

Fayetteville Public Works Commission

July 2021



Work And Asset Management Needs Assessment  
**EXISTING CONDITIONS**

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# Overview

Fayetteville Public Works Commission (FPWC) hired Vendor on December 18, 2020 to facilitate an assessment of technology-agnostic asset management practices and enterprise use of Oracle Work and Asset Management (WAM v1.x). The goal of the assessment is to identify the elements of a successful enterprise asset management (EAM) technology implementation, which includes the following deliverables:

- **Existing Conditions:** This deliverable contains Vendor’s findings, based on workshops facilitated across FPWC’s business units; an evaluation of the documentation provided by FPWC; and a review of FPWC’s WAM v1 use.
- **Gaps and Recommendations:** This deliverable discusses the people, process and technology gaps identified from the existing conditions document development. It will also include recommendations to address the gaps between the current state and desired future state.
- **Requirements Matrix:** This deliverable is a Microsoft Excel file detailing the functional requirements identified throughout the assessment.
- **Implementation Plan:** This deliverable presents a roadmap to create the desired change at FPWC. The plan includes a description of a series of required projects along with cost and duration. All the projects and key activities are plotted on a high-level schedule.

This document is being delivered in multiple iterations. The first iteration includes the existing conditions, gaps and recommendations and the requirements traceability matrix. Subsequent iterations will be provided as outlined above. The second iteration includes the implementation plan.

# Section 1 – Existing Conditions

The existing conditions section was developed based on information provided by FPWC as part of a request for information (RFI) and workshops facilitated by Vendor. Vendor facilitated several workshops between February 8, 2021 and February 18, 2021, with additional follow-up meetings and information requests as needed. FPWC has 680 active employees and 604 active WAM v1 users.

Vendor met with FPWC employees from the following groups:

- Stakeholders
- Electrical Systems
  - Generation
  - Construction & Maintenance
- Electrical Support Services -Substations, Meters, Apparatus
- Electrical – Engineering
- Water Resources
  - Wastewater Treatment
  - Water Treatment
  - Engineering
  - Water Construction & Maintenance
  - Water Quality
  - Backflow Prevention
  - Wastewater Collection Maintenance
- Environmental Compliance
- Water Meters
- Inventory
- Finance – Accounting, Payroll, and Purchasing
- Corporate Services – Information Technologies and Corporate Development

In each workshop a series of topics were discussed:

- Overview of the department’s use of WAM v1
- Work and Asset Management Practices
- Supply Chain / Inventory / Purchasing
- Data Quality
- Integrations
- Reports and Dashboards

To understand the use of the current Oracle Utilities WAM v1 solution set, the Vendor Team held both functional and technical workshops. The goal of the functional workshops was to understand how each business unit leverages WAM v1 to support their needs, while the technical meetings explored how WAM v1 is interfaced with other business applications.

# Stakeholder Needs and Expectations

## Overview

Vendor led a stakeholder workshop to discuss their goals, challenges and objectives, and anticipated risks.

## Goals / Long Term Success

The attendees raised the following list as long-term success goals for the future EAM implementation:

- Establish a consistent, reliable condition assessment program linked to the EAM software through work orders. Users should be able to query and view condition assessment results through the EAM software.
- Leverage the data within the EAM to make prioritized, data-driven decisions to make the right investments at the right time about FPWC's asset infrastructure.
- Manage the lifecycle of assets from planning, design, construction, and maintenance.
- Automate adding the costs to work orders, making it easier for crews during field activities, thereby capturing costs real-time.
- Be able to close work orders easier.
- Integrate effectively with other key FPWC decision support systems.
- Manage the lifecycle of assets.
- Develop a maintainable EAM, only customizing as a last resort.
- Establish a paperless work lifecycle within the new EAM.
- Develop configurable, easy-to-use dashboards at all levels of the organization.

## Challenges

The attendees raised the following organizational challenges:

- The Water and Wastewater Divisions are challenged with balancing capital infrastructure investment requirements for rehabilitation and greenfield installations.
- Potential unwillingness to change business processes to work with the chosen EAM, which could lead to software customizations and workarounds.
- Prioritizing capital and maintenance costs based on the best value for FPWC is difficult to do across departments because there is not a singular investment strategy.
- Reporting is difficult from WAM v1.

## Risks

The attendees raised the following risks:

- Selecting an implementation vendor or systems integrator that does not have a reputation of developing simple, high-value EAM systems for utilities.
- Overcoming the frustrations with using EAM technology based on the current EAM.
- Developing a system that does not leverage industry best practices.

## Electrical Systems - Generation

Vendor led a workshop with key stakeholders within the Electric Generation (EG) department. Below is a summary of the workshop. EG users (referred to as users) use the following technologies within the plants: ABB Control System, Oracle WAM v1, Oracle EBS / Hyperion. The workshop focused on the use of WAM v1. There are 29 users with EG that use WAM v1.

### Overview

- WAM v1 timesheet functionality works well for users, although there is a desire to have the time entered in work orders transferred automatically to timesheets.
- Users have the appropriate access to the EAM they need to do their jobs.
- Users see all work orders from everyone in the entire Electric Division when interacting with the system. The users find it difficult to filter down to just EG work orders.
- Double-clicking on a button or box within the form makes users feel like they are navigating in circles.
- Users feel they did not have adequate input or training on the software when it was initially made available. Thus, EG feels the software is overly complicated. However, the users admit they did not know how to give feedback to the implementation vendor at the time effectively.

### Work and Asset Management Practices

- Equipment costs are not currently tracked on work orders, but the users would like to track equipment costs in the future. Some equipment is stored in a warehouse at the plant. If the equipment is checked out of the warehouse to be used, users expressed the amount of time the equipment is used is tracked in Oracle EBS.
- WAM v1 is used for some of EG's preventive maintenance (PM) work orders. Users would like all PMs setup and tracked in a new EAM system.
- EG does not track the type of maintenance performed throughout the plant. Notably, data does not exist on the amount or cost of reactive, corrective, preventive or predictive maintenance performed even though all of these maintenance types are performed.
- EG focuses on tracking actual work performed. EG does not plan, estimate, or schedule work in WAM v1.
- Operators do not use WAM v1. If an operator identifies work to be performed, the operator emails the supervisor. The supervisor evaluates the work requested and will direct a crew to go and service the asset. The supervisor will create a work order with WAM v1 manually in these cases.
- No mobile technology is used throughout the plant.
- Supervisors have developed tasks lists for operator activities that have to be completed during their regular 12-hour shifts. Standing work orders have been developed that lists the reoccurring tasks. Supervisor do not have to assign work to operators actively. Operators know what is expected of them during their shift because of the defined task list.
- For maintenance activities, supervisor assign work based on the craft required. When someone on the maintenance team needs a work order, the supervisor will create the work order for that individual or crew.
- EG does not currently have a condition-based maintenance program.
- Labor time is entered directly on WAM v1 work order. Supervisors evaluate the labor time on the timesheets each week in WAM v1.
- PM schedules are developed based on the equipment manufacturers' recommendations or based on runtime hours on each machine. Runtime hours are tracked by the control system and tracked in a separate MS Access database. The Access database is used to track runtime hours, outages, and megawatts produced to provide power generation and monthly reports. EG does not currently have a way to roll up their outages to identify systemic issues but would like the ability to do so.
- EG has an asset hierarchy and feels it is 85% accurate to their needs (See Appendix X).
- EG does not track Failure Modes & Effects Analysis (FMEA) methods on work orders. Occasionally, notes are used to track why equipment fails.
- EG does not track warranties but would like the ability to track warranties in the future.

## Supply Chain / Inventory / Purchasing

- EG has its own warehouse (BWG), which has \$2,000,000 of inventory in it.
- Users go to the warehouse first when materials are required.
- P-Cards are used by staff mainly for consumables. Users are typically able to get the necessary parts and materials from their warehouse.

## Data Quality

- The quality of the existing transaction data in WAM v1 is not worth migrating and it does not help EG manage the plant.
- EG asset inventory and hierarchy in WAM v1 are worth migrating.

## Integrations to WAM v1

- WAM v1:EBS Timesheets
- EBS:WAM v1 Labor Costs, Direct Charges

## Reports and Dashboards

- Users would like a dashboard that show the productivity of their assets and crews.
- The following forms / reports were provided that are required in a new system:
  - Monthly Equipment Inspection
  - Monthly Fire Extinguisher Inspection
  - Monthly Fire Extinguisher Inspection Gas Turbines / Steam Turbines Controls
  - Monthly Fire Extinguisher Inspection CT ST Alarm Sprinkler
  - Monthly Diesel Fire Pump / Electric Fire Pump / Jockey Fire Pump Inspection
  - Monthly First Aid Station Inspection
  - Monthly Eye Wash Safety Shower Inspection
  - Monthly Qualified Individual (QI) Exercise Log
  - Monthly Fire Hydrant / Post Indication Valve Inspection
  - Tank and Secondary Containment Structure Inspection Log
  - Monthly Ladder Inspection
  - Semi-Annual Inspection Checklist

## Electrical Systems - Construction & Maintenance

Vendor led a workshop with key stakeholders within the Electric Construction and Maintenance (ECM) department (0820), particularly construction schedulers and coordinators, and support services. Below is a summary outline of the existing conditions reported during the workshop, as well as observances seen within the WAM v1 application or through follow-up questions and answers provided by FPWC personnel. ECM employees (referred to as users) that use WAM v1 also use the following technologies: Schneider Designer, Oracle EBS, and Oracle Hyperion. The workshop focused on the use of WAM v1. There are 84 users with ECM that use WAM v1. ECM described the following existing conditions with WAM v1:

### Overview

- Users receive or find appropriate work orders relevant to ECM and have effective work arounds to accomplish necessary work.
- Timesheet functionality works well for most users, with entry occurring in WAM v1, although there is a desire to have the time entered in work orders transferred automatically to timesheets. The crews and supervisors usually enter time for crew members. Many employees use WAM v1's auto-timesheet feature against standing work orders, which means costs do not get charged to unique work orders or to assets.
- The GIS Schneider Designer solution integrated with WAM v1, supporting electrical design, meets the user's requirements.
- ECM is frustrated by financial constraints configured on their work orders, where coded fields of work category, class, and activity are used for driving account automation to reduce errors. These fields are typically used for reporting and now cannot be used as effectively, so the user is forced to enter relevant information in the description field or on sub-fields.
- Other frustrations include estimating cost inaccuracies, lack of reporting capabilities, and burdensome processes inside WAM v1 that distract from their daily work.

### Work and Asset Management Practices

- ECM's maintenance program is exclusively reactive. ECM's PM and predictive maintenance (PdM) is not being recorded in WAM v1. This could result in more frequent failures and higher costs than would be with a better defined and more proactive maintenance program. The group is interested in looking at setup of PMs for Transformers and Switches, which are currently maintained as needed on a weather conditions basis.
- ECM manually generates work orders as needed. The work class, work category, and activity drive the account string. This makes accounting easier, but coding work is hampered because the activity codes are sometimes too generic on reports to be helpful.
- ECM users find searching for work orders in WAM v1 by address is a challenge because the address is not always in the same standard format of spelling.
- WAM v1 service requests are generated from the CC&B:WAM v1 Interface. These service requests are inconsistent, and occasionally missing the customer information such as the contact's name and phone number. Inconsistent data entry makes the customer service experience for FPWC customers less personal.
- Labor time cannot be charged to a service request, so ECM is not fully tracking investigation time accurately. Of all ECM service requests, 20% are turned into work orders because a design is needed. In some cases, separate new work orders and work designs are created and not associated with the originating service request. As a result, ECM cannot effectively track the association between the service request and the work order.
- ECM work estimates are inaccurate because compatible unit (CU) estimates in WAM v1 are not accurate. Both internal and external labor rates are not kept up to date. The business process to manage CU costs is not consistently practiced.
- The actual costs for labor, in some cases, are inaccurate as much as three or four times the estimated cost. As a result, users are not able to compare actuals versus estimated costs. A possible contributing factor with actual costs being suspect to users is the way that overhead cost allocation is done, particularly as the amounts allocated fluctuate.

- A work order is created from a benchmark work order for an Interruption Report, intended initially to record emergencies. Not all Interruption Report work orders are for emergencies because this practice is seen as a workaround for the strict controls related to FERC Accounting.
- ECM users cannot effectively see the work backlog in WAM v1. A spreadsheet is kept outside of WAM v1 and used to manage the backlog.
- ECM work is not being prioritized in WAM v1, as shown by the lack of use of the work priority field on the work order task. The problem with this is all work appears in WAM v1 as the same priority.
- Crew and planner (re-labeled 'WO Owner' on the WAM v1 work order) are not required on a work order or task, so assigning ECM work is not being done effectively.
- Work orders are not being associated to projects in WAM v1. Currently there is no use of any software for project planning, making planning and scheduling difficult.
- Warranties are not tracked in WAM v1, so FPWC may not be getting value from all warranty coverages.
- Scheduling is handled via notes on the work order, regarding contractor vs. in-house, where supervisors and planners record a scheduled date via notes on the work order. ECM does not use the WAM v1 daily or weekly scheduling module because it is difficult to navigate between the work order module and scheduling module.
- ECM previously used Microsoft Project (MS Project) to schedule work. Crews do not consistently document status updates on work orders to support the ECM planning needs, so the planners and supervisors talk directly to crews to know the status. Project Management used MS Project with Gantt charts to schedule work but that was stopped. Planners would like to view project schedules.
- ECM users cannot see Contractor estimates or actuals in WAM v1. This is a problem because work needs to be set up at least four days ahead of time to arrange for utility "locate" requests by groups outside FPWC.
- The PM program is not set up for ECM in WAM v1, specifically for condition-based and time-based PMs for transformers and switches. Work is seasonally planned with the planning efforts taking place outside of WAM v1.
- ECM crews and supervisors use wireless laptops in their trucks.
- Many ECM jobs are tracked by the phase of work in WAM v1, which is helpful. The phase serves as an indicator to users' progress, using pre-configured terms (e.g., 'Ready to Schedule'). This information automatically populates in the work activity log for the work order, so a history of the phase changes is available.
- At times, ECM users have to 're-stake' work in WAM v1 if something changes compared to the estimates on active work order tasks. When a change to the design is done in the field, the active work order task record in WAM v1 cannot be changed, so a new work order task must be created to 're-stake' the job. Changing materials is a complicated process within the work order record.
- The CU reconciliation process to correct for changes in materials used on the ECM work order in WAM v1 is cumbersome, including the need to use a temporary stock code referred to as a 'dummy' stock code 9999999. Temporary stock codes are changed for the "as-built" information once the work is complete.
- Time entry for ECM unique work orders (rather than standing work orders) is problematic if various crews work on the same work order task. Every Monday, ECM users spend one to two hours getting time entry corrected for the previous week. This situation happens, for instance, when afterhours call-outs occur at night or over the weekend. ECM crew leaders usually enter the crew time, but for those call-outs the individual enters their own time. It is not user-friendly for multiple crews working on work orders to enter their timesheet. It must be hand-entered by a Crew leader.
- Overhead cost allocations are unpredictable month over month and make comparing estimates versus actuals questionable.
- The ECM Asset register in WAM v1 is incomplete.
- There are 387,000 Assets in WAM v1 for this group, likely all from GIS. The information on the Assets does not provide enough information to use for analysis or planning. The asset descriptions are generic because that is what is available in the GIS system. 200,000 of these Assets do indicate the Electric Circuit ID associated, which is used on electric work orders.
- Asset criticality, a numeric value for consequence of failure, is not designated on ECM assets in WAM v1.

- ECM asset management activities for budgeting replacement are stored on spreadsheets, but ECM would like to store the information in the EAM system.
- No work orders for ECM work are designated as Renewal work in WAM v1.
- Retirement of physical assets is rarely recorded in WAM v1, with only 605 Assets retired. Retirements are recorded by quantities within group or fixed assets.

### Supply Chain / Inventory / Purchasing

- ECM users go to the central stores warehouse first when materials are required for jobs.
- Purchasing Credit Cards (called “p-cards”) are used by ECM staff for consumable items, or if items needed are out of stock in FPWC warehouse. Users are typically able to get the necessary parts and materials from their warehouse.
- When ECM crews get ready to do the work, the inventory available is not easy to see. This is a problem because visibility between available materials compared to the design ensures efficient use of time. The availability is not known until the checkout of material is processed. Part of the issue is the time between design and when the pick-up of materials is completed.
- There are rolling warehouses for selected ECM items (e.g., Wire/Cable reels). The inventory process works well for these items.

### Data Quality

- Data on ECM assets condition assessments are stored in spreadsheets. 20+ years of data is available to migrate to the EAM system. ECM would like to keep condition-based information in EAM to use for budgeting replacements.
- Asset Record Types for ECM were ‘S’ at one point (which is now Sewer), and some ‘L’ at another point (which was for Linear assets). For Data Conversion, this should be addressed. For ECM assets, the asset type will start with ‘E’.

### Integrations to WAM v1

- WAM v1:GIS - working well. Using ArcFM for designing with GIS.
- CC&B:WAM v1 - C2M Upgrade in process, due to Go-Live 07/01/2021. Meters will exist in C2M.

### Reports and Dashboards

- The process of getting an ECM report designed and working (e.g., Backlog Report) is not working. Estimated man-hours on the Backlog report are needed. Report requests should be efficient and trackable.
- Material demand and availability is currently tracked in Excel. This information should be readily available within the EAM system and trustworthy.
- Condition assessment data is kept on Microsoft Excel spreadsheets.

### References

RFI Input

## Electrical Support Services – Substations, Meters, Apparatus

Vendor led a workshop with key stakeholders within the Electric Support Services (ESS) department (0821 and 0894), Electric CT Meters (0824), and Electric Apparatus (0823). Below is a summary outline of the existing conditions reported during the workshop, as well as observances seen within the WAM v1 application or through follow-up questions and answers provided by FPWC personnel. ESS employees that use the WAM v1 system also use the following technologies: DNV Cascade, and Oracle EBS. The workshop focused on the use of WAM v1. There are 13 ESS users, 5 EAS users, 5 ECTM users that use WAM v1. ESS described the following existing conditions with WAM v1:

### Overview

- For Substation work, ESS work is tracked in Cascade. The integration between Cascade and WAM v1 was broken when Cascade was upgraded. As such, ESS users do not use WAM v1 beyond timesheets and monthly standing work orders for miscellaneous cost tracking.

### Work and Asset Management Practices

- The ESS maintenance program is managed outside of WAM v1 in Cascade, with work scheduled on a spreadsheet.
- The ESS Substation group uses Cascade for predictive maintenance (PdM) and condition-based maintenance (CBM).
- ESS users use a mobile device for their substation inspections. A supervisory control and data acquisition (SCADA) system is used to monitor electric parameters within the substation, providing an audible alarm in some cases. All PMs are health monitoring, time-based on 2-year, 5-year, 10-year intervals. These timers are setup in Cascade.
- ESS work orders are created monthly in WAM v1 with four tasks as standing work orders primarily for charging time. Some materials and purchases are seen on these work orders.
- The Apparatus repair shop has one standing work order used for all costs.
- Similarly, the CT Metering shop has two standing work orders for all their related costs.
- ESS contractor work is not tracked in WAM v1.
- Asset Management ESS manages assets 'inside the fence' of the substations. There are 35 locations and thousands of assets within ESS management.
- The asset register in WAM v1 is incomplete since Cascade is used as the system of record (SOR) for substation assets.
- The ESS assets in WAM v1 are associated with the Distribution Substations (DSS), Industrial Substations (ISS), and Point of Delivery (POD) locations. There is some data in the WAM v1 asset register on the individual physical assets within these locations, but the accuracy is questionable because the integration between WAM v1 and Cascade is not working.
- Asset criticality, as the consequence of failure, is not being tracked in WAM v1.
- The procurement process for the replacement of ESS equipment is completed through EBS.
- ESS does not track warranties.
- Commercial and some residential metering is tracked via MWM. These are high current large meter accounts. The remainder of residential meters are tracked in CC&B.

### Supply Chain / Inventory / Purchasing

- ESS users go to the warehouse first when materials are required, yet most supplies are handled external to FPWC. Wire and cable are two items received from the warehouse.
- Substations use EBS for purchasing as well as p-cards.
- ESS does have direct purchases visibility in WAM v1 as costs, but these charges are posted via direct charges rather than purchase orders and invoices.

## Data Quality

- ESS Department is 0894, but work order records in WAM v1 are charged to Department 0821 and accounts with cost center 0170. This condition will likely be a problem for data conversion. Finance and accounting setup for ESS should be confirmed for readiness to convert data into the next generation EAM system.

## Integrations to WAM v1

- Cascade:WAM v1 - Cascade is integrated with WAM v1, but the integration broke when Cascade was upgraded.

## Reports and Dashboards

- No ESS reports are generated from WAM v1.
- ESS users use PowerDB to create reports.

## Electrical - Engineering

Vendor led a workshop with key stakeholders within the Electric Engineering (EE) department (0810). Below is a summary outline of the existing conditions reported during the workshop and observances seen within the WAM v1 application or through follow-up questions and answers provided by FPWC personnel. EE employees (referred to in this context as users) that use the Oracle WAM v1 System also use the following technologies: Oracle EBS, Oracle CC&B, UBB (old database for Customer Service read-only), Oracle BI Publisher, MS Excel, MS Word, and Dataloader. The workshop focused on the use of WAM v1. There are 22 Users in EE that use WAM v1. EE described the following existing conditions with WAM v1.

### Overview

- The primary concern of EE is that engineers are being forced to act and think like accountants.
- FPWC uses an activity-based costing method for tracking costs to selected activities, as well as for overhead cost allocations, both direct and indirect overhead allocations.
- The process of setting up and closing out work orders is driven by getting the financial accounting correct, rather than the best design and efficient execution of the work.
- A business process improvement is needed regarding accounting in WAM v1. The level of detail required is burdensome to EE.
- For example, compatible units (CU's) are too specific (e.g., size and material of pole), and an effort has been discussed to consolidate continuous property records (CPRs) to simplify processing in WAM v1 and reduce the burden to EE of understanding accounting in WAM v1.
- Likewise, overhead cost allocation fluctuates for similar work, from month to month, for both internal FPWC costs and contractor costs. The cost allocations are problematic because it makes tracking, explaining, and predicting costs very difficult.
- The process of creating and sharing EE staking sheets is complicated, because the work design staking sheet cannot be printed, and some staking sheets do not have the "to and from" information, which makes it hard to communicate how much wire and cable needs to be pulled for a particular job.
- Timesheet functionality works well for most users, with entry occurring in WAM v1, although there is a desire to have the time entered in work orders transferred automatically to timesheets. These entries are against standing work orders.

### Work and Asset Management Practices

- EE work orders are largely based on capital budgets, with constructed assets resulting.
- The typical workflow is as follows:
  - A WAM v1 work design is created by an electrical engineer based on a request for service installation, typically via a call into CC&B coordinators.
  - An electric systems analyst (ESA) reviews the design for proper usage code, verifying that a map image is attached and in agreement with work design usage codes. An electrical supervisor approves the work design.
  - On the work order and task, the work class, work category, and activity code are verified. This is a financial accounting requirement to automate the account string population on the WAM v1 work order and task.
  - For work orders over \$10,000, an email is sent to the warehouse manager in the warehouse.
  - Most work designs are converted into work orders, with around 5% of designs canceled.
  - Work engineered by EE done by contractors, makes up about 60-75% of all EE work.
  - Scheduling is currently done outside of WAM v1.
  - The staking sheets printed from WAM v1 work orders are not descriptive enough. For example, the "from" and "to" locations do not display, which is a gap in information for the crew pulling wire. The output report itself seems to be an issue since this is driven from the work design. This makes it difficult to convey information to operations.
  - When construction is complete, the construction job packets are returned from ECM, whereby the work order has a note entered "Rec'd from EC", with the office assistant's (OA) initials and dates. The

- OA then distributes the construction completed work orders to ESA to eventually finish the work order task in WAM v1. The excel spreadsheet is updated with the construction complete date.
- Material and labor charges are verified posted on the WAM v1 work order.
- The work order packet is received back from the GIS group, the packet is held until all overhead cost allocations and expense charges have posted and are visible in WAM v1. This usually takes four to six weeks. Once all the overhead costs are verified posted, the work order is ready to finish.
- Issues with the work order are addressed via an automated alert, resolved by the ESA.
- Specifically, for Interruption Reports (IR) work orders:
  - A determination is made whether the work is billable.
  - Work through an IR is recorded after the completion of work, so this process is sometimes over utilized for simplicity. In many cases, a work design is created for an IR.
- The EE geospatial information system (GIS) is the system of record for physical linear assets and an integration involving a third-party vendor (GeoNexus) keeps those GIS asset records synchronized with WAM v1's asset register. EBS is the system of record for fixed assets. GIS does not have fixed asset information and EBS does not track physical asset records. The construction work management process in WAM v1 results in fixed assets by unit quantity, within a group asset record, with additions and retirements. The unit quantities in WAM v1 do not match the physical asset quantities in GIS. Auditors were brought on site to FPWC to try to match the two quantities, but that effort was not completed.
- Warranties are not being tracked in WAM v1.

### Supply Chain / Inventory / Purchasing

- The demand for material is not accurately visible within WAM v1. There is a daily interface with EBS inventory.
- There is a directive from corporate development to do a better job of communicating demand for material. A material review committee was created, which is working.
- EE does negotiate and work directly with Contractors. One problem is estimating jobs, as previously mentioned, based on unpredictable overhead cost allocations.

### Data Quality

- The CPR's and usage codes on CU's are too granular and should be simplified before migration to the new EAM system.

### Integrations to EAM system

- Designer:WAM v1 - compatible units, labor, and material information from WAM v1.
- EBS:WAM v1 – Timesheets, Payroll costs, overhead cost allocations.
- CC&B:WAM v1 – EE Would like to improve the integration to include more complete customer data.
- Dataloader is used for WAM v1 update of construction asset dates and actions.

### Reports and Dashboards

- During the initial implementation, EE did not have enough time to get the reports where needed.
- EE report data is exported from Business Intelligence (BI) and edited as needed. Examples include:
  - Billable IRs when construction completed, and the work order is finished and closed.
  - Contractor invoices and payment status.
  - Contract status for completed area light work, which is used for billing via CC&B.
  - Installations of streetlights and area lights are sent to accounting monthly.
  - Work orders with no activity recorded within the last six months is reported monthly.
  - A CPR balance report is exported out of BIP every 3 months.
  - Monthly report for work performed by ESA completed in Microsoft Word - Payment Authorization created for Contractor Invoicing.
  - Service Requests and CC&B To-Dos by individual employee.
  - Estimated man-hours needed to complete work.
  - Work orders with work under construction.
  - Quantity of work orders during the calendar year.
  - Estimated value of work orders during the calendar year.
  - Monthly activity report during the calendar year.

## Water Resources Part 1 - Wastewater Treatment, Water Treatment, and Engineering

Vendor led a series of workshops with WAM v1 users and stakeholders within the Water Resources. Below is a summary of the existing conditions reported during the workshop with Wastewater Treatment; Water Treatment; Water Resources Facilities Maintenance and Engineering.

### Overview

- WAM v1 timesheet functionality works well for users. This process is cumbersome for plant staff, as they need to charge time to as many as 20 work orders in a given day. Additionally, they would like to require user's complete information on the work order before charging time to it, especially for corrective work. There is a desire to have the time entered in work orders transferred automatically to timesheets.
- It was noted that multiple assessments have been performed over the last decade, and there was a sense of frustration on the lack of impact these assessments have had.
- WAM v1 is used primarily for the purpose of timekeeping and for creating work orders.
- While work order creation occurs in WAM v1, distribution of work orders occurs via email using screenshots of the work order.
- It was agreed that the system could be more effectively utilized, particularly for the use of managing preventive maintenance (PM) work for water and wastewater.
- There is a desire to manage the PM work orders on locations rather than individual assets.
- Users indicated it is difficult to search for assets within WAM v1 and attribute this to the way parent-child relationships of assets are setup.
- WAM v1 is used for tracking the time spent to issue permits and the permits themselves are a paper process. FPWC is evaluating permitting solutions, specifically requirements.

### Work and Asset Management Practices

- Standing work orders are used for activities that are not asset or maintenance based, such as vehicle cleaning and tool organization. It is estimated that only 5-10% of time charged is against a standing work order.
- Emergency work is tracked using the work order status field.
- There is a desire to track equipment failure, but failure tracking is not currently in place. Ideally this would be a straightforward method of choosing the appropriate failure code.
- The treatment departments' operators do not use the work request module within WAM v1, but there is a standard operating procedure (SOP) in place that enables them to create a work order. This work order is screened by the plants' facilities coordinators before being submitted to supervisors for approval.
- Condition assessments are performed, but the resulting data is managed within third-party systems. Personnel and time spent performing the assessment is tracked separately on a WAM v1 work order.
- SCADA is not integrated with WAM v1, but there is a desire to use SCADA triggers to generate work.
- Corrective work orders are generated manually based on the results of the condition assessment reports. However, there is not a direct line of traceability from the preventive or predictive work orders to the corrective work order. There is an interest in having this traceability if it is a seamless and efficient process.
- Work scheduling is challenging within WAM v1, even more so since the pandemic as workers are not meeting at a central facility where paperwork orders can be distributed. Users indicated that scheduling is a significant pain point.
- Crews are dynamic in that an employee may be part of a five-person crew on one day, or a crew of one on another.
- Timesheets are entered in WAM v1 and labor costs are interfaced back to a work order from EBS.
- Prior to the WAM v1 implementation, Engineering used Primavera to manage construction and engineering documents. Microsoft Excel is being used to track schedules, payment, and everything else that used to be tracked in Primavera.
- Tactical asset management plans were developed by others for WRE. The plans were not reviewed as part of this assessment.

- There is a desire to use smart IDs (intelligent nomenclature) on assets. This is seen as an aid for searching for assets within the hierarchy. The number assigned to an asset automatically by WAM v1 does not have meaning for the users, and this makes it difficult to search for assets.
- Users would like to have the ability to add asset attributes, such as make, model, manufacturer, and warranty date within a single screen/user interface within WAM v1. Currently, this information must be entered across multiple screens within the system, making data entry inefficient.
- There are challenges with replacing an asset within the hierarchy. Users are not able to add a new asset to the same spot in the hierarchy as the asset that is being replaced.
- Currently, warranties are not tracked in WAM v1, but there is a strong desire to do so.
- Asset health and risk are not tracked in WAM v1 but are tracked for some linear assets in Info Asset Planner. There is a desire to track asset health and risk on vertical assets as well.
- Not all assets maintained by FPWC are in GIS or WAM v1, such as sewer laterals, even though users indicated that a majority of construction work is performed on these assets. There is no way to associate a linear asset once it has been added in GIS and synchronized with WAM v1 with a work order, after the work order has been closed. By the time an asset is added to the GIS through the as-built process and synchronized with WAM v1, it cannot be tied to a work order.
- There are new meters in the system that capture pressure, and there are plans to install more throughout the distribution system. Generating alerts to investigate changes in pressure is desired.

### Supply Chain / Inventory / Purchasing

- While there is an integration with EBS, users expressed frustration with the process of generating a purchase requisition in WAM v1 through the work order. When a requisition is submitted through WAM v1, the number does not match the EBS requisition number, so there is no common identifier. Due to frustration with this issue, users create purchase requisitions in EBS instead of WAM v1.
- Users would like the ability to see what purchases were made against a work order within WAM v1.
- Purchase orders are issued against blanket contracts in EBS. For example, special equipment needed for work is arranged directly with the vendor, with no warehouse interface.
- Users stated that they use very few supplies from the warehouse.
- The plants maintain a satellite warehouse with key components they need in the event of equipment failure.
- Formal inventory tracking is not a priority to these users, as they indicated that the informal system, they have is working for them and they resupply their materials and components when necessary.
- Users would like the work order associated to the purchases (e.g., vendor, material, quantity). Currently, purchase cost is all that is shown on the work order.

### Mobile Technology

- There is a strong desire to have operators create work orders from a mobile application. Operators and other users can only submit a work order in WAM v1 once they return to their computer.
- Wi-fi or cellular signal may not be available in all locations, such as lift stations. There is a need to have off-line mobile capabilities.

### Data Quality

- There is not as much confidence in the data in the asset register as there was in the past, as not all data was migrated from the legacy system to WAM v1.
- Users expressed that there are gaps in the available data, and that there may be a need to perform a data collection effort to have a complete asset register.
- Data from two legacy systems, Cityworks and WMIS (7 years of data), has been migrated to a staging database by others. The intent is to have this data ready to migrate to WAM v1. Users expressed confidence in this legacy data, indicating that it is more complete than data migrated to WAM v1.
- No work order history was migrated to WAM v1.

## Integrations

- The GIS integration with WAM v1 is facilitated through a third-party solution called Geonexus. This is a one-way interface from the GIS into WAM v1.
- Engineering users did not want a full two-way integration that would directly update the GIS. The preference was to use tools within a work management application, such as red lining, to communicate changes back to GIS editors.
- There is a desire from Engineering users to have a GIS-centric asset register that includes both linear and vertical (plant and facility) assets. Users had visited with other utilities for demonstrations of GIS-centric solutions.
- A GIS integration that enables the ability to create a work order by choosing an asset from a map for linear assets is required.
- A GIS integration that enables the ability to create a work order by navigating to an asset by selecting a vertical asset (facility) on a map is desired.
- A GIS integration that supports the mapping of work orders to a spatial location is required. Not being able to map the location of work order history is a pain point for users.
- An integration between GraniteNet and Info Asset Planner is strongly desired, but not presently in place. While the users indicated that this interface may negate the need to integrate with WAM v1, Vendor recommends linking GraniteNet CCTV inspections with the EAM software
- VTSCADA is used at the facilities, and capturing run times, pressure, and flow through an interface with the work management system is desired.
- The workshop participants shared a list of desired integrations and indicated that interfacing with these solutions is required. During the workshop, the business requirements, and details for each of these integrations was not discussed since integrations are covered in separate workshops.
  - ESRI
  - EBS:WAM v1
  - CC&B:WAM v1
  - GraniteXP
  - GraniteNET
  - SCADA
  - Innovyze InfoAsset Planner
  - Hydraulic Model
  - E-Mail Client
  - eBuilder
  - Microsoft SharePoint
  - Microsoft Teams

## Reports and Dashboards

- It is important for these departments to track the costs of maintaining assets. Preventive and corrective work is tracked at the asset level.
- In addition to tracking the cost of the asset, there is a desire to track the number of work orders to a specific craft so that management can understand the type of resources needed to meet plant staffing demands. A report for this metric existed in the past, and per the users it is either no longer in place or no longer functioning.
- The Sisense reporting and analytics initiative was driven by corporate development. Users indicated that there are not a lot of reports available to them through this system.
- Users said the following reports are helpful:
  - Preventive Maintenance Report
  - Open Corrective Work Order Report
  - Backlog Report
  - Summary Water Resources Construction Report

## Water Resources Part 2 – Water Construction and Maintenance, Water Quality, Backflow Prevention, and Wastewater Collection Maintenance

Vendor led a series of workshops with WAM v1 users and stakeholders within Water Resources. Below is a summary of the existing conditions reported during the workshop with Water Resources Construction and Maintenance and Environmental and Compliance Department (Water Quality and Backflow Prevention).

### Water Resources Construction and Maintenance

#### Overview

- WAM v1 timesheet functionality works well for users although there is a desire to have the time entered in work orders transferred automatically to timesheets.
- Work order searching within WAM v1 is a pain point because there is not a standard for how information is added within WAM v1 and users are not able to search by address for a work order. Addresses are not standardized or validated when they are entered as they are added to a user defined field, and not in the work order header.
- Searching in WAM v1 is challenging for users, as it requires the creation of complex queries. Users would like to be able to perform simple searches based on keywords.
- Some searches take 15 to 20 minutes to return results (e.g., pulling data in the project and sub-project). The work around is that users are not associating projects and sub-projects to their work orders.
- Users indicated that there are modules in WAM v1 that are not being used because they are not integrated with EBS.
- Document attachments are stored in a manner that does not allow users to append to the attachments without recreating it. The document attachment process also requires users to open multiple interfaces in WAM v1 to make a change. Moving forward, users want to be able to append or update the attachments through a single user interface throughout the lifecycle of that document.

#### Work and Asset Management Practices

- Service Requests:
  - Users are unable to track labor and material on a service request. This is because there is no financial integration with the service request module.
  - Users create a work order if they need to charge time and materials because of a service request.
  - Service requests that are investigative in nature with no additional action are charged to a standing work order.
  - FPWC staff or outside agencies may inform them of a potential issue. A work order, rather than a service request, is generated to respond to issues reported this way. The external requests may be logged in CC&B, but this is only when there is an address available.
  - There is a customer portal available on FPWC's website for reporting issues, but there is no granularity to the request type category.
  - There is an increasing requirement from executives to see detailed reporting on the type and source (e.g., citizens, other agencies, officials) of issues being submitted. The systems in place do not support the level of detail requested by stakeholders.
- Work Orders:
  - Setting up PM work orders requires the user to first create a benchmark work order which is then associated with a PM work order. The users indicated that this is a cumbersome process and would like the ability to setup PM work orders through a single module.
  - It is difficult for users to add codes to work orders. The codes are not filter by the work order or asset type, so there is a tendency to pick a code to complete the work order, rather than users picking the correct code.
  - Users indicated that work order templates should be configured to the type of work being performed.
  - Users in Construction and Maintenance track work as either reactive or scheduled as the action code on the work order. The plants use additional maintenance categories to track work.

- Technicians and crew leaders do not have the ability to create work orders. The stakeholders in Construction and Maintenance would like this to remain unchanged.
- Supervisors can create work orders. Stakeholders would also like supervisors to have the ability to create, schedule and assign work in the field.
- Work Design:
  - At the time of the WAM v1 implementation, users in Water Resource Engineering were discouraged from using compatible units (CUs) for work design.
  - The users would find it beneficial to have a templated approach for materials used on certain work activities, such as new construction, but would like this to be outside of the work design module.
- Scheduling:
  - Water construction does not schedule work within WAM v1.
  - Users indicated that a scheduling module should include Gantt chart functionality, identify crews assigned to work, and display work and crew location on a map.
  - The map would be used as a tool for dispatching crews (30-35 crews) based on the location of work.
  - There are no additional applications being used for scheduling work; it is entirely a paper process.
- Sewer main issues are tracked in a spreadsheet outside of WAM v1. Some issues identified require more than a point repair, and these are submitted to Water Resource Engineering for review via email.
- Sewer mains are inspected regularly, using both a CCTV inspection program and smoke testing program.
- Data from the smoke testing program is entered into spreadsheets.
- Job cost information is inconsistent due to the volatility of overhead costs. Overhead costs are recalculated monthly. Estimated costs for work orders rarely reflect or even approximate actual costs because of this reason.
- Users would like to capture vehicle and equipment costs directly on work orders rather than capturing these costs through an overhead allocation method.
- Users suggested using a project accounting approach in WAM v1 rather than applying overhead costs to work orders from EBS.
- Failure codes are utilized in WAM v1, and they are working towards exporting this information from WAM v1 to be used in Info Asset Planner.
- Tracking warranties against the asset would be valuable to the users in Construction and Maintenance.

### Supply Chain / Inventory / Purchasing

- Construction and Maintenance users said they are satisfied with the way materials are issued from the warehouse.
- Using WAM v1 for work order materials planning is not customary for this department and is attributed to the way in which WAM v1 is setup using benchmark work orders (material costs not up to date) and the reactive nature of some of the work.
- Planning material needs for new line construction would be very helpful moving forward. Adding materials to an items worksheet today is time consuming.

### Mobile Technology

- Users indicated there is a desire to schedule and assign work from a mobile application.
- Mobile technology should include a mapping component that displays work and crew location.
- Currently, some crews complete service requests and work orders in the field on a laptop, but generally crews complete paper work orders, and WAM v1 is updated based on the paper forms.

### Data Quality

- Not all legacy data was migrated to WAM v1 when it was implemented.
- There are two computers that have legacy data (Cityworks and WIMIS) that is used for state reporting.
- Migration of this data to WAM v1 to enable reporting will be performed by others.

### Integrations

- GIS integration with WAM v1 is a pain point.
  - GIS is integrated with WAM v1 using Geonexus middleware.

- The nightly interface between GIS and WAM v1 is insufficient as it is at least one business day lag between new assets added in GIS being available in WAM v1.
- When the interface goes down, it can take even longer than a business day. Users want to be able to create work orders on new assets immediately, so the interface needs to run more frequently than nightly batch.
- Retiring an asset in GIS that is on an active work order is a pain point for construction and finance personnel. When the asset status change is passed through the Geonex interface, it causes the WAM v1 work order to lock up, and the only known remedy is to create a new work order and transfer all the associated information to the new work order. Due diligence is done by emails to validate whether an asset is going to be retired, as there is not always a work order for asset(s) to be retired.
- This issue can also occur when a line segment is split, as a new asset is created and the old asset is deleted, leading to the loss of work history associated to the original asset.
- Users are unable to map work orders from WAM v1 in GIS through an automated interface. This must be done manually, especially for linear assets. As an example, main repairs are tracked by adding a fitting to the GIS so that the repair location can be identified. Ideally, users want to be able to select an asset on the map and view it's work history.
- The users indicated that visualization of water quality related calls and main breaks on maps would be valuable for reporting and analysis.
- With capital work orders, assets cannot be added once the task has been made active. This is a pain point since the assets are not created in GIS until after they have been installed based on the as-built. Moving forward, it is a requirement to be able to add assets to a work order after the work has been performed.
- Users would like to leverage single sign-on for GIS and WAM v1, rather than needing to sign into multiple applications.
- CCTV Program
  - Construction and Maintenance use CUES GraniteNet and GraniteXP for the video inspection of wastewater collection system mains.
  - GraniteXP is being sunset and legacy data will be migrated to GraniteNet.
  - There is a requirement to integrate the EAM with GraniteNet, or at least use the National Association of Sewer Service Companies (NASSCO) standard Pipeline Assessment Certification Program (PACP) fields consistently.
- Water and Wastewater Hydraulic Modeling
  - There is a desire to integrate hydraulic modeling and WAM v1. For example, pressure information for water and flow data from flow monitoring devices in the collection system to drive maintenance activities.

## Reports and Dashboards

- Reporting is a pain point because users are unable to report on data that they know is stored and maintained in WAM v1. Users indicated that this functionality is either turned off or not functioning properly.
- Spreadsheets are maintained by users outside of WAM v1 to support reporting functions.
- Reports used internally at FPWC include main break reports and flushing reports.
- Reporting is also required for cost recovery from the Federal Emergency Management Agency (FEMA) after natural disasters. This is a very time-consuming effort and requires outside help to assemble the proper reports. The overhead cost calculation contributes to the issue of generating the reports.
- There is a desire to see visual reports on maps for the location and frequency of water quality issues, such as discoloration, odor, and pressure complaints.
- Ideally users would like the ability to configure and run ad-hoc reports. This stems from challenges in requesting changes to existing reports and submitting requests for new reports. Users have not seen these requests come to fruition.

- Sanitary Sewer Overflow (SSO) reporting is a paper-based process. A report to automate the transfer of relevant work order data to reduce this time-consuming process is required. Over 40 reportable SSOs are experienced annually, and sometimes more because of hurricanes.
- A sanitary sewer main repair spreadsheet is maintained that tracks trouble areas, point repairs, and repair/rehabilitation projects. This spreadsheet is populated with information from WAM v1, GIS, and institutional knowledge of the sanitary sewer field staff.

## Environmental and Compliance Department

### Overview

- Water Quality Applications
  - The department uses a Laboratory Information Management System (LIMS) for sample management and other water quality functionality.
  - The LIMS is not interfaced with GIS or WAM v1.
  - WAM v1 is used by all department staff for timesheet functionality. Time is charged to a standing work order.
  - The department tracks sampling results on paper, then input the recorded results back in the office.
  - The department is looking at new, cloud-based LIMS solutions. The current system has been in place for 17 years, has not been upgraded, and has limited functionality. They are actively seeking bids through a procurement process.
  - There is a desire to move to a modern LIMS solution that provides a mobile application; inventory functionality; instrumentation calibration; and statistical modeling.
  - Construction and Maintenance tracks water sampling stations and auto flushers in WAM v1 and GIS.
  - The department informs Construction and Maintenance via phone or email if they suspect a maintenance issue with either sampling stations or auto flushers.
  - Water quality complaints are created through CC&B as a field activity and then in WAM v1 as service requests. These complaints can be queried in either CC&B or WAM v1.
    - Construction and Maintenance investigates the initial complaint. If no issue is detected, and the customer is not satisfied, the complaint is referred to Environmental and Compliance Laboratory staff and they will work with the customer on a resolution.
    - Users are unable to create a map of water quality complaints without going through a manual process of exporting data to spreadsheets and having GIS geocode the complaint locations.
    - Reporting is generated in Microsoft Excel by the lab, based on any complaints they addressed that were submitted to them by Construction and Maintenance via email.
    - Executive stakeholders would like a report that includes the type of complaint (e.g., taste, odor, color, and pressure), date, frequency, time spent, and location of complaints.
      - This report is difficult to generate since users are unable to charge time against service requests.
- Backflow Applications
  - The backflow protection program uses SwiftComply and Linko (Aquatic Informatics) is used for the industrial pretreatment program.
  - An outside vendor provides a mail service to facilitate the notification of customers when a backflow inspection is due.
  - An outside vendor enters private backflow inspection results (e.g., pass or fail) in a portal. All backflow inspections are performed by a single vendor, with the exception of industrial backflow devices.
  - Users of the SwiftComply and Linko system are satisfied with using those systems.
  - Facilities Maintenance uses a plumbing contractor if there are issues with backflow prevention devices on water service lines at lift stations.
- Fats, Oils and Grease (FOG) Applications

- The department oversees seven grease pumpers that are responsible for ensuring 800 restaurants and 300 grease traps. The grease pumpers are permitted by FPWC to be hired by the restaurants to attend to grease problems.
- The department historically used an in-house program for the tracking of FOG trouble spots and grease traps, but it became obsolete in 2017 with the implementation of SwiftComply XC2.
- Since permits are issued on paper, the expiration date is not tracked in XC2.
- When there is an issue with a grease producing customer, GIS staff provide support by producing the results of a utility network trace of customers that may be affected.
- Customer information updates such as new customers and name changes are imported weekly from CC&B into XC2.
- When inspections are performed by the CCTV crew and an issue or violation is identified, they email a report to the Environment System Protection Supervisor. This report is logged in XC2 for investigation by Environment System Protection staff.

## Water Meters

### Overview

- Note: the planned subject matter expert for this topic from FPWC was unable to attend. The notes below reflect input from Water Resources Engineering staff who were present during the workshop.
- Water meters are tracked in CC&B and MDM. The CC&B and MDM applications will be sunset, and the meters will be migrated to Oracle C2M. Go-live for this project is expected in July of 2021.
- There is a process whereby approximately 110,000 service points (a meter location) are exported from CC&B for mapping in the GIS. Since this is a one-way interface, any corrections to the address or location coordinates are not subsequently updated in CC&B.
- Addresses entered into CC&B should comply with emergency/911 standard addresses. When this is not the case, GIS is unable to produce a matching address location. GIS staff are working to clean up between 12,000 – 15,000 of the service point addresses that are not a match, and this is a manual process.
- Service points, but not meters, are captured in WAM v1 via an interface with CC&B.
- FPWC is deploying smart metering technologies that include the ability to track both temperature and pressure.

## Inventory

Vendor led a workshop with key stakeholders within the Inventory Management (IM) department (0370). Below is a summary outline of the existing conditions reported during the workshop and observances seen within the WAM v1 application or through follow-up questions and answers provided by FPWC personnel. IM employees (referred to as users) that use WAM v1 also use the following technologies: Oracle EBS, and Oracle Hyperion. The workshop focused on the use of WAM v1. There are 13 users with IM that use WAM v1. IM described the following existing conditions with WAM v1:

### Overview

- WAM v1 timesheet functionality works well for users although there is a desire to have the time entered in work orders transferred automatically to timesheets. IM users enter time in WAM v1 against a standing work order.
- Material demand and availability process is being reviewed for optimization.
- Managing material demand effectively in support of FPWC field work has been an issue of concern.
- CU estimates are not always accurate or kept current for material, labor and equipment cost estimates.
- Material on work designs use the average unit price (AUP) for that material (as seen on the WAM v1 storeroom record price), as the AUP is on that day. If the work design becomes a work order month in the future, the actual costs will be different compared to the old AUP. The estimate is static and not updated.
- To provide IM users more visibility into work demand and corresponding material availability to support that work, a new custom report has been deployed via SiSense whereby, as the work design is approved

and turned into a work order, the material demand is seen on the custom report. This report also provides visibility to IM users for work orders estimated to be greater than \$10,000.

- IM personnel manage wire conductors, the lighting program, surplus equipment, and the document storage program (archiving).

### Work and Asset Management Practices

- Overhead (OH) cost allocation is related to materials via indirect charges and direct charges are allocated by finance to all applicable work orders worked during a given month. There are no markup costs in the average unit cost of the materials on the storeroom record.
- Once a month, the applicable cost information is distributed from a general ledger (G/L) clearing account. This OH amount is calculated in WAM v1, using a "giver work order". A "giver work order" is a standing work order in WAM v1 that the ACCT users enter direct charges and cost adjustment charges in WAM v1 to allocate OH costs to individual work orders. OH costs are spread across on active work orders related to the actual Equipment, Labor and Material (ELM) charged during that month.
- Engineering costs are spread across all work order tasks, as indirect OH cost allocations.
- The warehouse has no assets, only parts and materials in support of the utility's functions.
- Warranties are not tracked in WAM v1.

### Supply Chain / Inventory / Purchasing

- Inventory resides in EBS and remains synchronized with WAM v1 using integrations. The integrations synchronize the catalog/item, storeroom record, on-hand quantities, and issued materials against work orders. Having inventory visibility in WAM v1 allows for a work cost estimate.
- FPWC made the decision, during the initial implementation of WAM v1 and EBS in 2012, to have EBS as the system of record for inventory and purchasing. The choice was to not manage inventory costs in WAM v1.
- Critical spare parts are not tracked in inventory. If critical spares are tracked, it is done at a department level. The substation department has areas where spare parts are stored, but there is not a systemic tracking of these items.
- No direct purchase items are maintained as a pre-purchasing record. For example, parts referenced in an original equipment manufacturer (OEM) manual for asset maintenance are not kept on the shelf in inventory but are rather ordered when needed. For example, the value of having this information available on a bill of material (BOM) is greatly reduced time to reorder a part not typically stored in-house.
- Electrical transformers are pre-capitalized, meaning capitalized prior to being placed in-service, upon receipt and do not have a visible cost in WAM v1.
- There are some "satellite" storerooms such as the Butler Warner Generation Plant (BWGP), which contains inventory managed by EG users in EBS. BWGP receives most of their inventory themselves, without the materials passing through central stores.
- FPWC utilizes the concept of "rolling" warehouses, which are managed as another organization in EBS with a defined location. IM manually transfers inventory to the rolling warehouses. IM issues tickets to relieve inventory. Rolling warehouses only issue cable and conductor items.
  - Pre-picking/Staging:
    - IM users have created areas within the warehouse to have materials pre-picked and staged for pick-up. This process has been pilot tested but this is not yet an active process.
  - Purchase Requisitions & PO's:
    - IM has established a task force for stores replenishment to evaluate blanket PO's (e.g., commodity contract purchasing). IM procurements require bids from suppliers/vendors.
    - Vending machines are setup in strategic locations around the FPWC and are available for specific inventory items. The vending machine process is working well, especially for after-hours access to parts, and IM believes the process can be extended to more locations and more items.
    - Replenishment of the vending machines happens via a 'blanket concept', whereby the material is charged to FPWC when the machines are regularly maintained. IM users are expected to charge consumables usage to an account, which defeats the purpose of blankets.

- The IM group handles all items that need to be disposed of, such as transformers and computers. Only items tagged with a blue tag and therefore valued at greater than \$5,000 are tracked in EBS. IT asset management has its own warehouse for procurement, accountability, and control.
- IM has just started their evaluation of mobile computing and bar coding related to the use of the inventory management module of EBS.

### Data Quality

- IM Users did not express any concerns about data migration.

### Integrations to WAM v1

- WAM v1:EBS – Stock checkout request
- EBS:WAM v1 – stock issues; quantity on hand; average unit pricing

### Reports and Dashboards

- IM uses spreadsheets for tracking and trending. All necessary data is exported out of EBS, such as:
  - Fiscal year trends - average increase over the inventory; lots of year-to-year comparisons.
  - Number of issues on a monthly basis.
  - Categories – e.g., all wood poles, steel poles, etc.

## Finance - Accounting, Payroll, and Purchasing

Vendor led a workshop with key stakeholders within the FPWC Finance (FIN) department, including Accounting (ACCT) (0410 & 0490), Payroll (PAY) (0411), and Purchasing (PURCH) (0475 & 0497) departments. Below is a summary outline of the existing conditions reported during the workshop and observances seen within the WAM v1 application or through follow-up questions and answers provided by FPWC personnel. FIN employees (referred to in this context as users) that use the Oracle WAM v1 System also use the following technologies: Oracle EBS, Oracle CC&B, Oracle BI Publisher, and Dataloader. The workshop focused on the use of WAM v1. There are 15 ACCT, 2 PAY, and 7 PURCH users within the FIN department that use WAM v1. FIN described the following existing conditions with WAM v1.

### Overview

- FPWC uses an activity-based costing (ABC) accounting methodology, sometimes referred to as job costing and/or FERC Accounting.
- FPWC decided to reconcile WAM v1 and EBS costs, as part of the initial implementation of WAM v1 and EBS in 2012. The rounding of currency values is slightly different between WAM v1 and EBS. To reconcile the systems for accuracy, there are often journal entries of pennies. Easing this burden on accounting is desired.
- One aspect of this is that the financial configuration of WAM v1 is setup to automate the selection of the accounting string related to the work order and task.
- Users believe that accounting in WAM v1 is too demanding and would like that relaxed going forward.
- A key element in FPWC financial accounting is direct and indirect overhead cost allocation.
- From the RFI input Overhead Allocation Transfer (WAM\_EXT\_49) - Overhead job costs at FPWC are allocated to each work order task depending on a pro-rated weightage basis. FPWC has a requirement to transfer actual job costs from one task to another task. WAM v1 is designed to transfer these costs but does not transfer associated overhead costs through this process. This may lead to an understated asset value when assets are capitalized. To fill this functional gap, an extension was required to transfer overhead costs when actual job costs are transferred.
- In WAM v1, there is a "giver/receiver" concept (user terminology) to help calculate the proper overhead cost allocation. There are eight giver work orders and a random number of receiver work orders during any month. The reason for this approach is to make sure that the correct amount of overhead is distributed.
- Once per month, the applicable cost information is distributed from an EBS general ledger (G/L) clearing account. This overhead amount is captured in WAM v1 on a "giver work order", which is a standing work

order. There are eight “giver work orders” each month used to enter in the overhead amounts across the departments. Without this process, there is a surplus in the clearing account.

- ACCT users enter direct charges and cost adjustment charges in WAM v1 to allocate overhead costs to individual work orders. Overhead costs are spread across active work orders related to the actuals (e.g., equipment, labor, and material) charged during that month.
- The direct overhead allocation is recorded on the receiver work orders so that asset capitalization costs are captured.
- Engineering costs are spread across all work order tasks, as indirect overhead cost allocations.
- There is a concern with job costs related to overhead cost allocation. Specifically, with overhead cost allocation including vehicle overhead, the belief is that vehicle and equipment rates cannot be entered into WAM v1 for a specific work order. The amount for vehicles and equipment is already factored into the overhead cost allocations. The desire is to use FEMA rates, assigned to each vehicle individually. WAM v1 allows for this setup, but the overhead cost allocation would have to be modified to allow for this.
- Overhead is entered by FIN users into WAM v1 to all applicable work orders worked during a given month, related to equipment, labor and material.
- For billable work, overhead cost allocation is calculated manually to ensure that the amount is fair and accurate. FPWC is a not-for-profit agency, and the overhead allocation is only for the cost of service.

### Work and Asset Management Practices

- The daily work order closeout process in WAM v1 is completed every evening. As part of daily work order closeout, FPWC has an automated process to post direct charges and cost adjustments in WAM v1.
- The monthly work order closeout allocates the overhead costs, mentioned above. Before beginning the monthly overhead and close processes, the error logs for all the prior evenings batches are reviewed. If errors exist, the errors must be resolved and cleared prior to beginning.
- WAM v1 timesheet functionality works well for users although there is a desire to have the time entered in work orders transferred automatically to timesheets. Finance users charge their time to standing work orders. Timesheets are entered in WAM v1 and Labor costs are interfaced back from EBS.
  - WAM v1 allows for supervisors to enter the time for the entire crew, which is seen as a strong benefit to entering labor time in WAM v1.
  - Each week the payroll representative exports all timesheets and manually reviews and corrects any timesheet errors (e.g., overtime improperly recorded).
  - Each timesheet must show 40 hours, for non-exempt employees. There were no validation controls configured for timesheet rules when WAM v1 was originally implemented.
  - For Employees out on worker's compensation, there is a separate fund apart from regular salaries. For those who are on worker's compensation, timesheets are not created or submitted. There is a need to track when an employee has been on worker's compensation. There are no pay codes to generate a timesheet. It should not be payroll since the source for the pay is from outside of the salary fund.
- Water Resources Construction constitutes both water and sewer construction. Water is department (0620), and Sewer is department (0621). Occasionally, a cost needs to be split equally across both departments. When this happens, a transaction fails upon interface attempt into WAM v1 from EBS and must be manually reconciled.
- There has been a lot of re-work needed on IRs since 2018, as the IRs are used for more than just true interruptions. The re-work is related to controls circumvented by creating an emergency work order, designed to allow quick entry, that is not truly an emergency.
- Fixed assets in groups are tracked in EBS. WAM v1 work orders at FPWC are used in many cases for capital work to construct assets. WAM v1 has the concept of continuing property records (CPR's), and there is a custom FPWC CPR repository table within the WAM v1 database. Prior to implementing WAM v1, the concept of the CPR repository existed, and the repository of units of groups of fixed assets has always been different from the asset registry of physical assets. The CPR unit count does not match physical asset quantities, as seen in GIS for example.

- An interface adjustment brings over cost adjustments from the WAM v1 staging table as a journal import. These are highly customized processes.
- Summary level costs are used. All costs in WAM v1 are from EBS. Then it goes back to EBS. There is a process in WAM v1 that trues up costs first.

### Supply Chain / Inventory / Purchasing

- Inventory accuracies and visibility related to CU estimates and job designs have been an identified issue. See the Inventory section for further details.
- The purchase requisition process is solely in EBS. While WAM v1 can generate a requisition and associate to a purchase order and invoice, the actual costs against a work order are posted by using a direct charge (DCs) record. These DCs are imported via data loader.
- Occasionally there are failed transactions, where the wrong WAM v1 work order number is associated on the EBS PO. There are no controls in place for the validation of these purchasing transactions.

### Data Quality

- CUs are not up to date and should be verified before migration.
  - The accuracies of labor rate values on CU's should be verified.
  - Any changes made in WAM v1 for Usage codes on CUs need to be replicated in Designer as well.
  - The electric engineering group wants to group CU's and simplify CPRs and usage codes on CU's.

### Integrations to EAM

- Hyperion:EBS
- EBS:WAM v1

### Reports and Dashboards

- FERC Reporting is provided as Business Intelligence Publisher (BIP) reports. The data is derived from WAM v1 and EBS. Examples:
  - WAM\_EBS Close Verification Report
  - WAM-EBS FA Data Transfer Report
  - WAM-EBS GL Data Transfer Report
  - CPR Balance Report
  - WAM Overhead Report
  - Capital WO with Maintenance FERC Assignments
  - Maintenance WO with Capital FERC Assignments
  - Asset Depreciation Summary (By FERC)

### References

- RFI input
  - FPWC Interfaces\_DOC with Clsg Proc IncdRev 9.9.19.pptx
  - Revised WAM Two Day Processes for WO Close 2.15.21.doc

## Corporate Services – Information Technologies and Corporate Development

Vendor led a workshop with key stakeholders within the FPWC Corporate Services Division Information Systems/Technologies (IT) (0380) department and the Corporate Development (CD) (0360) department. Below is a summary outline of the existing conditions reported during the workshop, as well as observances seen within the WAM v1 application or through follow-up questions and answers provided by FPWC personnel. IT and CD employees (referred to in this context as users) that use the Oracle WAM v1 System also use the following technologies: Oracle EBS, Oracle CC&B, Oracle BI Publisher, and Dataloader. The workshop focused on the use of WAM v1. There are 33 IT users and 20 CD users that use WAM v1. IT and CD described the following existing conditions with WAM v1.

### Overview

- WAM v1 timesheet functionality works well for users, although there is a desire to have the time entered in work orders transferred automatically to timesheets. Many IT and CD users charge their time to standing work orders and use auto-timesheet generation.
- Legacy systems were highly customized.
- A couple of important concerns are that application security is not setup properly.
  - There are clear text passwords or base 64 which is easily identifiable.
  - Single sign-on (SSO) integration is not in place.
- A fundamental principle within IT and CD is to support business applications and to manage applications through configuration, avoiding customizations of said applications. Customizations are highly discouraged, yet WAM v1 was implemented with many custom elements, such as triggers.
- Versions are outdated.
- Data governance has been an issue in the setup and support of the WAM v1 application. Codes usually used for business groups to codify work orders are used to drive accounting automation.
- Some of the versions of FPWC software applications are obsolete and must be upgraded, including WAM v1.
- No single system out-of-the box will satisfy all FPWC users.

### Work and Asset Management Practices

- Timekeeping is entered in WAM v1 and is working well.
- Enterprise mobile computing is not being used but is desirable for scheduling and routing.
- The primary function of IT is to host and support software application environments.
- IT's desire is to move to software as a service (SaaS), which represent cost savings in acquisition and fewer resources needed to maintain the servers and applications.
- An example of existing projects to implement SaaS is the upgrade of CC&B/MDM to C2M, including OIC.
- One desired feature of the SaaS model is the ability to clone environments for development and testing.
- IT would like a best practice recommendation for the industry standard on managing change requests.
- IT is identifying systems that represent gaps in the FPWC environment stack.
- IT is also engaged in backup and recovery strategies and tactics, along with environment refresh planning and execution.
- An outage strategy and a disaster recovery plan exist for the on-premise applications and one is being developed for SaaS (e.g., C2M and OIC). There are performance service level agreements (SLA) in place.
- In 2012 FPWC implemented WAM v1 and CC&B together. Upgrading to cloud applications is seen as optimization, rather than as a new solution.
- The FPWC is looking at optimizing business processes, with focus currently on supply chain management.
- Mobile computing is an on-going effort. In some cases, having store-and-forward may be worth looking into, including the price differences and capabilities.
- There is a requirement for schedule routing for craft and geographical location.
- The mobile computing state and requirements should be a separate conversation with the business groups.

## Data Quality

- Data governance and oversight should be evaluated. Codes exist that are not used. There is a work class code of EENG for Electrical Engineering, for example, which is not used on any work orders and alludes to capital work while there is another work class code of ECAPITAL, which is used. Another example is asset type codes with no assets using that type code.

## Integrations within WAM v1 (from:to)

- WAM v1:EBS
  - Timesheets from WAM v1 into Oracle Time and labor (OTL).
  - There is an EBS HCM (Human Capital Management) project kicking off. As such FPWC is having an assessment of EBS. That project is set to kick off soon with current version of EBS being 12.1.3. The current available version is 12.2.7. One consideration for the assessment is whether the cloud version, Fusion ERP may be chosen by FPWC for target upgrade. Cloud computing is a stated goal, wherever possible and within reason.
- GIS:WAM v1
  - FPWC is in the process of upgrading from ArcGIS 10.2.1. to ArcGIS 10.6.1.
  - FPWC is also implementing ArcGIS Online (AGOL), the ArcGIS Web Adaptor and ArcGIS Server. The projected go-live was the end of February 2021.
  - In conjunction with ArcGIS, FPWC also uses Schneider Electric ArcFM. They are migrating to ArcFM version 10.6.1 B.
  - The Water and Electric Divisions are the same version of ArcGIS but use separate instances.
  - Geonexus GeoWorksSync and GeoWorksOffice are currently in place. Business users requested that middleware is not used to synchronize GIS and EAM asset registers in the future.
- CC&B:WAM v1 – CC&B and MDM being replaced by C2M (IaaS). The planned go-live for C2M is July 2021.
- For testing, FPWC has begun using Oracle Utilities Testing Application (OUTA).
- Microsoft Azure is used for versioning control for the user acceptance testing (UAT) environment. This is a SaaS model.

## Reports and Dashboards

- Users are unable to see the productivity of their assets and crews.
- During the Navigate project 400 documents (e.g., reports) were listed as required yet only 40 reports were created. That was across the Oracle suite of products using Oracle business intelligence enterprise edition (OBIEE). Oracle business intelligence publisher is used effectively, and the intention is to continue its use, even with SiSense in place.
- FPWC implemented SiSense as the enterprise data analytics program and is gradually working through case studies.
- Many reports are new requirements since the original implementation of WAM v1 in 2012.
- Custom work order packages are seen as custom reports.

## Integrations – WAM v1 <=> Related Interfaces

Vendor led workshops with key stakeholders within the IT department and business units to discuss existing integrations related to WAM v1. Below is a summary outline of the existing conditions reported during the workshop; observations seen within the WAM v1 application; and follow-up discussions with FPWC personnel.

Information depicted in each of the figures below is based on a Microsoft Visio file submitted by FPWC, in response to Vendor’s request for information. Modifications in the figures are for graphical purposes and all interfaces are shown as provided by FPWC in OAR Architectural Diagram v1 from FPWC.vsd.

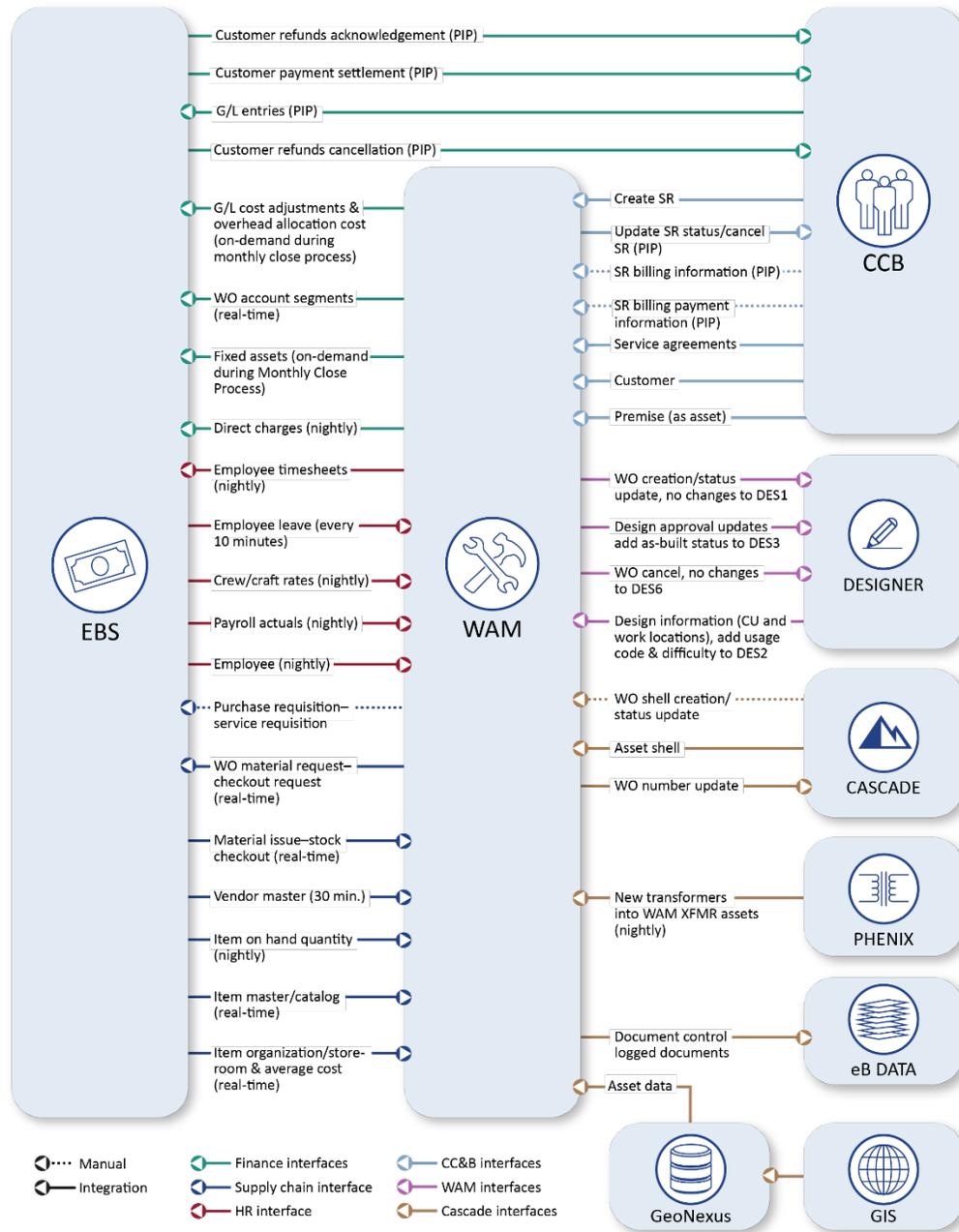


Figure 1: System Context Diagram (current)

The remainder of this section will describe existing details discussed related to each of the following WAM v1 related interfaces:

- Finance
- Supply Chain
- Human Resources
- Customer Care and Billing
- GIS
- Cascade

## Finance Interfaces

### EBS Finance <:> WAM v1 Interfaces

Oracle E-Business Suite (EBS) plays an important role and serves as the system of record for key enterprise data including financial, purchasing, human resources information, and fixed assets. Data is shared between EBS and WAM v1 to support various business and operational functions.

The following graphic depicts the finance-related integrations between EBS and WAM v1. Directional arrows signify the flow of information.

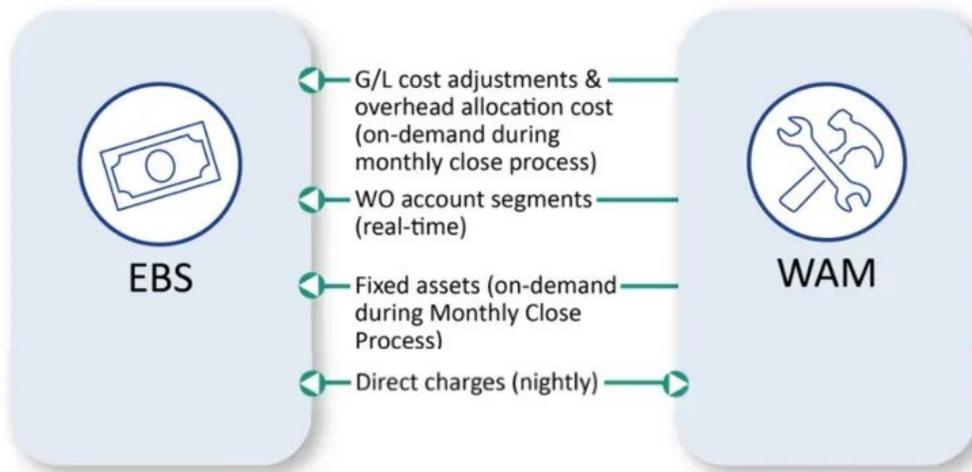


Figure 2: Current EBS Finance <:> WAM v1 Interfaces

There are three finance-related interfaces between WAM v1 and EBS. Details of the integrations are listed below:

- The G/L cost adjustment interface provides cost information related to asset maintenance and work activities to EBS.
  - This interface is executed manually during the monthly close process. Account codes are associated with each task in WAM v1.
  - Accounts are associated with the various work type of each department.
  - Some costs are split equally between Water and Sewer cost centers during posting of costs to EBS. This requires a manual cost adjustment to split costs in WAM v1.
  - Direct charges sent from EBS to WAM v1 are reconciled to the penny. This is done to clear the construction work in progress account (CWIP).
  - When the work order is closed, costs are officially allocated to the asset.
- Work order account segments interface passes information from WAM v1 to EBS in real-time.
  - Of the nine account segments, six are sent back to EBS from WAM v1.
  - Budget and FERC are mapped when a work order is created.
  - Once the account details are added to the work order, the work order can be activated.
  - All employees are coded in the system as 0620 for Water and 0621 for Sewer for labor costs.

- Fixed assets interface is executed manually during the monthly close process.
  - Fixed assets are entered and maintained in EBS, with WAM v1 providing information about unit quantities of additions and retirements within a group (e.g., poles).
  - EBS does not maintain physical assets.
  - WAM v1 is the asset register for both vertical/plant and horizontal/distributed/linear assets.
  - The ESRI GIS databases for Electric and Water are the system of record for linear assets.
  - WAM v1 receives additions and retirements of linear assets through nightly batch synchronization.

## Challenges

It was noted that, generally, the existing integrations work well with the following exceptions:

- All costs sent from WAM v1 to EBS must be reconciled back in WAM v1.
  - Some transactions coming back from EBS to WAM v1 fail. An example of a failed transaction is when the account string is incorrect, which can happen when a purchase is made against a work order, but the account string is not validated in EBS. This is where the purchase requisition interface would help. Another example that may cause a failed transaction is when the WAM v1 work order is closed.
- There are about 20 required manual adjustments per month for Water department personnel who work on sewer work orders, and Sewer department personnel that work on water work orders.
  - If SOA is down, transactions will fail.
  - The need for corrections is significantly impactful.
  - The user is required to manually select the work class, work category, and budget code and make-up the account information sent to EBS.
- The user is required to manually select the work class, work category, and budget code and make-up the account information sent to EBS.

## Supply Chain Interfaces

### EBS Supply Chain <:> WAM v1 Interfaces

Materials are purchased and maintained in EBS. Information related to materials use and stock checkout requests are exchanged between EBS and WAM v1 in real-time. Materials master, storeroom, and inventory data are shared between EBS and WAM v1 via WAM v1 Web Services. Updates are performed in real-time as well as batched with frequencies of 30-minutes to nightly.

The following graphic depicts the supply chain-related integrations between EBS and WAM v1. Directional arrows signify the flow of information.

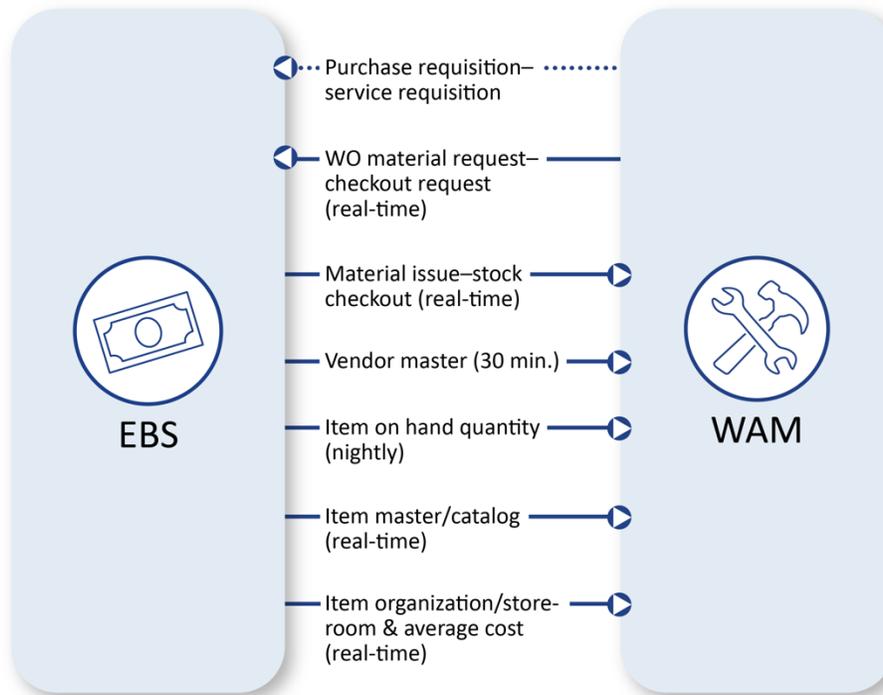


Figure 3: Current EBS Supply Chain <=> WAM v1 Interfaces

There are seven supply chain-related interfaces between WAM v1 and EBS. Details of the integrations are listed below:

- Purchase requisition-service requisition interface was intended but was never implemented.
  - The ability to plan parts and generate a purchase requisition from the work order is still desired.
  - Purchasing information comes back in to WAM v1 via direct charges interface (see *Figure 2: Current WAM v1 - EBS Finance Interfaces* in previous section).
- WO Material requisition checkout request interface updates are executed in real-time.
- Material issue-stock checkout interface updates are executed in real-time.
- Vendor master interface updates are executed in real-time.
- Item on hand quantity interface updates are executed nightly.
- Item master/catalog interface updates are executed in real-time.
  - Serialized items and EBS:
    - Transformers are assets in WAM v1. There are 40,000 transformer assets in WAM v1, of which 2500 are retired.
    - Transformers are pre-capitalized which means that issuing transformers is done at zero cost to the work order.
    - Meters are not stored in WAMv1 currently, but rather in CC&B.
- Item organization/storeroom interface updates are executed in real-time.

### Challenges

It was noted that, generally, the existing integrations work well with the following exceptions:

- Material demand against future work orders is problematic.
  - Material estimates are established for jobs associated with work orders that remain open over an extended period of time.
  - An initiative is underway to improve the forecast for materials, including the use of a custom report in SiSense.
- The Purchase Requisition interface was never implemented.

## HR / Timekeeping

### EBS HR & Timekeeping <=> WAM v1 Interfaces

EBS is the system of record for employee time keeping and employee labor rates.

The following graphic depicts the HR and timekeeping-related integrations between EBS and WAM v1. Directional arrows signify the flow of information:

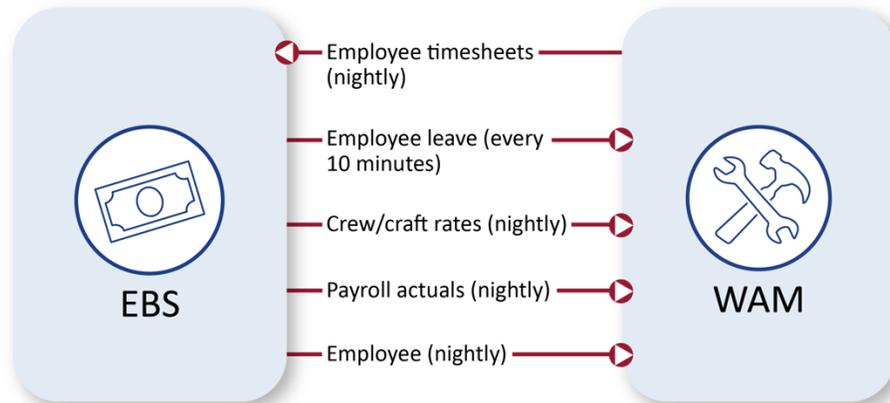


Figure 4: Current EBS HR & Timekeeping <=> WAM v1 Interfaces

There are five HR and timekeeping interfaces between WAM v1 and EBS. Details of the integrations are listed below:

- Employee timesheets integration passes timesheet data from WAM v1 to EBS in a nightly batch.
  - All labor timesheet entries reference work orders.
  - Standing work orders are used for time-entry for non-maintenance/non-construction activities.
  - Crew leaders enter their crew member's timesheets.
  - Crews are made up of employees of various crafts and controlled in WAM v1.
  - The WAM v1 auto-time sheet feature is used by 276 employees. This feature creates a timesheet automatically, 2 weeks in advance of the timesheet pay period, and is used when employees perform the same task routinely (e.g., standing work orders).
- Employee leave integration executes every ten minutes.
  - Leave and holidays are seen on WAM v1 timesheets because of an interface from EBS to WAM v1. All FPWC employees enter their leave request in EBS. Once the supervisor approves the leave request it is interfaced to WAM v1 and a timesheet entry is created against a personal time off (PTO) code.
- Crew/craft rates integration information is passed as a nightly batch.
  - Burdened costs are updated in WAM v1 nightly.
- Payroll actuals integration data is passed as a nightly batch.
- Employee integration data is passed as a nightly batch.
  - Information for new, updated, or deactivated employees is updated in WAM v1 nightly.
  - Employees benefits are built into the rates.

### Challenges

It was noted that, generally, the existing integrations work well with the following exceptions:

- WAM v1 is not configured to enforce all EBS Payroll rules. An employee can enter on their WAM v1 timesheet, for example, more than 40 hours in error without systematic correction or user alert, requiring effort to correct.

## CIS (CCB current – upgrading to C2M)

### WAM v1 <:> CCB Interface

CCB is Oracle's customer care and billing application and is the system of record for customer information and billing.

The following graphic depicts the customer care and billing-related integrations between EBS and WAM v1. Directional arrows signify the flow of information.

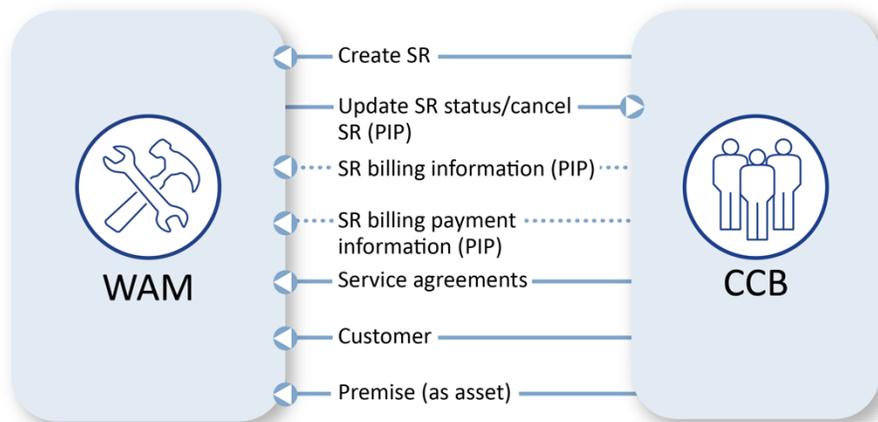


Figure 5: Current WAM v1 <:> CCB Interface

There are seven customer care and billing interfaces between WAM v1 and CCB. Details of these integrations are listed below:

- SR interface creates a work request in WAM v1 when a service request is created in CCB.
  - Requests for service are initiated in CCB as field activities (FAs), some of which interface to WAM v1 while the remainder are worked in Mobile Workforce Management (MWM).
  - The CCB to WAM v1 integration creates and updates service requests (SRs) in WAM utilizing the Oracle field work process integration packet (FW PIP).
  - A CIS customer service representative generates requests as Field App in CCB. There are 20 to 30 different types of SR's in WAM v1 that map to CC&B FAs. Work orders generated in WAM are fed back to CCB.
  - Data passed to WAM v1 from CCB include SR status and associated comments.
- Update SR status/cancel SR (PIP) interface
  - Some SRs are worked quickly and closed.
  - Subsequent work orders created from those service requests trigger information passing back to CCB. Meter activities are managed between CCB and MWM.
- SR billing information (PIP) interface executes every twenty (20) minutes.
- SR billing payment information (PIP) interface executes every five minutes.
- Customer interface
  - For customer information to be viewable and referenceable in WAM v1, there are point-to-point integrations between CCB and WAM v1 for customer, premise (asset), and service agreement.
  - Customer information integration is a problem, where the customer status is not updated in WAM v1.
  - All customer records (nearly 300,000) in WAM v1 are in an active status.
- Premise (as asset) interface
  - There are customer premise addresses and service points that are interfaced to WAM v1 as assets, and service agreements are viewable in WAM v1 on the customer record.

- Based on the existence of the customer and premise records already interfaced to WAM v1, CC&B sends its Field Application to WAM v1 as SRs via SOA and the field work PIP.

#### Related Integration Discoveries:

- CCB is currently the system of record for meters.
- Business rules such as the Web Services Gateway in WAM v1 impact the data handling.
- A database link is also used with this integration.
- WAM v1 – Field Application generates a 911 Water Service Request.

#### Challenges

It was noted that, generally, the existing integrations work well with the following exceptions:

- No request to install meters are managed in WAM v1. This activity is managed in MWM.
- Data does get out of sync.
- Custom reports are used to determine issues between the systems.
- When SOA goes down, issues can be introduced.
- There is a significant amount of time dedicated to error resolution.
- When a customer moves, CCB does not inform WAM v1 of the move and the vacating customer record is not deactivated in WAM v1.
- Meters are installed at Service Points, but not tracked in WAM v1.

### WAM Integrations - Ancillary Systems

#### SOA <:> WAM v1

Oracle SOA is leveraged as the middleware for the integrations and manages requests between systems.

#### Interface Discoveries

- It was noted that, generally, the SOA implementation is working well and stable.
- The FPWC version of Service Oriented Architecture (SOA) currently in use is version 11.2.1.1.
- WAM v1 is integrated with CCB using SOA and the field work PIP.
- The Oracle Integration Cloud (OIC) has been released and does not replace SOA but is being deployed with C2M at FPWC.
- C2M uses SOA as well.
- C2M Upgrade - July 2021 go-live.
- No requirements for SOA were listed regarding the next generation EAM system.

#### GIS <:> WAM v1 Interfaces

The ESRI GIS is the asset repository for linear assets that work activity in WAM v1 is associated with. Electrical Systems and Water Resources divisions each have their own ESRI GIS Database and versions are kept in synch.

#### Interface Discoveries

- ESRI upgrade from 10.2.1 to 10.6.1 is in progress (as of March 2021).
- The ESRI upgrade task includes an upgrade to Enterprise ESRI and ArcPro.
- FPWC is currently assessing the impacts to the organization and training needs.
- FPWC has an Enterprise License Agreement (ELA) with ESRI.
- ESRI AcrFM is used.
- GIS is the system of record for horizontal assets.
- WAM v1 is the system of record for vertical assets.
- As part of the WAM v1 implementation in 2012 FPWC decided to purchase a license agreement with a 3rd-party vendor GeoNexus to use products GeoWorksSynch and GeoWorksOffice.
  - GeoWorksSynch is working well as physical assets are synchronizing, but the frequency of the updates is too infrequent. This has presented issues as the updates are performed nightly. In some cases, a retirement in GIS has caused conflict on active work orders in WAM v1.

- GeoWorksOffice is not working. The intention was to provide GIS users the ability to see and create work orders from the map, using GeoWorx, but that is not working.
- Utility Network was discussed gathering these existing conditions:
  - The Utility Data Model from ESRI has not been implemented at FPWC yet. It is on their roadmap and it may be included with ArcPro.
  - Schneider Designer (aka 'Designer') was not compatible with the Utility Network Data model in the past, so there is a need to synchronize/coordinate the upgrade version with Schneider.

### Electric GIS

The ESRI GIS database for Electrical Services is heavily integrated with WAM v1.

The following graphic depicts the integrations between WAM v1 and Designer related to Electrical Services. Directional arrows signify the flow of information.

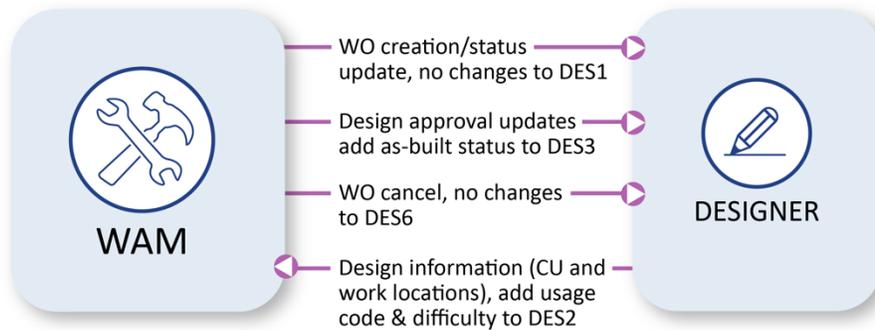


Figure 6: Current WAM v1 <-> Designer Interfaces

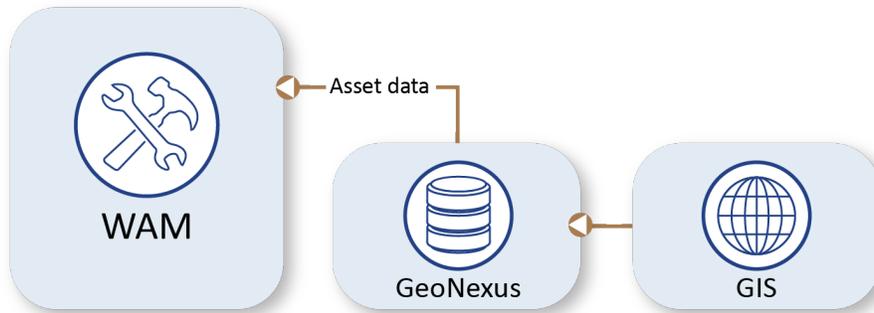
There are four interfaces between WAM v1 and Designer. Details of these integrations are listed below:

- WO creation/status update interface passes data on-demand as needed.
  - On the WAM v1 work design record there is a custom menu selection to “Create Folder in Designer”.
- Design approval updates interface passes data on-demand as needed.
  - There is a custom Design Message Router which integrates SOA, GIS, and WAM v1.
  - The Designer view is a layer in ArcFM
- WO cancel interface cancels work order on-demand as needed.
- Design information interface passes data on-demand as needed.
  - CU and usage code data in WAM v1 are synchronized to Designer.
  - The GIS design is created, completed, and approved then sent back to WAM v1 as a work design module record.
  - Work Design and Work Order are reviewed by an Engineering Staff Supervisor, then down for construction.

### Water GIS

The ESRI GIS database for Electrical Services is heavily integrated with WAM v1. The primary user of Water GIS is by the Construction and Maintenance department.

The following graphic depicts the data flow between WAM v1 and Water GIS via GeoNexus. Directional arrows signify the flow of information.



*Figure 7: Current WAM v1<:> Water GIS Interfaces*

The interface, primarily, involves the passing of asset information between WAM and the GIS via GeoNexus. The following are details of the workflow:

- Senior technicians are the editors who post and reconcile any discrepancies.
- There are 15 total editors of Water GIS data.
- Field editors do not do red-line editing on-line.
- Red-line editing is accomplished on paper.
- iPads, Toughbook's, and Surface Pros are used in the field.
- As of now, there is no requirement for field editing.
- When installations are entered in GIS there are edits in GIS Desktop, which then integrates with WAM v1.
- There is a web viewer application that FPWC uses for reference of water GIS assets.

## WAM v1 < Phenix Interface

Phenix Technologies is used to test transformers for FPWC.

The following graphic depicts the data flow between WAM v1 and Phenix for transformer asset data. Directional arrows signify the flow of information.



Figure 8: Current WAM v1 < Phenix Interface

There is one interface between WAM v1 and Phenix. Details of these integrations are listed below:

- New transformers interface updates WAM on a nightly batch basis.
- New transformers are added into WAM XFMR Assets and records new updated specifications data.

## WAM > eB Data

eB Data is the document management and storage platform and is integrated with WAM v1. This integration runs nightly. Documents associated with WAM v1 work activities are housed in eB Data with links to WAM v1.

The following graphic depicts the data flow between WAM v1 and eB Data for document management. Directional arrows signify the flow of information.



Figure 9: Current WAM v1 > eB Data Interface

There is, primarily, one interface between WAM v1 and eB Data. Details of these integrations are listed below:

- Document control logged documents interface is used to facilitate document management from files collected in WAM.
  - eB Data is the document storage for WAM v1 documents.
  - Five different work groups leverage eB Data in WAM v1.
  - *Water and Sewer:*
    - Current documents related to WAM v1 are stored as BLOBs in the WAM v1 database initially, then a batch job (nightly) moves data to separate storage in eB data repository.
    - Legacy data is on the remote server and not all legacy information is migrated.
    - Migrated documents relate only to (legacy) active work orders.

- Document control modification cannot happen in WAM v1, as configured. As a result, if an attached document associated with a work record requires a modification, the document has to be deleted, then the revised version must be up-loaded again.
- *Electrical*
  - No conditions mentioned.

### WAM v1 <:> Cascade

Cascade is the Supervisory Control and Data Acquisition (SCADA) platform for Electrical Systems substations.

Currently, there are some automations between Cascade and WAM v1. Cascade was upgraded in 2018 and the upgrade broke the existing integration with WAM v1. All maintenance is managed based on the data in Cascade. Other groups beyond substations have an interest in discussing the pros and cons of a SCADA integration.

The following graphic depicts the required data flow between WAM v1 and Cascade. Directional arrows signify the flow of information.

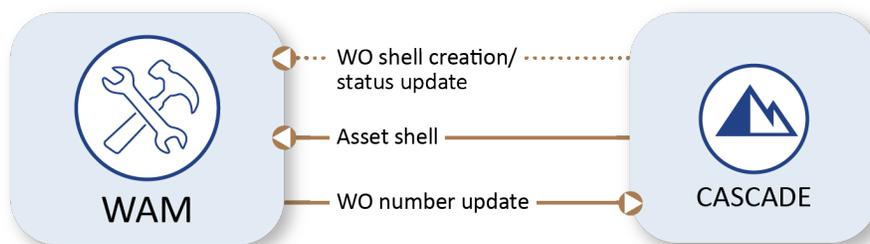


Figure 10: Current WAM v1 - Cascade Interface

There are four interfaces between WAM v1 and Cascade. Details of these integrations are listed below:

- Work order shell creation/status update interface processes data daily.
- Asset shell interface stopped working as a result of the Cascade upgrade.
- Job cost interface provides updates of a WAM v1 work order costs.
  - Error details are emailed to [navbusinessfunctionalcas@faypwc.com](mailto:navbusinessfunctionalcas@faypwc.com) and [navsysadmwmam@faypwc.com](mailto:navsysadmwmam@faypwc.com) for interface.
- Work order number update interface processes data daily.

## CCTV <=> WAM v1

There is currently no integration between Granite and WAM v1 for CCTV. The current process requires manual upload of data to WAM v1.

The following discoveries describe the current process:

- The current CCTV platform is GraniteNet.
- There are main line inspections and cleanings in WAM v1 as work orders.
  - Data from GraniteXP is manually uploaded to WAM v1 as attachments on these work order tasks, which end up interfaced to eB data.
- Currently, video recordings downloaded to external hard drive, and video binders are maintained of inspections for reference.
  - Time to conduct the inspections and cleanings is recorded against the specific WAM v1 work order tasks.
- There is no interface with WAM v1 to share detailed inspection information.
  - For the last 7 years video data has been stored in the binder system.
  - Data for the past 12 months is stored in a safe.
- For construction or repair there are work orders, but CIP does not include the physical assets built.
- Condition assessment data is not used for decision making.
- For workflow and scheduling 10% of main lines are inspected per year.
- An internal project was started in 2006 for Sub-Basins (sub sheds up to 18" pipe) within Basins.
- There is coordination with other CIP projects and other reactive work.
- Display of work orders on the map may benefit from event layers to see and manage work.
- Most CCTV work is planned.
- Notes for CCTV work are recorded in WAM v1, and there are PM master records in WAM v1 related to this work.
- There is a "job" in WAM v1 charge work.

## Innovyze InfoAsset Planner

There are no integrations between InfoAsset Planner and WAM v1 at this time.

## 311

A customer service portal for 311-type requests interface from the portal to CCB. If a 311 request ends up in WAM v1 it is because the customer service representative decides to send it to WAM v1 from CCB.

## Project Management Group - Reporting & Analytics

Vendor led a workshop with stakeholders within the Project Management group (PMG) department (0360). Below is a summary outline of the existing conditions reported during the workshop, as well as observances seen within the WAM v1 application or through follow-up questions and answers provided by FPWC personnel. PMG employees (referred to in this context as users) that use the Oracle WAM v1 System also use the following technologies: SiSense, Oracle EBS, Oracle CC&B, and Oracle BI Publisher. The workshop focused on the use of WAM v1. There are 20 users that use WAM v1. PMG users described the following existing conditions with WAM v1.

### Overview

- Many of the groups supported by PMG have expressed frustration with the lack of reports out of WAM v1. It was mentioned that existing reports do not meet current processes and/or reports that generate incorrect information.
- The staff dedicated to generating and managing the reporting effort related to WAM v1 is small (2-5 people).
- Reporting data governance is a primary concern of this group. Without code controls, reporting is very difficult. Some code combinations satisfy one requirement (e.g., automation of accounting string selection) while making reporting on work activities harder (e.g., SSO's). The challenge is to balance these entities interests for effective results.
- The implementation of Sisense, replacing OBIEE because it is obsolete, is the foundation of a new data and analytics program. PMG started using SiSense in July of 2020.
- Sisense does not use a data warehouse, instead uses a disaster recovery (DR) environment.
  - Of the 15 formal use cases, three have been developed to-date.
  - The prioritization of the schedule of reports to be created is based on the benefits to the business users.
- The data in the DR environment is refreshed every 2 weeks.
- BI Publisher is expected to be used for the foreseeable future.
  - More than 80 reports are in BI Publisher.
  - Most were initially created by the Oracle System Implementers. Requirement documents do exist for those reports.
- Some reports never met the requirements of the business and have not been used.
- Some reports have been modified over the years to meet business needs (requirement documents have not been updated to reflect changes) – one person ownership with too many requests.
- Some reports have been created over the years as requested by the business (requirement documents were not formally supplied or created) - one person ownership with too many requests.
- An audit of reports has not occurred since the Oracle Implementation project.

### Data Quality

- Data governance is not in place.

### Integrations to WAM v1

- Sisense uses WAM v1 data for reporting.

### Reports and Dashboards

- A reference was made to new use case requirements. End user groups are interested in new reports for information that is currently not available in the system. This would have a secondary effect to identify what needs to be reported on and what changes to the system might be needed to generate the report. In addition, information will be available regarding elements of business not being tracked.
- The Vendor assessment team requested and received a listing of existing reports currently used by FPWC. Not to develop detailed requirements for implementation, but rather, existing reports provide specific details regarding FPWC stated goals around information retrieval from an EAM system.
- A list of reports was created in Oracle's application Business Intelligence Publisher (BIP). See RFI input.

## Appendix A – Lexicon/Glossary

The following is a list of terms or abbreviations used within this document and/or in some way relevant to FPWC, and their meaning.

Acronym or name	Title	Explanation/comment
ABC	Activity-based Costing	In use at FPWC, related to FERC Accounting also. From Wikipedia: <i>“Activity-based costing (ABC) is a costing method that identifies activities in an organization and assigns the cost of each activity to all products and services according to the actual consumption by each. Therefore this model assigns more indirect costs (overhead) into direct costs compared to conventional costing.”</i>
AMP	Asset Management Plan	Refers to a document that documents details about assets and systems such as levels of services, cost, risk and lifecycle management.
AUP	Average Unit Price	A method of pricing that adjusts according to purchase price and Invoices over time.
BIP	Business Intelligence Publisher	Software application from Oracle used for creating simple reports, and in use at FPWC.
BWGP	Butler Warner Generation Plant at FPWC	The generation plant at FPWC.
CC&B	Oracle’s Customer Care and Billing	Software application for Billing Customers of FPWC service and products.
Cascade	DNV’s CMMS software product	SCADA-based work management system specializing in Electrical Substations. DNV was established in Norway in 1864.
Cityworks	Trimble’s CMMS software product	EAM system as a legacy application at FPWC.
CPR	Continuing property record	CPRs are a perpetual record of a plant in service.
CPR repository	Continuing property record repository	A FPWC custom table in WAM v1 that keeps track of the units within a given fixed asset group.
CU	Compatible unit	An individual record of materials, labor or equipment used on a work design and work order to make job cost estimating faster and based on standards. CUs drive how completed project costs are classified in the general ledger as each is mapped to

Acronym or name	Title	Explanation/comment
		a detailed listing of fixed asset records called continuing property records.
CWIP	Construction Work in Progress account.	A temporary holding account for capital work that gets reconciled when fixed assets are recorded in-service.
EAM	Enterprise Asset Management	Refers to an enterprise-wide software system that supports both work and asset management needs
EBS	Oracle Enterprise Business Suite	An enterprise resource planning software suite of applications
ELA	Enterprise License Agreement	This provides FPWC with immediate access to established software offerings.
ELM	Equipment, Labor and Material	Elements of cost recorded in an EAM system like WAM v1.
ESA	Engineering systems analyst	A position within FPWC.
ESRI	Environmental Systems Research Institute	An international supplier of geographic information system (GIS) software, web GIS and geodatabase management applications. The company is headquartered in Redlands, California.
FA	Field Activity	The work record message between CC&B and MWM. Lightly corresponds to a WAM v1 Service Request.
FERC	Federal Energy Regulatory Commission	The regulatory body that FPWC reports it's electrical activities to.
FERC Accounting	Accounting	FERC requires companies that fall under its regulatory oversight to use its accounting and financial reporting guidelines. The core of FERC accounting is the commission's Uniform System of Accounts, a set of requirements for the way companies maintain their accounting books and records. <i>Note: FPWC is not required to use FERC accounting but chooses to.</i>
FGA	Fine grain access	Oracle database policy-level control to isolate viewability of records based on parameters, such as user's department.
FMEA	Failure Modes & Effects Analysis	An analysis of data collected based upon standards of failure codes and causes.

Acronym or name	Title	Explanation/comment
FPWC	Fayetteville Public Works Commission	The Public Works Commission within the city of Fayetteville, NC that provides Electricity, Water, and associated services, including Wastewater removal and treatment.
G/L	General ledger in EBS	
Granite Xp / GraniteNet	CUES software application for CCTV	Pipeline inspection video and imaging software.
IaaS	Infrastructure as a service	Cloud infrastructure, IaaS compared to PaaS and SaaS. IaaS (infrastructure) being the larger array of cloud applications, PaaS (platform) being multiple applications related in a “stack” or “suite of apps”, and SaaS (software) referencing a single application.
MACP	Manhole Assessment and Certification Program, as part of NASSCO	<a href="#">Manhole Assessment (MACP)   NASSCO</a>
Maximo	IBM’s CMMS software product	EAM system as a legacy application at FPWC.
Milestone Utilities		Consulting company upgrading CC&B and MDM to C2M in the cloud.
MoSCoW	A methodology of prioritization in software implementation projects.	Categorizes a Requirement into one of only 4 groups: Must have, Should have, Could have, and Won’t have.
NASSCO	National Association of Sewer Service Companies	<a href="#">National Association of Sewer Service Companies   NASSCO</a>
OA	Office assistant	A title used by FPWC personnel
OBIEE	Oracle business intelligence enterprise edition	A data warehouse and analytics tool used by FPWC.
OIC	Oracle Integration Cloud	<a href="#">OIC and Integrating Oracle SaaS - Implementing Oracle Integration Cloud Service (oracle-integration.cloud)</a>
OTL	Oracle Time and labor	An entry point in EBS for Labor charges.
OUTA	Oracle Utilities Testing Application	A test suite application from Oracle, used by FPWC.
PaaS	Platform as a service	Cloud infrastructure, IaaS compared to PaaS and SaaS. IaaS (infrastructure) being the larger array of cloud applications, PaaS (platform) being multiple applications related in a “stack” or “suite of apps”, and

Acronym or name	Title	Explanation/comment
		SaaS (software) referencing a single application.
PACP	Pipeline Assessment Certification Program, as part of NASSCO	<a href="#">Pipeline Assessment (PACP)</a>
PROD	Production environment of a software application.	Production environment of an application that users use regularly to enter information.
PTO	personal time off	Time off usually recorded on a timesheet by the employee. In some cases, the entry is made by a supervisor or a payroll employee.
SaaS	Software as a Service	Cloud infrastructure, IaaS compared to PaaS and SaaS. IaaS (infrastructure) being the larger array of cloud applications, PaaS (platform) being multiple applications related in a “stack” or “suite of apps”, and SaaS (software) referencing a single application.
SAIDI	System Average Interruption Duration Index (SAIDI)	SAIDI is the average duration of interruptions per consumers during the year. It is the ratio of the annual duration of interruptions (sustained) to the number of consumers. If duration is specified in minutes, SAIDI is given as consumer minutes. $SAIDI = \text{Total duration of sustained interruptions in a year} / \text{total number of consumers}$
SAIFI	System Average Interruption Frequency Index (SAIFI)	SAIFI is the average number of sustained interruptions per consumer during the year. It is the ratio of the annual number of interruptions to the number of consumers. $SAIFI = (\text{Total number of sustained interruptions in a year}) / (\text{Total number of consumers})$
SCADA	Supervisory control and data acquisition	A software application that senses points (e.g., voltage, pressure, temperature) and reports and alarms based on set points.
SLA	Service level agreement	
SSO	Sanitary Sewer overflow	Reportable and unreportable unintended discharges of sanitary sewer material.
SSP	SSP Innovations software	
Staking		These are the designs for new construction. Typically, electrical designs.

Acronym or name	Title	Explanation/comment
UAT	User Acceptance Testing environment	The environment tested just before a code change is put into the production environment.
VTSCADA	Supervisory control and data acquisition software	Software application developed by Trihedral Engineering Limited of Nova Scotia, Canada.
WAM v1	Work and Asset Management	Software application from Oracle for tracking work against assets and managing those through their lifecycle.
WACS	Work and Asset Management in the cloud	Software application from Oracle for tracking work against assets and managing those through their lifecycle.