GUIDELINES FOR CREATION AND SUBMISSION OF ADAC XML FILES

ADAC XML Files to be included as an accompaniment to the "As-Constructed" bundle submitted to Port of Brisbane

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Version 3.4 FINAL (15th August 2016)

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VERSION NO	DISTRIBUTION	DATE	COMMENTS
1.0	INTERNAL PBPL STAKEHOLDERS	22/04/2016	DRAFT
2.0	INTERNAL PBPL STAKEHOLDERS	18/05/2016	DRAFT
3.0	INTERNAL PBPL STAKEHOLDERS	24/05/2016	DRAFT
3.1	FOR EXTERNAL RELEASE	26/05/2016	FINAL
3.2	FOR EXTERNAL RELEASE	29/07/2016	FINAL

1. BACKGROUND & PURPOSE

From 1st of May 2016 the Port of Brisbane (PBPL) will require compliant ADAC XML digital files to accompany the usual "As-Constructed" Bundle (i.e. plans, drawings, schedules, manuals and associated information) covering assets created or modified during civil works projects. The purpose of this document is to provide guidelines and general assistance with respect to the creation and provision of compliant ADAC XML files.

"As-Constructed" (also known as "As-Built" or "As-Executed") information indicates any variations in locations and/or alignments (survey) or other approved changes in assets or construction methods that may have occurred during operational works as compared to the original "Approved for Construction" design(s).

"As-Constructed" drawings provided must accurately reflect the details of assets at handover including material types, relevant specifications and other asset-specific information. The digital ADAC XML file is created in conjunction with the various "As-Constructed" Plans and contains particular asset-specific information in digital format for use by the receiving entity.

The final approved "As-Constructed" bundle of information accepted by PBPL, including ADAC XML file(s), ultimately provides a true and accurate record of asset locations and constructions details and becomes a valuable tool in the ongoing long-term management of these assets into the future.

Please Note: Further advice on the overall preparation and presentation of "As-Constructed" drawings and plans, including acceptable drawing file formats, styles, quantities etc can be found in the associated project documents:

- PBPL Port Drive Upgrade Project contract documentation;
- Queensland Transport and Main Roads Standard Drawings (http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Standard-drawings-roads.aspx); and
- SEQ Design & Construction Code – Asset Information Specification for water and sewerage (http://www.seqcode.com.au/standards/)

2. INTRODUCTION TO ADAC XML

ADAC XML files are a compulsory accompaniment to the "As-Constructed" bundle of information required by PBPL as a part of the handover of nominated works, associated assets and infrastructure.

Compliant ADAC XML files contain a structured and precise digital record of the assets described in the "As-Constructed" plans and other associated engineering documentation. Details noted within the ADAC digital files include survey-accurate cadastral and boundary references, geometries and relative levels as well as detailed asset records and accompanying attributes.

More specifically, the XML files are used as a secondary check regarding the completeness and accuracy of the "As-Constructed" information provided. The digital files afford further confirmation of compliance with specifications and contractual conditions as well as helping to verify engineering provisions and other design-related requirements.

Depending on the tools[1] (ADAC XML generator) being used to generate the ADAC XML, compliant files are initially created during survey capture and then finalised in conjunction with the creation of the "As-Constructed" drawings (e.g. DWGs). Alternatively the XML files may be generated after the electronic "As-Constructed" drawings have been finalised. It is however essential that the "As-Constructed" drawings and ADAC XML files are created using complete and survey-accurate information to identify the assets and the precise locations being represented.

Please also note that some assets are common to multiple asset classes e.g. Lighting assets may be related to either transport or open space. In those cases capturing and recording assets in the ADAC file under a different asset class to the actual area of use is valid and appropriate.

On receiving the "As-Constructed" bundle, PBPL will undertake a data format and conformance check on the ADAC XML file to confirm the completeness and validity of the details. Please note that if significant anomalies, errors or missing information are identified during these checks, the ADAC XML file(s) may be returned to the provider for correction and resubmission which can potentially delay the progress of asset handover and commissioning activities.

[1] Various software tools (purpose-built ADAC XML generators) are available to capture necessary details and asset attributes required to produce a compliant ADAC XML file. Advice can be sort from providers of most software (CAD) design suites and survey tools.

Once the ADAC XML data file(s) are accepted by the receiving entity they are uploaded to various internal systems and used to assist in the long-term management of the new or modified infrastructure and assets. The detailed asset and location data may also be made available to external agencies in the future via various digital formats.

3. GENERAL REQUIREMENTS

The ADAC XML file is to be produced using the current ADAC XML schema release (e.g. Ver 4.1) and should be "validated" for compliance before being submitted to PBPL. Details on the data schema (primary levels) noting asset classes and sub-classes to be addressed by the ADAC capture process can be found at Appendix A at the end of this document.

The ADAC XML files are to be provided via either electronic transmission or stored on a suitable digital storage device as may be requested (CD/DVD-ROM, USB memory stick). All electronic files will routinely need to be accompanied by an appropriate "Document Transmittal Form".

4. DATUM INFORMATION

Data contained in the ADAC XML file(s) must reflect the survey details exactly as found in the real world and also as represented on the accompanying "As-Constructed" drawings. Survey details must be derived from permanent survey marks (PSMs) with Map Grid of Australia (MGA Zone 56 – GDA94) coordinates and relevant UTM Zone for the survey area. All AHD levels to be to fourth (4^{th}) order standard or better as defined by the current ICSM[2] Standard.

[2] Intergovernmental Committee on Surveying & Mapping – http://www.icsm.gov.au

5. CREATION OF ADAC XML FILE(S)

In producing compliant ADAC XML files, information on the following asset classes will need to be captured according to the approved ADAC data schema (Vendors of ADAC XML generators are provided with any updates to the ADAC schema free of charge and should have these updates incorporated into their products for release to customers in a timely manner). Further information on the ADAC process, data schema, available tools and supporting agencies can be found on the ADAC website at: http://www.engicom.com.au/adac/

While the ADAC XML files are created from the survey-accurate "As-Constructed" information, particular attention must be given to how PBPL wishes to have particular details captured and recorded for each particular asset class.

The following sections within this document provide assistance with the capture of ADAC data when using proprietary ADAC XML generators either during the "As-Con" survey pickup or when capturing the ADAC asset information as a part of the creation of the "As-Con" plans and associated drawings in civil design (software) suites.

For the most part, the physical nature of the individual assets will determine where/if assets are captured separately within the ADAC XML file. For example, footpath or a pathway would be captured as individual and separate sections to reflect any changes such as width or material type. Similarly, water pipes are captured as separate individual sections broken at fittings (e.g. valves, reducers, tapers) to clearly reflect differences in diameter or material type.

Note: It is not within the scope of this document to provide detailed advice on how to operate the various specialist products and tools (ADAC XML generators) used in the creation and provision of the compliant ADAC XML files. Assistance and advice on the use of any particular tool should be sourced from the provider of the product who would necessarily be familiar with general ADAC requirements, processes and the current data model (ADAC XML schema).

These Guidelines have been designed from the perspective of being broad enough to suit all stakeholders while still specific enough to be of practical use. The following sections detail the list of asset types relevant to the PBPL, considering the capture of asset data by Service Class and asset type.

Transport

Roadways, Including Seals and Pavements

Asset Capture: Multi-patch region/polygon feature representing the area of Pavement. Asset capture is based on physicality therefore separate regions/polygons are required if any part of the pavement profile changes i.e. Surface, Base, Sub-Base, Lower Sub-Base and/or Subgrade. To be captured from "Kerb Lip to Kerb Lip" (kerb and channel) or "face of kerb to face of kerb" (kerb only). Please refer to the solid blue transparent hatch in figure 1 and 2 below for a typical representation of Pavement capture.

Spatial Relationship: Not Applicable.

Road Edge

Asset Capture: Complex linear feature (read: polylines including curves but not bézier curves) representing the invert of kerb. Please refer to the solid red line in figures 1 and 2 below.

Spatial Relationship: Not Applicable.

Sub-Soil Drain

Asset Capture: Simple Linear feature (i.e. straight lines) representing the sub-soil drain pipe asset. To be captured at the back of kerb, as shown by the solid yellow line below in figures 1 and 2. Subsoil Drain Pipes are typically broken where the Use and/or Type of drain changes.

Spatial Relationship: Not Applicable.

Road Island

Asset Capture: Multi-patch region/polygon feature representing the area of Island/LATM bounded by the back of Kerb features. Asset capture is based on physicality therefore separate regions/polygons are required if the Type of Island or Infill changes. Please refer to the solid green lines in figure 1.

Spatial Relationship: Not applicable.

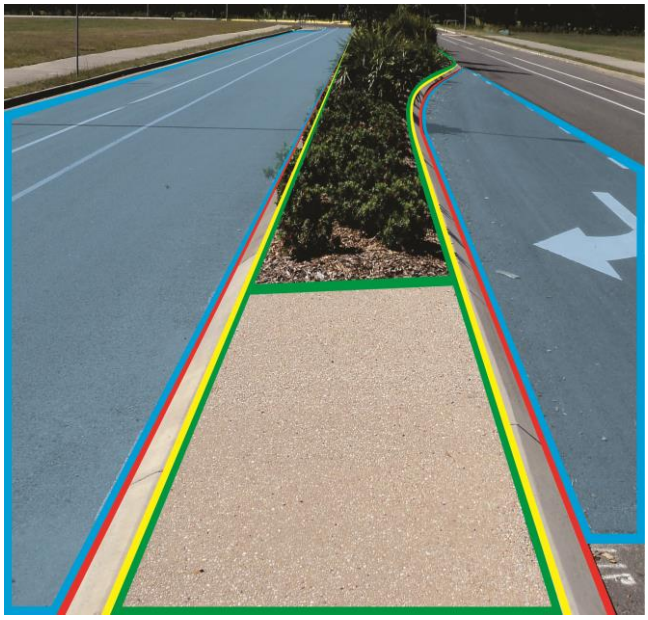


Figure 1

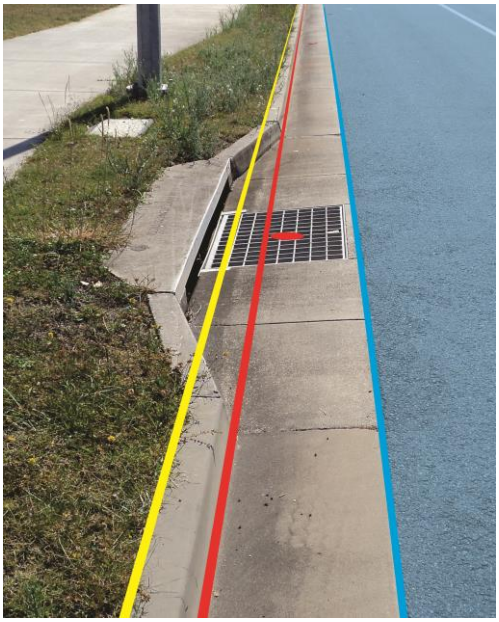


Figure 2

Bridge Extents

Asset Capture: Multi-patch region/polygon feature representing the area of Bridge Extent from abutment to abutment encompassing the bridge in its entirety. Please refer to the dashed red line in figure 3 below for a typical representation of bridge extents capture. Bridge extents to be defined under the Supplementary Polygon feature class with the Class element as “Bridge Extents” Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

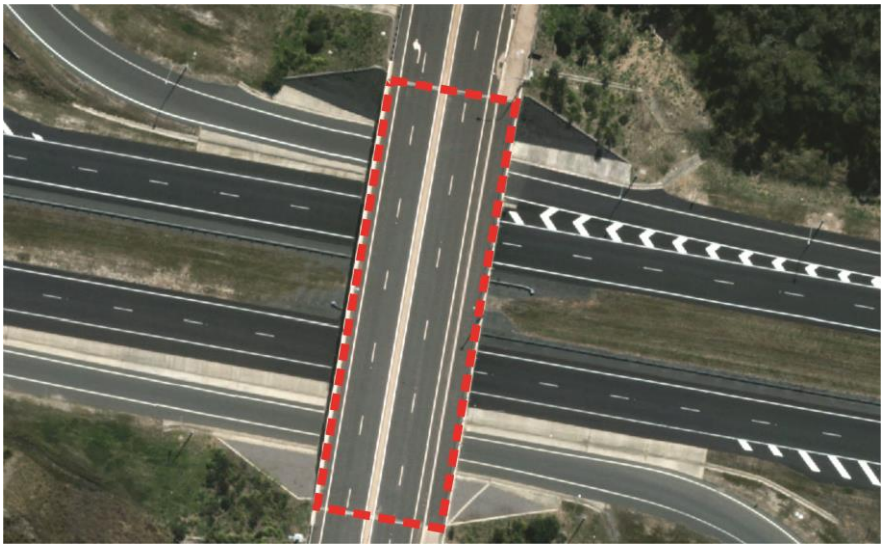


Figure 3 **Note:** Bridge Pavements/Seals to be defined as per Road Pavements above. Bridge Pathways to be defined as per Pathways below.

Bridge Scuppers

Asset Capture: Simple Linear feature (i.e. straight lines) representing the alignment of bridge scuppers. To be captured as a line feature along the alignment of scuppers as shown by the solid red line in figure 4 below. Bridge Scuppers to be defined under the Supplementary Point feature class with the Class element as “BridgeScupper”, Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

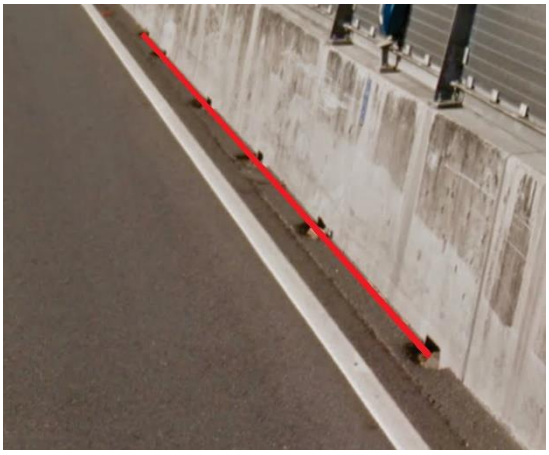


Figure 4

Chevrons

Asset Capture: Multi-patch region/polygon feature representing the area of chevrons. To be captured as the outside of chevrons, as per the shaded blue region in figure 4a and 4b below. Chevrons to be defined under the Supplementary Polygon feature class with the Class element as “Chevron”, no custom attributes are required for this Supplementary Feature.

Spatial Relationship: Not Applicable.

Pavement Line Marking

Asset Capture: Complex linear feature (read: polylines including curves but not bézier curves) representing the alignment of each line marking as per the red linework in figure 4a and 4b below.

Pavement line marking to be defined under the Supplementary Polygon feature class with the Class element as “Pavement Line Marking, no custom attributes are required for this Supplementary Feature.

Figure 4 a

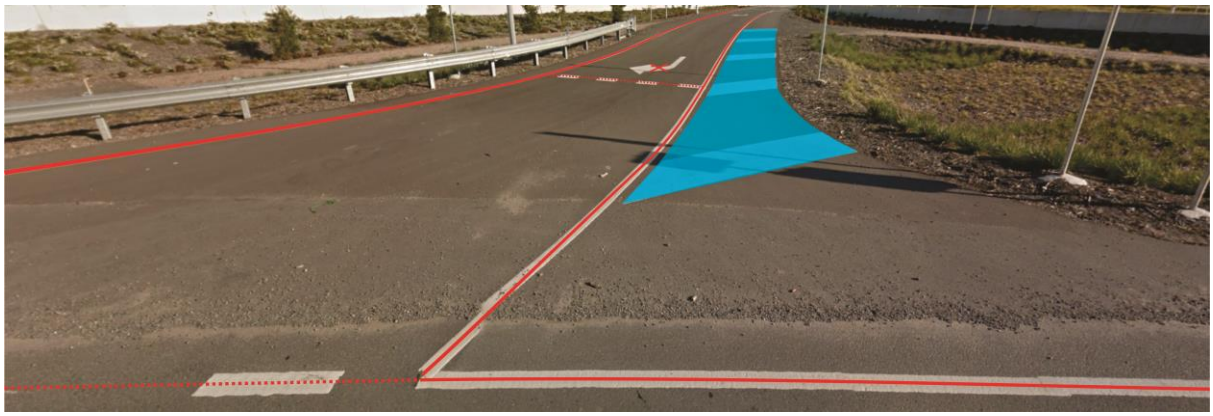


Figure 4 b

Directional Line Marking

Asset Capture: Simple point feature representing each directional line marking. To be captured as a single point feature representing the centroid of each line marking as shown in figure 5 below.

Directional line marking to be defined under the Supplementary Point feature class with the Class element as “Directional Line Marking”, Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 5

Detector Loop Sensor

Asset Capture: Simple point feature representing a detector loop buried in a traffic lane. To be captured as a single point feature representing the centroid of the loop itself, as shown in figure 6 below. Detector Loop Sensor to be defined under the Supplementary Point feature class with the Class element as “Traffic Loop”, no custom attributes are required for this Supplementary Feature.

Spatial Relationship: Not Applicable.

Figure 6

Weigh In Motion System

Asset Capture: Simple point feature representing the the overall buried system in a trafficable pavement (e.g. detector loops and sensors). To be captured as a single point feature representing the centroid of the system as noted in Figure 7 below. “Weigh in Motion Systems” to be defined under the Supplementary Point feature class with the Class element as “WiM System”, no custom attributes are required for this Supplementary Feature.

Spatial Relationship: Not Applicable.

Figure 7

Crash Barriers and Guard Rails

Asset Capture: Complex linear feature (read: polylines including curves but not bézier curves) representing the top of structure. Please refer to the solid red line in figures 8a – 8c below. Crash barriers and guard rails to be defined under the Supplementary Polyline feature class with the Class element "Barrier" and the type "Crash". Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 8 a

Figure 8 b

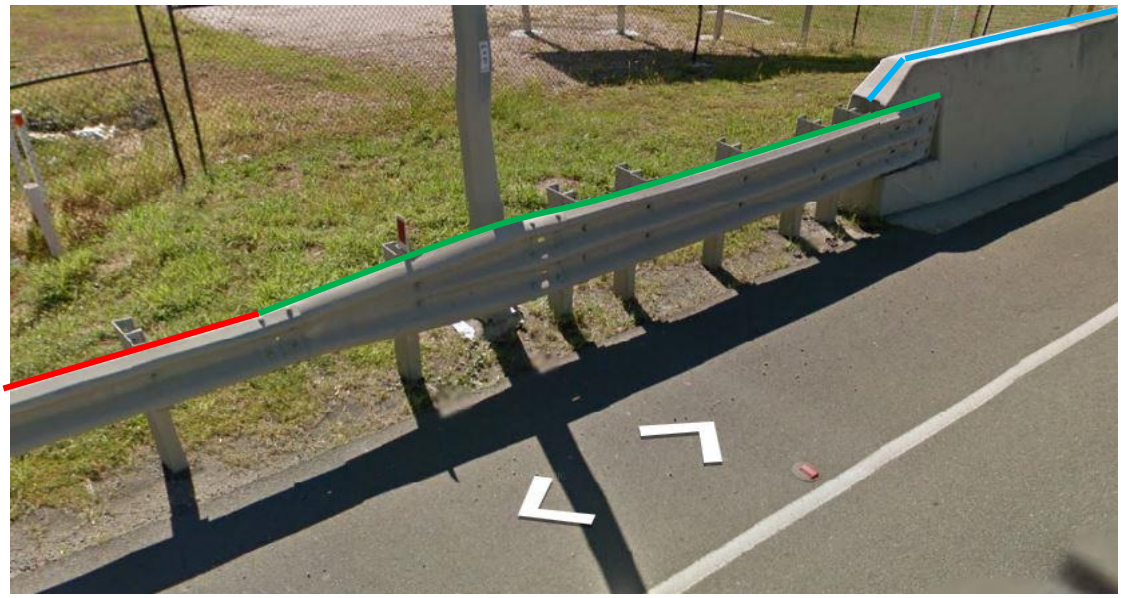


Figure 8c – Transition piece pickup

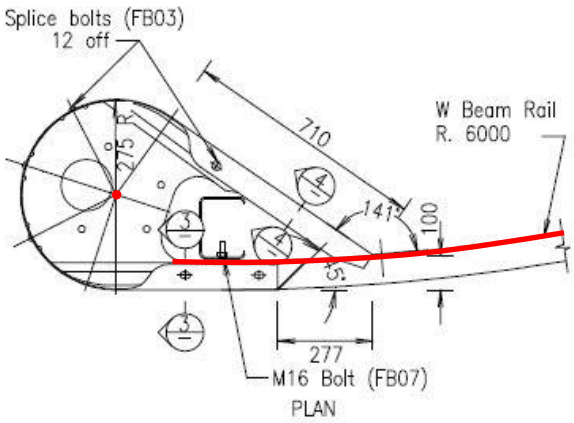
Example: red line – galvanised steel W-Beam; green line – transition piece; blue line – concrete single slope

Crash Barrier and Guard Rail End Treatments

Asset Capture: Simple point feature representing the leading end or trailing end of a crash barrier or guard rail. To be captured as a single point representing the centre of a curve, question mark or bullnose, as denoted by the red dot in figures 8a, 8d, 8f, 8h and DTMR extract, or the furthermost top point of a blunt end, as denoted by the red dot in figures 8e, 8i and 8j (end = ground in this instance). Leading and trailing end treatments are defined under the Supplementary Point feature "Barrier End". Please refer to Appendix A for attribute details.

Spatial Relationship: End treatment does not need to connect, but should be in close proximity to the end of the "Barrier" polyline.

Figure 8d – Soft gating, Question Mark end



Extract of DTMR drawing SD1476

Figure 8e – W-Beam with Crash Cushion

Figure 8f

The configuration in Figure 8f is defined as a “TRACC” Crash Attenuation system (also known as the “Minnesota Bullnose”). These have 3 standard lengths, so a single point on the last cross bar (red dot) will validate the length defined. This will also assist to determine the length if a transition or custom fitting has been applied.

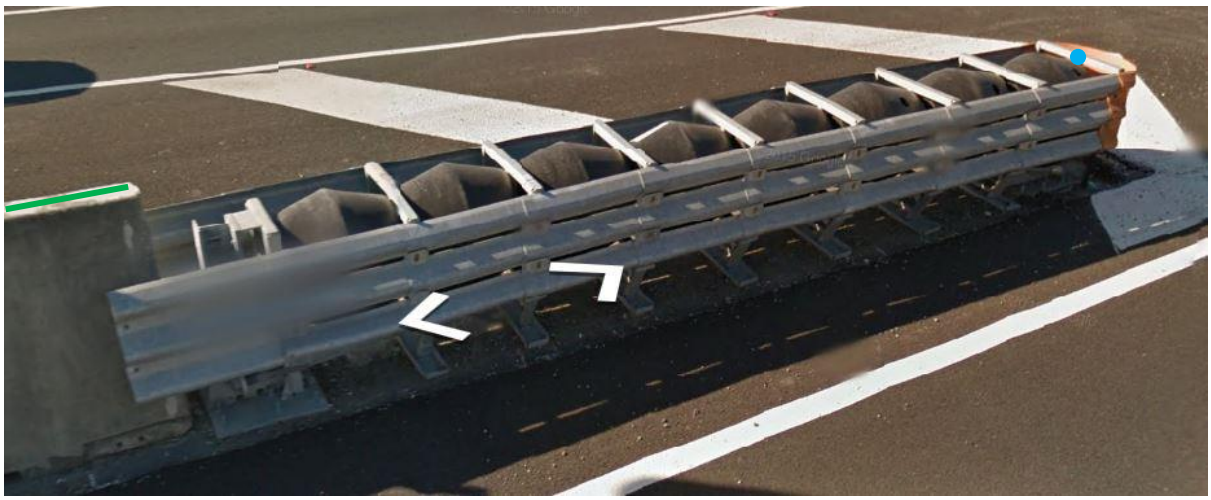


Figure 8g – Pick up of concrete, single slope barrier, with 6.5m long TRACC system picked up as blue dot.

Here are some more examples of barrier pick-ups

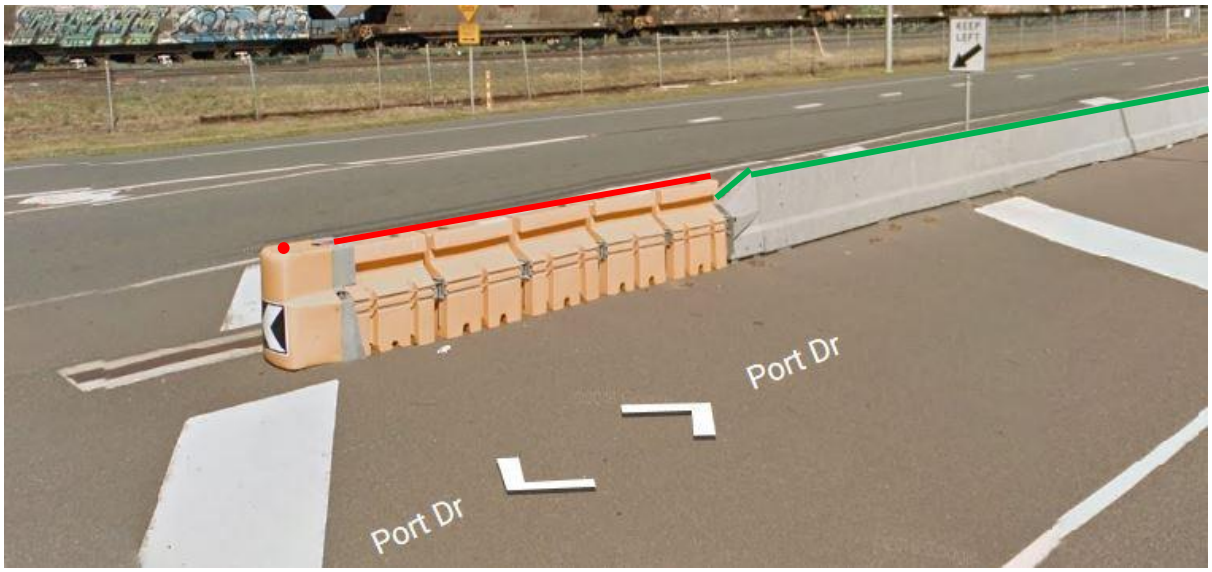


Figure 8h – single slope, galvanised steel barrier, with transition, polypropylene barrier, with bullnose, polypropylene end.

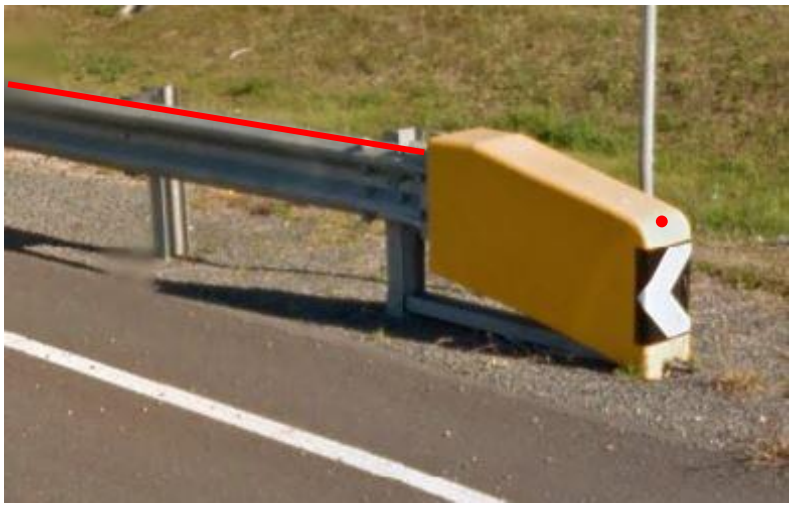


Figure 8i – W-beam, galvanised steel barrier, with polypropylene crash cushion end.

Figure 8j – Re-directive, wire rope, tapered to ground leading end. Wire, rope barrier with plastic top material on steel uprights.

Acoustic Barrier

Asset Capture: Complex linear feature (read: polylines including curves but not bézier curves) representing the base of structure. Please refer to the solid red line in figure 9 below. Acoustic barriers rails to be defined under the Supplementary Polyline feature class with the Class element "Barrier", and the type "Acoustic". Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 9

Pathway / RoadPathway / PathStructure

Asset Capture: Multi-patch region/polygon feature representing the area of Pathway. Asset capture is based on physicality therefore separate regions/polygons are required if any part of the pathway changes i.e. depth, material or connects with existing pathway. To be captured as the extents of pathway structure, as denoted by the solid red lines in figures 10a and 10b below.

Spatial Relationship: May "edge snap" to a Pram Ramp point feature or a Pavement or Parking polygon feature.

Figure 10 a

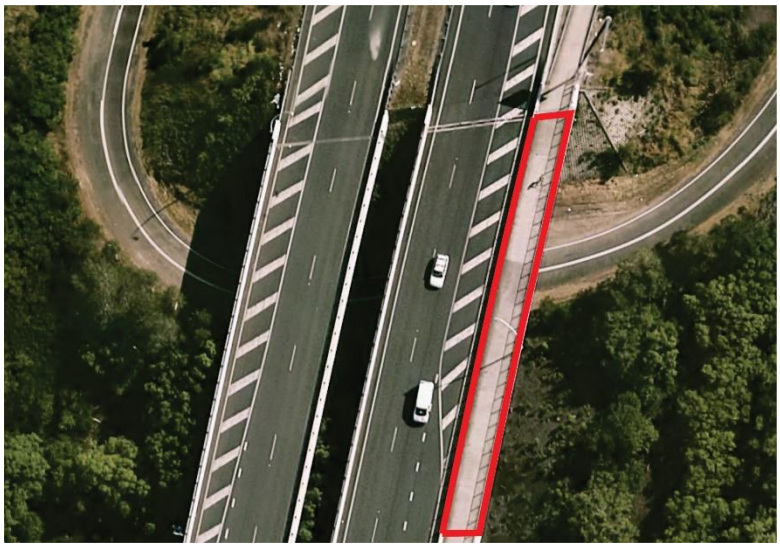


Figure 10 b

Transport Lighting

Asset Capture: Simple point feature representing transport lighting. To be captured as a single point feature representing the base of the structure as denoted by the red dot in figure 11 below. Transport lighting to be defined under the Supplementary Point feature class with the Class element as “Lighting”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 11

Road Sign

Asset Capture: Simple point feature representing each road sign. To be captured as a single point feature representing the base of the structure as shown by the red cross in figures 12a – 12e below. Road signs to be defined under the Supplementary Point feature class with the Class element as “Road Sign”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 12 a

Figure 12 b

Figure 12 c

Figure 12 d

Figure 12 e

Variable Speed Limit Sign

Asset Capture: Simple point feature representing a variable speed limit sign. To be captured as a single point feature representing the base of the structure as shown by the red dots in figures 14 and 15 below. Variable speed limit signs to be defined under the Supplementary Point feature class with the Class element as “VSL Sign”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 14

Figure 15

Variable Message Sign

Asset Capture: Polygon feature representing a variable message sign. To be captured as a polygon feature representing the footprint of the gantry as shown in figure 16 below. Variable message signs to be defined under the Supplementary Polygon feature class with the Class element as “VM” Sign”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

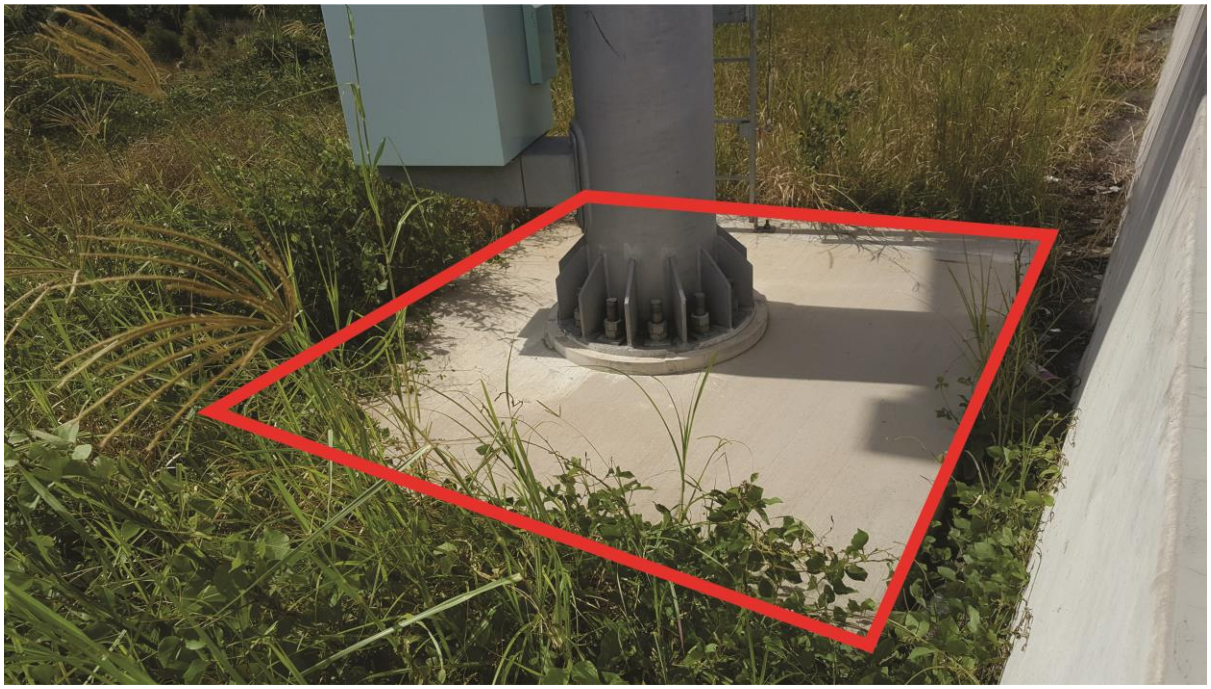


Figure 16

Stormwater/Drainage

Pit/Manhole

Asset Capture: Simple point feature representing the centre of chamber of a pit or manhole. Please note: If the asset's Use = "Pit" then the InletConfig and InletType elements must be populated. InletConfig's Left/Centre/Right is referenced from the lintel looking at the road.

Spatial Relationship: Not Applicable.

Irregular Shaped Chambers

Asset Capture: Polygon feature representing an irregular shaped pit/manhole chamber. Captured as a closed polygon, bounded by the inside chamber wall of the related pit/manhole as shown by the red line in figure 17 below. Irregular shaped chambers to be defined under the Supplementary Polygon feature class with the Class element as "Chamber". Please refer to Appendix A for attribute details.

Spatial Relationship: Must contain a pit feature within closed polygon region.

Figure 17

Pipe

Asset Capture: Simple linear feature representing the invert of the pipe or midpoint of a box asset. One feature will represent each cell for multiple-celled culverts/pipes, therefore the number of cells recorded in the "Cells" field of the table structure will always be 1. Enforced line direction from Gravity Upstream (read: higher AHD level) to Gravity Downstream (read: lower AHD level) due to gravitation flow. Pipe features are captured from the intersection of pipe material and chamber wall. Refer to figures 18, 19 and 20 below.

Figure 18 represents a single-celled pipe asset where vertices one (1) and four (4) represent the maintenance hole capture and vertices two (2) and three (3) are the intersection of the Pipe material and the chamber wall.

Figure 19 represents a triple-celled culvert asset from inlet to outlet. In this case there is a spatial relationship between each end of the pipe asset and the End Structure point feature.

Figure 20 represents an irregular shaped pit with multiple multi-celled pipes entering the pit asset and a large single-celled asset exiting the pit and outletting through an End Structure.

Spatial Relationship: Linear features to be broken and "end snapped" at all StormWater point features to maintain network connectivity.

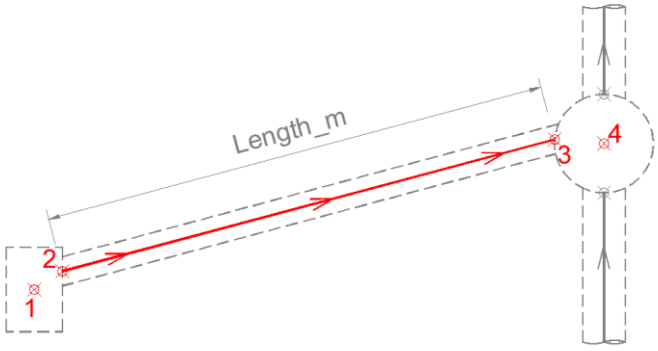


Figure 18

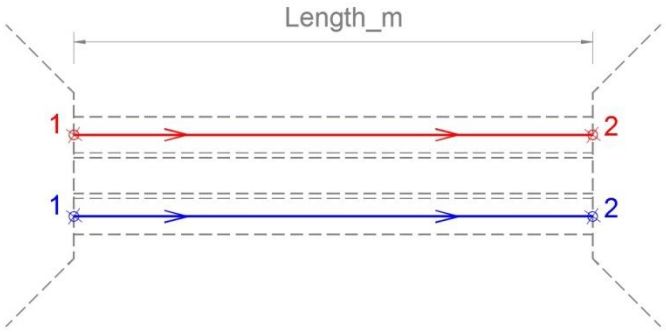


Figure 19

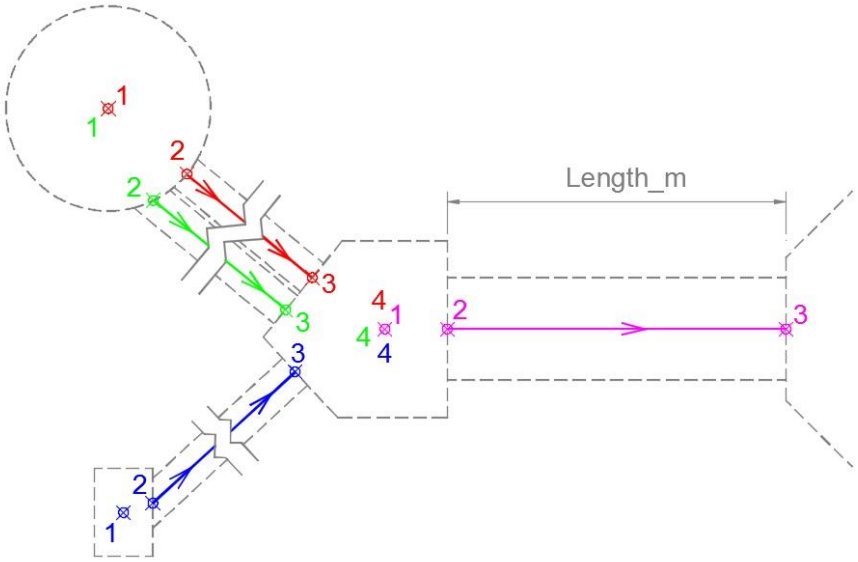


Figure 20

End Structure

Asset Capture: Simple point feature representing the invert of the outlet pipe. End structure point to be located at the invert of the pipe, identified by the red dots (at the point of the red arrow).

Spatial Relationship: Headwall “floats” adjacent to the end of a StormWater pipe feature.

End Structure Components

Asset Capture: Complex linear feature (read: polylines including curves but not bézier curves) representing the inside faces of end wall and wingwalls for end structures. Please refer to the solid red line in figure 21 below.

End structure components to be defined under the Supplementary Polyline feature class with the Class element “End Structure Face”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 21

Scour Protection

Asset Capture: Polygon feature representing scour protection. To be captured as a closed polygon at surrounding the extents of scour protection as shown by the blue hatching in figure 22a below. Scour protection to be defined under the Supplementary Polygon feature class with the Class element as “Scour Protection”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 22 a

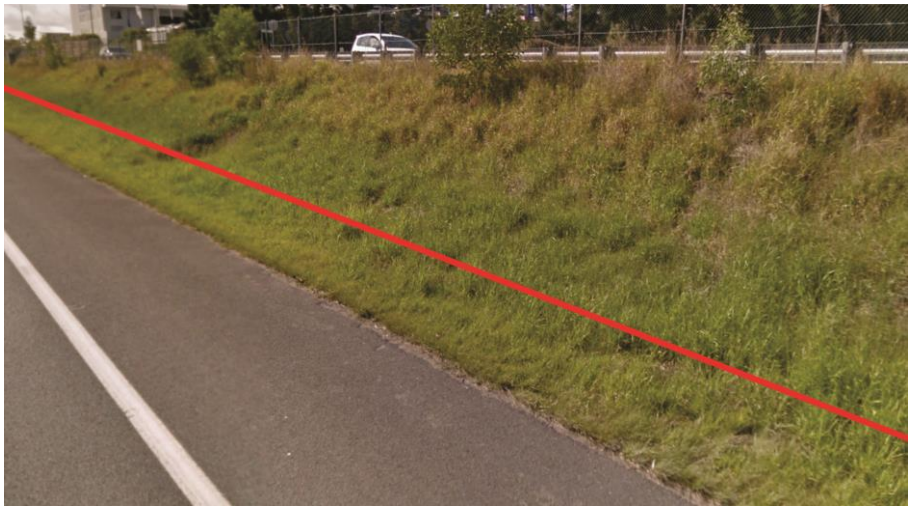


Figure 22 b

SurfaceDrain

Asset Capture: Simple linear feature representing the invert of the channel as shown as the red solid line in Figure 22b above.

Connectivity: May “end snap” to EndStructures and “edge snap” to WSUD or Scour Protection regions/polygons as noted in Figure 22a above.

Fitting

Asset Capture: Single point feature representing the centre point of the fitting. At this stage an End Cap is the only kind of fitting captured in this asset type.

Spatial Relationship: Must “end snap” to a StormWater pipe feature.

GPT Complex / GPT Simple / NonGPTSimple

Asset Capture: Single point feature located at the centre of chamber on the top surface. Note: Capturing centre of lid is appropriate only when the lid is centred over the chamber.

Known as Gross Pollutant Traps (GPTs) fall into and are captured in three primary categories:

- GPT Complex such as Commercial or Custom built device (e.g. Humes Interceptor)
- GPT Simple such as an “in pit” basket or “end of line” device
- GPT Non-Simple which represent basic and minor sand filtration storage

Spatial Relationship: GPTComplex and NonGPTSimple assets must “end snap” to pipe features as per Pits/Manhole features. However GPTSimple asset’s spatial location must correlate with a Pit/Manhole asset as they are housed within those structures and can be removed for maintenance or relocation.

WSUDArea

Asset Capture: Water Sensitive Urban Design areas such as kerbside bio-filtration beds or purpose built drainage swales should be captured individually as a region/polygon. Individual areas are to be recorded within the ADAC data capture fields defining class type (e.g swale, buffer strip, bio-retention basin)

Spatial Relationship: Not Applicable.

Breaklines

Asset Capture: Complex linear feature (read: polylines including curves but not bézier curves) representing distinct interruptions in the slope of a surface. Breaklines to be captured as polylines along the break in surface slope and to be defined under the Supplementary Polyline feature class with the Class elements as “Breakline”. No custom attributes are required.

Spatial Relationship: Not Applicable.

Port of Brisbane Speciality ADAC Assets

Camera

Asset Capture: Simple point feature representing a camera. To be captured as a single point feature representing the position of the camera at ground level as shown in figure 23 below. Cameras to be defined under the Supplementary Point feature class with the Class element as “Camera”. No custom attributes are required for this Supplementary Feature. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Figure 23 a

Figure 23 b

Service Conduit

Asset Capture: Complex linear feature (read: polylines including curves but not bézier curves) representing a conduit run. Service conduits to be defined under the Supplementary Polyline feature class with the Class element “Service Conduit”.

Conduit runs to be picked up at “centre-top” as shown in figure 24, along length of conduit run at no more than 10 metre intervals and at changes of

direction where a fitting is installed (i.e. bend, elbow or tee). Please refer to Appendix A for attribute details. Note: Conduit bank configurations to recorded as an attribute (e.g. “3x4”, “2x2”, “2x3”)

Spatial Relationship: Must “end snap” to Service points.

Figure 24

Service Point

Asset Capture: Simple point feature representing a service point (communication, electrical, optic or otherwise). To be captured as a single point feature representing the centre of the service point as denoted by the green dots in figure 25b below. Service points to be defined under the Supplementary Point feature class with the Class element as “Service Point”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

Field Cabinet

Asset Capture: Simple point feature representing a field cabinet. To be captured as a single point feature representing the centre of the base of the field cabinet, this may require deriving the centre from the bounding rectangle as shown by the blue dot in figures 25a below. Field Cabinets to be defined under the Supplementary Point feature class with the Class element as “Field Cabinet”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable.

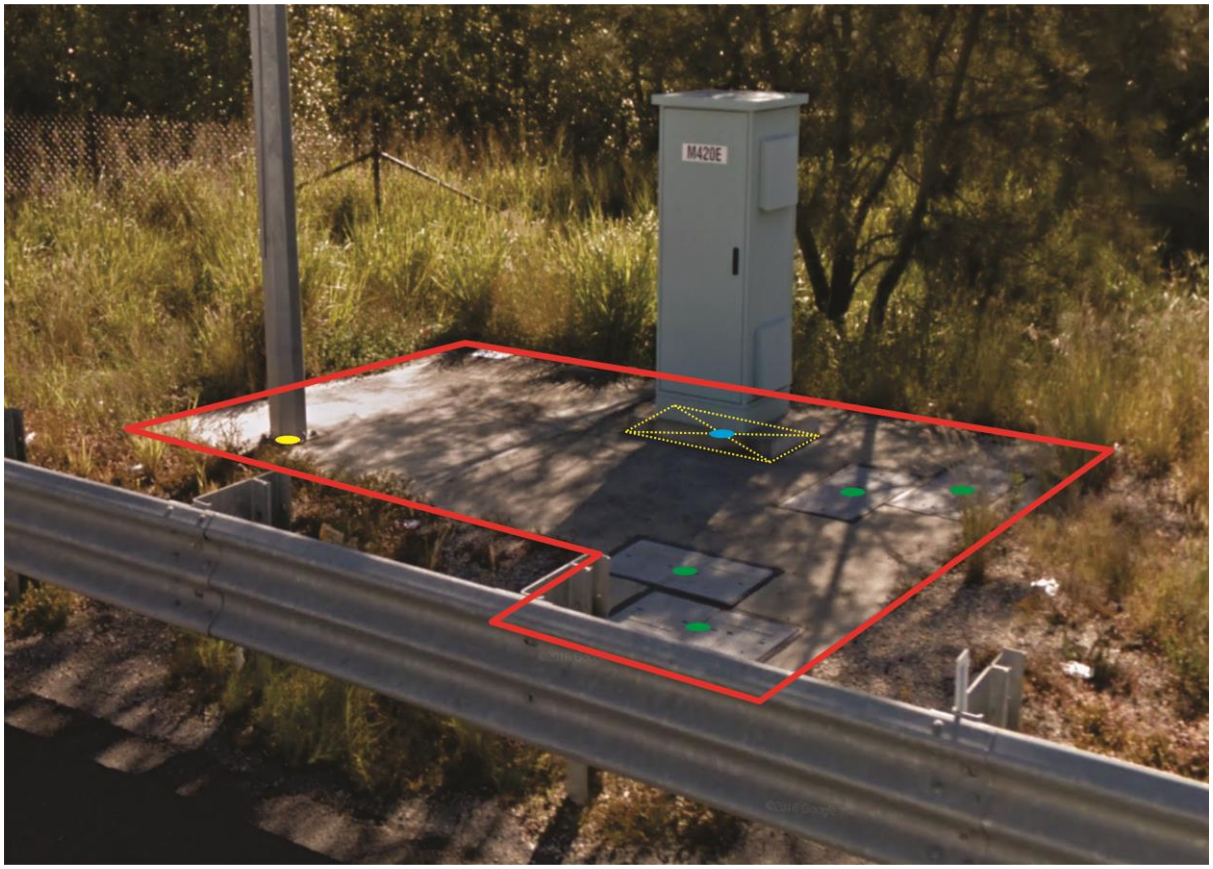


Figure 25 a

Figure 25 b

Horizontal Directional Drill Borehole Entry/Exit

Asset Capture: Simple point feature representing the entry and exit points as depicted in Figure 26. Bore Holes are to be defined under the Supplementary Point feature class with the Class element as “BoreHoleEntryExit”. Please refer to Appendix A for attribute details. Note: There should always be paired points captured representing the entry and exit locations of each bore with a linking Bore Log Identification Reference (BoreLogID’s) included.

Spatial Relationship: Not Applicable

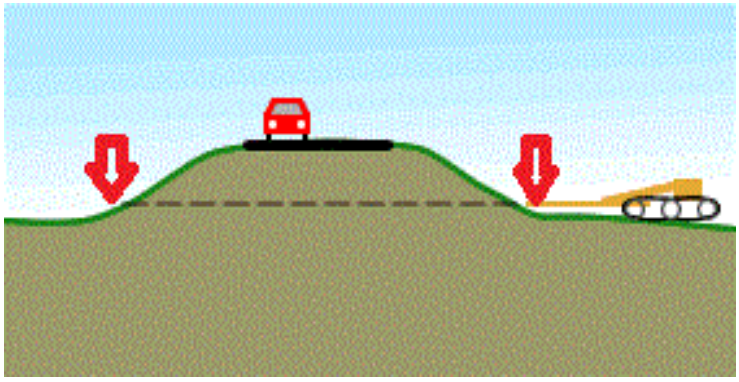


Figure 26

Landscaping

Asset Capture: Polygon feature representing an area of Landscaping. Captured as a closed polygon representing the different types of landscaping as noted in Figure 27 below. Landscaping is to be defined under the Supplementary Polygon feature class with the Class element as “Landscaping”. Please refer to Appendix A for attribute details.

Spatial Relationship: Not Applicable

Figure 27

Sewerage Assets

Property Connections

Asset Capture: Complex linear feature (read: polylines including curves but not Bezier Curves) representing the invert of the pipe asset. Enforced line direction from Inspection Opening to the Non Pressure Pipe/Maintenance Hole due to gravitational flow. Please refer to Figure 28 below.

Spatial Relationship: Gravity downstream end point of the linear feature must be coincident to anywhere on a Non Pressure pipe linear feature or the point feature of a Maintenance Hole if the asset is a "Stub" connection.

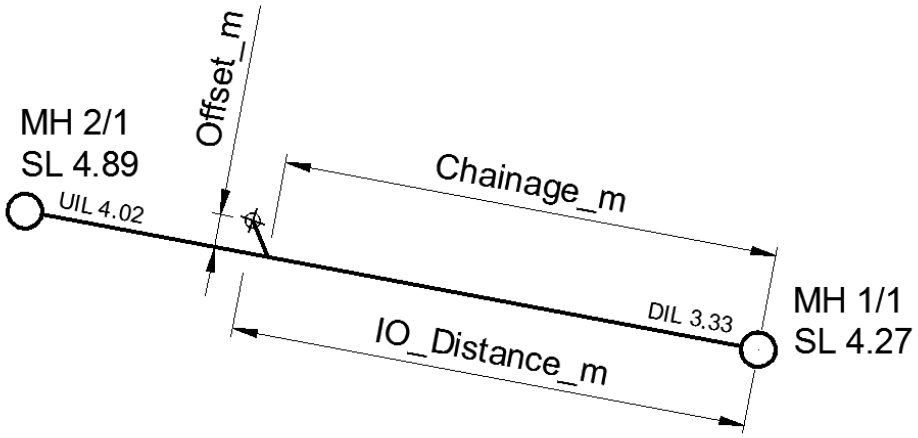


Figure 28

Fittings

Asset Capture: Single point feature representing the centre point of the fitting.

Spatial Relationship: Must be coincident to the end of pipe assets or a pipe asset anywhere along its length.

Maintenance Holes (Including Inspection Openings at End-of-Line)

Asset Capture: Single point feature located at the centre of chamber on the top surface. Note: Capturing centre of lid is appropriate only when the lid is centred over the chamber.

Spatial Relationship: Must be coincident to the end of pipe assets.

Irregular Shaped Chambers

Asset Capture: Polygon feature representing an irregular shaped pit/manhole chamber. Captured as a closed polygon, bounded by the inside chamber wall of the related pit/manhole. Irregular shaped chambers to be defined under the Supplementary Polygon feature class with the Class element as “Chamber”. Please refer to Appendix A for attribute details. (as per figure 17 above)

Spatial Relationship: Must contain a pit feature within closed polygon region.

Non Pressure Pipes

Asset Capture: Complex linear feature (read: polylines including curves but not Bezier Curves) representing the invert of the pipe asset. Enforced line direction from Gravity Upstream (read: higher AHD level) to Gravity Downstream (read: lower AHD level) due to gravitation flow in each individual pipe.

The gravity upstream and downstream ends of an individual pipe are captured at the intersection between the pipe material and the wall of the chamber. Please refer to figure 29 for a detailed diagram. Points 2 and 3 represent the intersection of pipe material and chamber wall whereas points 1 and 4 represent the Maintenance Holes capture.

Spatial Relationship: Must be coincident to Non Pressure pipe point features in the pumped sewerage network.

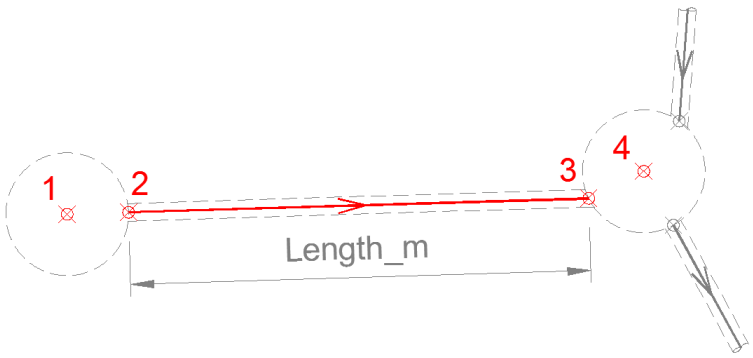


Figure 29

Pressure Pipes

Asset Capture: Complex linear feature (read: polylines including curves but not Bezier curves) representing the invert of the pipe asset. Enforced line direction from Pump active asset to Discharge Maintenance Hole due to pumped flow.

Pipes to be captured based on their physical and spatial properties and attributes. For example, if a pipe changes size, material, class, embedment or direction etc. then it must be broken and captured separately.

Spatial Relationship: Must be coincident to Pressure pipe point features in the pumped sewerage network.

Valves

Asset Capture: Single point feature representing the centre of a valve body, typically the spindle.

Spatial Relationship: Must be coincident anywhere along its length or at the end of Pressure Pipe assets.

Water Supply Assets

Fittings / Service Fittings / Irrigation Fittings

Asset Capture: Single point feature representing the centre point of the fitting. Please refer to the yellow circles in figure 30 (below) for representations of a "Tee" and "Tapping Band".

Spatial Relationship: Must be coincident to a pipe asset in the water reticulation network.

Hydrants

Asset Capture: Single point feature representing the centre of the vertical hydrant branch.

Spatial Relationship: Must be coincident to a pipe asset.

Maintenance Holes / Storage Tanks

Asset Capture: Single point feature located on the centre of the chamber. If required to capture the polygon feature please utilise the Supplementary Polygon feature (refer to Supplementary Features page 17 above).

Spatial Relationship: No connectivity is enforced due to the size and shape of the object.

Meters

Asset Capture: Single point feature located at the centre point of the domestic meter itself. Please note: The definition for the OffsetSide element is "the offset from the left or the right side boundary when looking from the road."

Spatial Relationship: Must be coincident to a water pipe with a Use of "Fire Service", "Service" or "Fire Service Thru Meter".

Pipes

Asset Capture: Simple Linear feature (i.e. straight lines) representing the Invert of a circular pipe asset. Pipe segments are to be captured based on the pipe attributes. If any physical element of a pipe changes (e.g. size, material, class etc.) then the pipe asset must be broken and captured separately. Please refer to the red and green polylines in figure 30 below. The red lines represent reticulation pipes whereas the green line represents a service pipe. Note: the dash/dot polyline is not broken at the fittings as the physical specification of the pipe doesn't change.

Spatial Relationship: Pipes must be coincident to water valves and fittings that participate in a flow network.

Valves

Asset Capture: Single point feature representing the centre of a valve body, typically the spindle.

Spatial Relationship: Must be coincident to a Water Pipe asset.

Asset Relationship: When a valve is in-line with a Water Pipe asset with ADAC.Use = "Fire" or "Service"; the Valve ADAC.Use value must be "Service".

Below is an image of a Tee and Tapping Band (yellow circles) connected to reticulation mains (redlines) and a service pipe (green line).

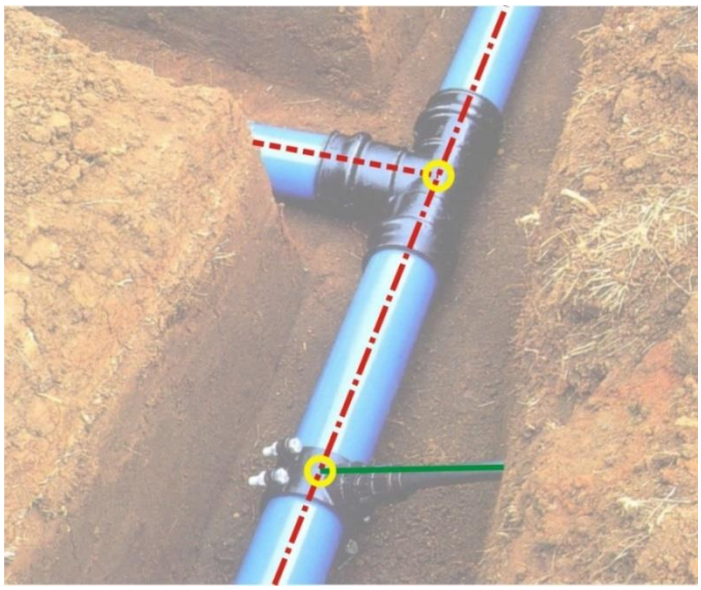


Figure 30

Break Points for Linear Assets

Water Pipes

When capturing water pipe networks the actual pipe lengths (individual pipe assets) must not be routinely broken at every fitting i.e. bend, elbow, tee or valve.

The following details identify where "breaks" are to be made and pipe lengths to be recorded as individual records during ADAC XML file creation.

Water Pipe lengths are to be broken or terminated at the following valves and fittings:

- Valves (ADAC.Use)
  - Stop Valves
  - Zone Boundary Valves
  - Pressure Reducing Valves
  - Reflux Valves
- Fittings (ADAC.Type)
  - Dead Plates, External Dead Ends
  - Connectors, Cross Connections, Connector Thrusts
  - Dismantling Joints, Gibaults, Tapers
  - Wyes, Tees
  - Tee Branch Dead Ends, Tee Branch External Dead Ends
  - Booster Pumps
- Water Maintenance Holes (all features)

Sewerage Pipes

The following details identify where "breaks" are to be made and pipe lengths to be recorded as individual records during ADAC XML file creation.

Sewer Pipe lengths are to be broken or terminated at the following fittings, devices and structures:

- Sewer Maintenance Holes (all features)
- Fittings (all features)
- Valves (ADAC.Use)
  - Stop
  - Services
  - Overflow

APPENDIX A - ADAC DATA SCHEMA

The following hierarchy identifies the individual assets and characteristics available to be captured and categorised by asset service class nominating attributes and “mandatory status”.

Default Supplementary Object Model

Note: These features only contain the Object_Id element from the Global elements.

SupplementaryPoint / SupplementaryPolyline / SupplementaryPolygon

Element Name	Mandatory (Y/N)
Class	Y
Note	N
Attribute()TextValue	N
Attribute()IntegerValue	N
Attribute()DecimalValue	N
Attribute()DateValue	N
Attribute()TimeValue	N
Attribute()DateTimeValue	N

Supplementary Transport Object Models

Bridge Extent Custom Attributes

Class = “Bridge Extents”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Name	TextValue		Y
Type	TextValue		Y
Use	TextValue	Rail, Road, Shared	Y
Spans	IntegerValue		Y
Configuration	TextValue	Overpass, Underpass	Y
OverClearance_m	DecimalValue		Y (If Overpass)
UnderClearance_m	DecimalValue		Y (If Underpass)

Bridge Scuppers Custom Attributes

Class = “Bridge Scuppers”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
NumberOfScuppers	IntegerValue		Y
Length	DecimalValue		Y

Directional Line Marking Custom Attributes

Class = "Directional Line Marking"

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
MUTCD_Code	TextValue	As per the "Manual of Uniform Traffic Control Devices" code	Y
ApplicationType	TextValue	Thermatic Painted, Painted	Y

Chevron Line Marking Custom Attributes

Class = "Chevron Line Marking"

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
ApplicationType	TextValue	Thermatic Painted, Painted	Y
TrafficDirection	TextValue	Traffic to Left, Traffic to Right, Traffic either side	Y

Pavement Custom Attributes

Class = "Motorway Pavement"

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Name	TextValue		Y
SurfaceType	TextValue	1 Coat Bitumen Seal, 2 Coat Bitumen Seal, Asphalt, Concrete, Slurry Seal, Stone Mastic Asphalt	Y (if Surface exists)
SurfaceThickness_mm	IntegerValue		Y (if Surface exists)
WaterProofingSealType	TextValue		Y (If Water Proofing exists)
WaterProofingSealDepth_mm	IntegerValue		Y (If Water Proofing exists)
IntermediateType	TextValue		Y (If Intermediate Layer exists)
IntermediateDepth_mm	IntegerValue		Y (If Intermediate Layer exists)
SealType	TextValue		Y (if Seal exists)
SealThickness_mm	IntegerValue		Y (if Seal exists)
BaseLayerType	TextValue	Asphalt Type, Gravel Type 1.1, 2.1, 2.2, 2.3, 2.4, 2.5	Y (if Base Layer exists)
BaseLayerDepth_mm	IntegerValue		Y (if Base Layer exists)
BaseStabilisation	TextValue	Cement, Foamed Bitumen, Geogrid, Lime	Y (if Base Stabilisation exists)
SubBaseLayerType	TextValue	Asphalt Type, Gravel Type 1.1, 2.1, 2.2, 2.3, 2.4, 2.5	Y (if SubBase Layer exists)

SubBaseLayerDepth_mm	IntegerValue		Y (if SubBase Layer exists)
SubBaseStabilisation	TextValue	Cement, Foamed Bitumen, Geogrid, Lime	Y (if SubBaseStabilistaion Exists
LowerSubBaseLayerType	TextValue	Asphalt Type, Gravel Type 1.1, 2.1, 2.2, 2.3, 2.4, 2.5	Y (if LowerSubBase Layer exists)
LowerSubBaseLayerDepth_mm	IntegerValue		Y (if seal exists)
LowerSubBaseStabilisation	TextValue	Cement, Foamed Bitumen, Geogrid, Lime	Y (if LowerSubBaseStabilisation exists)
LowerSubBaseSealType	TextValue		Y (if Lower SubBase Seal exists)
LowerSubBaseSealThickness_mm	IntegerValue		Y (if Lower SubBase Seal exists)
PavementGeoTextile	TextValue		Y (if PavementGeoTextile exists)
SubgradeCBR	IntegerValue		Y
SubgradeStabilisation	TextValue	Cement, Foamed Bitumen, Geogrid, Lime	Y (if SubgradeStabilisation exists)

Crash Barriers, Guard Rails, and Acoustic Barriers Custom Attributes

Class = “Barriers”

Element	Attribute Type	Enumerations	Mandatory (Y/N)
Type	TextValue	Acoustic, Crash	Y
Manufacturer	TextValue		Y
Model Number	TextValue		Y
impactType	TextValue	Rigid Semi-Rigid Non-Rigid / Flexible Gating Non-Gating Re-Directive System Non-Redirective System Temporary	Y
Profile	TextValue	Thrie Beam Modified Thrie Beam W-Beam Beam - other Ezyguard Rubrail Transition Single Slope Type F Rope Bollard Run Wall	Y

		Mound	
Length	DecimalValue		N
Height	DecimalValue		Y
Link_material	TextValue	Pressed Steel - Stainless Pressed Steel - Galvanised Corrugated Steel - Galvanised Steel - Wire Rope Steel - unspecified Aluminium Concrete Safety Glass Stone / Boulder Timber - Paling Timber - Plank Timber - Plywood Polypropylene Earth / Soil / Sand Water Container None - uprights only	Y (includes blank entry for other input)
Upright_material	TextValue	Steel - Stainless Steel - Galvanised Steel - Powder Coated Steel - unspecified Aluminium Concrete Stone / Boulder Timber - posts Timber - other Earth / Soil / Sand None	Y (includes blank entry for other input)
Top_material	TextValue	Chain Delineators Sheet - Metal Sheet - Timber Rail - Steel Rail - Timber Wire - Barbed Wire - Strand Plastic Other Aluminium None	Y
UprightNumber	DecimalValue		N
Scuppers	TextValue	True/False	Y
IntegratedConduit	TextValue	True/False	Y

Crash Barrier / Guard Rail End Custom Attributes

Class = “Barrier End”

Element	Attribute Type	Enumerations	Mandatory (Y/N)
impactType	TextValue	Non-Gating Re-Directive System Non-Redirective System Gating	Y
Manufacturer	TextValue		Y
Model Number	TextValue		Y
Profile	TextValue	Bullnose Question Mark / Curled Crash Cushion Taper to ground TRACC System 4.3m long TRACC System 6.5m long TRACC System 7.9m long Other	Y
Material	TextValue	Steel - Galvanised Steel - Wire Rope Steel - unspecified Concrete Stone / Boulder Polypropylene Earth / Soil / Sand Water Container	Y
Position	TextValue	Leading Trailing Median	Y
Rotation	DecimalValue		Y

Transport Lighting Custom Attributes

Class = “Lighting”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Use	TextValue	Pedestrian, Road, Safety, Shared	Y
Manufacturer	TextValue		Y
ModelNumber	TextValue		Y
Rotation	DecimalValue		Y

Road Signs Custom Attributes

Class = “Road Sign”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Type	TextValue	Regulatory Information Warning Naming Hazard Marker Guide Freeway Guide Temporary	Y
Structure	TextValue	Gantry Free standing Overpass Guard Single Pole Twin Pole Triple Pole Quadruple Pole Post - other	Y
MUTCD_Code	TextValue	The “Manual of Uniform Traffic Control Devices” unique code	Y
Rotation	DecimalValue		Y

Variable Speed Limit Signs Custom Attributes

Class = “VSL Sign”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Manufacturer	TextValue		Y
ModelNumber	TextValue		Y
Rotation	DecimalValue		Y

Variable Message Signs Custom Attributes

Class = “VM Sign”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Type	TextValue	Type A, Type B, Type C (MRTS202 - Section 8.5.1)	Y
Rotation	DecimalValue		Y

Camera Custom Attributes

Class = “Camera”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Use	TextValue	ANPR, CCTV	Y
MountType	TextValue	Pole, Horizontal Wall, Vertical Wall	Y

Field Cabinet Custom Attributes

Class = “Field Cabinet”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Identifier	TextValue		Y
CCTVCamera	TextValue	True, False	Y
ANPRCamera	TextValue	True, False	Y
VSLSign	TextValue	True, False	Y
VMSign	TextValue	True, False	Y
VehicleLoopDetector	TextValue	True, False	Y
WiM System	TextValue	True, False	Y

Service Point Custom Attributes

Class = “Service Point”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Use	TextValue	Communication, Electrical, Optic Fibre	Y
Type	TextValue	Pillar Box, Pit	Y

Service Conduit Custom Attributes

Class = “Service Conduit”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
NumberOfConduits	IntegerValue		Y
ConduitConfiguration	TextValue		Y

Horizontal Drilling Bore Holes Custom Attributes

Class = “BoreHoleEntryExit”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
BoreLogID	TextValue		Y

Landscaping Attributes

Class = “Landscaping”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Type	TextValue	Grass, Landscape/Tree/Mulch	Y

Supplementary Stormwater Object Models

Irregular Shaped Chamber Custom Attributes

Class = “Chamber”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
MaintenanceHoleID	TextValue		Y

End Structure Components Custom Attributes

Class = “End Structure Face”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Material	TextValue	Concrete, Gabion, Grouted Rock, Reinforced Concrete, Revetment Mattress	Y

Scour Protection Custom Attributes

Class = “Scour Protection”

Element Name	Attribute Type	Enumerations	Mandatory (Y/N)
Material	TextValue	Concrete, Geotextile, Gabion, Grassed, Grouted Rock, Placed Rock, Revetment Mattress, Stone Pitched	Y

Transport Object Model

Parking

Element Name	Mandatory (Y/N)
Name	Y
NoOfCarparks	N
OnOffStreet	Y
SurfaceType	Y (if Surface exists)
SurfaceThickness_mm	Y (if Surface exists)
SurfaceArea_sqm	N
PavementType	Y
BaseLayerType	Y (If BaseLayer exists)
BaseLayerDepth_mm	Y (If BaseLayer exists)
BaseStabilisation	N
SubBaseLayerType	Y (If SubBaseLayer exists)
SubBaseLayerDepth_mm	Y (If SubBaseLayer exists)
SubBaseStabilisation	N
LowerSubBaseLayerType	Y (If LowerSubBaseLayer exists)
LowerSubBaseLayerDepth_mm	Y (If LowerSubBaseLayer exists)
LowerSubBaseStabilisation	N
PavementGeoTextile	N
SubgradeCBR	Y
SubgradeStabilisation	N

PathStructure

Element Name	Mandatory (Y/N)
Use	Y
Structure	Y
SurfaceMaterial	Y
SubStructureMaterial	Y
Width_m	Y

Pathway

Element Name	Mandatory (Y/N)
Use	Y
Structure	Y
SurfaceMaterial	Y
Width_m	Y
Depth_mm	Y

Pavement

Element Name	Mandatory (Y/N)
Name	Y
SurfaceType	Y (if Surface exists)
SurfaceThickness_mm	N
SurfaceNomWidth_m	Y (if Surface exists)
PavementType	Y
BaseLayerType	Y (If BaseLayer exists)
BaseLayerDepth_mm	Y (If BaseLayer exists)
BaseStabilisation	N
SubBaseLayerType	Y (If SubBaseLayer exists)
SubBaseLayerDepth_mm	Y (If SubBaseLayer exists)
SubBaseStabilisation	N
LowerSubBaseLayerType	Y (If LowerSubBaseLayer exists)
LowerSubBaseLayerDepth_mm	Y (If LowerSubBaseLayer exists)
LowerSubBaseStabilisation	N
PavementGeoTextile	N
SubgradeCBR	Y
SubgradeStabilisation	N

PramRamp

Element Name	Mandatory (Y/N)
Rotation	N

RoadEdge

Element Name	Mandatory (Y/N)
Type	Y
Length_m	N
PavementExtension_mm	Y

RoadIsland

Element Name	Mandatory (Y/N)
Type	Y
Area_sqm	N
InfillType	Y

RoadPathway

Element Name	Mandatory (Y/N)
Use	Y
Structure	Y
SurfaceMaterial	Y
Width_m	Y

SubSoilDrain

Element Name	Mandatory (Y/N)
Use	Y
Type	Y
Length_m	N

Stormwater Object Model

EndStructure

Element Name	Mandatory (Y/N)
StructureID	Y
StructureLevel_m	Y
EndWallType	Y (if EndWall exists)
EndWallConstruction	Y (if EndWall exists)
WingWallType	Y (if WingWall exists)
WingWallConstruction	Y (if WingWall exists)
ApronType	Y (if Apron exists)
ApronConstruction	Y (if Apron exists)
GrateType	N
TideGate	N
PredominantMaterial	Y
OutletProtectionType	Y
Rotation	N

Fitting

Element Name	Mandatory (Y/N)
FittingType	Y
Rotation	N

GPTComplex

Element Name	Mandatory (Y/N)
Sqid_Id	N
Manufacturer	Y (if Commerical)
ModelNumber	Y (if Commerical)
Length_mm	Y (Rectangular only)
Width_mm	Y (Rectangular only)
Diameter_mm	Y (Circular only)
Function1	Y
Function2	N
Function3	N
US_PipeDiameter_mm	N
DS_PipeDiameter_mm	N
SurfaceLevel_m	Y
US_InvertLevel_m	Y
DS_InvertLevel_m	Y
CleanoutLevel_m	Y
Depth_m	N
SumpDepth_m	N
HasFilterMedia	N
HasBasket	N
HasBoards	N
DesignFlow_m3s	Y
MaxContaminantVolume_m3	N
MaxInternalVolume_m3	N
MaintenanceCycle_mnths	N
Rotation	N

GPTSimple

Element Name	Mandatory (Y/N)
Sqid_Id	N
Construction	Y
Manufacturer	N
ModelNumber	N
TreatmentMeasure	Y
Function1	Y
Length_mm	Y
Width_mm	N
MaintenanceCycle_mnths	N
Rotation	N

NonGPTSimple

Element Name	Mandatory (Y/N)
Sqid_Id	N
Construction	Y
Manufacturer	N
ModelNumber	N
TreatmentMeasure	Y
Function1	Y
Function2	N
Function3	N
Length_mm	Y
Width_mm	N
MaintenanceCycle_mnths	N
Rotation	N

Pipe

Element Name	Mandatory (Y/N)
US_InvertLevel_m	Y
DS_InvertLevel_m	Y
US_SurfaceLevel_m	Y
DS_SurfaceLevel_m	Y
Diameter_mm	Y (Circular only)
Height_mm	Y (Rectangular only)
Width_mm	Y (Rectangular only)
Material	Y
Class	Y
JointType	Y (Circular only)
Cells	Y
ConcreteCoverType	Y
Grade	N
Length_m	N

Pit

Element Name	Mandatory (Y/N)
PitNumber	Y
Use	Y
ChamberConstruction	Y
Length_mm	Y (Rectangular only)
Width_mm	Y (Rectangular only)
Diameter_mm	Y (Circular only)
Radius_mm	Y (Extended only)
Extension_mm	Y (Extended only)
LidType	N
SurfaceLevel_m	Y
InvertLevel_m	Y
Depth_m	Y
InletConfig	Y (if Inlet exists)
InletType	Y (if Inlet exists)
LintelConstruction	Y (if Lintel exists)
LintelLength_m	Y (if Lintel exists)
OutletType	Y
FireRetardant	Y
Rotation	N

SurfaceDrain

Element Name	Mandatory (Y/N)
Type	Y
Shape	Y
LiningMaterial	Y
LinedWidth_m	Y
BatterMaterial	N
BatterWidth_m	N
US_InvertLevel_m	Y
DS_InvertLevel_m	Y
AverageGrade	N
Length_m	N

WSUDArea

Element Name	Mandatory (Y/N)
Sqid_Id	N
TreatmentMeasure	Y
Function1	Y
Function2	N
Function3	N
PondingArea_m2	N
PondingDepth_m	N
FilterArea_m2	N
FilterDepth_m	N
TransitionDepth_m	N
DrainageDepth_m	N
MacrophyteZoneArea_m2	N
MacrophyteZoneDepth_m	N
CoarseSedimentArea_m2	N
SedimentVolume_m3	N
MinSurfaceLevel_m	N
PermanentPondLevel_m	N
OutletLevel_m	N
DesignFlow_m3s	N
HasSpillway	Y
MaintenanceCycle_mnths	N

Sewerage Object Model

Connection

Element Name	Mandatory (Y/N)
SurfaceLevel_m	Y
InvertLevel_m	Y
Use	Y
Diameter_mm	Y
Material	Y
Class	Y
Length_m	Y
Type	Y
Chainage_m	Y
Offset_m	Y
LineNumber	N
DSMHID	N
IO_Distance_m	Y
SO_Nearest_m	Y
SO_Other_m	Y
Sediment_Trap	Y

Fitting

Element Name	Mandatory (Y/N)
Type	Y
Material	Y
BodySize_mm	Y
BranchSize_mm	N
Rotation	N

MaintenanceHole

Element Name	Mandatory (Y/N)
Use	Y
Length_mm	Y (Rectangular only)
Width_mm	Y (Rectangular only)
Diameter_mm	Y (Circular only)
Area_sqm	Y (Custom only)
SurfaceLevel_m	Y
InvertLevel_m	Y
FloorConstruction	Y
FloorMaterial	Y
WallConstruction	Y
WallMaterial	Y
RoofMaterial	Y
Lining	N
LidMaterial	Y
DropType	Y
CatchmentPS	N
LineNumber	N
MH_Number	Y
Chainage_m	N
TieDistance_m	N
OffsetDistance_m	N
Rotation	Y

PipeNonPressure

Element Name	Mandatory (Y/N)
LineNumber	N
Use	Y
Diameter_mm	Y
Material	Y
Class	Y
Lining	N
Protection	Y
JointType	Y
US_InvertLevel_m	Y
DS_InvertLevel_m	Y
US_SurfaceLevel_m	Y
DS_SurfaceLevel_m	Y
Alignment_m	N
AverageDepth_m	Y
Embedment	Y
RockExcavated	N
PipeGrade	N
Length_m	N

PipePressure

Element Name	Mandatory (Y/N)
Use	Y
Diameter_mm	Y
Material	Y
Class	Y
Lining	N
Protection	N
JointType	Y
Alignment_m	N
AverageDepth_m	N
Embedment	N
RockExcavated	N
Length_m	N

Valve

Element Name	Mandatory (Y/N)
Use	Y
Type	Y
Diameter_mm	Y
Protection	N
Manufacturer	N
ModelNumber	N
Rotation	N

Water Supply Object Model

Fitting

Element Name	Mandatory (Y/N)
Type	Y
Material	Y
Lining	N
Protection	N
BodySize_mm	Y
BranchSize_mm	N
Rotation	N

Hydrant

Element Name	Mandatory (Y/N)
Use	Y
Diameter_mm	Y
Rotation	N

IrrigationFitting

Element Name	Mandatory (Y/N)
Type	Y
BelowGround	Y
Rotation	N

MaintenanceHole

Element Name	Mandatory (Y/N)
Use	Y
Length_mm	Y (Rectangular only)
Width_mm	Y (Rectangular only)
Diameter_mm	Y (Circular only)
SurfaceLevel_m	Y
InvertLevel_m	Y
FloorConstruction	Y
FloorMaterial	Y
WallConstruction	Y
WallMaterial	Y
RoofMaterial	Y
LidMaterial	Y
Rotation	N

Meter

Element Name	Mandatory (Y/N)
SerialNumber	Y
Type	Y
Diameter_mm	Y
Dials	N
Manufacturer	N
ModelNumber	N
InitialReading	N
PrivateBooster	Y
Offset_m	Y
InstallationDate	Y
LotNo	Y
PlanNo	Y
Rotation	N

Pipe

Element Name	Mandatory (Y/N)
Use	Y
Alignment_m	N
Diameter_mm	Y
Material	Y
Class	Y
Lining	N
Protection	N
JointType	Y
AverageDepth_m	N
Embedment	N
Length_m	N

ServiceFitting

Element Name	Mandatory (Y/N)
Type	Y
BelowGround	Y
WaterSaver	Y
AutoShutOff	Y
Rotation	N

StorageTank

Element Name	Mandatory (Y/N)
Material	Y
Source	Y
Manufacturer	N
ModelNumber	N
Volume_m3	Y
Rotation	N

Valve

Element Name	Mandatory (Y/N)
Use	Y
Type	Y
Diameter_mm	Y
Manufacturer	N
ModelNumber	N
Rotation	N