Water and Waste Department
Wastewater Services Division

Guideline to Document Asset Registry for Maintenance Project (Only)

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Revision History

Revision	Date	Revision Made	Revised By
(6)	2022-12-16	Version update	Operational Systems Branch

WWS Asset Classification and Specification Guideline

Table of Contents

1 INTRODUCTION

Asset registry is the fundamental building block for asset management, and it is a document that has assets organized by a unique identification number against which certain attributes are recorded. A registry organized in hierarchical order is the vehicle that enables the assessment of assets as individual components, composite assets, or groups of assets. It is important to emphasize that an efficient asset registry is built around four main concepts: asset hierarchy, asset classification, asset criticality information and asset specification record.

The purpose of the asset registry guideline is to create a set of instructions to ensure project consultants and contractors document asset information in a way that is OWAM-ready. Other benefits of a standardized asset registry framework are:

- Improved financial planning and integrated asset management planning for operations and maintenance.
- Structured asset visibility in OWAM
- Eliminate the complexity that arises with asset setup in OWAM
- Optimize management decision-making processes

Wastewater Services Division uses Oracle Work Asset Management (OWAM) Software for asset management. Therefore, adherence to these guideline instructions will simplify asset information updates in OWAM post-commissioning of any project.

1.1 Asset Hierarchy

Asset hierarchy is a representation of the relationships between infrastructure assets. It is arranged in a family tree describing the parent-child relation of an asset or component of an asset. Asset hierarchy is required to organize assets such that they are aggregated or rolled up to the higher level from the lower level but can never be disaggregated lower than the lowest threshold level. Properly documented asset hierarchy will organise assets by:

- System;
- Sub-system;
- Facility segments;
- Process area;
- Sub-process area;
- Parent asset;
- Child asset and;
- Components.

1.2 Asset Classification

Asset classification is a system for assigning assets into groups based on several common characteristics. The asset classification system is essential to effectively manage OWAM. Well-documented asset classification will provide the following asset information:

- Asset Class Type;
- CODE Asset Class Type;
- Asset Class Description;
- Asset Class;
- Asset Type and;
- CODE Asset Type.

1.3 Asset Criticality information

Asset criticality identifies the worst case of an asset's availability to perform its function. It is a measure of the asset's capability to impact the organisation's business drivers by impacting the goals of the Process Department/Area to which it belongs. Accurately documented asset criticality will capture information on the asset risk using the total consequence of failure (impact/severity) of the following business drivers (impact areas):

Business Drivers	Consequences of Failure
Environmental Stewardship	Based on the ability of the asset to discharge potential pollutants, including Wastewater & Effluent; Air Emissions: odour, dust, fumes, gases, and smoke; Chemicals: process additives, lubes, cleaners, degreasers, chemicals etc.
Occupational Safety	Measures the ability of the asset to create an unsafe condition that leads to injury or loss of limb/life.
Operational Consequences	
(3a) Level of Service Reduction	Measures how the failure will affect the Process Department/Area's ability to meet its mission requirements. It considers plant configuration that could mitigate the impact of an asset failure, chiefly through redundant plant or storage/buffer capacity after the asset.
(3b) Cost of Repair / Replacement	Measures the approximate cost to repair the asset following a debilitating failure or, in extreme cases, to replace it if repair is not appropriate.
(3c) Maintainability	Based on serviceability and supportability of assets
(3d) Detectability	Measures the ease with which a failure can be identified.
Total Scoring for Consequence of Failure	Total Consequence of Failure

Table 1: Criticality Business Drivers and their Impacts

1.4 Asset Specification Record

Asset specification is the information required to provide input for preventative maintenance and asset reliability to support operational efficiency. Properly documented asset records and specifications will provide the following asset information: Asset data record and specification data record.

2 ASSET REGISTRY DOCUMENTATION EXPECTATION

This Guideline should be used to document asset hierarchy, classification, criticality and specification. Consultants or contractors are expected to provide asset information to the City's representative in the format below:

- A complete hierarchical list of all assets, child assets and components showing the relationship of the parent-child asset on PowerPoint and Excel as required.
- Listing of asset classification and specifications according to the templates provided.

3 PREREQUISITES REQUIRED TO DOCUMENT THE ASSET REGISTRY

a) Before documenting the asset registry information, contractors, consultants, or the City's internal project coordinator shall request the list of the existing equipment assets that are scheduled for maintenance as defined in the project scope of the RFP/internal city initiatives document from the City Representative/Process Improvement Coordinator. This will set the ball rolling to document the asset registry correctly.

b) After the contractors, consultants, or the City's internal project coordinator receives the spreadsheet that has the listing of the assets, in the same spreadsheet, in sheet two (tab 2- Data), contractors, consultants, or the City's internal project coordinator should categorise the assets into the following categories: Assets (Equipment); Components and Parts (Spare parts). Also, in another column, in the same sheet two (tab 2- Data), contractors, consultants, or the City's internal project coordinator shall include the nature of the work done on the asset, e.g. if the asset is new or retired or repaired or replaced or untouched.

c) After documenting the required information in (b) above, contractors, consultants, or the City's internal project coordinator shall return the spreadsheet to the City Representative, which shall be forwarded to the Wastewater Services Division Process Improvement Coordinator for review.

d) Contractors, consultants, or the City's internal project coordinator shall await feedback from the Wastewater Services Process Improvement Coordinator before proceeding to document the asset hierarchy, classification, criticality and specifications.

4 METHODOLOGY TO DOCUMENT INFORMATION

To ensure consultants or contractors use the guideline successfully, it is important to explain that there are four parts to this guide and they include:

- Part A provides instructions to document asset hierarchy using the asset hierarchy framework.

- Part B provides instructions to document asset classification such that assets identified within a project are structured using Wastewater Services Division's standardized format.
- Part C provides instructions to document asset criticality information.
- Part D provides instructions to document asset specifications.

4.1 Part A: Asset Hierarchy (First Sheet of the Spreadsheet)

To provide detailed information for all project assets, contractors, consultants, or the City's internal project coordinator shall provide a hierarchical structure showing all assets from the process area to child assets and components. The asset hierarchy for all the assets identified during the project should be provided on the "First sheet" of all the eleven spreadsheets listed below (This means that the first sheet of the eleven spreadsheets will have the same information). In the same first sheet, there is an empty hierarchy structure chart that can help to document the asset hierarchy in the appropriate format. This can be copied and pasted to complete the required asset hierarchy. Locate the attachments of the eleven-asset class-type spreadsheets in Appendix 9:

1. Ancillary & Accessory Plant Equipment (1-AAPE) Spreadsheet;
2. Information and Communication Equipment (2-(COBE) Spreadsheet;
3. Minor Mechanical Equipment (3-MIME) Spreadsheet;
4. Automation & Control Equipment (4-ACEQ) Spreadsheet;
5. Major Mechanical Equipment (5-MAME) Spreadsheet;
6. All Electrical Equipment (6-AEEQ) Spreadsheet;
7. Outdoor Metal Structures (7-OMST) Spreadsheet;
8. Major Process Equipment (8-MPEQ) Spreadsheet;
9. Indoor Metal Structures (9-IMST) Spreadsheet;
10. Concrete Structures & Underground Piping (10-CUSP) Spreadsheet and;
11. Green Landscape (11-GRLA) Spreadsheet.

Note:

i. **If the embedded templates cannot be retrieved, please request electronic versions from the City representative.**

ii. **All the first sheets (tabs) of each of the eleven spreadsheets shall have the asset hierarchy images for all assets identified from the project.**

4.1.1 **Asset Hierarchy Framework:** Use the asset hierarchy level below to organise all project assets that will be handed over to the city post-commissioning. To complete the Asset Hierarchy structure, please familiarize yourself with the definitions below:

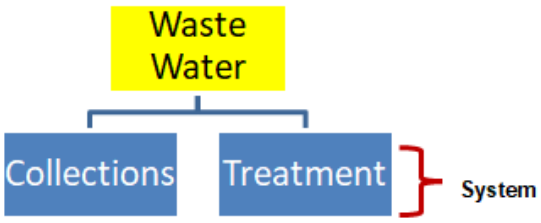
	Hierarchy Level	Definition
1	Department ***(Water & Waste)***	Accounting Department

2	Division ***(WWSD)***	Lowest-level GL bin. All Assets below this roll costs up to the Area.
3	System ***(Treatment or Collections)***	Highest Asset Level. This is a functional group of assets delivering a primary service, such as a wastewater system or water system.
4	Sub-System ***(NEWPCC OR SEWPCC OR WEWPCC)***	A sub-group of assets in a system that performs a specific function, such as a Treatment Plant or Water Mains.
5	Process ***(Secondary Treatment)***	A sub-group of assets that further categorizes a complex sub-system. This level is used primarily in Treatment Plants (Primary Clarification, Digestion, etc.) and Pumping Stations (Pumping, Reservoir).
7	Asset	The physical asset on which work is performed. Where there are a large number of similar small items, they are grouped as **Group Assets** (See Appendix 2)**.**
8	Child Asset	If an asset is complex, it may have child assets or components. A child asset will be used if it is worked on separately from the parent, and costs must be tracked against it.
9	Component	Repairable and trackable parts used on an asset. Spare parts that are replaced when broken should not be included.

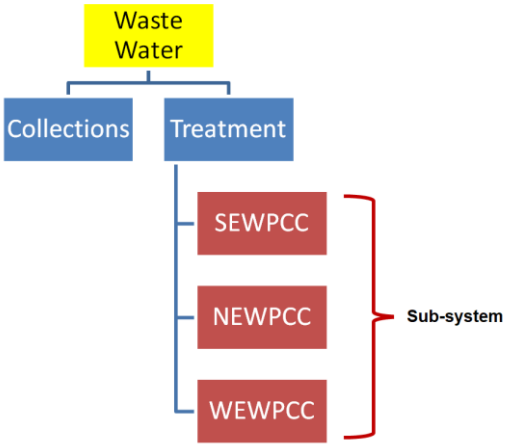
Table 2: Asset Hierarchy Framework

Note: Asset definition can be found in Appendix 1.

4.1.2 **System:** The first level of the asset hierarchy is the systems level**.** Please identify the system level for all project assets as shown in the image below:



4.1.3 **Sub-system:** The next level after the system is the sub-system. Please identify the sub-system level as shown in the image below:



4.1.4 **Process Area (Also known as Areas):** After identifying the sub-system in 3.1.3 above, please identify the process area for all the projects. The example below illustrates process area ideas in the red highlighted oval field. Existing area code descriptions are included in the WWD Identification Standard. The existing areas should also be verified with the City Representative before the consultant/ contractor determines a new process area.

Note: Each treatment plant has different process areas, so be sure to verify the process area where the project is implemented. The list below and the image on the next page will guide you in identifying the correct process level.

FACILITY	PROCESS	SUB-PROCESS
SEWPCC	Power Supply System	• Main Power Supply; • Standby Power Supply •
	Process Control System	No sub-process
	Fire & Security	No sub-process
	Administrative Building	• Buildings & Concrete Structures; • HVAC; • Electrical Power Supply and; • Instrumentation Workshop
	Pre-Treatment	• Influent Pumping; • Influent Screening; • Grit Handling; • HVAC; • Electrical Power Supply; • Building and Concrete Structures; • Instrumentation
	Primary Treatment	• Primary Clarification;

		• Buildings and Concrete Structures; • HVAC; • Electrical Power Supply and; • Instrumentation
	Wet Weather Treatment (HRC)	• High Rate Clarification • Electrical Power Supply • Buildings & Concrete Structures • HVAC • Instrumentation
	Sludge Treatment	• Primary Sludge Fermentation; • Primary Sludge Thickening; • Waste Activated Sludge Thickening; • Buildings and Concrete Structures; • HVAC and; • Electrical Power Supply • Instrumentation
	Secondary Treatment	• Bioreactors; • Secondary Clarification; • Buildings and Concrete Structures; • HVAC • Compressed Air System; • Flushing Water • Electrical Power Supply and; • Instrumentation
	UV Disinfection & Outfall	• UV Disinfection; • Instrumentation; • Buildings and Concrete Structures • HVAC and; • Electrical Power Supply
	Foul Air Treatment	• Bio-Filtration; • Buildings and Concrete Structures; • HVAC; • Electrical Power Supply • Instrumentation
	Piping System	• Potable Water • Non-Potable Water • Flushing water; • Glycol • Hot Water (Heating); • Cold Water (Cooling); • Natural Gas; • RAS; • WAS; • Instrument Air and; • Process Air
	Chemical Dosing System	• Delivery Area

		• Ferric Chloride; • Sodium Hypochlorite; • Sodium Hydroxide; • Sodium Bisulphite; • Polymer Mixing (FSL RDT); • Polymer Mixing (WAS RDT) • Polymer Mixing (HRC) • Polymer Mixing (Secondary Clarifier); • Electrical Power Supply; • Buildings & Concrete Structures; • HVAC and; • Instrumentation
	Sampling & Process Quality	• No sub-process

Table 3: SEWPCC Process Areas and Sub-Processes

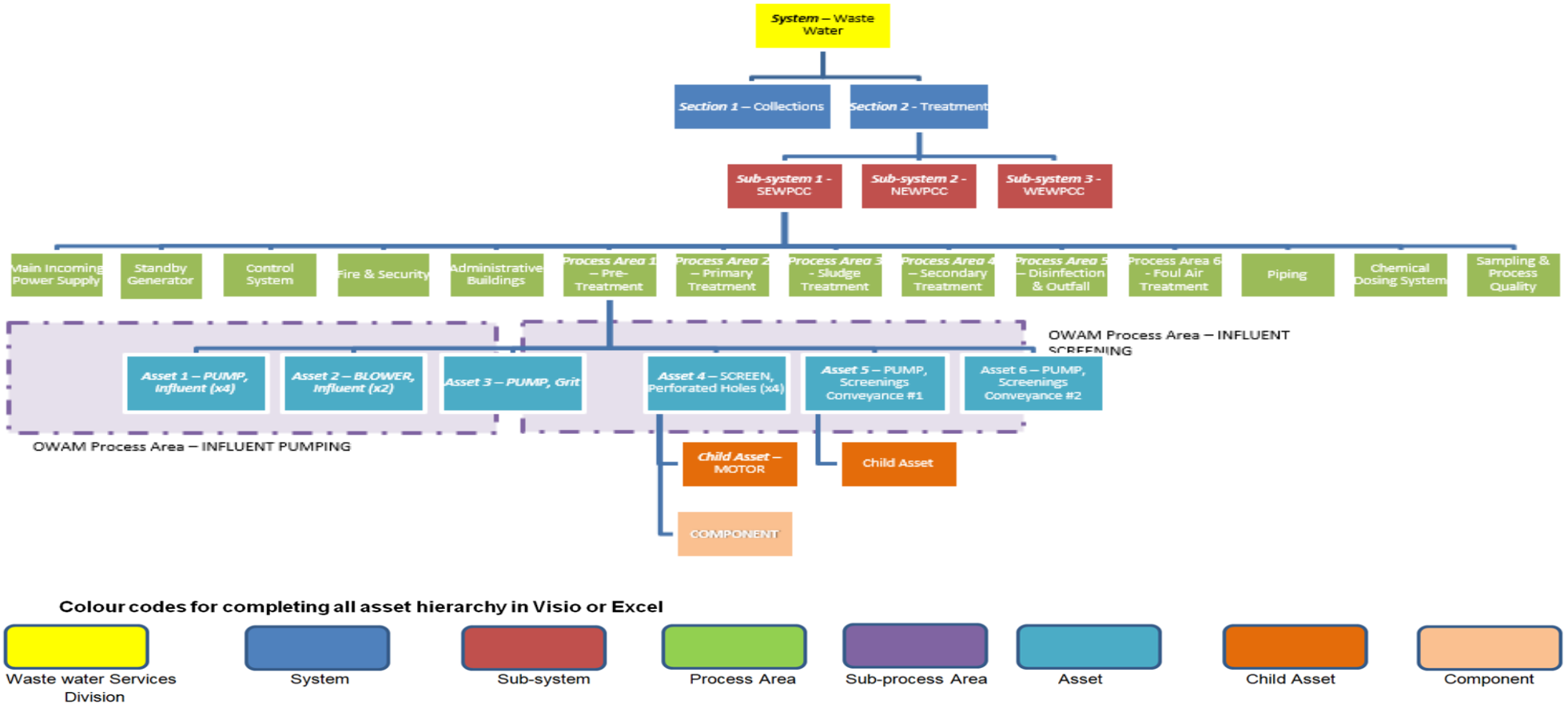
FACILITY	PROCESS	SUB-PROCESS
NEWPCC	Power Supply System	• Main Power Supply; • Standby Power Supply and; • Instrumentation • HVAC Systems
	Process Control System	No sub-process
	Fire Protection & Security System	No sub-process
	Administrative Buildings & Services	• Main Admin Building; • Mechanical Workshop; • Electrical Workshop; • Instrumentation Workshop; • Compressed Air System; • Boiler System; • Laboratory
	Headworks	• Hauled Liquid Waste • Influent Pumping • Influent Screening • Grit System • HVAC • Electrical Power Supply • Process Buildings & Concrete Structures • Instrumentation
	Primary Treatment	• Primary Clarification; • Buildings and Concrete Structures; • HVAC; • Electrical Power Supply and; • Instrumentation
	Secondary Treatment	• Bioreactors; • Secondary Clarification;

		• Buildings and Concrete Structures; • HVAC • Electrical Power Supply and; • Instrumentation
	Disinfection & Outfall	• UV Pumping; • UV Disinfection; • Buildings and Concrete Structures; • Building HVAC • Electrical Power Supply; • Instrumentation
	N&P Removal (SBR) Process	• Instrumentation; • Equalization; • Chemical Systems; • Buildings & Concrete Structures; • Building HVAC; • Electrical Power Supply and; • Instrumentation
	Sludge Digestion Treatment Process	• Raw Sludge Pumping; • Digestion; • Holding; • Gas System (Digester); • Sludge Storage • Ferric; • Buildings & Concrete Structures; • HVAC; • Electrical Power Supply and; • Instrumentation
	Dewatering	• Digested Sludge Pumping; • Dewatering; • Polymer; • Biosolids Storage & Transportation; • Drying Beds; • Buildings & Concrete Structures; • HVAC; • Electrical Power Supply and; • Instrumentation
	Foul Air Treatment	• Ventilation System 1; • Ventilation System 2; • Buildings & Concrete Structures; • HVAC; • Electrical Power Supply
	Piping	• Flushing water; • Well water; • RAS; • WAS; • Instrument Air;

		• SBR Process Air; • Pure O2; • Potable Water; • Soda Ash; • Methanol; • Ferric; • Polymer
	Testing and Verification	• Process Sampling

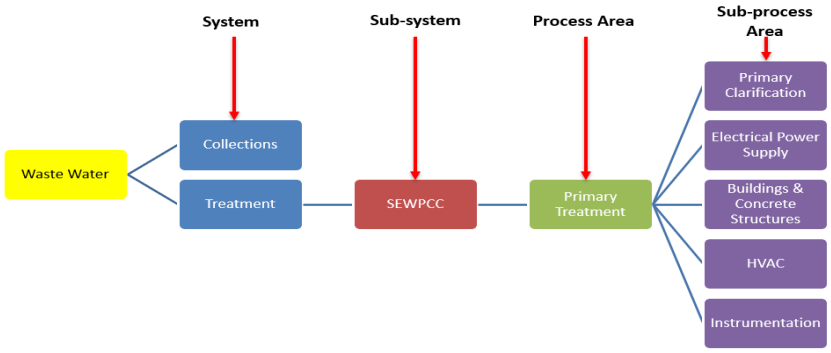
Table 4: NEWPCC Process Areas and Sub-Processes

Note: Electrical Power Supply sub-process and instrumentation are almost constant for all the processes. These two sub-processes are totally different from the general plant Power Supply Process as they speak to the electrical assets in that process rather than the general electrical assets in the entire facility's power supply building. The difference helps to distinguish between sub-process power supply assets and the general facility's power supply assets.


System – Waste Water
Section 1 – Collections
Section 2 - Treatment
Sub-system 1 - SEWPCC
Sub-system 2 - NEWPCC
Sub-system 3 - WEWPCC
Main Incoming Power Supply
Standby Generator
Control System
Fire & Security
Administrative Buildings
Process Area 1 – Pre-Treatment
Process Area 2 – Primary Treatment
Process Area 3 - Sludge Treatment
Process Area 4 – Secondary Treatment
Process Area 5 – Disinfection & Outfall
Process Area 6 - Foul Air Treatment
Piping
Chemical Dosing System
Sampling & Process Quality
OWAM Process Area – INFLUENT SCREENING
Asset 1 – PUMP, Influent (x4)
Asset 2 – BLOWER, Influent (x2)
Asset 3 – PUMP, Grit
Asset 4 – SCREEN, Perforated Holes (x4)
Asset 5 – PUMP, Screenings Conveyance #1
Asset 6 – PUMP, Screenings Conveyance #2
OWAM Process Area – INFLUENT PUMPING
Child Asset – MOTOR
Child Asset
COMPONENT
Colour codes for completing all asset hierarchy in Visio or Excel
Waste water Services Division
System
Sub-system
Process Area
Sub-process Area
Asset
Child Asset
Component

4.1.5 **Sub-process area:** After identifying the process area, please identify the sub-process area (if any) as demonstrated below. Tables 3 and 4 are resources to identify sub-process areas.

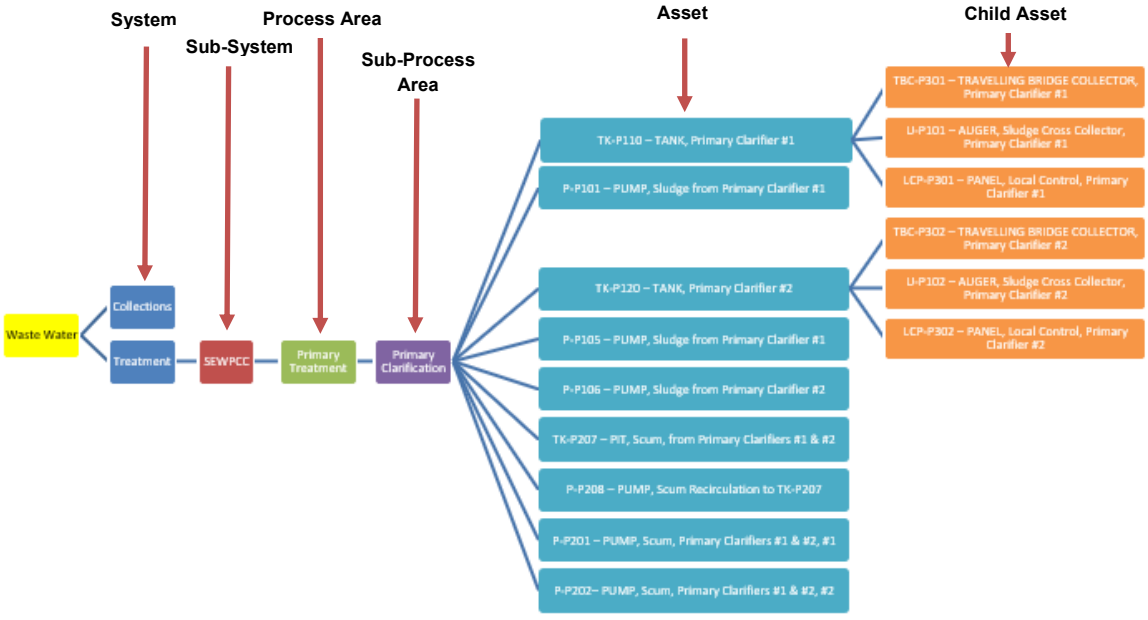
Note: There may be more than one category of sub-process areas for a process area.



4.1.6 **Asset and Child Asset:** Asset is the physical equipment on which work is performed. The complexity of the asset will determine if the asset has a child asset and/or a sub-child asset. Please identify the assets, child assets and components. **For more information on how to identify assets and child assets, consult appendices 1 & 2** of this document.

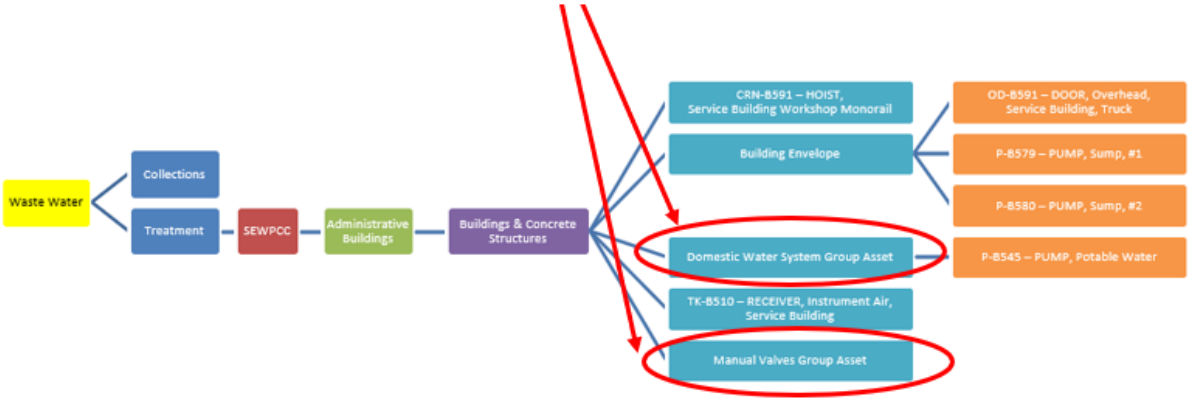
Note:

i. **It is important to minimize the child assets where possible for the most part.**
ii. **Components of an asset should not be described as a child or sub-child asset.**



4.1.7 **Grouped Assets:** Where we have a large number of similar small items, the assets can be grouped with a single asset created to represent multiple pieces of equipment in the register. **For more information on identifying grouped assets, consult Appendix 2** of this document.

Examples of Grouped assets



Appendices 7 and 8 are examples of asset hierarchy in one of the facilities that could give you a better understanding of the asset hierarchy expectations.

4.2 Part B: Asset Classification (Second Sheet of the Spreadsheet)

Note that contractors, consultants, or the City's internal project coordinator are not required to document any asset information in part B. This part only provides you with the prerequisite knowledge needed to understand how to populate columns 'A' and 'B' of the third sheet- data sheet (tab) as required in part C.

Contractors, consultants, or the City's internal project coordinator are expected to use the Asset Classification System sheet, as seen on the second sheet of each Asset Class Type spreadsheet, to identify the project assets. All asset types delivered to the city in the case of a new project or that were worked on during a maintenance project are expected to be documented. Within each spreadsheet provided in 4.1 (Part A), locate the second sheet (tab) labelled per asset class type, e.g. (1-AAPE), to identify the following fields:

- *Asset Class Type*;
- *CODE, Asset Class Type*;
- *Asset Class Description*
- Asset Class
- *Asset Type*
- *CODE, Asset Type*

4.2.1 Asset Class Type

ASSET CLASS TYPE is a group of asset classes with some common characteristics. It is the highest level of asset classification in OWAM.

The arrow below shows the column for asset class type for all assets.

Asset Class Type	CODE, Asset Class Type	Asset Class Description	Asset Class	Asset Type	CODE, Asset Type	Useful Life (years) for Depreciation
Ancillary & Accessory Plant Equipment	1-AAPE	Actuator	WW-ACTUATOR	ACTUATOR, Electric	WW-ACTU_EL	5
				ACTUATOR, Hydraulic	WW-ACTU_HY	
				ACTUATOR, Manual	WW-ACTU_MN	
				ACTUATOR, Pneumatic	WW-ACTU_PN	
		Analytical Instruments	WW-INSTR ANALYTIC	SAMPLER, Refrigerated	WW-SMPR_RE	
				ANALYZER, Gas	WW-ANAL_GA	
				TRANSMITTER, Analytic	WW-XMTR_AN	
				DETECTOR, Gas	WW-DETR_GA	
				PROBE	WW-PROBE	
		Domestic Water System	WW-WATER	SYSTEM, Domestic Hot water	WW-SYS_DHW	
				Shower, Emergency	WW-SWR_EMR	
		Fire Alarm System	WW-FIRE ALARM SYSTEM	ALARM, FIRE	WW-ALRM_FI	
		CCTV	WW-CCTV SYSTEM	SYSTEM, CCTV	WW-CCTV_SM	
		Security System	WW-SECURITY SYSTEM	ACCESS CONTROL	WW-CTRL_AC	
		Ultrasonic Cleaner	WW-ULTRASONIC CLEANR	CLEANER, Ultrasonic	WW-CLNR_UT	
		Dehumidifier	WW-DEHUMIDIFIER	DEHUMIDIFIER	WW-DEHUMID	
		Smoke Detector	WW-SMOKE DETECTOR	DETECTOR, Smoke	WW-DETR_SM	
		Aeration Diffuser	WW-AERATION DIFFUSER	DIFFUSER, Disc	WW-DFSR_DC	
		Filter System	WW-FILTER SYSTEM	FILTER, Auto	WW-FIL_ATO	
				STRAINER, Auto	WW-STR_ATO	
				SYSTEM, (Oil) Filter	WW-SYS_FTR	
		Fire Extinguisher	WW-FIRE EXTINGUISHER	EXTINGUISHER, Fire	WW-EXTR_FI	
				HEATER, Electric Duct	WW-HTR_ED	

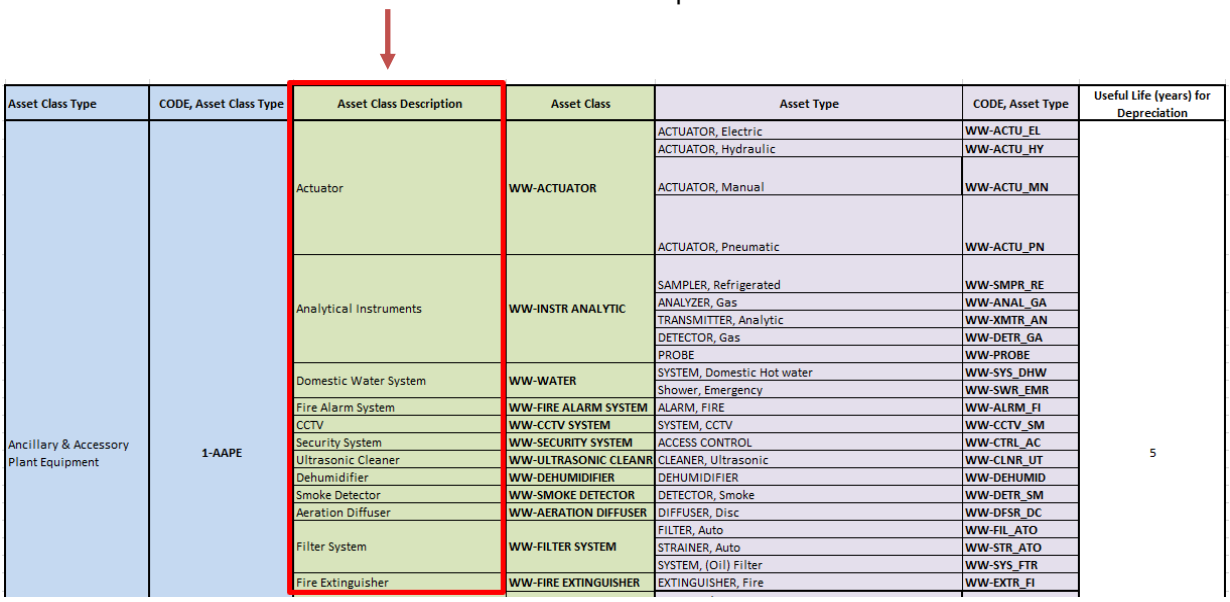
4.2.2 CODE, Asset Class Type

The arrow below shows the column for the CODE of asset class type for all assets.

Asset Class Type	CODE, Asset Class Type	Asset Class Description	Asset Class	Asset Type	CODE, Asset Type	Useful Life (years) for Depreciation
Ancillary & Accessory Plant Equipment	1-AAPE	Actuator	WW-ACTUATOR	ACTUATOR, Electric	WW-ACTU_EL	5
				ACTUATOR, Hydraulic	WW-ACTU_HY	
				ACTUATOR, Manual	WW-ACTU_MN	
				ACTUATOR, Pneumatic	WW-ACTU_PN	
		Analytical Instruments	WW-INSTR ANALYTIC	SAMPLER, Refrigerated	WW-SMPR_RE	
				ANALYZER, Gas	WW-ANAL_GA	
				TRANSMITTER, Analytic	WW-XMTR_AN	
				DETECTOR, Gas	WW-DETR_GA	
				PROBE	WW-PROBE	
		Domestic Water System	WW-WATER	SYSTEM, Domestic Hot water	WW-SYS_DHW	
				Shower, Emergency	WW-SWR_EMR	
		Fire Alarm System	WW-FIRE ALARM SYSTEM	ALARM, FIRE	WW-ALRM_FI	
		CCTV	WW-CCTV SYSTEM	SYSTEM, CCTV	WW-CCTV_SM	
		Security System	WW-SECURITY SYSTEM	ACCESS CONTROL	WW-CTRL_AC	
		Ultrasonic Cleaner	WW-ULTRASONIC CLEANR	CLEANER, Ultrasonic	WW-CLNR_UT	
		Dehumidifier	WW-DEHUMIDIFIER	DEHUMIDIFIER	WW-DEHUMID	
		Smoke Detector	WW-SMOKE DETECTOR	DETECTOR, Smoke	WW-DETR_SM	
		Aeration Diffuser	WW-AERATION DIFFUSER	DIFFUSER, Disc	WW-DFSR_DC	
		Filter System	WW-FILTER SYSTEM	FILTER, Auto	WW-FIL_ATO	
				STRAINER, Auto	WW-STR_ATO	
				SYSTEM, (Oil) Filter	WW-SYS_FTR	
		Fire Extinguisher	WW-FIRE EXTINGUISHER	EXTINGUISHER, Fire	WW-EXTR_FI	

4.2.3 Asset Class Description

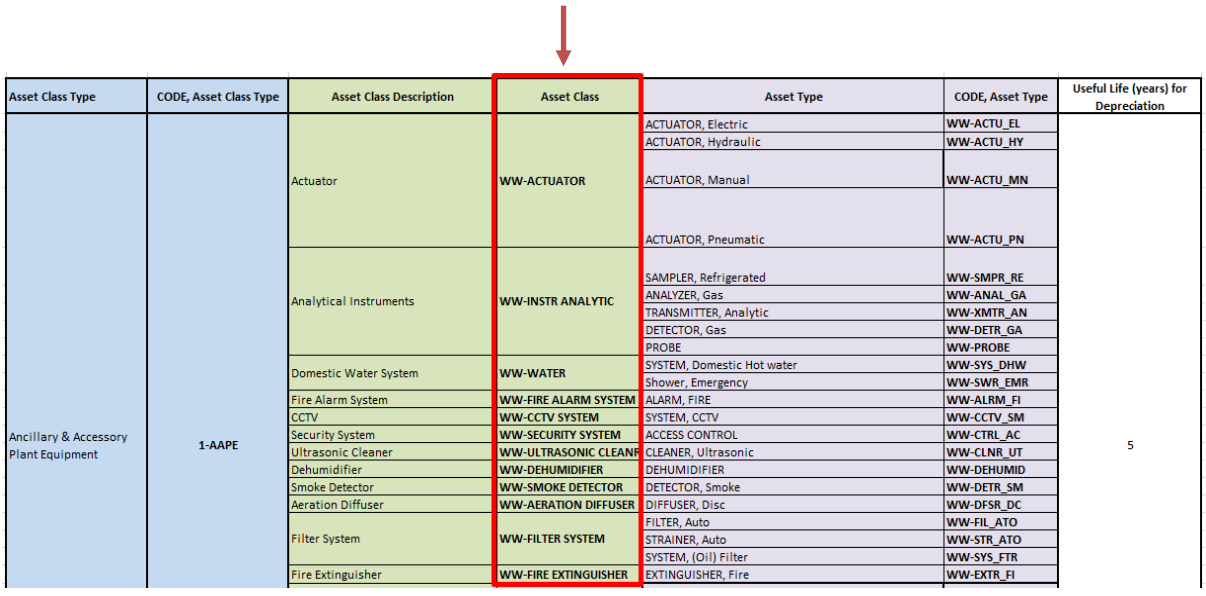
The arrow below shows the column for asset class description for all assets.



Asset Class Type	CODE, Asset Class Type	Asset Class Description	Asset Class	Asset Type	CODE, Asset Type	Useful Life (years) for Depreciation
Ancillary & Accessory Plant Equipment	1-AAPE	Actuator	WW-ACTUATOR	ACTUATOR, Electric	WW-ACTU_EL	5
				ACTUATOR, Hydraulic	WW-ACTU_HY	
				ACTUATOR, Manual	WW-ACTU_MN	
				ACTUATOR, Pneumatic	WW-ACTU_PN	
		Analytical Instruments	WW-INSTR ANALYTIC	SAMPLER, Refrigerated	WW-SMPR_RE	
				ANALYZER, Gas	WW-ANAL_GA	
				TRANSMITTER, Analytic	WW-XMTR_AN	
				DETECTOR, Gas	WW-DETR_GA	
				PROBE	WW-PROBE	
		Domestic Water System	WW-WATER	SYSTEM, Domestic Hot water	WW-SYS_DHW	
				Shower, Emergency	WW-SWR_EMR	
		Fire Alarm System	WW-FIRE ALARM SYSTEM	ALARM, FIRE	WW-ALRM_FI	
		CCTV	WW-CCTV SYSTEM	SYSTEM, CCTV	WW-CCTV_SM	
		Security System	WW-SECURITY SYSTEM	ACCESS CONTROL	WW-CTRL_AC	
		Ultrasonic Cleaner	WW-ULTRASONIC CLEANR	CLEANER, Ultrasonic	WW-CLNR_UT	
		Dehumidifier	WW-DEHUMIDIFIER	DEHUMIDIFIER	WW-DEHUMID	
		Smoke Detector	WW-SMOKE DETECTOR	DETECTOR, Smoke	WW-DETR_SM	
		Aeration Diffuser	WW-AERATION DIFFUSER	DIFFUSER, Disc	WW-DFSR_DC	
		Filter System	WW-FILTER SYSTEM	FILTER, Auto	WW-FIL_ATO	
				STRAINER, Auto	WW-STR_ATO	
				SYSTEM, (Oil) Filter	WW-SYS_FTR	
		Fire Extinguisher	WW-FIRE EXTINGUISHER	EXTINGUISHER, Fire	WW-EXTR_FI	

4.2.4 Asset Class

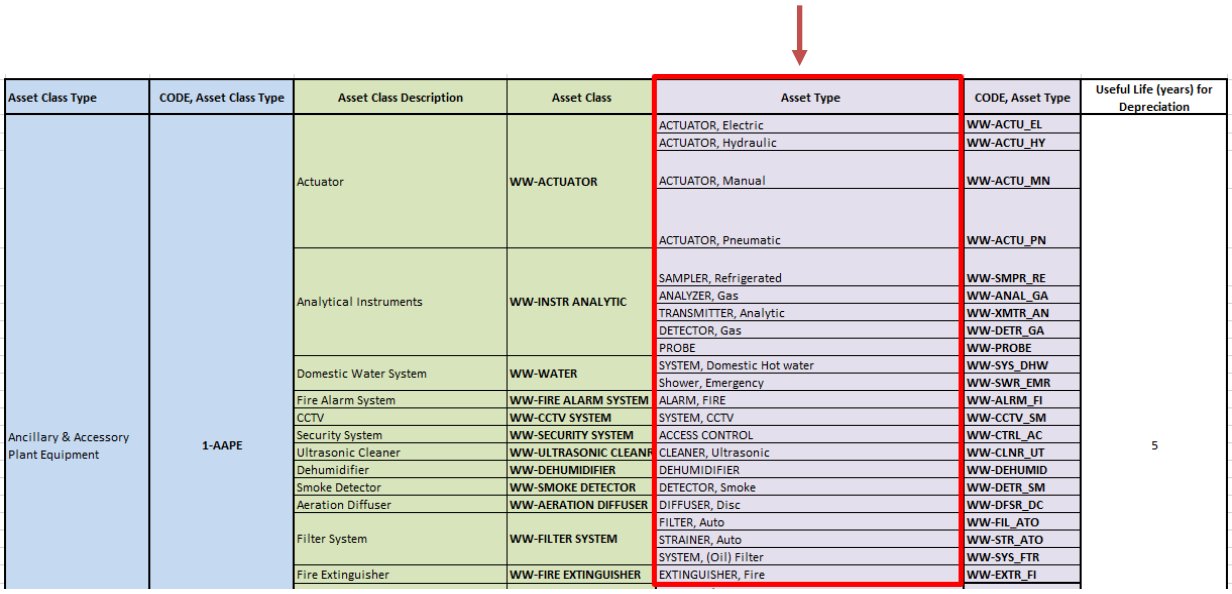
ASSET CLASS is a sub-grouping of Asset Class Type. An asset Class is a group of assets with a common operational philosophy and common purpose. The arrow below shows the column for asset class for all assets.



Asset Class Type	CODE, Asset Class Type	Asset Class Description	Asset Class	Asset Type	CODE, Asset Type	Useful Life (years) for Depreciation
Ancillary & Accessory Plant Equipment	1-AAPE	Actuator	WW-ACTUATOR	ACTUATOR, Electric	WW-ACTU_EL	5
				ACTUATOR, Hydraulic	WW-ACTU_HY	
				ACTUATOR, Manual	WW-ACTU_MN	
				ACTUATOR, Pneumatic	WW-ACTU_PN	
		Analytical Instruments	WW-INSTR ANALYTIC	SAMPLER, Refrigerated	WW-SMPR_RE	
				ANALYZER, Gas	WW-ANAL_GA	
				TRANSMITTER, Analytic	WW-XMTR_AN	
				DETECTOR, Gas	WW-DETR_GA	
				PROBE	WW-PROBE	
		Domestic Water System	WW-WATER	SYSTEM, Domestic Hot water	WW-SYS_DHW	
				Shower, Emergency	WW-SWR_EMR	
		Fire Alarm System	WW-FIRE ALARM SYSTEM	ALARM, FIRE	WW-ALRM_FI	
		CCTV	WW-CCTV SYSTEM	SYSTEM, CCTV	WW-CCTV_SM	
		Security System	WW-SECURITY SYSTEM	ACCESS CONTROL	WW-CTRL_AC	
		Ultrasonic Cleaner	WW-ULTRASONIC CLEANR	CLEANER, Ultrasonic	WW-CLNR_UT	
		Dehumidifier	WW-DEHUMIDIFIER	DEHUMIDIFIER	WW-DEHUMID	
		Smoke Detector	WW-SMOKE DETECTOR	DETECTOR, Smoke	WW-DETR_SM	
		Aeration Diffuser	WW-AERATION DIFFUSER	DIFFUSER, Disc	WW-DFSR_DC	
		Filter System	WW-FILTER SYSTEM	FILTER, Auto	WW-FIL_ATO	
				STRAINER, Auto	WW-STR_ATO	
				SYSTEM, (Oil) Filter	WW-SYS_FTR	
		Fire Extinguisher	WW-FIRE EXTINGUISHER	EXTINGUISHER, Fire	WW-EXTR_FI	

4.2.5 Asset Type

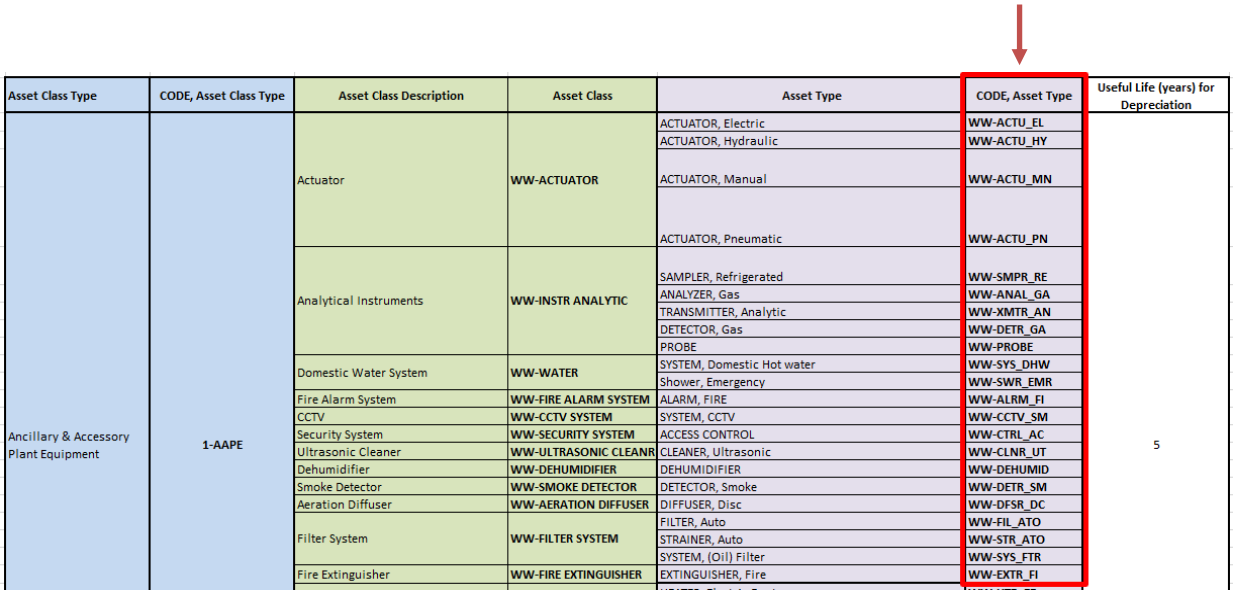
ASSET TYPE is a sub-category within the Asset Class category. Asset type describes an asset based on the principle of operation and assembly. The arrow below shows the column for asset type for all assets.



Asset Class Type	CODE, Asset Class Type	Asset Class Description	Asset Class	Asset Type	CODE, Asset Type	Useful Life (years) for Depreciation
Ancillary & Accessory Plant Equipment	1-AAPE	Actuator	WW-ACTUATOR	ACTUATOR, Electric	WW-ACTU_EL	5
				ACTUATOR, Hydraulic	WW-ACTU_HY	
				ACTUATOR, Manual	WW-ACTU_MN	
				ACTUATOR, Pneumatic	WW-ACTU_PN	
		Analytical Instruments	WW-INSTR ANALYTIC	SAMPLER, Refrigerated	WW-SMPR_RE	
				ANALYZER, Gas	WW-ANAL_GA	
				TRANSMITTER, Analytic	WW-XMTR_AN	
				DETECTOR, Gas	WW-DETR_GA	
				PROBE	WW-PROBE	
		Domestic Water System	WW-WATER	SYSTEM, Domestic Hot water	WW-SYS_DHW	
				Shower, Emergency	WW-SWR_EMR	
		Fire Alarm System	WW-FIRE ALARM SYSTEM	ALARM, FIRE	WW-ALRM_FI	
		CCTV	WW-CCTV SYSTEM	SYSTEM, CCTV	WW-CCTV_SM	
		Security System	WW-SECURITY SYSTEM	ACCESS CONTROL	WW-CTRL_AC	
		Ultrasonic Cleaner	WW-ULTRASONIC CLEANR	CLEANER, Ultrasonic	WW-CLNR_UT	
		Dehumidifier	WW-DEHUMIDIFIER	DEHUMIDIFIER	WW-DEHUMID	
		Smoke Detector	WW-SMOKE DETECTOR	DETECTOR, Smoke	WW-DETR_SM	
		Aeration Diffuser	WW-AERATION DIFFUSER	DIFFUSER, Disc	WW-DFSR_DC	
		Filter System	WW-FILTER SYSTEM	FILTER, Auto	WW-FIL_ATO	
				STRAINER, Auto	WW-STR_ATO	
				SYSTEM, (Oil) Filter	WW-SYS_FTR	
		Fire Extinguisher	WW-FIRE EXTINGUISHER	EXTINGUISHER, Fire	WW-EXTR_FI	

4.2.6 CODE, Asset Type

The arrow below shows the column for the CODE of asset type for all assets.



Asset Class Type	CODE, Asset Class Type	Asset Class Description	Asset Class	Asset Type	CODE, Asset Type	Useful Life (years) for Depreciation
Ancillary & Accessory Plant Equipment	1-AAPE	Actuator	WW-ACTUATOR	ACTUATOR, Electric	WW-ACTU_EL	5
				ACTUATOR, Hydraulic	WW-ACTU_HY	
				ACTUATOR, Manual	WW-ACTU_MN	
				ACTUATOR, Pneumatic	WW-ACTU_PN	
		Analytical Instruments	WW-INSTR ANALYTIC	SAMPLER, Refrigerated	WW-SMPR_RE	
				ANALYZER, Gas	WW-ANAL_GA	
				TRANSMITTER, Analytic	WW-XMTR_AN	
				DETECTOR, Gas	WW-DETR_GA	
				PROBE	WW-PROBE	
		Domestic Water System	WW-WATER	SYSTEM, Domestic Hot water	WW-SYS_DHW	
				Shower, Emergency	WW-SWR_EMR	
		Fire Alarm System	WW-FIRE ALARM SYSTEM	ALARM, FIRE	WW-ALRM_FI	
		CCTV	WW-CCTV SYSTEM	SYSTEM, CCTV	WW-CCTV_SM	
		Security System	WW-SECURITY SYSTEM	ACCESS CONTROL	WW-CTRL_AC	
		Ultrasonic Cleaner	WW-ULTRASONIC CLEANR	CLEANER, Ultrasonic	WW-CLNR_UT	
		Dehumidifier	WW-DEHUMIDIFIER	DEHUMIDIFIER	WW-DEHUMID	
		Smoke Detector	WW-SMOKE DETECTOR	DETECTOR, Smoke	WW-DETR_SM	
		Aeration Diffuser	WW-AERATION DIFFUSER	DIFFUSER, Disc	WW-DFSR_DC	
		Filter System	WW-FILTER SYSTEM	FILTER, Auto	WW-FIL_ATO	
				STRAINER, Auto	WW-STR_ATO	
				SYSTEM, (Oil) Filter	WW-SYS_FTR	
		Fire Extinguisher	WW-FIRE EXTINGUISHER	EXTINGUISHER, Fire	WW-EXTR_FI	

4.2.7 How to address missing fields in Part B

If an asset type cannot be found in the “Asset Type” field (colour-coded purple), don't hesitate to contact the City Representative before proceeding to complete part C of this guideline.

4.3 Part C: Asset Data and Asset Criticality (Third Sheet of the Spreadsheet)

This section is divided into three which includes:

Phase I: Documentation of asset information in the columns that are colour-coded light green based on the maintenance activities as described in the RFP or internal project.

Phase II: Documentation of asset data in the columns that are colour-coded pink, blue and yellow.

Phase III: Documentation of asset criticality in the columns that are colour-coded light brown

Contractors, consultants, or the City’s internal project coordinator are expected to populate the “Data” sheet (Third Tab) in each of the eleven-asset class-type spreadsheets provided in Part A. In each case, ensure the correct asset class type spreadsheet is used to document all the asset types identified from the project. Fill each cell based on the comments that are included in each column title. Continue to populate all the columns within the “Data” sheet and ensure the respective asset class type data sheet captures all the project's significant assets.

4.3.1 PHASE I: ASSET INFORMATION

Contractors, consultants, or the City’s internal project coordinator shall use the spreadsheet obtained from 3 (d) to populate the asset information column (colour-coded light green) following the feedback from the asset listing review from the Wastewater Services Process Improvement Coordinator.

Notable facts below will help with populating the “Data” Sheet (Third Sheet)

Serial #: If applicable, indicate the asset serial number based on the asset list you have provided in 3(d).

Asset scope as per RFP: Populate this column with the list of maintained assets as indicated in the scope of the RFP.

Asset Maintenance Update: Indicate the nature of work done on the asset, i.e. if the asset is new, retired, repaired, replaced, or untouched.

Asset Category: Indicate the asset category for each asset as predetermined from the asset listing exercise 3 (d): i.e. Asset, Components or Spare part.

4.3.2 PHASE II: ASSET DATA

Asset Type Attribute Description: For cases of multiple assets, use numbers to differentiate them within the key column, as they have different tag IDs. An example is WW-GEN_DSL1, WW-GEN_DSL2. This example can also be seen in the spreadsheet for better understanding.

Parent Asset:

i. The process or sub-process area may be the virtual parent asset for all assets (equipment) that fall within an identified process or sub-process area.
ii. Some identified equipment may be the parent asset for some child assets (equipment) that is a subsidiary of the asset.

Process Area: See tables 3 and 4 to identify the process area of an asset

Sub-process Area: See tables 3 and 4 to determine the sub-process area of an asset

Nameplate: Appendix 5 shows examples of asset nameplates

Tag ID: Each asset has its unique identifier number, as seen on the name tag images in Appendix 6

Plant OWAM: "01" should be populated for all assets for Plant OWAM.

Asset Record types: This describes the asset record as required by the Wastewater Services Division OWAM system. If the asset is identified as a process or a sub-process, it is an 'A" Asset. If the asset is a building, it is a "B" Asset. If the asset is equipment, it is an "E" Asset.

Asset Description: All assets description should be written in the standardized format used in WWD. This format is:

Plant where Asset is located: **NE;**

Process area where Asset is located: **LHW #1;**

Asset Tag: **S-Y910;**

Asset Common Name: **Refrigerated Sampler**

The above will be combined to make the example below: Plant Identifier, Process Area, Tag ID, and Common name, with each element separated by a comma and a space.

Example: **NE, LHW #1, S-Y910, Refrigerated Sampler**

Asset Status: Assets delivered during the project will have "ACTIVE" status, and Assets to be decommissioned will have "INACTIVE" status.

Administrative Department: All Assets are under the administration of WWD.

Administrative Area: All Assets are under the administrative area "WASTE."

Breaker Number: The source breaker identification number is the same as the tag ID for any asset, and the maximum data length should not be more than 12 characters.

Control Panel ID Number: This is required only if applicable to the asset.

Building Segment: This is the facility segment where the asset can be found. Identify the correct building segment below:

NEWPCC BUILDING SEGMENTS

CODE TABLE 25	BUILDING DESCRIPTION
NEWPCC ADMIN	NEWPCC MAIN ADMINISTRATION
NEWPCC BLDG LEACHATE	NEWPCC LEACHATE BUILDING
NEWPCC BLDG LHW #1	NEWPCC LIQUID HAULED WASTEWATER BUILDING #1
NEWPCC BLDG LHW #2	NEWPCC LIQUID HAULED WASTEWATER BUILDING #2
NEWPCC BOILER	NEWPCC BOILER
NEWPCC DEWATERING	NEWPCC DEWATERING
NEWPCC DIGESTER	NEWPCC DIGESTER
NEWPCC DRYING BEDS	NEWPCC DRYING BEDS BLDG #3
NEWPCC GARAGE	NEWPCC MAIN GARAGE
NEWPCC GAS BURNER	NEWPCC GAS BURNER
NEWPCC GAS SPHERE	NEWPCC GAS SPHERE
NEWPCC GRIT	NEWPCC GRIT
NEWPCC HAULED WASTE	NEWPCC HAULED WASTEWATER
NEWPCC LAB	NEWPCC MAIN LAB
NEWPCC LEACHATE	NEWPCC LEACHATE
NEWPCC MAIN	NEWPCC MAIN PUMPING
NEWPCC N-REMOVAL	NEWPCC NITROGEN REMOVAL
NEWPCC P-REMOVAL	NEWPCC PHOSPHORUS REMOVAL
NEWPCC PRIMARY	NEWPCC PRIMARY
NEWPCC REACTOR	NEWPCC REACTOR
NEWPCC SECONDARY	NEWPCC SECONDARY
NEWPCC UV	NEWPCC ULTRA VIOLET / TERTIARY

Table 5: NEWPCC Building Segment

SEWPCC BUILDING SEGMENTS

Code Table 25	Building Description
SEWPCC ADMIN	SEWPCC ADMINISTRATION
SEWPCC GENERATOR	SEWPCC GENERATOR
SEWPCC GRIT	SEWPCC GRIT
SEWPCC MAINT	SEWPCC MAINTENANCE
SEWPCC OIL STORAGE	SEWPCC OIL STORAGE
SEWPCC OUTFALL	SEWPCC OUTFALL
SEWPCC PRIMARY	SEWPCC PRIMARY
SEWPCC REACTOR	SEWPCC REACTOR
SEWPCC SECONDARY	SEWPCC SECONDARY

SEWPCC SEPTAGE	SEWPCC SEPTAGE
SEWPCC UV	SEWPCC ULTRA VIOLET / TERTIARY

Table 6: SEWPCC Building Segment

WEWPCC BUILDING SEGMENTS

Code Table 25	Building Description
WEWPCC ADMIN	WEWPCC ADMINISTRATION
WEWPCC DAF	WEWPCC DAF & CHEMICAL FEED
WEWPCC FERMENTER	WEWPCC FERMENTER
WEWPCC HEADWORKS	WEWPCC HEADWORKS
WEWPCC MONITORING	WEWPCC EFFLUENT MONITORING STATION
WEWPCC OUTFALL	WEWPCC OUTFALL
WEWPCC PRIMARY	WEWPCC PRIMARY
WEWPCC PRPS	WEWPCC PERIMETER ROAD PUMP STATION
WEWPCC SECONDARY	WEWPCC SECONDARY
WEWPCC UTILITY	WEWPCC UTILITY

Table 7: WEWPCC Building Segment

Note: Please contact the City representative if the applicable project building segment cannot be found.

The physical location of Asset: This is the physical location of the asset, where it was installed, e.g. Gallery XX, Tunnel XX, Basement, Upper Level, Lower Level, Mezzanine, West Wall etc. The maximum data length is 30 characters.

Note: Actual location could be the closest landmark to the asset, which floor or level the asset resides or the room the asset is located in.

Room Location: This is the room where the asset is located, if applicable. The maximum data length is 20 characters.

Drawing number: This is either the PPID or P&ID number for the most recent drawing where the asset can be found.

Note: Please consult the attached appendices for guidance on populating the datasheet. Contact the City representative periodically at agreed frequencies to review the documentation for accuracy and completeness.

4.3.3 PHASE III: ASSET CRITICALITY

Contractors, consultants, or the City's internal project coordinator are expected to document the asset criticality using a criticality ranking exercise. This ranking exercise should take place in a facilitated workshop comprising a multi-disciplinary, multi-hierarchal group with wide-ranging experience on the assets to be ranked. **Consultants or contractors may notify the City representative of the schedule of the facilitated workshop so the City can delegate a senior operator from the plant to attend the**

workshop. During the workshop, assets should be individually ranked, but the exercise should be done for all identified assets. The "granularity" or spread of the criticality scores is a function of the number of questions asked and the range of each question. The sum is unimportant; only the actual range that provides the equipment ranking is important. Note that there may be multiple pieces of equipment with the same criticality.

Criticality is done per asset, so every single asset must be analysed. The supporting documents required to analyse asset criticality include P&ID, PFDs & Electrical Distribution Single Line Diagrams.

Steps to determine the asset criticality:

Step 1: In determining the asset criticality, appendix 4 may be helpful to facilitate the workshop to assess the criticality ranking using a standard risk severity rating scale to determine the consequences of failure (impacts/severity) of the business drivers below:

1. **Environmental Stewardship -** Release of effluent/chemicals/gaseous pollutants to surface/groundwater/soil/air

- 00 = No Environmental Impact
- 35 = Low Impact - Minor environmental impact. Not reportable.
- 60 = Moderate Impact - Reversible effect. Reportable licence violation.
- 175 = Significant Impact - Major spill or release. Reportable licence violation.
- 275 = Severe Impact - Catastrophic environmental impact. Reportable licence violation.

2. **Occupational Safety-** Loss/injury of life/limb

- 00 = No Impact on the safety of personnel.
- 30 = Low Impact - Minor injury. Report only.
- 50 = Moderate Impact - Injuring requiring first aid/medical treatment.
- 175 = Significant Impact - Lost Time Injury.
- 325 = Severe Impact - Fatality possible.

3. **Operational Consequence of Failure**

3 (a) Level of Service Reduction

- 00 = No Impact - Complete redundancy, auto-switching available if required or 2 - 4 Weeks of buffer capacity available. A failure of this asset does not impact other assets.
- 75 = Low Impact - Complete redundancy, manual switching required or 1 - 2 Weeks of buffer capacity available. A failure of this asset does not impact other assets.
- 125 = Moderate Impact - Some redundancy available, 1 - 33% of process capacity lost. Lost capacity can be recovered through excess plant capacity or 24 Hours of buffer capacity. This asset may cause other assets to trip due to interlocks.
- 175 = Significant Impact - Minimal redundancy available, 34 - 66% of process capacity lost. May recover some of the lost capacity through excess plant capacity. This asset may cause other assets to trip due to interlocks or failure.
- 250 = Severe Impact - No redundancy, Immediate loss of >67% of process capacity lost with no recovery potential. No buffer capacity is available. Additionally, this asset may cause other assets to trip due to interlocks or failure.

3 (b) Cost of Repair/Replacement

- 00 = No Impact - Minor costs < $4,999
- 50 = Low Impact - $5,000 - $79,999
- 80 = Moderate Impact - $80,000 - $159,999
- 120 = Significant Impact - $160,000 - $249,999
- 200 = Severe Impact - ≥ $250K

3 (c) Maintainability

- 00 = No Impact - Serviceability is high (asset accessible, no special tools required, Low Impact maintenance effort), and Supportability is high (in-house resources required, spares are accessible)
- 80 = Moderate Impact - Serviceability Low Impact (asset accessible only with special tools, high maintenance effort) or vice versa Supportability high (only in-house resources required and spares are accessible)
- 130 = Significant Impact - Serviceability Low Impact (asset accessible with only special tools, high maintenance effort) or vice versa Supportability Low Impact (special (external) resources required and spares are un-accessible or need to be fabricated)
- 200 = Severe Impact - Serviceability is Low Impact (asset accessible with special tools, high maintenance effort), and Supportability is Low Impact (external resources required, spares are un-accessible or need to be fabricated, the asset needs to be shipped to special workshop)

3 (d) Detectability

- 00 = No Impact - Failure is detectable before occurrence based on high levels of equipment instrumentation.
- 50 = Severe Impact - Failure is only detectable after occurrence based on department performance or output.

Step 2: For every asset identified in the data sheet (Third tab of each embedded spreadsheet), populate column “W through column AB” with the risk score obtained from the analysis of each business driver during the workshop (Step 1); Environmental stewardship; Safety; Level of Service Reduction; Cost of repair/repairmen; Maintainability; Detectability.

Step 3: Once you have populated column “W through column AB”, column “AC” will automatically calculate the total consequence of failure.

Step 4: Populate column “AD” with the asset criticality by mapping the total consequences of failure to the OWAM criticality code outlined below:

TOTAL CONSEQUENCE OF FAILURE NUMBER	OWAM Criticality Code
00 - 80	1
81 - 160	2
161 - 240	3
241 - 340	4
341 - 440	5
441 - 590	6
591 - 790	7
791 - 1040	8
1041 - 1300	9

Table 8 – Mapping the Total Consequence of Failure to the OWAM Criticality Code

4.4 Part D: Asset Specification and Data (Fourth sheet and the rest of the sheets)

4.4.1 **Asset Specification Fields**

For each asset type identified in Part C above, consultants or contractors are expected to populate the asset data record (colour-coded blue) and specification data record (colour-coded grey) in each of the eleven asset class type spreadsheets provided in Part A above. From the fourth sheet of each of the eleven spreadsheets, each sheet is named by the asset type code of all asset types listed in the classification sheet (Second sheet); for ease of understanding and accuracy of requirement documentation, **e.g. WW-PUMP_DI** as in the case of asset type- PUMP. Ensure the correct asset class type spreadsheet is used to document all the asset types identified from the project. Fill each cell based on the comments that are included in each title cell. Continue to populate all the columns within asset specification data and specification. The typical asset type specification, including the datasheet image, is shown below.

Note: If an asset type sheet is missing in any of the eleven spreadsheets, please contact the City Representative to retrieve it.

WWS Asset Classification and Specification Guideline

The image below is a replica of the embedded Excel spreadsheet that gives you an idea of the content of the Excel document (OSB-AM-LOG-0002).

Classification Specification Template

Asset Typ PUMP, Diag

Asset Typ WW-PUMP_CE

Asset Data Record																
ASSET HIERARCHY LEVEL	RELATIONSHIP	ASSET_NO - Asset Number	TAGGED - Asset Tag/Name Plate	TAGID - Tag ID	PLANT - Synergen Plant	ASSET_RECORD_TYPE - Asset Record Type	ASSET_DESC - Asset Description	ASSET_STATUS - Asset Status	DEPARTMENT - Administrative	AREA - Administrative Area	CRITICALITY - Asset Criticality Rating	BREAKER_NO - Breaker Number	CONTROL_PANEL - Control Panel ID	BUILDING - Building Number	LOCATION - Physical location of Asset	ROOM - Room (location)

Specification Data Record																							
MANUFACTURER - Manufacturer	MAKE - Make	MODEL_NO - Model	CAT_NO - Catalog/type of type number	SERIAL_NO - Serial Number	MFRPT_NO - Manufacturer Part Number	DATEMFR - Date of Manufacture	PRESS_STRTUP - Startup Pressure (PSI/Bar)	FLOW - Flow Rate (lpm)	FLUID_COMM - Fluid Commodity Code	TEMP_OPER - Operating Temperature (°C)	PRESS_OPER - Operating Pressure	LIFT_DRY - Dry Suction Lift (m)	LIFT_WET - Wet Suction Lift (m)	DISPLACEMENT - Displacement per cycle	PORT_SIZE_AIR - Air Inlet Port Size (mm	PORT_SIZE_FLUID_IN - Fluid Intake Port Size	PORT_SIZE_FLUID_OUT - Fluid Outlet Port Size	COUPSIZE - Coupling Size Code	SPEED - Speed (RPM)	P/P CLASS - Pump Classification	STAGE - Number of Stages	BRG - Bearing Type	ENCL - Enclosure Code

Figure 1: Image of Asset Specification Record and Data Sheet

Hints:

- While populating the asset type specification, you may hide the asset type sheets (tab) that will not be used.
- **Repaired or untouched asset:** The specification information for repaired or untouched assets will not change. Therefore, specification information will not be documented for repaired or untouched assets.
- **New or replaced asset:** The specification information for new or replaced assets will change. Therefore, specification information will be documented for new or replaced assets.

WWS Asset Classification and Specification Guideline

GUIDELINE APPENDICES

APPENDIX 1: DEFINITION OF AN ASSET

Assets shall be created in the asset registry under any of the following conditions:

1. An asset may be tangible such as physical assets, or intangible such as software systems and information.
2. The asset is a high-value asset against which useful life, maintenance work, costs and history should be recorded and analyzed;
3. The asset is expected to have a significant environmental, safety, operational and maintenance impact;
4. There are other statutory requirements for identifying the individual asset;
5. The asset is required for parent hierarchy grouping purposes. These are artificial systems that will not incur any costs, work or schedule but will facilitate roll-up for reporting purposes;
6. There are operational or maintenance requirements to record statistical details;
7. There are requirements to record and manage warranty details against the asset;
8. There is a need to identify the total cost of ownership or life cycle costs;
9. There is a need to assess the condition over its service life.

If an asset does not fall within the above categories, it is unlikely to be needed for entry into the asset registry.

APPENDIX 2: ASSET HIERARCHY STANDARDS

The standards for the asset hierarchy are as follows:

1. The asset hierarchy logically reflects how the assets physically relate to other assets.
2. All managed assets must belong to a hierarchy.
3. Assets from within one asset class may form part of a hierarchy with assets from another asset class.
4. All efforts should be made to limit the asset layers to a single layer of assets and child assets where needed.
5. **Child Assets** are assets within a parent asset system. They are assets in their own rights, so they may also consume labour, materials and services. Criteria for designating a child asset are that the asset:
    a. Must be of significant value compared to the value of the asset
    b. Must have a need to track cost independent of the parent asset
    c. Be most likely to have different depreciation time periods than that of the parent asset
6. **Components** are repairable sub-assemblies of an asset system which may be used on multiple assets. For example, a Component could be an after-cooler, a gearbox, or a motor. They may be held in inventory or as shop spares.

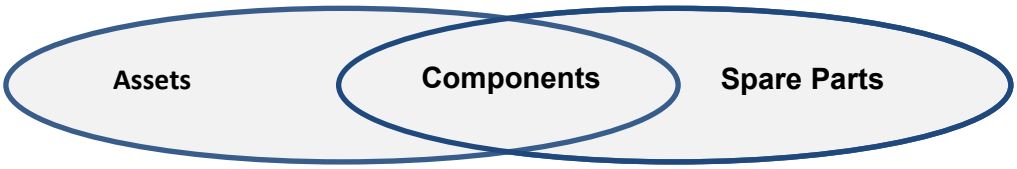


Figure 2: Asset, Component, and Spare Part Relationship

7. **Specific Rules for Child Assets:** Where one asset is serving another. E.g. BNR Mixers are 100% dedicated to mixing the individual reactors. Child assets could include the following:

    - **Motors / Size Driven Assets, e.g.,** Motors and VFDs / starters > 30KW
    - **Safety Driven Assets, e.g.** Gas detectors
    - **Process Driven Assets**

    Note: This rule is not to be applied without critical thinking

8. **Specific Rules for Grouped Assets:** Where there are many small similar items, it is not always beneficial to include every item as a discrete asset in the register. In these situations, the assets can be grouped with a single asset created to represent multiple pieces of equipment.

    Examples of Grouped assets are shown below. The rule is not to be applied without critical thinking. Exceptions identified to the rule are identified below.
    Grouped Assets (examples)
    - Air Conditioning Unit Group Asset
    - Channels & Waterways Group Asset
    - Condensing Unit Group Asset

- Domestic Water System Group Asset
- Ducting Group Asset
- Exhaust Fan < 1 kW Group Asset
- Heat Exchangers Group Asset
- Lighting & Receptacles Group Asset
- MV Cabling Group
- Supply Fan < 1 kW Group Asset
- Unit Heaters, Electric Group Asset
- Unit Heaters, Hot Water Group Asset
- Unit Heaters, Natural Gas Group Asset
- Manual valves < 150mm

Instrumentation Group: In general, instrumentation equipment will be grouped. Examples of instrument groups:

- Grit System Instrument Group
- HVAC Instrument Group
- Influent Pumping Instrument Group
- Influent Screening Instrument Group
- Main Power Instrument Group
- Standby Power Instrument Group

Instrumentation which is process-critical or safety-critical, will be identified as specific assets.
Examples identified to date are:
Process critical flow meters (influent; RAS; WAS) - identify at the Parent level.
Gas detector controllers - identity at the Parent level

Note: This rule is not to be applied without critical thinking

APPENDIX 3: HELPFUL HINTS FOR ASSET IDENTIFICATION

Louvers/Dampers:

- Dampers should not be identified since they are part of either the exhaust fan or AHU. However, suppose Preventative Maintenance (PM) Schedule is required for these dampers. In that case, they could be initiated with their respective associated asset with a clear description of the maintenance task that needs to be done on the damper.
- Point out exhaust fans and AHUs which have dampers by including the dampers in parenthesis within the description of each of the identified exhaust fans or AHUs to help the maintenance planner identify the associated asset to initiate damper PM.

Heat Exchanger: Identify all liquid-to-liquid heat exchangers and glycol heat exchangers as assets. Other heat exchangers, e.g. liquid to air, should not be identified.

Valve: Identify all “backflow preventer valves” and “automatic valves that get a control signal” (actuated) as assets. Manual or non-actuated valves should be identified as a group asset.

Filter: All filters should be identified as components.

Unit Heater: All Unit heaters should be identified as an asset

AHU: All Air Handling Units (AHU) should be identified as parent assets, and Air Conditioning Units (ACU) should be identified as the child asset of AHU.

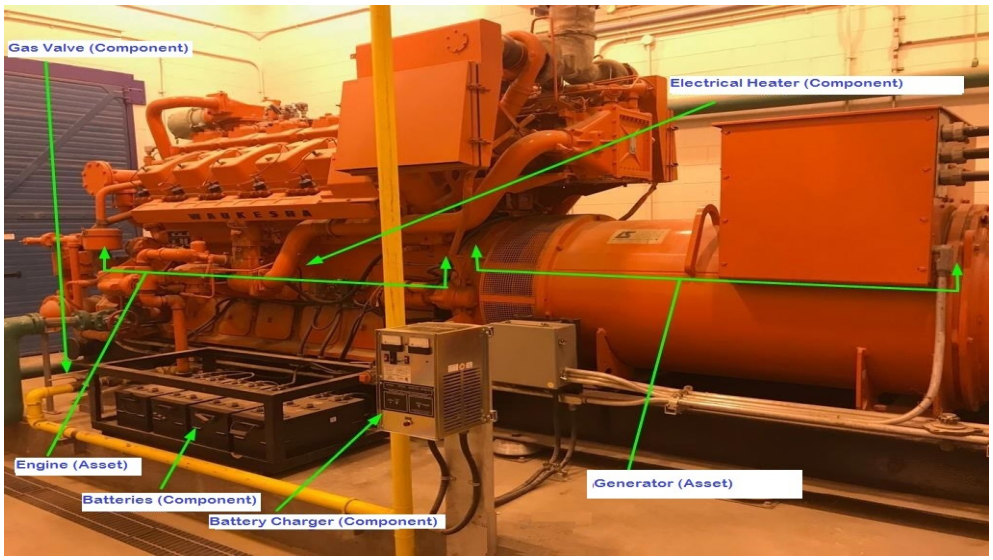


Figure: Image of Asset, Component, and Spare Part for an Engine

APPENDIX 4: FACILITATION HINTS FOR ASSET CRITICALITY WORKSHOP

4.1 Environmental Stewardship – Release of effluent/chemicals/gaseous pollutants to surface/groundwater/soil/air

Based on the impact of plant's potential pollutants, including Wastewater & Effluent; Air Emissions: odour, dust, fumes, gases, and smoke; Chemicals: process additives, lubes, cleaners, degreasers, chemicals etc.

Facilitation question:

- Does the asset impact the release of Wastewater to surface/groundwater/soil, Air Emissions or chemical spills?

Note: Rate 0 for all assets that do not directly impact the release of Wastewater to surface/groundwater/soil, Air Emissions or chemical spills.

4.2 Occupational Safety- Loss/injury of life/limb

Based on personnel safety evaluation

Facilitation question:

- What is the impact of the asset on the safety of personnel during failure and repairs/maintenance?

4.3 Operational Consequence of Failure

3 (a) Level of Service Reduction

Based upon throughput reduction and whether plant configuration allows for redundancy or a single point of failure. Based upon design or Best Demonstrated Capacity, not schedule requirements.

Facilitation question:

- How will failure affect the Process Department/Area's ability to meet mission requirements?
- Is there a redundant plant or storage/buffer capacity after the asset that could minimize the impact of failure?
- Does a failure of this asset cause other assets to fail or trip out of service?

3 (b) Cost of Repair/Replacement

Based upon most recent repairs or best estimates.

Facilitation question:

- What will it cost to repair/replace the asset?

3 (c) Maintainability

Based on Serviceability (ease of access, level of maintenance effort required to understand the nature of the failure (RCA) and the repair and to restore asset) and Supportability (internal and external resources available to support repairs, including access to spares.)

Facilitation question:

- What is the ease of access of the assets
- What is the level of maintenance effort required to understand the nature of the failure (RCA) and the repair and how to restore the asset?

3 (d) Detectability

Based upon appropriate levels of instrumentation or the failure being evident before it has impacted the process or other equipment.

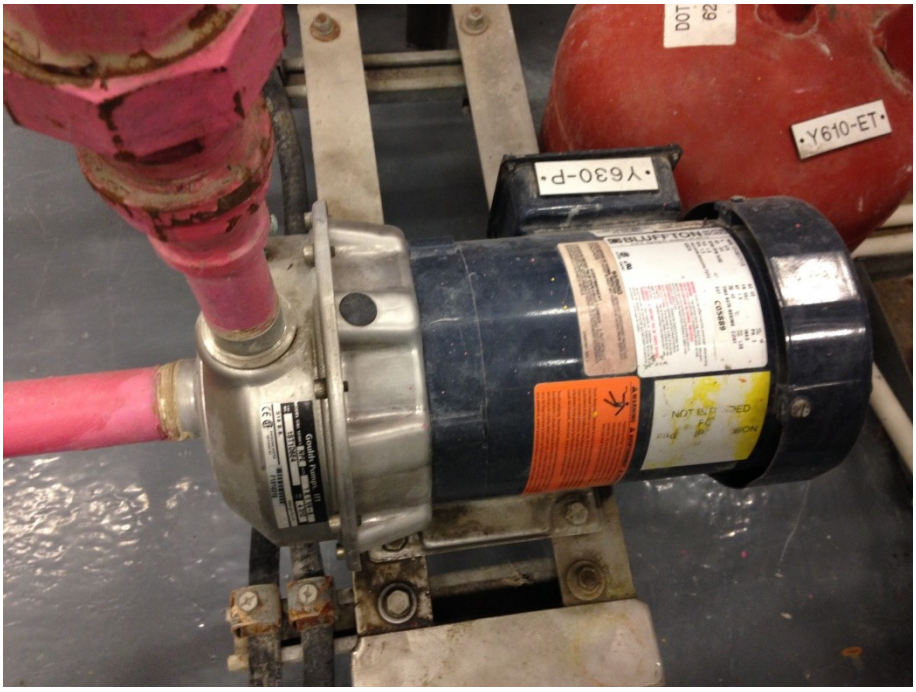
Facilitation question:

- How will it be known if an asset failure has occurred?

APPENDIX 5: EXAMPLES OF ASSET NAME PLATES (A-D)

A

B


Y610-ET
Y630-P

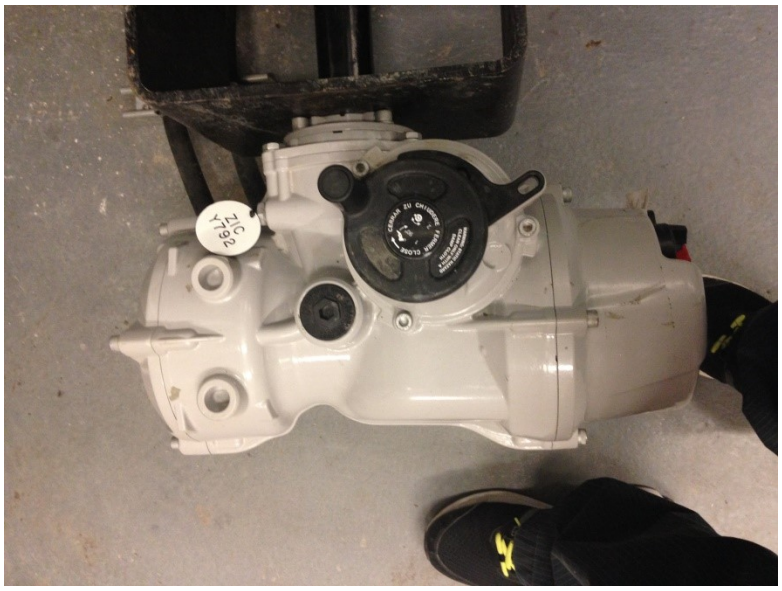
C


PANEL WE-1 FEEDER
TO TRANSFER SWITCH A1
Cutler-Hammer
ON
OFF
DANGER
PELIGRO
PANEL WN-1 FEEDER
TO TRANSFER SWITCH A1
Cutler-Hammer
ON
OFF
DANGER
PELIGRO

D

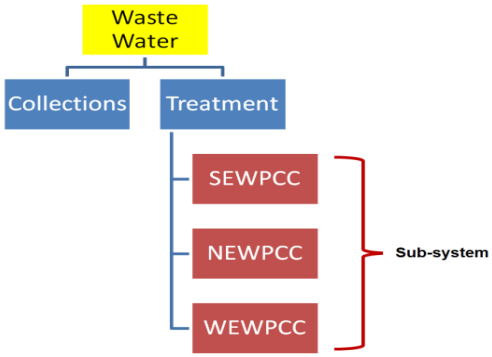

RELIANCER
INDUSTRIAL MOTOR
CAT. NO.
SPEC. 34K036-0873G1
HP .5
VOLTS 575
AMPS .8
R.P.M. 1725
FRAME 56J HZ 60 PH 3
SER. F. 1.00 CODE L DES B CLASS B
NEMA NOM. EFF. 74 % P.F. 63 %
RATING 40C AMB-CONT
CC USABLE AT 208V A
BEARINGS DE 6203 ODE 6203
ENCL. TEFC
W100721343
SMITH, AR. MFG. IN U.S.A.

APPENDIX 6: EXAMPLES OF ASSET TAG ID(S)

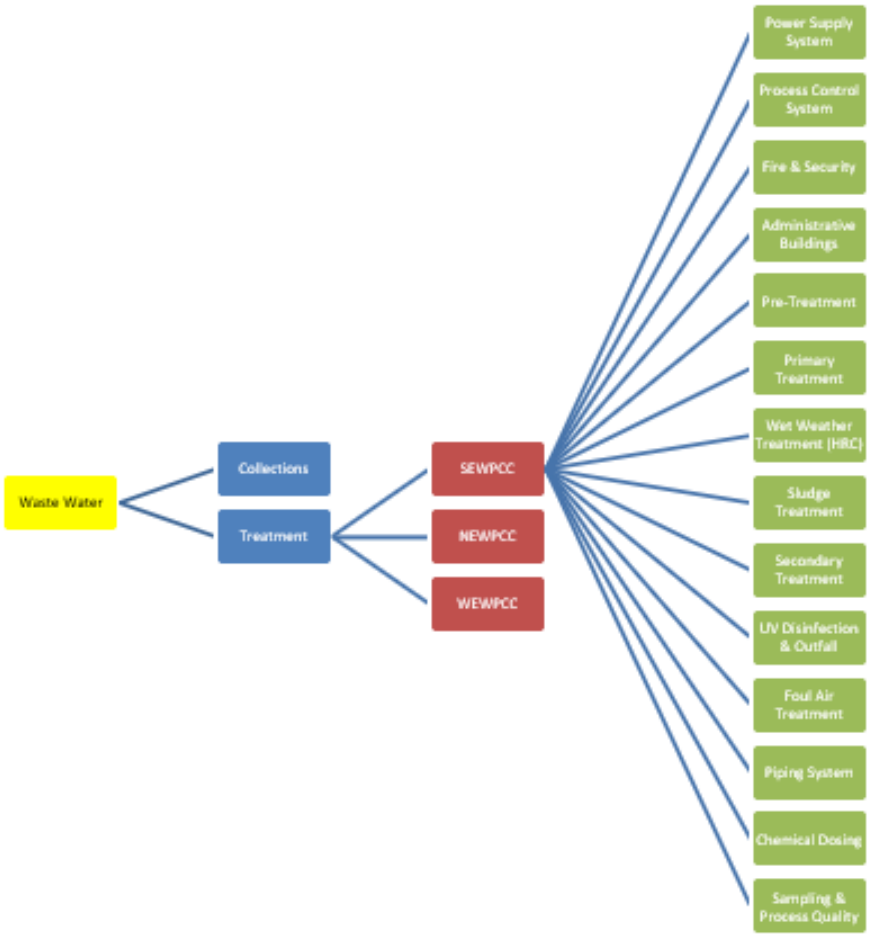


APPENDIX 7: EXAMPLE OF SEWPCC ASSET HIERARCHY

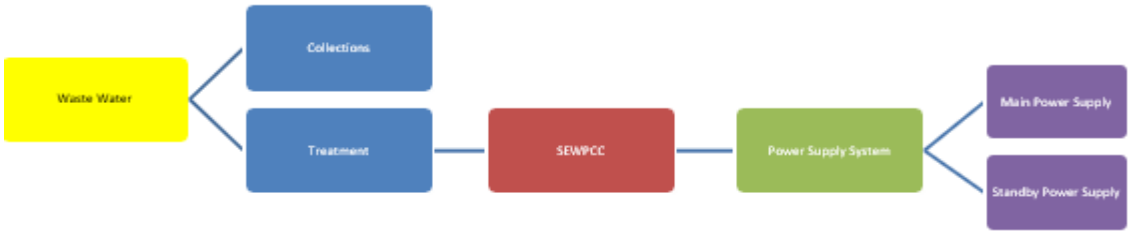
7.1 SEWPCC Asset Hierarchy – Main Administrative Level



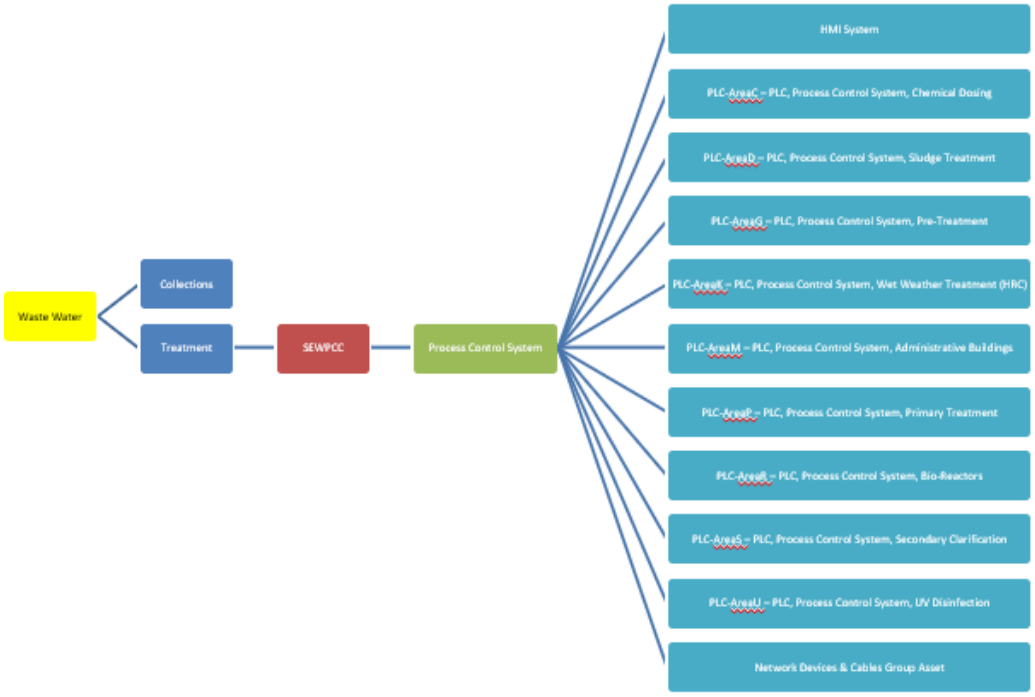
7.2 SEWPCC Asset Hierarchy – Main Processes



7.3 SEWPCC Asset Hierarchy – Power Supply System

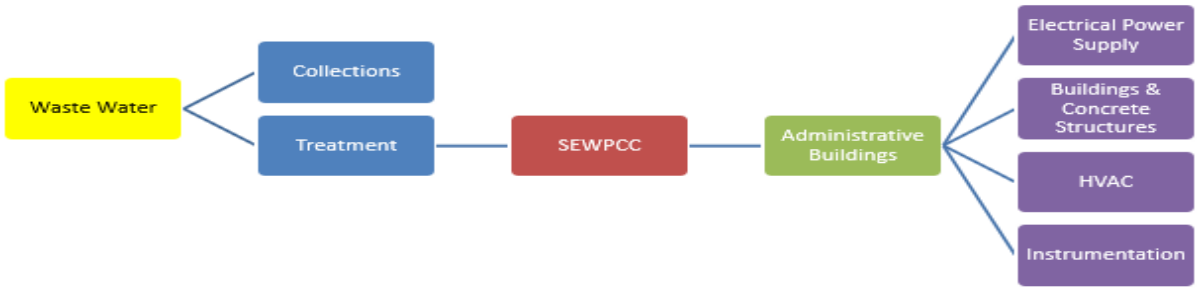


7.4 SEWPCC Asset Hierarchy – Process Control System

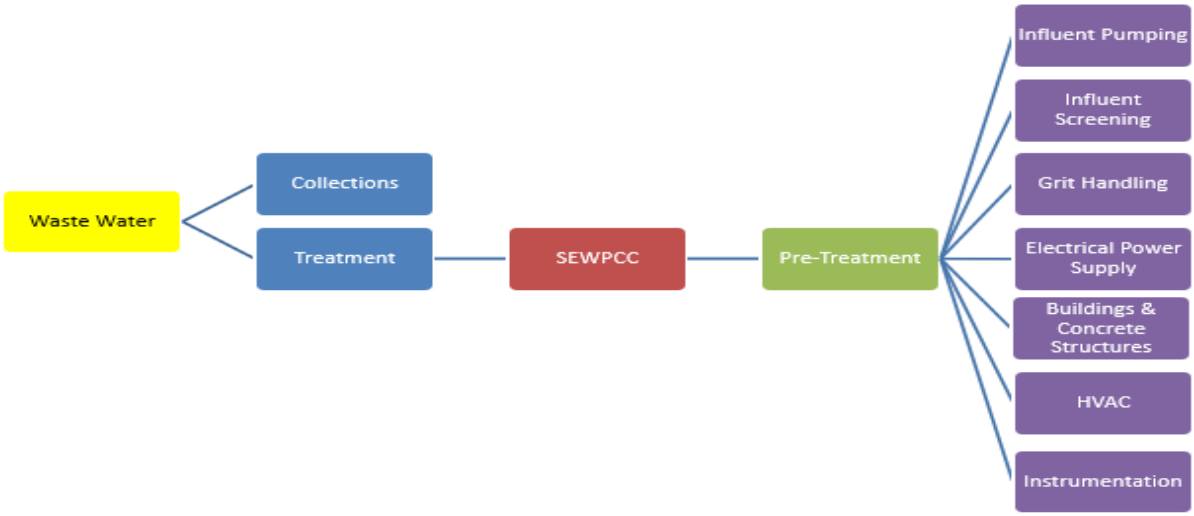


7.5 SEWPCC Asset Hierarchy – Fire Protection & Security System

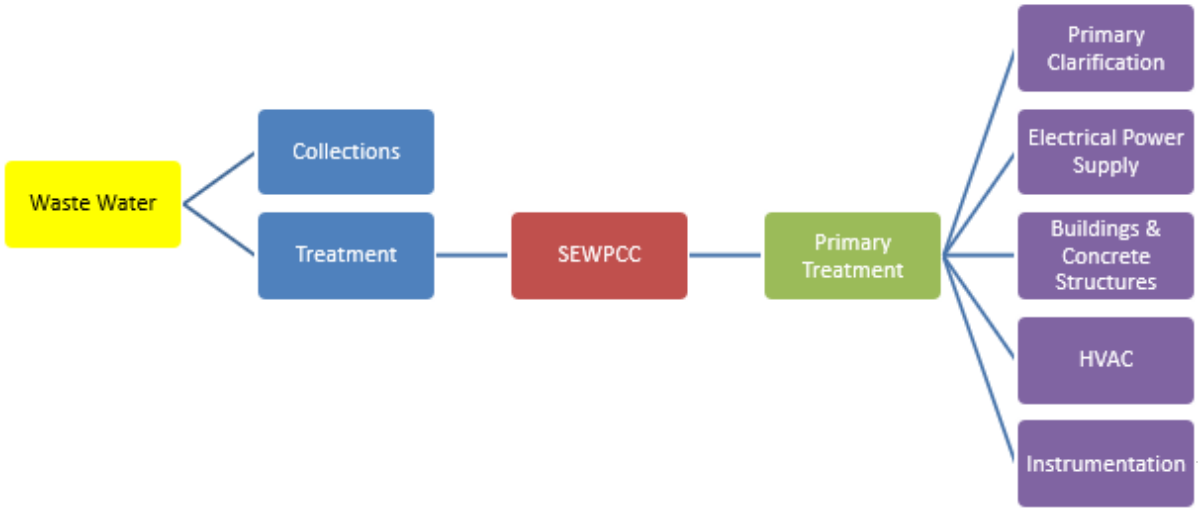
7.6 SEWPCC Asset Hierarchy – Administrative Building



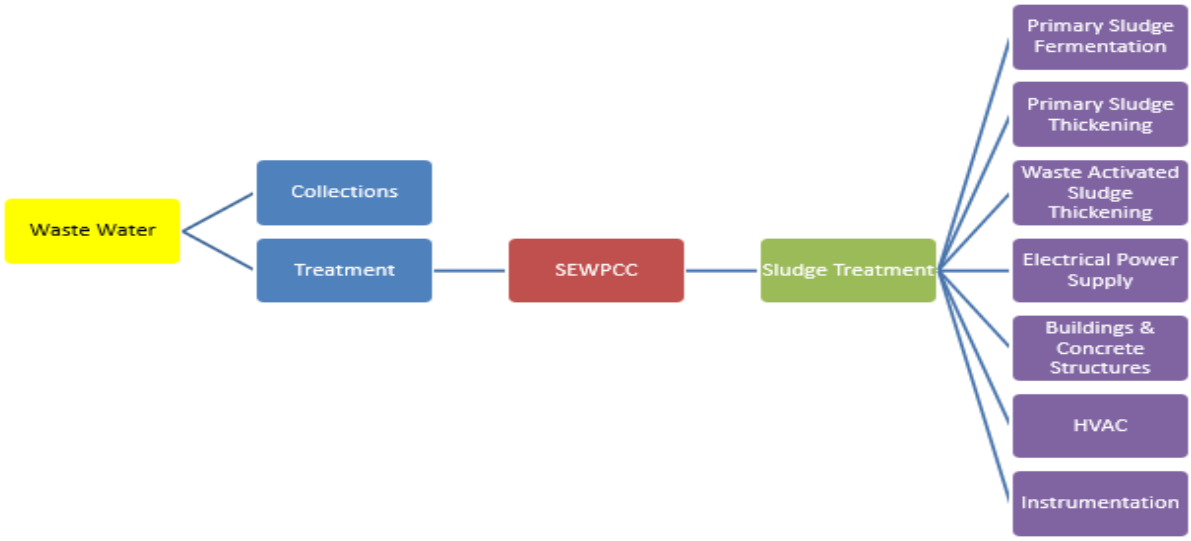
7.7 SEWPCC Asset Hierarchy – Pre-treatment Process



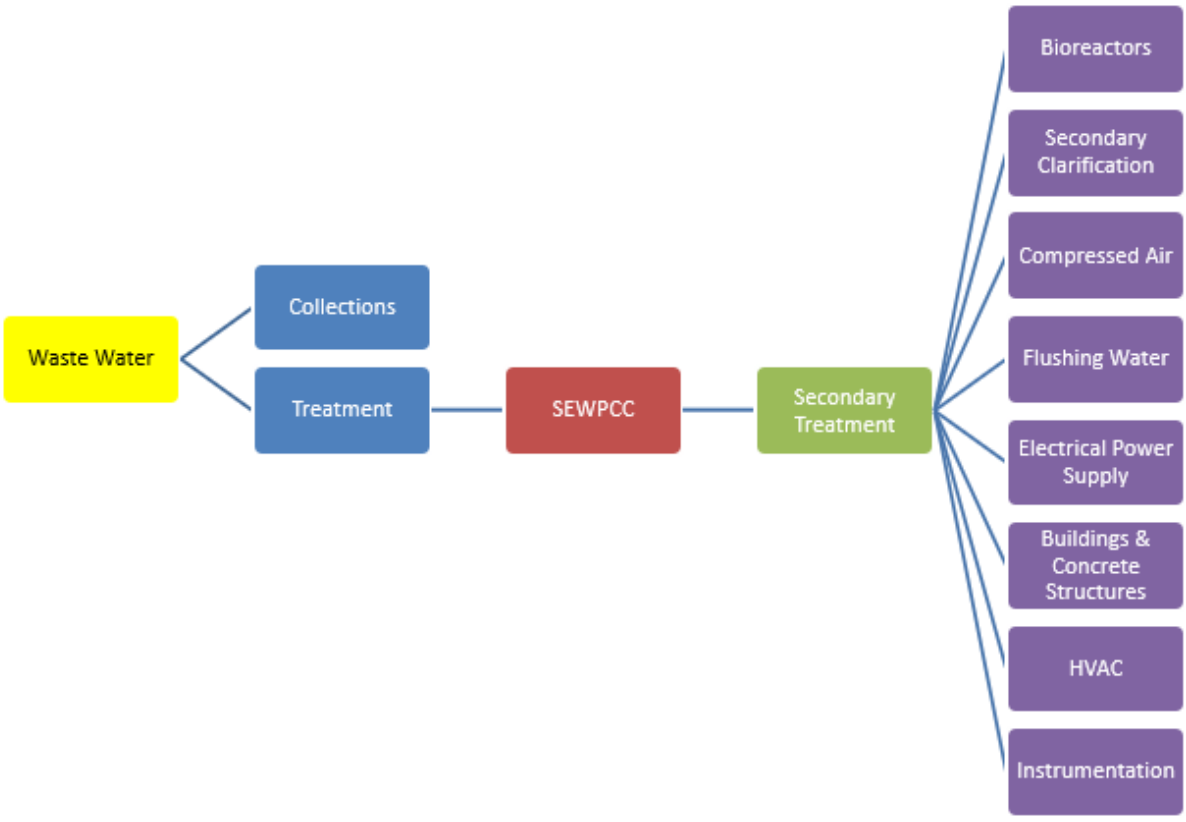
7.8 SEWPCC Asset Hierarchy – Primary Treatment Process



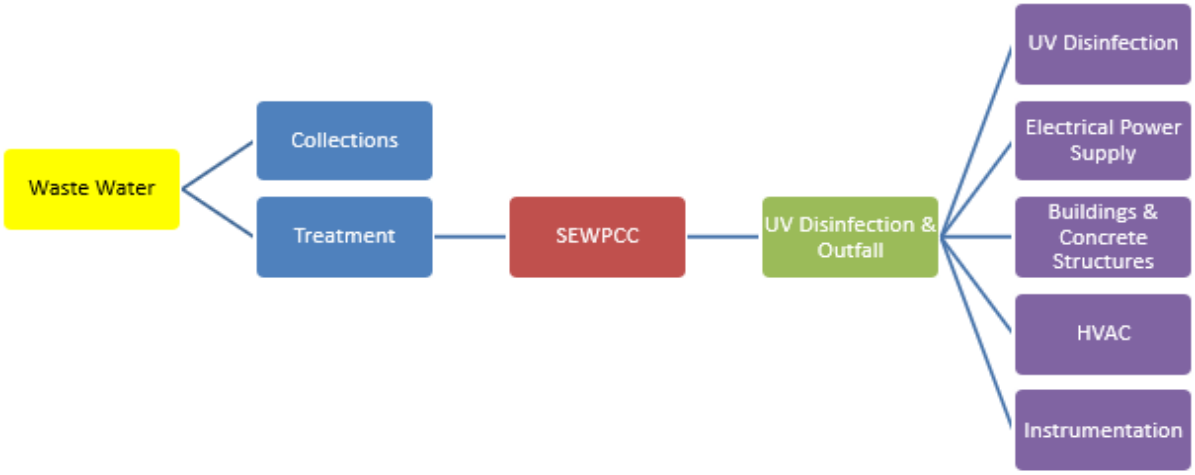
7.9 SEWPCC Asset Hierarchy – Sludge Treatment Process



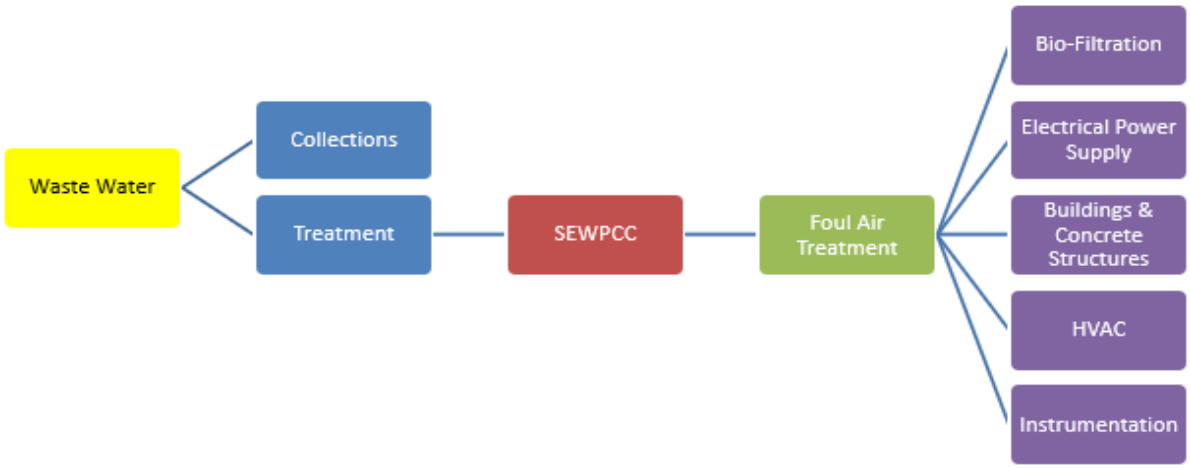
7.10 SEWPCC Asset Hierarchy – Secondary Treatment Process



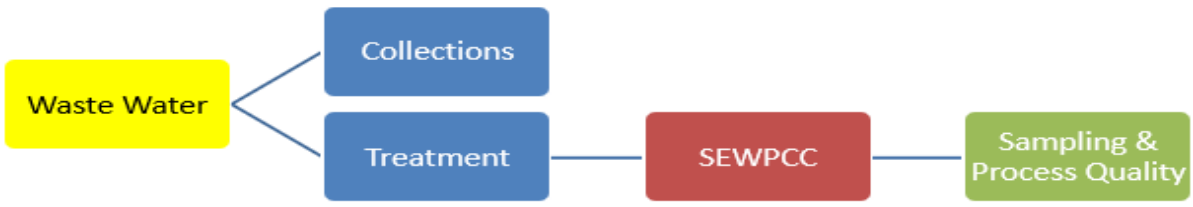
7.11 SEWPCC Asset Hierarchy – UV Disinfection and Outfall Process



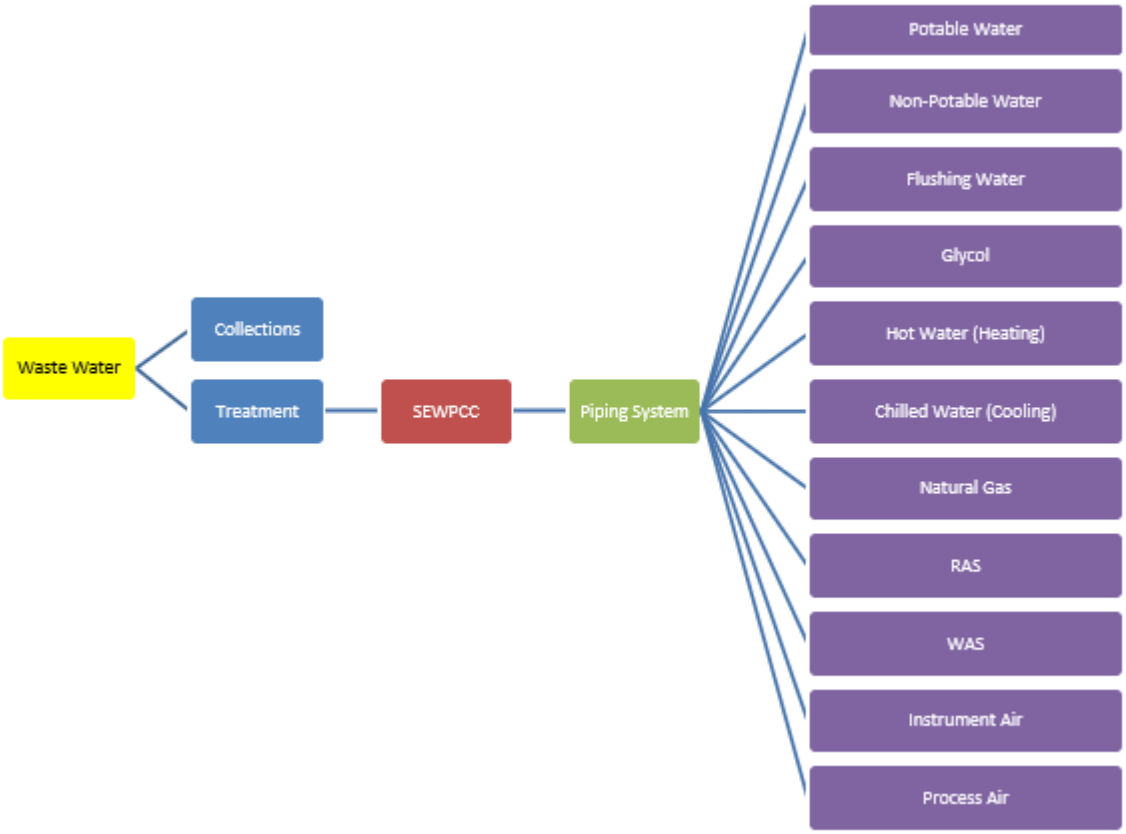
7.12 SEWPCC Asset Hierarchy – Foul Air Treatment Process



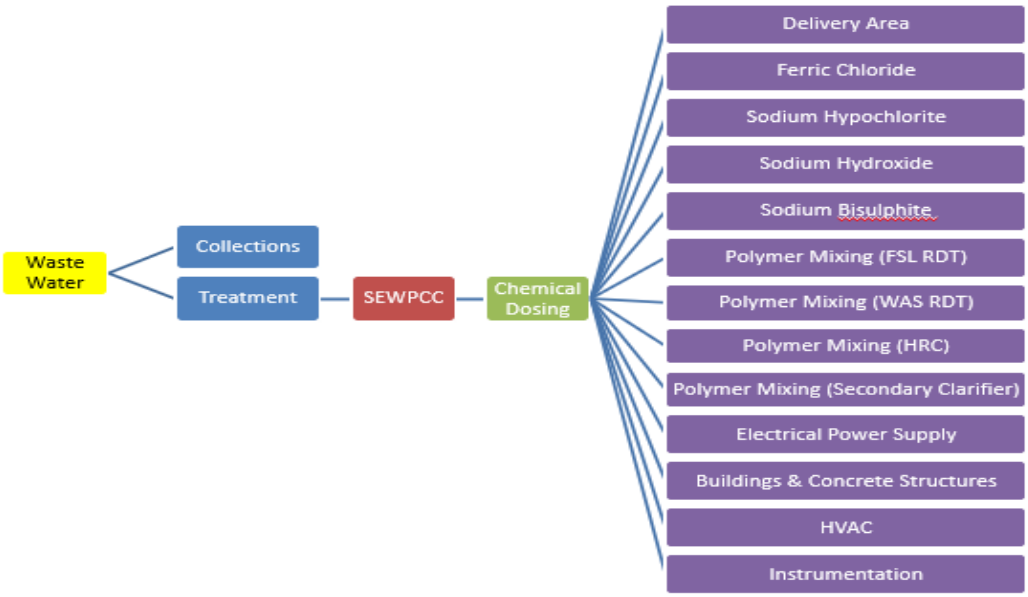
7.13 SEWPCC Asset Hierarchy – Sampling and Process Quality



7.14 SEWPCC Asset Hierarchy – Piping System

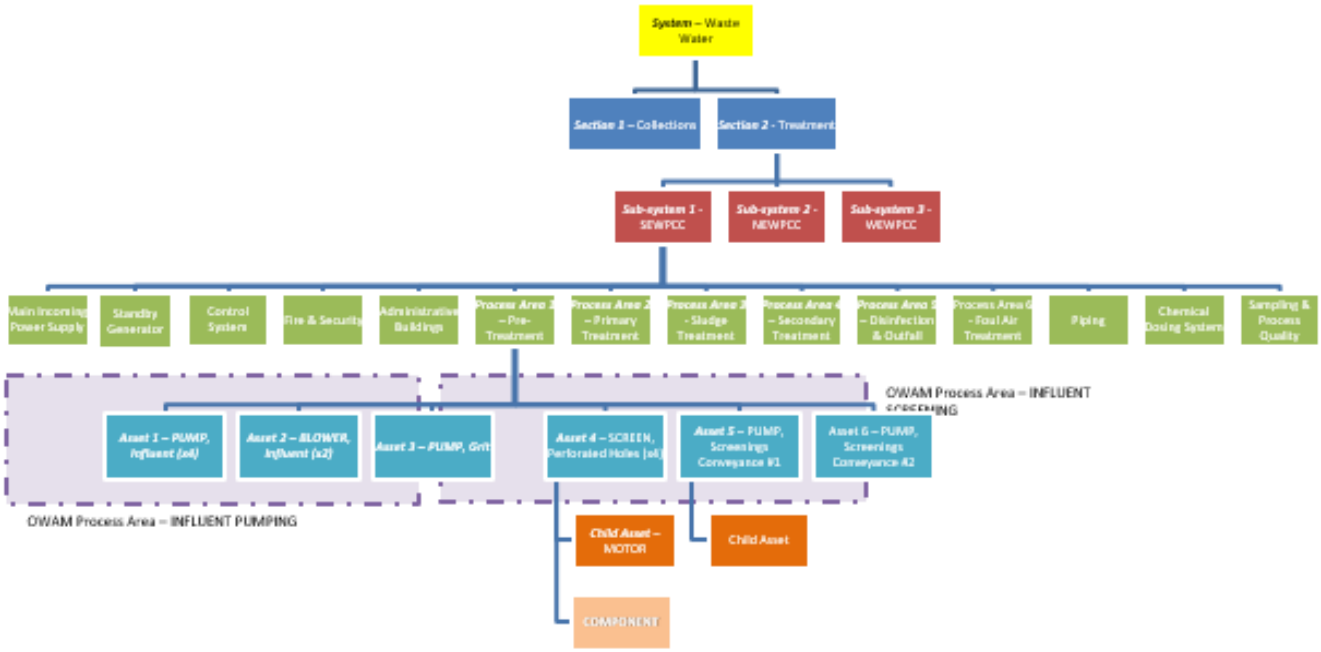


7.15 SEWPCC Asset Hierarchy – Chemical Dosing System

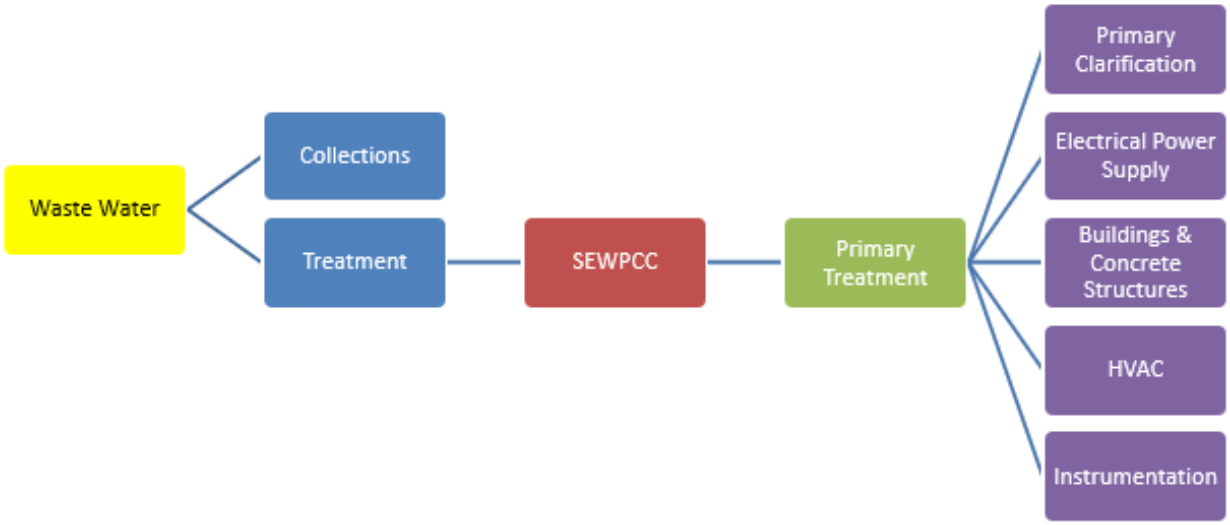


APPENDIX 8: EXAMPLE OF ASSET HIERARCHY FOR COMPLETE DEPARTMENT IN SEWPCC (PRIMARY TREATMENT)

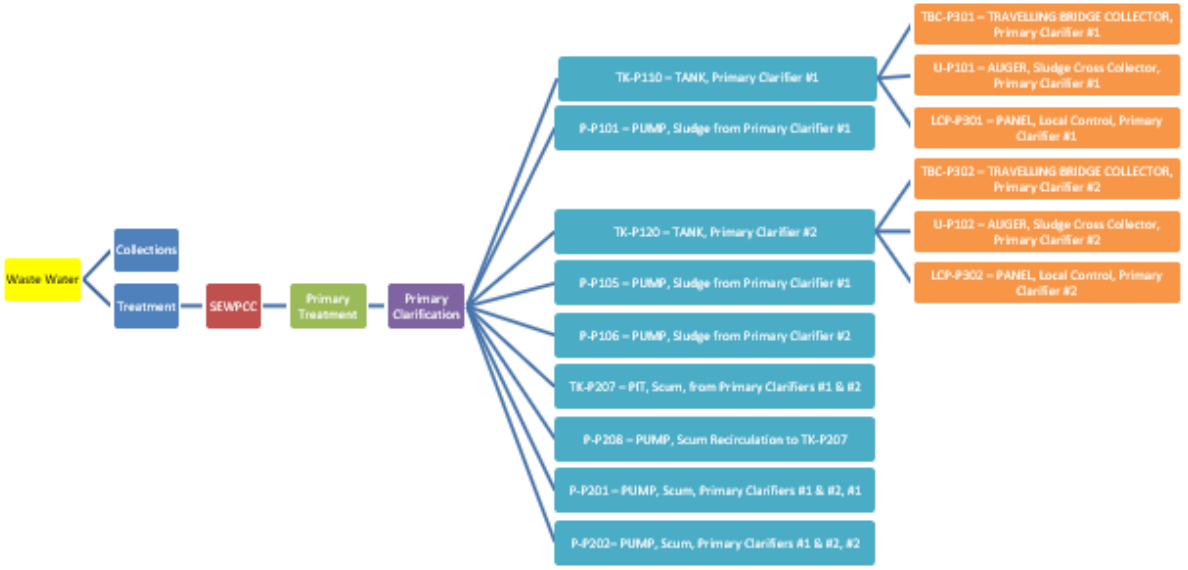
8.1 SEWPCC Asset Hierarchy Template identifying the subsystem (SEWPCC), process area (Pre-treatment), Child asset (Motor) and component.

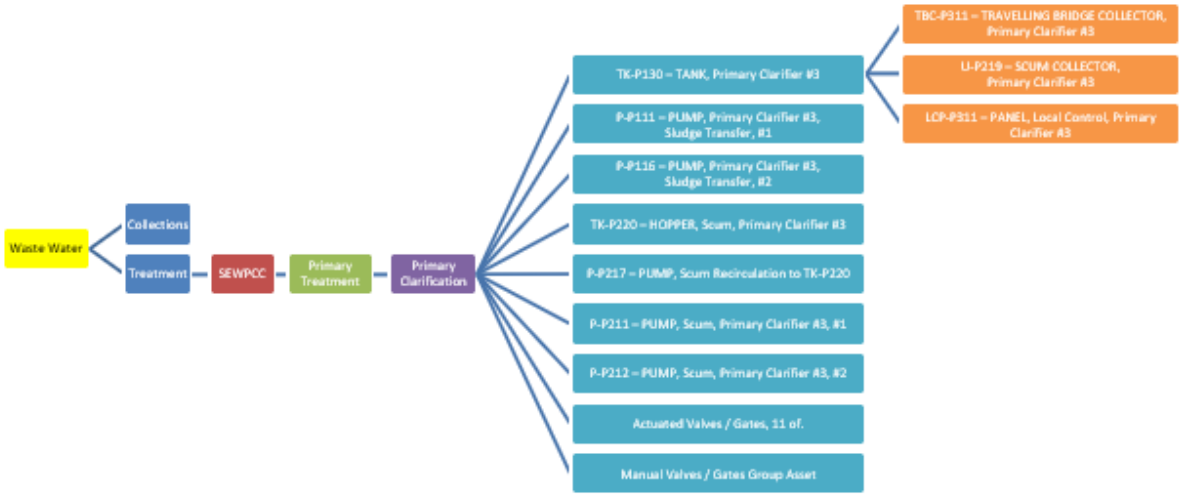


8.1.1 SEWPCC Primary Treatment Process

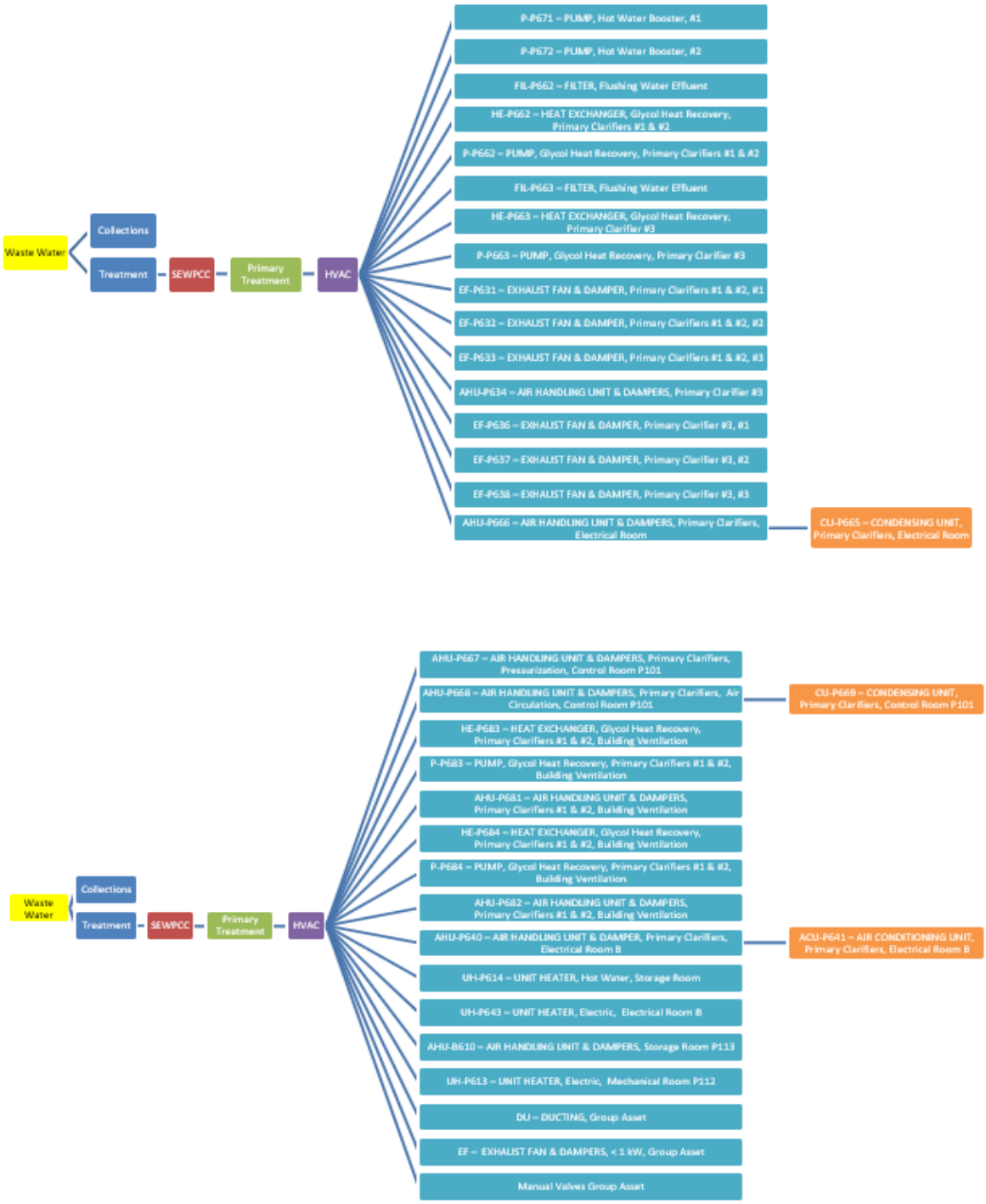


8.1.2 SEWPCC Primary Treatment Process (*Primary Clarification Sub-Process)*

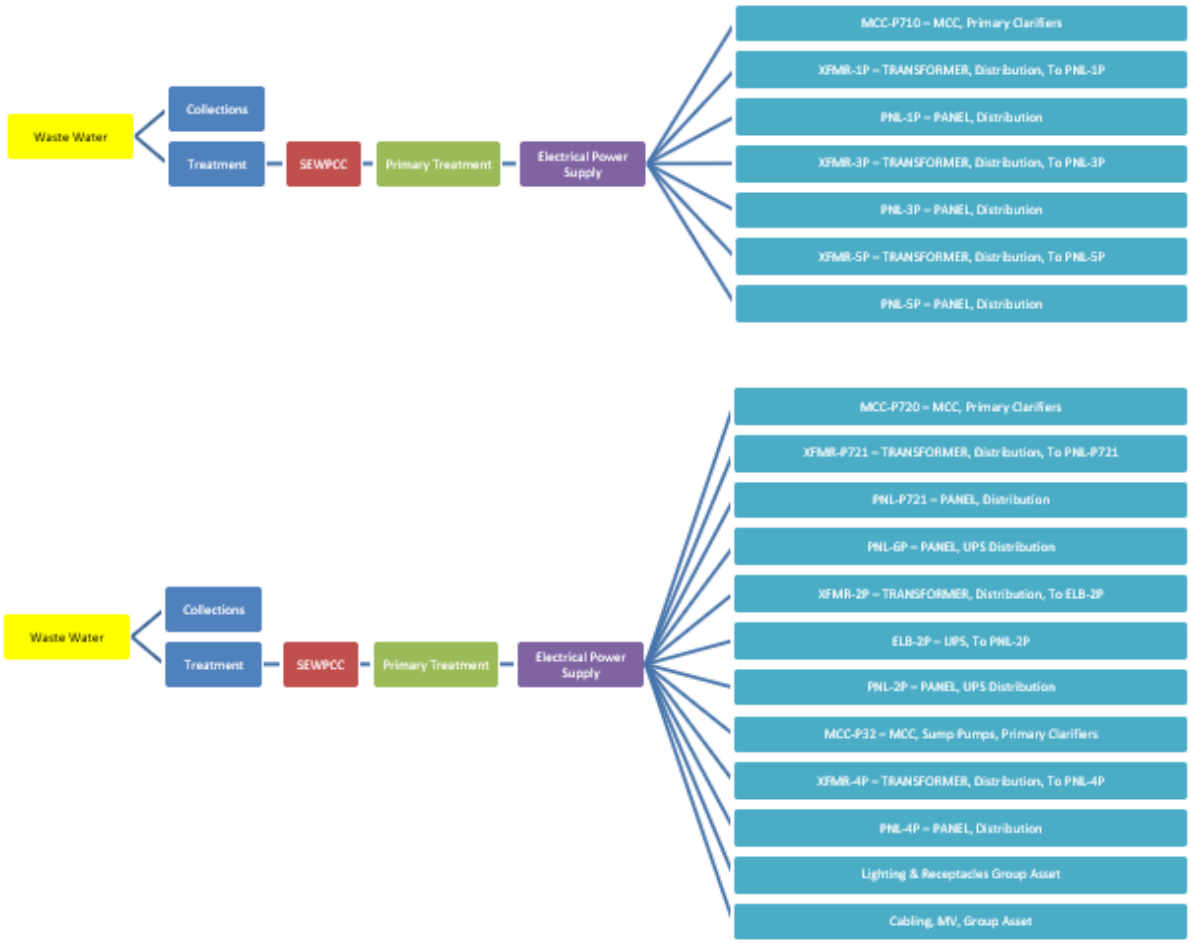




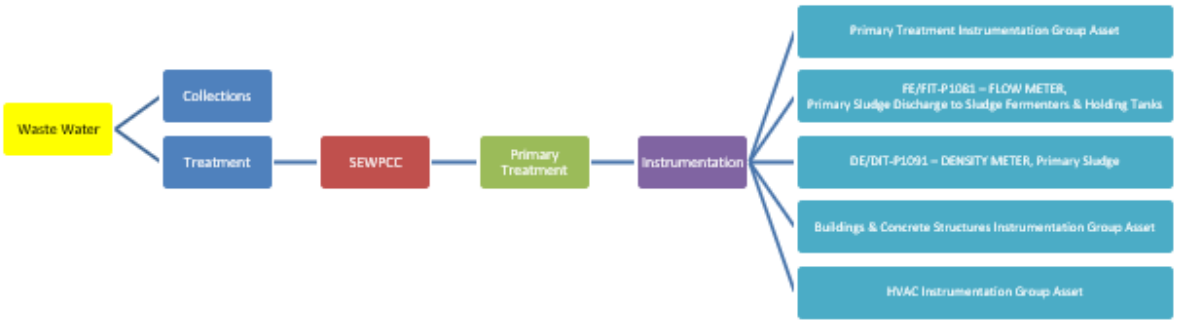
8.1.3 SEWPCC Primary Treatment Process (*HVAC)*



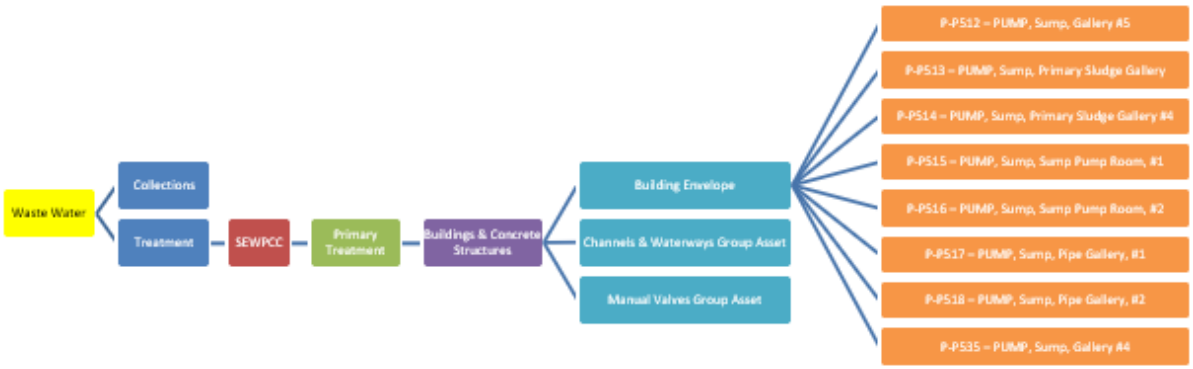
8.1.4 SEWPCC Primary Treatment Process (*Electrical Power Supply Sub-system- Primary Clarification)*



8.1.5 SEWPCC Primary Treatment Process (*Instrumentation)*



8.1.6 SEWPCC Primary Treatment Process- *Buildings & Concrete Structures*



APPENDIX 9: ASSET DATA TEMPLATES

Asset Data Spreadsheet_Maintenance Project Only.zip