



Operations Data Management (ODM) Platform

Request for Proposal

ISSUED BY:	Buffalo Sewer Authority
ISSUE DATE:	Tuesday, July 7, 2026
SUBMISSION TO:	Rosaleen B. Nogle, PE Principal Sanitary Engineer (via OneDrive link to be provided)
QUESTIONS DUE:	Friday, July 17, 2026, at 12:00 PM EST rnogle@buffalosewer.org
DUE DATE:	Thursday, July 30, 2026, at 3:00 PM EST
ANTICIPATED AWARD DATE:	September 2026

This RFP is issued to a short list of qualified vendors. Responses are confidential and will be evaluated by AUTHORITY and its Capital Projects Program Management Team (PMT) Consultant.

Section I. Project Overview

1.1 Background

The Buffalo Sewer Authority (AUTHORITY) owns and operates the Bird Island Wastewater Treatment Facility (WWTF) and is responsible for the sanitary wastewater and stormwater collection and treatment system within the City of Buffalo, serving a population of approximately 450,000. AUTHORITY manages over 900 miles of storm, sanitary, and combined sewer lines.

AUTHORITY's current Operations Data Management (ODM) environment is built on a suite of aging, on-premises, in-house applications that are reaching the end of their useful life. These applications are difficult to maintain, limited in their ability to support modern data access and visualization, and increasingly misaligned with AUTHORITY's regulatory and operational needs. The monthly permit report submitted to the New York State Department of Environmental Conservation (NYSDEC) depends on this legacy environment and must be sustained without interruption through any transition.

AUTHORITY, in conjunction with its Program Management Team (PMT), conducted a comprehensive ODM assessment that included stakeholder workshops, staff interviews, a market assessment, and an informal Request for Information (RFI) process. The assessment concluded that AUTHORITY's legacy application suite should be replaced with a modern, integrated platform capable of sustaining regulatory compliance, improving operational efficiency, and positioning AUTHORITY for the data management demands of the next decade. This RFP is issued to a short list of qualified vendors (VENDORS) identified through that process.

VENDORS are encouraged to propose the technology stack (solution) they believe will best meet the needs of THE AUTHORITY, including any subcontractors or third-party integration partners whose products or services are integral to the proposed solution. THE AUTHORITY is not prescribing a specific platform or architecture and will evaluate proposals based on how well the proposed approach addresses the requirements in this RFP. Where subcontractors are proposed, VENDORS shall clearly identify the firm, their role, and the specific components of the solution they will deliver. THE AUTHORITY reserves the right to select any combination of the functional areas described in Section II and is not obligated to procure all components as a single engagement. VENDORS should structure their proposals and cost submissions in a way that allows THE AUTHORITY to evaluate and price each functional area independently.

1.2 Current System Architecture

AUTHORITY's current ODM environment is built around the following core platforms:

- **Emerson Ovation DCS:** Primary distributed control system for plant process data. Data is transferred nightly to Oracle via the Ovation Enterprise Data Solutions (EDS) portal, running thousands of automated calculations used in daily operations and regulatory reporting.
- **Oracle Database (On-Premises):** Central data store for operations data. Two separate Oracle servers exist one for operations, lab, and process data and one for business data including HR, accounting, and maintenance.
- **IBM Maximo 7.6.1.2 (transitioning to MAS 9.1):** Asset and maintenance management system. AUTHORITY is actively procuring an upgrade to Maximo Application Suite (MAS) 9.1, moving from on-premises to cloud-hosted. Custom applications currently integrated with Maximo may not be compatible post-migration.
- **Custom AUTHORITY Operations Suite (34 applications):** A set of in-house applications built primarily in Delphi 12.3 as well as Oracle PL/SQL and legacy Visual Basic. These include the Operator Log (OpLog), Operations Data, Partial Treatment, Overflow Event Tracking, Operations Web Reports, and the Calculation Data Dictionary, and collectively support generation of the monthly SPDES permit report.
- **Custom LIMS:** A laboratory information management application built on Oracle, used daily for sample tracking, regulatory data feeds, and reporting. Difficult to query, limited in trending capability, and not accessible to staff beyond the core laboratory team.
- **ITrack (Industrial Waste):** Custom application tracking industrial waste hauler data, permits, load transactions, and inspection records. Requires replacement to support expanded permit requirements and tighter integration with LIMS.

1.3 Key Challenges

The following challenges define the scope and urgency of this procurement and should inform each VENDOR's proposed approach:

- Much of the data entry into the Operations Suite is manual; automation of data flow from Ovation to Oracle and into reporting is limited.
- The Oracle servers are aging and unsupported, and a hardware failure could require rebuilding legacy systems with diminishing institutional knowledge.
- LIMS data is difficult to access for trending, analysis, and cross-departmental use.
- Custom Maximo-integrated applications are at risk of breaking following the MAS 9.1 migration.
- No consolidated dashboard or real-time data visualization exists across systems.
- AUTHORITY is subject to new NYS cybersecurity regulations requiring individual user logins, role-based access controls, and compliance with eight defined focus areas as a facility permit requirement.

- AUTHORITY operates as a certified environmental laboratory (E-Lab) under NYS DOH oversight subject to NELAC Institute TNI standards, with audit readiness identified as an area for improvement.

Technical Memorandum #1 (TM#1) (ODM Evaluation, November 2025) and Technical Memorandum (TM#2) (ODM Recommendations, December 2025) are provided to short-listed VENDORS as background documents and are included as appendices to this RFP. VENDORS are expected to review these documents prior to submission and to demonstrate familiarity with AUTHORITY's operating environment in their proposals.

1.4 Project Description

AUTHORITY is seeking proposals from qualified VENDORS to provide a modern, integrated ODM platform that replaces the legacy custom application suite, supports regulatory compliance and reporting, and does not create new single-point-of-failure technology dependencies. The platform must integrate with AUTHORITY's three core enterprise systems: Emerson Ovation DCS, on-premises Oracle database, and IBM MAS 9.1 in a cloud-hosted deployment, or an approved equivalent. On-premises proposals will not be considered.

The scope of this procurement encompasses the following functional areas:

- Operations data management and operator interface
- Laboratory Information Management System (LIMS)
- Industrial waste and pretreatment tracking
- Regulatory reporting and electronic submission
- Dashboards and data visualization
- Cybersecurity compliance
- Asset management and quality control

This procurement is limited to the functional areas listed above. Maximo/MAS implementation, sewer maintenance applications, engineering systems, accounting, and HR systems are outside the scope of this RFP. Compatibility with those systems, where applicable, is a consideration in evaluation.

Section II. Scope of Work

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AUTHORITY is seeking a platform that modernizes its ODM environment, integrates with its existing enterprise systems, and positions the organization to meet its regulatory, operational, and cybersecurity obligations for the next decade. Requirements are organized by functional area. VENDORS are expected to address each requirement directly in the order presented.

"Shall" denotes a mandatory requirement. "Should" denotes a preference that will be evaluated but is not mandatory. Proposals that do not address all mandatory requirements may be deemed non-responsive.

1. Core Integration Requirements

Ovation, Oracle, and MAS 9.1 are non-negotiable constraints of AUTHORITY's operating environment. The MAS 9.1 migration from an on-premises Maximo 7.6.1.2 environment introduces transition risk that VENDORS must account for. VENDORS shall describe each integration method, protocol, achievable data latency, known limitations, and any middleware required.

The solution shall:

- Integrate with Emerson Ovation DCS via the EDS module or a documented equivalent.
- Support read and write access to AUTHORITY's existing Oracle database, preserving access to all historical data.
- Integrate with IBM MAS 9.1 in a cloud-hosted deployment.
- Support work order generation in MAS 9.1 triggered by Ovation process conditions or threshold events.

The solution should:

- Support compatibility with the Microsoft 365 ecosystem, including SharePoint and Power BI.

2. Regulatory Reporting

THE AUTHORITY's regulatory reporting obligations span multiple programs and agencies and are expected to evolve as permits are renewed and requirements change. The monthly SPDES permit report is a core deliverable of this procurement, but the solution must be capable of supporting all current reporting requirements while adapting to new or revised obligations without minimal VENDOR involvement. VENDORS shall describe the configuration process, identify supported regulatory portals and report types, explain the audit log architecture, and provide sample outputs from comparable deployments.

The solution shall:

- Generate THE AUTHORITY's required regulatory reports, including but not limited to the monthly SPDES permit report to NYSDEC, biosolids reports under 40 CFR Part 503, and air emissions reports under Title V of the Clean Air Act.
- Support direct digital submission to applicable regulatory portals, including CDX, NetDMR, and NYSDEC reporting systems, consistent with EPA CROMERR requirements.
- Allow regulatory calculations and report configurations to be modified by authorized AUTHORITY staff as permit requirements change, without requiring VENDOR involvement.
- Record all changes to regulatory calculations in a tamper-evident audit log capturing user, date, prior value, and new value.
- Support generation and electronic submission of Significant Industrial User (SIU) inspection reports in a format acceptable to NYSDEC.

The solution should:

- Accommodate new report types and regulatory submissions as THE AUTHORITY's permit obligations evolve, without requiring significant redevelopment or VENDOR customization.

3. Hosting and IT Operations

AUTHORITY requires a cloud-hosted solution that its IT team can administer without reliance on the VENDOR for day-to-day operations. VENDORS shall identify the hosting platform and architecture, describe the division of routine IT responsibilities between AUTHORITY and the VENDOR, and provide SLA, RTO, and RPO commitments.

The solution shall:

- Be deployed in a cloud-hosted environment. On-premises deployments will not be considered.
- Include a minimum guaranteed uptime service level agreement (SLA) of 99.5% for all production environments, excluding scheduled maintenance windows.
- Not require AUTHORITY IT staff to possess proprietary or VENDOR-specific knowledge for routine administration, updates, or troubleshooting.
- Include a documented disaster recovery and business continuity plan with defined RTO and RPO commitments.

VENDOR shall:

- Describe the underlying database architecture and AUTHORITY's ability to query data directly without VENDOR intermediation.
- Describe remedies for SLA breaches.

4. Data Ownership and Portability

AUTHORITY's data belongs to AUTHORITY. VENDORS shall confirm ownership in writing, describe the export process and available formats, and identify any associated costs.

The solution shall:

- Retain full ownership of all data with AUTHORITY. VENDOR shall confirm this explicitly and identify any exceptions or limitations.
- Support full export of all AUTHORITY data in open, non-proprietary formats upon request and upon contract termination.

VENDOR shall:

- Describe the data export process, available formats, estimated timeframes, and any associated costs.

5. Operator Interface

AUTHORITY requires a modern, mobile-accessible interface that allows operators to enter data during field rounds without returning to fixed workstations. Ease of use is a primary acceptance criterion. VENDORS shall identify supported platforms and devices, describe offline capability for areas with limited connectivity, and describe the approach to training and end-user adoption.

The solution shall:

- Provide a web-based or mobile-accessible operator log interface to replace AUTHORITY's existing legacy application.
- Support data entry via dropdowns, checkboxes, and numeric fields to minimize freeform text input.
- Be accessible on mobile devices for use during field rounds.

6. Laboratory Information Management

AUTHORITY is a NYS DOH-certified environmental laboratory subject to NELAC TNI standards. The solution must address day-to-day usability and audit readiness. VENDORS shall identify whether the LIMS is a native module or third-party integration, describe available query and reporting interfaces, and describe how the platform supports TNI compliance.

The solution shall:

- Include or integrate with a LIMS capable of replacing AUTHORITY's existing custom Oracle-based application.
- Support searchable access to historical laboratory data with user-configurable query, trending, and reporting.
- Support role-based access for authorized non-laboratory staff including operations and process personnel.
- Support QA/QC checklists, chain-of-custody recordkeeping, and document management consistent with NYS DOH NELAC TNI standards.

The solution should:

- Support integration with AUTHORITY's Laserfiche document management system.

7. Industrial Waste Tracking

AUTHORITY's industrial pretreatment program is expanding to include PFAS tracking under the current permit renewal, a FOG receiving pilot, and Mercury Minimization Program recordkeeping. Laboratory and pretreatment data must be accessible together within a single interface. VENDORS shall identify whether the module is native or third-party, describe PFAS and FOG capabilities, and describe the data migration approach.

The solution shall:

- Include or integrate with an industrial waste tracking module to replace AUTHORITY's existing ITrack application.
- Support all AUTHORITY permit types: outside district, inside Buffalo, temporary, and truck hauler permits.
- Support PFAS monitoring and source tracking consistent with AUTHORITY's current permit renewal.
- Support FOG waste stream receiving and tracking.
- Support Mercury Minimization Program tracking and recordkeeping.
- Share a common data environment between the industrial waste module and LIMS component, accessible within a single interface.
- Migrate a minimum of five (5) years of historical ITrack data.

8. Dashboards and Data Visualization

VENDORS may satisfy this requirement either by providing a native dashboard layer or a well-documented data access layer that allows AUTHORITY to build its own visualization environment. VENDORS shall identify which approach is proposed, state achievable data latency for Ovation process data, and describe the recommended data architecture.

The solution shall:

- Provide either:
 - (a) configurable dashboards natively aggregating data from Ovation, Oracle, LIMS, and MAS in a single interface, or
 - (b) a documented data access layer enabling AUTHORITY to build and maintain its own dashboards using third-party tools.
- Support trend analysis and data aggregation across dynamic date ranges and user-defined parameters.

9. Cybersecurity

New NYS cybersecurity regulations effective in early 2026 are a facility permit requirement covering eight defined focus areas. Individual user authentication is mandated, and group logins are not permitted. VENDORS shall describe the authentication architecture including single sign on (SSO) and multi-factor authentication (MFA) support, the access control model, user activity logging, and identify which of the eight focus areas the platform directly addresses.

The solution shall:

- Require individual user authentication. Shared or group logins are not permitted.
- Support role-based access control with configurable permission levels.
- Maintain a complete, tamper-evident user activity log.

VENDOR shall:

- Provide applicable security certifications (SOC 2 Type II, FedRAMP, or equivalent).

10. Asset Management, Quality Control, and Scalability

AUTHORITY has no dedicated calibration or quality control software and is working toward an ISO-aligned asset management program. The selected platform should also grow with AUTHORITY beyond the initial three functional areas without requiring re-platforming. VENDORS shall describe native capabilities or integrations available in this area and the platform's scalability model.

The solution shall:

- Support expansion to additional AUTHORITY departments and data sources without requiring re-platforming.

VENDOR shall:

- Describe the platform's scalability model, including whether pricing is modular or bundled.

The solution should:

- Support or integrate with calibration management and quality control tracking.
- Support document control functions consistent with an ISO 55000-aligned asset management program.
- Support future integration with collection system data sources associated with AUTHORITY's LTCP/QCCW capital program.

Section III. Required Content and Format

VENDORS shall provide the following materials in the order listed below. Submissions should be concise and provide a straightforward description of VENDOR's capabilities and offer to meet the requirements of this RFP. AUTHORITY will conduct a formal written Q&A period prior to the proposal deadline. All vendor questions must be submitted in writing by the date indicated on the cover page. Responses will be compiled and distributed to all VENDORS simultaneously. No verbal responses will be binding.

One (1) Portable Document Format (PDF) version of all materials must also be provided through a uniquely assigned One Drive folder. **One Drive Folder requests must be received by Rosaleen Nogle, PE, BCEE, BC WRE by Friday, July 17, 2026, at rnogle@buffalosewer.org.** Each page of the submission must be numbered in a manner so it can be uniquely identified. Legibility, clarity, and completeness are required.

The submission must be signed by each individual CONSULTANT or their authorized representative who shall have the legal authority to legally bind the CONSULTANT(S).

1. Cover Letter

VENDOR shall prepare and sign a cover letter that confirms understanding of the RFP, acknowledges all mandatory requirements in Section II, identifies any requirements the VENDOR cannot meet and explains how the proposed solution addresses the underlying need by other means, and confirms the VENDOR is willing and able to perform the services described. The cover letter shall be signed by an individual with legal authority to bind the VENDOR.

2. Technical Approach

VENDOR shall provide a narrative description of its proposed solution and technical approach. This section should demonstrate a clear understanding of AUTHORITY's operating environment and explain how the proposed platform addresses AUTHORITY's specific challenges — not simply describe the product's general capabilities. At a minimum, the technical approach shall include:

- Full technology stack: software platform, database, hosting model, and any middleware or integration layer.
- Architecture diagram showing how the platform connects to Ovation, Oracle, and MAS 9.1, with specific integration methods, data protocols, and achievable latency described for each.
- Description of how the solution addresses each requirement in Section II, organized by subsection
- Approach to data migration and how continuity of the SPDES reporting workflow will be maintained during transition

- Cybersecurity architecture and applicable certifications

3. Implementation Plan

VENDOR shall provide a project schedule from Notice to Proceed (NTP) through final handoff to AUTHORITY operations staff, including:

- Major phases and milestones with durations
- Parallel operation period with legacy systems
- Proposed go-live sequence by module, if phased
- AUTHORITY staff roles and estimated time commitments required during implementation and data preparation
- Post-go-live stabilization period before formal handoff

4. Qualifications

VENDOR shall provide a description of at least three (3) comparable deployments at wastewater utilities of similar size and complexity, at least one of which shall include integration with Emerson Ovation, IBM Maximo or MAS, or Oracle. For each reference, provide:

- Client name, contact person, telephone, and email address
- Modules deployed and integrations implemented
- Total contract value and contract term
- Current status and actual completion date if applicable

VENDOR shall also identify key team members assigned to this engagement, their relevant credentials and experience, and any subcontractors or third-party integration partners and their specific role.

5. Cost Proposal

VENDOR shall provide a complete cost proposal submitted as a separate document from the technical proposal, organized by the following categories for the full implementation of the proposed solution.

- Software Licensing (upfront or one-time)
- Implementation Services (including data migration, integration development, and training)
- Annual Subscription / SaaS Fees
- Annual Maintenance, Support, and Hosting
- Optional Add-Ons (itemize separately)

VENDORS shall distinguish one-time from recurring costs, identify any variable costs, describe support tiers and response time SLAs, and identify any costs AUTHORITY would bear outside of the above categories.

Section IV. Evaluation and Selection Process

The review and selection team will be assigned by the General Manager. AUTHORITY reserves the right to conduct interviews and request live demonstrations from VENDORS prior to final selection. The review and selection team will consider, but may not be limited to, the following factors:

Criteria	Estimated Weight
Technical capability and fit with AUTHORITY requirements	25%
Integration approach (Ovation, Oracle, MAS 9.1)	20%
Implementation plan, timeline, and alignment with requirements	15%
Regulatory reporting capability (SPDES/DEC, CROMERR)	15%
Qualifications, references, and relevant experience	10%
Cost (10-year total cost of ownership)	15%

AUTHORITY reserves the right, in its sole discretion, to disqualify any VENDOR whose conduct or submission fails to conform to the requirements of this solicitation, to make an award with or without negotiation in whole or in part, or to make no award at all. Incomplete submissions missing key components may be deemed non-responsive. All costs incurred in preparing a response shall be borne solely by the VENDOR. All submissions become the property of AUTHORITY and constitute public records subject to disclosure under the Freedom of Information Law. VENDORS are solely responsible for identifying any portions deemed to constitute trade secrets or proprietary information; any such information shall be clearly marked "CONFIDENTIAL."

Section V. Authority's Reservation of Rights

Upon submission in response to this Request for Proposals, each CONSULTANT acknowledges and consents to the following conditions relative to the submission, review and consideration of its submission:

1. All costs incurred by the VENDOR in connection with responding to this Request for Proposals and for participating in this procurement process shall be borne solely by the VENDOR.
2. THE AUTHORITY reserves the right, in its sole discretion, to reject for any reason any and all responses or components thereof and to eliminate any and all VENDORS responding to this Request for Proposals from further consideration for this procurement.
3. THE AUTHORITY reserves the right, in its sole discretion, to reject any VENDOR that submits incomplete responses to this Request for Proposals, or a submission that is not responsive to the requirements of this Request for Proposals.
4. THE AUTHORITY reserves the right, without prior notice, to supplement, amend, or otherwise modify this Request for Proposals, or otherwise request additional information.
5. All submissions in response to this Request for Proposals shall become the property of THE AUTHORITY and will not be returned.

6. All submissions in response to this Request for Proposals shall constitute public records subject to public disclosure.
7. THE AUTHORITY may request that VENDORS personally attend or send representatives to THE AUTHORITY for interviews and a demonstration of VENDOR's proposed services.
8. Any and all submissions in response to this Request for Proposals that are not received by THE AUTHORITY by 3:00 PM on Thursday, July 30, 2026, shall be rejected and not subject to consideration.
9. Neither THE AUTHORITY, nor its officers, officials nor employees shall be liable for any claims or damages resulting from the solicitation, preparation or delivery of any submission(s) in response to this Request for Proposals.

THE AUTHORITY reserves the unilateral right, in its sole discretion, to make and to accordingly exercise the following rights and options regarding this Request for Proposal and the procurement process in order to obtain the most advantageous offer for THE AUTHORITY:

1. To waive irregularities and/or minor non-compliance by any VENDOR with the requirements of this Request for Proposals.
2. To request clarification and/or further information from one or more VENDORS after the submitted deadline for submissions without becoming obligated to offer the same opportunity to all CONSULTANTS.
3. To enter into negotiations with one or more VENDORS without being obligated to negotiate with, or offer the same opportunity, to all VENDORS.
4. To reject any or all submission or parts of submissions, to accept part or all a submission or submissions based on considerations and to create a project of lesser or greater scope and/or breadth than described in this Request for Proposals or the VENDOR's submission.
5. To determine that any submission received in response to this Request for Proposals complies or fails to comply with the terms set forth herein.
6. To determine whether any perceived or actual conflict of interests exists that would affect or impair the award of any contract arising from this Request for Proposals to any VENDOR(s);
7. To waive any technical non-conformance with the terms of this Request for Proposals.
8. To change or alter the schedule for any events called for in this Request for Proposals.
9. To conduct investigations of any or all the VENDORS, as THE AUTHORITY deems necessary or convenient, to clarify the information provided and to request additional information to support the information included in any submission.
10. To suspend or terminate the procurement process described in this Request for Proposals at any time. If terminated, THE AUTHORITY shall have the unilateral right

to determine to commence a new procurement process without any obligation to the VENDOR.

11. THE AUTHORITY shall be under no obligation to complete all or any portion of the procurement process described in this Request for Proposals.

VENDORS are advised to submit a complete offer as their submission. Any waiver, clarification or negotiation will not be considered an opportunity for VENDORS to correct errors contained in their submission.

Section VI. Contract Requirements

On the following pages, in order:

- **Section VI.A:** Formal Contract & Informal Price Agreement – General Contract Terms and Conditions
- **Section VI.B:** Vendor Certifications and References
- **Section VI.C:** Regulations for Entering Formal Proposals For Materials, Supplies, Equipment & Services

BUFFALO SEWER AUTHORITY
FORMAL CONTRACT & INFORMAL PRICE AGREEMENT
GENERAL TERMS AND CONDITIONS

The Buffalo Sewer Authority (*hereinafter referred to as the Authority*) is a public benefit corporation of the State of New York, having its Administration Offices in Room 1038 City Hall, 65 Niagara Square, Buffalo, New York, 14202; its Wastewater Treatment Plant at the Foot of West Ferry Street, Buffalo, New York, 14213 and various operations/outlying pumping station facilities located at various addresses within the limits of the City of Buffalo.

I. APPLICABILITY

The terms and conditions set forth in this document are expressly incorporated in and applicable to the resulting procurement Contract or Price Agreement let by the Buffalo Sewer Authority through its Purchasing Office. The term “**Contract**” shall mean a Formal Contract or Purchase Order awarded for an annual commodity purchase or service or for a one-time as needed commodity purchase or service. The term “**Price Agreement**” shall mean an Informal Agreement awarded for an annual commodity purchase or service.

Where the phrase “**Bid Document**” is referenced throughout these General Terms and Conditions, it shall refer to the detailed **Scope of Services, Commodity Specifications or Request for Proposal** sections of the bid package.

For any Informal Price Agreement award, the document referred to herein as referenced, Buffalo Sewer Authority Regulations for Entering Formal Proposal for Materials, Supplies, Equipment and Services, shall not apply.

II. REVIEW OF PROPOSAL PACKAGE

The Authority requests that all questions or requests for information generated following review of the entire proposal package, are submitted in writing to the Authority no later than five business days prior to the bid opening date. All correspondence shall be directed to the Purchasing Department by any one of the following means:

- Mail: Treatment Plant, 90 West Ferry Street, Buffalo, New York, 14213
- E-mail: purchasing@buffalosewer.org , jrine@buffalosewer.org
- Fax: 716-883-9068

III. PRE-BID MEETING

A pre-bid meeting, **if applicable**, will be held on the date and time indicated on the Proposal Cover Page of the bid package. It is strongly suggested that any vendor intending to participate in submitting a bid attend the pre-bid meeting. By failing to attend, the bidder is at risk of missing valuable information that could significantly impact this bid. A vendor’s absence does not negate their responsibility to incorporate all information presented/discussed/viewed in their bid submittal. A vendor shall not plead misunderstanding or deception because of estimates of quantities, character, location, or other conditions surrounding the same.

IV. INITIAL AND RENEWAL TERMS FOR ANNUAL CONTRACTS & PRICE AGREEMENTS

This clause is applicable only to those contracts or price agreements for a commodity purchase or service on an annual basis. Contracts awarded for a one-time commodity purchase or service will not have an initial or renewal term and terms of delivery or completion of services will be clearly defined in the Bid Document.

Unless otherwise indicated in the Bid Document, the following shall apply:

- A. The contract or price agreement initial term shall be for a period of one year from July 1 through June 30th,
- B. If agreeable to both parties, the awarded contract or price agreement may be renewed for three (3) additional one-year (1) terms at the same prices and under the same terms and conditions as the original contract.
- C. For contracts or price agreements where prevailing wages apply, on the renewal date of the awarded contract or price agreement, the Vendor, or Authority may request a rate change (increase or decrease) based upon fluctuations in the latest published copy of the Department of Labor Prevailing Wage Schedule. **The Vendor or Authority shall be allowed to increase (or decrease) contract rates by the exact change in the prevailing wage schedule only. The Authority shall not be responsible for any increased costs incurred by the Vendor except for that of the prevailing wage adjustment. The increase or decrease shall be applied to the next year, effective on the renewal date of the contract. Such request shall be made in writing by either party within thirty (30) days of the renewal term of the renewal term or the availability of the prevailing wage schedule.**

V. SHORT TERM EXTENSION

In the event the replacement contract or price agreement has not been issued, any contract/agreement let and awarded hereunder by the Authority, may be extended unilaterally by the Authority for an additional period of up to one month upon notice to the vendor with the same terms and conditions as the original contract including, but not limited to, quantities (prorated for such one-month extension), prices, and delivery requirements. With the concurrence of the vendor, the extension may be for a period of up to three months in lieu of one month. However, this extension terminates should the replacement contract be issued in the interim.

VI. TERMINATION

This contract or price agreement may be terminated for cause by the Authority and all monies due, or to become due, to the Vendor hereunder may be forfeited and at the Vendor's expense where vendor becomes unable or incapable of performing the work, or meeting any requirements or qualifications set forth in the contract, or for non-performance, or upon a determination that Vendor is non-responsible.

This contract or price agreement may be terminated for convenience at any time by the Authority upon sixty (60) days written notice without penalty or other early termination charges due. Such termination of the contract or price agreement shall not affect any project or purchase order that has been issued under the contract prior to the date of such termination.

VII. METHOD OF BIDDING

An authorized person must fully and properly execute the bid. By signing, you certify your express authority to sign on behalf of yourself, your company, or other entity and full knowledge and acceptance of this formal bid proposal and contract document or informal bid proposal and price agreement and that all information provided is complete, true and accurate. The signatory has checked all of the bid figures and understands that the Authority will not be responsible for any errors or omissions on the part of the signatory in preparing this bid. Mistakes or errors in the estimates, calculations or preparation of the bid shall not be grounds for the withdrawal or correction of this bid. In case of error in extension of prices in the bid, **the unit price will govern.**

By signing and submitting this bid for consideration by the Authority, the Vendor acknowledges that they have read, understand and agree to all aspects of this complete proposal package and any subsequent addenda as presented without reservation or alteration.

Prices quotes shall be held firm through the initial contract/agreement term as indicated, except that decreases may be made at any time. **Prices quoted are to be “FOB DESTINATION” and shall include prepaid freight**, and if applicable all “Inside Delivery”, fuel surcharges, hazardous material handling charges, travel charges or any other miscellaneous charges unless any of these charges are requested for separately in the Bid Document or pricing table. Bidder certifies that federal, state or local taxes are not included in prices quoted.

Vendor shall complete, in their entirety, all required information and sign all applicable sections contained within the proposal package (*indicated below*) and submit as a whole and complete proposal no later than the due date and time:

- The Pricing Table in its entirety
- The Bidder Information & Signature Table in its entirety (***Federal Tax ID# must be provided***)
- Vendor References
- The Vendor Certification
- Any additional information as may be required shall be supplied as stated. The appropriate table, if applicable, shall be completed
- Any deviations, if allowed, to the Bid Document, must be detailed where required. If more space is needed, please provide a separate attachment with a reference to the exact section of the deviation. ***Please note that if deviations are allowed, it will be clearly stated in the Bid Document.***

ALL FORMS/TABLES MUST BE TYPE WRITTEN OR PRINTED IN INK.

VIII. REFERENCES

Bidder shall provide a minimum of three (3) references including reference from one of the bidder's largest customers. References shall be commercial or governmental accounts, and should demonstrate the ability of the bidder to perform the required services or provide the commodity similar in scope to the size, nature and complexity of the outlined bid. The references shall include all information as required in the table provided. All references shall remain confidential.

A minimum of three (3) references in accordance with the above shall also be provided for **each** subcontractor that may be used by the awarded Vendor for this contract/agreement.

IX. EVALUATION OF BID AND AWARD OF CONTRACT

The Authority reserves the right to reject any and all bids or parts of bids, to waive irregularities and technicalities and to request rebids. The Authority reserves the sole right to evaluate the bids. The Authority also reserves the right to award the bid in whole or in part to the lowest price vendor deemed to meet all requirements contained in the Bid Document. The Authority will have the right to award the contract(s) or price agreement(s) on such as the Authority deems will best service its interests.

The Vendor must be able to commence services within five (5) days of the beginning of the contract period.

The individual members of the Authority shall not be personally liable for the performance of this contract by the Authority.

X. QUANTITY

The Vendor shall agree that any difference between the estimated quantity as indicated in the Bid Document "Estimated Annual Quantity" section and the actual quantity shall not invalidate the contract or price agreement or release the Vendor from his/her responsibility to provide this commodity or service to the Authority. The Vendor shall not be entitled to any extra payment for damage or loss of profits because of any such difference.

In the case where the award is for a one-time commodity purchase, the Authority wishes to purchase the quantity as indicated in the Bid Document. If the need for additional quantities should arise within one year from the original award of purchase, the Authority, with the approval of the awarded vendor, shall be able to order additional quantities at the same original award pricing, terms and conditions.

XI. DELIVERY

Vendor shall comply with all delivery requirements for services and commodities as detailed in the Bid Document. Any delivery of equipment shall be shipped defect free to the Authority location as indicated in the Bid Document.

All deliveries of services and goods shall be accompanied by a delivery receipt and shall be signed for by an Authority representative. In the case where the service being provided is for waste hauling a certified weight ticket shall be provided upon delivery or removal. The Authority reserves the right to weigh all trucks before and after loading at a certified weigh scale to verify weight slips submitted by the Vendor.

Refer to the enclosed Buffalo Sewer Authority Regulations for Entering Formal Proposals for Materials, Supplies, Equipment and Services, Section 13 – DELIVERY DATE, PENALTIES AND EXTENSIONS OF TIME, regarding the failure to complete the contract within the specified time period.

XII. HOURS FOR SERVICE

Unless otherwise indicated in the Bid Document, the hours for services or deliveries shall be during normal business hours of 7:30 AM – 3:00 PM for the Authority Treatment Plant Facility and any outlying stations or 8:00 AM – 3:30 PM for the Authority Administrative Offices located in City Hall. Deliveries of goods are not permitted at the Authority's Treatment Plant location during the hours of 12:00 noon – 1:00 P.M. without written authorization from the Authority representative responsible for the receipt of those goods.

XIII. INVOICING

Unless otherwise indicated in the Bid Document, all invoices shall be sent to the Authority's Treatment Plant at the address previously indicated. All invoices shall be substantiated with a duplicate copy of signed (*by authorized Authority personnel*) delivery receipt and/or certified weight ticket. Unless otherwise indicated in the Bid Document, invoices shall be received monthly.

Invoices must be detailed. Where applicable –

- invoice must specify pick-up dates and clearly designate the type of waste being hauled;
- each different waste stream shall be on a separate invoice should a vendor have a contract(s) for hauling of more than one type of waste;
- invoice shall note reason for any waiting time fees and no-load fees;
- invoice must detail all services and hours for each service and craft;
- invoices shall detail any overtime hours worked at the request of the Authority;
- invoices shall be in accordance with all pricing as detailed in the bids submitted and subsequent award of contract or price agreement;

Where a contract or price agreement includes prevailing wages, the Vendor is required to submit a certified copy of the payroll for all work completed. These must accompany each invoice.

XIV. EMERGENCY PURCHASE/SERVICE

In the event that a disaster emergency is declared by Executive Order under Section 28 of Article 2-B of the New York State Executive Law, or that the Mayor of the City of Buffalo, or that the General Manager of the Buffalo Sewer Authority determines pursuant to his/her authority under Section 163(10)(b) of the New York State Finance Law that an emergency exists requiring prompt and immediate delivery of products or services, the Authority reserves the right to obtain such products or services from any source, including but not limited to this contract or price agreement, as the General Manager in his/her sole discretion determines what will meet the needs of such emergency. The Vendor shall not be entitled to any claim or lost profits for products or services procured from other sources pursuant to this paragraph.

XV. TREATMENT PLANT ACCESS

The Contractor shall enter the Treatment Plant site and transport all materials and equipment across the roadway portion of the International Railroad Bridge. Said bridge is located at the north end of the plant site (*street address location- next to 1726 Niagara Street – sign indicates entrance to Unity Island Park*) and has an H-20-S-16 load limit maximum. Trucks must conform to load limits posted by Canadian National Railway Company – 32 tons (64,000 lbs.) single truck and/or 36 tons (72,000 lbs.) tractor trailer. These load limits are subject to change. It is the Vendor's responsibility to ensure that the vehicle, including load, meets the allowable bridge loading. Unless otherwise notified, use of the West Ferry Street Lift Bridge will not be allowed.

From time to time, the Authority is notified by Canadian National Railway Company or other party that the International Railroad Bridge is not available for vehicle traffic either due to repairs or other reasons. These events are not in the control of the Authority. As soon as the Authority is notified of the unavailability of the bridge, the vendors are notified. In the event of bridge closure, the Authority shall have the right to revise any schedules based on bridge availability. The Authority shall not be responsible for any additional charges incurred by the vendor due to bridge unavailability beyond the control of the Authority.

XVI. SUBCONTRACTORS

Refer to the Buffalo Sewer Authority Regulations For Entering Formal Proposals For Materials, Supplies, Equipment And Services document. The appropriate forms contained in the proposal package shall be completed and submitted with bid. Upon approval of subcontractor list by the Authority and award of contract/agreement, the Subcontractors shall be legally bound to adhere to all portions of the contract/agreement. All information required to be submitted by any approved subcontractor must be done by the awarded Vendor. The Authority will not be responsible for dealing directly with any approved subcontractor.

XVII. INSURANCE

The Vendor and any subcontractors shall secure and maintain insurance coverage as specified in the Bid Documents. The Vendor shall furnish a certified copy of said policies or certificates evidencing said coverages to the City of Buffalo and Buffalo Sewer Authority at the time of execution of the contract or price agreement. It shall be the responsibility of the Vendor with whom the contract/agreement has been awarded to obtain and submit all required insurance certificates for any approved subcontractors that are being utilized.

The City of Buffalo and the Buffalo Sewer Authority shall be named as additional insureds under the general liability insurance coverage, automobile liability insurance as well as under any excess/umbrella liability coverage.

The Vendor shall not commence any work until insurance protecting him from claims which may arise from operation under the contract/agreement, whether such operation be by the Vendor or by a subcontractor or by anyone directly employed by either of them has been obtained and approved by the Authority.

It shall be the **responsibility** of the **awarded Vendor** named in the contract/agreement documents to provide the Authority with **new/renewed insurance certificates upon (preferably prior to) the expiration** of any provided certificates that expire during the term of the contract/agreement. **Failure to submit renewed insurance certificates may result in delay of payment.**

XVIII. PERFORMANCE BOND AND PRODUCT WARRANTY

Unless otherwise indicated in the Bid Document, the successful bidder will be required to furnish a performance bond as outlined in Section 3 of the Buffalo Sewer Authority Regulations for Entering Formal Proposals for Materials, Supplies, Equipment and Services included in this proposal package.

For those contracts awarded for a one-time purchase of a commodity, the successful bidder will not be required to furnish a performance bond. The successful bidder however, **will be required** to furnish a manufacturer's warranty on all materials and/or equipment as outlined in Section 3D of the Buffalo Sewer Authority Regulations for Entering Formal Proposals for Materials, Supplies, Equipment and Services.

Where the vendor or product manufacturer/developer general offers additional or more advantageous warranties than set forth above, the contractor shall offer or pass through any such warranties to the Authority.

XIX. ALL INFORMATION REQUIRED

BIDDERS SHALL ANSWER ALL QUESTIONS APPEARING ON BID FORM. FAILURE TO FOLLOW INSTRUCTIONS SHALL BE REASON FOR DISQUALIFICATION.

VENDOR CERTIFICATION

THIS PROPOSAL IS TENDERED BY (A) (AN):

CORPORATION ☐ PARTNERSHIP ☐ INDIVIDUAL ☐

PARTNERS CONSTITUTING PARTNERSHIP _____

INCORPORATED IN WHAT STATE, IF CORPORATION? _____

IF FOREIGN CORPORATION, STATE IF AUTHORIZED TO DO BUSINESS IN NEW
YORK STATE: YES ☐ NO ☐

<u>*CORPORATE OFFICERS' NAMES</u>	<u>TITLES</u>	<u>ADDRESSES</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

*PRINCIPAL STOCKHOLDERS

<u>NAMES</u>	<u>ADDRESSES</u>	<u>NAMES</u>	<u>ADDRESSES</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

***NOTE:** THIS INFORMATION IS NOT REQUIRED FROM NATIONALLY KNOWN
CORPORATIONS.

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:

- 1) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
- 2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any bidder or to any competitor;
- 3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

IRAN DIVESTMENT ACT CERTIFICATION

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract award hereunder, the Contractor certifies in accordance with State Finance Law §165-a that it is not on the "Entities Determined to be Non-Responsive Bidders/Offerers pursuant to the New York State Iran Divestment Act of 2012" ("Prohibited Entities List") posted at:

<http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf>

Contractor further certifies that it will not utilize on this contract any subcontractor that is identified on the Prohibited Entities List. Contractor agrees that should it seek to renew or extend this Contract, it must provide the same certification at the time the Contract is renewed or extended. Contractor also agrees that any proposed Assignee of this contract will be required to certify that it is not on the Prohibited Entities List before the contract assignment will be approved by the Buffalo Sewer Authority (AUTHORITY).

During the term of this contract, should the AUTHORITY receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, the AUTHORITY will review such information and offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment activity which is in violation of the Act within 90 days after the determination of such violation, then the AUTHORITY shall take such action as may be appropriate and provided for by law, rule or contract, including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

The AUTHORITY reserves the right to reject any bid, request for assignment, renewal or extension for an entity that appears on the Prohibited Entities List prior to the award, assignment, renewal or extension of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the Prohibited Entities List after contract award.

Signature: _____

Print Name: _____

Title: _____

Company Name: _____

Date: _____

BIDDER AFFIRMATIVE ACTION STATEMENT

The _____
(Company Name)

hereby states that we will make good faith efforts to ensure a diverse workforce and minority business participation for this proposal/bid in accordance with the Buffalo Sewer Authority's goal promoting equity of economic opportunity for minority group members and women.

We will work toward a minimum rate of twenty percent (20%) utilization of qualified and certified Minority-Owned/Women-Owned Business enterprises (M/WBE).

(Signature of Authorized representative of Bidder)

Date _____

BIDS/PROPOSALS FAILING TO INCLUDE OR COMPLETE ANY OF THE ABOVE ITEMS WILL BE CONSIDERED NON-RESPONSIVE AND WILL NOT BE ACCEPTED.

BIDDER COMPANY NAME:

REFERENCES

REFERENCES PROVIDED WILL REMAIN AS CONFIDENTIAL INFORMATION

THE BUFFALO SEWER AUTHORITY MAY NOT BE USED AS A REFERENCE.

Company Name & Contact Person	Company Complete Address	Contact Person Phone and Fax Numbers
1)		
2)		
3)		
4)		
5)		

BIDDER COMPANY NAME:

LIST OF PROPOSED SUBCONTRACTORS

Company Name & Contact Person	Company Complete Address	Contact Person Phone and Fax Numbers
1)		
2)		
3)		
4)		
5)		
6)		

BIDDER COMPANY NAME:

SUBCONTRACTOR COMPANY NAME:

SUBCONTRACTOR'S REFERENCES

REFERENCES PROVIDED WILL REMAIN AS CONFIDENTIAL INFORMATION

THE BUFFALO SEWER AUTHORITY MAY NOT BE USED AS A REFERENCE.

Company Name & Contact Person	Company Complete Address	Contact Person Phone and Fax Numbers
1)		
2)		
3)		
4)		
5)		

BUFFALO SEWER AUTHORITY
REGULATIONS FOR ENTERING FORMAL PROPOSALS
FOR MATERIALS, SUPPLIES, EQUIPMENT AND SERVICES

1) METHOD FOR TENDERING PROPOSALS

- A) All bidders must tender their proposal on the form furnished with these specifications and shall execute the form in ink or typewriter without alteration or additions of any kind. Except for catalogs or other descriptive literature specified or requested, ANY LETTERS OR OTHER PAPERS ATTACHED TO THE PROPOSALS, OR SUBMITTED UNDER SEPARATE COVER, CONTAINING CONTINGENT CLAUSES OR MODIFICATIONS TO THESE SPECIFICATIONS WILL NOT BE ACCEPTED. Any deviation or minor points or variance shall be specifically shown and stated in the space provided on the bid sheet and only those deviations or minor variations contemplated or permitted thereby will be considered.
- B) No person, co-partnership, or corporation, shall submit more than one proposal, either directly or by agent. Each bidder shall sign said proposal with his full name, in his own handwriting, and, if a partnership, each partner must sign; if a corporation, the corporate name shall be signed and acknowledged by a duly authorized official thereof.

2) QUALIFICATIONS FOR BIDDER

Vendor/Bidder hereby agrees to comply with all applicable federal, state and local laws, rules and regulations, as well as the Authority's policies.

Ordinarily proposals are not considered from bidders on supplies, material or equipment, if the bidder or manufacturer of same is in bankruptcy, or in receivers hands at the time of tendering a proposal or at the time of entering into a contract, but the General Manager reserves the right to accept or reject such proposals in the best interest of the Authority.

3) CONTRACT, BOND and WARRANTY

- A) The successful bidder will be required to enter into a contract and furnish a bond guaranteeing the faithful performance of the contract in the penal amount of the contract price within five (5) days after written notice to do so. Such security to be executed by the bidder as principal, and by a duly incorporated company authorized to guarantee the performance of the contract and to do business in the State of New York as surety. Said surety to be approved by the Corporation Council of the City of Buffalo as to form and by the Comptroller of the City of Buffalo sufficiency of the security. The amount of the performance bond shall be based on the total amount of the contract, arrived at by the additions of the totals for all groups or units listed thereon.

Where specifically provided for in the specifications, the Buffalo Sewer Authority may permit a performance bond in an amount less than the full contract price.

- B) **ALTERNATIVES TO PERFORMANCE BONDS.** Where the cost for the purchase of materials, supplies or equipment does not exceed one hundred thousand dollars (100,000.00), the General Manager may, in his discretion, waive the

requirement of a performance bond and authorize instead the submission of a certified check, bank draft or letter of credit in the amount of fifty (50) per cent of said cost. Where the cost of such purchase exceeds one hundred thousand dollars (100,000.00), the Board of Buffalo Sewer Authority may upon the recommendation of the General Manager, waive the requirement of a performance bond and authorize instead the submission of a bank draft, certified check or letter of credit in the amount of fifty (50) percent of said cost.

Where the cost of such purchase does not exceed twenty five thousand dollars (25,000.00) and usual circumstances are presented, the Board of the Buffalo Sewer Authority may, upon the recommendation of the General Manager, waive the requirements of a performance bond or the alternative set forth in this section, upon such terms and conditions as may be imposed by the Board of the Buffalo Sewer Authority or General Manager.

- C) EXCEPTIONS. Wherever the total of items awarded to any bidder is less than \$10,000, purchase orders will be issued and no performance bond will be required. This exception does not apply where a trade-in is involved. In such cases, the gross total quoted amount shall be the determining figure. A bond, or other security, shall be required when the amount is \$10,000.00 and over.
- D) Manufacturers warranty on all materials and/or equipment supplied to, or purchased by the Buffalo Sewer Authority. Said warranty shall cover any defects in the material and/or equipment that result from manufacturing, fabricating or shipping. The warranty shall be for a period of not less than one (1) year. Warranty period shall begin at the time of acceptance by the Buffalo Sewer Authority.

4) DISCOUNT

Bidder will please specify cash discount, if any; discount period to begin with receipt of invoice in the Buffalo Sewer Authority offices. The cash discount is not to be considered in determining the low bid, except where bids are otherwise identical.

5) PATENT INFRINGEMENT

The contractor shall agree to indemnify and save harmless the Buffalo Sewer Authority, the City of Buffalo and their respective, its servants, agents and employees from any and all suits or actions at law or in equity, which may hereafter be brought against them or either of them, or, on account of, the infringement or alleged infringement, of any patent or patent rights upon or pertaining to any of the articles described herein.

6) GENERAL

- A) The contractor will not be allowed to take advantage of any errors or omissions. The Buffalo Sewer Authority reserves the right to reject any and all bids on any or all items in the proposal and to waive any informalities. In case of error, unit price governs. The Buffalo Sewer Authority reserves the right to award item-by-item, group-by-group, or a whole unit, in the best interest of the Authority.
- B) Should there be any question concerning these specifications, or intent of these specifications, the prospective bidder shall apply to the Purchasing Department of the Buffalo Sewer Authority for such information.

- C) These regulations, specifications, invitation for bids, and the proposal are deemed to be incorporated in the contract.

7) TAXES

Quotations shall not include any New York Sales Tax, as Public Authorities of New York State are not subject to this tax. No federal tax of any kind shall be included unless the Federal Law specifically levies such tax against purchases made by the Public Authorities of a State.

8) TITLE

Contractor must transfer a good and incontrovertible title to all equipment furnished hereunder, free and clear of all liens and encumbrances of whatever name and nature. These regulations and specifications are for the benefit and protection of the Buffalo Sewer Authority. No extra work shall be allowed without the prior approval of the Board of Directors of the Buffalo Sewer Authority.

9) ASSIGNMENT AND SUBCONTRACTING

No contractor shall assign, transfer or sublet, subcontract, or otherwise dispose of the within contract, or any part thereof, or any right, title, or interest there under, without the prior written consent of the General Manager of the Buffalo Sewer Authority.

10) SUBCONTRACTOR LIST

The successful bidder shall submit a list of proposed subcontractors to the General Manager for this approval and obtain his written consent thereto prior to the execution of the contract.

11) DELIVERY DATE, PENALTIES AND EXTENSIONS OF TIME

If the contractor and/or supplier fails to complete the contract within the specified delivery date or within any extensions there-of granted in accordance with this section, the Buffalo Sewer Authority may elect to permit the contractor and/or supplier to proceed with and complete the contract, provided however, that in any such case such permission shall not be deemed a waiver in any respect by the Buffalo Sewer Authority of the contractor's and/or supplier's liability for damages or expenses thereby incurred by the Buffalo Sewer Authority as a result of the failure to complete delivery within the specified time, but such liability shall continue in full force against the contractor and/or supplier as if such permission had not been granted.

In order to avoid all controversy in the determination of actual damages or expenses to the Buffalo Sewer Authority for the delay in completion of the contract by reason of the Buffalo Sewer Authority's election not to terminate the right of the contractor and/or supplier and their surety shall be liable for and shall pay or allow to the Buffalo Sewer Authority a sum equal to one percent (1%) of the total amount of the contract per day as fixed and agreed liquidated damages for each and every calendar day, Sundays and Holidays included, after the date fixed for delivery during which time the contract shall remain incomplete, and any such damages and expenses may be deducted by the Buffalo Sewer Authority from any payment or payments then due or thereafter to fall due to the contractor and/or supplier.

No extension of time for completion of this contract shall be granted unless the contractor and/or supplier shall make written applications to the General Manager no later than five (5) calendar days prior to the specified delivery date for an extension of time to complete delivery and the General Manager shall have granted such extension in writing no later than the date upon which delivery was to have been made. The granting of any such extension and the length of time thereof shall be in the sole discretion of the General Manager.

12) INDEMNIFICATION

Contractor/Vendor hereby warrants the said materials, supplies and equipment delivered or services performed under this contract/agreement shall be without any defects in material or workmanship, or manner of performance, and shall be in strict accordance with said specifications. The contractor/vendor shall defend, indemnify and hold harmless the Authority and the City of Buffalo for all claims of personal injury, property damage or other liability relating to claims of alleged negligence or products liability on the part of the contractor/vendor involving the materials, supplies and equipment or services provided or performed under this contract/agreement.

13) NON-COLLUSIVE BIDDING CERTIFICATION

If the bidder is a corporation, the execution of the non-collusive certification in the form of proposal shall be deemed to have been authorized by the Board of Directors of the bidder and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

No bid shall be considered for an award nor will any award be made to a bidder where the proposal does not include the statements as to non-collusion as set forth in the form of proposal herein: provided however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and furnish with the bid a signed statement which sets forth in detail the reasons therefore. In such event, the bid shall not be considered for award nor shall any award be made unless the General Manager determines that such disclosure was not made for the purpose of restricting competition. In this connection it should be noted that the fact that a bidder has published price lists, rates or tariffs covering items being procured or has informed prospective customers of the proposed or pending publication of new or revised price lists for such items, or has sold the same items to other customers at the same price as being bid, does not constitute, without more, a disclosure to any other bidder or to any competitor within the meaning of the non-collusive certification included in the form of proposal.

14) STATE LABOR LAW – PREVAILING RATE OF WAGES

The bidder must comply with all provisions of the Labor Law of the State of New York in the performance of this agreement. In accordance with the provisions of Section 220 of the Labor Law, prevailing rates of wages to be paid laborers, workers and mechanics have been determined and fixed by the Comptroller of the State of New York.

In case it becomes necessary to employ any person in a trade or occupation for which no minimum wage rate is herein specified, the Authority shall be notified immediately by the person to whom the agreement is awarded and it will furnish the minimum wage rate. The minimum rate thus furnished shall be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment.

SECTION 220-E, LABOR LAW

PROVISIONS IN CONTRACT PROHIBITING DISCRIMINATION ON ACCOUNT OF RACE, CREED, COLOR OR NATIONAL ORIGIN IN EMPLOYMENT OF CITIZENS UPON PUBLIC WORKS

Every contract for or on behalf of the State or a Municipality for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies shall contain provisions by which the contractor with the State or Municipality agrees:

- (a) That in the hiring of employees for the performance of work under this contract or any subcontract hereunder, no contract, subcontractor, nor any person acting on behalf of such contractor or subcontractor, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the state of New York who is qualified and available to perform the work to which the employment relates;
- (b) That no contractor, subcontractor, nor any person on his/her behalf shall in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, color, disability, sex or national origin;
- (c) That there may be deducted from the amount of payable to the contractor by the State or Municipality under this contract a penalty of fifty dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of the contract;
- (d) That this contract may be canceled or terminated by the State or Municipality, and all moneys due or to become due hereunder may be forfeited, for a second or any subsequent violations of the terms or conditions of this section of the contract; and
- (e) The aforesaid provisions of this section covering every contract for or on behalf of the State or Municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.

Appendices

- **Appendix A:** Technical Memorandum #1 — Operations Data Management Evaluation (May 2026)
- **Appendix B:** Technical Memorandum #2 — Operations Data Management Recommendations (May 2026)

BUFFALO

SEWER AUTHORITY

CAPITAL PROJECTS PROGRAM | OPERATIONS DATA MANAGEMENT

Technical Memorandum #1 – Operational Data Management Evaluation

Buffalo Sewer Authority

► **FINAL** May 2026



BSA Capital Projects Program Management Team:

TYLin **ARCADIS** **JMDavidson**
Engineering, D.P.C.

Schnabel Engineering | Hallmark Planning & Development | e3 Communications | Ravi Engineering | International Institute of Buffalo | CORE Environmental | Watts Architecture & Engineering | NASCO Construction Services | Atlantic Testing Laboratories | CWD Consulting | Jade Stone Engineering | Frandina Engineering and Land Surveying | JKMuir | KHEOPS Architecture, Engineering and Survey | People Inc.

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Table of Contents

EXECUTIVE SUMMARY.....	1-1
SECTION 1 BACKGROUND.....	1-1
1.1 Staff Related Factors	1-1
1.2 Technical Factors.....	1-1
SECTION 2 OBJECTIVES.....	2-3
SECTION 3 EVALUATION PROCESS.....	3-3
3.1 Apps Arranged by Topics.....	3-4
3.2 General Workshops.....	3-4
3.3 Topical Workshops	3-4
SECTION 4 FINDINGS	4-5
4.1 Operations Data Management Matrix.....	4-5
4.2 Summary of Observations for Each Group of Apps.....	4-5
4.2.1 Module #1: Summary of Operations Applications	4-6
4.2.1.1 Specific Needs	4-11
4.2.2 Module #2: Summary of Lab/LIMS Applications.....	4-12
4.2.2.1 Specific Needs	4-14
4.2.3 Module #3: Summary of Maintenance/Maximo	4-15
4.2.3.1 Specific Needs	4-18
4.2.4 Module #4: Summary of Industrial Waste Applications	4-19
4.2.4.1 Specific Needs	4-21
4.2.5 Module #5: Summary of Sewer Maintenance Applications.....	4-22
4.2.5.1 Specific Needs	4-23
4.2.6 Module #6: Summary of Engineering Applications	4-25
4.2.6.1 Specific Needs	4-27
4.2.7 Module #7: Summary of Accounting Applications	4-28
4.2.7.1 Specific Needs	4-30
4.2.8 Module #8: Summary of Human Resources Applications.....	4-31
4.2.8.1 Specific Needs	4-34
SECTION 5 COMMON NEEDS AND CHALLENGES FACING BSA.....	5-36
5.1 Common needs and challenges include the following:.....	5-36

Table of Contents

SECTION 6	CONCLUSIONS AND NEXT STEPS.....	6-37
6.1	Notable Needs and Considerations.....	6-37

List of Tables

Table 1:	List of Abbreviations	1-1
Table 2:	BSA Contributors.....	1-2
Table 3:	Operations Apps.....	4-6
Table 4:	Laboratory / LIMS Apps.....	4-13
Table 5:	Maintenance / Maximo Apps	4-16
Table 6:	Industrial Waste Apps	4-20
Table 7:	Sewer Maintenance Apps	4-23
Table 8:	Engineering Apps	4-25

Executive Summary

This Technical Memorandum (TM#1) documents the evaluation of operations data management (ODM) practices and applications at Buffalo Sewer Authority (BSA). These are the results of a collaborative effort of BSA staff and their Capital Projects Program Management team members TYLin, and CWD Consulting. The project was initiated in response to BSA's need to modernize and improve its data management systems for greater efficiency, sustainability, and continued regulatory compliance. Key drivers include anticipated IT staff transitions, current use of custom-developed applications which rely on IT staff support, and the need to modernize data management practices for better usability and efficiency. This evaluation covers ODM practices across BSA's Operations, Laboratory/LIMS, Maintenance/Maximo, Industrial Waste, Sewer Maintenance, Engineering, Accounting and Human Resources disciplines. While the goal of TM#1 is to understand and document BSA's current ODM practices, subsequent TM#2 is underway to develop general recommendations for improvements of these systems.

The ODM evaluation process for TM#1 involved the following major steps:

1. Compiling a preliminary summary of applications in use.
2. Conducting workshops with BSA IT staff, management, and users to gather detailed feedback.
3. Documenting findings in an ODM Matrix and through topical summaries included in this TM#1.

The findings of this evaluation include specific needs related to each discipline, as well as common needs and challenges facing BSA. Some of the notable needs are as follows:

- ▶ **Operations:** BSA relies on a suite of custom applications for critical reporting and daily operations. Many of these apps require updates to increase the level of automation of data manipulation, improve usability, and coordinate better with recent process upgrades.
- ▶ **Laboratory/LIMS:** The custom LIMS app is complex to use and maintain. Enhancements are needed to make the system more user-friendly and sustainable, with less reliance on BSA IT staff. There is debate over updating the existing system versus adopting new commercial LIMS software.
- ▶ **Maintenance/Maximo:** Many custom apps supporting Maximo may not function after the upcoming migration to Maximo App Suite (MAS). Improved and modernized automation, documentation, and user interfaces are needed, along with electronic workflows for approvals and reporting.
- ▶ **Industrial Waste:** The ITrack system and supporting apps manage waste tracking and regulatory reporting. Needs include better data visualization, digital documentation for inspections, and streamlined data entry from external labs.
- ▶ **Sewer Maintenance:** Integration between GIS and Maximo is lacking, affecting asset location and work order efficiency. Mobile app challenges and manual data processes persist. Upcoming projects would benefit significantly from improved data management.
- ▶ **Engineering:** ESRI GIS products and AutoCAD are central to data collection and mapping. Expanded licensing and training would allow for broader departmental use. Improved drawing digitization processes are needed. Standardization of data collection (e.g. preconfigured drop-down lists, etc.) is needed to improve accuracy and usefulness of data.
- ▶ **Common Needs and Challenges**
 - Sustainability of custom apps amidst IT staff turnover.
 - Increased automation of data manipulation and reduction of manual data entry.
 - Empowering users to adapt and improve systems with less reliance on IT staff.

- Enhanced data visualization and accessibility.
- Transitioning paper-based processes to electronic formats for improved efficiency and regulatory compliance.
- Consolidation of applications to simplify maintenance and use.
- Improved interdepartmental data sharing and coordination.
- Updates to data applications to better reflect current plant processes.

TM#1 provides a comprehensive assessment of BSA's current ODM systems and identifies specific and common needs across disciplines. The findings serve as documentation of current status, and a foundation for developing recommendations in the next phase. TM#2 will explore recommendations for actionable improvements, system upgrades, and strategies for sustainable data management.

Based on the findings documented here in TM#1, we can identify key drivers and priorities for improvements to BSA's data management practices. BSA's plan to upgrade Maximo to MSA is supported, and will be factored into TM#2 recommendations. The decision to maintain the custom LIMS app or replace it with commercial software is one of the next highest priorities as the LIMS system is not only central to laboratory functions but is also the source of much of the data used in Operations and reporting. This decision will be followed by decisions regarding apps serving Operations and the remaining disciplines.

TM#2 will include some specific recommendations as well as some general recommendations which serve to form a road map guiding BSA toward improved data management practices throughout. This is not anticipated to be a short list of quick fixes, but rather a significant and valuable effort leading BSA to a new and improved generation of operations data management.

Table 1: List of Abbreviations

APC	Air Pollution Control	MS4	Municipal Separate Storm Sewer System
BSA	Buffalo Sewer Authority	MSGP	Multi-Sector General Permitting
CAM	Compliance Assurance Monitoring	NHS DEC	New York State Department of Environmental Conservation
CEMS	Continuous Emissions Monitoring System	ODM	Operations Data Management
CROMERR	Cross-Media Electronic Reporting Rule	P&ID	Process & Instrumentation Diagram
CSO	Combined Sewer Overflow	QCCW	Queen City Clean Waters
DCS	Distributed Control System	REST API	Representational State Transfer Application Programming Interface
EPA	Environmental Protection Agency	RTC	Real Time Control
ERP	Electronic Resource Planning	SCRS	Sludge Cake Receiving System
FOG	Fats, Oils, Grease	SIU	Significant Industrial User
GI	Green Infrastructure	SMD	Sewer Maintenance Division
GIS	Geographic Information Systems	SPDES	(NY) State Pollution Discharge Elimination System
LIMS	Laboratory Information Management System	SWPP	Stormwater Pollution Prevention Plan
LTCP	Long Term Control Plan	TM	Technical Memorandum
MAS	Maximo App Suite	WWTF	Wastewater Treatment Facility
MCRT	Mean Cell Residence Time		

SECTION 1 BACKGROUND

This project was conceived as Buffalo Sewer Authority (BSA) expressed the need to improve their Operations Data Management (ODM) practices for better efficiency and long-term sustainability. Multiple factors contributed to the need and urgency to evaluate and improve these ODM practices:

1.1 Staff Related Factors

BSA is anticipating the loss of at least two experienced IT staff in the coming months who have been instrumental in the development and maintenance of many of the existing ODM applications. Many of these applications have been custom developed for BSA and the functions they provide must be maintained, either in those apps or as part of other software. It would be advantageous to leverage the experience of those IT staff, while they are available, to support the transition to more sustainable data practices.

1.2 Technical Factors

Many of the technical factors described in detail in this document can be summarized as the need to modernize data management practices. This may include migrating features of some of the existing apps into more contemporary software that utilizes powerful and flexible tools providing better usability and efficiency.

While the original focus of the project was to address the data management practices related to Operations, the scope evolved to include related data management practices used by laboratory and maintenance staff, as well as other BSA departments. A potential advantage of evaluating and improving the data management practices of various groups within BSA, is improvement of interdepartmental communication and opportunities for cooperation, resulting in other secondary benefits.

While this project has evaluated ODM practices and applications used by various BSA departments, there are some related software applications that were not fully within the scope of the evaluation, mainly because there is no intention of significant changes to those apps. One example is the Emerson Ovation distributed control system (DCS), which is used for process control and is the original source of much of the data use in other apps evaluated here. Other examples include planning, management and controls related applications such as Munis, Procore, Primavera and Unifier. While these apps may be mentioned in this evaluation where applicable, there is no intention of BSA moving away from using these apps.

The effort to understand and document BSA's current ODM practices has been a collaborative effort of BSA with their Capital Projects Program Management Team led by TYLin, assisted by CWD Consulting. Each member of the team has provided an essential role and had significant input to the information summarized in this document. The participation and contributions of BSA staff listed below in *Table 2* are appreciated:

Table 2: BSA Contributors

Name	Title	ODM Task Role
Charles Riley	Executive Secretary and CFO	BSA Main Point of Contact – ODM Modules 7, 8
Rosaleen Nogle	Principal Sanitary Engineer	BSA Main Point of Contact – ODM Modules 6, 7
Tim Blake	WWTF Capital Projects Manager	BSA Main Point of Contact, WWTF Team
Alex Emmerson	Treatment Plant Superintendent	BSA Main Point of Contact – ODM Module 1
Brian Hargrave	IT Director	BSA Main Point of Contact – ODM Module 7, 8
Peter Zimmer	IT Specialist	BSA Main Point of Contact – ODM Module 2, 3, 8
Alan Emke	IT Specialist	IT Team
Maha Alabbadi	Assistant Computer Programmer	IT Team
Sean Morrison	Operations Shift Superintendent	BSA Main Point of Contact – ODM Module 1
Steve Tuhovak	Laboratory Director	BSA Main Point of Contact – ODM Module 2
Paul Harris	Superintendent of Mechanical Maintenance	BSA Main Point of Contact – ODM Module 3
Blake Harper	Preventive Maintenance Coordinator	BSA Main Point of Contact – ODM Module 3
Rick Bonner	Instrument Tech	CEMS MAINT app user
Kevin Colman	Instrument Tech	
Elizabeth Scheeler	Industrial Waste Administrator	BSA Main Point of Contact – ODM Module 4
Joel Renzoni	Director of Sewer Maintenance	BSA Main Point of Contact – ODM Module 5
Vinnie Vullo	Assistant Superintendent - Sewer Maint	BSA Main Point of Contact – ODM Module 5
Doug Smith	Chief Inspector	
Katie Walsh	GIS Specialist	BSA Main Point of Contact – ODM Module 4, 6

Name	Title	ODM Task Role
Regina Harris	Senior Engineer	
Yasmin Abdul-Malik	GIS Specialist	
Perry Pope	Preventative Maintenance Coordinator	
Lori Scaletta	Acting Director of Employee Relations	BSA Main Point of Contact – ODM Module 8
Crystalee Lozada	Personnel Clerk	Administrative/HR User
Joy Houston	Senior Personnel Clerk	BSA Main Point of Contact – ODM Module 8
Leah Rossi	Personnel Clerk	Administrative/HR User
Danielle Sharp	HR Clerk	Administrative/HR User
Jessica Rine	Purchasing Supervisor	Administrative/Accounting User
Joel Woodall	Typist	Administrative/Accounting User
Colin Shanahan	Senior Stock Clerk	Administrative/Accounting User
Jess Langworthy	Purchasing Supervisor	Administrative/Accounting User

It is also important to note that the Program Management Team approached this project with awareness of two related ongoing projects with which they are also involved. These include improvements to Asset Management, and development of P&IDs for Bird Island WWTF. Impacts between these projects have been and will be considered by the Program Management team as these projects progress.

SECTION 2 OBJECTIVES

The main objectives of this project are as follows:

- ▶ To better understand and document BSA's operational data systems and applications. This involves identifying challenges, inefficiencies, manual processes, and potential areas for improvement. This objective is the focus this document, Technical Memorandum #1 (TM#1), ODM Evaluation.
- ▶ To develop general recommendations for improvements of these systems which may involve updating and optimizing existing apps, adding new vendor software, or a combination of both. This objective will be addressed separately in Technical Memorandum #2 (TM#2), ODM Recommendations.

SECTION 3 EVALUATION PROCESS

A systematic approach was followed to evaluate and document the apps used by various BSA departments in a detailed and consistent manner.

3.1 Apps Arranged by Topics

First, BSA IT staff provided a preliminary spreadsheet summary of apps with basic information such as the name, purpose, location, etc. This spreadsheet was the basis for what would become the primary document summarizing the details of the app evaluation.

3.2 General Workshops

Next, a series of meetings and workshops was held with a representative group of BSA management and IT staff, starting with a project kickoff meeting on October 30, 2024 to discuss the background and establish project objectives. BSA operational needs were discussed, and main concerns were provided regarding the current operations.

Following the kickoff meeting, three follow-up meetings were held to establish further details about the purpose and products of the various applications currently in use. These meetings focused on obtaining additional details about the apps and related procedures from the perspective of the IT staff (who developed many of the apps), and managers who lead BSA departments who use the apps. In addition, the team of BSA, TYLin and CWD staff worked together to develop the process that would be used to discuss, evaluate and document the apps in use. The following meetings occurred:

1. ODM Group Meeting 1 on November 21, 2024.
2. ODM Planning Meeting on November 27, 2024.
3. ODM Group Meeting 2 on December 18, 2024. (This meeting was started on 12/18/2024, continued on 1/7/2025, and completed on 1/10/2025)

Full details from these workshops can be found in the meeting minutes in the appendix to this document.

3.3 Topical Workshops

Following the initial general workshops, the team focused on gathering feedback from the apps' primary users. The goal was to better understand from daily users the benefits and challenges of working with the current apps, as well as the procedures associated with data management from the staff using each group of apps.

A general format was developed for these workshops, including a common set of exploratory questions designed for consistency in the evaluation. Then a detailed agenda was created for each topical workshop to tailor the discussion to each topic (i.e. each group of associated apps). Screenshots were compiled prior to each topical workshop to reflect the reports, products, user interface, and other pertinent information associated with the group of apps being discussed.

A series of eight topical workshops were held from May to August 2025, including the following:

- Workshop #1 – Operations..... May 2, 2025
- Workshop #2 – Laboratory/LIMS May 16, 2025
- Workshop #3 – Maintenance/Maximo..... May 30, 2025
- Workshop #4 – Industrial Waste June 4, 2025
- Workshop #5 – Sewer Maintenance June 24, 2025

- Workshop #6 – Engineering..... July 25, 2025
- Workshop #7 – Accounting July 18, 2025
- Workshop #8 – Human Resources August 12, 2025

Detailed minutes of each workshop are provided in the appendix to this document.

SECTION 4 FINDINGS

The information gathered in the workshops mentioned above was documented in several formats to ensure information was recorded consistently and could be easily referenced and used.

4.1 Operations Data Management Matrix

With a primary goal of the project being to document pertinent details of the software apps in use by BSA staff, the results of the workshops described above are recorded in a spreadsheet called the Operations Data Management (ODM) Matrix, which is included in Appendix A. The ODM Matrix includes one row for each app, and groupings of columns to define the characteristics of the apps as follows:

1. General Information Columns: These include columns for quick filtering (i.e. App ID, BSA Point of Contact, Grouping), App Name, Description, Purpose, Products, and Screen Shots captured.
2. Use and Association Columns: These columns document whether the app is associated with regulatory reporting, operations, laboratory, or maintenance functions.
3. User Information Columns: These columns indicate the approximate number of users, primary users, and how frequently the app is used.
4. Data Source and Accessibility Columns: These columns document the data source and qualitatively assess the efficiency and ease of use of the apps (i.e. clarity of display, data path, accessibility, and maintainability).
5. Quick Assessment Columns: The final three columns provide a record of any initial and/or obvious observations of pros/cons of each app, as well as cursory recommendations for maintaining or eliminating the app.

The full matrix is best accessed electronically (in Excel format) and will be transmitted as such with this document. BSA is recommended to maintain this matrix as a tool to manage and document the ODM apps going forward, as some apps are added, deleted or modified in the effort to optimize data management. In addition to the matrix, information is provided in additional detail in the summaries below.

4.2 Summary of Observations for Each Group of Apps

A summary is provided in this section for each group of apps, organized by topic. Each summary provides information regarding the main BSA points of contact, users, purpose/products of each app, data management features, and specific needs related to the group of apps. The information is consistent with the details shown on the ODM Matrix, and presented here in more detail, while further highlighting critical issues.

4.2.1 Module #1: Summary of Operations Applications

1. Main BSA Points of Contact:
 - a. Alex Emmerson, Treatment Plant Superintendent
 - b. Sean Morrison, Operations Shift Superintendent
2. Primary BSA Users:
 - a. Alex Emmerson, Treatment Plant Superintendent
 - b. Sean Morrison, Operations Shift Superintendent
 - c. Scott Lennon, Process Group
 - d. Operations Staff
 - e. Staff from the Lab, Maintenance and Engineering to a lesser degree.
3. Software Applications Used:
 - a. There are 34 applications related to Operations use. This includes six main custom applications developed by BSA IT staff which combine to form the "Operations Suite":
 - i. Operations web reports
 - ii. Operations data
 - iii. Partial treatment data
 - iv. Overflow data
 - v. Calculation data dictionary
 - vi. Operator Log

► The full list of apps related to Operations is found in *Table 3*.

Table 3: Operations Apps

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
Operations Data	Operations Data Maintenance	Part of "Operations Suite". Operations Data Maintenance app. 8-page (being expanded to 12) operator interface for displaying process data (mainly supporting the monthly report). Critical part of the Operations Suite.	Screen which displays data (most calculated in Oracle database, some from Ovation DCS, some manually entered).

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
Partial Treatment	Partial Treatment Event Tracking	Part of "Operations Suite". Partial Treatment Event data tracking. Feeds into the monthly report. This is part of the Operations Suite.	Screen which displays Operations data related to partial treatment events. (Partial treatment event is Primary treatment only, during high flow event.)
OverFlow	01A Overflow Event Tracking	Part of "Operations Suite". Overflow Event Tracking	Report that feeds OverFlow event data into the Monthly "12-Page Report" to regulators.
Operations Web Reports	Operations Reporting Interface	Part of "Operations Suite". Operations Reporting Interface for generation of various reports.	PDF or Excel Reports, based on selected parameters.
Operations Web Reports Home	Operations Reporting Interface Home Page	These are 3 Reports Pages/Tabs, accessible from the "Treatment Plant Operations Data" menu screen, used for accessing and querying Operations Web Reports (above).	Operations Web Reports (above).
Operations Web Reports Maintenance	Operations Reporting Maintenance	Maintains Operations Report List.	No screen shot since this is a maintenance app.
OpLog	BSA Operator Log	Part of "Operations Suite". Operator Log of data entered by each shift, and related Operator Shift functions (Ops Procedures, etc.).	Data feeds into various reports.
Odor Complaint Log	Odor Complaint Log	Entry of odor complaint info (dates, data, description of complaint, etc.).	Odor Complaint Log

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
Current Plant Data	Current Plant Data	Provides a summary of current plant data, accessible off site. Values updated every 10 minutes.	Report of Current Plant Data for offsite access.
Odor Samples	Odor Samples (LIMS)	Simple Informational app to view Lab Odor Samples	Lab Odor Sample Reports
Operator Comments and Suggestions	Operator Comments and Suggestions	Logs Operator Comments and Suggestions	This app is not currently used, but the concept should be incorporated elsewhere.
Special Operating Instructions	Special Operating Instructions	Special Operating Instructions, appears on home screen of Operations Log. (button on OpLog home screen to navigate to entry page)	Special operating instructions made available from shift to shift, etc. Refer to screen shot of typical comments.
Main Pump, Screen Room, Grit Chambers	Main Pump, Screen Room, Grit Chambers Log Summary	Generates Log Summary	Log Summary for Main Pump, Screen Room, Grit Chambers
Raw Sludge Pump	Raw Sludge Pump Log Summary	Generates Log Summary	Log Summary for Ras Sludge Pumps
Settled Wastewater and Sludge Thickeners	Settled Wastewater and Sludge Thickeners Log Summary	Generates Log Summary	Log Summary for Settled Wastewater and Sludge Thickeners
Aeration	Aeration Log Summary	Generates Log Summary	Log Summary for Aeration
Blowers	Blowers Log Summary	Generates Log Summary	Log Summary for Blowers
Final Effluent	Final Effluent Log Summary	Generates Log Summary	Log Summary for Final Effluent
Digester Control	Digester Control Log Summary	Generates Log Summary	Log Summary for Digester Control

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
Sludge Dewatering	Sludge Dewatering Log Summary	Generates Log Summary	Log Summary for Sludge Dewatering
Incineration 1	Incineration 1 Log Summary	Generates Log Summary	Log Summary for Incinerator 1
Incineration 2	Incineration 2 Log Summary	Generates Log Summary	Log Summary for Incinerator 2
Partial Treatment	Partial Treatment Log Summary	Generates Log Summary	Log Summary for Partial Treatment
Remote Stations and Comments	Remote Stations and Comments Log Summary	Generates Log Summary	Log Summary for Remote Stations and Comments
Electric KWH Usage	Electric KWH Usage	Logs data from Shark Power Monitors via Ovation.	Summary of Power Consumption for some switchgear main feeders and large equipment (i.e. Blowers, etc.). May eventually include other main feeders and MCCs.
Equipment Run Times	Equipment Run Times (Need Update)	Equipment Run Time Log is out of date. This function is performed within the DCS.	
Compliance Assurance Monitoring	Compliance Assurance Monitoring (Needs Update)	Collects data on water flows into Scrubber system.	Data log, and report for permit compliance. Although somewhat manual.
APC	CAM Water Flow Excursions (Needs Update)	Logs data for CAM system related to excursions. (part of same app as CAM above).	Data log, and report for permit compliance. Although somewhat manual.
CEMS_MAINT	CEMS Maintenance Log (Needs Update)	Logs data from Continuous Emissions Monitoring System computer. Still active. In future, this data may be integrated to Historian.	Documentation of periodic CEMS maintenance.

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
DCU TAGS	ABB SCADA system DCU points list	Legacy document of prior ABB DCU (no longer onsite).	
INCIN	Incinerator APC Data Trends (Out of Date, Needs Update)	Incinerator data from Ovation for Air Pollution Control (APC).	Calculates and documents deviations for Air Title V (semi-annual and annual reporting) reporting purposes.
PROCESS SPREADSHEET	Process Department Ovation Spreadsheet	Reports (MCRT) based on Lab and Ovation data.	Presents Mean Cell Residence Time (MCRT) data.
SCADA TRENDS	Plant Flow and Wet Well Trends	(Out of Date - No longer used)	
OVXfer	BSAOP Nightly Calculation and Ovation Data Transfer	Nightly data transfer over multiple paths.	
Calculation Data Dictionary	Calculation (Operations) Data Dictionary	Part of "Operations Suite". Tracks the origin and path of data between various apps. Indicates other variable that use the data, or incorporated into the data. Also contains data change log documentation.	Electronic documentation of data origins and paths.

4. Major Purposes/Products

- The Operations Suite of six critical apps is used to generate a 12-page operations report in either PDF report format or Excel format for further manipulation. This is a critical function as this report forms the basis of the monthly regulatory report submission.
- Data entered to the Operator Log is used to generate various Operations-related reports.
- The Calculation Data Dictionary app was developed by BSA to document the sources of data, and details about where that data is used.
- There are twelve Operator Log Summary apps which provide access to stored daily operator logs for staff who don't otherwise have direct access to the Operator Log. The log summaries are dedicated to various process operations.

- e. There are various other apps in this operations set related to odor sampling and complaint logging, special operating instructions, equipment run times, power monitoring, air emissions from scrubbers and incinerators, and (Mean Cell Residence Time) MCRT data. Refer to the ODM Matrix for additional details.

5. Data Management Notes:

- a. Much of the data is manually entered into the Operations Suite apps and specifically the Operator Log (i.e. sample times, flows, etc.). Once data is entered, calculations are performed automatically in Oracle, or in a linked spreadsheet.
- b. Operator Log data is fed into the set of Operator Log Summary apps. Although the Operator Log Summary apps can be searched by date, the text is not searchable.

4.2.1.1 **Specific Needs**

1. Major Needs – Operations Apps

- a. Update the “Operations Data” app, which feeds critical operations reporting, to improve level of automation of data manipulation, and improve general usability.
- b. “OpLog” app and twelve Log Summary apps/reports all need updates to reflect changes in processes and equipment.
- c. “OpLog” app should be considered for significant updates or replacement with newer/better app to improve usability, efficiency and automation of data.
- d. Further automate the uploading of operational data into electronic submissions to regulators.
- e. “Compliance Assurance Monitoring” (CAM), “Air Pollution Control” (APC), and “Continuous Emissions Monitoring System” (CEMS_MAINT) apps need updates to reflect current permit emissions requirements and scrubber system operation.

2. Minor Needs – Operations Apps

- a. Make stored Operator Log Summaries searchable for text strings.
- b. It is difficult for operators to visualize the processes and equipment covered by the Operator Log Summaries. Consider a graphic overlay to allow operators to select a process area for quick access to log summaries.
- c. “Operations Web Reports Home” app includes three pages used to select and generate various reports. Add descriptive titles to the three “page” tabs and to the top of each page to clarify the information in focus under each page.
- d. Eliminate “Current Plant Data” app and replace function with Ovation DCS EDS, or other solution (i.e. Representational State Transfer Application Programming Interface tools, or REST APIs).
- e. “Odor Samples” app may be eliminated if Lab software can provide similar reports of odor sample lab data.

- f. "Operator Comments and Suggestions" app is not used, and can be eliminated. But the concept should be provided in another app.
- g. Eliminate "Special Operating Instructions" app and replace function with another app.
- h. Improve or replace "Electric KWH Usage" app for power monitoring, with the goal of enhancing facility-wide power usage tracking.
- i. "Equipment Run Times" app may be eliminated since this function is accomplished in the Emerson Ovation DCS (redundant with this app). Ensure run time integration with Maximo.
- j. Eliminate "DCU TAGS" app related to former ABB DCS (which is no longer onsite).
- k. Update "INCIN" app which produces incinerator APC Data Trends using data from Ovation DCS. Implement updates to represent current operations.
- l. Eliminate "SCADA TRENDS" app of plant flow and wet well trends, which is out of date and no longer used.
- m. Consider offsite accessibility (read-only) to operations data for uses outside of BSA (i.e. vendors, engineers, etc.) who may need access to certain data.

3. Preferences for Consideration – Operations Apps

- a. Reduce the overall number of apps needed to provide all operations-related functions. It is possible that only a few applications could provide most/all of these functions.
 - i. For example, many of the functions provided by the 34 custom apps related to Operations use may be provided by one or more overarching operations support software package(s). And, some of the functions and calculations executed by the custom apps could be programmed to occur within the existing Ovation DCS. A combination of a new operations app and modifications to the existing DCS could significantly reduce the number of custom apps needed to provide all desired functions, thereby simplifying data management. This will be further explored in TM#2.

4.2.2 Module #2: Summary of Lab/LIMS Applications

- 1. Main BSA Points of Contact:
 - a. Steve Tuhovak, Laboratory Director
 - b. Peter Zimmer, IT Programming Specialist
- 2. Primary BSA Users:
 - a. Steve Tuhovak, Laboratory Director
 - b. Alex Emmerson, Treatment Plant Superintendent
 - c. Laboratory Staff
- 3. Software Applications Used:
 - a. There are 11 applications related to Lab/LIMS use.

- i. There is one main custom BSA "LIMS" app, and six related supporting apps.
- ii. There are four informational apps that have not been used for years and would need updates to be used again. These include "Sampinfo", "Results", "Reports", and "View Sterilizer Cycles".

► The full list of apps related to Laboratory/LIMS is found in *Table 4*.

Table 4: Laboratory / LIMS Apps

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
MicroExam	LIMS Micro Exam Worksheets	Data entry app for Lab to track Microscopic exam results and evaluations. Data source is custom BSA LIMS app.	Produces LIMS Microbiology Exam Worksheets.
LIMS Reports	LIMS System Web Reports Interface	LIMS General Reporting Interface	LIMS Reports
LIMS Reports Edit	LIMS System Web Reports Maintenance	LIMS Maintenance routine to maintain LIMS Report app.	This is a LIMS system admin app with no user interface or screen shots.
View Lab Samples	View Lab Samples (LIMS)	Data Lookup app to pull data from LIMS per sample or per date range. Useful to Process department.	Shows lab sample record for individual samples by analyte or Sampe Log#, or all samples per day/date.
Pending Industrial Waste Lab Samples	Pending Industrial Waste Lab Samples (LIMS)	Data Lookup app to pull Industrial Waste data. But Industrial Waste samples are currently analyzed by 3rd party lab, so there is no data available for this at this time.	Info regarding pending industrial waste samples (if being analyzed in house).
Sampinfo	LIMS SamplInfo Audit (LIMS)	Simple Informational app to view Sample Info based on LIMS Sample Log #.	Has not been used in years. May need updates if want to maintain.
Results	LIMS Results Audit (LIMS)	Simple Informational app to view LIMS Results Audit.	Has not been used in years. May need updates if want to maintain.

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
Reports	LIMS Reports Audit (LIMS)	Simple Informational app to view LIMS Reports Audit.	Has not been used in years. May need updates if want to maintain.
View Sterilizer Cycles	View Sterilizer Cycles (LIMS)	Simple Informational app to view Lab Sterilizer Cycles.	Has not been used in years. May need updates if want to maintain.
LIMS	Laboratory Information Management System (LIMS)	Custom BSA LIMS App. This is the primary LIMS system app developed and maintained by BSA IT staff.	Manages all LIMS data and reports.
LabPost	LIMS Nightly Calculation and BSAOP Data Transfer	Data Transfer routine that Transfers data to "Operations Data" app nightly.	Data Transfer and Calculation routine. No operator interface, as this is a system admin app.

4. Major Purposes/Products

- a. These apps are primarily used for Lab and Operations purposes. They include the main custom BSA Laboratory Information Management System (LIMS) app, and related apps with supporting functions such as reporting, sample data display, and audit tracking.
- b. The "LIMS" app includes the home screen for the LIMS system, which shows 6 tabs including: Home, Log In Samples, Search Edit, Record Results, Utilities, and Reports. Functions on these tabs are generally for Lab staff to log in samples and record results, and for Process/Operations and other staff to search results and create reports.

5. Data Management Notes:

- a. Much of the data is manually entered into the LIMS app. Other apps in this group obtain data from LIMS, and receive other data via manual entry, or from other apps such as the Ovation DCS or iTrack.

4.2.2.1 Specific Needs

1. Major Needs – Lab/LIMS Apps

- a. Custom "LIMS" app is complex and difficult to navigate at times. Need to make this system more efficient and user-friendly, as well as more maintainable and sustainable in the future with less reliance on BSA IT staff.
- b. Any changes to "LIMS" system must be implemented by IT staff. Whereas it would be more efficient if Lab and Operations users could make minor changes.

- c. There are differing views within BSA on whether updating the custom BSA LIMS system, or replacing it with a vendor software is the better approach.
- 2. Minor Needs – Lab/LIMS Apps
 - a. Incorporate photos/videos captured by the microscope computer into “MicroExam” app worksheets for use in LIMS system reports. The microscope computer has this capability but it has not been integrated.
 - b. “LIMS Reports” app occasionally needs changes in format or content of reports to comply with lab audits. Those changes must be implemented by BSA IT staff. Would be more efficient if such minor changes could be made by Lab staff users as needed.
 - c. Determine if the “Pending Industrial Waste Lab Samples” app should be maintained or modified since it is only needed if Industrial Waste samples will be analyzed in the BSA lab in the future (they are currently processed at a third-party lab, so this app is not used).
- 3. Preferences for Consideration – Lab/LIMS Apps
 - a. Consider any improvements to these apps that could simplify the annual lab audit process. Possibly improved tracking of audit issues, more efficient updates to report content/format, etc. The following apps were previously (but no longer) used as documentation to support lab audits: “Sampinfo”, “Results”, “Reports”, “View Sterilizer Cycles”. There may be no need to maintain these apps pending improvements to the lab auditing process.

4.2.3 **Module #3: Summary of Maintenance/Maximo**

- 1. Main BSA Points of Contact:
 - a. Paul Harris, Superintendent of Mechanical Maintenance
 - b. Peter Zimmer, IT Programming Specialist, Maximo Lead
 - c. Blake Harper, Maximo Lead, User Group Representative
- 2. Primary BSA Users:
 - a. Paul Harris, Superintendent of Mechanical Maintenance
 - b. Blake Harper, Maximo Lead, User Group Representative
 - c. Alex Emmerson, Treatment Plant Superintendent
 - d. Maintenance Staff, and Maximo users
 - e. Staff who process purchase requisitions
 - f. Stock Clerks
- 3. Software Applications Used:
 - a. Maximo (version 7.6.1.2) is a primary software tool used for maintenance applications at BSA. Although it is not directly listed or evaluated on the ODM Matrix, Maximo software will be updated to Maximo App Suite (MAS) and maintained as a critical software going forward. It is possible that integrated features of MAS may replace the functions of

many of the custom Maximo-related apps discussed here. Based on analysis by Blake Harper, it is believed that some of these custom apps likely will not work in their current form after the migration to MAS.

- b. It is also important to note that TYLin is managing a parallel task to update Asset Management processes for BSA that should be coordinated with assessment and recommendations related to these maintenance and Maximo apps.
- c. There are 14 applications related to Maint/Maximo use. Most of these are designed to manipulate data to or from Maximo and/or Munis accounting software for maintenance related tasks. These functions related to data import/export and transfer between Maximo and Munis are now commonly integrated using REST APIs available in both those applications, likely making many of the custom apps unnecessary.
- d. There is one app ("Barcodes") which is designed to develop and print barcodes for specific assets and inventory.

► The full list of apps related to Maintenance/Maximo is found in *Table 5*.

Table 5: Maintenance / Maximo Apps

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
MaxTrends	Maximo Data Trending System	Produces trends of work orders and labor quantities based on Maximo work order records.	Printable Trends of Work Order and Labor quantities.
MaxWebEdit	BSA Maximo Reporting Maintenance	System App for Maintaining Maximo Reporting subsystem. (System maintenance only, related to 4 Maximo reporting apps below).	No product. This is a system admin app only.
MaxNoneReps	BSA Maximo No Parameter Reporting interface	Reporting Interface for Maximo	General Reports, Web-serve Pdf files of various Maximo reports.
MaxWebPurch	BSA Maximo Purchasing Office Reporting interface	Reporting Interface for Maximo Purchasing Reports.	Purchasing Reports.
MaxWebMaint	BSA Maximo Maintenance Department Reporting interface	Reporting Interface for Maximo Maintenance Reports.	Maintenance Reports.

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
MaxWOReps	BSA Maximo Work Order Report interface	Reporting Interface for Maximo Work Order Reports.	Work Order Reports.
Barcodes	BSA Maximo Barcode Generator	Prints barcodes for specific item.	Physical barcode stickers for Assets and Inventory.
MaxBudImport	BSA Daily Budget Import	BSA Daily Budget Import, data transfer. (Primarily a Purchasing Department app, rather than a Maintenance app.)	No product.
MaxBudStatus	BSA Maximo PR Budget Status	Data Lookup app to pull data from Munis Accounting app.	Puts budget status data on screen. Used by all who process purchase requisitions.
MaxReqExport	BSA Maximo PR Export	Transfer Routine to move Purchase Reqs into Munis. (Primarily a Purchasing Department app, rather than a Maintenance app.)	Generates Output file for import to Munis.
MaxIssueHist	BSA Maximo Item Issue History	Data lookup app to pull data from Maximo inventory regarding purchase requisitions that have been issued.	Puts Purchase Req Issued ("Issue") data on screen. Used primarily by Stock and Inventory staff.
MaxItemHist	BSA Maximo Item Purchase History	Data Lookup app to pull purchase history data from Maximo Inventory app. Used by Purchasing and Maintenance staff to see purchasing trends, as basis for future orders, stock, budgeting, etc.	Puts data on screen. Used by all who process purchase requisitions.

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
MaxOrderStatus	BSA Maximo/Munis PO Status	Data Lookup app to pull data from Maximo and Munis, and compare status. Shows how data is moving between Maximo and Munis regarding which P.O.'s have been approved in Munis and are ready to be moved through Maximo.	Puts data on screen. Used by all who process purchase requisitions.
MaxPOStatus	BSA Maximo/Munis PO Sync Status	Data Lookup app to pull data from Munis and Maximo P.O.s	Puts purchase order status data on screen. Used by all who process purchase requisitions.

4. Major Purposes/Products

- a. The apps discussed in this section are related to various maintenance functions including purchasing, asset management, inventory, work order tracking, and various reporting functions.
- b. Many of these apps obtain data from Maximo and/or Munis to produce reports, or compare status between the two softwares.
- c. The products of these apps are data displayed on the screen (web format), or in report format.

5. Data Management Notes:

- a. These report interfaces are directly accessible from Maximo or from the BSA Network.
- b. Much of the data used in these apps is manually entered into Maximo or Munis, and obtained by the functions of these apps. The process of obtaining the data is generally manual based on user-entered query parameters.

4.2.3.1 Specific Needs

1. Major Needs – Maintenance /Maximo Apps

- a. Since most of these custom apps may not work after the migration to MAS, it may be critical to develop these functions in MAS as Maximo is upgraded.
 - i. These custom apps require maintenance by experienced BSA IT staff, and are not thoroughly documented. Most of these apps were developed 15 years ago, and contemporary IT staff may not be equipped with skills to maintain them.
 - ii. The report server that supports most of these apps runs on a 32-bit server running Windows 10 OS, soon to be upgraded to Windows 11). If/when Windows

discontinues support for 32-bit servers the report server would need to be replaced.

- b. A primary need associated with the functions provided by these apps is improved ability of users to manipulate data more efficiently (e.g. add/remove fields), without manual steps of transferring data to other formats. For example, while using Maximo or related apps users would like the ability to efficiently reformat reports, add/remove fields from records, customize work order trends, or make other similar changes,
- c. The Ability to directly export to Excel would also be useful.
- d. The workflows involved with completing and processing these maintenance reports, transferring them, obtaining approval, etc., involve many manual steps, in some cases even circulating physical printed reports. Automating these processes and making them fully electronic (i.e. electronic approvals/signatures via Electronic Resource Planning, or ERP) would be more efficient.
- e. Improvement is needed in tracking and stocking various types of parts based on data associated with reliability, failure frequency, cost, ease of installation, and other relevant criteria. This type of analysis should be further automated.

2. Minor Needs – Maintenance /Maximo Apps

- a. The interface to many of these apps could be more user-friendly.
- b. Improve “MaxOrderStatus” app function to further automate purchase order status review between Munis and Maximo (without a click for each P.O.). Further automating this may require additional access/rights in Munis (which would require high level BSA/Buffalo discussion).

3. Preferences for Consideration – Maintenance /Maximo Apps

- a. Solutions and improvements to these apps must take into account BSA’s intention to update Maximo software to MAS in the near future. Any custom apps may not work, and may need to be modified for interim service, or functionality replaced altogether in the new MAS software suite.

4.2.4 **Module #4: Summary of Industrial Waste Applications**

1. Main BSA Points of Contact:

- a. Elizabeth Scheeler, Director of Industrial Pretreatment Program
- b. Katie Walsh, Engineering GIS

2. Primary BSA Users:

- a. Elizabeth Scheeler, Director of Industrial Pretreatment Program
- b. Katie Walsh, Engineering GIS
- c. Alex Emmerson, Treatment Plant Superintendent
- d. Industrial Waste Group staff

3. Software Applications Used:

- a. ITrack is the primary app used by BSA's Industrial Waste Group. It is a custom software tool developed by BSA.
- b. There are also 4 custom supporting apps developed by BSA to integrate hauling, scales, and the Sludge Cake Receiving System (SCRS).

► The full list of apps related to Industrial Waste is found in *Table 6*.

Table 6: Industrial Waste Apps

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
ITrack	Industrial Waste Tracking System	Industrial Waste Tracking System (i.e. permits, inspections, receiving/discharges, reporting, sampling)	Creates state reports, billing invoices, etc.
SCRS Invoice	SCRS Invoice Creator	Data transfer utility that runs as part of the nightly posting. Critical app that connects scale data to Itrack.	No user visibility. SCRS is discussed below under App #77.
WHDischarge	Waste Hauler Scale Discharge Tracking, Scanning.	Each load that arrives through the scale gets entered via this screen.	Sends data to Itrack through SCRS Invoice program.
Grease and Sludge Discharge Schedule	Grease Discharge Appointment Log	Creates and tracks appointments for Industrial Waste Haulers expected onsite.	Calendar of Haulers for Operator viewing (so they know who will be discharging onsite each day).
SCRS Transaction	SCRS Scale Transaction Log	Industrial Waste - Sludge Cake Receiving System (SCRS). Scans incoming loads of sludge cake.	Accounting/billing of sludge cake received.

4. Major Purposes/Products

- a. The apps discussed in this section primarily serve Operations, but also include features related to regulatory reporting, and the laboratory.
- b. ITrack is used to track permits, inspections, receiving/discharges, reporting, sampling, and billing of industrial waste received by BSA. It also creates the annual state regulatory reports. Refer to "BSA Industrial Waste Tracking System, Version 7.3, User Documentation", dated March, 2024, for more detailed information regarding the ITrack system.

- c. The "WHDischarge" app collects data for each truck load arriving at the plant. The data is partially scanned, and partially manually entered at the scale by approximately 60 waste haulers. That captured data is combined with raw scale data and then used to build invoice data nightly in ITrack via the 'SCRS Invoice' app..
 - d. A schedule of waste haulers expected onsite is managed in the "Grease and Sludge Discharge Schedule" app. The schedule is produced by this app for viewing by operators to track expected loads received (i.e. onsite discharges).
 - e. The 'SCRS Transaction' app reports sludge-cake delivery data entered by the badge readers, the scale, and the 'WHDischarge' app. It displays a summary of the data used by the nightly invoice creation process and has no data manipulation functions.
5. Data Management Notes:
- a. The majority of the data used in these apps is manually entered, although the 'SCRS Invoice' app builds invoice data from data entered by the badge readers, the scale, and the 'WHDischarge' app.
 - b. Some data is automatically scanned as haulers arrive at the scales.
 - c. The operator-facing apps are all accessible from the BSA Network.

4.2.4.1 Specific Needs

1. Major Needs – Industrial Waste Apps
- a. A better view of the details of the load transactions is needed in ITrack. It currently takes some manipulation to see the data, and execute permits for haulers.
 - b. Hauler data needs to be presented or manipulated for better technical understanding to help BSA to analyze and make decisions on permitting of individual haulers.
 - i. There are local annual limits of incoming industrial waste that get distributed among haulers via permits. These limits factor in to how many haulers can be permitted, and the discharge limits that apply to each.
 - c. Inspections of Significant Industrial Users (SIUs) are currently documented on paper. As BSA is striving to become compliant with the requirements of the Environmental Protection Agency's Cross-Media Electronic Reporting Rule (EPA CROMERR)-compliant regarding utilization of electronic documentation and submissions, the preference is to transition to documenting these inspections digitally in a form suitable for electronic submission to the NYS DEC.
 - d. Samples of incoming industrial waste are sent out for analysis to one of several outside labs, and results must be manually entered which is very tedious and time consuming. Automating this data entry, or at least creating a common interface where the labs could enter the data would be more efficient.
 - i. There is also a related reconciliation process (required by state audit) that would benefit from streamlining.

- e. Any significant changes or replacement of ITrack and related apps should incorporate historical data to the new application. At a minimum, 5 years of data must be maintained, or more if possible.
- 2. Minor Needs – Industrial Waste Apps
 - a. The ITrack system could benefit from higher level views that more clearly show trends in waste receiving.
 - b. It may be beneficial to create similar badges for chemical haulers so they can use the same scales to weigh in and out (This is currently not done for chemicals. Tank level change is the only check against the shipping manifest).
- 3. Additional Considerations – Industrial Waste Apps
 - a. BSA is considering bringing other waste hauler loads into the facility (i.e. tracking and receiving Fats, Oils, and Greases (FOG), as well as other waste streams). Consider the initiative to implement a FOG receiving program among other solutions regarding Industrial Waste.
 - i. A pilot program may be underway in 2025-2026.
 - b. Digitizing the Mercury Minimization Plan (related to dental facility discharges) should be considered with any improvements to these apps.
 - c. The Truck Scale system is an independent computer system that may be upgraded in the near future to accommodate dual truck scales, and/or a newer scale management system.

4.2.5 **Module #5: Summary of Sewer Maintenance Applications**

- 1. Main BSA Points of Contact:
 - a. Joel Renzoni, Director of Sewer Maintenance
 - b. Vinnie Vullo, Assistant Superintendent, Sewer Maintenance
- 2. Primary BSA Users:
 - a. Joel Renzoni, Director of Sewer Maintenance
 - b. Vinnie Vullo, Assistant Superintendent, Sewer Maintenance
 - c. Other Notable Users/Contacts
 - i. Jaime Davidson, JMD Engineering (consultant)
 - ii. Angela Hintz, JMD Engineering (consultant)
 - iii. Carrie Parker, Blue Herron (consultant)
 - iv. Laurie Chase, Blue Herron (consultant)
- 3. Software Applications Used:
 - a. Maximo (which is discussed further under Maintenance).
 - i. Sewer Maintenance field staff use the EZ Maximo (EZMax) Mobile app, which is a part of Maximo.

- b. BSA’s ARC GIS application (which is discussed further under Engineering).
 - c. “SMD Daily” and “SMD Wheel” are custom apps developed by BSA IT staff for the Sewer Maintenance Department (SMD).
- The list of apps (not including Maximo, or GIS) related to the Sewer Maintenance Department is found in *Table 7*.

Table 7: Sewer Maintenance Apps

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
SMD Wheel	Sewer Maintenance Overtime Wheel	Sewer Maintenance Department Crew Overtime Assignments.	None.
SMD DAILY	SMD Daily Assignment Sheet	Sewer Maintenance Department Crew Assignments.	None.

4. Major Purposes/Products

- a. The apps discussed in this section are primarily used for sewer maintenance purposes with minimal impact on regulatory reporting, operations, or the laboratory.
- b. Maximo is used by Sewer Maintenance office staff for routine scheduling, work orders and other maintenance functions. SMD field staff use EZMax to enter and track work orders on a tablet while in the field.
- c. “ARC GIS” is used by SMD field staff to more precisely and efficiently locate assets.
- d. “SMD Daily” is used by SMD for daily work assignments for crews and equipment, including vehicles, foremen, and crewmen.
- e. “SMD Wheel” is intended to be used by SMD to schedule rotating overtime duties for staffing supervisors (i.e. to monitor the complaint phone line and other OT assignments). However, this app was never used by SMD due to challenges with accessing the app from remote locations. A paper system is used instead.

5. Data Management Notes:

- a. No data is required for the “SMD Wheel”.
- b. Minimal data is required for the “SMD Daily” app. The required data is generally available by selection from dropdown lists.
- c. Data management for Maximo and ARC GIS is discussed further under the Maintenance and Engineering sections.

4.2.5.1 Specific Needs

1. Major Needs – Sewer Maintenance Apps

- a. Although ARC GIS is used by SMD field staff to locate assets, it is not directly linked to Maximo. The current revision of Maximo (as configured) lacks inter-departmental data transfer capabilities in general. Therefore, work orders still only locate assets based on addresses, which makes some assets difficult to locate in the field. Full integration of GIS-based asset location to Maximo would improve efficiency.
 - b. Having sewer flow data available to SMD so they can track when flows are impacted/reduced and cleaning may be needed. XYLEM, an outside vendor, works with BSA to track sewer flows, and may be able to integrate this data with SMD. They have been tasked to create a dashboard for SMD staff to monitor flows, but it has not yet been implemented.
 - c. SMD is not well connected to BSA's Industrial Waste (IW) group. Improved integration and communication between the groups would allow SMD to IW of any suspect waste (i.e. grease, etc.) being released to the sewers.
 - d. Any significant changes to crews (i.e. adding a new vehicle or new employee) must be made by BSA IT staff rather than by SMD users. It would be more convenient if the system were configured to allow SMD users to make those changes.
2. Minor Needs – Sewer Maintenance Apps
 - a. Concerns with EZMax remote Maximo application
 - i. Provide standardized drop-down menus for how a field issue is addressed (i.e. resolution, linear footage of sewer affected, etc.). This standardization would help with monitoring issues and evaluating solutions to typical sewer issues.
 - ii. Need to address minor issues with login trouble, password management.
 - iii. There is a tendency for numerous work orders to build up in EZMax. It will be necessary to investigate the cause(s) and possible remedies for this.
 - iv. It should be noted that the Maximo upgrade to MAS may provide a new mobile app to replace EZMax Mobile that may address some of the issues.
 - b. Address challenges with accessing the "SMD Wheel" and replace the functionality of the paper OT-management system currently employed.
3. Other Considerations – Sewer Maintenance Department
 - a. Consultants, JMD Engineering and Blue Heron, have a long history of assisting BSA Sewer Maintenance staff with training, SOP development, and other operational and sewer maintenance equipment support. These consultants meet with SMD staff on a regular basis and may be helpful to consult regarding current needs for this group.
 - b. There will be approximately 50+/- projects impacting the sewer and collection system under the Clean City / Clean Waters Program BSA's Queen City Clean Waters initiative as part of the City of Buffalo's Long Term Control Plan (LTCP/QCCW), which is just getting started. Projects include construction of additional Real Time Control (RTC) structures and equalization facilities. The controls and data management associated with these projects must be factored into the future of applications used by the SMD.

4.2.6 Module #6: Summary of Engineering Applications

1. Main BSA Points of Contact:
 - a. Rosaleen Nogle - Principal Sanitary Engineer
 - b. Katie Walsh - GIS Specialist
2. Primary BSA Users:
 - a. Rosaleen Nogle - Principal Sanitary Engineer
 - b. Regina Harris - Senior Engineer
 - c. Katie Walsh - GIS Specialist
 - d. Yasmin Abdul-Malik - GIS Specialist
 - e. GIS Staff
 - f. Field Staff
3. Software Applications Used:
 - a. There are four applications listed on the ODM Matrix as being utilized by Engineering. Most significant is the group of field data collection and management apps, ESRI products, which primarily includes ArcGIS Enterprise (Version 10.8.1), ArcGIS Portal, FieldApps, and Survey 123.
 - b. Trimble hardware products are used with the ESRI apps to collect field data. Related software used by BSA is limited to licensing and firmware associated with the field data collectors. Trimble is an ESRI Platinum partner, and a global leader in field collection of GIS data.
 - c. Engineering also uses AutoCAD (Version 2021), Bluebeam Revu, and Adobe Acrobat for document development, review and editing.

► The list of apps related to Engineering is found in *Table 8*.

Table 8: Engineering Apps

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
AutoCAD	AutoCAD	Engineering drawing development and editing software.	Detailed drawings produced for project designers, BSA internal documents, GIS network creation & updates.
ESRI	ESRI Products	ESRI products, including ArcGIS Enterprise, host GIS datastores, provide interface websites (ArcGIS Portal), FieldApps, and Survey 123.	Report production, data collection, and mapping. CSO BMP, Semi-Annual Report, SWPPP tracking, MS4 Compliance, SPDES, MSGP, GI, Community Outreach Documents, Printed Maps for discussion/ display.

App Name	Description	Purpose	Products (Reports, Data Sets, etc.)
Bluebeam Revu	Bluebeam Revu	PDF editing, document conversion, document batch processes, off-line plan review.	Modify pdf documents for Internal Use and for reporting.
Trimble	Trimble Products	Field data collection to feed ESRI software products.	Backbone of accurate data collection, using Trimble software, licensed to BSA by Waypoint Technology Group.

4. Major Purposes/Products

- a. The ESRI products and related Trimble field data collection equipment are essential tools for gathering, storing and manipulating GIS data for many purposes supporting regulatory reporting, operations, and laboratory and maintenance uses.
 - i. ArcGIS Enterprise is the industry-leading GIS server-based software platform used for GIS infrastructure, data collection, mapping, data management, and reporting. BSA uses this platform extensively to support Combined Sewer Overflow (CSO) Best Management Practices, Semi-Annual Reporting, Stormwater Pollution Prevention Plan (SWPPP) tracking, Municipal Separate Storm Sewer System (MS4) compliance, NY State Pollution Discharge Elimination System (SPDES) compliance, Multi-sector General Permitting (MSGP), Green Infrastructure (GI), Community Outreach documents, printed maps for discussion/display, among other uses.
 - ii. ArcGIS Portal is a web-based interfacing component of ArcGIS Enterprise which allows users to share maps, scenes, apps, and other GIS-based data with other users in the organization.
 - iii. FieldMaps (which replaced and incorporates "FieldApps") is a mobile application used to streamline field operations and data collection under the ArcGIS Enterprise platform. This enables field staff to perform various tasks including data collection, inspections, asset management, and staff coordination in the field, while maintaining connection to office staff and data stores.
 - iv. Survey123 is software that creates surveys used to gather data, and analyze results. The surveys are formatted to improve efficiency and accuracy of data collection. BSA works with "Western NY Stormwater Coalition" to develop survey forms to produce reports that match the formats required for regulatory submissions.
- b. Trimble data collection devices are primarily used for field GIS data collection. The devices currently in use have a GIS location accuracy of approximately one meter. They are also capable of real-time asset location/tracking (i.e. for vehicles, equipment, field staff, etc.), although BSA does not currently use the equipment for that purpose.
- c. BSA uses AutoCAD to create, modify and update detailed engineering drawings. It is used to digitize drawings from many formats into a form suitable for recognition by the

ESRI suite of software. AutoCAD is also used to open and review dwg-format files received from BSA partners or design consultants. There is also an ongoing process using AutoCAD to digitize sewer system drawings.

- d. Bluebeam Revu is used by BSA Engineering for viewing and editing pdf files, document conversion, document batch processes, and off-line plan review and markups. While this app provides similar functionality to Adobe Acrobat, it does have unique features that set it apart, such as comment tracking, and overlay layering capabilities. Since the cost is minimal, it is reasonable to maintain Bluebeam in addition to Adobe Acrobat

5. Data Management Notes:

- a. These apps are locally loaded on Engineering staff workstations and easily accessible.
- b. The primary source of field GIS data is the Trimble field data collectors which are closely integrated to the ESRI products for efficient data management.
- c. AutoCAD primarily obtains data/files in one of several ways. Files may already be received in AutoCAD dwg format. Drawings may be translated from pdf format or scanned in from paper copies and converted to AutoCAD dwg files. Translating or scanning drawings and converting to AutoCAD format has varying degrees of success and efficiency, depending on the quality of the source data.
- d. Bluebeam Revu typically uses pre-developed files in pdf format from other sources.

4.2.6.1 **Specific Needs**

1. Major Needs – Engineering Apps

- a. ESRI products are capable of handling work management and timelines of system changes/improvements, but these features are underutilized by BSA. Engineering, and especially other BSA departments could benefit from more effectively using ESRI products to streamline work management, data collection, and reporting and communications of GIS data.
- b. Improvements are needed in efficiency and accuracy of digitizing and converting engineering drawings. When drafting drawings from paper copies into AutoCAD, human error can affect quality. And location data doesn't always convey when exporting drawings from AutoCAD to ESRI software.
- c. Further standardization of data collection is needed to improve accuracy and usefulness of data (i.e. for queries, reporting, data analysis, etc.). This can be achieved by more extensive use of preconfigured drop-down lists for selections and data entry in the ESRI data collection apps.

2. Minor Needs – Engineering Apps

- a. ESRI product licensing should be analyzed for potential expansion. BSA currently holds 3 "Creator" licenses, 10 "Mobile Worker" licenses, and unlimited "Viewer" licenses. Creator licenses are for GIS specialists who create applications and data, and allow sharing of data with other users, while Mobile Worker licenses are used for remote/field access and allow only minimal editing. BSA could use one more Creator license as a "floater seat" that could be used by various staff who need only intermittent use of

those capabilities and permissions. And, they could benefit from several additional Mobile Worker licenses to serve field staff.

- b. BSA's Industrial Waste staff, and staff from other departments have use for access to ESRI products, but often rely on the Engineering group's three GIS specialists for these services based on their experience. BSA's Engineering group seeks to better equip these other departments for GIS applications by providing the training, assistance and licensing needed for them to be productive.
 - c. Additional licenses are needed for Bluebeam Revu to make that app available to more users simultaneously.
3. Other Considerations – Engineering Apps
- a. BSA Engineering is working with BSA IT to consider imminent upgrades to their ESRI suite of products. They are currently using Version 10.8.1 and intend to pursue a multi-step upgrade approach through Version 10.9 (a necessary step to preserve certain data and functionality), then on to Version 11. A critical benefit of upgrading to Version 11, is the ability to create a "Utility Network" that more accurately represents the relationship between (sewer and other) assets, providing additional capabilities for analysis. This upgrade could be executed by BSA IT and other in-house staff, although it could be done more efficiently with outside vendor support.

4.2.7 **Module #7: Summary of Accounting Applications**

- 1. Main BSA Points of Contact:
 - a. Charles Riley – Executive Secretary and Chief Financial Officer
 - b. Rosaleen Nogle – Principal Sanitary Engineer
 - c. Brian Hargrave – IT Director
- 2. Primary BSA Users:
 - a. Charles Riley – Executive Secretary and Chief Financial Officer
 - b. Rosaleen Nogle – Principal Sanitary Engineer
 - c. Jess Langworthy – Purchasing Supervisor
 - d. Carlos Coster – Senior Accountant
- 3. Software Applications Used:
 - a. There are three Accounting-related applications that are being utilized by BSA staff: **(1) Munis, (2) Adobe Pro, and (3) Microsoft Office 365.**
- 4. Major Purposes/Products
 - a. Munis
 - i. City of Buffalo, including Buffalo Board of Education, uses Munis (a Tyler Technologies software) for key functions: General Ledger, Accounts/
 - ii. Munis is controlled by the City's Department of Management Information Systems (MIS) and the City controller . The MIS department is short-staffed and has limited

resources – BSA has expressed challenges to get MIS support and implement changes.

- iii. Integration exists between Maximo and Munis for purchase requisitions; a link established 15-20 years ago.
- iv. While the City has improved the way Munis is upgraded, there is no formal roadmap from MIS for system enhancements.
- v. MIS generally notifies departments (including BSA) late, for example about fiscal year-end closing or system upgrades.
- vi. The city's Munis version has improved in recent years with more frequent upgrades, but communication is often last-minute.
- vii. Some workflows exist within Munis for requisition approvals and journal entry sign-offs, with routing based on department.

b. Adobe Acrobat Pro

- i. Adobe Pro is used for tasks outside of Munis: signatures on wires, bank reconciliations, and other approvals that used to be done on paper.
- ii. The BSA Accounting team has used Adobe Pro for several years to circulate documents and apply signatures, which has reduced reliance on paper.
- iii. BSA sees the opportunity to expand digital signatures and paperless approvals to more areas.

c. Microsoft Office 365

- i. Office 365 is used mainly for standard tasks: Excel for reporting, Outlook for email, and Teams for meetings.
- ii. No major integrations or workflow automations exist within Office 365.

5. Data Management Notes:

- a. Because Munis is a city-wide department system, unless key city stakeholders are engaged then discussions about Munis changes will not be actionable.
- b. BSA is not pushing major Munis changes – they should focus on developing supporting systems that work alongside Munis and Maximo.
- c. BSA noted that while requisition approvals and purchase order creation workflows do function well in Munis, the invoice processing side has not met expectations, and prior attempts to fix this through Munis were not successful.
- d. BSA previously discussed using Laserfiche as a possible solution about 5 years ago for automated workflows.
 - i. Adobe Pro's capabilities work well for current operations, but BSA is open to better tools if they have stronger workflow automation.
 - ii. The City's SharePoint has tried to be implemented for electronic workflows, but BSA ran into coordination issues with the comptroller's office; and internally replicated the solution was not feasible.

- iii. BSA attempted to build an invoice workflow within Munis but the MIS team was not onboard, and the attempted configuration did not function as needed.
- e. The Capital Projects Program Management Team is currently implementing the Unifier project management information system to manage payment workflows.
- f. For Operations, invoices will still mostly arrive via mail as paper signed by supervisors, scanned and uploaded manually.
- g. Bluebeam
 - i. Bluebeam Revu is used by BSA Engineering for viewing and editing pdf files, document conversion, document batch processes, and off-line plan review and markups. While this app provides similar functionality to Adobe Acrobat, it does have unique features that set it apart, such as comment tracking, and overlay layering capabilities. Since the cost is minimal, it is reasonable to maintain Bluebeam in addition to Adobe Acrobat.
 - ii. Some BSA staff have Bluebeam licenses. Bluebeam's broader features may be unnecessary for accounting's use and involves extra licensing costs.
 - iii. Bluebeam has been used by BSA because it was preferred from staff – it has not been evaluated for accounting needs.
 - iv. Adobe works for most accounting tasks (merging files, creating/editing PDFs, electronic signatures, etc.)
- h. BSA IT has shared a desire to be involved in decisions on outdated business processes in order to maximize the effectiveness of IT related investments.

4.2.7.1 **Specific Needs**

1. Major Needs – Accounting Apps
 - a. BSA desires to expand digital signatures and paperless approvals to more business areas, including further automation of the invoice approval process.
 - b. This includes optimal future workflows – Vendors email PDFs, routed automatically to the right clerk and supervisor for approval, uploaded to Munis with no paper handling.
 - c. BSA is seeking ideas for better electronic invoice submission and approval processes.
 - d. Any electronic invoice or approval system must ensure records are securely saved on the BSA network to meet long-term retention requirements.
 - e. The city has a SharePoint site where vendors can send invoices. This is an old system – invoices still need to be manually sorted and routed to the right department – not truly automated.
2. Other Considerations – Accounting Apps
 - a. Adobe Pro's capabilities work well for current operations, but BSA is open to better tools if they have stronger workflow automation.
 - b. BSA recommends to focus on developing supporting systems that work alongside Munis and Maximo that enables digital approvals even when Munis cannot be modified.

- c. The Program Management Team has inquired on the possibility of BSA engaging Munis users across other City departments to exchange best practices, common issues, and explore which improvements can be made that are beneficial to all City agencies.
- d. Map current manual vs desired electronical workflows.

4.2.8 **Module #8: Summary of Human Resources Applications**

1. Main BSA Points of Contact:
 - a. Charles Riley – Executive Secretary and Chief Financial Officer
 - b. Rosaleen Nogle - Principal Sanitary Engineer
 - c. Tim Blake – WWTF Capital Projects
 - d. Brian Hargrave – IT Director
 - e. Pete Zimmer – IT Specialist
 - f. Lori Scaletta – Acting Director of Employee Relations
2. Primary BSA Users:
 - a. Brian Hargrave – IT Director
 - b. Joy Houston – Senior Personnel Clerk
 - c. Crystalee Lozada – Senior Personnel Clerk
 - d. Leah Rossi – Senior Personnel Clerk
 - e. Danielle Sharp – HR Clerk
 - f. BSA staff, notably non-City Hall based staff
3. Software Applications Used:
 - a. The full list of Human Resources-specific apps are summarized below:
 - Claim
 - Employee Tracking
 - Benefits Tracking
 - Overtime Tracking
 - IDCards
 - LateEarly Report
 - CompTime Report
 - T&A Web Reports
 - Badge Readers
 - BADGE READER MAINTENANCE (admin app used for maintenance)
 - TA Reports (Employee data suite)
 - Badge Reader Update (IT Dept app)
 - Munis (maintained and controlled by the City of Buffalo)
 - ExecuTime (maintained and controlled by the City of Buffalo)

4. Major Purposes/Products

- a. BSA HR described their HR primary functions:
 - i. Employee tracking
 - ii. Benefits tracking
 - iii. Overtime tracking
 - iv. T&A web reports (part of T&A programs)
- b. BSA HR described the group of interconnected systems:
 - i. **Employee Info System:** primary repository for personnel data (name, address, DOB, SSN, pay grade).
 - ii. Legacy employee tracking system: badge readers, time punches.
 - iii. **Benefits Tracking:** Receives union and title data from Employee Info; tracks accruals (sick, vacation, personal time).
 - iv. **Overtime System:** Also fed by Employee Info.
 - v. **Claim System:** Used for workers' comp; receives basic employee data.
 - vi. **ExecuTime** (City of Buffalo): External system used for payroll processing. This involves separate manual updates to align with internal time clock records.
 - vii. **Munis** (City of Buffalo) – Tyler Technologies ERP payroll(direct deposits, checks) and accrual source.
- c. Items I–V are all part of a suite of BSA applications that work off the same database, linked by a single BSA employee record. Items VI–VII are City of Buffalo applications. The two systems are independent due to City of Buffalo policy that does not allow any external data systems to access their accounting and payroll databases. This causes duplication of data entry and a need for verification across systems. There is a significant administrative workload for BSA HR staff and thus unnecessary risk for duplication/errors.
- d. The BSA Badge Reader and Time & Attendance system remains a single integrated system. As part of payroll processing (which has never been a BSA application function) an additional layer was introduced requiring the use of ExecuTime and City of Buffalo time clocks.
- e. Payroll & Benefits Tracking
 - i. The annual "new year" process is overly manual; calculations have been done by hand instead of letting the system automate.
 - ii. Discrepancies exist between ExecuTime and the internal "white card" system (monthly employee benefit summaries). Discrepancies between BSA and ExecuTime are an inherent result of the two systems operating under different rules.
 - iii. BSA benefit time controls have been tailored over time to reflect BSA policy and union contract constraints; as such, the BSA white card records should be treated

as the authoritative source until ExecuTime can be configured to align with BSA-specific requirements.

- iv. The “white card” time clock records is treated as the authoritative source even when it conflicts with Executime.
- v. The HR department needs to regularly audit Benefits & ExecuTime – it is not always accurate.
 - (1) The Benefits tracking system is internal
 - (2) The 2 systems must be verified to match payroll system.

f. ID Cards / Badge Readers

- i. ID Cards and Badge Readers are an HR function, managed as part of the Employee Tracking application. It is related to access control and timekeeping. BSA desires a new employee information system.
- ii. Badge-related tasks have historically been performed by the IT department due to the volume of requests originating from the Treatment Plant, though all functions are available to and can be performed by HR staff..
- iii. There are multiple systems for **ID Badges and Access** (Bird Island WWTF)
- iv. The current setup uses multiple systems:
 - (1) **Genetec Security Desk** - controls doors and gates.
 - (2) BSA-built employee database for accessing
 - (3) **ExecuTime** – time and attendance system mandated by the City of Buffalo.

g. Challenges:

- i. Employees must scan their badge at the WWTF gate (logs into employee info system) and also clock in separately using **ExecuTime**. BSA IT believes this creates inefficiency and redundancy.

5. Data Management Notes:

- a. Business practices and processes: Multiple systems are in use due to past changes and/or outdated. BSA desires to update processes/applications to increase efficiency and reduce making processes complicated.
- b. BSA has limited control of Munis and ExecuTime – City of Buffalo-managed systems.
 - i. The City notifies BSA of upgrades, but they don’t always resolve BSA’s issues.
 - ii. No integration exists for City owned software. MIS (City IT) is hesitant to open APIs due to security risks. BSA will need to modernize systems to ensure they are secure.
- c. VPN technical issues:
 - i. At City Hall, the issue appears tied to network switch distance sessions time out.
 - ii. For BSA staff when working remotely: Cisco VPN times out periodically, disconnecting users.

- iii. Duo is used for 2-factor authentication.
 - iv. Both issues described above appear similar to HR staff but stem from different causes.
 - v. Both issues require the system to be reset by IT staff.
- d. BSA IT is interested in further system development and support: programming language and architecture, how systems interconnect (from infrastructure to database to end users), and VPN-related integration and dependencies.
 - i. Core HR/employee applications written in Delphi by Pete Zimmer, maintained since the mid-1990s with major rewrites (latest in 2018).
 - ii. Source code is available, and modifications can be made internally.
 - iii. Some desired features (e.g., training and certification tracking) have not been integrated.
- e. BSA desired future state(s) / Opportunities for Improvement
 - i. Simplify benefit and payroll tracking.
 - ii. Consolidate functions into fewer applications (ideally one, realistically two due to city-mandated ExecuTime) and explore options for reducing duplicate data entry
 - iii. Use one ID badge for: Gaining entry at the gate, Accessing doors within the facility, Logging into time and attendance system.
 - iv. BSA described a potential integration approach: Keep Genetec Security Desk for access control, Use API to link Genetec with ExecuTime. The goal is have Single badge swipe triggers both access control and timekeeping records.
 - v. Consider future integration of training, certification, and other HR functions.
 - vi. BSA has also expressed interest to move systems to a cloud-based system for improved functionality and accessibility.
 - vii. Address network/VPN timeout issues.

4.2.8.1 Specific Needs

1. **Modernization of BSA's current time & attendance system.**
2. BSA IT recommends that **various HR processes should be consolidated.**
 - a. The HR team has duplicated efforts around Time and attendance tracking, Leave balances, and Payroll coordination. The team currently enters data into at least two separate programs daily and can view similar data in multiple locations. Items i and iv are both the same data, as the white cards are a report produced by the Benefits Tracking application:
 - i. **Benefits tracking** - records late arrivals, early departures, and use of accruals (personal, sick, vacation).
 - ii. **T&A program** - used if employees forget to punch in for ExecuTime; gate punches are used to fill missing records. This is a data retrieval web application

that displays data and generates reports; data entry for correcting badge reader entries is available but not regularly used.

iii. **Excel spreadsheets** - maintains additional time records for payroll accuracy. This is a separate task to track information that was never requested to be integrated into either application.

iv. **White card system** - manual, physical record for each employee.

b. During the end of each year, HR must tabulate all employee data on white cards to ensure accuracy for the new year – process takes two days forcing the team to work during holidays.

c. BSA HR highlighted the need for a new, integrated employee benefits and time tracking system that can work with ExecuTime, despite its limitation

3. **Address VPN Timeout Issues and Lockouts in the Employee Info Database**

a. There are frequent lockouts from the employee information database, causing issues at least twice a week. HR staff regularly contact IT to be manually let back in.

b. VPN timeouts often trigger lockouts in legacy applications. Users often must contact IT for a reset if programs were not closed.

c. The original system attempted to account for complex HR needs (union rules and accrual structures), but the technology is outdated.

4. **Integrate Certifications, Career Tracking, and Training Records**

a. No system currently exists to track employee certifications, career progression based on training and experience. This data is tracked manually via spreadsheets.

b. Vector Training Solutions is a potential option, used by the City.

c. BSA has mandatory training programs like Operator certifications, Sexual harassment training, Cybersecurity awareness (upcoming state regulation). These are tracked manually.

5. **Other Considerations – HR Apps**

a. BSA has between 235 and 240 employees, not including retirees.

b. BSA needs to staff plan for additional IT Specialists.

c. The BSA HR department has reiterated that time and attendance is the highest priority for modernization.

d. A phased implementation approach can be considered. New applications can run in parallel with existing systems while BSA departments get comfortable with new systems being implemented.

e. It is important to BSA that historical data must be preserved while implementing new systems, although BSA does not have a large volume of data.

SECTION 5 COMMON NEEDS AND CHALLENGES FACING BSA

The operational data management needs and challenges expressed by BSA include several common themes along with the specific issues documented in the summaries above.

5.1 Common needs and challenges include the following:

1. Although not explicitly stated in relation to a particular app, the **long-term sustainability of many in-house developed apps** is a critical concern. Ensuring that institutional knowledge, documentation, and development capabilities are maintained and transferred as part of any IT staffing transitions is essential. Any modernization of custom apps should be approached in a way that supports current IT staff and preserves BSA's ability to maintain operational continuity.
 2. There is a common need to **further automate processes** involving data capture and manipulation to improve efficiency and accuracy. This includes streamlining manual steps involved in data management so that staff can redirect their efforts toward higher-value tasks and analysis..
 3. There is a desire to **further enable users to adapt, modify and improve** data management functions with greater self-sufficiency in routine tasks. This is intended to empower users to optimize the software tools they rely on, while allowing IT staff to focus on higher-priority development, maintenance, and support needs.
 4. **Improvements to access, visual display and interaction with data** (i.e. more intuitive graphics, tables, trends, etc.) are envisioned to improve data analysis techniques and results, further advancing the value and usefulness of data to users.
 5. Various processes which are documented on paper such as inspection of industrial users, and preparation of reports for regulatory submittal need to **transition to electronic processes** as BSA moves toward becoming more EPA CROMERR-compliant.
 6. There is a general need to **consolidate data applications** where possible to simplify use and maintenance of data management systems. This may involve migrating certain functions into better-supported platforms, with the goal of reducing complexity and improving reliability while retaining the operational capabilities that current applications provide.
 7. BSA desires to **improve and expand interdepartmental use and sharing of various types of data** to improve efficiency, quality of operations, and communications in general. Improvements considered for specific departments should account for coordination of potential advantages to other departments as well.
 8. Several applications require **updates to reflect recent improvements** to plant processes and equipment.
- Refer to the summaries and ODM Matrix for additional details of needs associated with individual apps.

SECTION 6 CONCLUSIONS AND NEXT STEPS

This document satisfies the first objective of this project, to better understand and document BSA's operational data systems and applications. Common and specific needs and challenges are documented here as a resource to pursue improvements going forward.

The summaries provided in Section V for each group of applications document the details of major and minor needs related to those apps. This is the starting point for considering next steps for each group of apps.

6.1 Notable Needs and Considerations

Below are several important needs and factors that must be considered as the current status is reviewed and next steps are explored.

1. **Operations** - Most of the Operations-related apps (including the "OpLog") are custom apps that may become more increasingly difficult to maintain with IT staff transitions.
2. **Laboratory/LIMS** - The current custom "LIMS" app is complex and can be difficult to navigate. Significant upgrade or replacement of this app should be considered. A consensus must be developed within BSA as to whether the existing custom app should be modified, or if commercially available software may provide a better solution.
3. **Maintenance/Maximo** - It is critical to note that most of the custom apps used by the Maintenance staff, and associated with Maximo may no longer work in their current form after the upcoming migration to MAS.
4. **Industrial Waste** - BSA is considering receiving other waste streams (i.e. tracking and receiving Fats, Oils, and Greases, etc.). These future plans must be considered with any changes made to the Industrial Waste use of data management tools.
5. **Sewer Maintenance** - There will be approximately 50+/- upcoming projects impacting the sewer and collection system under the LTCP/QCCW Program, as well as other various Capital Projects. LTCP/QCCW projects include construction of additional Real Time Control (RTC) structures and equalization facilities. These projects must be factored into the future of applications used by the SMD.
6. **Engineering** - BSA is considering upgrades to their ESRI suite of GIS-related products that would require a multi-step progression. A critical benefit of these upgrades is creation of a virtual "Utility Network" that would enhance capabilities for data usage by Engineering and other divisions.
7. **Data Storage** - Most of BSA's current data management applications rely on connection to an Oracle database for data storage and access. The majority of the data is collected from the Ovation DCS and stored in the Oracle database. BSA's intention is to maintain the Oracle database for this purpose.
8. **Accounting** - BSA desires to expand digital signatures and paperless approvals to more business areas, including further automation of the invoice submission and approval process. This includes optimal future workflows - Vendors email PDFs, routed automatically to the right clerk and supervisor for approval, uploaded to Munis with no paper handling.
9. **Human Resources** - Multiple HR systems are in use, resulting duplication of data entry, inefficiencies, and a need for verification across BSA and City Hall. Systems are outdated and

timeout frequently. BSA desires to updated/consolidate applications (time & attendance, badge scanning, VPN, simplified benefit and payroll tracking) that reduce duplicate data entry while having more integrated features (training, certification, and career tracking)

While this document provides a record of the existing operational data management applications currently in use, and highlights the needs and challenges associated with these apps in their current configuration, refer to “Technical Memorandum #2 – ODM Recommendations” for further guidance on next steps and improvements to be considered.

Technical Memorandum #2– Operational Data Management Recommendations

Buffalo Sewer Authority

► **FINAL** May 2026



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Table of Contents

EXECUTIVE SUMMARY.....	1-1
SECTION 1 BACKGROUND.....	1-1
SECTION 2 OBJECTIVES AND CRITERIA	2-1
2.1 OBJECTIVE 1: Combine/Consolidate ODM Apps to Simplify Data Management.....	2-1
2.2 OBJECTIVE 2: Modernize Data Management to be More Sustainable	2-2
2.3 CRITERIA to Determine and Evaluate Recommendations	2-2
SECTION 3 DECISION PATH.....	3-3
SECTION 4 GENERAL RECOMMENDATIONS.....	4-4
4.1 Establish an ODM Improvement Committee	4-4
4.2 IT Staff Augmentation	4-4
4.2.1 IT Staff Augmentation via Contracted Staff.....	4-4
4.3 Maintenance of Existing Apps Through Transition Phase	4-5
4.4 BSA Regulatory Assessment	4-5
SECTION 5 RECOMMENDATIONS BY MODULE.....	5-6
5.1 Module #1: Operations Applications	5-6
5.1.1 Optimize Existing Operations Apps or Replace with New Software.....	5-6
5.1.2 Summary of Recommendations for Module 1 Operations Apps	5-9
5.2 Module #2: Lab/LIMS Applications.....	5-10
5.2.1 Optimize Existing Custom LIMS App or Replace with New LIMS Software.....	5-10
5.2.2 Summary of Recommendations for Module 2 Lab/LIMS Apps.....	5-12
5.3 Module #3: Maintenance/Maximo	5-13
5.3.1 New Features Available in Maximo Application Suite (MAS)	5-13
5.3.2 How to Handle Existing Custom Apps Related to Maximo.....	5-14
5.3.3 Summary of Recommendations for Module 3 Maintenance/Maximo	5-14
5.4 Module #4: Industrial Waste Applications.....	5-15
5.4.1 Optimize Existing ITrack App or Replace with New Industrial Waste Tracking Software	5-15
5.4.2 Summary of Recommendations for Module 4 Industrial Waste Apps	5-18
5.5 Module #5: Sewer Maintenance Applications.....	5-18

Table of Contents

5.5.1	Summary of Recommendations for Module 5 Sewer Maintenance Applications.....	5-18
5.6	Module #6: Engineering Applications	5-19
5.6.1	Summary of Recommendations for Module 6 Engineering Applications	5-20
5.7	Module #7: Accounting Applications	5-21
5.7.1	Summary of Recommendations for Module 7 Accounting Applications	5-21
5.8	Module #8: Summary of Human Resources Applications.....	5-22
5.8.1	Summary of Recommendations for Module 8 Human Resources Applications.....	5-22
SECTION 6	TM#2 CONCLUSIONS AND NEXT STEPS.....	6-24
6.1	TM#2 Review Workshop	6-26

List of Tables

Table 1:	List of Abbreviations	1-1
Table 2:	Option 1 – Optimize Existing Operations Apps, Advantages and Disadvantages	5-6
Table 3:	Option 2 – Replace Operations Apps with New Software, Advantages and Disadvantages 5-7	
Table 4:	Option 1 – Optimize Existing Custom LIMS App, Advantages and Disadvantages.....	5-10
Table 5:	Option 2 – Replace Custom LIMS App with New LIMS Software, Advantages and Disadvantages 5-11	
Table 6:	Option 1 – Optimize Existing ITrack App, Advantages and Disadvantages	5-16
Table 7:	Option 2 – Replace ITrack App with New Industrial Waste Tracking Software, Advantages and Disadvantages.....	5-17
Table 8:	Summary of Notable Recommendations	6-24

Executive Summary

This Technical Memorandum #2 (TM#2) developed by the Buffalo Sewer Authority's (BSA) Capital Projects Program Management Team (PMT), in collaboration with BSA staff, provides a comprehensive set of recommendations for improving Operations Data Management (ODM) practices at the Buffalo Sewer Authority. Building on the findings of TM#1 (submitted in November 2025), which documented current data applications and practices in use, TM#2 provides actionable steps and strategic options to enhance efficiency, and ensure sustainability and regulatory compliance across BSA's data management landscape. Although the initial focus of this ODM task order was to improve data systems focused on Operations and related systems, the scope of the "ODM" evaluation was expanded to include administrative and other related systems as discussed herein.

Key Objectives

In TM#2, the development of recommendations is guided by two primary objectives:

- 1. Combine and Consolidate ODM Applications to Simplify Data Management.**
- 2. Modernize Data Management to be More Sustainable.**

Decision Path and Critical Choices

This document identifies critical decisions that will shape the future of BSA's ODM systems, including whether to update and maintain custom applications or replace them with modern, commercially available software in key areas such as Operations, Lab/LIMS, and Industrial Waste. These decisions are foundational and will influence subsequent recommendations and implementation strategies.

General Recommendations

Several general recommendations are made which are independent of various disciplines and BSA departments, including the following:

- ▶ **Establish an ODM Improvement Committee:** Form a cross-functional team to guide decision-making, evaluate options, and oversee implementation.
- ▶ **IT Staff Augmentation:** As Buffalo Sewer works to develop long-term plans for a sustainable workforce, address upcoming anticipated IT staff transitions by considering contracted support, leveraging existing agreements, and exploring new support agreements or consulting arrangements.
- ▶ **Maintain Existing Apps During Transition:** Ensure continuity of critical operations while new systems are evaluated and implemented.
- ▶ **Conduct a Regulatory Assessment:** Systematically document regulatory requirements to prioritize compliance in all recommendations.

Module-Specific Recommendations

For each major Module (Operations, Lab/LIMS, Maintenance/Maximo, Industrial Waste, Sewer Maintenance, Engineering, Accounting, and Human Resources), TM#2 presents specific recommendations ranging from major decisions to more focused actions such as:

- ▶ Options to optimize existing custom applications or migrate to new software solutions (where applicable).
 - Detailed advantages and disadvantages for each option.
 - Step-by-step procurement and evaluation processes for selecting new software providers.
- ▶ Specific recommendations for each module including such actions as app updates, integration, automation, user training, etc.

Implementation and Next Steps

TM#2 emphasizes a collaborative, phased approach to decision-making and implementation. It recommends follow-up workshops to review and refine recommendations, prioritize actions, and ensure alignment across departments. The document also highlights the importance of preserving historical data, supporting staff and ODM practices through transitions, and integrating solutions across modules for maximum organizational benefit.

While some recommendations made here can be implemented immediately, it is important to note that significant and lasting improvement to BSA's ODM systems and processes will require long-term focus and resource dedication. It will involve an evolution of the organizational mindset to embrace the next generation of powerful software tools available to maximize the efficiency of data flow, and the value of data access and presentation. That may include a change in how BSA views IT staffing and support of its various departments which depend on operational data. The organization may benefit from reassessing how it supports and develops its IT staff capabilities, and from exploring software solutions that empower staff with modern tools while preserving institutional knowledge and operational continuity.

Documenting all that is involved in the existing ODM apps in TM#1, and the recommendations for improvements in TM#2 reveals that a tremendous amount of effort and resources are required to modernize and maintain current ODM systems and practices to make them more useful and sustainable going forward. But the investment is worthwhile. The value and importance of these modern software applications parallel the emphasis once placed on distributed process control systems as they emerged as a critical factor in improving treatment processes. While the controls remain important, the handling of data now carries the same weight as its value touches nearly every aspect of the organization from optimizing treatment to maximizing efficiency, cost savings, regulatory compliance, safety, planning, and countless other benefits. As such, ODM tools and practices warrant the high level of attention and resources necessary to optimize and sustain them. This document provides a guideline for the next steps necessary to pursue that level of ODM support.

Table 1: List of Abbreviations

APC	Air Pollution Control	MS4	Municipal Separate Storm Sewer System
BSA	Buffalo Sewer Authority	MSGP	Multi-Sector General Permitting
CAM	Compliance Assurance Monitoring	NYS DEC	New York State Department of Environmental Conservation
CEMS	Continuous Emissions Monitoring System	ODM	Operations Data Management
CROMERR	Cross-Media Electronic Reporting Rule	P&ID	Process & Instrumentation Diagram
CSO	Combined Sewer Overflow	QCCW	Queen City Clean Waters
DCS	Distributed Control System	REST API	Representational State Transfer Application Programming Interface
EDS	Enterprise Data Solutions (Ovation)	RFI	Request for Information
EPA	Environmental Protection Agency	RFP	Request for Proposal
ERP	Electronic Resource Planning	RTC	Real Time Control
FOG	Fats, Oils, Grease	SaaS	Software as a Service
GI	Green Infrastructure	SCRS	Sludge Cake Receiving System
GIS	Geographic Information Systems	SIU	Significant Industrial User
LIMS	Laboratory Information Management System	SMD	Sewer Maintenance Division
LTCP	Long-Term Control Plan	SPDES	(NY) State Pollution Discharge Elimination System
MAM	Maximo Asset Management	SWPP	Stormwater Pollution Prevention Plan
MAS	Maximo App Suite	TM	Technical Memorandum
MCRT	Mean Cell Residence Time	WWTF	Wastewater Treatment Facility

SECTION 1 BACKGROUND

This Technical Memorandum #2 (TM#2 - ODM Recommendations) developed by the Buffalo Sewer Authority's (BSA) Capital Projects Program Management Team (PMT), in collaboration with BSA staff, represents the next step in the continuation of a project for BSA to improve their Operations Data Management (ODM) practices for better efficiency and long-term sustainability. The first major deliverable in this effort was Technical Memorandum #1 (TM#1 – ODM Evaluation). The purpose of TM#1 was to understand and document BSA's current ODM practices. TM#1 included details of over 90 existing applications (apps) in use by BSA, and highlighted common and specific needs and concerns related to those apps. An ODM Matrix was included with TM#1 to summarize basic information about each app in one standardized format.

The purpose of TM#2 is to provide general recommendations and associated guidelines for next steps in the path toward improvements of these ODM apps and practices. Where possible, this document provides specific, actionable recommendations for improvement. And, where additional discussion, evaluation, or decisions are required it provides multiple options with advantages/disadvantages of each, and guidelines for how BSA can move forward from the current status. The complex nature of the ODM and related systems used across multiple BSA departments requires careful consideration of many factors before implemented solutions can be identified and implemented. In some cases, this requires a multiphase approach where decisions must be made in a logical sequence. While the urgency of improvements is acknowledged (for reasons documented in TM#1), the existing ODM systems are functioning in a relatively stable manner and are maintainable in the near-term as possible solutions are evaluated and their implementation is planned appropriately.

SECTION 2 OBJECTIVES AND CRITERIA

Two primary objectives support the purpose of TM#2 in the development of recommendations for improvements to the ODM apps and practices. The following overarching objectives are based on the "Common Needs and Challenges" documented in TM#1 and form the basis for recommendations offered here in TM#2:

- ▶ **Objective 1: Combine/Consolidate ODM Apps to Simplify Data Management**
- ▶ **Objective 2: Modernize Data Management to be More Sustainable**

2.1 OBJECTIVE 1: Combine/Consolidate ODM Apps to Simplify Data Management

As documented in the ODM Matrix, there are over 90 software apps used to support ODM and related functions. Some apps function independently, while others work in combination with other apps to perform required functions. Some of the apps have been purchased as commercially available software, while others are custom apps developed and maintained by past and present BSA IT staff.

Consolidating and reducing the total number of apps would simplify maintenance of ODM software. It would establish clear responsibility for software maintenance that may involve a combination of BSA IT staff and contracted support from others outside of BSA. It would allow for more formal scheduling of software updates/upgrades to ensure applications remain efficient and secure.

Combining and consolidating the full set of apps may include eliminating some unused apps, combining related apps, or replacing the functionality of some apps using other software that may already be in use (i.e. with enhancements to Maximo, Ovation, etc.), or new software that could be procured.

There is inherent value in combining and consolidating the existing apps early in the process of making improvements to the overall set of ODM apps as this forms a better foundation for possible migration to modern ODM software solutions as discussed further below. As future solutions are evaluated with potential software suppliers, a consolidated set of existing ODM apps would allow for a clearer scope for further improvement. Ultimately, incorporation of new software solutions with broader functionality would likely allow for further reduction in the total set of apps to be maintained.

2.2 OBJECTIVE 2: Modernize Data Management to be More Sustainable

"Modern operational technology systems offer far more than just automation. They support real-time monitoring, remote access, predictive maintenance, and new ways to boost efficiency and service." (from "The Hidden Costs of Legacy Operation Technology", by Fawn Radmanich, Pete Perciavalle, and David Wilcoxson of Stantec). Several of BSA's most common concerns documented in TM#1 involve limitations of existing apps as compared to modern ODM software and best practices. Examples include the following:

- ▶ Increase self-sufficiency among operations and engineering staff to adapt and modify applications using modern features such as REST APIs, enabling IT staff to focus on higher-priority development and support work.
- ▶ Further automate processes involving data capture and movement.
- ▶ Improve data access, visual displays and interaction with data.
- ▶ Expand interdepartmental use and sharing of data by integrating ODM systems across departments.
- ▶ Migrate toward electronic/digital processes and regulatory submittals.
- ▶ Update systems to reflect recent plant/process improvements.

Modernizing the ODM apps through upgrades or replacement with commercially available software would serve to address the above concerns.

2.3 CRITERIA to Determine and Evaluate Recommendations

While the objectives above set the major course for improvements, the criteria listed below can be used to determine and evaluate individual recommendations and potential new software packages.

- ▶ Utilization of latest available technologies and industry best practices
- ▶ Extent of features, and ability to address multiple BSA needs
- ▶ Ease of use and training requirements
- ▶ Improvement to user interface and data visualization
- ▶ Impact on IT staff workload, and ability to empower staff with appropriate tools and training.
- ▶ Support of electronic/automated data processes
- ▶ Cost of implementation, and cost to maintain
- ▶ Time to implement (short-term vs long-term)
- ▶ Compliance with regulatory requirements
- ▶ Secondary benefits (i.e. value across departments, reduction in total apps, etc.)

Together with BSA, this list of criteria can be expanded and prioritized to serve as a basis for evaluation of the recommendations listed in this TM#2.

SECTION 3 DECISION PATH

When considering facility-wide improvements of interrelated systems such as those related to ODM, it is important to prioritize the sequence in which critical decisions must be made. Certain decisions must be made before other, dependent decisions can be made. These higher priority decisions can serve to clarify remaining choices by establishing protocols, dictating the outcome or even eliminating some lower priority decisions.

First, we must acknowledge decisions which have already been made inherently, such as the following:

- ▶ Oracle Database will be maintained as the primary means to store, organize and serve data.
- ▶ Emerson Ovation will be maintained as the Distributed Control System (DCS) to Operate and Control the treatment processes. At some point, BSA intends to add Ovation Enterprise Data Solutions (EDS) capabilities to enhance DCS data organization and usability, while working seamlessly with the Oracle Database.
- ▶ IBM Maximo will be maintained as the enterprise asset management system. Maximo will undergo migration/upgrade from Maximo Asset Management (MAM) to Maximo Application Suite (MAS) in the near future.
- ▶ ESRI products, including ArcGIS Enterprise, will be maintained as the primary software for asset mapping and geographical data used by Engineering, Sewer Maintenance and other divisions.

Having acknowledged the above decisions, the next most critical decisions to make are as follows:

- ▶ Module #1, Operations Applications: Decide if BSA would prefer to update and maintain the existing custom operations suite of apps or replace it with a modern commercially available operations data software package.
- ▶ Module #2, Lab/LIMS Applications: Decide if BSA would prefer to update and maintain the existing custom LIMS app or replace it with a modern commercially available LIMS software package.
- ▶ Module #4, Industrial Waste Applications: Decide if BSA would prefer to improve and maintain the existing custom ITrack app or replace it with a modern commercially available software package.

Making these critical decisions will establish the main course of action for improvements to the ODM systems. Some subsequent recommendations will be dependent upon what is decided, while other recommendations may be independent. Since the above decisions are critical to the future BSA's ODM systems, they may require focused workshops to present and discuss alternatives before a decision can be made. Here in TM2 we will present advantages and disadvantages of each choice, in preparation for each option to be carefully considered. Refer to **Section 5, Recommendations by Module**, for more detail regarding these decisions.

SECTION 4 GENERAL RECOMMENDATIONS

These recommendations address general ODM concerns, rather than specific needs related to individual modules/disciplines. They are suggested to facilitate implementation of the detailed improvements recommended with the TM#2.

4.1 Establish an ODM Improvement Committee

Establish a committee to evaluate recommendations and make critical decisions throughout the duration of the project. The committee is recommended to include key staff from BSA, the Program Management Team (PMT), and other consultants and software as/when appropriate. The group should convene at regular intervals to establish criteria, assess recommendations and other alternatives, review progress, and compare potential courses of action against project objectives and constraints. Through structured discussion and analysis, the committee can identify the most viable recommendations, develop implementation plans, and oversee the execution of selected actions. This process ensures that decisions are collaborative and aligned with organizational priorities.

4.2 IT Staff Augmentation

As previously documented, some key Operations and IT staff will be leaving BSA over the coming months/years. Over decades, these staff have been integral in the development and maintenance of many of the ODM apps in service at the facility today. While it is not possible to directly replace their skills, experience, and familiarity with the current software, we must consider options to provide staff resources who can continue their service of ensuring BSA has the necessary ODM software tools available to meet the organization's greater mission. Efforts should prioritize knowledge transfer, documentation, and staff development so that existing capabilities are preserved and built upon as ODM systems are modernized.

Ideally, BSA could benefit from hiring qualified staff to support and eventually replace those who are leaving. However, many municipalities face several challenges when attempting to hire highly technical staff for long-term full-time employment. These primarily include difficulties authorizing salary and benefits packages competitive with those which these qualified technical staff may be offered elsewhere. While many public organizations are making strides to improve their offerings, it often takes years to make the significant adjustments required to attract and retain qualified staff.

BSA should prioritize hiring and developing qualified staff to maintain and grow internal IT capabilities. In parallel, software support agreements with vendors can supplement internal staff for application-specific needs, particularly as new systems are implemented and staff are trained.

4.2.1 IT Support Considerations for ODM Modernization

As BSA works to grow a sustainable future workforce that will manage and maintain their ODM in the long-term, IT support could be provided through several contract vehicles in the short-term:

- ▶ **Through an existing support contract**
BSA likely has one or more existing contracts which could provide IT staff resources, including a general staff augmentation contract, Term Agreement contracts, or specific agreement such as the one with Emerson to support the Ovation DCS.
- ▶ **Through the existing Capital Projects Program Management contract**
The PMT may be able to provide IT support services from their organization, or through one or more of their Subconsultants.

► **Through a support contract with a software provider**

One of the most valuable aspects of considering new software applications is the possibility of procuring support agreements to access specialized staff resources needed to support, modify and optimize ODM systems. Eventually, there may be support agreements in place with software providers who could provide the bulk of the required support services. While this may not provide the necessary assistance during the initial and interim phases, it is a viable and common solution for long-term ODM support.

Another alternative worth considering is whether the current IT staff who are leaving could be retained under a part-time consulting arrangement for continued support over some period.

Further discussion is recommended to establish the qualifications, scope, timelines, training and funding required for this type of support. Once the recommendations are finalized and improvements are underway, BSA will have a better understanding of the IT resources needed to support the ODM systems long-term. The best implemented solution for interim and long-term support is likely to involve a combination of resources from the above alternatives where BSA staff and contracted staff partner to optimize technical expertise and financial efficiency.

4.3 Maintenance of Existing Apps Through Transition Phase

There are many benefits to maintaining the existing ODM apps through the transition phase. Not only is it necessary for critical apps to continue working as long as their functions are required, but the existing apps can also serve as an important cross-check against data and reports produced by new software as those new systems are commissioned.

Maintaining the existing apps is tied to the availability of qualified IT staff as discussed above. A means of preserving or conveying critical knowledge from current IT staff to others may be necessary at the appropriate time. Some apps may require interim updates to remain in service following upgrade or replacement of other apps. And keeping some of the custom apps working while migrating to new software (or after) may require the use of middleware (i.e. Mulesoft or similar) to preserve access and operation of the custom apps. These middleware integration services may require procurement of qualified migration consultants with the skills and experience to work with the older and newer apps.

The specific needs required to maintain the existing apps through the transition phase and beyond cannot be determined until some of the other critical decisions are made. Therefore, the recommendation at this time is that as decisions are made, the team should be intentional about meeting to discuss the necessary requirements to sustain individual apps through transition phase. These meetings will likely require input from BSA, the PMT, and even the software providers, as appropriate.

4.4 BSA Regulatory Assessment

As suggested by BSA's Plant Superintendent, a detailed assessment is recommended to identify and document all applicable regulatory requirements facing BSA (across all departments). This effort would establish a clean and cohesive summary of regulations and help to focus the efforts of this project on prioritizing regulatory compliance as the TM#2 recommendations are finalized and implemented.

SECTION 5 RECOMMENDATIONS BY MODULE

This section provides recommendations to address specific needs identified in TM1 for each group of apps (i.e. each module). This includes actionable recommendations that can be made at this time for near-term implementation, as well as recommendations for further evaluation regarding needs that cannot be addressed yet.

5.1 Module #1: Operations Applications

Operations data functions are provided by 34 apps. The primary recommendation for this module is to decide whether to update and improve those individual apps, or to procure a commercial operations software package that can replace the functions of the majority of those apps while making the needed improvements. These two options are discussed in further detail below:

5.1.1 Optimize Existing Operations Apps or Replace with New Software

Option 1 – Optimize Existing Operations Apps

Maintaining and optimizing the existing operations apps involves addressing all the needs identified in TM#1 Module 1 for the 34 operations-related apps. These apps could be further improved by using **Microsoft Power BI** (or similar visualization tools) to add software dashboards over existing apps to improve data presentation and make it more accessible to users from multiple disciplines.

The scope of improvements under this option includes implementing the list of action items in the Summary of Recommendations at the bottom of this section. Much of this work could be performed by BSA IT staff, with possible support from staff augmentation resources.

Advantages and disadvantages of this option are summarized in the table below.

Table 2: Option 1 – Optimize Existing Operations Apps, Advantages and Disadvantages

Option 1- Optimize Existing Operations Apps	
Advantages	Disadvantages
➤ Lower initial capital cost ➤ Less disruption of services ➤ Specialized/custom features preserved	➤ Significant short-term impact on IT staff to implement improvements, especially with some key staff ➤ Higher level of IT staff dependency ➤ Lack of modern features which would be provided with new software

Pursuing Option 1 may require further discussions with the BSA and the PMT to prioritize and further define the recommendations to be implemented.

Option 2 – Replace Operations Apps with New Software

Replacing the existing operations apps with modern operations software is a different approach to addressing the same needs identified in TM#1 for the 34 operations-related apps. Under this approach commercial software providers would be evaluated to determine how BSA needs could best be satisfied through a multi-step procurement process.

Under this option, the list provided in the Summary of Recommendations at the bottom of this section would ultimately form the basis of the scope of services to be provided by the selected software provider.

Table 3: Option 2 – Replace Operations Apps with New Software, Advantages and Disadvantages

Option 2- Replace Operations Apps with New Software	
Advantages	Disadvantages
➤ Less short-term impact on BSA IT staff, frees them up to focus on other improvements and support of migration activities ➤ Lower level of long-term IT staff dependency, especially with possibility of support agreement ➤ Access to modern features available with new software ➤ Flexibility to include other functions and expand integration to other departments.	➤ Higher initial capital cost ➤ More substantial impact to services during transition ➤ Care required to preserve existing specialized/custom features

Pursuing **Option 2** would require recurrent workshops to facilitate the communication and coordination needed to guide and support the process. A suggested multi-step approach is outlined below for consideration (This could be modified, and steps/details added, as needed).

Step 1: Create a scope outline for use in an RFQ/RFP to initiate contact with potential software providers. In addition to basic requirements for this type of software package, include specific requirements based on needs identified in TM1.

Step 2: Identify potential software providers. A preliminary list of possible operations software providers includes the following:

- ▶ AllMax Operator10
- ▶ Aquasight
- ▶ Aquatic Informatics (Hach WIMS, WaterTrax, and other products)
- ▶ eRIS (employed by City of Toronto for interface to water operations).
- ▶ Klir (in communications with BSA Industrial Waste Department for possible pilot program for fat, oil, and grease (FOG) collection)
- ▶ NWA Utility Services
- ▶ Ovation EDS (Add-on to existing DCS)

- ▶ Utility Cloud
- ▶ Waterly
- ▶ Xylem (already working with BSA Sewer Maintenance Department)

Step 3: Establish a list of criteria to evaluate software providers in a procurement environment. Below is an initial list of suggested criteria:

- ▶ Product lifecycle, and inclusion of industry-leading features
- ▶ Extent of features
 - Ability to collect, store, and process data from various sources, including Ovation, Lab software, Maximo, etc.
 - Ability to seamlessly integrate data from Oracle database (including historical data)
 - Ability to address multiple BSA needs
- ▶ Reporting Capabilities
 - Generate reports to satisfy regulatory requirements, and data visualization to provide insight into process optimization.
 - Automate data and reporting processes
- ▶ Compliance with regulatory requirements (i.e. reporting formats, etc.)
- ▶ Scalability/Flexibility to account for future growth and process modifications
- ▶ Security to protect against, and recover from unauthorized data access as well as accidental data loss or corruption
- ▶ Experience with similar sized wastewater facilities
- ▶ Experience with wastewater facilities based in the state of New York
- ▶ Cost of implementation, and cost to maintain
- ▶ Abundance of available/accessible support resources, both remote and onsite
- ▶ Secondary benefits (i.e. value across departments, reduction in total apps, etc.)

Note that many of the “Common needs and challenges” identified in TM1 may also be considered in the evaluation of potential software providers. They should be able to address those common issues in the solution they propose for operations data. Consider those general needs in addition to the list of specific recommendations when evaluating potential software providers.

Step 4: Issue an initial RFQ and evaluate responses to identify a short list of software providers to participate in further evaluation.

Step 5: Issue a detailed RFP to short-listed software providers to obtain cost/technical proposals for detailed evaluation. Following receipt and review of written responses to the RFP, invite some or all of the responders to make a presentation and participate in Q&A session to further explore their capabilities.

Step 6: Select one or more responders to initiate scope/fee negotiations. Include contractual/financial vetting by procurement as well as technical/cost negotiations. It is important to consider the long-term cost of ownership of the systems including not only initial hardware and software costs, but also licensing, maintenance, updates and modifications, cybersecurity, training, etc. Consider establishing a long-term support agreement to set rates and expectations for support qualifications, response times, etc.

Step 7: Select and procure the preferred software provider. Initiate planning for the improvements. Establish support required by BSA IT and Operations staff for coordination and continued support of existing apps during the transition.

Recognize that the implemented solution may include a hybrid approach where a new commercial operations software package is procured to provide the majority of the functions currently provided by the custom Operations apps, and some improvements to custom apps or other software (i.e. Ovation EDS, and Maximo MAS) may also contribute to meeting the needs related to the operations apps.

Similar decisions/options are presented below for other modules. Note that some software providers may be capable of providing solutions that apply to multiple modules. This could result in cost savings as well as better integration of data across multiple disciplines, which is a general need expressed by BSA.

5.1.2 Summary of Recommendations for Module 1 Operations Apps

1. Select Option 1 (Optimize Existing Operations Apps) or Option 2 (Replace Operations Apps with New Software). Then consider the recommendations below accordingly.
2. Update the "OperationsData" app, which feeds critical operations reporting, to improve level of automation of data manipulation, and improve general usability.
3. Update "OpLog" app to improve usability, efficiency and automation of data.
4. Update "OpLog" app and twelve related Log Summary apps/reports to reflect changes in processes and equipment.
5. Further automate the uploading of operational data into electronic submissions to regulators.
6. Update "Compliance Assurance Monitoring" (CAM), "Air Pollution Control" (APC), and "Continuous Emissions Monitoring System" (CEMS_MAINT) apps to reflect current permit emissions requirements and scrubber system operation.
7. Make stored Operator Log Summaries searchable for text strings.
8. Provide an intuitive graphic overlay to allow operators to select a process area for quick access to Operator Log Summaries. This could be done using MS Power BI, or new Operations software.
9. "Operations Web Reports Home" app includes three pages used to select and generate various reports. Add descriptive titles to the three "page" tabs and to the top of each page to clarify the information in focus under each page.
10. Improve or replace "Electric KWH Usage" app for power monitoring, with the goal of enhancing facility-wide power usage tracking.
11. Update "INCIN" app which produces incinerator APC Data Trends using data from Ovation DCS. Implement updates to represent current operations.
12. Eliminate the following apps, and replace their functions in other apps:
 - "Current Plant Data" – Replace function in Ovation EDS or other app.
 - "Odor Samples" – Replace function in Lab app, or other app.
 - "Operator Comments and Suggestions" – Replace function in other app.

- “Special Operating Instructions” – Replace function in other app.
 - “Equipment Run Times” – Run times are now available directly from the DCS.
 - “Partial Treatment” – Incorporate function in OpsData or other app.
 - “OverFlow” – Incorporate function in OpsData or other app.
 - “Odor Complaint Log” – Incorporate function in Maximo for better tracking.
13. Eliminate the following apps, whose functions are no longer used/needed:
- “DCU Tags”
 - “SCADA Trends”
14. Consider providing offsite accessibility (read-only) of operations data for uses outside of BSA (i.e. vendors, engineers, etc.) who may need access to certain data.

5.2 Module #2: Lab/LIMS Applications

Lab/LIMS functions are provided by 11 apps. The primary recommendation for the Lab/LIMS module is to decide whether the existing custom LIMS app will be maintained and improved, or if it will be replaced by a commercially available LIMS software package. This is a critical decision as lab data from the LIMS system is relied upon for regulatory reporting, operations reporting and decisions, and other uses. The two options are discussed in further detail below:

5.2.1 Optimize Existing Custom LIMS App or Replace with New LIMS Software

Option 1 – Optimize Existing Custom LIMS App

Maintaining and optimizing the existing custom LIMS app involves addressing all the needs identified in TM#1 Module 2 for the 11 Lab/LIMS-related apps. The scope of improvements under this option includes implementing the list of action items in the Summary of Recommendations at the bottom of this section. Improvements to the existing LIMS apps may involve using MS Power BI (or some middleware) utilizing REST APIs to better integrate upgraded custom LIMS into other apps that use LIMS data. This work could be performed by BSA IT staff, with possible support from staff augmentation resources.

Advantages and disadvantages of this option are summarized in the table below.

Table 4: Option 1 – Optimize Existing Custom LIMS App, Advantages and Disadvantages

Option 1- Optimize Existing Custom LIMS App	
Advantages	Disadvantages
➤ Lower initial capital cost ➤ Less disruption of services ➤ Highly customized LIMS software features preserved ➤ Lab staff and other users are familiar with existing LIMS app	➤ Custom LIMS app is complex and difficult to navigate. Requires significant effort to be user-friendly ➤ Significant short-term impact on BSA IT staff to implement improvements, especially with some key staff

Option 1- Optimize Existing Custom LIMS App	
	➤ Higher level of IT staff dependency to make any changes (i.e. reports) ➤ Lab audit process is arduous ➤ Lack of modern features which would be provided with new software

Pursuing Option 1 would require significant and high priority effort by existing BSA IT staff most familiar with the custom LIMS app. In addition, cross-training of additional IT staff to support the custom LIMS app should be planned and implemented to ensure long-term continuity.

Option 2 – Replace Lab/LIMS Apps with New LIMS Software

Replacing the existing custom LIMS app with modern LIMS software could address the primary concerns identified in TM#1 for the 11 Lab/LIMS-related apps, and it could provide additional benefits. Under this approach commercial software providers would be evaluated to determine which could best address BSA Lab/LIMS needs through a multi-step procurement process.

Under this option, the Summary of Recommendations provided at the bottom of this section could be addressed by the selected software provider, as part of the LIMS upgrade process, resulting in a modern, more sustainable and user-friendly LIMS package.

Table 5: Option 2 – Replace Custom LIMS App with New LIMS Software, Advantages and Disadvantages

Option 2- Replace Custom LIMS App with New LIMS Software	
Advantages	Disadvantages
➤ Modern LIMS software likely significantly more efficient and user-friendly than custom LIMS app. ➤ Reduced short-term burden on BSA IT staff, allowing them to focus on other modernization and support priorities ➤ Reduced long-term maintenance burden on internal IT staff, with vendor support available for ongoing software needs ➤ Access to modern features available with new software ➤ Improved features to support automated/electronic preparation and submittal of regulatory reports ➤ Better integration to other data apps ➤ Streamlined lab auditing	➤ Higher initial capital cost ➤ More substantial impact to services during transition ➤ Care required to preserve custom features from existing LIMS app into new LIMS software. ➤ Training required to familiarize Lab staff and other users with new LIMS software.

Pursuing Option 2 would require recurrent workshops to facilitate the communication and coordination needed to guide and support the process.

The same 7-step approach as outlined under Module 1 (page 5-7) for procurement of Operations software could be used here for procurement of a new LIMS software package. Below is an initial list of potential LIMS software providers for consideration:

- ▶ ApolloLIMS (now Clinisys)
- ▶ Aquatic Informatics (Hach WIMS, Rio)
- ▶ CloudLIMS
- ▶ Confience
- ▶ Cority
- ▶ Khemia
- ▶ LabHQ
- ▶ LabLynx
- ▶ LabTrax
- ▶ LabWare
- ▶ Labworks
- ▶ SewerCare
- ▶ Xylem (already working with BSA Sewer Maintenance Department)

Modern LIMS packages are typically “Vendor agnostic”, meaning they have flexibility to communicate with a variety of other software packages from various other vendors, typically using REST APIs.

5.2.2 Summary of Recommendations for Module 2 Lab/LIMS Apps

1. Select Option 1 (Optimize Existing Custom LIMS App) or Option 2 (Replace Custom LIMS App with New LIMS Software). Then consider the recommendations below accordingly.
2. Identify and implement improvements to make the LIMS app less complex, and more user-friendly.
3. Train remaining IT staff to support custom LIMS app long-term.
4. Incorporate photos/videos captured by the microscope computer into “MicroExam” app worksheets for use in LIMS system reports. The microscope computer has this capability but it has not been integrated.
5. Enable/Equip Lab staff users to make minor changes in format or content to “LIMS Reports” app to comply with lab audits, without reliance on IT staff.
6. Determine if the “Pending Industrial Waste Lab Samples” app should be maintained or modified since it is only needed if Industrial Waste samples will be analyzed in the BSA lab in the future (they are currently processed at a third-party lab, so this app is not used). If not needed, then this app can be eliminated.
7. Implement improvements to simplify the annual lab audit process, such as improved tracking of audit issues, more efficient updates to report content/format, etc.

- The following apps were previously (but are no longer) used as documentation to support lab audits: “Sampinfo”, “Results”, “Reports”, “View Sterilizer Cycles”.
 - These four apps have not been used for years, and may be eliminated if appropriate improvements are made to support the lab audit process.
8. Maintain the “Pending Industrial Waste Lab Samples” app only if industrial waste samples will again be analyzed in house at BSA. If not, then this app can be eliminated.

5.3 Module #3: Maintenance/Maximo

As noted above, BSA is planning to migrate their Maximo asset management system from Maximo Asset Management (MAM) to Maximo Application Suite (MAS), as support for the current version 7.6.1.2 of MAM ended September 30, 2025. This substantial migration dominates the consideration of improvements to this module of apps. In this section we acknowledge this upcoming migration as we develop recommendations for improvements. However, migration from MAM to MAS requires some considerations that are beyond the scope of this TM#2 document. The following points should be considered separately as BSA embarks on migration to MAS:

- **Working with an IBM partner Maximo migration consultant is essential to a successful upgrade.** They can be instrumental in proper planning and preparation for not only the Maximo upgrade but also impacts to, and integration with related apps like SCADA, MUNIS, GIS, Laserfiche, etc.
- MAS is designed to run in a cloud environment, unlike existing MAM which is locally hosted.
- There are differences in licensing, where “AppPoints” are used in a token-based arrangement to share licensing across various software components and features.
- New AI and analytics features in MAS are dependent upon the quality of data available, which may require some “clean-up” to standardize data, eliminate duplicates, etc.
- The MAS interfaces are somewhat different and will require some training to familiarize staff with the new system.
- BSA’s Maximo users should be consulted during migration planning to ensure MAS is procured and configured to meet all their needs.
- The powerful features available in MAS (AI and analytic features) may require a shift in organizational mindset for asset management to be utilized near their full potential.

It is also important to note that the Program Management Team (PMT) is managing parallel tasks to update Asset Management processes and Process & Instrumentation Diagrams (P&ID) for BSA that should be coordinated with recommendations made here regarding migration to MAS, and improvement/replacement of existing custom apps related to Maximo.

5.3.1 New Features Available in Maximo Application Suite (MAS)

Migration from MAM to MAS brings new features and changes to the way Maximo works, such as the following:

- User interface is more modern and intuitive, with simpler icons, larger buttons, real-time filtering, global search capabilities.
- New cloud-based system architecture based on Red Hat OpenShift (an open-source containerized API), using REST APIs for integration to other data systems, providing additional flexibility.
- Integral AI-driven modules (e.g. Health, Predict, Visual Inspection) for proactive maintenance.
- Advanced BIRT reporting with automated upgrades.
- Improved tightly integrated mobile interface (MAS Mobile).

5.3.2 How to Handle Existing Custom Apps Related to Maximo

There are 14 custom BSA apps related to Maintenance/Maximo use. Most of these are designed to manipulate or transfer data to or from Maximo and/or Munis accounting software for maintenance related tasks. These functions related to data import/export and transfer between Maximo and Munis are typically integrated using REST APIs available in both MAS and Munis, likely making many of the custom apps unnecessary.

While MAS may have integrated features that replace the functions of some of the existing custom apps, others whose functions are not included with MAS are not likely to work with MAS in their current form. While they could be modified and made to work with MAS, a better more sustainable solution is recreation of those functions using the latest available features available to MAS (i.e. REST APIs, etc.) This type of solution would make the access and use of these functions more streamlined and user-friendly.

5.3.3 Summary of Recommendations for Module 3 Maintenance/Maximo

1. Acknowledge BSA's intention to migrate from MAM to MAS, and implement the remaining recommendations accordingly.
2. Upon migration to MAS, equip users to use Maximo's inherent data reporting, visualization, and analytics features with limited dependence on IT staff. The BIRT reporting tool available in BSA's current version of MAM is not enabled for users, but BIRT reporting is an integral feature in MAS.
3. Recreate the functions of the existing custom apps in MAS, or provide a temporary middleware solution to allow these apps to work until such time as their functions can be replaced in MAS.
 - The following apps can likely be eliminated with their functions replaced in MAS: MaxTrends, MaxWebEdit, MaxNoneReps, MaxWebPurch, MaxWebMaint, MaxWOREps.
 - Note the report server that supports most of these apps runs on a 32-bit server running Windows 10 OS, soon to be upgraded to Windows 11). If/when Windows discontinues support for 32-bit servers the report server would need to be replaced.
4. As the functions of existing apps are made available in MAS, either directly or via middleware solution, ensure users have improved ability to manipulate data more efficiently (e.g. add/remove fields), without manual steps of transferring data to other formats.

- For example, while using Maximo or related apps, users should be able to efficiently reformat reports, add/remove fields from records, customize work order trends, or make other similar changes,
- 5. Provide the ability to directly export data to Excel.
- 6. Automate the workflows involved with completing and processing maintenance reports, transferring them, and obtaining approvals, etc.
 - These processes currently involve many manual steps, in some cases even circulating physical printed reports. Automating these processes and making them fully electronic (i.e. electronic approvals/signatures via Electronic Resource Planning, or ERP) would be more efficient.
- 7. Improve and further automate the process of tracking and stocking parts based on data associated with reliability, failure frequency, cost, ease of installation, and other relevant criteria.
- 8. Improve the “MaxOrderStatus” app function to further automate purchase order status review between Munis and Maximo (without a click for each P.O.).
 - Further automating this may require additional access/rights in Munis (which would require high level BSA/Buffalo discussion).
- 9. The recommendations below were suggested in BSA document “Draft BSA Asset Management Overall Picture” by Paul Harris and Blake Harper:
 - Provide interdepartmental training in Maximo to Supervisors, Clerks, and Technical Users.
 - Develop “super users” to lead others in the use of Maximo.
 - Form Maximo user groups to close the gap between the user community and their IT support.
- 10. Refer also to recommendations in Module #5: Sewer Maintenance Applications, which may also benefit from the migration to MAS.

5.4 Module #4: Industrial Waste Applications

The custom ITrack developed by BSA IT staff is the primary app used by the Industrial Pretreatment Program. There are also four custom supporting apps used to integrate hauling appointments, truck scale data, and the Sludge Cake Receiving System (SCRS). The primary recommendation for the industrial waste apps is to decide whether the existing ITrack and supporting apps will be maintained and optimized, or if they will be replaced by commercially available software. The two options are discussed in further detail below:

5.4.1 Optimize Existing ITrack App or Replace with New Industrial Waste Tracking Software

Option 1 – Optimize Existing ITrack App

Maintaining and optimizing the existing ITrack and related apps involves addressing the needs identified in TM#1 Module 4 for the Industrial Waste apps. The scope of improvements under this option includes implementing the list of action items in the Summary of Recommendations at the bottom of this section. Many of the noted recommendations involve improvements to data management and presentation, making recognition and assessment of data trends more apparent. Other needs include further automation of lab and inspection data, and electronic submittal of inspection reports. This work could be performed by BSA IT staff, with possible support from staff augmentation resources.

Advantages and disadvantages of this option are summarized in the table below.

Table 6: Option 1 – Optimize Existing ITrack App, Advantages and Disadvantages

Option 1- Optimize Existing ITrack App	
Advantages	Disadvantages
➤ Lower initial capital cost ➤ Less disruption of services ➤ Highly customized ITrack software features preserved ➤ Industrial waste staff and other users are familiar with existing app	➤ Significant short-term impact on IT staff to implement improvements, especially with some key staff ➤ Requires ongoing IT staff engagement to implement changes ➤ Majority of data is manually entered (except for scale data captures) ➤ Lack of modern features which would be provided with new software

Pursuing Option 1 would require some effort by existing BSA IT staff most familiar with the custom ITrack app and related apps. Although not as complex as the operations or LIMS apps, cross-training of IT staff to support the custom industrial waste apps should be planned and implemented to ensure continuity of maintenance and support .

Option 2 – Replace ITrack App with New Industrial Waste Tracking Software

Replacing the existing ITrack and associated apps with modern industrial waste tracking software could address the primary concerns identified in TM#1 these apps. Under this approach commercial software providers would be evaluated to determine which could best address BSA needs through a multi-step procurement process.

Under this option, the Summary of Recommendations provided at the bottom of this section could be addressed by the selected software provider, as part of the software upgrade process, resulting in a modern, more sustainable system.

Table 7: Option 2 – Replace ITrack App with New Industrial Waste Tracking Software, Advantages and Disadvantages

Option 2- Replace ITrack App with New Industrial Waste Tracking Software	
Advantages	Disadvantages
➤ Modern IW tracking software provides better visuals for advanced analysis of waste streams ➤ Reduced short-term burden on BSA IT staff, allowing them to focus on other modernization and support priorities ➤ Reduced long-term dependency on internal IT staff, with vendor support available for ongoing software needs ➤ Improved features to support automated data collection, automated permit generation, and electronic preparation and submittal of inspection reports ➤ New software could be procured with features to track FOG (if needed in the future) ➤ Improved integration with Lab/LIMS and other software apps	➤ Higher initial capital cost ➤ Some impact to services during transition ➤ Training required to familiarize staff with new software.

Pursuing Option 2 would require recurrent workshops to facilitate the communication and coordination needed to guide and support the process. This type of solution could easily incorporate tracking of FOG waste streams if BSA decides to receive those as well. Any replacement of ITrack and related apps should incorporate at least 5 years of historical data.

The same 7-step approach as outlined under Module 1 (page 5-7) for procurement of Operations software could be used here for procurement of a new Industrial Waste Tracking software package. Below is an initial list of potential software providers for consideration:

- ▶ Aquatic Informatics (LinkoCTS, LinkoFOG, and LinkoHW)
- ▶ Avena
- ▶ iPACS
- ▶ Klir
- ▶ SwiftComply
- ▶ Xylem Vue (Already working with BSA Sewer Maintenance Department)

5.4.2 Summary of Recommendations for Module 4 Industrial Waste Apps

1. Select Option 1 (Optimize Existing ITrack App) or Option 2 (Replace ITrack App with New Industrial Waste Tracking Software). Then consider the recommendations below accordingly.
2. Improve presentation of hauler data and load transactions to simplify decision making and execution of individual hauler permits. Incorporate the local annual limits of incoming industrial waste to determine how many haulers can be permitted, and the discharge limits that apply to each.
3. Add the capability for electronic generation of Significant Industrial User (SIU) inspections (currently documented on paper), as BSA is striving to become compliant with the requirements of the Environmental Protection Agency's Cross-Media Electronic Reporting Rule (EPA CROMERR)-compliant. Format digital inspection reports to be suitable for electronic submission to the NYS DEC.
4. Automate capture of lab data for samples of incoming industrial waste analyzed by outside labs. This should also streamline the related reconciliation process for state audits.
5. Provide better presentation of high-level data views to more clearly show trends in waste receiving, better facilitating decision making.
6. Badge creation for waste haulers is managed through the BSA Employee Tracking System application. Incorporate creation of similar badges for chemical haulers so they can use the same scales to weigh in and out. This is currently not done for chemicals, and tank level change is the only check against the shipping manifest.
7. Incorporate possible future receiving of Fats, Oils, and Greases (FOG), as well as other waste streams in any improvements or new software procurement regarding industrial waste. (A FOG receiving pilot program may be underway in 2025-2026.)
8. Consider digitizing the Mercury Minimization Plan (related to dental facility discharges) with any improvements or new software procurement regarding industrial waste.
9. The Truck Scale system is an independent computer system that may be upgraded in the near future to accommodate dual truck scales, and/or a newer scale management system. Account for this in any improvements or new software procurement regarding industrial waste.

5.5 Module #5: Sewer Maintenance Applications

The Sewer Maintenance Department's (SMD's) primary software tools include Maximo and ARC GIS, which are discussed in Module #3 and Module #6, respectively. SMD field staff use the EZMaxMobile app, which is integrated to Maximo. In addition to those apps, SMD also uses two small apps related to crew daily assignments and overtime coverage. Recommendations specific to SMD are discussed in this section.

5.5.1 Summary of Recommendations for Module 5 Sewer Maintenance Applications

1. Replace EZMaxMobile with the MAS Mobile feature natively available in MAS and eliminate the subscription and maintenance costs of that third party add-on software.
2. Address the following needs related to using Maximo mobile features if not inherently addressed by migration to MAS:

- Provide standardized drop-down menus for how a field issue is addressed (i.e. resolution, linear footage of sewer affected, etc.) to more efficiently manage issues and apply solutions to common sewer issues.
 - Address issues with login trouble, password management.
 - Address the tendency for numerous work orders to build up in EZMax. (It will be necessary to investigate the cause(s) and possible remedies for this, if not inherently addressed by migration to MAS.)
3. Fully integrate ARC GIS with Maximo/MAS, including inter-departmental data transfer capabilities, to improve efficiency of asset location using GIS data rather than addresses only, among other benefits.
 4. Make sewer flow data (which is tracked by XYLEM for BSA) available to SMD so they can track when flows are impacted/reduced and cleaning may be needed. Note that XYLEM may have been tasked to create a dashboard for SMD staff to monitor flows, but it has not yet been implemented.
 5. Improve integration and communication between SMD and the Industrial Waste (IW) group to allow SMD to alert IW of any suspect waste (i.e. grease, etc.) being released to the sewers.
 6. Enable SMD users to make changes to crews (i.e. adding a new vehicle or new employee, etc.) without relying on IT staff.
 7. Fully train SMD staff in use of MAS, and related mobile features used by field staff.
 8. Address challenges with accessing the “SMD Wheel” and replace the functionality of the paper OT-management system currently employed.
 9. Eliminate the “absentee” part of the “SMD Wheel” app, as that part is not used.
 10. Consider the following while implementing the above recommendations:
 - Ensure implementation of these recommendations acknowledge 50+/- upcoming projects impacting the sewer and collection system under BSA’s Queen City Clean Waters initiative as part of the City of Buffalo’s Long Term Control Plan (LTCP/QCCW). Projects include construction of additional Real Time Control (RTC) structures and equalization facilities. The controls and data management associated with these projects must be factored into the future of applications used by the SMD.
 - Program Management Team consultants JM Davidson Engineering and Blue Heron have a long history of assisting BSA Sewer Maintenance staff with training, SOP development, and other operational and sewer maintenance equipment support. These consultants meet with SMD staff on a regular basis and may be helpful to consult regarding implementation of these recommendations.

5.6 Module #6: Engineering Applications

The Engineering Department uses four main software apps for various purposes, including the ESRI suite of products (ArcGIS Enterprise, ArcGIS Portal, FieldApps, and Survey 123), AutoCAD, Bluebeam Revu, and

Trimble. While the intention is to maintain all these apps, the recommendations in this section include some improvements that can be made to processes, as well as some application or system improvements.

The most significant improvement is already being planned by Engineering and IT staff and involves upgrading the ESRI ArcGIS software from Version 10.8.1 to Version 11. This multi-step upgrade requires an interim upgrade through Version 10.9, to preserve certain data and functionality. The ultimate upgrade to Version 11 has the critical benefit of the ability to create a “Utility Network” that more accurately represents the relationship between (sewer and other) assets, providing additional capabilities for analysis.

5.6.1 Summary of Recommendations for Module 6 Engineering Applications

1. Implement the plan to upgrade the ESRI ArcGIS software from Version 10.8.1 to Version 11. This upgrade is recommended to be implemented efficiently and accurately using expert support from ESRI staff under a support agreement with ESRI.
2. Plan and implement a BSA training program to be delivered by Engineering and/or ESRI support staff to instruct staff from Engineering and other departments on the following:
 - Initial and refresher training in use and benefits of ESRI software suite.
 - Streamline work management processes and timelines of system changes/improvements using ESRI software suite.
 - Streamline data collection, reporting and sharing of GIS data among departments.
3. ESRI Product Licensing Needs
 - **Add one or two floating “Creator” licenses for ArcGIS.** BSA currently holds 3 fixed “Creator” licenses, for GIS specialists who create applications and data, and allow sharing of data with other users. Creator licenses cost approximately \$500/year each. The additional Creator licenses could be used by various staff from Engineering or other departments who need only intermittent use of those capabilities and permissions (especially as additional staff from other departments are trained in value of the ESRI software tools).
 - **Add three to five “Mobile Worker” licenses for ArcGIS.** BSA currently holds 10 Mobile Worker licenses used for remote/field access, with minimal editing rights. Mobile Worker licenses cost approximately \$350/year each. The additional Mobile Worker licenses would provide better availability to field staff who need access to ArcGIS away from the plant.
4. Bluebeam Revu Licensing Needs
 - **Add two to three licenses for Bluebeam Revu.** Revu licenses cost approximately \$250-450/year each, depending on capabilities purchased. These additional licenses will make this app available to more user simultaneously.
5. Further standardization of data collection is needed to improve accuracy and usefulness of data (i.e. for queries, reporting, data analysis, etc.). This can be achieved by more extensive use of preconfigured drop-down lists for selections and data entry in the ESRI data collection apps.

6. Recommend further integration of ESRI applications currently in use to allow more efficient and accurate data capture, plan digitizing, and data analysis. Improvements are needed in efficiency and accuracy of digitizing and converting engineering drawings. When drafting drawings from paper copies into AutoCAD, human error can affect quality. And location data doesn't always convey when exporting drawings from AutoCAD to ESRI software.
7. As a long-term recommendation, consider the costs/benefits to BSA of developing a "Utility Network" in ArcGIS Version 11. Such an endeavor may be a suitable project for an intern working under the guidance of Engineering and/or ESRI staff.

5.7 Module #7: Accounting Applications

The BSA Accounting Department primarily uses Munis, Adobe Acrobat Pro, and Microsoft Office 365 tools. Consistent with one of the primary objectives of this project to modernize ODM systems and related processes, the recommendations regarding accounting involve further automation of processes, and improved communication and coordination of data.

It is important to recognize the potential solutions available through the upgrade from Maximo to MAS discussed in the maintenance/Maximo module. The MAS app supports automated invoice review and approval through its native workflow capabilities in Maximo Manage. Those capabilities can be further enhanced to accommodate specific invoice requirements and coordinate with third party systems using custom automation scripts (e.g. in Python) or via REST API interfacing. BSA's Laserfiche system could even be used, leveraging its intelligent capture capabilities to bring higher quality invoice data into MAS. This type of modern solution may require cooperation from the City's MIS group to allow further integration with Munis, but the majority of the innovation and development resides with BSA.

5.7.1 Summary of Recommendations for Module 7 Accounting Applications

1. Explore and implement improvements to further automate BSA's invoice receiving, review and approval processes. The solution should accommodate multiple methods of invoice receiving, including receipt of pdf invoices as well as fully electronic invoice submittal. And it must be coordinated with the City's Munis application. Leverage the capabilities available in MAS, Laserfiche and other apps. And, there are other third-party add-on apps (i.e. IntelliChief, or ScanNmax) that can be connected to MAS for more advanced invoice processing capabilities.
 - The above recommendation requires an initial effort to clearly document existing workflows that need improvement. And create models of the desired electronic / automated workflows that can be used for further investigation, discussion with consultants or software providers, and eventually form the basis for a scope of improvement work.
2. Establish a BSA Accounting Committee to assemble critical accounting and IT staff on a regular basis to communicate, plan, and better represent BSA's accounting needs when communicating with the City's Department of MIS regarding things like improvements to Munis software.
 - This BSA Accounting Committee could lead an effort to establish a City-wide Accounting Forum which meets and communicates regularly to allow the City's

accounting professionals, IT/MIS, procurement, and other critical staff to discuss technical issues, share best practices, and explore and plan improvements.

5.8 Module #8: Human Resources Applications

BSA Human Resources staff rely on a group of custom apps maintained by BSA IT, as well as Munis and ExecuTime, which are both managed by the City of Buffalo. As a whole the systems require significant manual data entry, including duplicate entry of some data which comes with risk of duplicate data and errors. Modernization and consolidation of these apps is needed to improve efficiency and accuracy of these systems.

Improvement of these general human resources tracking systems is well-suited for a **“software as a service” (SaaS)** solution. There are many SaaS HR tracking systems available that could address the issues faced by BSA, including the following:

- ▶ ADP Workforce Now
- ▶ GovSense
- ▶ NEOGOV
- ▶ OpenGov
- ▶ Paycor
- ▶ Rippling
- ▶ UKG (Ultimate Kronos Group)
- ▶ Workday

Although not listed above, even the City of Buffalo’s current accounting system Munis (by Tyler Technologies) has SaaS HR tracking capabilities that could be explored. If a SaaS solution is deemed feasible, a similar multi-step approach to that described under Module 1 could be used to evaluate and procure an appropriate provider. The detailed issues and requirements documented in TM#1 can be used to form the basis for the scope of work.

5.8.1 Summary of Recommendations for Module 8 Human Resources Applications

1. Explore alternatives and implement modernization of BSA’s time and attendance system.
 - Consider SaaS provider solutions.
 - Consolidate data entry tasks where duplication exists across time and attendance tracking, benefits tracking, and separate spreadsheets maintained for payroll accuracy. Note that white cards are a report generated by the Benefits Tracking application and are not a standalone program.
 - Consolidate access control and timekeeping to allow the same employee ID badge to serve both functions (currently met by separate Genetec Security and ExecuTime time and attendance systems).
 - A phased implementation approach can be considered. New applications can run in parallel with existing systems while BSA departments get comfortable with new systems being implemented.
 - Historical data must be preserved while implementing new systems.
 - Refer to TM#1 for details of additional issues and requirements.

2. Address frequent VPN timeout issues and lockouts in the Employee Info Database
 - Current software is outdated, but actively maintained by BSA IT staff. The modernization path should be evaluated to address known timeout and lockout issues while preserving existing functionality.
 - Solution could be coupled with SaaS solution proposed above.
3. Integrate Certifications, Career Tracking, and Training Records
 - No system currently exists to track employee certifications, career progression based on training and experience. This data is tracked manually via spreadsheets.
 - Consider Vector Training Solutions, which is used by the City.

SECTION 6 TM#2 CONCLUSIONS AND NEXT STEPS

While the object of TM#1 was to better understand and document BSA’s operational data systems and applications, the focus of this TM#2 document is to provide recommendations for improvements to the ODM systems in support of two main objectives:

- ▶ **Objective 1: Combine/Consolidate ODM Apps to Simplify Data Management**
- ▶ **Objective 2: Modernize Data Management to be More Sustainable**

Several recommendations are provided to address general ODM concerns, and many detailed recommendations are provided to address specific concerns related to each module. While some of these recommendations can be implemented immediately, many of the recommendations that would have more significant impact on ODM systems and practices require a more substantial investment of time and resources. The table below provides a summary of notable recommendations but is not intended to diminish the importance of the many detailed recommendations provided above.

Table 8: Summary of Notable Recommendations

Module	Recommendation
General	Establish an ODM Improvement Committee
General	IT Staff Augmentation (several options)
General	Maintenance of Existing Apps Through Transition Phase
General	BSA Regulatory Assessment
Module #1 Operations Applications	Decide to Optimize Existing Operations Apps or Replace with New Software
Module #1 Operations Applications	Updates to various Operations apps as applicable (depending upon decision above).
Module #2 Lab/LIMS Applications	Decide to Optimize Existing Custom LIMS App or Replace with New LIMS Software
Module #2 Lab/LIMS Applications	Updates to various Lab/LIMS apps as applicable (depending upon decision above).
Module #3 Maintenance/Maximo	Acknowledge and support BSA’s intention to migrate from MAM to MAS. Advise working with a Maximo Migration Consultant.
Module #3 Maintenance/Maximo	Implement various improvements made possible by the migration to MAS, and equip staff to use the new features.

Module	Recommendation
Module #4 Industrial Waste Applications	Decide to Optimize Existing ITrack App or Replace with New Industrial Waste Tracking Software
Module #4 Industrial Waste Applications	Various improvements to hauler, scale, and lab data functions (depending upon decision made above).
Module #5 Sewer Maintenance Apps	Replace EZMaxMobile with the MAS Mobile feature natively available in MAS
Module #5 Sewer Maintenance Apps	Various improvements to related apps to capitalize new features and integration available through migration of Maximo to MAS, as well as better integration of ARC GIS throughout BSA.
Module #6 Engineering Applications	Implement the plan to upgrade the ESRI ArcGIS software from Version 10.8.1 to Version 11.
Module #6 Engineering Applications	Plan and implement a BSA training program to be delivered by Engineering and/or ESRI support staff to instruct staff from Engineering and other departments in use of ESRI software.
Module #7 Accounting Applications	Explore and implement improvements to further automate BSA's invoice receiving, review and approval processes.
Module #7 Accounting Applications	Establish a BSA Accounting Committee to assemble critical accounting and IT staff on a regular basis to communicate, plan, and better represent BSA's accounting needs when communicating with the City's Department of MIS regarding things like improvements to Munis software.
Module #8 Human Resources Applications	Explore alternatives and implement modernization of BSA's time and attendance system.
Module #8 Human Resources Applications	Address frequent VPN timeout issues and lockouts in the Employee Info Database.
Module #8 Human Resources Applications	Integrate Certifications, Career Tracking, and Training Records.
Modules #6 and #7	Adobe and Bluebeam have similar capabilities, so BSA could consider consolidating to a single application to edit/modify pdf documents.
Modules #7 and #8	Regarding the improvements to the Munis ecosystem, with its effect on Accounting and HR system as an example, consider cross-agency (City) collaboration. It is highly likely that the issues and needs of BSA are not totally unique, and thus the more City agencies (including BSA) are able to standardize/leverage the shared

Module	Recommendation
	investment, the greater probability there is to realize efficiencies in shared systems under City Hall.
Multiple	Eliminate and consolidate apps which are unused, and whose functions are replaced by other improvements. Where appropriate, consider moving to SaaS or Cloud-based software environments that offer modern features and broader maintainability, while ensuring that institutional knowledge and operational capabilities are preserved and built upon through the transition.
Multiple	Consider other agencies within City Hall or Erie County (if not already) where BSA could leverage more purchasing power based on common/shared needs across agencies.
Multiple	Make updates to various apps to reflect changes to processes/facilities, and regulatory requirements.

6.1 TM#2 Review Workshop

As discussed in TM#1, the mission to improve BSA’s ODM systems and practices is best pursued by a collaborative effort of BSA and the Capital Projects Program Management Team (PMT). In its current form, this version of TM#2 should be considered a draft. The PMT proposes to arrange one or more workshops with BSA to review and discuss these recommendations, with the **objective of determining the next steps together**. Workshop discussions could accomplish the following key points:

- ▶ Agree/Adjust the criteria for evaluating recommendations (Ref. Section 2.3)
- ▶ Accept/Adjust the major decision path (Ref. Section 3)
- ▶ Discuss alternatives for IT Staff Augmentation (Ref. Section 4.2)
- ▶ Review/Discuss the Advantages/Disadvantages of various options presented in TM#2
- ▶ Decide which specific recommendations to implement
- ▶ Discuss interim actions and solutions to support existing apps through upcoming transitions
- ▶ Discuss timelines for making major decisions and implementing recommendations

It is important for potential solutions to be reviewed and considered by representatives of multiple disciplines, including management, operations, maintenance, laboratory, SCADA/Controls, IT, process engineers, etc. Involvement of diverse representatives from across the organization builds commitment and ownership, laying the groundwork for resource allocation necessary to implement and support solutions. Indeed, the best solutions may be those which address mutual needs across disciplines and promote interaction and cooperation among BSA departments.