STORMWATER DRAINAGE SPECIFICATION

Specifications for Drainage Digital Spatial Data at the City of Albany

Version 1.3
2017

INDEX

1. The Stormwater Drainage Specification

As part of the CITY OF ALBANY SPATIAL DATA SPECIFICATION the Stormwater Drainage Specification focus on both formed and natural drainage that the City of Albany have to maintain or be aware of. It captures both asset and some engineering details that allow not only for financial reporting and maintenance of assets but also to support future design and development.

The underpinning spatial standards are defined in the parent document, CITY OF ALBANY SPATIAL DATA SPECIFICATION.

The STORMWATER DRAINAGE SPECIFICATION is a requirement of the City of Albany to streamlines the processes undertaken for all drainage asset capturing and maintenance of this data in its geographic information systems (GIS).

This specification is for use by any Developers and Surveyors (hereafter referred to as "Consultants") who undertake Land Development or Capital Works activities that have to be recorded by the City of Albany.

This also includes any related construction activities undertaken by the City of Albany.

2. Contract Deliverables

2.1. Digital Spatial Data File Format

All data is to be supplied in the format specified by the City of Albany:

1. Preferred: ESRI Shapefile, FileGDB, PersonalGDB
2. By Special Arrangement: Mapinfo TAB/MIF, geoXML
3. Not Preferred: CADD DXF/DWG + EXCEL/CSV(Attribute Table)
4. Not Acceptable: PDF or hardcopy of Plan

2.2. Submission Metadata File

A readme.txt file is a simple text file that contains information about the project the digital data is being provided for and must accompany every digital data submission.

Label	Description	Example
PROJECT	Project name	Wyndham Estate
STAGE	Subdivision Stage Name	Stage 3B
DATE SUBMITTED	Date the digital data submitted	31/1/2008
COMPANY	Company name taking responsibility for the data	Work Force
SURVEY NUMBER/REF	Company's survey reference	A1
CONTACT	Contact name for this project	John Somebody
TELEPHONE	Telephone number	(08) 5555 1234
EMAIL	Email address (as applicable)	johns@workforceco.com.au
MAILING ADDRESS	Mailing address	Level 19 Lower St, Blackhouse Sth, WA, 6000
PHYSICAL ADDRESS	Physical business address	"As Above"
DATUM/PROJECTION	The coordinate system the data is in. Please note the City of Albany only uses GDA94 Zone 50.	GDA94 Zone 50
TRANSFORMATION	The coordinate system the data was transformed from	E.g. Albany Grid ALB94 to GDA94 Zone50
DATA FORMAT & VERSION	Details about the software and file version used to create the digital data	E.g. AutoCAD Map 2008 and QGIS
NOTES	Important notes or information to be included here.	Any other relevant information that the data custodian needs to be aware of.

2.3. Submission Media

The following are acceptable media for providing the digital data files.

- Email to the City of Albany cityassets@albany.wa.gov.au. (File size limitation is 15 megabytes)
- USB devices / CD-ROM / DVD
- Include the following (as a label or in the Email):
  Estate Name and Stage or Project Name: _____
  Council Approval Number(s): _____
  Authorised by: _____ Date: _____
  Consultant Company: _____

3. Graphical Specifications

3.1. Theme/Layer Structure

The following information is provided as the structure when putting together the spatial information.

Depending on the asset to be captured, not all the layers indicated here may appear in submitted data.

It is important to note that each layer should only contain the listed features; any other features present will impede the acceptance testing.

Layer	Feature Type	Description	Attributes
DRAINAGE PITS	Point	Specifies pits / access points in network. Examples of this include end walls, inlet and outlet structures.	**Attribute**
DRAINAGE PIPES	Polyline	Specifies drainage pipe line-work.	**Attribute**
PROP CONN	Polyline	Connections into the drainage network from any private properties.	**Attribute**
LAKES	Polygon	Specifies the area of the features for. Basins, Sumps, Wetlands, Ponds, Lakes and dams.	**Attribute**
SWALES	Polygon	Specifies the area of the trench indicating the location of a Swale (linear), Buffer Strips, Rain Gardens.	**Attribute**
DRAINAGE VISUALS	Point	Comments and observations supported by visual evidence. Like 2007 & 2014 Camera Surveys Video & Imagery	**Attribute**

3.2. Graphical Data Construction Principals

This section details the graphical data construction principles that must be adhered to for all features (polygons, lines, points).

Please use sound practices when recording data, such as snapping to lines or points, closing polygons and directional graphing in the direction of flow.

3.2.1. Drainage Pits

It is important to note that the pipe ends must snap to match to the pits.
Pipe end coordinates are used to match to pits and if they do not match, the acceptance testing will fail. A small number of errors may be corrected by the City of Albany, but excessive errors will result in processing delays and charges may be incurred.

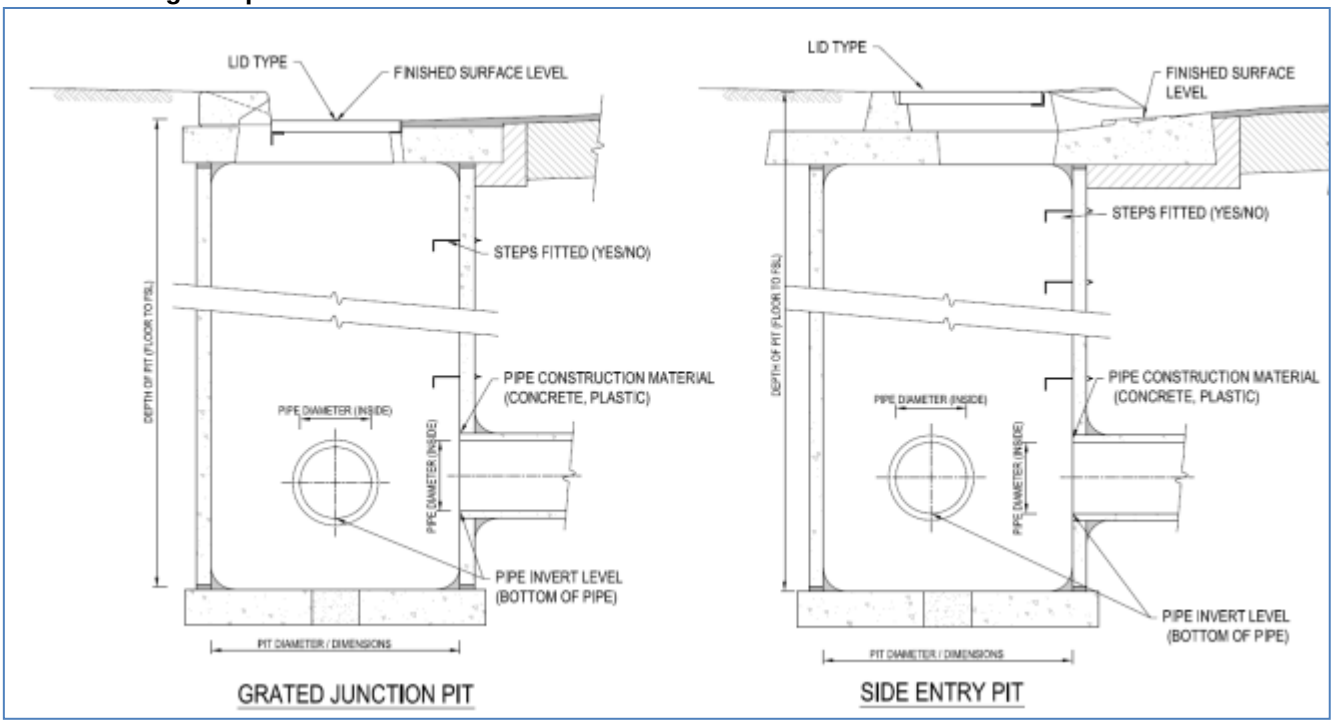
Each pit shall be depicted by a single point feature.

The attributes for this layer are specified in Table 4.1.

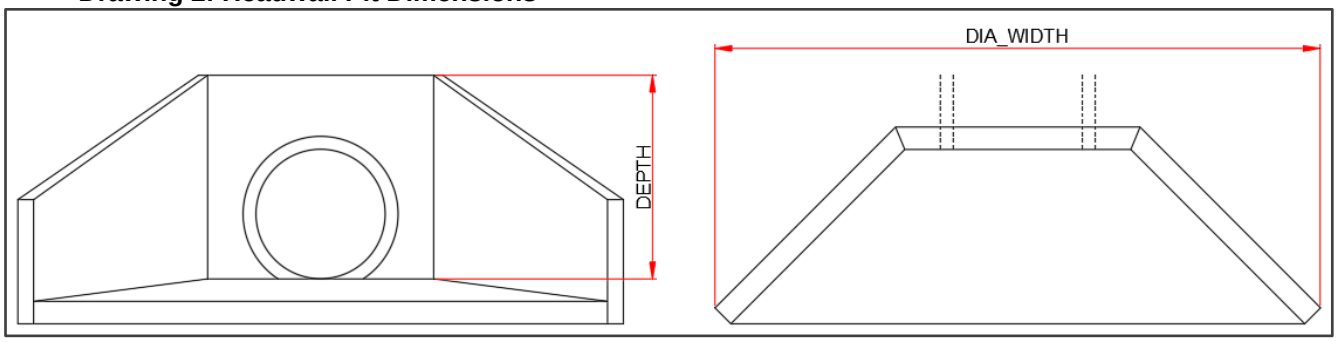
Drawing 1, Drawing 2 and Drawing 3 depict:

- Pits and other structures (headwalls, outlets) must be depicted by a point
- The point must be representative of the FSL (Finished Surface Level)
- For regular shaped pits (i.e. round, rectangular or square) the coordinates are to be in the centre of the structure, generally where the pipes would intersect.
- For irregular shaped structures the point is generally where the inlet and outlet pipe would intersect, or at the centre of the structure

Drawing 1: Pipe and Pit Attributes



Drawing 2: Headwall Pit Dimensions



3.2.2. Drainage Pipes

It is important to note that the pits and pipe ends must snap to match to the pits.
Pipe end coordinates are used to match to pits. If they do not match the acceptance testing will fail depending on the severity. A small number of errors may be corrected by the City of Albany, but excessive errors will result in processing delays and charges may be incurred by the consultant.

The attributes for this layer are specified in Table 4.2

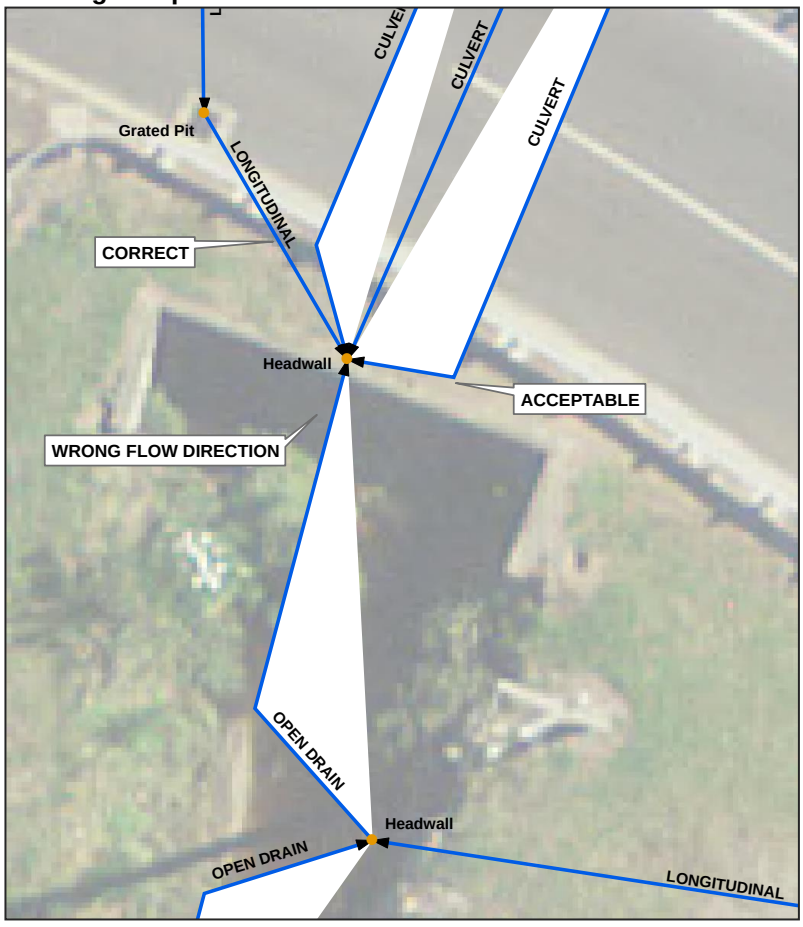
Each pipe shall be depicted by a single continuous line representative of the centreline of that pipe section. There is no attribute allowed to indicate multiple pipes per line feature.

Drawing 3 Depicts:

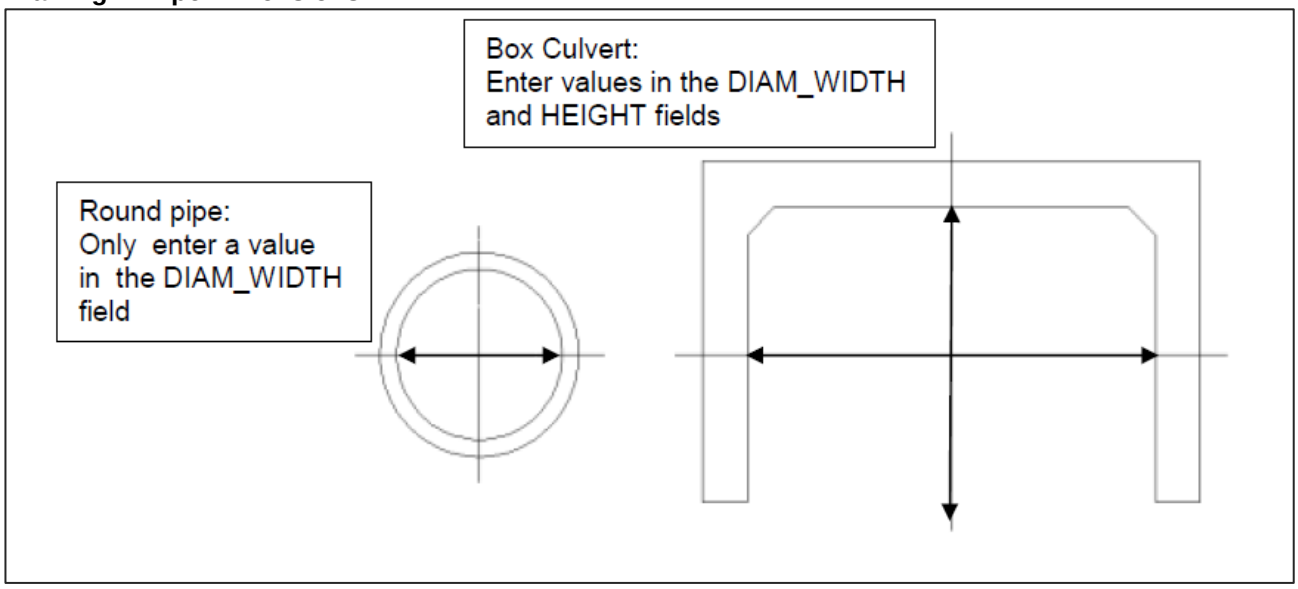
- Each pipe section shall run continuously between pits and is to be broken only at pit intersections, with exceptions of (see Drawing 3):
    - Open drains and swales
    - Multiple pipes connecting to a headwall
    - Subsoil drainage (like aggregated subsoil drains not connecting to a pit)
- Each pipe section is to be captured in the direction of its flow. (Di-Graph, see Drawing 3)
- A pit of type 'JP' must also be provided for any combination of the following instances:
    - changes in grade along a pipe section
    - changes in direction along a pipe section

Note that swales use a code 'UNK' for the pipe material since swales are constructed of multiple layers.

Drawing 3: Pipe Connections and Direction



Drawing 4: Pipe Dimensions



3.2.3. Property Connections

A property connection is any single (or sometimes dual) connection into the drainage network from private properties, being residential or commercial.

The attributes for this layer are specified in Table 4.3

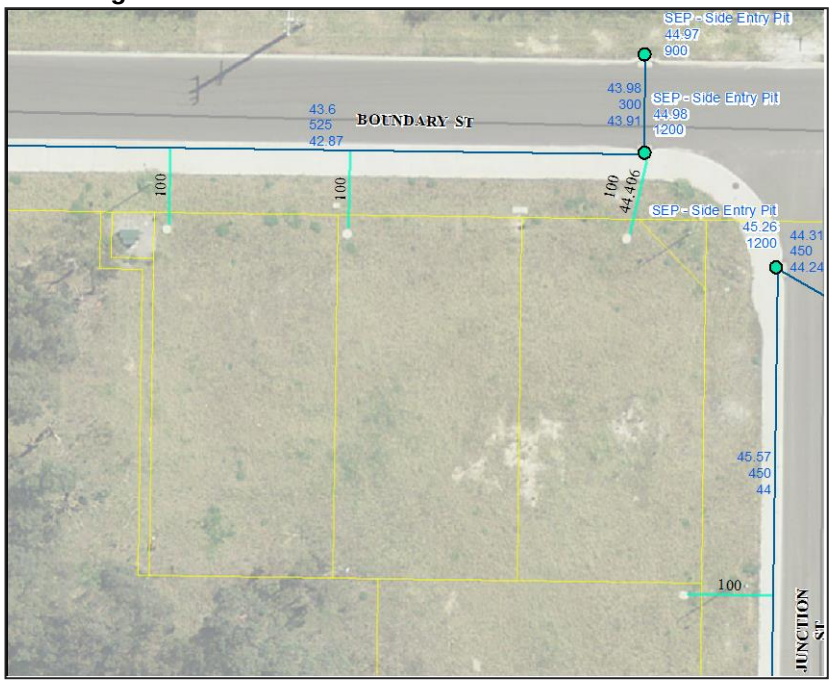
Each property drainage connection shall be depicted by a single continuous line representative of the centreline of the property connection starting at property connection pit and ending at the network pit.

Note that private properties containing drainage infrastructure in easement(s) are to the benefit of the City, and must be captured as defined in the PITS and PIPES sections.
In addition to this, it is not a requirement to provide any information of a network on private property (such as private car parks that are not in an easement), but it is strongly recommended to do so if possible (see pits and pipes owner attribute), especially if it is not a single house connection that significantly impact the drainage network.

Drawing 5 depict:

- Each property connection shall run continuously to a pit or pipe.
- Each pipe section is to be captured in the direction of its flow (Di-Graph)
- All lines must be “snapped” to a drainage pipe line features where applicable e.g. from the property connection pit to the drainage pipe.
- Some house connections connect to the network through a pit and must therefore snap to the appropriate point feature.

Drawing 5: House Connection



3.2.4. Lakes

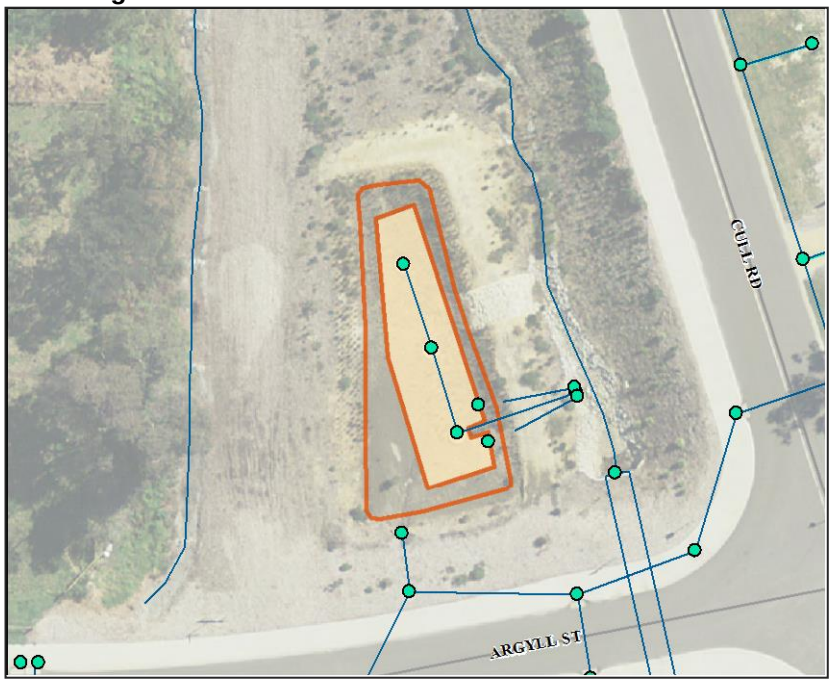
The features depicted in this section relate to areas of land or water bodies for water retention mechanisms, and not as stormwater conveyance mechanisms.
Basins, Sumps, Wetlands, Ponds, Lakes and Dams can be extensively vegetated areas of land/water bodies that range in size from house block scale to large regional systems. This excludes fish ponds, water features or fountains (see MANAGED SPACE SPECIFICATION).

The attributes for this layer are specified in Table 4.4

Each pond area shall be depicted by one polygon representing the size of the area i.e. top or maximum surface area.

These systems can be serviced by inlet and outlet structures and are recorded in sections 3.2.1 Pits and 3.2.2 Pipes.

Drawing 6: Ponds



3.2.5. Swales

The features depicted in this section relate to elements that are designed for linear retention of water runoff which consumes a surface area.

The attributes for this layer are specified in Table 4.5

Each swale area shall be depicted by two graphical components:

1. An area representing the size of the swale trench
    a. The swale trench is to be depicted by a polygon
    b. Generally represents the surface area of the trench, “top of bank”
2. A collection trench at the base of the swale, “bottom of trench”
    a. These features are captured as part of the PIPE network, section 3.2.1 Pipes.
    b. Swales are constructed from multiple layers of material and use the pipe material code ‘UNK’

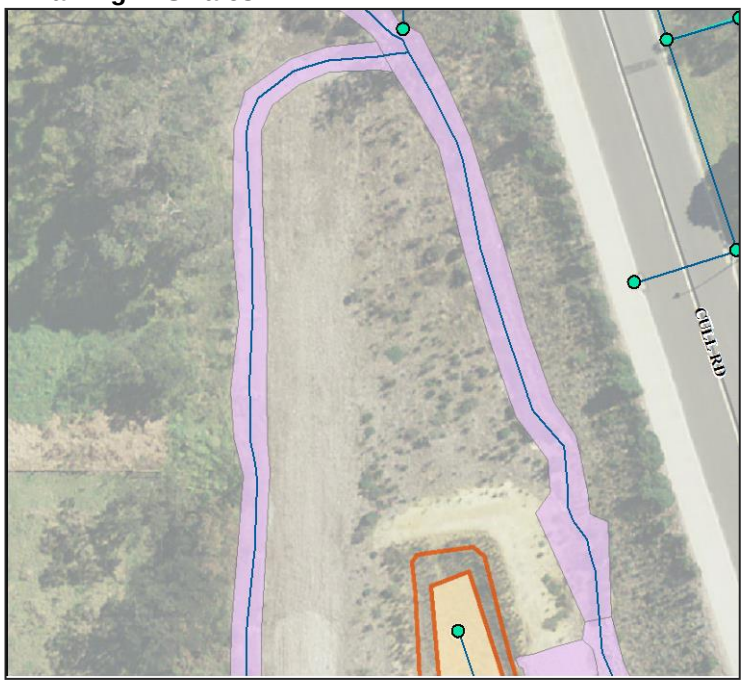
Definition of a “linear” swale:
Swales are linear depressions or channels that provide for stormwater collection and conveyance, where bio-retention swales (or bio-filtration trenches) are infiltration systems that are located within the base of the swale. Vegetated swales are used in lieu of a pipe network to convey stormwater.

This feature can be described in one of the following ways:

- Vegetated swale
- Bio-retention swale
- Buffer/Filter Strip
- Rain Garden

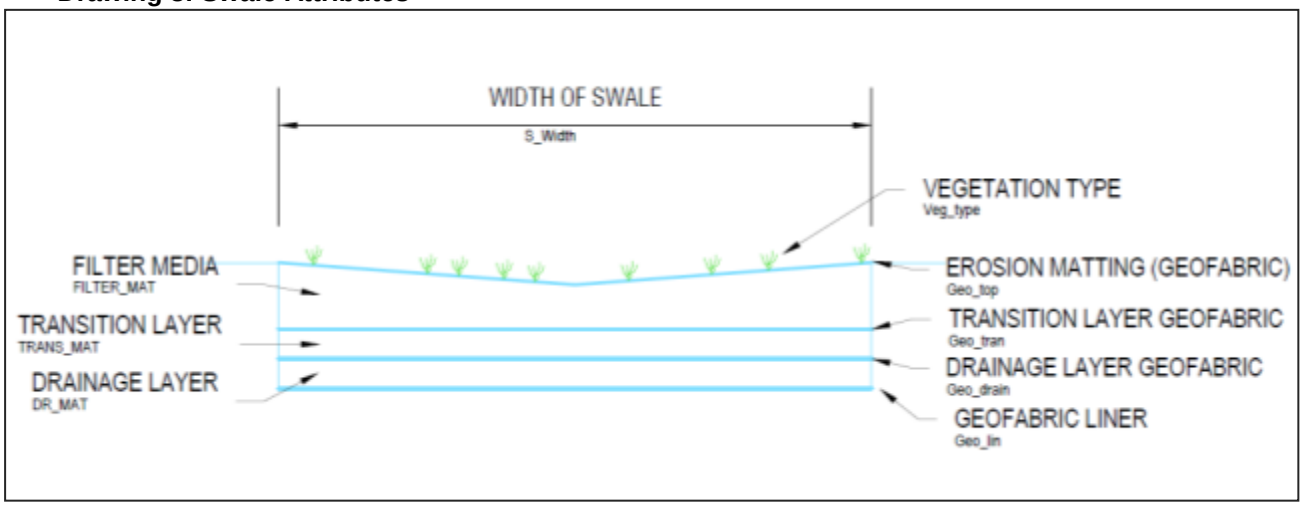
Please be aware that where there are instances of swale trenches in-between driveway crossovers that they must be separate polygons depicting each section of the swale.

Drawing 7: Swales



As the terminology for different components of Swale drains can vary, please use the below diagram as a guide for the collection of attributes.

Drawing 8: Swale Attributes



3.2.6. Drainage Visuals

Points are used to document visually identified defects and problems inside pits or pipes. A video or photo has to be supplied and referenced as specified in the attributes Table 4.6.

Each pit shall be depicted by a single point feature that is snapped to the associated pipe or pit.

There is also a Field in the PIPES attributes (Table 4.2) to support media (video or photo) related to the pipe sections.
The video or photos are to be supplied in a Sub Folder of the submission named VISUALS.

Drawing 9: Visuals

3.3. Acceptance Testing

Please note that the STORMWATER DRAINAGE SPECIFICATION reflects the City of Albany's requirements to record the asset. Contractual and compliance requirements, such as provision of marked-up drawings, are separate to this specification.

! The drainage network shall be a single continuous file/drawing (not tiled or split in any form). Non-compliance will result in failing the acceptance testing.

! Attributes must comply with all the specifications in Section 4. Non-compliance will fail the acceptance testing.

! Please note that Data Validation is implied by the feature type, attribute data types and content descriptions provided in Section 4. Contractors still have to ensure the data is correct.

3.4. Matching to Existing Infrastructure

It is the responsibility of the consultant to ensure the "As Constructed" digital data of the assets are related to the current digital drainage data held by the City of Albany.

The City of Albany will make available an extract of any digital drainage data held in their GIS that cover the specific project area. In some instances there may not be any data available or available data may not have been verified.

! Submissions must include all required attributes of the existing infrastructure that the new assets are connecting to. This allows for verification of existing drainage data and creates a 'tie-in' reference for the new infrastructure.

4. Attribute Specifications

All submissions will be provided in the preferred datum of City of Albany (MGA50 & AHD) as described in the CITY OF ALBANY SPATIAL DATA SPECIFICATION framework.

As all new cadastral information is placed on the MGA grid it is an expectation that all data provided by Contractors will be representative of this level of accuracy.

- All fields are to be populated in accordance with the notes and codes supplied in this document.
- All attribute files are to use the Column Names and Data Types set out in this section. Column names are restricted to 10 characters for compatibility (i.e. for ESRI Shape-files).
- All attributes marked with an M in the tables must be provided, and will fail the acceptance testing if not provided. **M = Mandatory Attribute**

4.1. DRAINAGE_PITS

	Column Name	Data Type	Max Length	Constraint	Contents
M	FEAT_TYPE	Alpha	5 chars	No commas	Type of pit; EG: JP or SEP (Table 5.1)
	FIELD_REF	Alpha/Numeric	10 chars	No commas First chars are the FEAT_TYPE	A unique field reference to this asset. This attribute does not necessarily change when the asset is replaced or moved. It is not an asset ID for tracking, but rather a long term in-field & contractual reference. EG "BBQ7"
	CON_TYPE	Alpha	5 chars	No commas	Construction Type; EG: Insitu (Table 5.2)
	LID_TYPE	Alpha	5 chars	No commas	Lid Construction Type EG: METAL (Table 5.3)
	LID_PDATE	Alpha/Numeric	10 char	dd/mm/yyyy	Creation/Construction/Installation date, EG: 2010; 17/05/2001
	LID_COND	Whole Number	n/a	Whole Number	Asset Condition Rating classification (Table 6.1)
	CYCLE_SAFE	Alpha	1 char	Yes/No field	Specific to Grate-style lids
M	DIA_WIDTH	Whole Number	n/a	Whole mm	Diameter of circular pit, or Side Width of pit; EG: 600
	LENGTH	Whole Number	n/a	Whole mm	Side Length of pit if it's not circular; EG: 900
M	FSL	Decimal Number	n/a	2 decimal metres	Finished Surface Level (FSL) of Pit (Drawing 1)
M	DEPTH	Decimal Number	n/a	2 decimal metres	Natural or Finished Surface level to bottom of pit relative to FSL. A 'down measure' depicted in Drawing 1.
	FLOOR_TYPE	Alpha	5 chars	No commas	Floor/Base of pit (Table 5.4)
	NO_OF_IRONS	Whole Number	n/a	0 if none	Number of installed step irons; EG: 4
	LITTER_TRP	Alpha	1 char	Yes/No field	Litter Traps is installed; EG: Y
M	PLACE_DATE	Alpha/Numeric	10 char	dd/mm/yyyy	Creation/Construction/Installation date, EG: 2010; 17/05/2001
I	CONDITION	Whole Number	n/a	Whole Number	Asset Condition Rating classification (Table 6.1)
I	COND_BY	Alpha	15 chars	No commas	Condition surveyor
	ASSET_ID	Alpha/Numeric	25 chars	No commas	Unique Asset identifier, used for accounting & asset management
	EXPEC_LIFE	Whole Number	n/a	Years	Expected life in Years
	REPL_COST	Decimal Number	n/a	Currency	Replacement cost of Asset as new
M	OWNER	Alpha/Numeric	5 chars	No commas	Responsible Entity (Table 5.10)
I	COA_REF	Alpha/Numeric	20 chars	No commas	Synergy file or record number
	SOURCE_REF	Alpha/Numeric	20 chars	No commas	Plan Number or Survey Job Reference: EG: 6080R212
	SOURCE	Alpha/Numeric	100 chars	No commas	Additional details related to the PLAN_NO field; EG: As-Constructed Plan; Designed Drawing; Great Southern Surveyors - Staqe 2 – 09/02/2013; CoA Assets Surveyor – Bob Jones – 15/07/2009

	WAPC_NO	Alpha/Numeric	20 chars	No commas	Western Australian Planning Commission reference number; or ‘n/a’
	LAST_AUDIT	Date	n/a	dd/mm/yyyy	Date of the previous audit EG: 12/06/2012
	COMMENTS	Alpha/Numeric	150 chars	No commas	Any additional comments that relate to this pit

4.2. DRAINAGE_PIPES

	Column Name	Data Type	Max Length	Constraint	Contents
M	FEAT_TYPE	Alpha	15 chars	No commas	EG: Pipe, open, culvert, subsoil (Table 5.5)
	FIELD_REF	Alpha/Numeric	10 chars	No commas First chars are the FEAT_TYPE	A unique field reference to this asset. This attribute does not necessarily change when the asset is replaced or moved. It is not an asset ID for tracking, but rather a long term in-field & contractual reference. EG "BBQ7"
M	MATERIAL	Alpha	5 chars	No commas	Pipe material, EG: RC (Table 5.6)
M	DIA_WIDTH	Whole Number	n/a	In millimetres	Pipe Diameter if circular, or Side Width if a culvert or non-circular; EG: 450 (Drawing 4)
	HEIGHT	Whole Number	n/a	In millimetres	Side Height if a culvert or non-circular pipe; EG: 450 (Drawing 4)
M	US_IL	Decimal Number	n/a	2 decimal metres	Invert Level at the Upstream side of pipe
M	DS_IL	Decimal Number	n/a	2 decimal metres	Invert Level at the Downstream side of pipe. Usually DS_IL =< US_IL. COMMENTS if this is not so by design.
M	PLACE_DATE	Alpha/Numeric	10 chars	dd/mm/yyyy	Creation/Construction/Installation date, EG: 2010; 17/05/2001
I	CONDITION	Whole Number	n/a	Whole Number	Asset Condition Rating classification (Table 6.2)
I	COND_BY	Alpha	15 chars	No commas	Condition surveyor
	ASSET_ID	Alpha/Numeric	25 chars	No commas	Unique Asset identifier, used for accounting & asset management
	EXPEC_LIFE	Whole Number	n/a	Years	Expected life in Years
	REPL_COST	Decimal Number	n/a	Currency	Replacement cost of Asset as new
M	OWNER	Alpha/Numeric	5 chars	No commas	Responsible Entity (Table 5.10)
I	COA_REF	Alpha/Numeric	20 chars	No commas	Synergy file or record number
	SOURCE_REF	Alpha/Numeric	20 chars	No commas	Plan Number or Survey Job Reference: EG: 6080R212
	SOURCE	Alpha/Numeric	100 chars	No commas	A Source name and additional details related to the SOURCE_REF; EG: As-Constructed Plan; Designed Drawing; Great Southern Surveyors - Stage 2 – 09/02/2013; CoA Assets Surveyor – Bob Jones – 15/07/2009
	WAPC_NO	Alpha/Numeric	20 chars	No commas	Western Australian Planning Commission reference number; or 'n/a'
	LAST_AUDIT	Date	n/a	dd/mm/yyyy	Date of the previous audit EG: 12/06/2012
	COMMENTS	Alpha/Numeric	150 chars	No commas	Any additional comments that relate to this pipe section
	VISUALS	Alpha	255 chars	No commas	Complements the VISUALS Layer. Relative Path to the video or image in the VISUALS subfolder; "visuals\123.avi"

4.3. PROP_CONN

	Column Name	Data Type	Max Length	Constraint	Contents
	FEAT_TYPE	Alpha	10 chars	No commas	EG: Use: “EXTRACTION” or “CONNECTION”
	FIELD_REF	Alpha/Numeric	10 chars	No commas First chars are the FEAT_TYPE	A unique field reference to this asset. This attribute does not necessarily change when the asset is replaced or moved. It is not an asset ID for tracking, but rather a long term in-field & contractual reference. EG “BBQ7”
M	MATERIAL	Alpha	5 chars	No commas	EG: PVC (Table 5.6)
M	DIAMETER	Whole Number	n/a	Whole mm	Diameter; EG: 450
M	DS_IL	Decimal Number	n/a	2 decimal metres	Invert level at end of pipe where it connects to the system; EG: 1.75
M	SILT_TRAP	Alpha	1 char	Yes/ No field	If silt trap exists then yes - EG: “Y” if not then “N” for no.
M	PLACE_DATE	Alpha/Numeric	10 chars	dd/mm/yyyy	Creation/Construction/Installation date, EG: 2010; 17/05/2001
I	CONDITION	Whole Number	n/a	Whole Number	Asset Condition Rating classification (Table 6.2)
I	COND_BY	Alpha	15 chars	No commas	Condition surveyor
	ASSET_ID	Alpha/Numeric	15 chars	No commas	Unique Asset identifier, used for accounting & asset management
	EXPEC_LIFE	Whole Number	n/a	Years	Expected life in Years
	REPL_COST	Decimal Number	n/a	Currency	Replacement cost of Asset as new
M	OWNER	Alpha/Numeric	5 chars	No commas	Responsible Entity (Table 5.10)
I	COA_REF	Alpha/Numeric	20 chars	No commas	Synergy file or record number
	SOURCE_REF	Alpha/Numeric	20 chars	No commas	Plan Number or Survey Job Reference: EG: 6080R212
	SOURCE	Alpha/Numeric	100 chars	No commas	Source name and additional details related to the SOURCE_REF; EG: As-Constructed Plan; Designed Drawing; Great Southern Surveyors - Stage 2 – 09/02/2013; CoA Assets Surveyor – Bob Jones – 15/07/2009
	WAPC_NO	Alpha/Numeric	20 chars	No commas	Western Australian Planning Commission reference number; or ‘n/a’
	LAST_AUDIT	Date	n/a	dd/mm/yyyy	Date of the previous audit EG: 12/06/2012
	COMMENTS	Alpha/Numeric	150 chars	No commas	Any additional comments that relate to this pipe section

4.4. LAKES

	Column Name	Data Type	Max Length	Constraint	Contents
M	FEAT_TYPE	Alpha	5 chars	No commas	Feature type EG: Lake (Table 5.7)
	FIELD_REF	Alpha/Numeric	10 chars	No commas First chars are the FEAT_TYPE	A unique field reference to this asset. This attribute does not necessarily change when the asset is replaced or moved. It is not an asset ID for tracking, but rather a long term in-field & contractual reference. EG "BBQ7"
	TOT_CATCH	Whole Number	n/a	Whole m²	Total catchment area that the system is servicing
	EQ_CATCH	Whole Number	n/a	Whole m²	Equivalent catchment area that the system is servicing
	TOP_AREA	Whole Number	n/a	Whole m²	Ground level area of the storage system
M	TOP_RL	Decimal Number	n/a	2 decimal places	Top bank level of the system
	BOTT_AREA	Whole Number	n/a	Whole m²	Base area of the storage system
M	BOTT_RL	Decimal Number	n/a	2 decimal places	Level at the base of the system. TOP_RL > BOTT_RL
	BATTERS	Decimal Number	n/a	2 decimal places	Grade of batters. EG: A grade of :1 in 8.5 to be recorded as 8.5
	STORREQ10	Whole Number	n/a	Whole m³	Storage required for 1 in 10 year storm
	STORAV10	Whole Number	n/a	Whole m³	Storage available for 1 in 10 year storm
	TWL_10	Decimal Number	n/a	2 decimal places	Top Water Level (RL) for 1 in 10 year storm. < TWL_DEC
	TWLAREA10	Whole Number	n/a	Whole m²	Top Water Level Area for 1 in 10 year storm
M	DES_EVC	Whole Number	n/a	Whole number	Design Event Criteria for Pond EG: 1 in 50 storm event
	STORREQDEC	Whole Number	n/a	Whole m³	Storage required for Design Event Criteria storm
	STORAVDEC	Whole Number	n/a	Whole m³	Storage available for Design Event Criteria storm
	TWL_DEC	Decimal Number	n/a	2 decimal places	Top Water Level (RL) for Design Event Criteria storm. < TOP_RL
	TWLAREADEC	Whole Number	n/a	Whole m²	Top Water Level Area for Design Event Criteria storm
M	PLACE_DATE	Alpha/Numeric	10 chars	dd/mm/yyyy	Creation/Construction/Installation date, EG: 2010; 17/05/2001
I	CONDITION	Whole Number	1 chars	Whole Number	Condition rating of the Pond Edge as defined in (Table 6.3)
I	COND_BY	Alpha	15 chars	No commas	Condition surveyor
	EXPEC_LIFE	Whole Number	n/a	Years	Expected life in Years
	REPL_COST	Decimal Number	n/a	Currency	Replacement cost of Asset as new
	ASSET_ID	Alpha/Numeric	15 chars	No commas	Unique Asset identifier, used for accounting & asset management
M	OWNER	Alpha/Numeric	5 chars	No commas	Responsible Entity (Table 5.10)
I	COA_REF	Alpha/Numeric	20 chars	No commas	Synergy file or record number
	SOURCE_REF	Alpha/Numeric	20 chars	No commas	Plan Number or Survey Job Reference: EG: 6080R212

	SOURCE	Alpha/Numeric	100 chars	No commas	Source name and additional details related to the SOURCE_REF; EG: As-Constructed Plan; Designed Drawing; Great Southern Surveyors - Stage 2 – 09/02/2013; CoA Assets Surveyor – Bob Jones – 15/07/2009
	WAPC_NO	Alpha/Numeric	20 chars	No commas	Western Australian Planning Commission reference number; or 'n/a'
	LAST_AUDIT	Date	n/a	dd/mm/yyyy	Date of the previous audit EG: 12/06/2012
	COMMENTS	Alpha/Numeric	150 chars	No commas	Any additional comments that relate to this feature

4.5. SWALES

	Column Name	Data Type	Max Length	Constraint	Contents
M	FEAT_TYPE	Alpha	5 chars	No commas	Feature type; EG: Swale, Buffer Strip, Rain Garden (Table 5.8)
	FIELD_REF	Alpha/Numeric	10 chars	No commas First chars are the FEAT_TYPE	A unique field reference to this asset. This attribute does not necessarily change when the asset is replaced or moved. It is not an asset ID for tracking, but rather a long term in-field & contractual reference. EG "BBQ7"
M	PURPOSE	Alpha	5 chars	No commas	Feature type; EG: Vegetated or Bio-retention (Table 5.9)
	DS_IL	Decimal Number	n/a	2 decimal places	Downstream end-of-swale Invert Level at the surface
	US_IL	Decimal Number	n/a	2 decimal places	Upstream end-of-swale Invert Level at the surface
	SURF_LENG	Decimal Number	n/a	2 decimal places	Total surface length of swale
	SURF_WIDTH	Decimal Number	n/a	2 decimal places	Width of swale in meters
	SURF_DEPTH	Decimal Number	n/a	2 decimal places	Depth of swale trench in meters from natural ground level to base
	VEG_TYPE	Alpha	50 chars	No commas	Vegetation type planted on the surface of the swale
	DRAIN_LINER	Alpha	50 chars	No commas	Liner used for the swale EG: Rock
	GEO_TOP	Alpha	50 chars	No commas	Geofabric top layer
	FILTER_MAT	Alpha	20 chars	No commas	Filter media / geo fabric used in the swale trench; EG: sandy loam
	FILTER_DEP	Whole Number	n/a	Whole mm	Filter / geo fabric media depth in millimetres
	TRANS_MAT	Alpha	20 chars	No commas	Transition layer material
	TRANS_DEP	Whole Number	n/a	Whole mm	Transition layer material (geo fabric) depth in millimetres
	DRAIN_MAT	Alpha	20 chars	No commas	Drainage layer material
	DRAIN_DEP	Whole Number	n/a	Whole mm	Drainage layer material depth in millimetres
	GEO_TRAN	Alpha	50 chars	No commas	Transition Layer Geofabric type / grade (if applicable) ; or 'n/a'
	GEO_DRAIN	Alpha	50 chars	No commas	Drainage Layer Geofabric type / grade (if applicable) ; or 'n/a'
	GEO_LINER	Alpha	50 chars	No commas	Geofabric liner type / grade (if applicable) ; or 'n/a'
	BATTERS	Decimal Number	n/a	2 decimal places	Grade of batters. EG: A grade of 1 in 8.5 to be recorded as 8.5
M	PLACE_DATE	Alpha/Numeric	10 chars	dd/mm/yyyy	Creation/Construction/Installation date, EG: 2010; 17/05/2001
I	CONDITION	Whole Number	n/a	Whole number	Condition rating of Swale as defined in (Table 6.4)
I	COND_BY	Alpha	15 chars	No commas	Condition surveyor
	ASSET_ID	Alpha/Numeric	15 chars	No commas	Unique Asset identifier, used for accounting & asset management
	EXPEC_LIFE	Whole Number	n/a	Years	Expected life in Years
	REPL_COST	Decimal Number	n/a	Currency	Replacement cost of Asset as new
M	OWNER	Alpha/Numeric	5 chars	No commas	Responsible Entity (Table 5.10)

I	COA_REF	Alpha/Numeric	20 chars	No commas	Synergy file or record number
	SOURCE_REF	Alpha/Numeric	20 chars	No commas	Plan Number or Survey Job Reference: EG: 6080R212
	SOURCE	Alpha/Numeric	100 chars	No commas	Source name and additional details related to the SOURCE_REF; EG: As-Constructed Plan; Designed Drawing; Great Southern Surveyors - Stage 2 – 09/02/2013; CoA Assets Surveyor – Bob Jones – 15/07/2009
	WAPC_NO	Alpha/Numeric	20 chars	No commas	Western Australian Planning Commission reference number; or 'n/a'
	LAST_AUDIT	Date	n/a	dd/mm/yyyy	Date of the previous audit EG: 12/06/2012
	COMMENTS	Alpha/Numeric	150 chars	No commas	Any additional comments that relate to this feature

4.6. DRAINAGE_VISUALS

	Column Name	Data Type	Max Length	Constraint	Contents
	COMMENT	Alpha/Numeric	250 chars	No commas	Short notation of problem
M	INDEX	Alpha/Numeric	15 chars	No commas	Distance or time stamp on video, or image; 1.4m, 0:13:56
	DIRECTION	Alpha	10 chars	No commas	Direction taken in relation to flow: 'UPSTREAM' or 'DOWNSTREAM'
	SURV_DATE	Date	n/a	dd/mm/yyyy	Closest date to observation
M	LINK	Alpha	250 chars	No commas	Relative Path to the file in the VISUALS subfolder; "drain_visuals\123.jpg"

5. Code Lists

Code lists are used to standardise terminology by providing a list of item descriptions relating to a particular attribute. A number of attributes specified in Section 4 require the input of these codes.

Consultants please note that should a code not exist within an attribute code list, mark the entity as code UNK, then write the new code and an appropriate description in the comment field. Please pre-empt this situation by communicating such anomalies to the City of Albany promptly (email: cityassets@albany.wa.gov.au).

5.1. Pit Type

Code	Description	Comment
EP	End of Pipe	Use when no Headwall or Pit
CAP	Capped pipe	Temporary cap placed for future connection. Lid type = UNK, Con Type = UNK
BUP	Bubble Up Pit	End of line/pressure relief
GP	Grated Pit	Pit with grated lid not in trafficable locations. Pit lid type = GR
GUL	Gully Pit	Grated Pit constructed along road kerb or in crossovers. Grated Pits where traffic management is required. Pit lid type = GR
GPT	Gross pollutant trap	Provide details in comments field
GSP	Grated Swale Pit	Inlet placed in swale. Pit lid type = GR
GSH	Grated Swale Pit (House Connection)	Pit lid type = GR
GSOAK	Grated Soak Well	Pit lid type = GR
HW	Headwall	End treatment for pipes, use this description for both upstream and downstream treatments. Lid type = 'UNK'. Con Type not ERT, UNK
INC	Inlet from Basin	Compensating or drainage basin
INP	Industrial Gully Pit	Generally used in WA. Pit lid type = GR
JP	Junction Point	To be placed at a change of grade or direction of pipe, or an intersection of pipes with no constructed pit. Lid Type ='UNK', Floor type = UNK, Dia Width = NULL, Length = NULL
JPC	Junction Pit with Chamber	Pit with associated chamber
SEP	Side Entry Pit	Pit lid type = CI
SEPG	Side Entry / Gully Pit	Side Entry / Gully Pit combination. Pit lid type = Lid of SEP not the grate component.
OSEP	Oversized Side Entry Pit	Larger than MRWA Spec. Dimensions to be included in Comments field
OSEPG	Oversized Side Entry / Gully Pit	Larger than MRWA Spec. Dimensions to be included in Comments field
SOAK	Soak Well	Pit fitted with weepholes in sides

WEIR	Weir	Provide details in Comments field
VP	V Throated Pit	
UNK	Unknown	Use when not known

5.2. Pit Construction Type

Code	Description	Comment
PC	Pre-cast	Concrete pre cast
CIS	Cast in-situ	Concrete in-situ
CO	Concrete	Use if unknown concrete type
PCC	Pre-Cast Concrete	Commercially produced concrete product
BRK	Brick	Brick and mortar
RBRK	Rendered Brick	Brick rendered with in-situ concrete
STN	Stone	Generally a mortared stone
TMB	Timber	
ERT	Earth	
UNK	Unknown	Use when not known

5.3. Pit Lid Type

Code	Description	Comment
CA	Cast Iron	Pre-Cast Iron Inserts
CI	Concrete Insert (includes PCC)	Pre-Cast Concrete Inserts
CO	Concrete	Use if unknown concrete type
F	Fibreglass	
GA	Steel-Trafficable	Gatic™ style product, steel frame concrete filled
GR	Grate	
UNK	Unknown	Use when not known

5.4. Pit Floor Type

Code	Description	Comment
CPC	Concrete Pre Cast - Solid	Solid concrete base
CPW	Concrete Pre cast with weephole	Concrete base with soakage weephole
CIS	Cast in-situ	Concrete floor cast in-situ
AGG	Aggregate	Loose aggregate-filled
BENCH	Benched over pipe	Pit placed over existing pipe
HAUN	Concrete Haunches	Concrete haunches formed on pit floor
UNK	Unknown	Use when not known

5.5. Pipe Type

Code	Description	Comment
LONGITUDINAL	Longitudinal	
OPEN DRAIN	Constructed Open Drain	Managed/Maintained Waterways. For Natural earth/grass use MATERIAL = UNK
CROSSOVER	Property entrances	
CULVERT	Box culvert	
RELINED	Relined longitudinal pipes	Existing pipe relined with new material.
SUB-SOIL	Sub-soil drainage	
SWALE	For Swales 3.2.5	Used to denote conveyance of water in a swale, spillway and rain gardens
WATER COURSE	Natural Waterway	Flow channel of a natural River or Stream. MATERIAL = UNK
UNK	Unknown	Use when not known

5.6. Pipe Material

Code	Description	Class	Comment
AG	Aggregate Drains		Commonly used in sporting fields
AC	Asbestos Concrete		
BRK	Brick		
STONE	Stone pitched or mortared		
CONC	Concrete		Not known if reinforced
CORR	Corrugated Steel/Aluminium		Define Steel or Aluminium in Comments field
FSP	Fibre Reinforced Concrete		No steel reinforcement
FGP	Fibreglass Pipe		
HDPE	High Density Polyethylene		
IRON	Iron		Specify Galvanised or otherwise in comments
PPP	Polypropylene		“Black Max”
PVC	Polyvinylchloride		
RC	Reinforced concrete	No class	Use if class unknown
RC1	Reinforced concrete	1	
RC2	Reinforced concrete	2	
RC3	Reinforced concrete	3	
RC4	Reinforced concrete	4	
UCON	Un-reinforced Concrete		Concrete – no steel reinforcement
UPVCS	Un-plasticised Polyvinylchloride		Sewer Quality UPVC
VC	Vitreous clay		
UNK	Unknown		Use when not known or pipe type. Swale, Open Drain

5.7. Lake Type

Code	Description	Comment
PBS	Basins	Infiltration basin / bio-retention basin. Do not have a conveyance function, they provide treatment for storm water through fine filtration, extended detention and some biological uptake
SUMP	Sumps	Sedimentation basin. Component of the treatment train and are specifically designed to remove (by settling) the course to medium sized sediments
WTL	Wetlands	Shallow, extensively vegetated bodies of water. Generally consist of inlet zone, macrophyte zone and high flow bypass channel.
LAKE	Lakes	Permanent standing or slow moving bodies of open water created by natural depression or excavating below natural surface levels.
POND	Pond	Ponds are defined the same as a lake, but considered smaller then a lake and the water is shallow enough to support rooted plant growth and for the light to penetrate to the bottom.
DAM	Dams	A dam has a barrier that impounds water or underground streams. Dams not only suppress floods but provide water for various human needs.
UNK	Unknown	Use when not known

5.8. Swale Type

Code	Description	Comment
SWL	Swale	Swales are linear depressions or channels that provide for stormwater collection and conveyance. Swales can be either bio-retention or vegetated. (Table 5.9)
BFS	Buffer Strip	Buffer strips are areas of vegetation through which runoff passes while travelling to a discharge point. Buffer strips are aligned perpendicular to the water flow
RGN	Rain Garden	A planted depression that allows rainwater runoff from impervious urban areas
SPIL	Spillway	Generally used to armour areas from scouring, or to disperse flows. Function = SWNP
UNK	Unknown	Use when not known

5.9. Swale Function

Code	Description	Comment
SWVG	Vegetated	Convey stormwater in lieu of pipes and provide for removal of course and medium sediment. The system uses overland flow and mild slopes to convey water downstream
SWBR	Bio-retention	Provide both stormwater treatment and conveyance functions. A bio-retention system is installed in the base of a swale that is designed to convey minor floods. The swale component provides pre-treatment of stormwater to remove course to medium sediments while the bio-retention system removes finer particles and associated contaminants
SWNP	Non-permeable	Conveyance of stormwater with no infiltration or removal of sediments. IE concrete spillway
UNK	Unknown	Use when not known

5.10. Owner

Code	Description	Comment
COA	City of Albany	
EU	External Utilities	Western Power, Telstra, etc
SG	State Government Departments	MRWA
L	Lessee	Responsibility of the Lessee
PVT	Private	On Private Land

6. Conditions Ratings

Condition Ratings are generally in three classes. The maintenance demand is related to these classes:

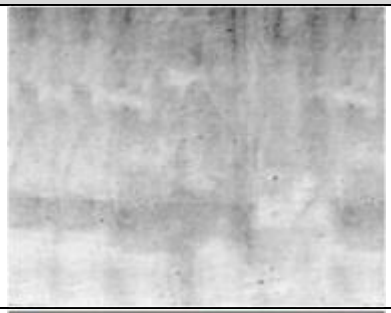
- Rating 1 is in very good condition, with no defects or wear evident
- Rating 2 is serviceable with no maintenance required;
- Rating 3 could benefit from maintenance but is still performing its required function;
- Rating 4 requires maintenance to perform its function to full effect.
- Rating 5 requires immediate attention. The asset has failed and is posing a risk.

A rating of 0 (zero) is only used when an asset has not been rated. This situation should be avoided.

6.1. PIT Condition Rating

Rating	Condition	% Rem Life	Example	Description
1	Excellent	100		Recently Installed or in as-new condition
2	Good	70		As-new, sound physical condition. Asset likely to perform adequately without major works.
3	Average	50		Wear and tear could be evident but no failures in structural integrity. Potentially half way through its useful life.
4	Poor	20		Evidence of minor structural failures and/or maintenance required.
5	Very Poor	2		Failed or failure imminent. Poor condition which would have the structure in need of intervention in the short term.
0	NOT RATED			Asset has not been rated

6.2. PIPE Condition Rating

Rating	Condition	% Rem Life	Example	Description
1	Excellent	100		Recently Installed or in as-new condition
2	Good	70		As-new, sound physical condition. Asset likely to perform adequately without major works.
3	Average	50	 	Wear and tear could be evident but no failures in structural integrity. Potentially half way through its useful life. Some minor slipping at joins or exposed lifting points.

4	Poor	20	 	Evidence of minor structural failures and/or maintenance required.
5	Very Poor	2		Failed or failure imminent. Poor condition which would have the structure in need of intervention in the short term.
0	NOT RATED			Asset has not been rated

6.3. POND EDGE Condition Rating

Rating	Condition	Example	Description
1	Very Good		New or as new, sound physical condition. Asset likely to perform adequately without major works for 15 years or more. No work required.
2	Moderate		Significant deterioration evident, Overgrowing of vegetation and slight erosion. Minor components or isolated sections of the pond need repair now but asset still functions safely at adequate level of service. Work required but asset is still serviceable.
3	Very Poor		Failed or failure imminent. Vegetation prohibiting access to the pond and pond edge is eroded. Major work required in the near future.
0	NOT RATED		Asset has not been rated

6.4. SWALE Condition Rating

Rating	Condition	Example	Description
1	Very Good		Swale is functioning as designed, with water flow achievable, with sufficient growth for nutrient removal/water absorption
2	Moderate		Swale is functioning, however performance is hindered by vegetation and weeds, and overtopping via an easier path is a risk. Cleaning/remediation is required.
3	Very Poor		Swale overgrown/silted to the point where water flow path is not evident
0	NOT RATED		Asset has not been rated

Document Approval	
Document Development Officer:	**Document Owner:** *(Member of EMT)*
GIS Technical Officer	Manager of Engineering

Document Control	
Purpose:	STORMWATER DRAINAGE SPECIFICATION – Specifications for Drainage Digital Spatial Data at the City of Albany
File Number - Document Type:	LP.GLF.5 – Guideline
Synergy Reference Number:	NG1766355
Meta Data: Key Search Terms	GIS, SPATIAL DATA, ASSETS, AS-CONSTRUCTED, DEVELOPMENT
Status of Document:	**Administrative decision:** Approved. Version 1.3
Document file details:	N:\Works & Services\City Engineering\Assets\00 ASDS\01 ASDS\ASDS - Version 1.3\1.3_STORMWATER_DRAINAGE_SPECIFICATION_20190627.docx
Quality Assurance:	
Distribution:	Public Document

Document Revision History

Version	Author	Version Description	Date Completed
Draft 0.0	Grant Boonzaaier	As converted from the original D-Spec	28/11/2013
Draft 0.1	Grant Boonzaaier	Initial Draft from original D-SPEC	4/07/2014
Draft 0.2	Grant Boonzaaier	Revised with Assets input	6/10/2014
Draft 0.3	Rhys Skipper	Revised by Assets	10/02/2015
Draft 0.4	Grant Boonzaaier	Corrected formatting and referencing, and Review	13/02/2015
Draft 0.5	Grant Boonzaaier	Workflow and minor corrections	23/02/2015
Draft 0.6	Rhys Skipper	Code Lists; Condition ratings	24/02/2015
Draft 0.7	Rebekah Polette Grant Boonzaaier	Review entire document Finalise Document for Authorisation Revised Rating, Codes and formatting	26/02/2015 6/03/2015 27/05/2015
Draft 0.8	Rebekah Polette Grant Boonzaaier	Code Definition Updates Workflow Diagrams	7/07/2015
Draft 0.8	Grant Boonzaaier Rebekah Polette	Annual Review. Document name Renaming feature classes Renaming codes	18/02/2016
Draft 0.8.1	Grant Boonzaaier	Full Review for final implementation	29/04/2016
Draft 1.0	Rebekah Polette	Layer definition update request	12/10/2016
Draft 1.0	Rebekah Polette	Condition ratings update request	01/03/2017
Draft 1.0	Grant Boonzaaier	Review for publication	06/06/2017
1.0	Grant Boonzaaier	Publication	07/06/2017
1.1	Rebekah Polette	Added field in 2.1. Code change in 3.5	03/07/2017
1.2	Rebekah Polette	Additional drawing of Headwall	14/12/2017
1.3	Rebekah Polette	Annual review. Addition of 'Contract Deliverables' section. Addition of 'Owner' Table. Addition of 'COA_Ref'. Deleted GF and TRP codes form Pit Types	23/01/2019