 ONLY	Type 1 through Type 13	Correspond to the WSAA bedding types shown on drawings SEQ-SEW-1201-1 to SEQ-SEW-1204-1 Do not use types 14-17 shown on drawing SEQ-SEW-1205-1 for road crossings. These are elaborations on the basic types that provide further detail for backfill above the level of the pipe. Use equivalent basic types as appropriate.		
		Version 5.01 onwards	*Natural*	*Pipe laid directly on natural in-situ material*		
		Version 5.01 onwards	*GBH*	*Granular bed and haunch*		
		Version 5.01 onwards	*GBS*	*Granular bed and surround*		
		Version 5.01 onwards	*GBSonConc*	*Granular bed and surround on concrete support*		
		Version 5.01 onwards	*GBSonGPT*	*Granular bed and surround on geo-textile pillow*		
		Version 5.01 onwards	*GBSonPiles*	*Granular bed and surround on piles*		
		Version 5.01 onwards	*CemStabBS*	*(ement) stabilised bed and surround*		
		Version 5.01 onwards	*ConcBS*	*Concrete bed and surround*		
		Version 5.01 onwards	*ConcBSonPiles*	*Concrete bed and surround on piles*		
		Version 5.01 onwards	*Enveloped*	*Within an enveloper pipe*		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			EB_1	Non-Standard embedment type with a meaning agreed with the receiving entity		
			EB_2	Non-Standard embedment type with a meaning agreed with the receiving entity		
		Version 5.01 onwards	*None*	*Thrust-bored or trenchless*		
			Above Ground	Pipe is not buried; it is on piers or attached to a structure such as a bridge deck.		
			Unknown	Unknown type of embedment at time of submission		
			Other	Another type of embedment not specified in the schema,		
Rock Excavation RockExcavated	Boolean		TRUE/FALSE	See pipe breaking rules.	No	Yes

Note. Not all combinations of pipe attributes exist for example a reinforced concrete pipe would not have a concrete protective liner or flanged joints. Particular attention should be given to provide valid pipe-material pipe-class combinations.

14.3 Sewer Maintenance Structures (Wet Wells, Manholes and Maintenance Shafts)

SewerMaintenanceHole

14.3.1 Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Length_mm (Rectangular structures only)*	Yes	Yes
Width_mm (Rectangular structures only)*	Yes	Yes
Diameter_mm (Circular structures only)*	Yes	Yes
Area_sqm (Custom/irregular shapes)	Yes	Yes
SurfaceLevel_m	Yes	Yes
InvertLevel_m	Yes	Yes
Chainage_m	No	No
TieDistance_m	No	No
OffsetDistance_m	No	No
Rotation	Yes	No for symmetrical (round/square) chambers. Yes for non-symmetrical chambers. Angle of the longest axis measured anti-clockwise from East.
*Note where the diameter/width/length vary over the depth of the structure take the largest		

Terminate sewer pipes, both pressure and non-pressure. ADAC only requires a single point to locate the Sewer MaintenanceHole feature. However, two points are required to determine the rotation of the maintenance hole by survey. The surveyor puts the target on the centre point of the maintenance hole and picks up an additional point to give the rotation. Location point is defined as the point on the cover or top slab that is directly above the centroid of greatest plan area of the structure. This may or may not be the centre of the cover.

The invert level of the maintenance structure can be located by holding the target on the floor of the hole and measuring the level; this is not the same level as invert level of the ingoing and outgoing pipes.

Surface level is taken as the top level of the lid or, of the roof where there is no lid, or the wall where there is no roof.

14.3.2 Non-Spatial Attributes

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Use of Chamber sewer_mh_use	Schema Defined Complex	The use for the structure			Yes	Yes
			Grit Collector MH	Used for a chamber designed specifically to collect grit. See Drawings SEQ-SPS-1401-1 and SEQ-SPS-1401-2		
			Maintenance Hole	Used for any of the standard SEQ-SP Code Maintenance Structure types		
			Maintenance Shaft	Used for any of the standard SEQ-SP Code Maintenance Shaft types		
			TEP	Terminal entry point(TEP)/rodding eye		
			Other	Another unspecified use		
			Outlet	Discharge manhole to an overflow		
			Overflow	Maintenance Hole with an overflow to the environment, receiving waters or an emergency storage		
			Pump Station	A pumping station or lift station wet-well		
			Rising Main Discharge MH	A maintenance structure into which at least one rising main discharges and a gravity sewer leaves.		

			Storage Tank	A tank hydraulically connected to a gravity sewer or pumping station to provide off-stream storage.		
			Temporary Works	A shaft or structure such as a tunnel or thrust bore access shaft that has been left in place		
			Unknown	Use is unknown		
			Vacuum Lift	A chamber containing a vacuum lift pipe in a vacuum sewerage system		
			Vacuum Sewerage MH	A Maintenance Hole on a vacuum system with incoming house connections or gravity sewers that may also containing a vacuum valve		
			Vacuum Sewerage Pump Station	A pumping station substructure that creates the vacuum for a vacuum sewerage system		
			Valve Pit	A pit provided for access to one or more valves on a sewer rising main		
Material sewer_mh_material	Enumerated List	Material used to construct maintenance structure/shaft element. Roof base and walls all specified separately.		Note: construction method "Prefabricated" or "Insitu" is also required for walls and base, in the attributes Wallconstruction and FloorConstruction respectively.	Yes	Yes
			Concrete			
			PVC	Polyvinyl Chloride		
			PE	Polyethylene		
			PP	Polypropylene		
	Not in v 4.2		*FRP*	*Fibre Reinforced Plastic*		
			GRP	Glass Reinforced Plastic		

			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			Unknown	Material unknown at time of submission.		
Roof Material sewer_mh_roofmaterial	Enumerated List	The material used for the structure's roof.			Yes	Yes
			Aluminium			
			Cast Iron			
			Concrete			
		Not in v 4.2.	*FRP*	*Fibre Reinforced Plastic*		
			Grid Mesh - Aluminium	Open Grid Mesh made from Aluminium		
		Not from v 5.01 onwards.	Grid Mesh - GRP	Open Grid Mesh made from Glass Reinforced Plastic		
			Grid Mesh - SS	Open Grid Mesh made from Stainless Steel		
			PVC	Polyvinyl Chloride		
			PE	Polyethylene		
			PP	Polypropylene		

			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			MS	Solid Mild Steel includes chequer plate		
			No Roof	Chamber that has no roof usually with walls extending above ground.		
			Other	Material other than those listed herewith		
			SS	Solid Stainless Steel includes chequer plate		
			Unknown	Material unknown at time of submission.		
Chamber Lid sewer_mh_lidmaterial	Enumerated List	The material used for the lid.			Yes	Yes
			Aluminium			
			Cast Iron			
			CI Concrete Infill	Gatick type comprising cast iron grid-iron filled on side with concrete.		
			Concrete			
		Not in v 4.2	*Composite*	*Composite Material*		
		Not in v 4.2	*DI*	*Ductile Iron*		
			PVC	Polyvinyl Chloride		
			PE	Polyethylene		
			PP	Polypropylene		

			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			MS	Solid Mild Steel includes chequer plate		
		In 4.2 this is No_Lid	No Lid	For chamber that have no roof or have a roof with no lid or have a roof that is removable in its entirety.		
			Other	Material other than those listed herewith		
			SS	Solid Stainless Steel includes chequer plate		
			Unknown	Material unknown at time of submission.		
Lining sewer_mh_lining	Enumerated List	The internal protection material used to protect or support the inside of the pipe			No	Yes
			Epoxy	Coating		
			M_1	Non-standard descriptor for new material as agreed with receiving entity		
			M_2	Second non-standard descriptor for new material as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE	Polyethylene Liner		
			Polyurea	Coating		

CITY OF
GOLD COAST.

CITY OF
LOGAN

UrbanUtilities

Redland
CITY COUNCIL

Unitywater

			PVC	Polyvinyl Chloride Liner		
			Unknown	Material unknown at time of submission.		
			Unlined	An alternative to entering a null value where there is no lining		
Configuration sewer_mh_droptype	Enumerated List	Describes whether a Maintenance structure or maintenance shaft has a backdrop and for those that do not whether there is a change in horizontal direction			Yes	Yes
			Alternative External Drop	See drawing SEQ-SEW-1306-1		
			Change in Direction Through MH	Default for various types with no backdrop where the chamber changes the horizontal (on plan) alignment of the inlet and outlet.		
			External Drop	Types D and Y on SEQ-SEW-1301-2, SEQ-SEW-1301-8 and SEQ-SEW-1303-1		
			Internal Drop	Type X maintenance structures and some maintenance shafts where sewer entry is into the shaft riser.		
			Oblique 45deg Backdrop	Type C on SEQ-SEW-1301-2 & SEQ-SEQ-1301-4 and Type-W on SEQ-SEW-1303-1		
			Straight Through MH	No – backdrop and no change to horizontal alignment of pipes through chamber. Type-A on SEQ-SEW-1301-2 & SEQ-SEW-1301-4 and some configurations of maintenance shafts.		

CatchmentPS	String			Name/number of pumping station for the catchment	No	No
LineNumber	String			Line number for the sewer or rising main entering the chamber	No	No
MH_Number	String			Manhole Number designation from sewer plan	Yes	Yes

14.4 Sewer Connections

SewerConnections

14.4.1 Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
SurfaceLevel_m	Yes	Yes
InvertLevel_m	Yes	Yes
Diameter_mm	Yes	Yes
Length_m	Yes	Yes
Chainage_m	Yes	Yes
Offset_m	Yes	Yes
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	Yes	Yes
SO_Nearest_m Perpendicular distance from the inspection opening to the nearest cadastral boundary	Yes	Yes
SO_Other_m Perpendicular distance from the inspection opening to the next nearest cadastral boundary	Yes	Yes

Terminates or breaks gravity sewer pipes. A simple straight connection is picked up using two points at the start and end of the connection. If the line is not straight add more points to indicate any curvature of the line (For example long-radius bends in PE pipe). Circular bends can be simulated by a series of straight lines. The number of points in a connection is unlimited.

The Z coordinate of the alignment is recorded as the invert level of the pipe.

The chainage, offset, IO_Distance Measurements are required so the drainer can locate the connection.

14.4.2   Non-Spatial Attributes

ADAC Attribute Name	Data Type	Description of non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Connection Material sewer_house_connection_material	Enumerated list	Connection material			Yes	Yes
			Cast Iron			
			DI	Ductile Iron		
			FRC	Fibre Reinforced Concrete		
			FRP	Glass Fibre Reinforced Plastic		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE	Polyethylene		
			PVC-O	Oriented PVC		
			PVC-M	Modified PVC		
			PVC-U	Unplasticised Polyvinylchloride		
			RCP	Reinforced Concrete Pipe		
			Unknown	Material unknown at time of submission.		
			VC	Vitrified Clay		

ADAC Attribute Name	Data Type	Description of non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Connection Material Class sewer_house_connecti on_material_class	Enumerated list	The class of material used for the connection			Yes	Yes
		SN10 and SN 12 not used in 4.2	SN4, SN6,SN8, *SN10 and SN12* SH SEH	Class SN4 (formerly SH) Class SN8 (formerly SEH) Refers to ring stiffness in KN/m2 Used primarily for SWPP pipes		
			Other	Another (non-standard) class		
			SDR21	For PE and UPVC		
			Unknown	Class unknown at time of submission		
Connection Type Sewer_house_connecti on_type	Enumerated list	The type of connection			Yes	Yes
			Jump Up	Connection of any material type that is in the form of a jump up. Type D on SEQ-SEW-1105-1, Types C1 & C2 on SEQ-SEW-1106-5		

ADAC Attribute Name	Data Type	Description of non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Ramp Riser	Type B, B1 & B2 on SEQ-SEW-1104-1/1106-4		
			Sloped Branch	Type A ,A1,A2,A3 & A4 on SEQ-SEW-1104-1/1106-2/1106-3		
			Stub	Any connection directly into a Maintenance Structure/Shaft		
			Twin Jump Up	As simple Jump-up, but branched after jump to service 2 properties		
			Twin Ramp Riser	As simple Ramp Riser, but branched after rise to service 2 properties		
Line Number

Sewer_house_connection_LineNumber | | Sewer Line identification | | | No | No |
| DSMHID | | ID of downstream maintenance structure (Manhole) | | | No | No |
| Sediment Trap Sewer_house_connection_SedimentTrap | Boolean | TRUE if connection includes an inline sediment trap, FALSE if it does not | | | Yes | Yes |

14.5 Sewer Fittings

SewerageFittings – Terminate pressure pipes

14.5.1 Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Geometry (Point)	Yes	Yes
BodySize_mm	Yes	Yes
BranchSize_mm	No	No
Rotation	No	No for in-line fittings. Yes for branched fittings. Angle of main run measured anti-clockwise from East.
For a taper, record the larger diameter in the BodySize_mm attribute and the smaller diameter in the BranchSize_mm		

ADAC only requires a single point to locate a fitting. However, two points are required to determine the rotation of the fitting.   The z location point is the fitting invert at the plan survey point. The plan survey point for straight through fittings is the midpoint of a line joining the centrelines of the main branches. The plan survey point for a T,Y, or Cross is the point where the lines through the centrelines of the branches intersect. The plan survey point for bends is the intersection of the centreline of the pipe with the radius of curvature that bisects the angle of the bend.

The invert level of the fitting can be derived from taking the crown level and deducting the actual diameter and wall thickness.

See section 10.8. It is not mandatory to record the following fittings: Connector, Connector Thrust, Dismantling Joint, Gibault, or Puddle Flange.

14.5.2 Non-Spatial Attributes

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Fitting Material sewer_fitting_material	Enumerated List	Fitting wall material			Yes	Yes
			ABS	Acrylonitrile Butadiene Styrene		
			AC	Asbestos Cement (Legacy Systems only not for new infrastructure)		
		Not in v 4.2	*Aluminium*	*Aluminium*		
			Concrete	Steel reinforced or mass concrete		
			DI	Ductile Iron		
			FRC	Fibre Reinforced Concrete		
			GRP	Glass Fibre Reinforced Plastic (Hobas)		
			MS	Mild Steel		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE-100	Grade 100 Polyethylene		
			PE-80B	Grade 80B Polyethylene		
			PVC-M	Modified Polyvinyl Chloride		

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			PVC-O	Oriented Polyvinyl Chloride		
			PVC-U	Unplasticised Polyvinyl Chloride		
		Not in v 4.2	*Rubber*	*Rubber*		
		Not in v 4.2	*SS*	*Stainless Steel*		
			Unknown	Material unknown at time of submission.		
			VC	Vitreous Clay		
Sewer fittings Sewer_fitting_type		Types of sewer and rising main fittings excluding valves			Yes	Yes
		Note that for NuSewers, or PE pressure sewer pipe that is bent into alignment on site or for RIGSS systems, long radius manufactured bends, these are not entered as fittings but as lengths of pipe with sufficient coordinates to describe their alignment in 3-dimensional space.	Bend	Bend fitting of any magnitude		
			Booster Pump	Pump at origin of a rising main		
			Cathodic Protection Point	Electrical connection point for cathodic protection		
			Connector	Non-specific in line connector. – <u>Not mandatory to record for SEQ-SPs</u>		

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Dead Plate	Blank flange or welded on dead end at the end of a pipeline		
			Connector Thrust	Straight connector capable of transmitting axial thrust		
			Dismantling Joint	In-line connector of adjustable length		
		Not in v 4.2	*Duck Bill*	*Duck bill fitting usually on end of pipe*		
			External Dead End	Purpose made end cap.		
		Not in v 4.2	*Frog Flap*	*Frog flap fitting usually on end of pipe*		
			Gibault	Gibault – Not mandatory to record for SEQ-SPs		
			Inspection Opening	An Inspection Opening on a pressure pipe		
			Puddle Flange	Puddle Flange – Not mandatory to record for SEQ-SPs		
			Sampling Point	A fitting to facilitate the taking of samples from the pipe contents.		
			Taper	In-line fitting to change from one diameter to another		
			Tee			
			Tee Branch Dead End	Tee with pre-made dead end flange or cap		
			Wye	Y-junction		

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Protection Sewer_pressure_pipe_ protection		External protection to the Fitting		See values under sewer pressure pipes	No	Yes
Lining Sewer_pipe_pressure_l ining		Internal Lining to the Fitting		See values under sewer pressure pipes	No	Yes

14.6 Sewer Valves

14.6.1 Use/Type Mapping

sewer_valve_use and sewer_valve_type

All valves shall be surveyed and included in the XML.
The Schema has the following uses and types with valid combinations mapped as shown in the table below:

Valve Use	Valve Type	Valve Use	Valve Type
Non-Return	Generic	Pressure Control	Overflow
	Rubber Gate		Pressure Relief
	Swing Check		Vacuum Release
Service	Gate	Gas Release	Air Valve
Stop	Butterfly	Other	Special
Scour	Knife Gate		
Diversion	Eccentric Plug		
Zone Boundary	Globe		
Flow Control	Ball		
	Penstock		
	Generic		

14.6.2 Spatial Attributes

In relation to their spatial attributes, valves can be treated as fittings with no branch.

14.6.3 Non-Spatial Attributes

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			FBE	Fusion Bonded Epoxy		
			FBPE	Fusion Bonded Polyethylene (Sintakote)		
			Plastic Wrapped	Wrapped in plastic tape		
Protection Sewer_pressure_pipe_protection				See values under sewer pressure pipes	No	Yes
Lining sewer_pipe_pressure_lining				See values under sewer pressure pipes	No	Yes
manufacturer_model_details (Manufacturer)	String	Manufacturer of valve		Required for all valves with a use of pressure control, Gas release and other.	No	Yes*
manufacturer_model_details (Model)	String	Model of valve		Required for all valves with a use of pressure control, Gas release and other. Optional for other valve uses	No	Yes*

14.7 Outfalls for Water and Sewerage

May terminate emergency overflow pipes scours and treated effluent discharge lines. To enter an outfall that is part of the water or sewerage infrastructure use the storm water feature with the owner and department fields set appropriately to identify the headwall as being part of the water/sewerage infrastructure set rather than the storm water infrastructure set.

14.7.1 Spatial Attributes

Feature_StormWater_EndStructure

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Geometry (Point) *XYZ (Red point)*	Yes	Yes
Rotation	No	No - Angle of main wall measured axis anticlockwise from East.
StructureLevel_m (Yellow point)	Yes	Yes

ADAC only requires a single point to locate an outfall headwall fitting. The location point, shown in red, is at the invert of the pipe through the headwall. The structural_level_m point is shown in yellow and is vertically above the invert at the highest point of the structure.

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
StructureID	String	An identifier often painted on the headwall		Not required for SEQ-Code Enter dummy value "Not Applicable"	Yes	No
EndWall stormwater_end_struct ure_construction (stormwater_constructio n_type)	Enumerated List	Type of Headwall	Type 1 Type 2 Type 3	Not applicable in SEQ-Code. Leave as null value	No	No
Ditto (construction method)	Enumerated List	Type of construction	Prefabricated Insitu	Use Prefabricated for pre-cast concrete and Insitu for in-situ concrete	Yes	Yes
WingWall stormwater_end_struct ure_construction (stormwater_constructio n_type)	Enumerated List	Type of wing wall	Type 1 Type 2 Type 3	Normal foundations With cut-off wall With large footing for poor soils or null	No	No
Ditto (construction method)	Enumerated List	Type of construction	Prefabricated Insitu	Use Prefabricated for pre-cast concrete and Insitu for in-situ concrete	Yes	Yes
Apron stormwater_end_struct ure_construction (stormwater_constructio n_type)	Enumerated List	Type of apron	Type 1 Type 2 Type 3	Grouted rock pitching Rock filled wire mattress Reinforced Concrete or null	No	No

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Ditto (construction method)	Enumerated List	Type of construction	Prefabricated Insitu	Use Prefabricated for pre-cast concrete and Insitu for in-situ concrete	Yes	Yes
GrateType stormwater_grate_type	Enumerated List	Type of screen			No	Yes
			Baffled	Fitted with an exit baffle		
			Grated	Fitted with a screen		
			Stilling Basin	Stilling Basin (not common for water and sewerage)		
			None	No grate		
TideGate stormwater_tidegate_type	Enumerated List	Type of tide gate fitted			No	No
			Controlled	Pneumatically, hydraulically or electrically operated.		
			Fibreglass Proprietary	Off the shelf fibreglass gate		
			Fabricated	Bespoke for situation		
			Rubber	Rubber gravity flap		
			None	No Gate		

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
PredominantMaterial" stormwater_predominant_material_type	Enumerated list	The main material used in the headwall			Yes	Yes
			Concrete			
			Reinforced Concrete			
			Grouted Rock	Very unlikely in SEQ-Code submission.		
			Revetment Mattress	Very unlikely in SEQ-Code submission.		
OutletProtectionType stormwater_outlet_protection_type	Enumerated List	Protection downstream of headwall		Use null value	No	No

14.7.3   Non-Spatial Attributes (Version 5.01 Onwards)

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
StructureID	String	An identifier often painted on the headwall		Not required for SEQ-Code Enter dummy value "Not Applicable"	Yes	No

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
EndWall (stormwater_end_structure_endwall_type)	Enumerated List	Type of Headwall	Multi Cell Box Endwall Multi Cell Pipe and Box Endwall Sloping Pipe Endwall	Not applicable in SEQ-Code. Leave as null value	Yes	Yes
WingWall LWW_Material RWW_Material	Enumerated List	Left side and right side wing wall material	Reinforced Concrete Grouted Rock Revetment Mattress		Yes	Yes
WingWall LWW_Construction RWW_Construction	Enumerated List	Left side and right side wing wall type of construction	Prefabricated Insitu	Use Prefabricated for pre-cast concrete and Insitu for in-situ concrete	Yes	Yes
Apron_Material	Enumerated List	Apron material	Reinforced Concrete Grouted Rock Revetment Mattress	Grouted rock pitching Rock filled wire mattress Reinforced Concrete or null	Yes	Yes
Apron_Construction	Enumerated List	Type of construction	Prefabricated Insitu	Use Prefabricated for pre-cast concrete and Insitu for in-situ concrete	Yes	Yes
GrateType stormwater_grate_type	Enumerated List	Type of screen			No	Yes
			Baffled	Fitted with an exit baffle		
			Grated	Fitted with a screen		
			Stilling Basin	Stilling Basin (not common for water and sewerage)		

This document contains information which is proprietary to the SEQ service providers and may not be used for purposes other than those intended without written consent from the SEQ service providers

CITY OF
GOLDCOAST.

CITY OF
LOGAN

UrbanUtilities

Redland
CITY COUNCIL

Unitywater

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			None	No grate		
TideGate stormwater_tidegate_type	Enumerated List	Type of tide gate fitted			No	No
			Controlled	Pneumatically, hydraulically or electrically operated.		
			Fibreglass Proprietary	Off the shelf fibreglass gate		
			Fabricated	Bespoke for situation		
			Rubber	Rubber gravity flap		
			None	No Gate		

15 Water supply Feature Class

Enumerated Values or attributes shown in italics are new in v 5.01 and not available in v 4.2.

15.1 Water Pipes

Feature_Water_Pipe - Pipe extends between terminating features and/or pipe-breaks

15.1.1 Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Diameter_mm	Yes	Yes
Alignment_m	No	No
V4.2 AverageDepth_m *V5.01 Depth_m*	No No	No No
Length_m	No	No
Geometry_fragment_complex	Yes	Yes

Collected at real pipe ends and all pipe-breaks. The ADAC Schema requires a single polyline to locate a water pipe. If the line is not straight, for example in the case of a long-radius bend created by successive joint displacement on a spigot-socket pipeline, add more points to indicate the curvature of the line (bends at fittings terminate the pipe run). See also the main specification section **2.1** on the number of points to be surveyed. Even though invert level is less relevant to pressure pipelines, the Z coordinate of the alignment is recorded as the invert level not the centre line of the pipe.

15.1.2 Other Attributes

Note. Not all combinations of pipe attributes exist for example an ABS pipe would not have a protective liner or spigot-socket joints. Particular attention should be given to provide valid pipe-material pipe-class combinations.

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Use water_pipe_use	Enumerated List	The use for the line		See pipe breaking rules	Yes	Yes

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Conduit	Pipe protecting a water pipe running inside it. Not hydraulically connected to the network. See 10.11.		
		Not available for v 4.2, v 5.01 only	*Commercial Service*	*Commercial Service Pipe*		
		If this value is selected status should be 'Retired"	Disused	Disused or Abandoned line		
			Fire Domestic	Domestic Fire Service - usually used for private customer-owned infrastructure not owned by the water service provider.		
			Fire Service	Fire Service - usually used for private customer-owned infrastructure not owned by the water service provider		
			Fire Sprinkler	Dedicated un-metered fire sprinkler service - usually used for private customer-owned infrastructure not owned by the water service provider		
			Fire Service Thru Meter	Metered Fire Service - usually used for private customer-owned infrastructure not owned by the water service provider		
			Irrigation	Irrigation Pipe - usually used for private customer-owned infrastructure not owned by the water service provider		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Intake	Intake pipe feeding a water treatment plant or irrigation system (usually with non-potable water)		
			Internal	Customer owned pipe on customer side of the meter distributing water from mains to internal fixtures		
			Other	Use that does not comply with any of the other values.		
			Reticulation	Normal water main usually of a diameter smaller than a trunk main that is not a trunk water main.		
			Scour	Pipe from scour valve to point of scour discharge.		
			Service	Used for service connections > DN63 from main to meter. Domestic Services use water service feature class		
			Trunk	NOT USED in submission to SEQ-SPs. Use "Reticulation" A water main of greater nominal diameter greater than a reticulation main		
			Waste	Pipe discharging overflow water or non-potable water. Not commonly used in submissions made under the SEQ Code		
Pipe Material water_pipe_material	Enumerated List	Pipe wall material		See pipe breaking rules	Yes	Yes
			ABS	Acrylonitrile Butadiene Styrene		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			AC	Asbestos Cement (Legacy Systems only not for new infrastructure)		
			Copper	Water services only		
			DI	Ductile Iron		
			GRP	Glass Fibre Reinforced Plastic (Hobas)		
			MS	Mild Steel		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE-100	Grade 100 Polyethylene		
			PE-80B	Grade 80B Polyethylene		
			PVC-M	Modified Polyvinyl Chloride		
			PVC-O	Oriented Polyvinyl Chloride		
			PVC-U	Unplasticised Polyvinyl Chloride. Not used for new water mains be SEQ-SPs		
			RCP	Reinforced Concrete Pipe – Not used in SEQ-SP submissions		
			SS	Stainless Steel		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Unknown	Material unknown at time of submission.		
Class water_pipe_class	Enumerated List	The class of pipe relevant to the material type		See pipe breaking rules	Yes	Yes
			4.8mm, 5mm, 6mm, 7mm, 8mm, 9mm, 10mm,11mm, 12mm,16mm	Wall thickness for mild steel and stainless steel pipes		
			Other	Another (non-standard) class		
			SN5000, SN8000, SN10000	Used for GRP pipes		
			PN6, PN6.3, PN8, PN9, PN10, PN12, PN12.5, PN16,PN18,PN20, PN35	Used for flanged pipes and some pipes without flanges. PN35 (35 Bar pressure) is equivalent to the standard class for Ductile Iron. Also used for PE-100, PVC and other types.		
			FLCL	Flanged Ductile Iron. Use flange class for SEQ-Code. Usually PN35		
			SDR 7.4, SDR9, SDR11, SDR13.5, SDR17, SDR21,	Used for HDP, PVC, PE-100 Standard Dimension Ratio describes the wall thickness relative to the nominal diameter and hence is a measure of allowable working pressure.		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Type A, Type B	ABS pipe classes		
			Unknown	Class unknown at time of submission		
Lining water_pipe_lining	Enumerated List			See pipe breaking rules	No	Yes
		The internal protection material used to protect or support the inside of the pipe	CL	OPC Cement Lined		
			CL_SR	Sulphate Resistant Cement Lined		
			CL_AC	Calcium Aluminate Cement Lined		
			FBE	Fusion Bonded Epoxy		
			Other	Another type of lining not covered elsewhere.		
			PVC	PVC lining such as Humes Plastiline and the like.		
			Unknown	Lining type unknown at time of submission		
			Unlined	No internal lining		
External Protection water_pipe_protection	Enumerated List	External protection to the pipe. This is not the embedment type.		See pipe breaking rules	Yes	Yes
			Concrete Encased			
			Epoxy	Epoxy paint or coating		
			FBE	Fusion Bonded Epoxy		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			FBPE	Fusion Bonded Polyethylene (Sintakote)		
			Plastic Wrapped	Wrapped in plastic tape		
			P_1	Non-Standard protection type with a meaning agreed with the receiving entity		
			P_2	Non-Standard protection type with a meaning agreed with the receiving entity		
			Tape Wrapped	Wrapped in protective tape impregnated with waterproofing compounds. (Denso Tape and the like)		
			Unknown	Unknown protection type at time of submission		
			Uncoated	No protection		
			Zinc	Galvanised or zinc painted		
			V4.2 Zinalium *V5.01 Zinc-Aluminium Alloy*	Zinc Aluminium alloy coating (Petair Saint-Gobain) or similar		
Joint Type water_pipe_jointtype	Enumerated List	The way the sewer pipe is joined		See pipe breaking rules	Yes	Yes
			BW	Butt Weld (PE pipes)		
			EFW	ElectroFusion weld (PE pipes)		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			FJ	Flanged Joint (DI & MS)		
			MCJ	Mechanical compression Joint. Mainly used on copper and PE		
		V 4.2 use "RR"	*RRJ*	Rubber Ring joint		
			RRRJ	Rubber Ring Restrained Joint (Tyton-Lok)		
			SWJ	Solvent Welded Joint (PVC ABS)		
			JT_1	*Non-Standard joint type with a meaning agreed with the receiving entity*		
			WJ	Welded Joint (Steel Pipes)		
			Other	Another kind of Joint not included in the Schema		
			Unknown	An unknown joint type at time of submission		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Embedment type water_pipe_embedment	Enumerated List	The embedment type (bedding and surround) to the pipe based on the WSAA sewerage codes		See pipe breaking rules.	Yes	Yes
		For version 4.2 ONLY	Type 1 through Type 13	Correspond to the WSAA bedding types shown on drawings SEQ-SEW-1201-1 to SEQ-SEW-1204-1 Do not use types 14-17 shown on drawing SEQ-SEW-1205-1 for road crossings. These are elaborations on the basic types that provide further detail for backfill above the level of the pipe. Use equivalent basic types as appropriate.		
		Version 5.01 onwards	*Natural*	*Pipe laid directly on natural in-situ material*		
		Version 5.01 onwards	*GBH*	*Granular bed and haunch*		
		Version 5.01 onwards	*GBS*	*Granular bed and surround*		
		Version 5.01 onwards	*GBSonConc*	*Granular bed and surround on concrete support*		
		Version 5.01 onwards	*GBSonGPT*	*Granular bed and surround on geo-textile pillow*		
		Version 5.01 onwards	*GBSonPiles*	*Granular bed and surround on piles*		
		Version 5.01 onwards	*CemStabBS*	*(ement) stabilised bed and surround*		
		Version 5.01 onwards	*ConcBS*	*Concrete bed and surround*		
		Version 5.01 onwards	*ConcBSonPiles*	*Concrete bed and surround on piles*		

This document contains information which is proprietary to the SEQ service providers and may not be used for purposes other than those intended without written consent from the SEQ service providers

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
		Version 5.01 onwards	*Enveloped*	*Within an enveloper pipe*		
			EB_1	Non-Standard embedment type with a meaning agreed with the receiving entity		
			EB_2	Non-Standard embedment type with a meaning agreed with the receiving entity		
		Version 5.01 onwards	*None*	*Thrust-bored or trenchless*		
			Above Ground	Pipe is not buried; it is on piers or attached to a structure such as a bridge deck.		
			Unknown	Unknown type of embedment at time of submission		
			Other	Another type of embedment not specified in the schema,		
WaterQuality *water_supply_water_quality*				Quality of water carried by the pipe.	Yes	Yes
			Drinking Water	Drinking-quality (potable) water for normal mains supply by the municipal water service provider		
			Recycled Aplus	Class A+ tertiary treated with reverse osmosis recycled water for supply via dual reticulation for permitted interior and exterior uses		
			Recycled A	Class A tertiary treated recycled water for supply via dual reticulation for permitted exterior uses		

This document contains information which is proprietary to the SEQ service providers and may not be used for purposes other than those intended without written consent from the SEQ service providers

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			Treated Effluent	Treated Effluent to class B through class D for irrigation only. Provided for compatibility for use with other types of water infrastructure, but not used for water pipes See 9.5 Recycled Water		
			Rain Water	Rain Water collected directly into the system for irrigation		
			Raw Water	Untreated water from a watercourse or pond used to feed a water treatment plant or irrigation system		
			Ground Water	Untreated water from bores used to feed a water treatment plant or irrigation system		
			Process Water	Non-potable process water of some description		
			Other	Some other kind of water or liquid not included in the Schema		
			Unknown	An unknown quality of water.		

15.2   Water Maintenance Structures (Valve pits and the like)

Water_MaintenanceHole – Terminates sewer pipes, both pressure and non-pressure

15.2.1   Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Geometry X,Y,Z	Yes	Yes
Length_mm (Rectangular structures only)*	Yes	Yes
Width_mm (Rectangular structures only)*	Yes	Yes
Diameter_mm (Circular structures only)*	Yes	Yes
SurfaceLevel_m	Yes	Yes
InvertLevel_m	Yes	Yes
Rotation	No	No for symmetrical (round/square) chambers. Yes for non-symmetrical chambers. Angle of the longest axis measured anti-clockwise from East.
*Note where the diameter/width/length vary over the depth of the structure take the largest		

ADAC only requires a single point to locate the Water_MaintenanceHole feature. However, two points are required to determine the rotation of the maintenance hole by survey. The surveyor puts the target on the centre point of the maintenance hole and picks up an additional point to give the rotation. Location point is defined as the point on the cover or top slab that is directly above the centroid of greatest plan area of the structure. This may or may not be the centre of the cover.

The invert level of the maintenance structure can be located by holding the target on the floor of the hole and measuring the level; this is not the same level as invert level of the ingoing and outgoing pipes.

Surface level is taken as the top level of the lid or, of the roof where there is no lid, or the wall where there is no roof.

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Use of Chamber water_mh_use	Schema Defined Complex	The use for the structure			Yes	Yes
			Complex	Use where chamber has more than one use		
		If this value is selected status should be 'Retired"	Disused	Disused or Abandoned chamber		
			Other	Chamber serving some other purpose to those listed herewith.		
			Pressure Regulation	Chamber used for pressure regulating equipment		
			Pump Station	A water pumping station		
			Unknown	Use is unknown		
			Valve Pit	An accessible chamber containing valves.		
Material water_mh_material	Enumerated List	Material used to construct maintenance structure shaft/ walls/ base elements. Roof material specified separately.		Note: construction method "Prefabricated" or "Insitu" is also required for walls and base, in the attributes Wallconstruction and FloorConstruction respectively.	Yes	Yes
			Concrete			
			PVC	Polyvinyl Chloride		
			PE	Polyethylene		
			PP	Polypropylene		

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			GRP	Glass Reinforced Plastic		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			Unknown	Material unknown at time of submission.		
Roof Material water_mh_roofmaterial	Enumerated List	The material used for the structure's roof.			Yes	Yes
			Aluminium			
			Cast Iron Frame	Gatic type with concrete infill.		
			Concrete			
			Grid Mesh - Aluminium	Open Grid Mesh made from Aluminium		
			Grid Mesh - GRP	Open Grid Mesh made from Glass Reinforced Plastic		
			Grid Mesh - SS	Open Grid Mesh made from Stainless Steel		
			PVC	Polyvinyl Chloride		
			PE	Polyethylene		

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			PP	Polypropylene		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			MS	Solid Mild Steel includes chequer plate		
			No Roof	Chamber that has no roof usually with walls extending above ground.		
			Other	Material other than those listed herewith		
			SS	Solid Stainless Steel includes chequer plate		
			Unknown	Material unknown at time of submission.		
Chamber Lid water_mh_lidmaterial	Enumerated List	The material used for the lid.			Yes	Yes
			Aluminium			
			Cast Iron			
			CI Conc Infill	Gatick type comprising cast iron grid-iron filled on side with concrete.		
			Concrete			

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
			PVC	Polyvinyl Chloride		
			PE	Polyethylene		
			PP	Polypropylene		
			GRP	Glass Reinforced Plastic		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			MS	Solid Mild Steel includes chequer plate		
			No Lid	For chamber that have no roof or have a roof with no lid or have a roof that is removable in its entirety.		
			Other	Material other than those listed herewith		
			SS	Solid Stainless Steel includes chequer plate		
			Unknown	Material unknown at time of submission.		

15.3

15.4   Water Services

Feature_Water_Service

See Section   **Water services** in Appendix D.

15.4.1   Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Diameter_mm 20, 25, 38, or 50 for copper and 25, 32, 40, 63, for PE (external diameter)

Diameter in 4.2 | Yes | Yes |
| Geometry Poly Line | Yes | Yes |

The SEQ-ADAC Schema requires a single polyline to locate a water service. The service should terminate at a ready tap or tapping band feature at the water main end and a ball valve or meter at the customer's end. If the service is not straight add more points to indicate the curvature of the line. Service pipes of greater than 65 mm diameter should be input separately as the constituent water pipe, fitting and valve features.

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Water Quality water_supply_water_quality	Enumerated List	The water quality supplied through this service	See Water Pipes feature for the full list of options for this attribute	For water services the only valid choices are Drinking Water, Recycled APlus, Recycled A or Disused.	Yes	Yes
			Drinking Water			
			Recycled Water			
		If this value is selected status should be 'Retired"	Disused	Disused or Abandoned line		
Pipe Material water_service_material	Enumerated List	Service pipe material			Yes	Yes
			Copper			
			DI	Ductile Iron		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE	Polyethylene		
			Unknown	Material unknown at time of submission.		

ADAC Attribute Name	Data Type	Description of Non-spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Pipe Material water_service_class	Enumerated List	Service pipe material class	PN6, PN6.3, PN8, PN9, PN10, PN12, PN12.5, PN16,PN18,PN20, PN35 and Type A	PE should be class PN16 DI should use PN35 Copper should use Type A	No	Yes
External Protection water_service_protection	Enumerated List	Water service should be in conduit under roadways.			No	Yes
			Conduit			
			No Conduit			
			Unknown			
			Other	Service is protected in another way		
Terminal Valve Type water_service_termination	Enumerated List	Valve fitting at customer end			No	Yes
			Ball Valve	Service ends in ball valve		
			No Valve	Service ends with no valve prior to meter		
			Other	Service ends in another type of valve		
			Unknown	Service ends in an unknown way		

15.5   Water Fittings

WaterFittings – Terminate pressure pipes

15.5.1   Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Geometry (Point)	Yes	Yes
BodySize_mm	Yes	
BranchSize_mm	No	No
Rotation	No	No for in-line fittings. Yes for branched fittings. Angle of main run measured anti-clockwise from East.
For a taper, record the larger diameter in the BodySize_mm attribute and the smaller diameter in the BranchSize_mm		

ADAC only requires a single point to locate a fitting. However, two points are required to determine the rotation of the fitting.   The z location point is the pipe invert at the plan survey point. The plan survey point for straight through fittings is the midpoint of a line joining the centrelines of the main branches. The plan survey point for a T,Y, or Cross is the point where the lines through the centrelines of the branches intersect. The plan survey point for bends is the intersection of the centreline of the pipe with the radius of curvature that bisects the angle of the bend.

The invert level of the fitting can be derived from taking the crown level and deducting the actual diameter and wall thickness.

See section 10.8. It is not mandatory to record the following fittings: Connector, Connector Thrust, Dismantling Joint, Gibault, Tapping Band, Ready Tap or Puddle Flange.

15.5.2 Non-Spatial Attributes

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Fitting Material water_fittings_material	Enumerated List	Fitting wall material			Yes	Yes
			ABS	Acrylonitrile Butadiene Styrene		
			AC	Asbestos Cement (Legacy Systems only not for new infrastructure)		
			Brass	Mainly for customer-owned small bore not SEQ-SP infrastructure		
			Copper	Mainly for customer-owned small bore not SEQ-SP infrastructure		
			DI	Ductile Iron		
			MS	Mild Steel		
			M_1	Non-standard descriptor for new materials as agreed with receiving entity		
			M_2	Non-standard descriptor for new materials as agreed with receiving entity		
			Other	Material other than those listed herewith		
			PE	Medium Density Polyethylene		
			PVC	Modified Polyvinyl Chloride		
			Unknown	Material unknown at time of submission.		

Water fittings Water_fittings_type		Types of water main fittings excluding valves			Yes	Yes
		Note that for PE water mains or water mains made from other flexible materials that are bent into alignment on site are not entered as fittings, but as lengths of pipe with sufficient coordinates to describe their alignment in 3-dimensional space.	Bend	Bend fitting of any magnitude		
			Booster Pump	Water transport or pressure regulating pump		
			Cathodic Protection Point	Point for connecting cathodic protection.		
			Connector	Non-specific in line connector - Not mandatory to record for SEQ-SPs		
			Connector Thrust	As above but designed to take thrust against a restraining structure - Not mandatory to record for SEQ-SPs		
			Cross Connection	4-way branch.		
			Dead Plate	Blank flange or welded on dead end at the end of a pipeline		
			Dismantling Joint	A straight connector often of adjustable length specifically included to facilitate the dismantling of complex flanged pipework and valves		
			External Dead End	Fitting such as an endcap that forms a dead end in a pipe run		

				Flush Point	*A flushing point*		
		Not available in v 4.2, v 5.01 onwards only					
				Gibault	Gibault – <u>Not mandatory to record for SEQ-SPs</u>		
		Not available in v 4.2, v 5.01 onwards only		*Saddle*	*Saddle*		
				Sampling Point	In line fitting that can be opened to take a sample from the pipeline.		
				Puddle Flange	Puddle Flange – <u>Not mandatory to record for SEQ-SPs</u>		
				Ready Tap	Pre-fabricated fitting to provide service connections. See Water services		
				Surge Vessel	Pressure vessel designed to dampen water hammer.		
				Taper	In-line fitting to change from one diameter to another		
				Tapping Band	Fitting to tap main for a water service. See Water services		
				Tee	Normal Tee		
				Tee Branch Dead End	A dead end plate pre-fitted to one branch of a Tee for access or future connection		
				Tee Branch Ext Dead End	Dead end on a Tee fitting with a side branch of extended length		
				Wye	Y - Joint with 3 arms where the angle between any 2 arms is not 90 or 180 degrees		
Lining Water_pipe_lining		Internal protection to fitting			See attribute description under water pipes	No	Yes

Protection water_pipe_protection		External protection to fitting		See attribute description under water pipes	No	Yes
Water Quality water_supply_water_quality	Enumerated List	The water quality supplied through this fitting	See Water Pipes feature for the full list of options for this attribute	For water fittings on municipal water supply lines, the only valid choices are Drinking Water, Recycled APlus, Recycled A or Disused.	*Yes*	*Yes*

15.6 Water Valves

15.6.1 Use/Type Mapping

water_valve_use and water_valve_type
All valves shall be surveyed and included in the XML. The Schema has the following uses and types with valid combinations mapped as shown in the table below:

Valve Use	Valve Type	Valve Use	Valve Type
Non-Return	Generic NR	Pressure Control	Overflow
	Rubber Gate		Pressure Relief
	Swing Check		Pressure Sustaining
	Wafer		Altitude Valve
	RPZ		Vacuum Release
Stop Scour Diversion Zone Boundary Flow Control	Gate	Gas Release	Air Valve
	Butterfly	Other	Special
	Knife Gate		
	Eccentric Plug		
	Globe		
	Ball Valve		
	Vee Ported Ball		
	Control		

15.6.2   Spatial Attributes

In relation to their spatial attributes, valves can be treated as fittings with no branch.

15.6.3   Non-Spatial Attributes

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
manufacturer_model_details (Manufacturer)	String	Manufacturer of valve		Required for all valves with a use of pressure control, Gas release and other. Optional for other valve uses	No	Yes*
manufacturer_model_details (Model)	String	Model of valve		Required for all valves with a use of pressure control, Gas release and other. Optional for other valve uses	No	Yes*
Water Quality water_supply_water_quality	Enumerated List	The water quality supplied through this valve	See Water Pipes feature for the full list of options for this attribute	For water valves in the municipal water supply the only valid choices are Drinking Water, Recycled APlus, Recycled A or Disused.	Yes	Yes

15.7 Hydrants

15.7.1 Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Geometry (Point)	Yes	Yes
Diameter_mm	Yes	Yes
Rotation	No	No

ADAC only requires a single point to locate a hydrant. However, two points are required to determine the rotation if required. The location point is at the base of the hydrant at the centre of the hydrant's connection onto the hydrant-tee or pipe branch.

15.7.2 Non-Spatial Attributes

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Hydrant Type water_hydrant_use	Enumerated List	Type/use of hydrant			Yes	Yes
			Spring	Below ground		
			Pillar	Above Ground		
			Filling Point	Hydrant (usually of spring type) with a metered standpipe semi-permanently in place.		
Water Quality water_supply_water_quality	Enumerated List	The water quality supplied through this Hydrant	See Water Pipes feature for the full list of options for this attribute	For hydrants in the municipal water supply the only valid choices are Drinking Water, Recycled APlus, Recycled A or Disused.	Yes	Yes

15.8   Meters

15.8.1   Spatial Attributes

Element Name	Mandatory for ADAC	Mandatory for SEQ Code
Geometry (Point)	Yes	Yes
Diameter_mm	Yes	Yes
Rotation	No	No
Lot and Plan Details	Yes	Yes
OffsetSide Side (Left or Right when facing the lot) from which offset_m is measured	Yes	Yes
Offset_m Distance from property side-boundary where meter is located on front boundary.	Yes	Yes
Lot Number The lot number of the customer's lot served by this meter	Yes	Yes
Plan Number The registered plan number of the customer's lot.	Yes	Yes

ADAC only requires a single point to locate a meter. However, two points are required to determine the rotation if required.   The location point is not the centre of the meter box lid because not all meters are in boxes. The location point is in the top of the meter body casing mid-way along the meter's length,

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code	Mandatory for ADAC	Mandatory for SEQ Code
Serial Number	String	Serial number of meter	N/A		Yes	Yes
Dials	+ve Int	Number of dials on meter face	N/A		No	No
Initial Reading	+ve Int	Reading at installation	N/A		No	No
Private Booster	Boolean	True if meter is associated with a private pressure boosting installation	N/A	Default is False	Yes	Yes
InstallationDate	Date	Date of meter installation	N/A		Yes	Yes
water_meter_manufacturer			ABB		No	No
			ABB Kent	(Davies Shepherd, Kent)		
			RMC	Reliance Manufacturing Company		
			Email			
			ELS	Elster Metering		
			Other	Maker other than those listed		
			Unknown	Unknown maker		

ADAC Attribute Name	Data Type	Description of Non-Spatial Attribute	Allowable Code/s	Code Description and use in this SEQ Code Note, values not in the standard Schema, but acceptable to the SEQ-SPs are shown in italics	Mandatory for ADAC	Mandatory for SEQ Code
water_meter_type					Yes	Yes
			Magflow	Electro/magnetic or Doppler type		

			Turbine	Meter with a moving propeller or turbine		
			Conventional	Standard displacement type meter		
			Manifold	Displacement type with built in valves to allow meter change over without disconnection.		
			Irrigation	Small in-line meter used in irrigation systems to give a general indication of flow volumes but not at the accuracy needed for billing or control. Not used for municipal water supply,		
			Other	Another unspecified type of water meter		
			Unknown	Meter type unknown at time of data submission		
Water_meter_model	Text	Model of the water meter		Free Input	No	Yes
Water Quality water_supply_water_quality	Enumerated List	The water quality supplied through this meter	See Water Pipes feature for the full list of options for this attribute	For water meters connected to the municipal water supply, the only valid choices are Drinking Water, Recycled APlus, Recycled A or Disused.	Yes	Yes

15.9   Storage Tanks, Irrigation Fittings and Water Service Fittings

Feature Class Feature_Water_StorageTank is not used for reservoirs fitted to the municipal water supply. It is used for irrigation systems and private water reticulation not connected to the mains.

Feature_Water_ServiceFitting is not used for the municipal water supply system. It is used for customer-owned infrastructure on the customer side of the water meter (such as drinking fountains and dog bowls) and for irrigation fittings such as sprinklers.

Neither of these classes are part of the water supply infrastructure covered by the SEQ Code