



**THE CITY OF WINNIPEG**

# **Work and Asset Management Upgrade Project**

## **Appendix A - Needs Assessment and Existing Conditions**

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## Overview

The Water and Waste Department (WWD or the “Department”) is a large, complex, and dynamic department within the City of Winnipeg (CoW). Today, the Department relies on the Oracle Utilities Work and Asset Management (OWAM) system to help manage asset lifecycles, maintenance operations, supply chain performance, safety, and regulatory compliance. The Department is the executive sponsor and custodian of the system although it is also used in to a lesser degree across the City where collectively, there are approximately 500 active OWAM users across seven departments and 21 divisions/branches.

The current release of OWAM implemented within the WWD is version 1.9.1.2.14 and it is nearing the end of the vendor’s support lifecycle. Therefore, it is due for a major upgrade that is expected to bring about people, process, and technology changes involving the business, even if configured as close to “like for like” as possible. Preparation for this upgrade, including the identification of key needs, issues, and opportunities, has been the focus of Phase 1 of the Work and Asset Management System Upgrade Project (the “Project”). There is also the strategic decision to examine how the City can leverage the system to maximize its benefits across the Department and move towards a future state focused on Enterprise Asset Management (EAM), and eventually Enterprise Intelligent Asset Management (EIAM).

## Stakeholders

The Water and Waste Department consists of three distinct “utilities” – Water Services (WS), Wastewater Services (WWS), and Solid Waste (SW). As the primary users of Oracle Work Asset Management (OWAM) solution, it was determined that only the WS and WWS divisions would be in scope for the gap analysis. To closely examine the processes of individual business units, the Project further subdivided the WS and WWS divisions. WS was subdivided into Railway (W-R), Treatment Plant (W-P), and Distribution (W-D). WWS was subdivided into Treatment Plants (WW-P) and Collections (WW-C).

## Consideration for other stakeholders

In addition to the primary stakeholders of this project, the WS and WWS divisions, there are several other secondary stakeholders both within the WWD and across the City of Winnipeg (CoW) who will be affected by the upgrade process. The vendor must further investigate the level of involvement of these stakeholders during design and testing to ensure a successful upgrade. Table 3.1 provides a summary of additional stakeholders and their current use of OWAM.

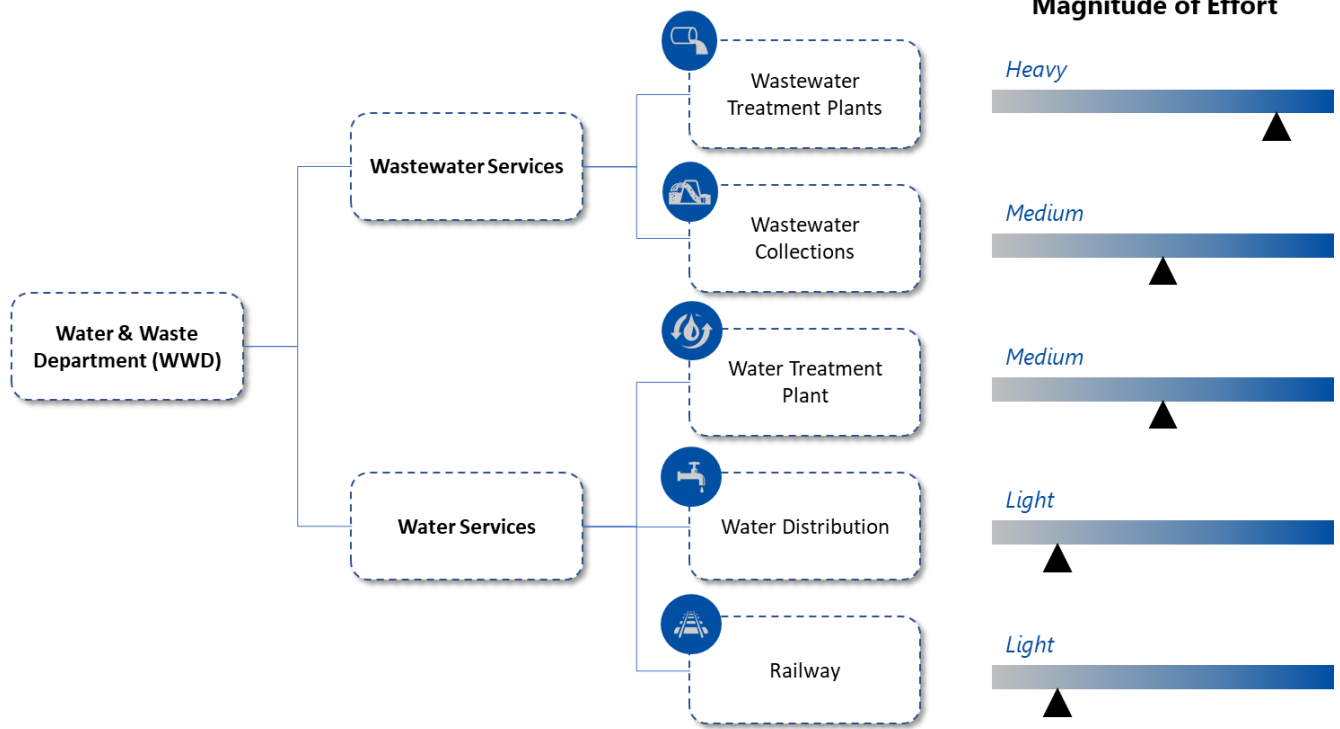
**Table 1: Secondary Stakeholders**

Stakeholder	Responsibility	Primary Use of OWAM
<b>Finance &amp; Administration (FA)</b>	FA is responsible for financial services, administrative services, customer meters and meter reading, billing and collection, rates and rate structure, business planning, process improvement and financial planning.	FA manages water turn off/turn on due to non-payment situations. When WS attends a property, a Service Request (SR) is created in OWAM and, once updated to Finished Status and forwarded to billing, is reviewed by a Clerk in FA.
<b>311</b>	311 is a resource available to citizens to get information about CoW services and programs, or to make a request for service. 311 Customer Service Representatives (CSR) are available 24 hours a day, 7 days a week and 365 days a year.	311 operators will log citizen calls in Verint as an SR. 311 Operators do not use OWAM, only Verint. Calls during normal working hours are reviewed by a WS Yard Clerk. This Yard Clerk will manually update the comments in Verint with details provided in the OWAM WO. 311 will review comments and provide updates to citizens on open or closed issues, if requested.
<b>Customer Service</b>	Customer Services is responsible for utility billing inquiries, public information, community	A CSR will receive requests directly from citizens. Customer Services uses CC&B as a

	relations, public consultation, market research, citizen surveys, and internal communication.	first step in most situations where OWAM is used. Interactions typically deal with water meter, new service, turn on, turn off, removal, and seasonal service. OWAM is used by WS to manage the work initiation and subsequent field work.
<b>Public Works</b>	Public Works is responsible for road construction, regional street and lane closures, snow and ice control, bike projects, construction projects, parks and open spaces, road safety, and permits and approvals.	OWAM is used for informational purposes only. For example, if there is street work being done and WS is performing work, Public Works can review details in OWAM.
<b>Corporate Finance</b> (including PeopleSoft Finance, City Clerks, and Risk Management)	Corporate Finance is responsible for managing the purchasing information in PeopleSoft, as well as managing risks.	Corporate Finance works with those in each division responsible for managing inventory in OWAM.
<b>Engineering Services</b>	Engineering Services is responsible for water planning and conservation, wastewater and land drainage planning, capital improvement programming and budgeting, asset management, plan approval, development agreements, project management, design and contract administration, survey and inspection, material and service standards, lot grading By-laws, drafting and graphic services, and records management.	Engineering Services' primary usage is read only and includes functions such as looking for information on sewer backups or basement flooding, water infrastructure related issues, service requests, information related to S41 sewer repairs, reviewing specific asset work history (such as work orders on a specific pump) and reviewing preventative maintenance that has been/is being performed on an asset.
<b>Solid Waste</b>	The Solid Waste division is responsible for providing collection, disposal, and waste minimization programs and facilities for solid waste.	While the Solid Waste division does not currently interact with OWAM, there is the potential for OWAM v2.X to replace the functionality of their current Cart Management System (CMS).

The estimated effort required for each individual subdivision to undergo a 'like for like' upgrade to OWAM is depicted in the figure below. The Wastewater Treatment Plants are expected to require the most effort as this subdivision includes heavy users of many of the core OWAM modules (e.g., asset master and inventory management), as well as two full-time maintenance planners who use OWAM for planning/scheduling. The magnitude of effort required for Wastewater Collections and the Water Treatment Plant is described as medium. Resources in Wastewater Collections are not heavy users of OWAM for assets, but do use work orders extensively. Users in the Water Treatment Plant use some key modules of OWAM and track some assets within the system, but do not use it as extensively as in the Wastewater Treatment Plants. Both Water Distribution and Railway have very few or no assets on OWAM. Water Distribution, however, uses service requests extensively. The magnitude of effort required for Water Distribution and Railway is described as light.

# Change Index Across WS and WWS



## History of WAM in the Water and Waste Department

The original version of Oracle Utilities Work Asset Management (OWAM) v1.5 (formerly known as Synergen) went live June 2002. The OWAM upgrade to v1.9.2.3 completed in April 2015. The last update was patch set v1.9.2.14 completed on January 18, 2020.

OWAM is currently utilized by the following Water and Waste Department divisions; Engineering, Customer Service, Finance and Administration, Wastewater Services and Water Services. The Public Works Department, 311 Services and Corporate Finance Risk and Insurance.

The Wastewater Division's (FGA) Fine Grain Access Phase 1 project initiated in June 2015 and completed March 31, 2016 to enable view only access Wastewater Division's data to the department's partner as part of the Winnipeg Sewage Treatment Program (WSTP). This is made possible using the 'Fine-Grained Access' feature available with the Oracle Enterprise Edition Database and extension into the OWAM application.

FGA Phase 2 project followed immediately after Phase 1 to facilitate the underlying business need and effort to improve maintenance and inventory management practices by improving data capture and quality, ability to analyze and forecasting asset life. This phase completed in September 2018 in alignment of recommendations from the WSTP where several major upgrade programs underway at the treatment plants that will add new and more complex assets to the plants. Wastewater Services needed to expand their use of OWAM to improve maintenance execution to achieve the full asset life of these new assets.

## Current State Assessment

A technical upgrade readiness assessment was conducted in 2023 that focused on the following areas:

- Evaluate total cost of ownership (TCO) of staying on-premise or going to Oracle’s Cloud solution
- Evaluate and recommend an environment management plan for upgrade
- Evaluate existing and future integrations
- Evaluate existing customizations
- Evaluate data quality and migration efforts
- Evaluate existing reporting requirements and future needs
- Evaluate next phase implementation activities (Testing, Training and Rollout Options)
- Evaluate technical support needs (training, system support)

The assessment aimed to aid the City in identifying the optimal platform for upgrading the WAM application. The City had two choices: adopting WAM On-Premise, mirroring the current deployment model, or opting for Oracle's Cloud solution (WACS). This evaluation involved creating a 10-year total cost of ownership (TCO) model for both on-premise and cloud alternatives, along with a thorough examination of the advantages and disadvantages of each deployment model. The assessment results led to the following decision to remain on-premise.

## Assessment Observations

### Asset Management

#### Asset & Asset Hierarchy

- Asset Hierarchy Clean-Up needed.
- Asset Hierarchy is not really used for asset cost analysis, mainly used just to find assets
- Need to review if all assets are in the system that should be.
- Assets are sometimes difficult to find. This leads to incorrect assets being selected on work orders. Might help setting up Process to represent System and then location fields to identify physical location in plants (Location, Building, etc...).
- There is no formal group responsible for the creation and upkeep of the asset registry. No formal process for requesting new assets or retiring of assets.
- Need process/approach to review existing asset registry to see if assets need to be marked for Inactive/Retire as process not in place to keep this record keeping up
- Asset Criticality - not in place
- Asset Failure Analysis - not in place
- Asset Condition Assessment - not used
- Specification data is cluttered and not consistently maintained

Below is a comparison of the features in WAM 1.9 and WAM 2.x

Feature	WAM 1.9	WAM 2.x	Used by WINNIPEG	Comments
Asset Hierarchy	x	x	x	Old hierarchy in WAM 1.9 needs to be split between Organization, Asset Location and Asset modules in WAM
Asset	x	x	x	Will need to define asset location for each asset within WAM
Asset Replication		x		

Specifications	x	x	x	
Failure Profiles		x		Will need to define failure profiles by asset type
Bill of Materials	x	x	x	
Asset Class	x	x		Now called Condition Assessment Class and Condition Assessment Group in WAM
Asset Inspection	x	x		Replaced by Service History in WAM
Condition Aging Factors	x	x		
Operational Tolerances				Now called Operational Reading
Asset Runtime				Now called Operational Reading
Warranty	x	x		
Warranty Claim	x			
Component Processing	x	x		
GIS Integration		x		Integration was custom in WAM 1.9; WAM provides an out-of-the-box capability of integrating with an ESRI-based GIS solution, including an interface to maintain a synchronization of assets in both repositories.
Process	x	x		
Change Request	x			

#### Business Improvement Recommendations:

1. **AM1:** Asset Hierarchy Restructure – recommend going through an asset hierarchy restructuring effort as part of the upgrade effort as it will be harder to make changes in the future once the data is in the new system.
  - a. **Timing:** Should be done during the implementation project
  - b. **Benefits:** Allow for better cost analysis
  - c. **Benefits:** Allow for users to find assets more effectively
2. **AM2:** Asset registry cleanup of old assets that should have been retired
  - a. **Timing:** Should be done during the implementation project
  - b. **Benefits:** Improve data accuracy and data reliability
3. **AM3:** Completion of an Asset Criticality Assessment
  - a. **Timing:** Can be done as a secondary or parallel project but does not impact the ability to upgrade the system
  - b. **Benefits:** Business impacts to scheduling, asset replacement, and PM Program
4. **AM4:** Create Asset Management Group that would be responsible for the definition and upkeep of the asset registry, asset criticality, specifications, etc.
  - a. **Timing:** Should be done as part of implementation project or select individuals identified as the responsible parties of the asset register
  - b. **Benefits:** Better control of data accuracy and structure since assets are a fundamental building block of asset management.



**5. AM5:** Definition of Failure Profiles for Asset Types

- a. **Timing:** Can be done as a secondary or parallel project but does not impact the ability to upgrade the system

**6. AM6:** Definition of Condition Assessment and Asset Inspections

- a. **Timing:** Can be done as a secondary or parallel project but does not impact the ability to upgrade the system

Work Management

*PM Master Module*

- PM: Benchmark Ratio is typically 1:1. Further review would need to occur to see if it would be beneficial to have a many:1 ratio of PM: Benchmark where multiple PM's reference the same benchmark.
- Evaluate the completion dates on PM's compared to the required/forecast date of the PM for PM efficiency and if lead time is triggering PM far enough in advance to get the WO scheduled and completed
- Look at linking PM to the type of Failure the PM is trying to prevent

Below is a comparison of the features in WAM 1.9 and WAM 2.x:

Feature	WAM 1.9	WAM 2.x	Used by WINNIPEG	Comments
Work Request	x	x	x	
Work Order	x	x	x	
Work Order Task	x	x	x	Now called Work Activity
Service History	x	x		Expanded capability in WAM
PM Masters	x	x	x	Expanded into multiple modules: Maintenance Trigger, PM Calendar
Benchmark WO's	x	x	x	Now called Work Order Template
Maintenance Specifications		x		New to WAM
Maintenance Schedule		x		New to WAM
Maintenance Plan		x		New to WAM
Maintenance Event		x		New to WAM
Functions	x	x	x	
Direct Charges	x	x	x	Now called Other Direct Charges
Project/Subproject	x	x	x	Now called Project
Scheduling	x	x		
Activity Type		x	New to WAM v2	Used to define types of activities (tasks), default labor requirements, default scheduling parameters, and define completion events (improved workflow)

Equipment		x	New to WAM v2	Used to be in Direct Charges in WAM 1.9
Maintenance Manager	x	x		
Planner	x	x	x	
Crew	x	x	x	
Craft	x	x	x	
Work Planning Tool	x	x		
Service Request	x	x	x	Now called Service Call

**Business Improvement Recommendations:**

1. **WM1: Auto Close Indicator cleanup.** Recommend a data cleanup effort as well as adjustments to configuration settings to set the Auto Close Indicator on Benchmark Wo’s, Wizards and make the field default to checked. Not having work orders go to Closed prevents the work orders from going to history.
  - a. **Timing:** Should be done as part of implementation project
  - b. **Proposed cleanup logic**
    - i. Run query to start based on update logic below to determine record set to compare against final state
    - ii. Set all work order records (including benchmark work orders) to have Auto Close Indicator checked
    - iii. Configure modules to default auto close indicator (wizards, benchmark wo, etc.)
    - iv. Run update statement with following logic
      1. Finished WO with status date < 180 days, just set Auto Close Indicator
      2. Finished WO with status date > 180 but < 360, change status to Closed and update status date = status date + 180
      3. Finished WO with status date > 360, change status to Closed and leave status date as is
        - a. System nightly batch should move these work orders to History on next run. Based on number of work orders affected, if it is a large volume, recommend running this batch routine over the weekend for system performance concerns.
2. **WM2: Configuration Adjustments**
  - a. **Timing:** Should be done as part of implementation project
  - b. Default Approval Route settings on User Profiles
  - c. Cleanup of un-used UDF’s on work order module
  - d. Review Work Priority definitions
3. **WM3: Evaluate the completion dates on PM's compared to the required/forecast date of the PM for PM efficiency and if lead time is triggering PM far enough in advance to get the WO scheduled and completed**
  - a. **Timing:** Should be done as part of implementation project **but** is not critical for the success of the implementation project
4. **WM4: Look at linking PM to the type of Failure the PM is trying to prevent (Could be deferred as part of WAM efforts, asset management practices)**
  - a. **Timing:** Can be done as a secondary or parallel project but does not impact the ability to upgrade the system

**Inventory Management**

Below is a comparison of the features in WAM 1.9 and WAM 2.x:

Feature	WAM 1.9	WAM 2.x	Used by WINNIPEG	Comments
Master Catalog	x	x	x	Now called Stock Item
Storeroom Setup	x	x	x	Now called Storeroom
Storeroom	x	x	x	Now called Stock Item Details
Checkout Request	x	x	x	Now called Material Request
Stock Issue	x	x	x	Now called Material Issue
Stock Return	x	x	x	Now called Material Return
Material Request Template		x		New to WAM
Physical Inventory	x	x	x	
Receiving (Returns)	x	x		Read Only, Process performed in PeopleSoft
Multi-Step Receiving	x	x		
Reorder Review	x	x	x	
Stock Transfer	x	x	x	
Inventory Log	x	x	x	
Shipping Memo	x	x		

## Procurement Management

### Observations from Review:

- Winnipeg uses all the modules from WAM 1.9 related to purchasing to support integrations where access rights are restricted to read-only.
- All purchasing functions are performed in PeopleSoft.

Below is a comparison of the features in WAM 1.9 and WAM 2.x:

Feature	WAM 1.9	WAM 2.x	Used by WINNIPEG	Comments
Vendors	x	x	x	Read Only
Requisition	x	x	x	
Purchase Order	x	x	x	Read Only
Invoicing	x	x	x	Read Only
Blanket Contracts	x	x	x	Read Only

Request for Quotes	x			
Expedite PO	x	x		
Invoice Batch	x	x		Now called Invoice Group
Buyer	x	x	x	
Manufacturer	x	x	x	Is its own module now in WAM 2.x
Standard Notes	x	x		

## Human Resource Management

Below is a comparison of the features in WAM 1.9 and WAM 2.x:

Feature	WAM 1.9	WAM 2.x	Used by WINNIPEG	Comments
Employee	x	x	x	
Timekeeping	x	x	x	
Payroll Vouchers	x			
Leave Summary	x			
Crew Shift		x		New to WAM
Leave Request	x	x		Now called Employee Unavailability
Pay Periods	x	x	x	Now called Time Period

### Impacts to WAM 2.x:

1. **HR2:** Look at configuring To-Do when new employees are created to notify WAM system administrator to create a user profile.
  - a. **Timing:** Should be done as part of implementation project
2. **HR3:** Look at developing script that would inactivate employee record and delete user profile when employee is terminated.
  - a. **Timing:** Should be done as part of implementation project

## Financial Management

Below is a comparison of the features in WAM 1.9 and WAM 2.x:

Feature	WAM 1.9	WAM 2.x	Used by WINNIPEG	Comments
Accounting Periods	x	x	x	Now called Accounting Calendar

Account Log	x	x	x	Now called Financial Transactions
Inventory Log	x	x	x	WAM has a transaction log but there is no user interface to the log.
Accounts	x	x	x	Now called Cost Center
Expense Code	x	x	x	
Department / Area	x	x	x	Now called Organization

## System Wide

### Observations from Review:

- Crystal Reports are used for corporate reporting
- Data integrity suggestion for when employees or assets are inactivated the following would occur:
  - Inactivation of Employees
    - Inactivate User Profile
    - Set all assigned responsibilities to have an end date for that user based on the date the employee record went inactive
    - Remove user from business rules, approval routes, etc.
  - Inactivation of Assets
    - Inactivate all PM Masters
    - Remove asset from benchmark work orders, asset lists and PM Routes
- Develop a sustainable training program to be used for new hires, refresher training courses or job promotions

Below is a comparison of the features in WAM 1.9 and WAM 2.x:

Feature	WAM 1.9	WAM 2.x	Used by WINNIPEG	Comments
User Profile	x	x	x	Now called Users
Approval Processing	x	x	x	Now called Approval Profile
Attachments	x	x	x	
Configuration Extensions	x	x	x	WAM offers more ability to configure system to meet Winnipeg's business processes
Bookmarks	x	x	x	
Saved Searches	x	x	x	
Responsibilities	x	x	x	Now called Access Security and User Groups
Business Rules	x	x	x	Now called Master Configuration
Code Tables	x	x	x	Now called Lookups

Module Administration	x	x	x	Now controlled through Business Objects (BO's)
SAPI	x		x	Now controlled through algorithms and scripts
Alerts	x	x	x	Now called To-Do's
Job Manager	x	x	x	Now called Batch Control & Batch Job Submission
Job Manager Log	x	x	x	Now called Batch Run Tree

### Business Improvements to WAM 1.9:

#### 1. SW1: Data Integrity for employees or assets:

- Inactivation of Employees
  - Inactivate User Profile
  - Set all assigned responsibilities to have an end date for that user based on the date the employee record went inactive
  - Remove user from business rules, approval routes, etc.
  - **Timing:** Should be done as part of implementation project
- Inactivation of Assets
  - Inactivate all PM Masters
  - Remove asset from benchmark work orders, asset lists and PM Routes
  - **Timing:** Should be done as part of implementation project

#### 2. Impacts to WAM 2.x:

- Develop a sustainable training program

## Reporting

A properly architected solution should align with Winnipeg's Mission, Visions and Values by reducing operational complexity and increasing the access to key information for making business decisions. With that goal in mind a focus on the result and what key information is required for Winnipeg to operate their business areas and align with their corporate mission.

### Version 1.9 Reporting

Winnipeg has invested extensively in developing reports to assist in various managerial, tactical, and strategic decision making and these reports would have to be analyzed for re-development as the data model in WACM 2.x is completely different than v1.9. As part of that analysis, PSA evaluated how frequently the standard and custom reports were executed to determine if reports are obsolete. Winnipeg will need to determine the type of assistance they would need from a system implementer in the re-development of their key reports. Such assistance could be advising on data dictionary, identifying the tables and fields each report would require, development of database views that mirror the data model current custom reports utilize but are using the data from WAM, or full report development services.

### WAM 2.x Reporting Options

The out-of-the-box reports offered by Oracle in the new version of WAM are very limited and would require a separate reporting tool to be installed. Oracle has replaced the previous Oracle Report Developer with Oracle BI Publisher. BI Publisher requires a separate installation. Included as separate files are the eight (8) out-of-the-box reports offered by

Oracle at the time this report is being written. These reports are related to: WO Activity, Work Order, Crew Shift Daily Report, Crew Shift Weekly Report, Physical Inventory, Inventory Picklist, Receiving, and Requisition.

Below is a list of WAM 1.9 reports or Custom Reports and sorted by the frequency of usage (within last 1000 days at time of the report). The higher run reports should be looked at for re-development in the future WAM 2.x solution.

*Standard Oracle Reports*

Reports	Used by Customer	Usage In last 1000 Days	WAM Standard	Report Title
S_RPT001	N			Core Report - Code Table Report
S_RPT002	N			Core Report - Business Rule Report
S_RPT003	Y	1		Core Report - Procedures Report
S_RPT005	Y	91		Core Report - Specification Report
S_RPT006	N			Core Report - Process Report
S_RPT007	N			Core Report - Process Report with Asset Detail
S_RPT010	N			Core Report - Purchase Orders with Returns Report
S_RPT011	N			Core Report - Component ID Report
S_RPT012	Y	8		Core Report - Employee Report
S_RPT015	N			Core Report - Code Table Definition Report
S_RPT016	Y	3		Core Report - Catalog (without Quantities) Report
S_RPT017	Y	58		Core Report - Storeroom Report with Quantities
S_RPT018	Y	4		Core Report - Storeroom Value Report by Vendor
S_RPT019	Y	2		Core Report - Storeroom Value Report By Class
S_RPT020	Y	34446	X	Core Report - Issue Ticket Report
S_RPT021	N			Core Report - Vendor Listing Report
S_RPT022	N			Core Report - Vendor Characteristics Report
S_RPT023	N			Core Report - Purchase Orders Not Yet Received Report
S_RPT024	N			Core Report - Purchase Order Accruals (Unpaid Receipts) Report
S_RPT025	Y	2	X	Core Report - Receiving Report
S_RPT026	Y	1	X	Core Report - Inventory Picklist Report
S_RPT026 B	N			Core Report - Inventory Picklist Report - Barcode
S_RPT027	N			Core Report - Delivery Ticket Report
S_RPT028	Y	Planned		Core Report - About to Reorder Report
S_RPT029	N			Core Report - Purchase Order Over Received Report
S_RPT032	N			Core Report - New Storeroom Items Report
S_RPT033	Y	66		Core Report - Storeroom Activity Report
S_RPT034	N			Core Report - New Stock Items Report
S_RPT035	N			Core Report - Overstock Report
S_RPT036	Y	7		Core Report - Understock Report
S_RPT037	N			Core Report - Receiving Worksheet Report
S_RPT038	Y	27	X	Core Report - Physical Inventory Listing Report
S_RPT039	Y	5		Core Report - Physical Inventory Variance Report
S_RPT040	Y	44	X	Core Report - Workweek Schedule Report
S_RPT041	N			Core Report - Daily Schedule Report
S_RPT042	Y	6		Core Report - Work Request Summary Report
S_RPT043	N			Core Report - Work Order Tasks Delayed By Materials Report
S_RPT044	Y	1205	X	Core Report - Work Order Package Report
S_RPT045	Y	40		Core Report - Work Order Backlog Report
S_RPT046	Y	1014	Analytics	Core Report - Work Order Aging Report
S_RPT047	N			Core Report - Receipt Delivery Worksheet Report
S_RPT048	N			Core Report - Work Order (Condensed) Report

Reports	Used by Customer	Usage In last 1000 Days	WAM Standard	Report Title
S_RPT050	Y	2		Core Report - Catalog Non-Usage Report
S_RPT051	Y	3792		Core Report - Work Order Asset List Report
S_RPT053	Y	19	X	Core Report - Purchase Order Report
S_RPT054	N			Core Report - Requisition Report
S_RPT055	Y	19		Core Report - Work Order Backlog Detail Report
S_RPT056	Y	13	Analytics	Core Report - Work Order Task Aging Report
S_RPT058	Y	382		Core Report - PM Route Report
S_RPT061	Y	2		Core Report - Wage Rate History Report
S_RPT062	N			Core Report - Purchase Order Accruals (Unpaid Receipts) Report
S_RPT063	N			Core Report - Ready for Payment Report
S_RPT064	N			Core Report - Invoice Variance Report
S_RPT065	Y	20		Core Report - Employee Pay Period Time Report
S_RPT066	N			Core Report - Payroll Report
S_RPT067	N			Core Report - Labor Expenditure Summary by Account Report
S_RPT068	N			Core Report - Labor Distribution by Account Report
S_RPT069	Y	1		Core Report - Labor Distribution by Employee Report
S_RPT071	Y	1		Core Report - Work Order Forecast Report
S_RPT072	N			Core Report - Reservation Dispatch Report
S_RPT073	N			Core Report - Mechanic Accountability Report
S_RPT074	Y	2		Core Report - Preventive Maintenance Report
S_RPT075	Y	1		Core Report - Equipment History Summary Report
S_RPT076	N			Core Report - Historical Cost Performance Report
S_RPT077	N			Core Report - Equipment List by Shop Report
S_RPT078	N			Core Report - Holiday Overtime Standing Report
S_RPT079	Y	5		Core Report - Overtime Standing Report by Crew
S_RPT080	N			Core Report - Overtime Standing Report by Zone
S_RPT081	Y	2		Core Report - Bill of Material Report
S_RPT082	N			Core Report - Tax Report for Non-Stocked Items
S_RPT083	N			Core Report - Tax Report for Inventoried Stocked Items
S_RPT085	N			Core Report - Service Contract Details Report
S_RPT086	N			Core Report - Service Contract Summary Report
S_RPT087	N			Core Report - Service Contract Accrued Cost Report
S_RPT089	Y	1		Core Report - Asset Listing by Type and Class
S_RPT090	N			Core Report - PM by Asset Report
S_RPT091	N			Core Report - Historic Cost Performance by Asset
S_RPT093	N			Core Report - Request for Quotes Report
S_RPT097	Y	15		Core Report - Job Manager Log Report
S_RPT098	N			Core Report - Confined Space Report.
S_RPT099	N			Core Report - Hot Work Permit
S_RPT100	N			Core Report - Safety Work Permit Report
S_RPT101	Y	20		Core Report - Confined Space Report.[BLANK]
S_RPT102	N			Core Report - Hot Work Permit[BLANK]
S_RPT104	Y	3	X	Core Report - Physical Inventory Listing Report
S_RPT105	N			Core Report - Accruals By Account Report
S_RPT106	N			Core Report - Storeroom Value Report By Stock Code
S_RPT107	N			Core Report - Delivery Receiving Report
S_RPT108	Y	5		Core Report - Inspection/Discrepancy Physical Inventory Report
S_RPT109	N			Core Report - Property Inventory Report - Items Not Found
S_RPT110	N			Core Report - Property Inventory Report - Discrepancies



Reports	Used by Customer	Usage In last 1000 Days	WAM Standard	Report Title
S_RPT111	N			Core Report - Property Inventory - Items to be Inventoried
S_RPT112	N			Core Report - Purchase Order Report With Standard Notes and Attachments
S_RPT113	N			Core Report - Lockout/Tagout Report
S_RPT114	N			Core Report - Change Request Report
S_RPT115	Y	1		Core Report - Stock Transfer Report
S_RPT115 B	N			Core Report - Stock Transfer Report - Barcode
S_RPT124	N			Core Report - Vendor Label Report (Avery 5160)
S_RPT139	N			Core Report - Employee Timesheet
S_RPT140	N			Core Report - Listing of Completed NCMs
S_RPT141	N			Core Report - Vendors with 3 or More Deficiencies
S_RPT142	N			Core Report - Deficient Vendors
S_RPT143	N			Core Report - Superior Vendor Performance Data
S_RPT144	N			Core Report - Vendor Performance by Buyer
S_RPT145	N			Core Report - Vendor Performance Data
S_RPT150	N			Core Report - Asset Inspection Worksheet
S_RPT151	N			Core Report - Compatible Units Audit Report
S_RPT152	N			Core Report - Daily Schedule Assignments Report
S_RPT153	N			Core Report - Schedule Plan Report
S_RPT154	N			Core Report - Work Design Report
S_RPT155	N			Core Report - Work Design Estimate Report
S_RPT156	N			Core Report - Work Design Comparison Report
S_RPT200	N			Core Report - PO Vendor Report
S_RPT201	N			Core Report - Purchase Order Listing Report - group by Vendor Code
S_RPT202	N			Core Report - PO Inventory Item Cost Report
S_RPT203	N			Core Report - Purchase Order Listing Report
S_RPT204	N			Core Report - Purchase Order Expensing Account Detail Report
S_RPT206	N			Core Report - Blanket Contract Report
S_RPT207	N			Core Report - Purchase Order Report - Vendor Copy
S_RPT208	N			Core Report - Purchase Order Report - Department Copy
S_RPT209	N			Core Report - Purchase Order Report - Finance Copy
S_RPT210	N			Core Report - Shipping Memo Report
S_RPT211	N			Core Report - Open Purchase Order Summary Report
S_RPT212	N			Core Report - Open Purchase Order Detail Report
S_RPT213	N			Core Report - Vendor Classification Activity Report
S_RPT214	N			Core Report - Contract PO Activity Report
S_RPT215	N			Core Report - Requisition Report
S_RPT216	N			Core Report - Receiving Report
S_RPT217	N			Core Report - Work Order History (Condensed) Report
S_RPT218	Y	25		Core Report - Work Order History Report

*Custom Oracle Reports*

Reports	Used by Customer	Usage In last 1000 Days	WAM Standard	Report Title
C_WIN101	Y	3		Customer Report - YTD Service Request Summary Report

Reports	Used by Customer	Usage In last 1000 Days	WAM Standard	Report Title
C_WIN200	Y	157		Customer Report - Address List Report
C_WIN201	Y	2		Customer Report - Winnipeg Purchase Order Report
C_WIN202	Y	1071		Customer Report - Service Request Record Count Report
C_WIN203	N			Customer Report - Address List Report (Includes Finished Status)
C_WIN204	N			Customer Report - Purchase Order Internal Detail
C_WIN205	N			Customer Report - CWMS Emergency Purchase Orders
C_WIN206	Y	13501		Customer Report - Service Request Print Report
C_WIN207	Y	1		Customer Report - Non Payment / NSF Report
C_WIN208	N			Customer Report - Accruals By Account Report
C_WIN209	N			Customer Report - Service Request Deficiency Report
C_WIN210	Y	13938		Customer Report - Work Order Task Summary Report
C_WIN211	Y	4		Customer Report - Work Order Material Report
C_WIN212	Y	10		Customer Report - Water Services Outstanding Task Report
C_WIN213	Y	108		Customer Report - Water and Waste Planning and Scheduling Report
C_WIN214	Y	6		Customer Report - Waste Water Assignment Report
C_WIN215	Y	59		Customer Report - Water and Waste Month End Detail Report
C_WIN216	N			Customer Report - Waste Water Time Distribution Report
C_WIN217	Y	5357		Customer Report - Asset Detail Work History Report
C_WIN219	N			Customer Report - Property Damage Report
C_WIN222	Y	472		Customer Report - Turnkey Schedule Print Report
C_WIN223	Y	21		Customer Report - Water Services Work Summary Report
C_WIN224	Y	88		Customer Report - Store Room Report
C_WIN225	N	2		Customer Report - Physical Inventory Listing Report
C_WIN226	N			Customer Report - Asset Cost Summary Report
C_WIN227	Y	5		Customer Report - Function or Account Cost Summary Report
C_WIN228	N			Customer Report - Work Order Cost Summary Report
C_WIN229	Y	1		Customer Report - Sewer Services Work Summary Report
C_WIN230	N			Customer Report - Permit Report
C_WIN_A001	Y	114		Customer Report - Archive Service Request Print Report

*Custom Views for Crystal Reports*

Reports	Used by Winnipeg	Comment
CV_CRYSTAL_WINN002	Y	*56 Customer Crystal Reports use these custom views. Usage is unknown.
CV_CRYSTAL_WINN003	Y	
CV_CRYSTAL_WINN004	Y	
CV_CRYSTAL_WINN005	Y	
CV_CRYSTAL_WINN006	Y	
CV_CRYSTAL_WINN007	Y	
CV_CRYSTAL_WINN008	Y	
CV_CRYSTAL_WINN009	Y	
CV_CRYSTAL_WINN010	Y	
CV_CRYSTAL_WINN011	Y	
CV_CRYSTAL_WINN012	Y	
CV_CRYSTAL_WINN013	Y	
CV_CRYSTAL_WINN014	Y	

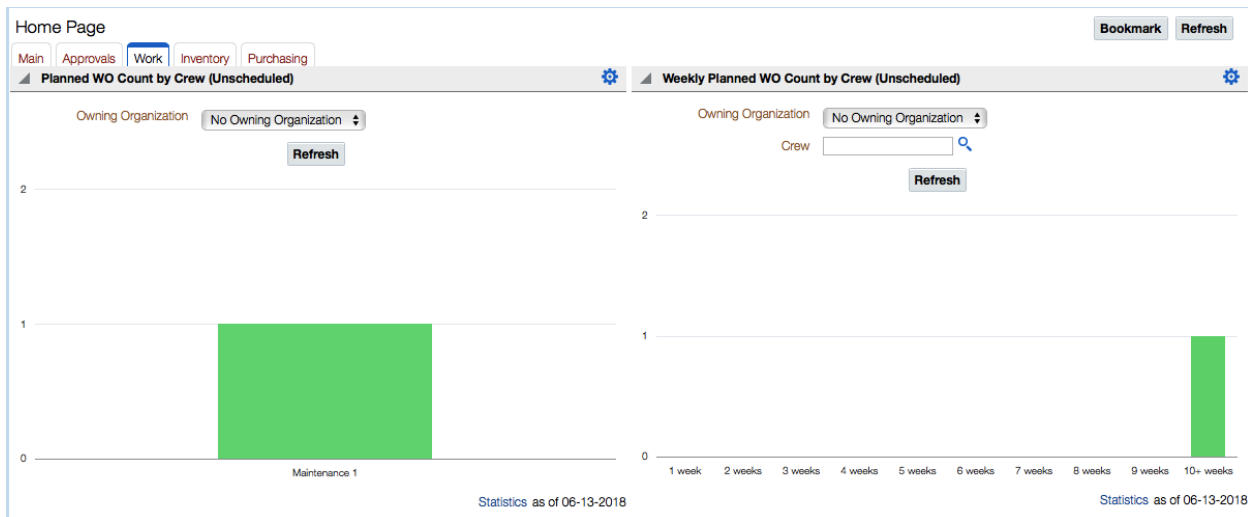
Reports	Used by Winnipeg	Comment
CV_CRYSTAL_WINN015	Y	
CV_CRYSTAL_WINN016	Y	
CV_CRYSTAL_WINN017	Y	
CV_CRYSTAL_WINN018	Y	
CV_CRYSTAL_WINN019	Y	
SVA_ASSET_DOWNTIME_SUMMARY	Y	
SVA_COMPLETED_WORK_LAST_MONTH	Y	
SVA_COMPLETE_WORK_COST_SUM	Y	
SVA_WORK_BACKLOG_SUMMARY	Y	
SVA_WORK_COST_COMPARISON	Y	
SVA_WORK_STATUS_SUMMARY	Y	
CV_C_WIN218A	Y	
CV_C_WIN218B	Y	

Graphs

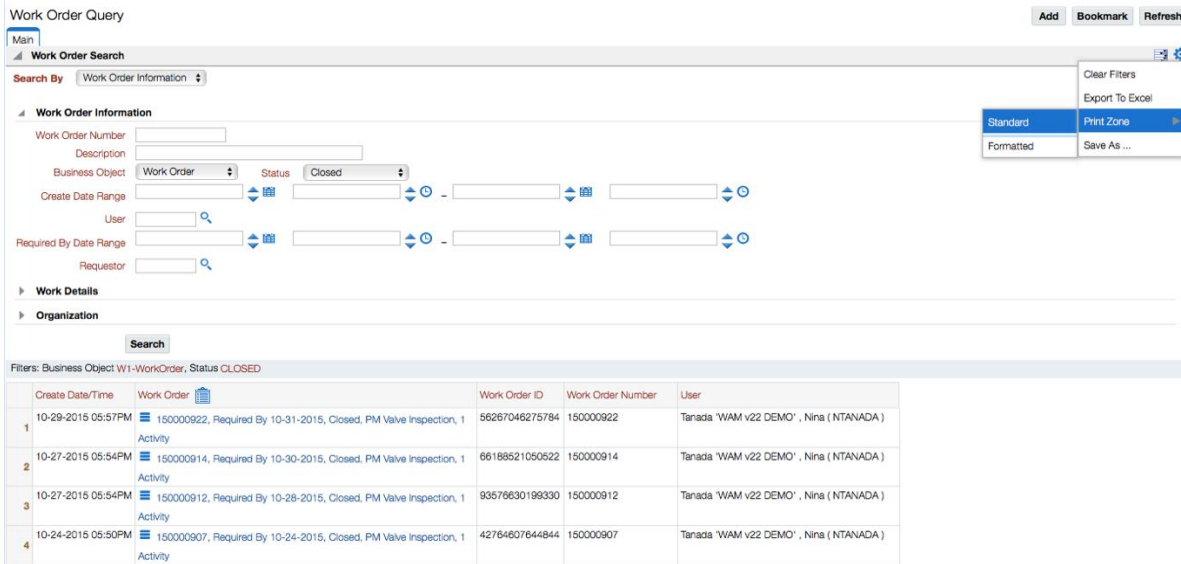
Graphs	Used by Winnipeg	Comments
ACTIVE TASKS BY CREW	X	*Replace with Oracle Utilities Analytic Visualization
ACTIVE TASKS BY PRIORITY	X	
ASSET CONDITION SUMMARY	X	
ASSET MAINTENANCE COST	X	
EMP TIME BY CHARGE TYPE	X	
EMPLOYEE COUNT	X	
SEWER SR OVER SLA	X	
VEHICLE COST YRLY	X	

Oracle WAM application does have other reporting options available within the application. Throughout the application there are pre-built analytics (examples below) that provide similar type features as the old charts & graphs functionality in WAM 1.9 provided.

**(Example of Pre-Built Analytics within WAM)**



**(Example of exporting, printing, or saving query results in WAM)**



**Customizations**

As noted below, Winnipeg has minimal customizations with the current WAM 1.9 application. These customizations can be found in SAPI (Oracle Forms API) Library files, database packages, database procedures, database triggers, and database functions. Winnipeg has expressed the desire to limit or eliminate customizations in the new WAM implementation as customizations puts additional burden on IT and Business staff in maintaining the customizations functionality in future releases of WAM. Below is a list of the customizations grouped by their Type, Module in WAM, Name of Customization and a brief description of the customization.

WAM 2.x was built on Oracle’s Utility Application Framework (OUAF) that provides a set of utilities for implementers to extend applications without compromising upgradeability. Those customizations Winnipeg believes should remain after their analysis would be discussed during the implementation to find the best approach for incorporating the requirements of each customization utilizing the set of utilities provided by Oracle and the OUAF architecture.

**Version 1.9 SAPI Extensions**

Module	SAPI Procedure	Description
Service Request	SIFP_CUSTOM_SEVREQ	Generates available appointment slots found in a custom database table for Utility Billing and 311 CSRs.  Utility Billing CSR’s use a custom Oracle Form to perform the search and 311 CSR’s search is executed through a data hub.
Service Request		Status change logs call history on Service Request to send back to 311 system

**Version 1.9 Database Packages**

Database Package Name	Module
DATAHUB.DH_LOG_PKG	Logging for 311/OWAM integration

DATAHUB.DH_SERVICE_REQ_PKG	Procedures for 311/OWAM integration for Service Requests
DATAHUB.UTIL_PKG	Retrieves key values from SA_RULE_KEY, rule WINN 311 INTERFACE, for a given key name
WINN_WO_INTERFACE	MOM integration for WO
WINN_STOCK_INTERFACE	MOM integration for Stock Checkout

### Version 1.9 Database Procedures

Database Procedure Name	Module
WINN_INSERT_PERIOD_DATES	This procedure inserts next year accounting and pay period records. Currently set up as a Batch.
WINN_UPDATE_TASK_PHASE	For all the Finished work order tasks with non-blank task phase, change task phase to 'In Prog'. For all the Closed work order tasks with non-blank task phases (Plan/Hold/Schedule), change task phase to 'In Prog'.
WINN_MONITOR_311CASE	Sends email to <a href="mailto:WWD-IntSynergen@winnipeg.ca">WWD-IntSynergen@winnipeg.ca</a> if a duplicate 311 case is found. The code searches from duplicate records by grouping SA_SERVICE_REQUEST.attribute8 (311 Case#).
WINN_CREATEDAY_SCHED_TURNKEY	Each year calculate the number of days needed in the year and populate the schedule
COW_AUTO_APPROVE_TIMESHEETS	Batch auto-approve of timesheets
COW_WAIF_SERVICE_REQUEST_INT	This procedure will receive data and insert or update SA_SERVICE_REQUEST and WAIF_SERVICE_REQUEST staging table. Real-time insert and update of Service Request including status in ('CREATED', 'ACTIVE', 'CANCELED', 'FINISHED'). MOM Integration
COW_SA_WORKFLOW_ITEM	Procedure used for MOM integration - set alerts to read
COW_SERVICE_REQUEST_CALL_HIST	This procedure will receive data and insert into SA_SERVICE_REQUEST_CALL_HIST.

### Version 1.9 Database Triggers

Trigger Name	Module
WINN_ASSET_NOTES_ACTIVITY	Trigger for asset notes to insert asset activity on asset activity log for the purpose of maintenance especially for the TEMP REMARKs note type

### Version 1.9 Database Functions

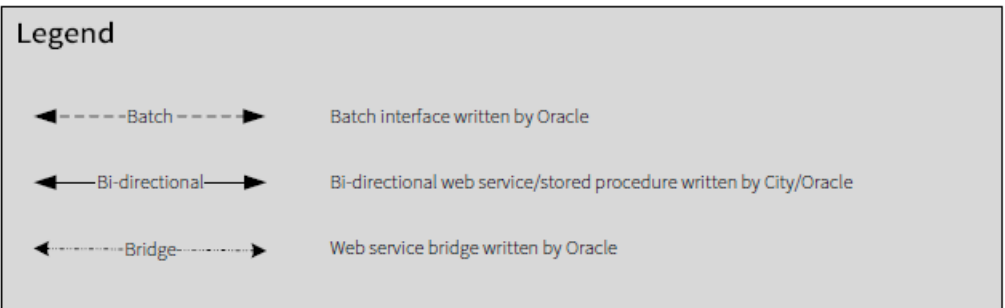
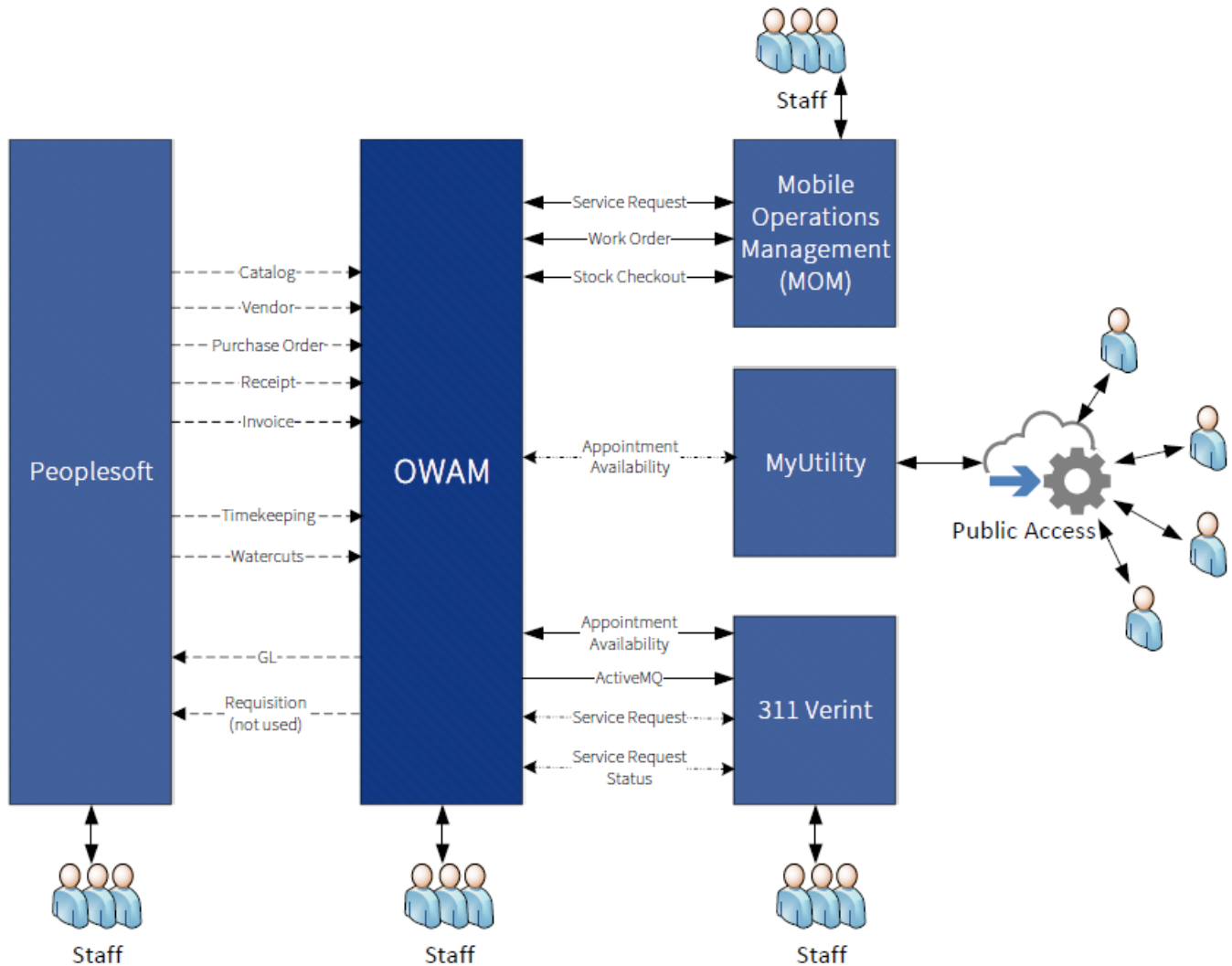
Database Function Name	Module
WINN_ADDRESS_TYPE	Returns Service Request Address Type

### Integrations

WAM 2.x was designed to use web services for integrations. Web services typically require a service-oriented architecture layer in between WAM and the interface system(s).

There are several systems which will remain a vital part of Water and Waste business practices that will require interaction with WAM. These interactions will be defined by Integrations with WAM 2.x. The interactions ensure that there is no duplication of effort or unnecessary delay in information distribution. Users do not need to adjust their daily work to accommodate users of the “other” application. For most users, there should be no indication that data arrives from outside their primary application. The main objective of the integration should be to move data between applications and keeping them synchronized automatically, without any user interference.

The figure below, depicts the current integrations in place at Winnipeg between WAM and other systems. These integrations will need to be re-written and ported to WAM 2.x.



Further descriptions of the above-mentioned Integrations are below.

#### PeopleSoft (Finance) – WAM (Work Management)

Oracle WAM works in conjunction with Oracle PeopleSoft to efficiently capture cost information as users enter their information in their primary application. Oracle Utilities WAM is responsible for Work and Asset management. Oracle PeopleSoft is responsible for Inventory, Purchasing, Account Payable, Timekeeping. As PeopleSoft is used as primary supply chain system for enterprise this requires several business interaction points between PeopleSoft and WAM systems to enable efficient business processes. Master data owned by EBS system must be accessible to WAM for transactional data.

1. **Suppliers** - This is a one-way interface between PeopleSoft suppliers and WAM vendors. PeopleSoft system is the master system which will manage vendor data. Modifications within WAM will not be allowed. WAM manages vendors per location so PeopleSoft will have to supply detail data including sites of a vendor. WAM needs suppliers because it can generate a requisition for goods or/and services needed to finish a work order.
2. **Inventory/Storeroom** - This is a one-way interface between PeopleSoft master inventory and WAM catalog. PeopleSoft will be storing all inventory items throughout WINNIPEG warehouses. PeopleSoft will be master of inventory dataset. WAM needs inventory to perform any work that has been identified for a crew.
3. **Requisition** - This is a one-way interface between WAM Requisitions and PeopleSoft Requisitions. WAM will only send direct purchase requisitions to PeopleSoft. Within WAM, approval process will need to be created and requisitions will be moved only at APPROVED status.
4. **Purchase Order** - This is a one-way interface between PeopleSoft Purchase Order and WAM Purchase Order. PeopleSoft is the procurement system for WINNIPEG. All purchasing will be initiated from PeopleSoft. The Interface will pick up only WAM related approved purchase order records. There will be logic within PeopleSoft purchase order record that will indicate whether the purchase order is WAM related or not.
5. **Receiving>Returns** - This is a one-way interface between PeopleSoft Receiving and WAM Receiving. PeopleSoft is responsible for matching items received from vendors to a purchase order line. This integration will only pick records related to WAM work order. Once WAM processes the receipt record into the system, WAM will triggers an internal process and alert the requestor that requested parts has arrived.
6. **Invoice** - This is a one-way interface between EBS Invoice and WAM invoice. After EBS has issued a purchase order to a vendor and vendor has supplied requested materials/services, an invoice is generated. Invoice will be picked up at "PAID" status from EBS. Once the record arrives in WAM, it will do line-item match against a purchase order.
7. **General Ledger** – This is a one-way interface between EBS Material Transaction and WAM Stock Checkout. Material transaction will checkout an Inventory stock item out of the warehouse or to return a stock item back to the warehouse that has not been used on a job. EBS will have to build logic to attach the WAM work order number to the material transaction record. WAM will only pick up those material transaction records that have been flagged to be WAM related.
8. **Direct Charges** – This is a one-way interface between EBS and WAM Cost Adjustment. In EBS, cost adjustment can occur for any miscellaneous (i.e. P-Card, Timesheet change, ...) charges against a WAM related project. WAM will create a cost adjustment against a project and task.



## 311 – WAM

311 is a primary application to capture customer profile and any trouble calls. Once the call is logged into 311, next step is to follow-up the trouble calls. To do this, it requires field crews that can go onsite and investigate the problem. This follow-up activity needs to be tracked in WAM to capture cost. Field crews with help from mobile devices can easily track this and can provide useful information that can get back to the customer.

## MOM – WAM

Mobile systems are useful for field crews who are on-site and have no access to work management. By using mobile devices, dispatchers can schedule and send work directly to the crews in the field, For Crews, having mobile devices gives them real time feedback to the base applications. This also eliminates dual entries where now crews can update the work orders in the field and enter proper closeout information.

## Crystal Reports – WAM

There are numerous reports connected to WAM v19 with Crystal reports. Some or all of these can be replaced by OUAV (Oracle Utilities Analytics Visualization) which comes with Oracle cloud subscription. Since Oracle Cloud does not offer a direct database connection to WAM, this will need to be redeveloped if Crystal Reports is still to be used. WAM does provide web services that can be consumed by Crystal Reports.

## Data Conversion

This section is intended to identify the migration requirements from WAM v1.9 to WAM 2.x. Winnipeg's requirement is to have all data from WAM v1.9 to WAM 2.x.

When defining the data migration scope in a potential RFP for upgrade services, Winnipeg should include in the RFP as much information as possible so that potential bidders can bid the migration appropriately. We executed a series of scripts for Winnipeg to run near the time of the RFP issuance to produce the most accurate information needed for the RFP. These scripts generated a master list of data sets and identify the number of records or years to be migrated. This allows potential bidders to properly estimate the data conversion scope of the upgrade.

There are two primary types of data to be migrated, foundation data and transactional data. Foundation data is data that is static in nature. Foundation data can be migrated or manually entered based on the number of records in each set. For example, code tables in WAM v1.9 will most likely be manually configured in WAM 2.x. Assets, employees, accounts, expense codes and vendors should be migrated. Generally, it is reasonable to request that all foundation data be migrated. It is expected that foundation data may be cleaned or filtered to exclude old or non-active data during the implementation. In fact, the implementation is a great time to review foundation data to determine if it is still relevant. Transactional data is data that is created on a daily basis. Examples of transactional data are: work orders, service history, purchase orders, invoices, etc.

It is recommended that Winnipeg staff assess key foundation data sets to determine if there are any cleanup efforts that need to be made prior to migrating data into WAM 2.x. To aid in the migration efforts and timeline data cleanup takes, Winnipeg may elect to begin data quality analysis ahead of upgrade project activities. Oracle does not provide any pre-built migration scripts or services to automate the migration of data from WAM 1.9 to WAM 2.x. This task is the responsibility of the client and/or their system implementer.

Unless the WAM core team finds that some data sets are incomplete, we advise migrating all historical data. This way you are ensuring that all historical data is available from a single source. This makes future reporting easier as there is only one source. Discussions will be had during the implementation project to analyze each data set field mapping and logic and whether fields like user defined fields will carry forward to WAM 2.x or new fields available in individual modules.

Foundation data sets would include:

- Assets
- Employees
- Accounts
- Expense codes
- Vendors
- Commodity codes
- Bill of materials
- PM Masters
- Asset condition criteria
- Master Catalog
- Storerooms
- Specifications
- Code tables
- Business rules
- Manufacturers

Transactional data sets would include:

- Work orders
- Blanket contracts
- Purchase orders
- Invoices
- Requisitions
- Receipts
- Asset run time / consumable
- Service history
- Crew history
- Asset condition assessments
- Inventory Issues>Returns

Type	WAM v19 Object	Count of Records
Inventory	Storerooms (Warehouses)	9
	Catalog (Inventory Stock)	11528
	Storeroom (Warehouse Inventory)	15977
	Issues>Returns	612152
Asset	Assets	235407
	Specifications (Attributes)	7608 (Header)/199209 (Detail)
Work Management	Work Orders	51475
	Work Order Tasks	122221
	PM's	2073

	Benchmarks (PM Templates)	2664
Service Requests	Service Request	1149195
Purchasing	Vendors	33413
	Requisitions	441
	Purchase Orders	46124
	Change Orders	26732
	Invoices	59811
	Direct Charges	275865
	Receipts/Returns	141192
Attachments	Document	4800
Cost Center	Accounts	119
HR	Employee	2180
Users	User Profiles	1900

## Data Cleansing

- Data cleansing will happen prior to migration in WAM v1.9x.
- Data cleansing will include following items:
  - Generic User Accounts
  - Unused Assets
  - Review and Revise PM Masters and Benchmarks
  - Unused Reports
  - Review and Revise Approval Routes
  - User Permissions/Access

## Data Conversion Tools

Oracle has delivered a new tool, Conversion Artifact Generator. The Conversion Artifacts is a set of supporting files used for data upload with SQL Loader. The artifacts are generated based on the table and maintenance object metadata and the definitions from Conversion Master Configuration and Configuration Task Types. Conversion artifacts include SQL Loader control files and input data file specifications. Input data file specifications provide detailed field-by-field description of the expected data type and format, field order and other instructions.

Winnipeg’s implementation may use these specifications to create the legacy data extract. The generator reads Conversion Master Configuration in order to determine the conversion task type associated with the table or maintenance object. Winnipeg can choose to generate artifacts for table-level and/or maintenance object-level load, or for the entire system or for specific Table or Maintenance Object

## Implementation Approach

The information below should be used in future Implementation RFPs to explain to potential bidders what the City of Winnipeg is expecting from the potential bidder. The sections below will cover Testing, Training, Rollout Approach, and Support desired.

### Testing

Testing is a vital element of the Implementation of WAM, particularly related to Data Conversion and Interfaces/Integration and system readiness. By the end of testing, the applications are expected to be ready to Train End Users and Go-Live.

Each element of the integrated solution must be Unit and System tested, to anticipate the proper operation of the WAM application once the system is in Production use.

Testing of the various elements is balanced with availability of resources, such as data, environments where testing occurs, and the right personnel to test – with a well-documented Test Plan.

The following are the stages of testing typically conducted related to a WAM project:

#### *Data Migration Testing (DMT)*

The creation of an effective data migration testing strategy is essential to reduce risk and ensure success in the migration. The recommended approach in devising a workable strategy is the looking at the likelihood of risks occurrence. This is then used to devise a way to mitigate the risk long before they occur. Getting the data accurately to the new system is critical. However, the accuracy varies depending on the compatibility of the old and new systems.

The testing is usually made to confirm that the application will run properly with the new data format. This in turn helps save the organization lots of frustrations or losses (e.g. Equipment or Work History) of data and to support reporting or having to report out of two different systems.

#### *System Integration Testing (SIT)*

System integration testing (SIT) is a testing process that exercises a software system's coexistence with other software applications. With multiple integrated systems, if each have already passed initial unit testing by the developer, SIT proceeds to test their required interactions. Following this, the deliverables are passed on to acceptance testing.

#### *User Acceptance Testing (UAT)*

User Acceptance Testing (UAT) is a process to obtain confirmation that a system meets mutually agreed-upon requirements. A Subject Matter Expert (SME), preferably the owner or client of the object under test, provides such confirmation after trial or review. A UAT usually includes a check of completeness, verification against contractual requirements, a proof of functionality (either by simulation or a conventional function test) and a final inspection. The results of these tests give confidence to the clients as to how the system will perform in production.

Below is a sample RACI diagram that Winnipeg can include in the future RFP for implementation services identifying the responsibilities of Winnipeg and the Implementer.

Area or Function	Narrative	WAM Core Team	Business Divisions	IT	Service Provider (Vendor)
Develop Test Plan	Document that details the approach to testing, availability of resources, such as data, environments where testing occurs, and the right personnel to test	C	C	C	R
Develop Test Cases	List of tests (not steps) that should be conducted to test the system, integrations, or conversions.	R	C	C	A
Develop Testing Scripts	List of step-by-step instructions on how to carry out each test case.	C	I	I	R
Manage Testing Process	Person or group responsible for managing each testing activity.	A	I	I	R

DMT (Data Migration Testing)	Data moved from legacy software (WAM 1.9) to the WAM 2.x application.	A	I	R	R
SIT (System Integration Testing)	System integration testing (SIT) is a testing process that exercises a software system's coexistence with other software applications.	C	I	A	R
UAT (User Acceptance Testing)	User Acceptance Testing (UAT) is a process to obtain confirmation that a system meets mutually agreed-upon requirements. A Subject Matter Expert (SME), preferably the owner or client of the object under test, provides such confirmation after trial or review.	I	C	C	R

R – Responsible: “Doers” of the work; person(s) responsible for completing activity

C – Consulted: Needed to provide input; “in-the-loop”, active participants

A – Accountable: “Owner”; approval of task or decision; ultimately accountable for

I – Informed: Need to be updated, kept “in-the-picture” on progress or decisions/outcomes

## Training

The implementation of any enterprise application can be both complex and challenging. Education and Training are critical elements of knowledge sharing and transfer process, and often can make or break the success of an entire Project. Education needs to be looked at as an iterative effort across the organization, not just an event. The approach to Education and Training should be based on common philosophies related to Adult Learning in a Business environment – Just Right and Just-in-time. This approach provides specific aspects of education and training that can enhance the experience and the absorption of the new application and modified Business Processes.

One goal is to balance theory with practice for Education and Training. Realistically these aspects relate to:

- “Understanding the big picture.”
- “Where do I fit in with these Processes?”
- “Can I be provided with enough understanding of our new business processes so that my team can be successful and grow?”

PSA recommends a structured, flexible Education model for understanding the use of WAM. The principles of knowledge transfer are intended to relate to all types of students. Options available for consideration are Train-the-Trainer, development of tutorials, classic classroom, or one-on-one training. Winnipeg needs to determine what strategy best fits the WAM upgrade project and what they will look to the system implementer to deliver.

Below is a sample RACI diagram that Winnipeg can include in the future RFP for implementation services identifying the responsibilities of Winnipeg and the Implementer.

Area or Function	Narrative	WAM Core Team	Business Divisions	IT	Service Provider (Vendor)
Develop Training Plan	Document that details the approach to training, classes offered, times of each class.	A	C	C	R
Develop Training Materials	Documents that detail the use of each module	A	C	C	R
Core Team Orientation and Training	Exposure and familiarity to the WAM Application.	A	C	C	R
Training of Testers	Exposure and familiarity to the WAM Application, as it specifically relates to effectively testing the WAM Application through various stages of development.	A	I,C	I,C	R
Train-the Trainer	Prepare the Winnipeg Trainers.	A	I	I	R
End User Training	Delivery of Business Process change knowledge transfer and Training.	A	I,C	I,C	R

R – Responsible: “Doers” of the work; person(s) responsible for completing activity

C – Consulted: Needed to provide input; “in-the-loop”, active participants

A – Accountable: “Owner”; approval of task or decision; ultimately accountable for

I – Informed: Need to be updated, kept “in-the-picture” on progress or decisions/outcomes

### Rollout Strategy

Winnipeg is looking for a single rollout where all divisions and project activities: data conversion, integrations, reporting, testing, and training occur at the same and not staggered or phased.

### Support Service

System support for the WAM application is broken into three categories: IT System Administration, Business Division Administration and Support Center. Application Administration is typically filled by the operational business group that is the closest to the actual application usage (i.e. Business Divisions). The Database Administration is filled by the organizations IT department who contains the proper technical skills required to support an application like WAM.

### Support Center

- 1st line of troubleshooting
- Help Desk support
- Small group of people (e.g. 2-3 people) reasonably dedicated to providing coverage any questions that come up related to the WAM Application, and/or systems that Interface to WAM.

- They are expected to have a means of tracking a 'help desk ticket' and to respond with confirmation of receipt and periodic status updates. These tickets are currently being recorded in MKS.

#### *Business Division Administrator*

- 2nd line of troubleshooting. If an issue warrant escalating beyond the Help Desk, there may be a business reason or affect related to that issue.
- Business Process Ownership. This group should have at least one representative for each Work Group that is readily available to address Business Process questions and to provide a basis for a past decision, or consider a change as requested.
- Management of WAM Code Tables. The Work Group representatives may be asked to modify/enter values in WAM Code Tables to provide selectable values where their Work Group's workflow will be improved. Examples include such values as adding to for Job Codes, or Asset Type.
- Assignment of User Access Rights. This relates to Responsibilities in WAM, which are cumulative. The Business Administrator is best suited to designate the proper Responsibility for someone in their Work Group.
- This group is expected to participate and manage the activities necessary to test the WAM Application through each stage of testing.
- This group is expected to aide in the definition of Training needs for each group within them.
- To accomplish their Tasks, this group will often work with the Help Desk, based on User request, and/or IT Administrator, based on security compliance.
- Business Division Administrators likely meet regularly to learn from one another how best to support their work groups and may benefit from standard practices considered for other groups.
- The members in this elite group should also consider periodic review of Cost Summaries and Work Backlog, so that the integrity of the business is maintained, and the Return on Investment is increased.
- This group will likely want to be involved in the WAM Community User Group, which has regular monthly conference calls and regular (usually annual) conference meetings at an off-site location.

#### *IT System Administrator*

- 3<sup>rd</sup> line of troubleshooting - There are times when an issue raised may affect Users across Work Groups, thereby going beyond one Business Division Administrator.
- This group is often seen as the 'Gatekeeper for Security', such that Winnipeg is compliant with Auditable practices.
- Batch Log Review - Batch Jobs that run periodically (e.g. nightly) will produce success/fail messages, such that review of the logs will provide for minimized effect of any anomalies.
- System Configuration – This group will support Configuration Workshop discussions and tracking of decisions to configure the WAM Application for each Work Group. Coordination of future changes is dependent on this group having the proper context of basis for Winnipeg decision.
- Interface Oversight – The various systems that WAM can and will Interface/Integrate with require a coordination that this group is expected to support, including the monitoring of these Interfaces once in place and running regularly.
- User Management – New Users will be created as coordination between the IT System Administrators and the Business Administrators.
- System Upgrades – The identification of needed upgrades (for patch fixes and desired enhancements) is part of this group's responsibility. Regular review of Release Notes is advisable, along with the creation of Customer Support Service Request (SR) tickets on My Oracle Support (<https://support.oracle.com>). This requires knowledge of the CSI (Customer Support Identifier) and the procedures needed to log a ticket.
- System Backups – The need for and periodicity of Backups should be coordinated between IT System Administrators and DBAs.
- The IT System Administrators are expected to interact closely, as needed, with the Database Administrator(s).
- This group will likely want to be involved in the WAM Community User Group, which has regular monthly conference calls and regular (usually annual) conference meetings at an off-site location.

Similarly, below is a chart that depicts the activities that are the typically responsibility of the Application and Business Administrators and the Database Administrator.

Activity	Business Application Administrators	It and Database Administrator
<b>Environment Management</b>		
Build Oracle database and application servers as necessary		
Configure, maintain, and manage application server(s)		
Maintain Application instances		
Perform back-up, recovery, and archival tasks		
Perform Disk-space management		
Manage and perform Installations & Upgrades		
Review, test, sign-off on application upgrades		
<b>Application Access</b>		
Establish and manage <b>User Profiles</b> , including passwords		
Manage User Security at the Database level		
Create, manage, and assign application <b>Responsibilities</b> rights		
<b>Application Configuration</b>		
Defines business need for <b>user defined fields</b> (UDF's) and maintain UDF configuration		
Establish new <b>User-Defined Fields (UDF's)</b>		
Manage standard and custom <b>Code Tables</b>		
Manage standard and custom <b>Business Rules</b>		
Manage <b>Account Structure</b>		
Configure and maintain <b>Accounting/Pay Periods</b>		



Recommend & design workflow changes		
Maintain attachments and specifications		
Configure and maintain <b>Approval Titles</b> and <b>Approval Routes</b>		
Configure and maintain required fields, default values and other options in the <b>Modules Administration</b> module		
Configure and maintain <b>Sequence Numbers</b>		
Defines business need for custom List of Values (LOVs)		
Configure and maintain custom List of Values (LOVs)		
Manage and administer batch processing, including interfaces		
Review Job Manager logs		
Design custom reports		
Install and manage custom reports ( <b>Report Administration</b> )		
Manage peripheral applications (i.e. GIS, Barcoding, SCADA, etc.)		
Application <b>Auditing</b>		
<b>End-User Support</b>		
Respond to 'help desk' inquiries		
Analyze user problems		
Work with Oracle Support on application issues		

## High Level Architecture

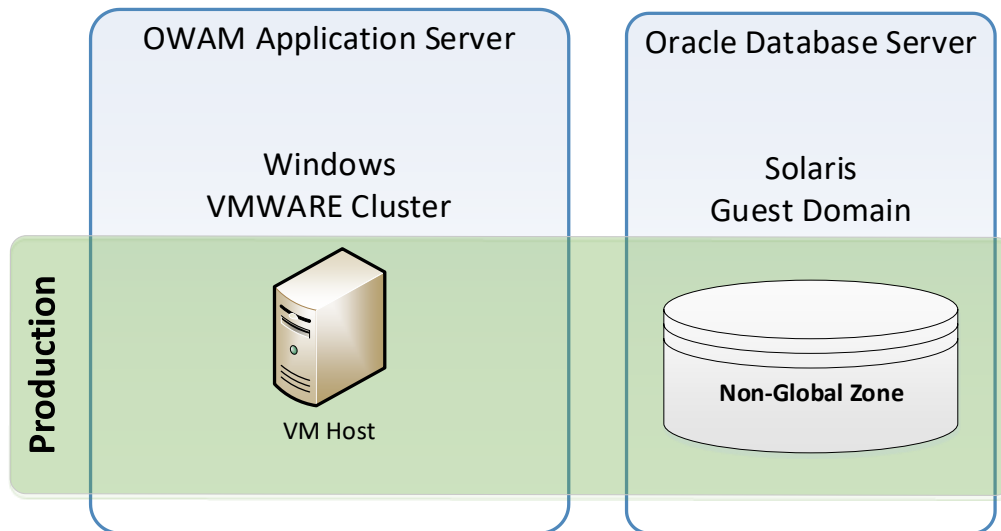
### Production Servers

Oracle WebLogic is hosted as a Windows 2012 R2 (64 Bit) Virtual Machine host within a dedicated VMWare ESXi host.

- UCSB-B200-M4 Intel(R) Xeon(R) CPU E5-2637 v4 @ 2.60GHz

Oracle databases are hosted separately within Solaris guest zones on a SPARC S7-2 server.

- The Oracle Customer Care and Billing application is currently being hosted on the production application server. Oracle Work and Asset Management will be hosted in one or many zones for version 2.x.

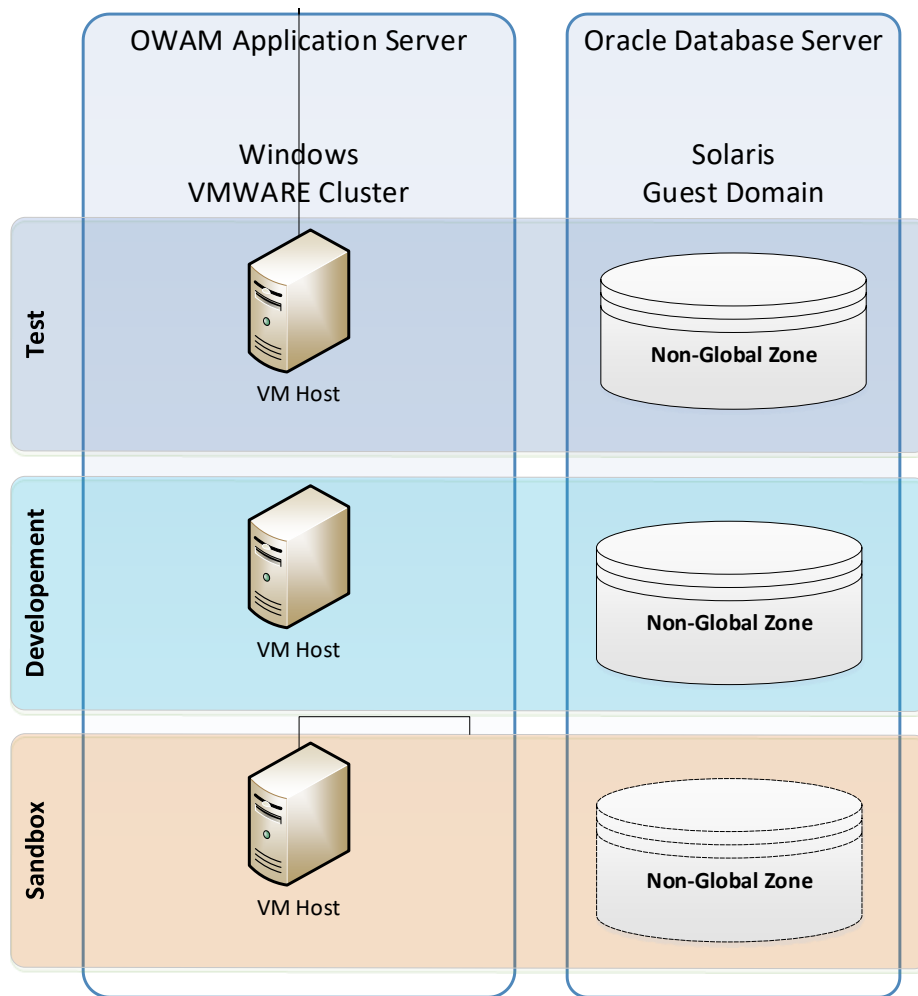


### Non-Production Servers

Oracle WebLogic is hosted as a Windows 2012 R2 (64 bit) Virtual Machine host within a dedicated VMWare ESX host.

Oracle Database is one Solaris guest zone on a SPARC S7-2 server.

The guest domains will be used to host application and database guest zones for the Oracle Customer Care and Billing Application and Work and Asset Management (WAM). Current WAM 1.9.x only supports the database on Solaris. The WAM WebLogic server must be on a supported Windows Server.



## Environments

Each environment has a defined purpose in the ongoing maintenance and development of the OWAM application. The maintenance of each hardware/storage, middleware environment is current managed by INV Department – BTS with exception of the WebLogic middleware. WebLogic infrastructure and the OWAM applications are administered and supported by WWD Department - IST Enterprise Systems. The following describes each environment, and the purpose of the environment.

### Production

Production is the primary operational environment hosted on separate infrastructure hardware and/or middleware from that of the development, test and sandbox environments. This environment is considered the 'golden state for all data used in the non-production environments. It provides the baseline state for configuration and customizations. All future releases and maintenance environments are cloned or based on the production environment to mitigate risks and ensure it is the integral starting point for subsequent changes or code releases.

INV-BTS services managed the Oracle database backups and recovery infrastructure and processes. However, there are no disaster recovery environments or processes in place. The INV-BTS project initiated in 2018 was to deliver these expanded services. Status of project is unknown.

## Test

The Test environment is used for non-functional, functional, end-to-end and user acceptance testing for the promotion of life cycle product changes and customizations built for the business. This environment is not on production hardware. The test environment can be refreshed with a copy of production data for testing.

## Development

The Development environment is used for developing changes and unit testing. This environment is not on production hardware. Development can be refreshed with a copy of production data, or a subset of test data. Changes developed in Development environment(s) are tested as part of a system test in the Test environment.

## Sandbox

Sandbox is a derivative of a development environment. It is primarily used by a subset of end-users to develop and test new business workflows and application functionality. A Sandbox environment should be easily restorable or refreshed based on end-user requirements. Any development performed in the Sandbox must follow the standard change process and be tested and implemented in the Test, and Quality Assurance before being implemented into Production.

## Target Environments

The Department current has six S7 servers 2 x 8-core 4.27 GHz SPARC 512G Memory. The servers currently host Customer Care and Billing (CCB) application and database services as well as the database services for WAM 2.x. The project will target deploying WAM application services onto the S7 servers. An internal assessment of the current load and available resources indicate the existing server resources are sufficient.

## Production

- One S7 server for the WebLogic clustered CCB application servers.
- One S7 server for single instance databases for CCB and WAM.
- WAM 2.x WebLogic application server will be implemented on the application S7 host server.
- It is anticipated the new WAM application environment will utilize WebLogic clustering.

## Non-production

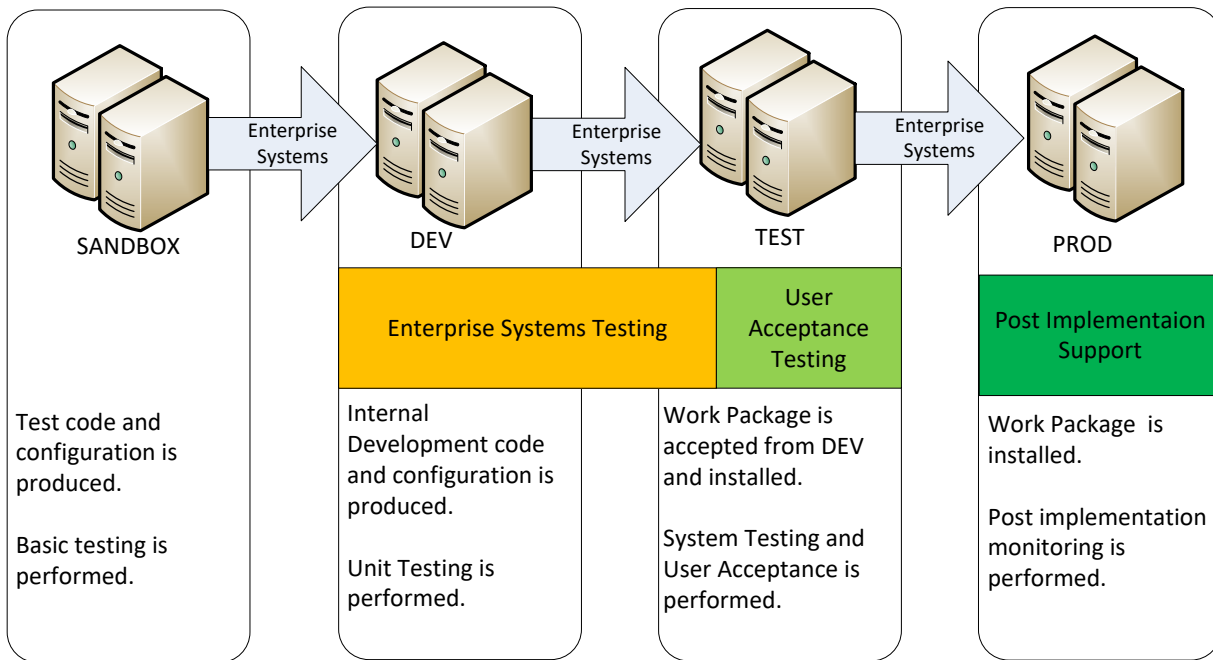
- One S7 server for a mix of WebLogic clustered CCB application servers and non-clustered environments.
- One S7 server for multiple single instance databases for CCB and WAM.
- WAM 2.x WebLogic application server will be implemented on the application S7 host server.
- It is anticipated the new WAM application environment will utilize WebLogic clustering.

## Disaster Recovery

- One S7 server designated (not –installed) for migration of WebLogic clustered CCB application servers and non-clustered environments.
- One S7 server designated (not –installed) for single instance databases for CCB and WAM.
- It is anticipated the WAM 2.x WebLogic application server will have a reservation on the DR application S7 host server.
- It is anticipated the new WAM application environment will utilize WebLogic clustering.
- It is expected the WAM Upgrade Project will review the current DR process and make modification to support the new environments with expected improvements.

## Change Flow

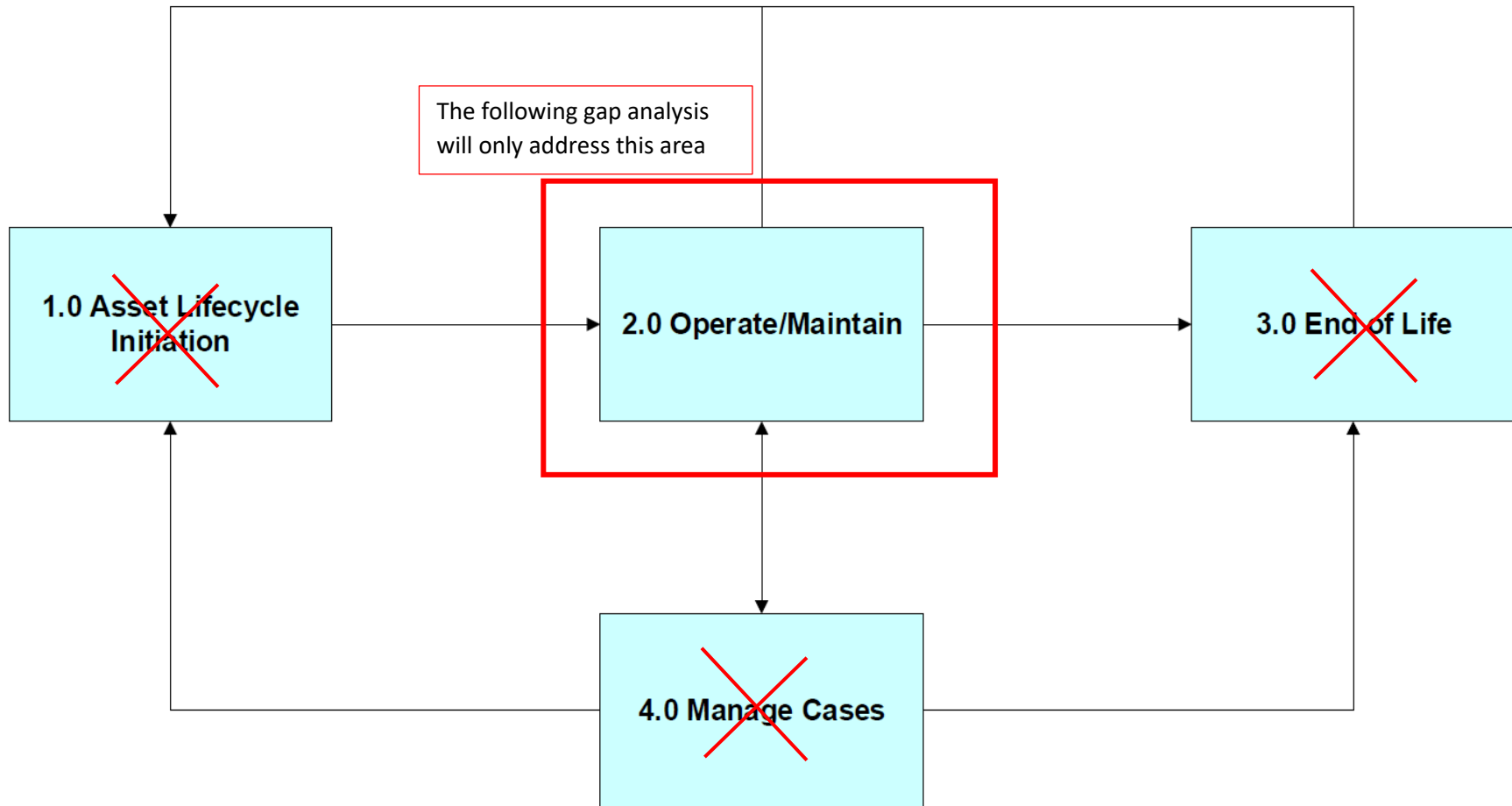
The following is the systems development life cycle flow.



# Preliminary Gap Assessment

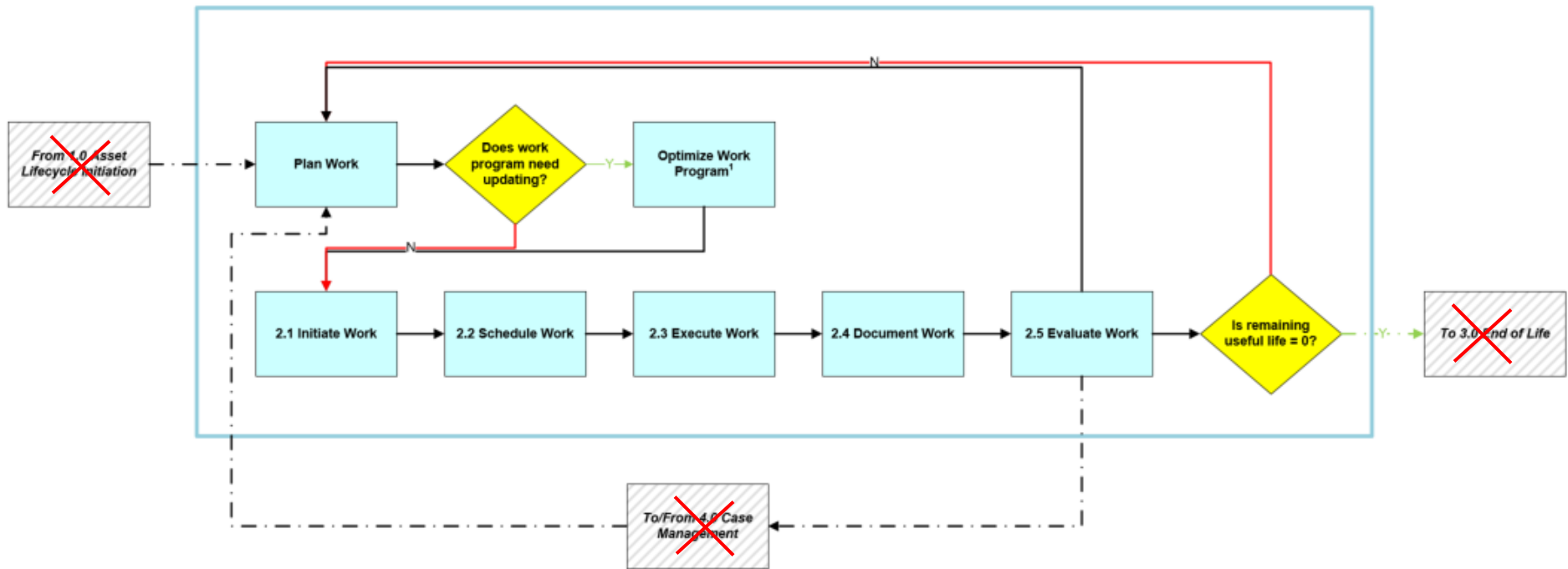
## Asset Lifecycle Overview

Figure 1: Asset Lifecycle Overview



## Operate & Maintain

Figure 2: Process Flow – Operate & Maintain



**Note 1 -- Elements of a Work Program:**  
**Asset Master** - Tombstone data, drawings, manuals, videos, GIS cross-reference  
**Asset Hierarchy** - Parent-child relationships for asset class/group/type, asset, components, failure modes  
**Parts Master** - standard bill of material for assets, parts tombstone data, etc.  
**Maintenance Policies** - UBM, CBM & FBM (based on risk vs asset lifecycle cost, performance, reliability, legislative requirements, etc.)  
**Work Plans** - frequency, standard procedures, standard labour hours, standard materials, quality standards, safety procedures, attachments  
**Budget** - "from the asset's perspective", at standard  
**Failure Tree** - for each asset or asset group (problem / cause / action codes)

## Optimize Work Program

**Table 2: Work Program Gaps**

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
WP1	Data can be a couple of years old (e.g., repair markers, leaks, etc.), and its addition to the GIS system can be delayed. In new developments, there is often no GIS data as Engineering can be several years behind.	X				X	Missing GIS data related to the condition or location of assets can result in equipment not being appropriately maintained and reduce the efficiency of field crews.	<ul style="list-style-type: none"> <li>- Reduce backlog by prioritizing the addition of data to the GIS system in an agreed timing window.</li> <li>- Consider the use of OWAM's redlining capability. Field crews can annotate on a separate layer of the map to mark assets that are not yet on the map, or errors with the current map.</li> </ul>
WP2	Timekeeping and hired equipment entry are done manually for the official record. It is then entered into PeopleSoft which goes to OWAM via an interface.	X					Manual entry for the official record results in duplicate effort by those who then have to enter the data into PeopleSoft. Duplicate entry of similar information results in loss of productivity, errors, and potentially unnecessary reconciliation.	Best practices suggest entering data once as close to source as possible. Typically, time is entered into OWAM and used for both payroll purposes (through integration with PeopleSoft EAM) and to maintain an accurate work history in OWAM.
WP3	A Bill of Material (BoM) is not currently being used on OWAM or PeopleSoft. Rail, for example, uses OEM/contractor catalogues or other sources outside OWAM.	X	X	X	X	X	<ul style="list-style-type: none"> <li>- Having a BoM enables better planning and scheduling by providing a comprehensive list of what may be needed to complete a job. The planner/scheduler role then has all the data needed to estimate how long maintenance will take, when parts will be available, how many people need to be involved, etc.</li> <li>- With better planning comes more accurate knowledge on how much time maintenance will take, which facilitates greater productivity of staff and more accurate and effective costing</li> <li>- A clear list of materials and quantities available helps prevent common inventory management issues, such as stock outs or ordering parts unnecessarily</li> <li>- A BoM provides guidance to staff who need to order parts on a repetitive basis, including preferred</li> </ul>	<ul style="list-style-type: none"> <li>- Could use OWAM BoM for stations (i.e., in Collections). It would also help with the costing of work orders, inventory control and parts availability when needed.</li> <li>- Could be value in having a standard BoM for some assets (e.g., large, critical, and/or expensive assets), as well as possibly for internal part numbers and multiple cross-referenced part numbers. This value must be balanced with the maintenance cost of a database and frequent part number/specification changes.</li> </ul>



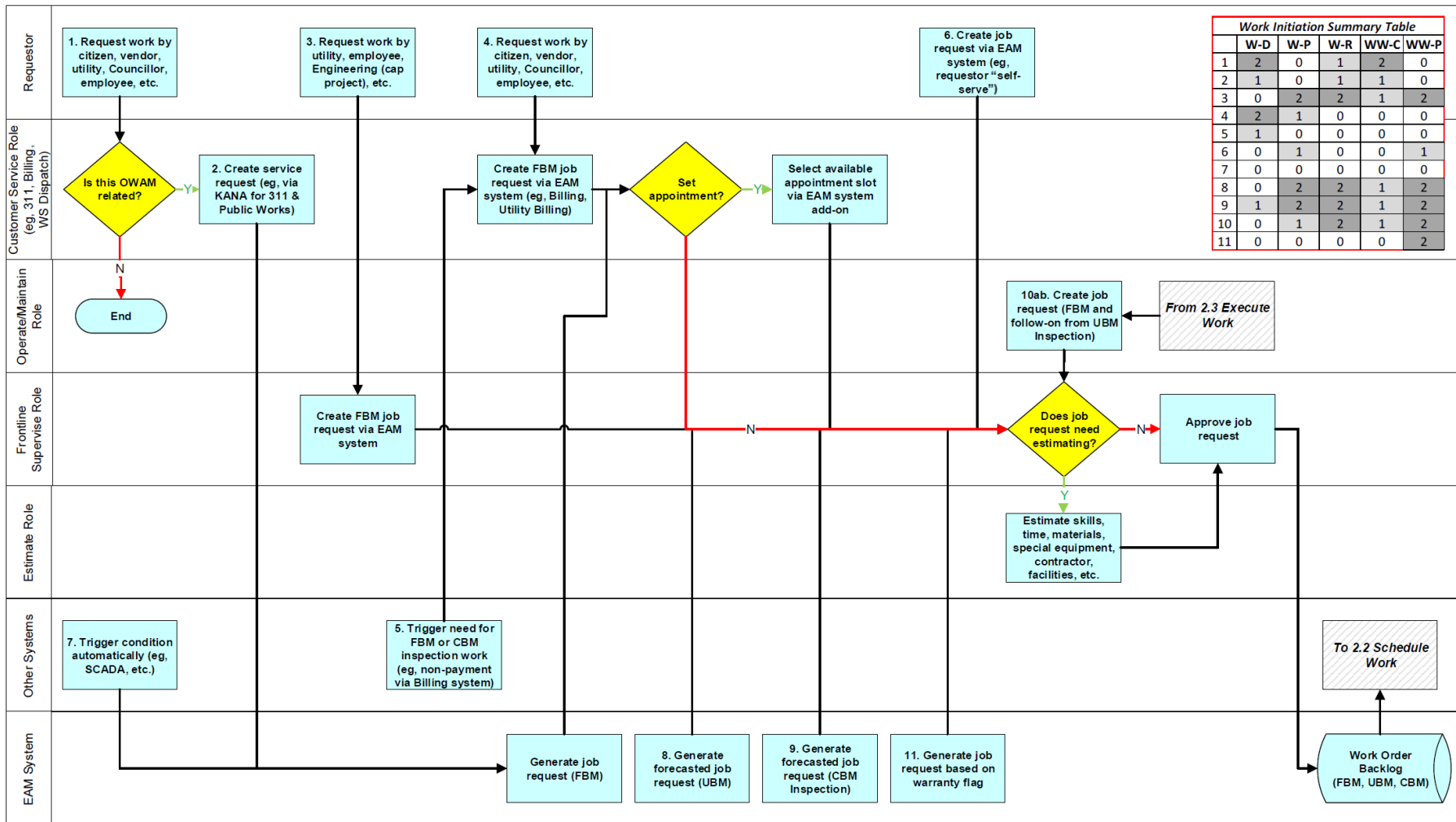
Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
							vendor, cross-referenced links to OEM catalogues and SKU #, reasonable substitutions, which items are stocked vs purchased, and quick access to availability if the item is stocked; this, in turn, ensures consistent ordering of replacement parts and greater efficiency	
WP4	User-definable templates have not been reviewed for use with Treatment Plant asset master (i.e., asset register) tombstone or specification data (e.g., trees vs pumps). Currently, Excel spreadsheets are being used.		X		X		Keeping asset master data on OWAM rather than within disparate Excel spreadsheets increases consistency of terminology, provides widely shared access to the data and facilitates better planning.	Consider the use of user-definable templates for Treatment Plant asset master (i.e., asset register) tombstone or specification data (e.g., trees vs pumps) within OWAM V2.
WP5	<p>- Drawings and training videos are not kept on OWAM. The City has EDMA software for some drawings (e.g., construction drawings), but it is not interfaced with OWAM.</p> <p>- OWAM does have limited copies of digital manuals, but they are more likely physical or kept on a shared drive or online, depending on the age of the equipment.</p>	X	X	X	X	X	Frontline maintainers do not have access to key media to assist them with their work (e.g., training videos, sketches, historical drawings). This could affect the amount of time needed for a job and/or quality of the work, especially for unfamiliar jobs.	Examine if the current document management system can be linked to OWAM for a more robust asset master and work program accessible by maintainers (e.g., drawings, photos, videos) on the worksite. This may also help justify mobile devices for frontline maintainers.
WP6	Rail has no linear assets and very few fixed assets on OWAM.			X			<p>Although this approach appears to simplify and minimize administrative work by the planner/scheduler and maintainer roles, there may be more resultant work to:</p> <ul style="list-style-type: none"> <li>- note comments on work done as opposed to a few simple drop-down selections</li> <li>- document work completed when eventually able to get access to a desktop computer (sometimes long after work was finished), as opposed</li> </ul>	Complete cost/benefit analysis to determine whether the one-time setup and ongoing process change required to add Rail's linear and fixed assets to OWAM is of value.

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
							<p>to the use of mobile devices which have greater functionality, accuracy, and timeliness (e.g., attaching photos, running clock for auto time tracking)</p> <ul style="list-style-type: none"> <li>- queue for access to a single desktop computer for all users, as opposed to having a smartphone or tablet</li> <li>- review extensive comments by the foreman/supervisor to accurately analyze work done to date (e.g., # of ties laid) and plan for future periods, as opposed to the software reporting on accomplishments regularly</li> <li>- respond to Engineering, management, Public Works, and regulatory bodies as to queries regarding compliance, accomplishments, problem areas, trends, etc., by combing through extensive comments to build reports, as opposed to auto-generated reports, dashboards, queries, heat maps, etc.</li> </ul>	
WP7	<p>OWAM is not used for budgeting. A custom corporate budget system (REPA) is used for forecasting costs for the year from Finance and Administration. This system is not integrated with OWAM. There are rarely requests for how much a process/asset costs as input.</p> <p>- Rail doesn't use REPA data for regular budgeting (e.g., know the annual program for tie</p>	X	X		X	X	<p>The budget is an important driver of any EAM system in terms of planning, scheduling, and tracking progress on the Council-approved cost of labour, material, 3rd party, projects/programs, etc., on an accurate and timely basis.</p>	<p>Consider using OWAM for budget creation using asset history as a guide, as well as budget tracking (e.g., original budget vs revised estimate vs committed vs actual) with an integration to REPA as the single source of truth for Council-approved budgets.</p>

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
	replacement and write contract/budget accordingly).							

# Initiate Work

Figure 3: Process Flow –Initiate Work



**Table 3: Initiate Work Gaps**

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
IW1	311 can sometimes create multiple work requests (WRs) on one service request (SR). Note: There is approximately one every three weeks for Collections.	X				X	Multiple WRs on one SR can result in an incomplete, disconnected, and/or obfuscated work history. It is also easier to plan and schedule work with a proper work breakdown structure as close to the source as possible.	Create masterwork order and sub-work order children that all cross-reference the SR or create multiple SRs.
IW2	The City of Winnipeg currently receives the majority of inbound 311 requests by phone (~80%). This is followed by email (~15%), from the City's website, and through social media (~5% combined).	X		X		X	Moving inbound request volume from phone to web-based can increase 311 staff efficiency and accuracy. It also enables more opportunities for the City to be transparent to residents.	Look to increase the number of queries coming through a web interface as opposed to a phone. Ultimately, self-service for certain common concerns should be enabled. There is also potential to establish a query on a service request that has already been set up (e.g., to see when a maintainer is coming or completed work), thereby increasing visibility to customers.
IW3	Currently, there is a human interface between automated condition-monitoring systems (e.g., SCADA) or specialized equipment and OWAM to generate fail-based maintenance (FBM) job requests.	X	X	X	X	X	Reducing the amount of human intervention required to initiate work will increase the efficiency and effectiveness of frontline staff.	FBM job requests should be triggered automatically by condition-based alarms (e.g., through SCADA) related to OWAM, and changed to a work request without having to go through a human interface. Companies are experimenting with artificial intelligence to sift through alarms and learn which ones require what maintenance work, if any. This is part of a wider industry transformation – the "Industrial Internet of Things" or "IIoT."
IW4	311 sometimes reacts to the first item that a customer says (e.g., an information request and sewer backup, but SR only shows the information request).	X				X	This can result in delayed or unsatisfactory service to CoW residents as not everything that needs to be addressed is captured during the first touchpoint.	A well-executed self-service web form for requestors can help to capture sufficient information to avoid the issue. As well, more robust 311 scripts for call-in requests or problem trees for call-in or web-based requests may help.
IW5	311 determines whether a call is relevant to Water or Wastewater, but sometimes it belongs to the other department. The default is Water if	X				X	It is inefficient and can slow down resolution if the wrong group is notified of a problem	This can be improved with a more comprehensive response guide for 311 operators and by increasing the volume of self-service and/or web-based inbound requests.

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
	the 311 operator is unsure. Note: Off-hours dispatch sends work directly to two emergency Water crews that handle the issue, and the crew will get Wastewater involved if needed urgently, such as in the case of a sewer backup.						and has to redirect it to the other group.	

# Schedule Work

Figure 4: Process Flow –Schedule Work

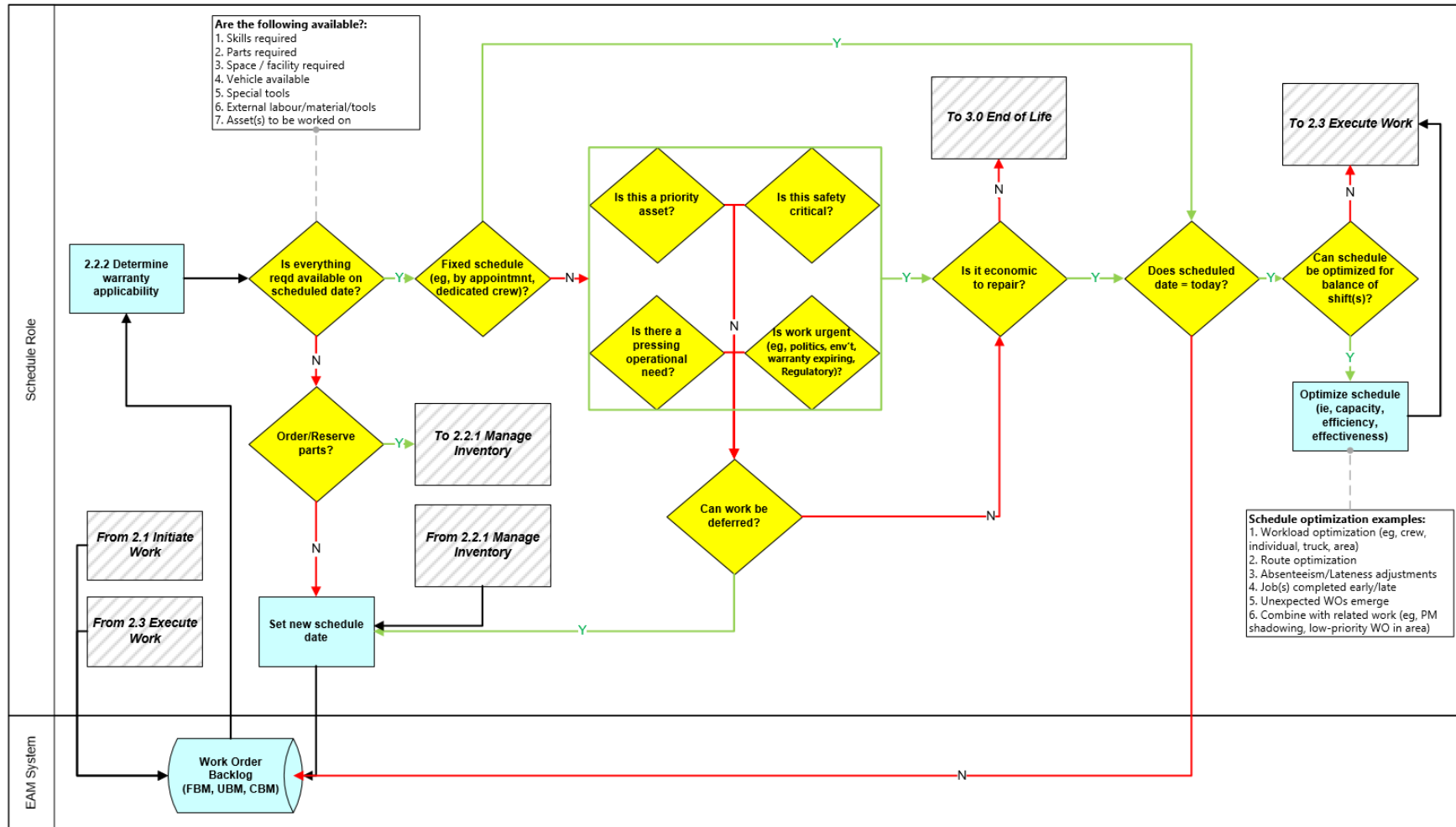


Table 4: Schedule Work Gaps

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
SW1	Wastewater is very reactive (i.e., 80% reactive and 20% planned) and would like to be "100% Planned", including fail-based maintenance (FBM). However, the infrastructure is ageing and there is a lot of resultant FBM vs use-based maintenance (UBM) and condition-based maintenance (CBM).				X		Increasing the percentage of planned work enables more effective and manageable schedules, reduces asset downtime, and can help control costs (e.g., through resource efficiency and reduced downtime).	<ul style="list-style-type: none"> <li>- Consider planning/scheduling of all maintenance (including fail-based maintenance) using the full suite of OWAM tools available, including capacity planning, and possibly, integration with Oracle's P6 Primavera for capital renewal projects.</li> <li>- All maintenance work should be planned regardless of who does it (e.g., both maintenance and operations).</li> </ul>
SW2	There does not appear to be a formal, standardized way to prioritize work/assets such as asset criticality, risk score, operational impact, health/safety/environmental (HSE) impact, etc. Also, determining critical spares seems to depend on whom you ask.	X	X		X	X	A lack of asset prioritization and criticality makes it difficult to ascertain the relative organizational risks and failure consequences associated with Water and wastewater assets. This hinders the City's ability to focus on mitigating critical risks to the business.	Use OWAM functionality for better prioritization of work, assets, and parts, as well as the creation of failure trees by Engineering for at least critical spares, etc.
SW3	The OWAM scheduling functionality is currently not used.	x	X		X	X	<p>Graphical scheduling on the system can improve frontline productivity by facilitating optimization of the schedule and reducing time lost performing these tasks outside of OWAM as follows:</p> <ul style="list-style-type: none"> <li>- determining the availability of skills, parts, etc. in real-time, including parts reservation</li> <li>- prioritizing work, including emergent work throughout the day that may change priorities</li> <li>- optimizing the schedule throughout the day based on workload, travel time, crewing and staffing changes, etc.</li> </ul> <p>Training for OWAM scheduling will be critical to ensure users are able to use the system effectively</p>	Ensure City employees have adequate access to training for OWAM scheduling through 'train the trainer' programs and more readily accessible materials within OWAM itself. For larger projects, explore the use of Oracle's P6, which is fully integrated with OWAM.



Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
SW4	Planners are “filling a void” for the frontline by performing purchasing prep work and scheduling for PMs.					X	As Wastewater planners are spending time purchasing pre-work, they cannot spend a sufficient amount of time planning and scheduling maintenance work. Currently, about 80% of the Wastewater maintenance work is FBM, which is not typically handled by planners/schedulers. Planners/schedulers cannot keep up with even the 20% UBM/CBM, which makes it difficult to move the organization to a more planned environment. When moving from 80:20 to 20:80 through better planning/scheduling, most organizations achieve significant savings in labour, parts, capital, and output quality. This can only be accomplished through additional resourcing across planning/scheduling and purchasing.	<ul style="list-style-type: none"> <li>- Hire additional experienced maintenance planners (as opposed to solely experienced traders), who are familiar with the typical roles and responsibilities of planners, to work alongside any current planners.</li> <li>- Use processes and supporting features in OWAM to help prepare FBM, CBM, and UBM work, such as BoMs for at least critical assets, inventory management within the work order and/or scheduling screen, parts reservations, parts kitting, etc.</li> <li>- Hire additional stock-keeping / purchasing resources if above insufficient.</li> </ul> Maintenance planners can rely on dashboards to continuously identify patterns and trends to improve the work program continuously.
SW5	Planned work can require (or it is beneficial) to send a notification to residents. Currently, this process is manual (e.g., flyers).	X				X	Digitization and automation reduce the time required to create and deliver notifications manually. It also enables customers to receive real-time updates, thereby improving overall service delivery.	Automate workflows, notifications, and mail merge for customer notifications (e.g., addresses to be affected by isolating a water main/sewer main repair/replacement).
SW6	Project management software (e.g., MS Project or Primavera) is not used/integrated with OWAM.	X	X		X	X	Manual or semi-automated project planning is time-consuming and less effective than a fully integrated software solution.	When fully integrated with OWAM, project management software (e.g., P6) provides OWAM users with the full suite of project management software features (e.g., critical path analysis, what-if analysis) and the ability to easily present results back in OWAM. Investigate the value of integrating OWAM with the City's project management software.



# Manage Inventory

Figure 5: Process Flow – Manage Inventory

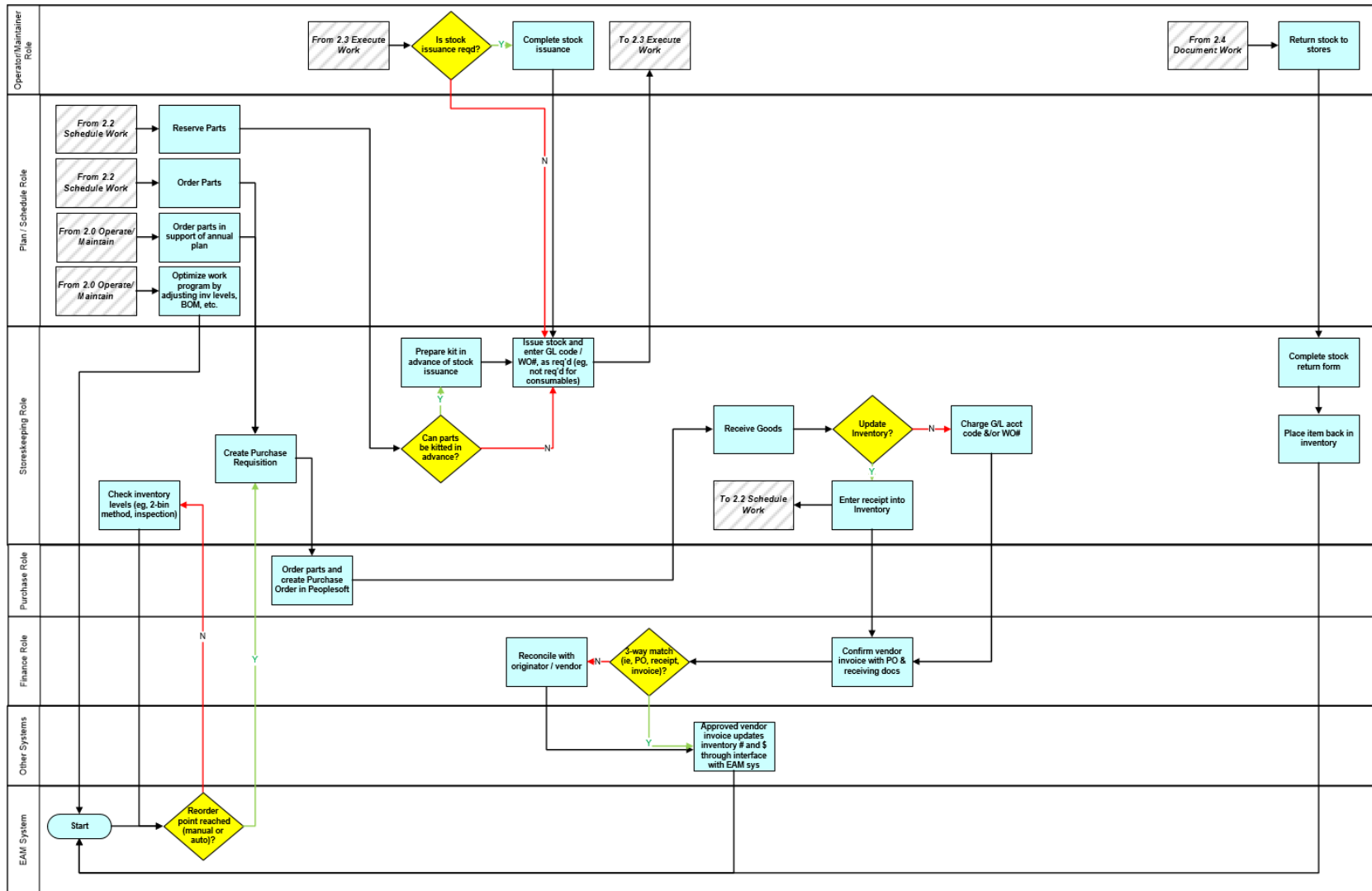


Table 5: Manage Inventory Gaps

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
MI1	<p>- Accuracy in Stores can be improved as the right materials are not always documented on work orders</p> <p>- Lookups and reservations are difficult as the material is not recorded as in inventory.</p> <p>- Multiple parts are being charged to a single work order instead of being charged to inventory (e.g., using stock requisitions on OWAM for charging to a work order).</p>	X	X	X	X	X	<p>- Inaccurate Stores lead to inefficient maintenance schedules, significant maintenance delays (i.e., due to lack of inventory) that can lead to idle technicians and extended asset downtime, and inefficient purchase orders (e.g., multiple POs instead of one with a volume discount).</p> <p>- Original WO is overstated, while subsequent WOs are understated.</p> <p>- There is no accurate visibility of inventory, therefore one cannot do a lookup and understand how many parts are in Stores</p> <p>- It is difficult to reconcile parts inventory at the end of the year when source data is inaccurate.</p>	Industry best practice for non-consumables is to charge inventory upon receipt and use the EAM system for issuances to charge parts to specific work orders as they are drawn from inventory. This is done regardless of where inventory is kept, as OWAM can track any number of "Stores" where parts are located (e.g., electrician's tool crib, truck #1). This requires an enormous discipline of those ordering, receiving, retrieving, or returning parts, i.e., to wear multiple hats as storekeeper and whatever their "day job" is. The alternative is to hire more full-time storekeepers to ensure standard procedures are followed.
MI2	Staff have to go to Stores to determine parts availability instead of checking on the system directly in OWAM or through an interface with PeopleSoft.				X	X	Having to go to Stores to determine parts availability is inefficient when the process can be digitized.	Charge parts to appropriate inventory account upon purchase, and track where parts are at any given time by following standard procedure and completing appropriate data entry (e.g., PO, receiving, stock issuance, stock returns to Stores).
MI3	Emails are received if someone wants parts kitted by Stores.					X	Kitting should be more common and should be a part of the OWAM system flow to reduce stock outs and unnecessary trips to Stores, as well as reduce redundant processes and systems.	OWAM can be set up with critical parts defined, a parts catalogue and complete inventory levels. With a complete setup and utilization of OWAM, maintainers could even take pictures of an asset or part and ask for that specific part or look it up themselves on mobile devices.
MI4	Although PeopleSoft is the single source of truth for purchasing of	X	X	X	X	X	Establishing a 'single source of truth' and structured process	Although modern EAM solutions can draw the line between the EAM and ERP in any number of ways, it

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
	parts/materials, the lines are blurry between OWAM and PeopleSoft in terms of which system holds which inventory-related data and how / when to access that data. In addition, or perhaps as a result, data sets are incomplete.						for inventory management can reduce duplicate data entries and version control issues, improve access to timely data values, improve data warehousing and reporting, and help to increase productivity.	would be worthwhile to review the integration between PeopleSoft and OWAM in terms of a 'single source of truth.' Consider managing parts inventory on OWAM, issuing purchase requisitions on OWAM, and issuing purchase orders on PeopleSoft. This is typically one of the tightest points of 2-way, real-time integration between an EAM and any other system, where both systems are kept updated as transactions occur.
MI5	<ul style="list-style-type: none"> <li>- There are significant inefficiencies in processes due to gaps with batch integration three times per day between OWAM and PeopleSoft.</li> <li>- Material costs on work orders are prone to being captured inconsistently and inaccurately.</li> <li>- There are limited or no cost rollups due to inaccurate or incomplete data and integration issues.</li> </ul>				X	X	These issues contribute to cost reporting that lacks accuracy and timeliness, if feasible at all. It is clear that many issues at play will need addressing simultaneously to ensure that cost reporting is accurate and timely.	<ul style="list-style-type: none"> <li>- Consider a stronger integration between OWAM and PeopleSoft for more effective and timely 3-way matching (PO, receiving documentation, and vendor invoice), as well as the reconciliation of costs between the two systems.</li> <li>- Cost reporting would improve in terms of accuracy and timeliness with an online, real-time PeopleSoft interface and improved data collection processes.</li> </ul>
MI6	CCB carries an inventory of meter serial numbers, but it is not always updated when meters are removed from inventory.	X					Meter inventory can be inaccurate, which reduces the ability to plan, as well as potentially causing service delays if there is a shortage of meters.	Consider integrating asset master data in OWAM with CCB and work order information relevant to meter status.
MI7	<ul style="list-style-type: none"> <li>- Much of inventory control is manual (e.g., Wastewater purchase requisitions by email, Wastewater receipts, Water cycle counts, Water stock requisitions).</li> <li>- There is little planning of materials for PMs and reactive work, due to lack of resources to plan, inconsistent processes, and underutilization of supporting systems (OWAM and PeopleSoft).</li> </ul>	X	X	X	X	X	The current annual spend on materials, parts, and supplies is about \$16 million for Water and \$12 million for Wastewater (according to the 2020 budget). Even a 1% improvement in spending is enough to pay for additional resources to help with purchasing and inventory management. Savings would come from the reduction of manual processes, better integration with PeopleSoft,	<ul style="list-style-type: none"> <li>- Consider using OWAM's capacity planning for long-term to short-term scheduling.</li> <li>- In Wastewater Services, additional staff, split shifts and/or training for buying and Stores (e.g., multiple locations) should be considered.</li> <li>- Barcode scanning of parts and assets will reduce time and errors.</li> <li>- Consider charging parts to inventory and not to work orders, where appropriate, as this is a major contributing factor to the accuracy of asset history and inability to rollup costs in Wastewater.</li> <li>- Clear obsolete inventory from the books and revisit the true inventory value.</li> </ul>

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
							greater planning and scheduling of parts, and more consistent use of streamlined process flows for managing inventory, ordering parts, and charging work orders.	
MI8	There are limited "formal" resources and processes for inventory control and purchasing. For example, in Wastewater Services, there are many resources with purchasing "rights" (e.g., lead hands with credit cards, etc.) but not necessarily full knowledge of formalities required (e.g., quotations, complete data entry), and "informal" involvement of maintenance planners who take on much of the buying responsibility instead of completing maintenance planning/scheduling tasks.				X	X	As above	<ul style="list-style-type: none"> <li>- Should review policies, procedures, and organizational structure with regard to Wastewater Stores and inventory control to address inconsistencies in processes and use of systems, as well as clarify roles and responsibilities.</li> <li>- There is a need for additional staff, such as storekeepers (rather than stashing stock). This is a small initial step to make improvements, otherwise even the current state process flows may be difficult to achieve.</li> <li>- Simplify the process/system to make it easy to follow when people are assuming multiple roles (e.g., lead hand taking parts and playing a storekeeper role). Process changes to consider, for example, are using a barcode scan or at least a stock issuance document to take out or return a part, reorder cards underparts or parts bin to facilitate consistent and more timely reordering, and use of the two-bin method for visual inspection.</li> </ul>
MI9	Inventory counts are done manually at year-end, which can be disruptive.	X	X		X	X	Annual counts are time-consuming, resource-intensive and prone to error since a whole year goes by with little expectation for accuracy. Year-end counts are also very disruptive while taking place. Using randomized cycle counts instead has become the industry norm because it minimizes the disruptive nature of annual counts, creates a culture where accuracy is continuously monitored and is important,	Consider cycle counts assisted by OWAM

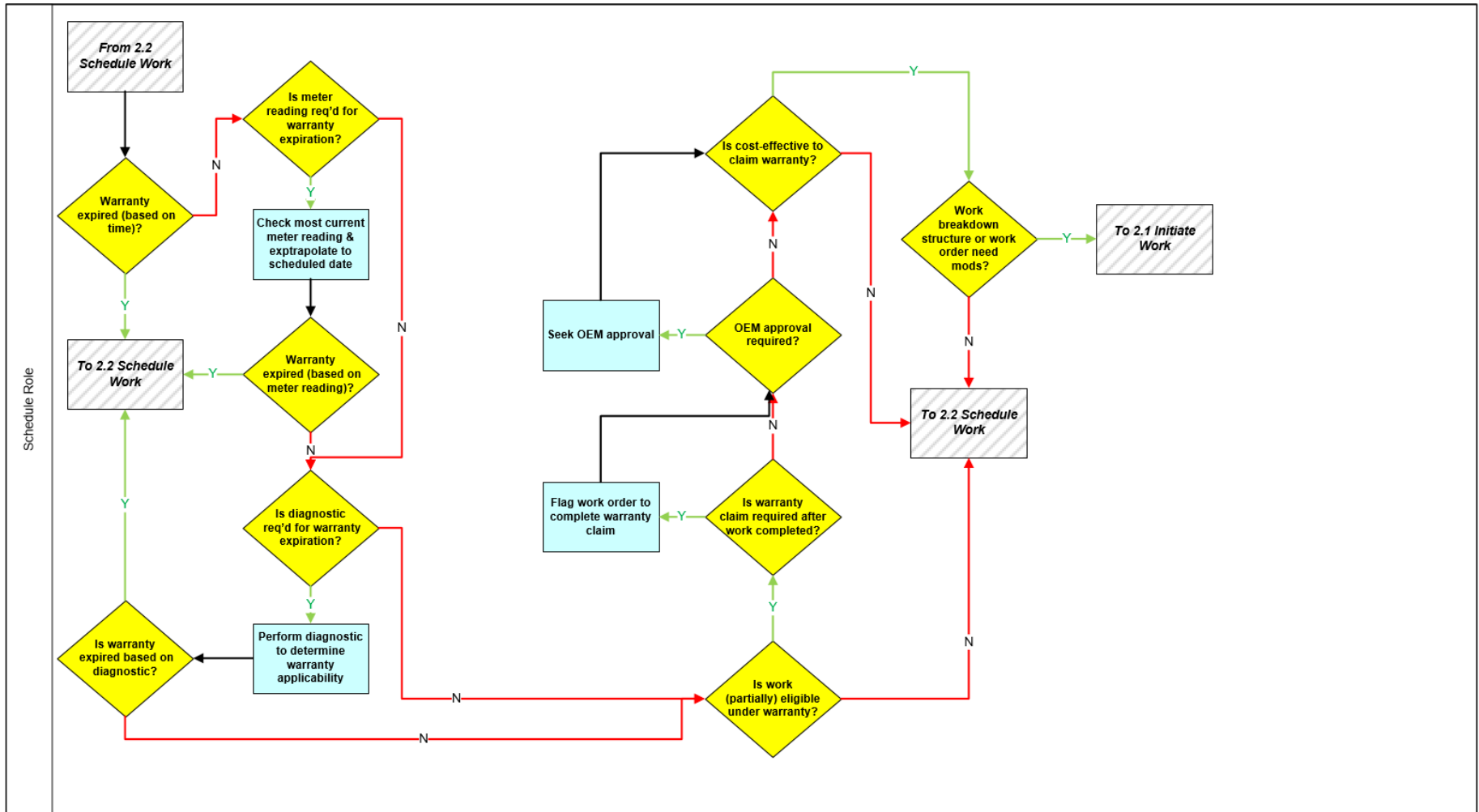
Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
							and spreads the workload to a much more manageable level. OWAM will assist in planning and executing cycle counts across all parts storage areas. Typically, the accuracy of inventory goes up with cycle counts.	
MI10	The CoW is required to keep critical parts spare under its Operating License, but parts are not kept in inventory and not stored in a consistent manner.		X				Having an up-to-date BoM in OWAM for critical assets and flagging critical spares will assist in meeting regulatory obligations. However, it is also necessary to manage inventory more formally as outlined above so that the accuracy and timing improves on inventory availability, parts ordering, parts usage, and cost rollups from properly charged work orders.	Consider developing a critical spares list for flagging in OWAM and establishing BoMs for at least critical assets.
MI11	- Staff are unable to easily find inventory, if at all. - At year-end, there are a lot of miscounts since staff use different names for different items.		X				Consistent nomenclature and cross-references in OWAM will help across the department to ensure the accuracy of inventory levels, counts, and ultimately cost rollups.	Consider standardizing nomenclature and establishing a formal means of approving official CoW names of parts and assets as it appears on the OWAM asset and parts master, with appropriate BoM, complete with multiple vendor cross-references and catalogue links. This information will change and grow over time as more people request various parts on jobs.

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
MI12	Processes for handling parts are inconsistent. Sometimes parts are put into stock but not inventory. Sometimes to increase low stock levels, parts are charged against a function code (e.g., spare instruments are treated like a consumable).		X				This issue is not about where the parts are located since each trade knows where their parts are kept and approximately how much they have. This issue is more about having an updated inventory listing online and not relying on individuals for those numbers, or planning work ahead of time. In turn, this leads to a more accurate work order history including cost rollups.	Consider more formal and consistent processes using OWAM, such as multiple "Stores" or stock locations, and inventory management processes.
MI13	Stores will order a part by default because the originator did not say the part was available. Stores has no inventory visibility outside their stockroom as many parts in multiple locations are not on the system.		X				There will be errors in ordering too much or too little inventory without accurate and timely inventory tracking on OWAM across all part storage locations. This is exacerbated as informal ordering takes place by multiple people without a BoM and inventory availability on the system.	Consider the use of OWAM for inventory tracking across multiple parts storage locations, standard BoM and links to various OEM parts catalogues, and access to inventory availability directly from the work request/order screen.
MI14	Because not many parts are needed in Rail, visual inspection is used to monitor stock levels. Stock is kept at St. Boniface, Ross and Hadashville. Maintainers get their own parts and return them if not left on a truck. This is a manual process, not on OWAM.			X			There is no accurate picture of the value and level of Rail inventory, as inventory is not tracked on OWAM. This is fine for consumables but may not be sufficient for all of Rail assets/parts.	Consider using OWAM to track at least "A" class Rail parts more formally. Visual inspection can still be used to trigger orders, but at least an accurate record will be maintained on OWAM.



# Determine Warranty Applicability

Figure 6: Process Flow –Determine Warranty Applicability

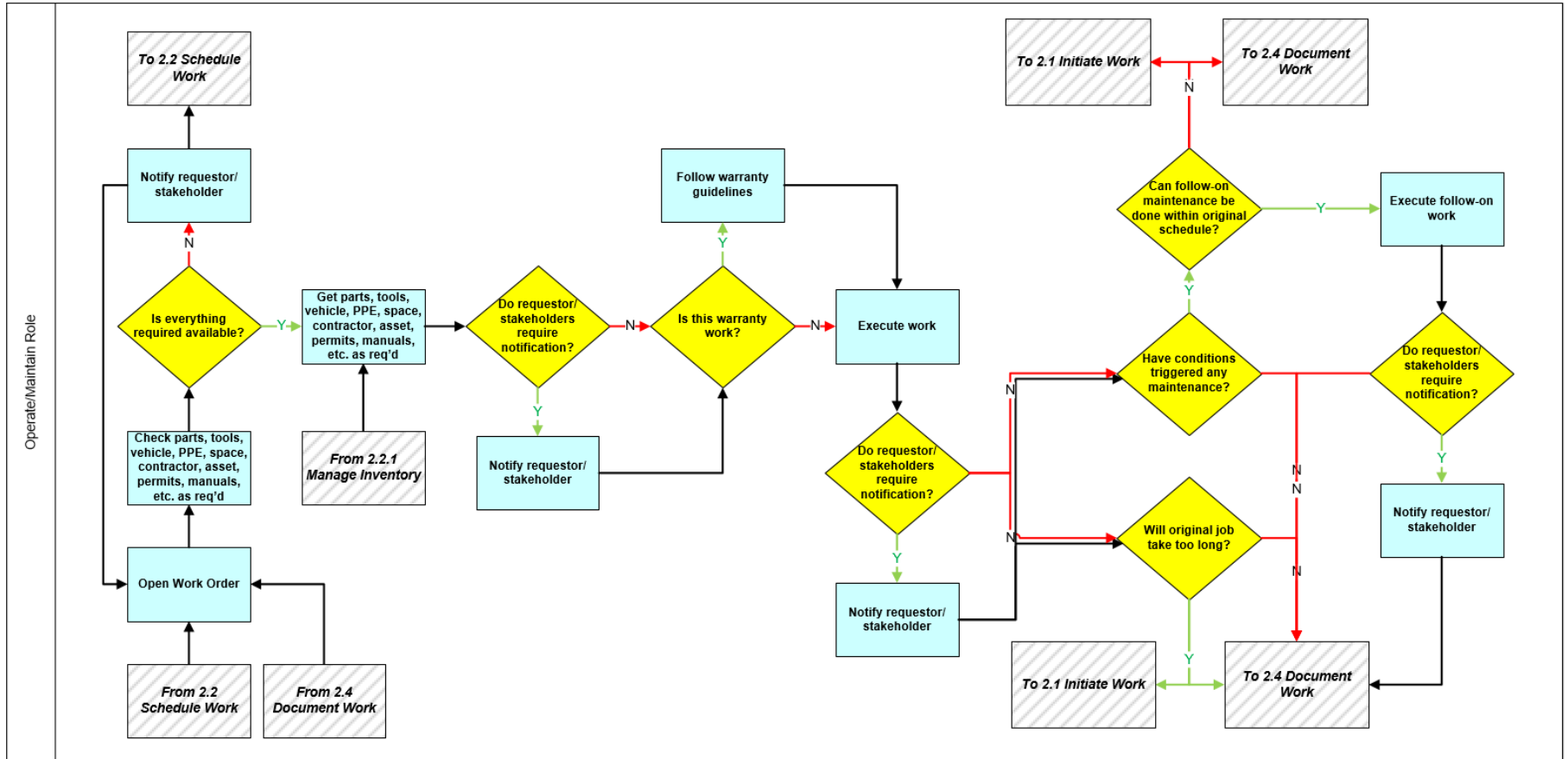


**Table 6: Determine Warranty Applicability Gaps**

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
WR1	<p>- WW Plants are not currently using OWAM warranty functionality but would like to do so.</p> <p>- In WW Collections, warranty is mostly based on capital projects. Therefore, either external consultants or Engineering are responsible for notifying maintainers to complete an inspection, albeit without the use of OWAM. Warranty functionality could be useful for smaller assets, upgrades to stations, or one-offs (e.g., pump for a station).</p>				X	X	<p>- WW cannot ensure warranties are used when applicable as there is no record in OWAM.</p> <p>Having easily accessible data indicating if a given part/asset is under warranty can enable the City to save on potentially expensive repair or replacement costs.</p>	<p>Consider using OWAM warranty functionality. Warranty features to explore include parent/child warranties, warranty start dates if parts or assets are inventoried, warranty contracts, and claims management.</p>
WR2	<p>If maintainers are not on OWAM on the job (e.g., with mobile devices), they will not necessarily receive alerts or have access to warranty information such as warranty terms and conditions or the OEM claim form.</p>		X		X	X	<p>Maintainers are not aware when a given part/asset is under warranty. This may lead to unnecessary expenditures when replacements/repairs are covered.</p>	<p>- Consider using the full OWAM warranty functionality for flagging warranty assets on work orders.</p> <p>- Consider using mobile devices for the frontline for more timely access to information such as warranty applicability.</p>
WR3	<p>Engineering tracks large capital outside of OWAM. When warranty work is completed (e.g., at stations), operators/maintainers must reach out to Engineering outside of the system.</p>	X	X	X	X	X	<p>There is no record of warranty terms and conditions, expiration date, parent-child relations, warranty claim forms and other warranty information on OWAM, so asset master data is incomplete. Thus, there is significant reliance on staff's memory which has its limitations.</p>	<p>Consider implementing an OWAM flag for warranty expiration, such as a flag that a claim is required, attaching or linking a claim form, and flagging to seek OEM approval where applicable.</p>

# Execute Work

Figure 7: Process Flow – Execute Work

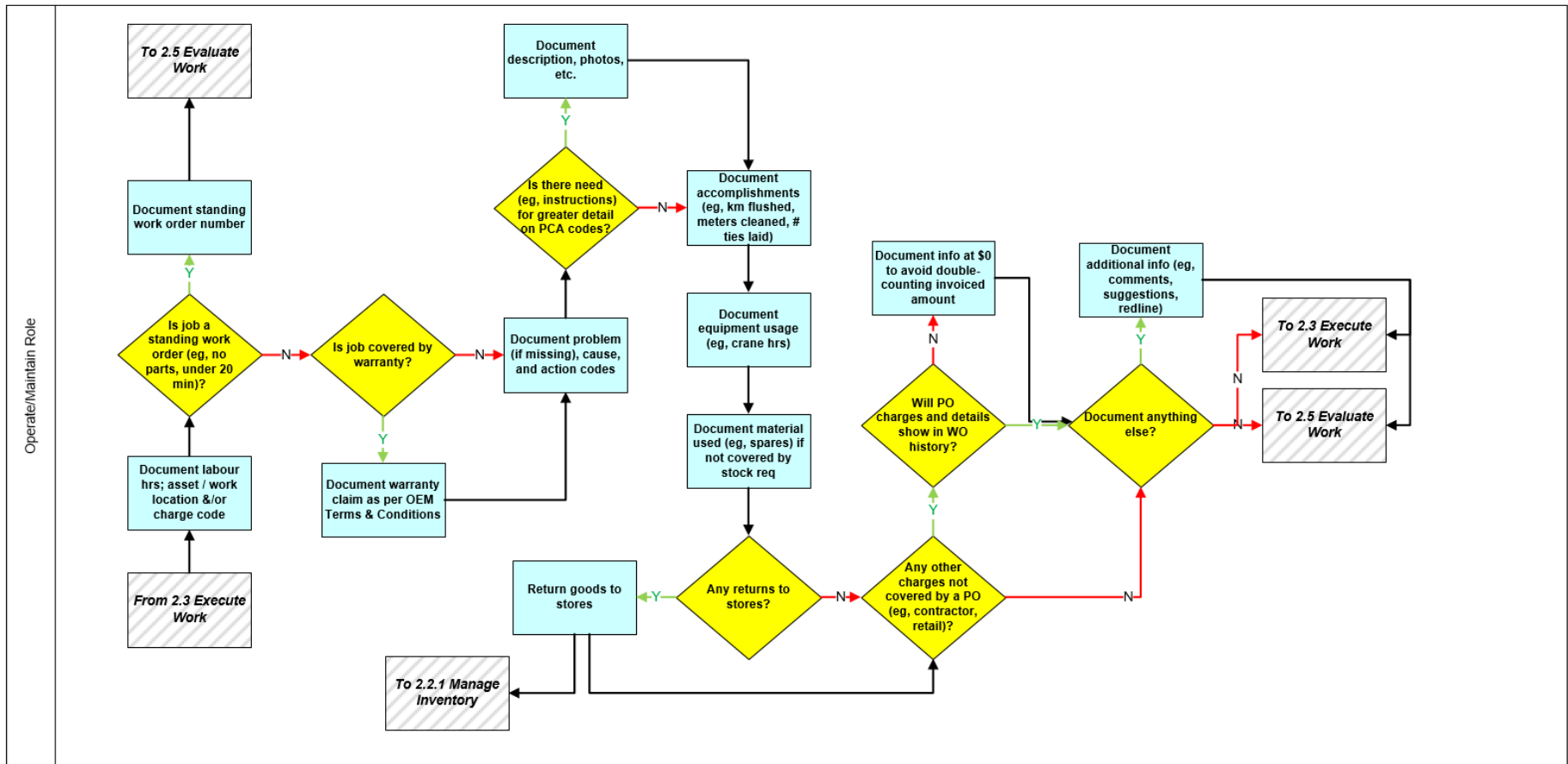


**Table 7: Execute Work Gaps**

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
EX1	Addresses are used to direct field workers on service requests; however, they are not always the address associated with the problem noted on the service request even though the work order shows them as such.	X					If field workers are unable to easily locate the asset related to a service request, their work is delayed, and efficiency is reduced.	Consider showing asset location and work location as a point, line, or polygon on a GIS map tied to the service request in OWAM. The map should be a tab on any OWAM object, such as a work order or the asset master. Enter the address where work is done on the work order and/or work location on a map integrated with the work order in the field. Mobile devices ensure accuracy, timeliness, and access to instructions and background information, as well as documentation of work done.
EX2	When executing work, parts are not always available.		X		X	X	Maintainers can spend a long time tracking down or fetching parts as opposed to completing work.	Improved planning/scheduling in OWAM will help to ensure parts are available when work execution takes place.
EX3	The current process for notifying requestors/stakeholders (e.g., of the status of work execution) is informal and mostly manual.	X	X	X	X	X	Manual notification is time-consuming and potentially incomplete. As well, manual notifications often provide inadequate lead time to stakeholders.	Automating the notification process removes the burden from operators/maintainers. Some or all of the notification process can be automated by writing business rules to notify requestors and/or stakeholders at different stages within the Execute Work process (e.g., if conditions have triggered maintenance).
EX4	The City is not currently using OWAM's automated condition triggers and/or interactive questionnaire. For example, if an operator/maintainer were to enter a pressure value when conducting a routine maintenance inspection on a pump, OWAM would either indicate if the asset passes the condition or requires follow-up maintenance (as well as provide what the work may look like).	X	X	X	X	X	Automated condition triggers and OWAM's interactive questionnaire can streamline maintenance for critical processes/equipment, which leads to increased productivity, improved accuracy and consistency in responding to condition triggers, and an audit trail of the event (e.g., for proof of regulatory compliance).	Consider the implementation of OWAM's automated condition triggers and interactive questionnaire. The workload required to set up the questionnaire and triggers should be balanced with the time/effort saved by their use (i.e., for critical processes/equipment).
EW5	The way follow-on work is handled depends on the level of training of the maintainer (e.g., some maintainers will add comments to the existing WOs, other maintainers will fill out a new WO or a new task		X				This practice leads to suboptimal scheduling in terms of labour utilization and labour productivity. It also makes it difficult to retrieve information consistently.	A consistent methodology for addressing follow-on work in OWAM should be established and followed. Training should be conducted accordingly.

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
	on the same WO, others will create a separate work request without a cross-reference, and some maintainers will complete the work with no documentation)							

Figure 8: Process Flow –Document Work



**Table 8: Document Work Gaps**

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
DW1	- Descriptive fields are being used instead of tracking cause and action codes (e.g., identifying private vs municipal responsibilities when 311 SR sends maintainer to investigate sewer backup). 311 provides the problem code, however cause and action taken are noted by the frontline in text/comment fields. The same holds true for all other OWAM work (i.e., there is just a description). Note: 311 does not identify the problem code for Rail.	X	X	X	X	X	Descriptive fields cannot be easily searched or sorted. The level of detail is inconsistent, as is semantics and terminology. Analysis such as Pareto analysis is impossible (e.g., top 3 cause codes for year-to-date). This leads to loss of productivity in documenting the work done, and ineffectiveness in planning future work. Descriptive fields are far more useful and likely to include sufficient detail if used very discreetly when following a suspected or identified issue (e.g., in trying to understand why so many leaks with a given asset, Engineering instructs frontline to add descriptions and photos for a given asset & cause code).	Use OWAM to document and track cause and action codes. This will require a one-time setup of failure trees, starting with critical assets, which can be modified and improved over time.  - Cause and action codes, when properly tracked, increase maintenance productivity since codes are easier to document and search for than manually entered text fields. Entries are also more consistent. These codes can be used to facilitate the education and training of new maintainers, they allow for future solutions to be implemented more rapidly (look back into the history of work orders and view previous solutions), and they can also create more proactive maintainers by allowing them to anticipate the action they need to take when they see certain codes (e.g., troubleshooting database).

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
DW2	Operators/maintainers in Rail are writing finishing comments for 12 different function codes (i.e., a running list of comments on a standing work order or SWO). Each entry includes a date, person, comment on what was done, and possibly what was used or accomplished (e.g., 50 ties installed). The supervisor uses this data at year-end to calculate the number of ties used. In turn, this is used to reconcile the inventory of ties and estimate the need for next year's program. This process is similar for other use cases, such as ballasts.			X			Creating a running list of comments for 12 function codes is time-consuming to create and analyze (e.g., tracking progress, identifying repetitive issues, determining root cause, understanding performance). It is error-prone and inconsistent. There is also a limited ability to obtain accurate work history, cost rollups, and other asset-related information for the 12 function codes. For example, information on which asset was being worked on or where the asset/work was located would be unavailable. Additionally, it is impossible to gather analytics via dashboard, heat map, Pareto diagrams, etc., to share across the division (e.g., performance, accomplishments, downtime, bad actors, and problem areas).	<ul style="list-style-type: none"> <li>- Consider identifying asset and/or work locations to the SWOs. Alternatively, operators/maintainers can document accomplishments against an annual route WO for linear assets (e.g., in terms of metres inspected, number of ties laid, etc.).</li> <li>- Consider integration and use of GIS for more easily identifying asset/work locations and analysis of accomplishments, problem areas, etc.</li> </ul>
DW3	Asset-related information, such as maintenance work done by operators, is not planned/scheduled or recorded in OWAM against the asset (e.g., asset downtime, exercise valves).				X	X	Incomplete asset history (e.g., not tracking asset downtime accurately) limits the ability to understand cause and effect relationships (i.e., root cause analysis), and increases time spent performing analysis when needed.	Create an "operators logbook" in OWAM for a given asset, separate from work orders, to determine things like failure information, downtime information, conditions applicable, work order references, and line stops (i.e., when equipment stops for a few minutes and operator makes a minor fix, can actually record what happened electronically).

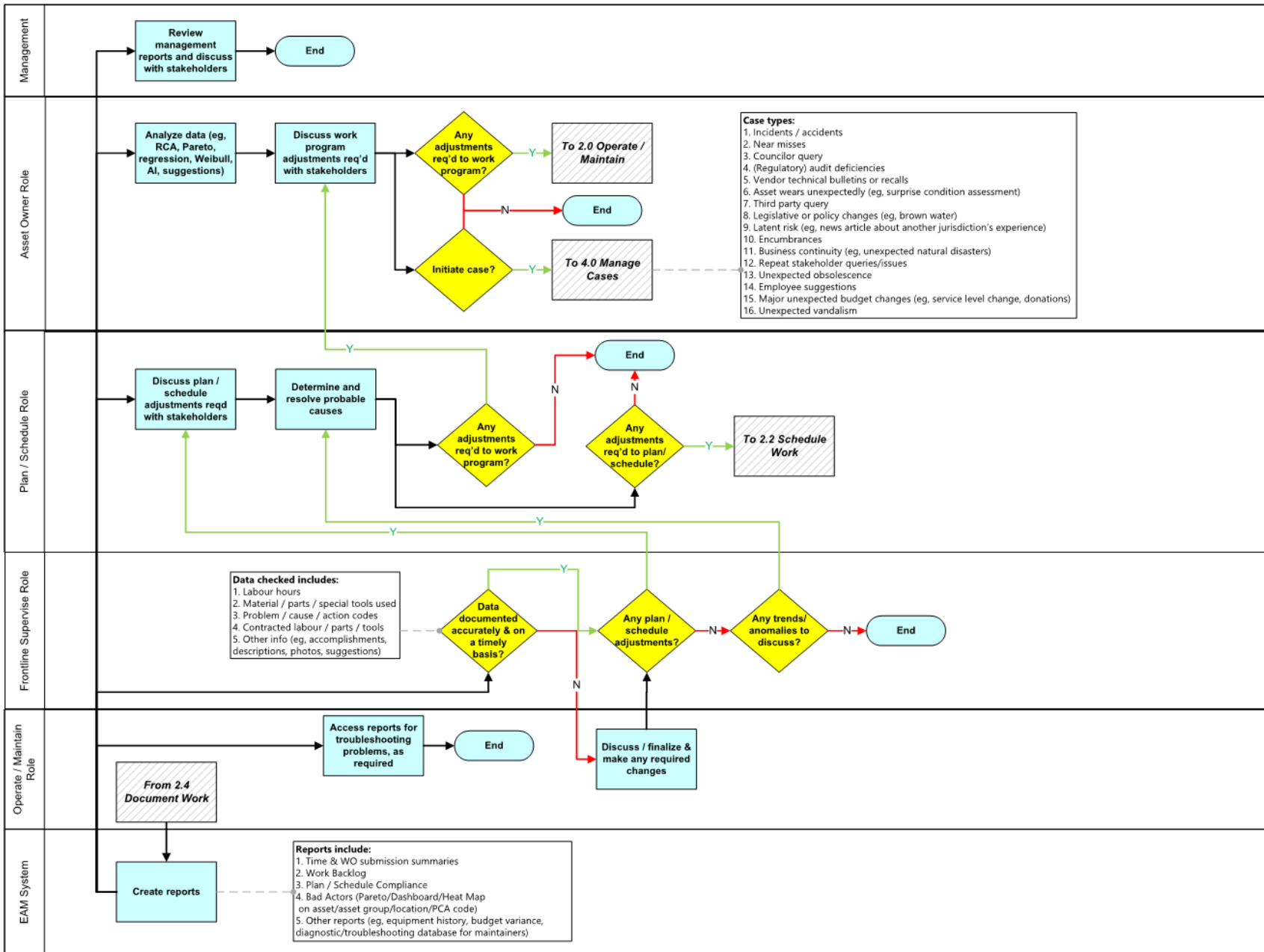


Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
DW4	Comments/redlining/suggestions coming from operators/maintainers are not being formally documented, if at all.	X	X	X	X	X	Due to the current informal process, time spent by staff creating comments is not leveraged. There is no audit trail, nor a formal feedback mechanism to ensure timely status reporting and resolution regarding staff comments.	OWAM can be used to record comments/redlining/suggestions coming from operators/maintainers as well as their status and resolution.
DW5	Rail is constrained due to the fact that there is only one desktop computer in the office for documenting work and planning/scheduling work.			X			Due to the lack of availability of technology to engage with OWAM, it can be difficult for maintainers and other frontline Rail staff to use OWAM to its full capacity. This ultimately results in reduced accuracy, timeliness and productivity.	Explore purchasing City smartphones for Rail employees, as personal devices cannot be used for City work. Alternatively, there should be more desktops available.
DW6	There is duplication in time data entry, for the purpose of payroll (on PeopleSoft) and an accurate asset/work history (in OWAM). Much of the data is entered manually, after-the-fact and not necessarily accurate.	X	X	X	X	X	Manual and duplicate time data entry results in loss of productivity and potential errors. Additionally, entries are not timely, especially if reconciliation is required from multiple sources.	Industry best practices suggest entering data once as close to the source as possible. This means entering time data once via OWAM and automatically integrating with PeopleSoft (i.e., for payroll purposes). EAM systems today deploy a "running clock", whereby users on a mobile device optionally select a given job and start the running clock by selecting a work order to begin work, select another job and therefore automatically stop the running clock on the previous work order and start the clock on the new work order. Users can select an activity code (e.g., travel time, safety meeting, clean up), thereby automatically stopping the running clock on the previous work order and start the clock on the activity. Users with security clearance can optionally override start/stop times manually and can optionally set up the running clock with a start/stop button rather than the application calculating automatically.

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
DW7	Business units are not tracking accomplishments for linear assets. For example, for the aqueduct, there is only an annual inspection of different sections.	X		X		X	Not tracking accomplishments on linear assets limits the ability of the City to validate work done, optimize work methods and track continuous improvement against target KPIs.	Begin tracking accomplishments for linear assets against KPIs as part of building a culture of continuous improvement.
DW8	Work order history for work/materials/etc. covered by a PO, especially regulatory work (e.g., a contractor on a PM route for a crane inspection), is not currently being tracked. Note: contractor work can only be entered into OWAM by a CoW employee.		X				Not tracking work history for work completed by contractors leads to an inaccurate or incomplete work/asset history and asset lifecycle cost. This means repair/replace and other decisions are not based on the full cost history.	A CoW employee should enter information into OWAM for critical work completed by hired contractors.
DW9	TKMS, an in-house developed permitting/work management system used by Public Works, supplies Water Distribution with the cost of external rentals. The system takes the average cost/hour on rentals, which is then entered manually into OWAM against a WO (i.e., there is no TKMS interface). Note that there is a large cost range, so using averages is not a very accurate estimate for a given WO.	X					Average cost/hour, especially considering there is a large range of costs involved, makes it difficult to determine an accurate cost history when external rentals are involved.	Enter data into one system and have OWAM update actual cost rather than average cost/hour for a given WO through an interface.

## Evaluate Work

**Figure 9:** Process Flow –Evaluate Work



**Table 9: Evaluate Work Gaps**

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
EV1	Work locations are sometimes found to be in error. For example, if targeting all work done on a particular linear asset (e.g., sewer at a certain location), field workers do not have IDs on watermain. To find the history of the sewer, a user needs to find all work orders tagged to home addresses associated with the sewer. Sometimes, a neighbour complains, and a work order is tagged to the neighbour as opposed to the actual address where work was completed.	X				X	It is difficult to gather accurate work history. It is important to track the work history of specific assets and/or work locations for extrapolation (i.e., predictive maintenance), so that assessments can be done on the cumulative value of maintenance versus replacement cost of the component or compared to the remaining value of an older component.	Consider the following using OWAM: unique asset IDs, defining large linear assets and/or work locations, full integration with GIS, and reconciliation with the 'single source of truth' (e.g., GIS is a geospatial reference for asset and work locations; OWAM is the single source of truth for asset master data and work order history or transactional data).
EV2	<ul style="list-style-type: none"> <li>- OWAM is used minimally for evaluating work. Sometimes OWAM history is checked, such as for identifying increased failure trends of UV lamps, but it is often not analyzed.</li> <li>- In Water Treatment, work is flagged based on observations by maintenance and operations (e.g., issues with a pump in a station).</li> <li>- In Distribution, evaluation is done by Engineering (e.g., within the hydrant inspection system) and managers interact with Engineering (e.g., to ask for the budget history of repair recurrence).</li> </ul>	X	X				<p>Significant time, money and energy is spent on data entry and maintaining data in OWAM, which should allow work to be evaluated. By not fully evaluating work, opportunities for improvements are missed, such as to:</p> <ul style="list-style-type: none"> <li>- increase productivity (e.g., avoid repetitive failures or discover a better way of fixing a problem),</li> <li>reduce asset downtime (e.g., reduce frequency and severity of digs),</li> <li>- increase quality of work (e.g., troubleshooting database for determining optimal action to fix a given problem),</li> <li>- increase asset performance (e.g., understand causal</li> </ul>	<ul style="list-style-type: none"> <li>- For linear assets, there should be full integration with GIS and a defined 'single source of truth' where work locations are tracked as points/lines/polygons. Further analysis is required to determine if this integration should be carried out with OWAM or MOM. Built-in OWAM features should be used for root cause analysis (RCA) and other work evaluation tools for fixed assets.</li> <li>- Industry best practices are to use the EAM system, with full integration with GIS for linear assets, to evaluate trends and anomalies for continuous improvement of processes, improvements to the work program, such as maintenance policy changes and standard operating procedures, repair/replace decisions, OEM comparisons on lifecycle costs, under/over-performing assets, and so on. For linear assets, this might show as a heat map which highlights problem work locations/assets on a map.</li> </ul>

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
							<p>relationships that affect flow rates),</p> <ul style="list-style-type: none"> <li>- provide better asset availability (e.g., evaluating OEMs, methodologies, configurations, and procedures that maximize asset availability),</li> <li>- improve labour utilization (e.g., optimized planning and scheduling that reduces travel time),</li> <li>- increase labour effectiveness (e.g., increased intelligence and knowledge base on how to best operate and maintain equipment under certain conditions), and</li> <li>- lower material costs (e.g., finding the proper balance of inventory on-hand versus stock outs).</li> </ul>	
EV3	Asset Navigator is an OWAM report used for cost rollups and to compare the high-level spend by plants (i.e., asset group level). However, drill-downs (e.g., multiple pump comparison) may or may not be accurate.				X		Accurate lower-level costs are more useful and more reliable in summary form than tracking only higher-level costs. Staff would also have the ability to easily compare different vendors, pumps, etc., for identifying cost reduction opportunities.	Consider charging work to a greater level of granularity in defining assets.

## Asset Lifecycle Initiation + End of Life / Investment Recovery

**Table 10:** Asset Lifecycle Initiation + End of Life / Investment Recovery Gaps

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
IE1	<p>- New capital (e.g., new hydrants and water mains) are designed and built by contractors who provide drawings. This is handled by the Capital division, which does not use OWAM.</p> <p>- Capital renewal and/or major maintenance is handled outside OWAM.</p>	X	X	X	X	X	<p>- There is a significant loss in productivity and quality of work if OWAM users have little or no access to accurate asset master data, drawings, etc.</p> <p>Further loss in productivity, accuracy, timeliness and level of detail may result if maintenance/operations are forced to replicate any asset master data, drawings, etc. Replicating the data from scratch rather than transitioning to operations (e.g., ported to OWAM / GIS from a contractor) can be a significant expense.</p>	<p>- Focus on creating a smooth transition to operations and integration with OWAM for all assets across the organization (e.g., new assets from plant upgrades are defined to the right level of granularity)</p> <p>- Should provide design estimation capability for managing the smooth transition of capital projects and new construction through to the maintenance phase including: developing initial estimates including all materials, resources, permits, contracts, and other costs; integration from the design estimate to the work order, for tracking and analyzing the "as designed" versus the "as planned" versus the "as-built" variances; integration with graphic design and engineering tools; integration with materials catalogue and e-procurement module for estimating material costs; integration with asset lifecycle accounting</p> <p>- Many assets are serialized (e.g., meters, hydrants) and can be inventoried and tracked starting with asset lifecycle initiation, right through to end of life/investment recovery</p>
IE2	There is currently no way to update asset information in OWAM, based on Engineering's input.	X	X	X	X	X	Unable to take advantage of any warranty features within OWAM (e.g., dozens of assets needing retirement & new assets replacing them).	Engineering should have access to OWAM to enter information as close to the source as possible or port information from the contractor.
IE3	End-of-life/investment recovery decisions are made outside of OWAM.	X	X	X	X	X	Staff do not have access to a complete and accurate picture (i.e., true asset lifecycle cost) when making repair/replace decisions or when comparing OEMs.	Should manage all engineering changes to each asset throughout its lifecycle including the following as relevant to a given asset: track all major and minor revisions to an asset from the "as designed," to "as installed," to "as modified" throughout its life; track temporary and permanent changes; track changes to the configuration of assets; identify affected parent/child equipment, affected documents, and objects such as active work orders that are affected by a given change; manage the change process from start to finish, synchronizing all affected activities for data

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
								integrity, all end of life costs and/or investment recovery streams.



## Case Management

**Table 11:** Case Management Gaps

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
CM1	<p>Cases are covered either verbally or through other corporate systems (e.g., worker accidents on the job tracked by the corporate incident management system) and not fully integrated through OWAM. Thus, a full picture of everything related to an asset is lacking a major component – most cases. A case is a surprise, anomaly, or unexpected event as opposed to a planned event and may include the following:</p> <ol style="list-style-type: none"> <li>1. Incidents/accidents</li> <li>2. Near misses</li> <li>3. Councillor query</li> <li>4. (Regulatory) audit deficiencies</li> <li>5. Vendor technical bulletins or recalls</li> <li>6. Asset wears unexpectedly (e.g., surprise condition assessment)</li> <li>7. Third party query</li> <li>8. Legislative or policy changes (e.g., brown Water)</li> <li>9. Latent risk (e.g., news article about another jurisdiction's experience)</li> <li>10. Encumbrances</li> <li>11. Business continuity (e.g., unexpected natural disasters)</li> <li>12. Repeat stakeholder queries/issues</li> <li>13. Unexpected obsolescence</li> <li>14. Employee suggestions</li> <li>15. Major unexpected budget changes (e.g., service level change, donations)</li> <li>16. Unexpected vandalism</li> </ol>	X	X	X	X	X	<p>Fully integrating case tracking into OWAM gives the following benefits:</p> <ul style="list-style-type: none"> <li>- Resolving cases quicker at a lower cost and higher quality</li> <li>- Ability to easily track the status of cases at any time for lower cost of reporting</li> <li>- Improved productivity, lower asset downtime, improved safety, lower environmental impact, better regulatory compliance, increased asset performance and lower material costs from evaluation and continuous improvement of case management (i.e., avoiding future cases) and the work program (e.g., changing processes, maintenance policies, PM intervals, operating procedures)</li> </ul>	<p>A fully integrated case management system enables organizations to get a full picture view of their assets (e.g., can determine what an asset is costing in terms of cases). Staff would be able to sort by case type, determine what cases are open, etc. Consider the use of a fully integrated case management tool, including the following capabilities:</p> <ol style="list-style-type: none"> <li>a. Cases may launch one or more work orders tied to it, for corrective action and work to prevent recurrence;</li> <li>b. Track Case ID with automatic numbering;</li> <li>c. User-definable case type (e.g., global or local to a site);</li> <li>d. Hierarchical incidents (e.g., parent = security break-in; children = 2 assets stolen, fire extinguisher fired off, and explosion);</li> <li>e. Case risk scoring including probability and impact evaluation;</li> <li>f. Modification and recording of new or edited steps including modified by, and date/time modified;</li> <li>g. Problem/Cause/Resolution codes and description;</li> <li>h. Issuance of instructions for Operations in order to deal more effectively with the case (e.g., shut off valve or use equipment at half speed until permanently repaired);</li> <li>i. Follow-on work required or recommended in the form of a checklist, with an optional link to activity/work order for each line item on the checklist;</li> <li>j. Management of Change process initiated under multiple user-definable conditions (e.g., spend and/or risk score exceeds a user-defined threshold);</li> <li>k. Campaign management tied to a given case, for permanent countermeasures that are implemented broadly (e.g., as part of case tracking, monitor a campaign to change OEM/make/model of a part in similar</li> </ol>

Gap ID	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
								<p>equipment throughout the plant and across an enterprise); and</p> <p>l. Case tracking (i.e., status, history of progress, approval history for all relevant steps) includes monitoring status of linked projects, campaigns, work orders, tasks, activities, purchase orders, operating instructions, and other objects.</p>

General

Table 12: General Gaps

Gap ID	Category	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
G2	Strategy	There does not appear to be a formal, unified asset management strategy for the Water and Waste Department.	X	X	X	X	X	<p>The absence of a unified strategy has contributed to the following:</p> <ul style="list-style-type: none"> <li>- unclear future direction in the form of inconsistent or missing KPIs</li> <li>- conflicting and changing priorities (e.g., resourcing of support and line staff)</li> <li>- silo thinking (e.g., Engineering functions separately from Operations/Maintenance with little interaction)</li> <li>- culture of continuous improvement has been difficult to encourage and gain momentum</li> <li>- OWAM is underutilized as a tool for achieving major improvements (e.g., cost reduction, minimizing asset downtime, maximizing asset performance)</li> </ul>	A unified asset management strategy would enable the City to have consistent methodology for the implementation and documentation of asset management practices, plans, processes, and procedures across business units. This strategy would enable more efficient use of asset management systems, streamline training, and allow for further optimization of processes. OWAM should provide analytics and reporting to support ongoing operations / maintenance to ensure strategic objectives are met.
G3	Processes	Processes and use of OWAM is inconsistent across divisions, within branches (e.g., each plant), and even between people in the same group.	X	X	X	X	X	There are still many manual processes and/or processes that have not been optimized.	A large savings potential can be achieved through standardized and streamlined process flows across divisions, along with a configured system supporting them across the complete asset lifecycle. Many areas would benefit by sharing processes, data, and even staff.
G4	Measurement & Service Levels	<ul style="list-style-type: none"> <li>- Many key measures, targets, and trends are not currently being tracked.</li> <li>- The root cause can often be traced to data entry. For</li> </ul>	X	X	X	X	X	Without accurate, effective, and reportable key measures, targets, and trends, it becomes difficult to optimize and/or improve current practices,	<p>OWAM should be used to accomplish the following:</p> <ul style="list-style-type: none"> <li>- track cost and budget variances by asset or asset grouping,</li> </ul>

Gap ID	Category	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
		<p>example, it is not possible to track how much was spent last year on a given pump failure type because work is not being charged correctly, is missing, or it is charged to a higher-level asset, such as the building.</p> <ul style="list-style-type: none"> <li>- Much of the data collected is missing (e.g., cause and action codes), inaccurate (e.g., addresses), or difficult to search, such as text fields.</li> </ul>						<p>anticipate and prevent common issues, prioritize efforts, and make active use of the data that is being captured.</p>	<ul style="list-style-type: none"> <li>- perform Pareto analysis on asset problems, root causes and actions taken,</li> <li>- track for at least critical assets total cost of ownership, asset performance asset availability, asset reliability and quality of output,</li> <li>- track overtime to identify "chronic overtime" that can be replaced by regular hours, and</li> <li>- report on PM compliance, such as preventive to the corrective ratio for each asset type.</li> </ul> <p>This will require training frontline and support staff in more streamlined and consistent processes, such as developing failure trees, capturing root cause and action codes accurately, validating their use by frontline supervisor roles and analyzing the data for continuous improvement.</p>
G5	Redundant Systems	<ul style="list-style-type: none"> <li>- Asset data is spread over multiple systems (e.g., OWAM, GIS, hydrant inspection system, bridge management system, aqueduct management system, and sewer management system) with an unclear 'single source of truth.'</li> <li>- OWAM has comprehensive functionality that could eliminate the need for several of these systems, but the City is required to use some of them (e.g., MSDS tracking system).</li> </ul>	X	X	X	X	X	<p>Establishing a 'single source of truth' for asset data offers transparency and accountability around asset performance. It enables the creation of a consistent data foundation for cost-effective measurement, monitoring, maintenance, and improvement programs.</p>	<p>Need to clarify the 'single source of truth' for asset data (e.g., geospatial data, asset master data, transactional data, etc.). Consider if any of the many overlapping specialty systems, especially older systems, can be replaced by OWAM.</p>

Gap ID	Category	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
G6	GIS Integration	OWAM is not fully integrated with Hexagon GIS, although MOM draws data from both.	X			X	X	Industry best practices are to use an EAM system, with full integration with GIS for linear assets, to evaluate trends and anomalies for continuous improvement of processes, improvements to the work program, such as maintenance policy changes and standard operating procedures, repair/replace decisions, OEM comparisons on lifecycle costs, and under/over-performing assets.	There is a strong case to consider a GIS system that integrates well with OWAM, such as ESRI, an industry leader. This could also facilitate finding and maintaining resources and support staff.
G7	CCB Integration	There are manual systems for updating both OWAM and CCB with the same information.	X					This can create reconciliation issues or lead to missing information. For example, billing needs to confirm that Water is turned off at an address, and the same address might be slightly different between the two systems.	There should be a 'single source of truth' with data entered as close to the source as possible (e.g., meter serial number installed at which location, and proper integration for updating both systems).
G8	CCB Integration	Customer Service books appointments on OWAM with little flexibility. Optimally, multiple meters can be easily grouped at a given address or when addresses are close together.	X					The current appointment booking process has made it difficult to optimize schedules/routes.	Consider providing feedback and integration between booked appointments and the related impact to billings through integration and notifications (e.g., was a meter installed, removed, exchanged). Explore the functionality of the new OWAM mobile field module.

Gap ID	Category	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
G9	Condition Assessment	There is minimal integration of condition-based maintenance and condition assessments of assets with OWAM.	X	X	X	X	X	Lack of integration makes it more difficult to efficiently/effectively manage regulatory compliance and predict failures.	Industry best practices are moving towards automation and the integration of specialized CBM tools, such as bridge management and pipeline integrity systems. Consider using condition-based maintenance features of OWAM, such as checklists, triggers, accomplishments, routes, and standing work orders. Investigate the value of integrating with any condition assessment software used, such as the sewer management system.
G10	ERP Integration	There is limited integration with OWAM and other ERP functions, such as HR skills & training, payroll, budgeting, and Finance (e.g., Fixed Asset Accounting, Accounts Payable for the invoiced cost of parts).	X	X	X	X	X	There is a need for tighter integration between EAM and an organization's core ERP functionality in today's complex environment. The greater the integration, the greater the expense. However, significant benefits are derived from information fully shared in terms of HR skills & training (e.g., to know when someone is fully certified before being assigned to a particular job), payroll (e.g., to enter data only once to feed WO history and payroll), budgeting (e.g., tracking actual WO history against the council approved budget), and Finance (e.g., ensuring the cost of parts are accurate following three-way matching).	Consider a cost/benefit analysis to determine which functions, on a case-by-case basis, are beneficial to have integrated with OWAM, and to what degree (i.e., infrequent and one-way batch transfer of limited data, to online, real-time two-way transfer or synching of data).
G11	Mobile Technology	Water has deployed MOM to assist with data entry in the field. MOM satisfies many business gaps with innovative technology (e.g., Google Maps, Google View,	X				X	Customized solutions can increase the complexity of upgrades, create version compatibility issues, cause security issues, and lead to higher maintenance costs. It is	Modern EAM system mobile applications should be explored and compared with functionality built in-house or in a hybrid model, based on business requirements. Oracle's TOA mobile solution should be investigated and compared to long-term

Gap ID	Category	Current State Issue	W-D	W-P	W-R	WW-P	WW-C	Potential Impact	Potential Opportunity to Address Gap
		route optimization, integration with GIS and OWAM, work charged to work location). However, it is a customization that addresses business gaps that may be better addressed by commercial-off-the-shelf (COTS) software (e.g., use of route work orders and standing work orders, etc.).						also harder to stay on top of new hardware, telecommunications, operating systems, security issues, etc. and a raft of other issues that are typically handled routinely by the COTS vendor. Essentially it turns the City into a software developer. However, customized solutions can also be highly beneficial as they are fit for purpose, at least over the short term.	cost/benefit. Plan for the long-term blend between customization and COTS software, where customization supports any business gaps that cannot be delivered through COTS.

## Appendix A – Glossary

<b>Acronym/Term</b>	<b>Definition/Description</b>
<b>Asset Hierarchy</b>	multi-level parent/child relations for physical assets (eg, from asset portfolio at the highest level to components at the lowest level)
<b>BOM</b>	Bill of Materials
<b>BU</b>	Business Unit
<b>CBM</b>	Condition-based maintenance
<b>CMMS</b>	Computerized Maintenance Management System
<b>CoW</b>	City of Winnipeg
<b>CSR</b>	Customer Service Representative
<b>EAM</b>	Enterprise Asset Management
<b>EDMA</b>	an electronic document management system (was Hummingbird, with custom web interface; taken care of by Engineering)
<b>Failure Tree</b>	a visual record of a system that shows the logical relationships between events and causes that lead to failure
<b>FBM</b>	Failure-based maintenance
<b>GIS</b>	Geographic Information System
<b>HIS</b>	Hydrant Inspection System
<b>HSE</b>	Health Safety Environmental
<b>IIOT</b>	Industrial Internet of Things
<b>iView</b>	System used in conjunction with GIS to view maps
<b>Kana</b>	See <i>Verint</i>
<b>KPI</b>	Key Performance Indicator
<b>MOM</b>	Mobile Operations Management
<b>MS</b>	Microsoft (e.g., Microsoft Excel, Microsoft SharePoint, Microsoft Project)
<b>MSDS</b>	(Material) Safety Data Sheets
<b>O&amp;M</b>	Operate & Maintain
<b>OEM</b>	Original Equipment Operator
<b>OWAM</b>	Oracle Utilities Work and Asset Management
<b>PCA Code</b>	Problem, cause, and action codes
<b>PO</b>	Purchase Order
<b>RCA</b>	Root Cause Analysis
<b>Redline</b>	drawing a line that is coloured red on a separate layer of a map (e.g., showing where a route is, or a circle where an asset or work location is or should be)
<b>Renewal</b>	capital expenditure on replacement of an existing asset or component (e.g., replacing a roof as opposed to maintaining or repairing a roof)
<b>REPA</b>	A custom corporate budget system
<b>RFID</b>	Radio Frequency Identification
<b>SCADA</b>	Supervisory Control And Data Acquisition
<b>SLA</b>	Service Level Agreement
<b>SMS</b>	Sewer Management System
<b>SOP</b>	Standard Operating Procedure
<b>Special Tools</b>	Tools are assigned to a specific maintainer or operator; whereas special tools are reserved and taken from stores or rented for a limited time (e.g., calibration equipment, test equipment, large power tools, crane, lift)
<b>SR</b>	Service Request
<b>SWO</b>	Standing Work Order
<b>SWS</b>	Solid Waste Services
<b>TCO</b>	Total Cost of Ownership
<b>TKMS</b>	Older in-house developed permitting/work management system used by Public Works



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<b>Tombstone Data</b>	The standardized/descriptive data on assets
<b>UBM</b>	Use-based maintenance
<b>Verint</b>	Customer service system (formerly known as Kana)
<b>WO</b>	Work Order
<b>WR</b>	Work Request
<b>WS</b>	Water Services
<b>WWD</b>	Water and Waste Department
<b>WWS</b>	Wastewater Services

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## Appendix B – Custom Objects

Custom Objects	Status	Object Type	Comments
COW_AUTO_APPROVE_TIMESHEETS	VALID	PROCEDURE	Job Manager Batch # 25
COW_SA_WORKFLOW_ITEM	VALID	PROCEDURE	
COW_SERVICE_REQUEST_CALL_HIST	VALID	PROCEDURE	
COW_WAIF_SERVICE_REQUEST_INT	VALID	PROCEDURE	
WINN_ACCT_CONV_INTERFACE	VALID	PROCEDURE	
WINN_CALENDAR_RECORDS	VALID	PROCEDURE	
WINN_CATALOG_CONV_INTERFACE	VALID	PROCEDURE	
WINN_CHECK_PROCESS	VALID	PROCEDURE	
WINN_CREATE_ACCOUNT	VALID	PROCEDURE	
WINN_CREATEDAY_SCHED_TURNKEY	VALID	PROCEDURE	Job Manager Batch # 41
WINN_CREATEDAY_SCHED_TURNKEY_2	VALID	PROCEDURE	Job Manager Batch # 7
WINN_DELETE_DH_LOG	VALID	PROCEDURE	Job Manager Batch # 234
WINN_EXPENSE_CONV_INTERFACE	VALID	PROCEDURE	
WINN_INSERT_ACT_PERIOD_DATES	VALID	PROCEDURE	
WINN_INSERT_PAY_PERIOD_DATES	VALID	PROCEDURE	
WINN_INSERT_PERIOD_DATES	VALID	PROCEDURE	Job Manager Batch # 32
WINN_METRIC_NO_WATER_COUNT	VALID	PROCEDURE	
WINN_MONITOR_311CASE	VALID	PROCEDURE	Job Manager Batch # 274
WINN_NEXTAPP_SCHED_TURNKEY	VALID	PROCEDURE	Job Manager Batch # 49
WINN_REMOVE_311CASE	VALID	PROCEDURE	
WINN_SEND_MAIL	VALID	PROCEDURE	
WINN_UPDATE_TASK_PHASE	VALID	PROCEDURE	Job Manager Batch # 133
WINN_VEND_CONV_INTERFACE	VALID	PROCEDURE	
WINNADMIN_CREATE_SUPER_CREW	VALID	PROCEDURE	
WINNIPEG_LOAD_VENDOR	VALID	PROCEDURE	
WINNIPEG_WRITE_GL_FILES	VALID	PROCEDURE	
WINN_311_DATE_RANGE	VALID	TABLE	
WINN_ACCOUNT_CONVERSION	VALID	TABLE	
WINN_CALENDAR	VALID	TABLE	
WINN_CALENDAR_WEEK	VALID	TABLE	
WINN_CATALOG_CONVERSION	VALID	TABLE	
WINN_EXPENSE_CONVERSION	VALID	TABLE	
WINN_EXPIREDUSER	VALID	TABLE	
WINN_INTERFACE_PURCHASE_ORDER	VALID	TABLE	
WINN_INTERFACE_PURCHASE_ORDER1	VALID	TABLE	
WINN_JOB_MANAGER_LOG	VALID	TABLE	
WINN_PEOPLESOFT_ID	VALID	TABLE	
WINN_SCHEDULE_TURNKEY	VALID	TABLE	
WINN_STAGING_ASSET_METER	VALID	TABLE	
WINN_ASSET_NOTES_ACTIVITY	VALID	TRIGGER	
WINN_BI_INVOICE	VALID	TRIGGER	
WINN_BI_WORKFLOW_ITEM	VALID	TRIGGER	
WINN_SCHED_TURNKEY_AVAIL	VALID	TRIGGER	
WINN_TMP_SCHEDULER_COUNT	VALID	VIEW	

## Appendix C – WSTP Proposed KPIs

<b>Asset Data Record Improvement</b>	
<b>Leading</b>	<b>Lagging</b>
<p><b>SEWPCC: Total Asset Data Records Uploaded (%)</b></p> <p>= Num. of Asset Data Record Uploaded / Total Num. of Asset Data Records anticipated x 100%</p> <p>(measures completeness of register)</p>	<p><b>OWAM Asset Data Record (Audit)</b></p> <p>Semi-annual (twice per year) audit of Asset Data Record against requirements.</p> <p>(measures completeness and accuracy of register)</p>
<p><b>SEWPCC: Asset Data Records Uploaded in month</b></p> <p>= simple count.</p> <p>(Measures completeness of register)</p>	
<b>Schedule Control</b>	
<b>Leading</b>	<b>Lagging</b>
<p><b>Available hours scheduled / week (%)</b></p> <p>= Number of hours scheduled / Number of hours available x 100%</p>	<p><b>Schedule compliance / week (%)</b></p> <p>= scheduled WO Hours completed / WO Hours scheduled (per week) x 100%</p> <p>Or, where data on hours is not available or inaccurate</p> <p>= Number of scheduled WOs completed / Number of WOs scheduled (per week) x 100%</p> <p>(recommended in Maintenance Planning Manual , 2018) Note: Calculation based on hours is preferred.</p>
	<p><b>WOs completed per month</b></p> <p>= simple count</p>

## Planning Control

Leading	Lagging
<p><b>Planned Coverage / month (%)</b></p> <p>= Num. Planned WOs Completed / Num. of ALL WOs Completed (per month) x 100%</p> <p>(recommended in Maintenance Planning Manual , 2018)</p>	
<p><b>Planned Corrective Backlog (%)</b></p> <p>= Num. of Planned Corrective WOs moved from plan phase / Num. WOs approved in week x 100%</p> <p>(recommended in Maintenance Planning Manual , 2018)</p>	
<p><b>Maintenance Backlog (weeks)</b></p> <p>= Man Hours of Available Work / Total Weekly Man Hours' Capacity in the Maintenance Department</p>	
<p><b>Num. of Benchmarks in OWAM at month end (SEWPCC)</b></p> <p>= simple count</p>	
<p><b>Num. of WOs with Helpful Feedback / month</b></p> <p>= simple count</p>	

## Appendix D – 311 SLAs

<b>Water Services - 311 SLAs</b>	
<b>Service Request Type</b>	<b>SLA</b>
No Water	24 Calendar Hours
Turn On / Turn Off Watermain Renewal	24 Working Hours
Water Critical Customer Stakeholders List Request	2 Working Days
Hydrant Leaking	24 Working Hours
Hydrant Hit or Damaged	48 Calendar Hours
Hydrant Buried in Snow	5 Working Days
Hydrant Painting Required	30 Working Days
Hydrant Marker Required	30 Working Days
Check for Water Leak - Trickling	24 Calendar Hours
Check for Water Leak - Gushing	24 Calendar Hours
Dscoloured Water	24 Calendar Hours
Discoloured Water Inquiry	SR Closes automatically
Hose Lines	24 Working Hours
Poor Pressure	48 Calendar Hours
Standpipe/Bulk Water Station Concern	24 Calendar Hours
Water Tank Rental or Concern	24 Calendar Hours
Water Meter Leaking - Emergency	4 Calendar Hours

Water Meter Leaking - Non Emergency	12 Working Days
Water Meter Noisy	12 Working Days
Water Meter Damaged, Broken or Not Working	12 Working Days
Water Clean Up After Repairs	10 Working Days
Valve Box - Cover Missing	30 Working Days
Valve Box - Locate	30 Working Days
Valve Box - Damaged	60 Calendar Days
Valve Box - Adjust Height	60 Calendar Days
Service Box - Adjust Height	60 Calendar Days
Service Box - Damaged	60 Calendar Days
Service Box - Locate	30 Working Days
Life Preserver Missing/Box Damaged	24 Calendar Hours
Water Excavation - Dangerous	24 Calendar Hours
Turn Off Water - Repairs Emergency	4 Calendar Hours
Turn Off Water - Repairs NonEmergency	12 Working Days
Turn Off Water - Sprinkler Repairs	12 Working Days
Turn On Water - Repairs Complete	24 Calendar Hours
Turn On Water – Sprinkler Repairs Complete	24 Calendar Hours
Turn On Water - Payment Made	24 Calendar Hours
Water Information Request	2 Working Days

Water Notices Received Inquiry/Concern	2 Working Days
Water Staff Commendation/Complaint	7 Working Days
Watermain Cleaning Discoloured Water	1 Working Day
Watermain Cleaning Inquiries and Concerns	1 Working Day
Water Meter - Fix Water Meter By Pass	2 Working Days
Water Meter - Request for Additional Meters	2 Working Days
Water Meter - Request to Relocate Meter	2 Working Days

<b>Wastewater 311 SLAs</b>	
<b>Service Request Type</b>	<b>SLA</b>
Basement Flooding	4 Calendar Hours
Catch Basin Cover Ajar or Off	4 Calendar Hours
Catch Basin Cover Missing	4 Calendar Hours
Catch Basin Damaged - Back Lane	124 Calendar Days
Catch Basin Damaged - Front Street	124 Calendar Days
Catch Basin Frozen - Back Lane	24 Calendar Hours
Catch Basin Frozen - Front Street	24 Calendar Hours
Catch Basin Plugged - Back Lane	24 Calendar Hours
Catch Basin Plugged - Front Street	24 Calendar Hours
Manhole Damaged - Back Lane	124 Calendar Days

Manhole Damaged - Front Street	124 Calendar Days
Manhole Cover Missing	4 Calendar Hours
Manhole Cover Ajar or Off	4 Calendar Hours
Sewer Back Up - Clean Water	4 Calendar Hours
Sewer Back Up - Raw Sewage	4 Calendar Hours
Sewer Clean Up After Repairs	24 Calendar Hours
Sewer Excavation - Dangerous	24 Calendar Hours
Sewer Odour Inside Building	24 Calendar Hours
Sewer Odour Outside	24 Calendar Hours
Sewer Information Request	2 Business Days
Sewer Notices Received Inquiry/Concern	2 Business Days
Staff Commendation/Complaint	7 Business Days
Storm Retention Basin Dead Fish Concerns	4 Calendar Hours
Storm Retention Basin Vegetation Concerns	24 Calendar Hours
Storm Retention Basin Garbage Concerns	24 Calendar Hours
Storm Retention Basin Fountain Concerns	24 Calendar Hours
Storm Retention Basin Odour Concerns	24 Calendar Hours
Storm Retention Basin Beaver Muskrat Concerns	24 Calendar Hours
Storm Retention Basin High Water Concerns	24 Calendar Hours
Storm Retention Basin Information Request Concerns	2 Business Days



River Pollution Outfalls

4 Calendar Hours

## Appendix E – Sample KPIs

### **MATERIALS MANAGEMENT**

- Vendor performance (<1% variance)
- Supplier pricing (3 quotes on top 20% Pareto)
- For ABC classifications: Service level vs Inventory level/turns (A=93%, all=75%; turns>3)
- Obsolescence (<5%)
- Rush orders (<cost of inventorying)
- Procurement cost (per order/unit): blanket PO's, e-procurement

### **ASSETS**

- Availability (vs machine downtime) (>95%)
- Utilization (vs available but not used) (>95%)
- Reliability (eg. MTBF, MTTR) (0% var to spec)
- Performance (ie, efficiency) (>97% of spec)
- Quality of output (eg, scrap) (<3%)
- Total Cost of Ownership (ie, lifecycle cost) (<replacement PV; <industry/eng norm)

### **LABOUR**

- Utilization (ie, % productive vs non-value-added like wait time) (>75% wrench time)
- Performance (ie, % of standard/plan) (100%)
- Effectiveness (eg, % contracted, overtime, training, innovation, quality) (<5% O/T)
- Safety (injuries<2 per 200,000 maint hrs)

### **FINANCIAL/OVERALL**

- Cost/Unit for inventory, equipment/facility, people (maint < 10% of operating cost)
- Planned vs Budget vs Actual Costs (<5% var)
- Performance to Schedule (>90%)
- Cycle time (<3% var)
- "Customer" Satisfaction (eg, response time, backlog, compliance, satisfaction survey results) (>95%)
- Service Levels (<1% var from SLA targets)
- Cash conversion cycle (Inv+AR-AP days) (<0)