CITY OF MIRAMAR
PROPOSED CITY COMMISSION AGENDA ITEM

Meeting Date: June 3, 2026

Presenter's Name and Title: Mark Williams, Field Operations Manager, on behalf of the Utilities Department, and Alicia Ayum, Director of Procurement on Behalf of the Procurement Department

Prepared By: Mark Williams, Field Operations Manager (Wastewater Collection)

Temp. Reso. Number: 8704

Item Description: Temp. Reso. #R8704 APPROVING THE PURCHASE OF IN-SERVICE LEAK DETECTION AND VISUAL PIPE INSPECTION SERVICES USING SAHARA TECHNOLOGY FROM PURE TECHNOLOGIES U.S., INC., IN AN AMOUNT NOT-TO-EXCEED $92,229.00, THROUGH THE SOLE SOURCE METHOD OF PROCUREMENT; AUTHORIZING THE CITY MANAGER TO EXECUTE THE NECESSARY PURCHASE DOCUMENTS. *(Utilities Field Operations Manager Mark Williams and Procurement Director Alicia Ayum)*

Consent ☒ Resolution ☐ Ordinance ☐ Quasi-Judicial ☐ Public Hearing ☐

Instructions for the Office of the City Clerk: To be signed at the dais

Public Notice – As required by the Sec. ____ of the City Code and/or Sec. ___, Florida Statutes, public notice for this item was provided as follows: on _____ in a _____ ad in the _____; by the posting the property on _____ and/or by sending mailed notice to property owners within ____ feet of the property on _____ (fill in all that apply)

Special Voting Requirement – As required by Sec. _____, of the City Code and/or Sec. ____, Florida Statutes, approval of this item requires a _____ (unanimous, 4/5ths etc.) vote by the City Commission.

Fiscal Impact: Yes ☒ No ☐

REMARKS: Funding of $92,229.00 has been appropriated in FY26 Utilities Accounts 410-55-800-533-000-606519-52104, entitled "Water Distribution System Improvements.

Content:

- **Agenda Item Memo from the City Manager to City Commission**
- **Resolution TR8704**
- **Attachment(s)**
  - **Attachment 1:** Sole Source Letter
  - **Attachment 2:** Sole Source/Product Standardization Form
  - **Attachment 3:** Price Quote

CITY OF MIRAMAR
INTEROFFICE MEMORANDUM

TO: Mayor, Vice Mayor, & City Commissioners

FROM: Dr. Roy L. Virgin, City Manager

BY: Francois Domond, P.E., Director of Utilities

DATE: May 28, 2026

RE: Temp. Reso. No. 8704 approving the Purchase of In-Service Leak Detection Service from Pure Technologies U.S. Inc.

RECOMMENDATION: the City Manager recommends approval of Temp. Reso. No. 8704, approving the purchase of in-service leak detection and visual pipe inspection services using Sahara technology from Pure Technologies U.S., Inc., in an amount not-to-exceed $92,229.00, and authorizing the City Manager to execute all necessary related purchase documents, in a form approved as to legal sufficiency by the City Attorney.

ISSUE: City Commission approval is required for purchases exceeding $75,000 pursuant to Section 2-412(a)(1) of the City Code. The requested approval includes a sole source procurement pursuant to Sections 2-419 and 2-424 of the City Code.

BACKGROUND: The Utilities Department is responsible for operating and maintaining the City's water distribution system, which currently includes approximately 470 miles of water lines, 34,937 water meters installed, 4,771 fire hydrants, and 8,722 isolation valves. Detecting leaks in large-diameter mains is critical to water conservation, maintenance of system pressure, service reliability, and reduction of non-revenue water loss. While conventional acoustic leak detection methods are effective for smaller-diameter pipelines, they are less reliable and less efficient for larger-diameter water mains and canal crossings. In-service leak detection and visual inspection allow the City to assess critical pipelines while they remain in service.

DISCUSSION: On March 4, 2026, Pure Technologies U.S., Inc. submitted a proposal to perform in-service leak detection and visual pipe inspection using Sahara technology for two water mains crossing a canal near SW 136th Avenue and SW 41st Street / Blue Gill

Road, including approximately 150 linear feet of 36-inch raw water main and 150 linear feet of 20-inch potable water main, in a total amount not-to-exceed $92,229.00. The proposal includes project planning and mobilization, flow testing, inspection, and reporting.

ANALYSIS: Approval of this item will allow the City to use a specialized inspection technology for critical large-diameter water mains at a canal crossing where conventional methods are less effective. The proposed work supports proactive asset management, water conservation, non-revenue water reduction, and continued system reliability.

Temp. Reso. No. 8704
4/8/26
5/28/26

CITY OF MIRAMAR
MIRAMAR, FLORIDA

RESOLUTION NO. _____

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF MIRAMAR, FLORIDA, APPROVING THE PURCHASE OF IN-SERVICE LEAK DETECTION AND VISUAL PIPE INSPECTION SERVICES USING SAHARA TECHNOLOGY FROM PURE TECHNOLOGIES U.S., INC., IN AN AMOUNT NOT-TO-EXCEED $92,229.00, THROUGH THE SOLE SOURCE METHOD OF PROCUREMENT; AUTHORIZING THE CITY MANAGER TO EXECUTE THE NECESSARY PURCHASE DOCUMENTS; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the City of Miramar Utilities Department is responsible for the operation and maintenance of the City's water distribution system, consisting of more than 441 miles of pipeline and approximately 34,800 water service connections; and

WHEREAS, the timely detection of leaks in large-diameter water mains is important to water conservation, system reliability, pressure maintenance, and reduction of non-revenue water loss; and

WHEREAS, conventional acoustic leak detection methods are less reliable and less efficient for larger-diameter water mains and certain critical crossings; and

WHEREAS, in-service leak detection and visual pipe inspection using Sahara technology allows inspection of pressurized water mains while the pipeline remains in service, providing acoustic and visual data to identify leaks, trapped air pockets, and other anomalies; and

WHEREAS, on March 4, 2026, Pure Technologies U.S., Inc. submitted a proposal to perform in-service leak detection and visual pipe inspection services for approximately 150 linear feet of 36-inch raw water main and 150 linear feet of 20-inch potable water main at a canal crossing near SW 136th Avenue and SW 41st Street / Blue Gill Road, in an amount not-to-exceed $92,229.00; and

WHEREAS, under Section 2-420 of the City Code, procurements exceeding $75,000.00 require formal advertised bids or proposals unless another authorized method of source selection is applicable; and

WHEREAS, Section 2-419 of the City Code identifies sole source procurement as an authorized method of source selection; and

WHEREAS, pursuant to Section 2-424 of the City Code, a contract may be awarded without competition when the Chief Procurement Officer or authorized designee determines in writing that there is only one source for the required supply, service, or construction item; and

WHEREAS, the sole source record for this purchase states that Pure Technologies U.S., Inc. is the only practical and available source for the required Sahara inspection technology and related services, and includes supporting justification and vendor confirmation; and

WHEREAS, the City Commission finds that approval of this sole source procurement is in the best interest of the City.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF MIRAMAR, FLORIDA AS FOLLOWS:

Section 1: That the foregoing "**WHEREAS**" clauses are ratified and confirmed as being true and correct and are made a specific part of this Resolution

Section 2: The City Commission hereby approves the purchase of in-service leak detection and visual pipe inspection services using Sahara technology from Pure Technologies U.S., Inc., in an amount not-to-exceed $92,229.00, as a sole source procurement pursuant to Sections 2-419 and 2-424 of the City Code, and authorizes the City Manager to execute the quotation, related purchase documents, and any non-substantive changes deemed necessary and approved as to form and legal sufficiency by the City Attorney.

Section 3: That the appropriate City officials are authorized to do all things necessary and expedient to carry out the aims of this Resolution.

Section 4: That this Resolution shall become effective upon adoption.

PASSED AND ADOPTED this _____ day of _____, _____.

_____
Mayor, Wayne M. Messam

_____
Vice Mayor, Carson “Eddy” Edwards

ATTEST:

_____
City Clerk, Denise A. Gibbs

I HEREBY CERTIFY that I have approved
this RESOLUTION as to form:

_____
City Attorney,
Austin Pamies Norris Weeks Powell, PLLC

Requested by Administration	**Voted**
Commissioner Maxwell B. Chambers	_____
Commissioner Avril Cherasard	_____
Commissioner Yvette Colbourne	_____
Vice Mayor Carson “Eddy” Edwards	_____
Mayor Wayne M. Messam	_____

March 9, 2026

City of Miramar
13900 Pembroke Road
Miramar, FL 33027

Attention: Mark Williams, Utility Field Operations Manager

Subject: **Pure Technologies Leak Detection Services**

Dear Mr. Williams,

Pure Technologies Ltd. ("**Pure**") has created various leak detection and condition assessment technologies that are protected by various North American and international patents and form an integral part of Pure's intellectual property portfolio.

Sahara®

Pure's Sahara platform is a tethered tool used to identify stress in the pipe wall of pressurized mains which is an indicator of where the pipe will be damaged.

The applicable U.S. patents are:

Deployment of Equipment into Fluid Containers and Conduits

Patent No. 6,889,703
Issue Date: 5/10/2005

Patent No. 7,331,215
Issue Date: 2/19/2008

Pure can state with confidence that we are the only company within the United States or elsewhere offering pipeline inspection platforms with these capabilities, features and accuracy that adhere to the patent above. This technology is proprietary and forms an integral part of our Intellectual Property Portfolio.

If you require any further information, please feel free to contact me or Jennifer Leone at jennifer.leone@xylem.com.

PURE TECHNOLOGIES U.S. INC.

Mike Garaci
Director, Business Development-Assessment Services
Mike.Garaci@xylem.com

City of Miramar
SOLE SOURCE/PRODUCT STANDARDIZATION JUSTIFICATION FORM

Previous Contract No. (if any): 3247	Department: Utilities
Recommended Vendor (if any): Pure Technologies U.S. Inc	Date: 03/24/2025 Not-to-Exceed Amt.: $92,229.00
	Contact Person: Mark Williams
☐ Ongoing Purchase	☒ New Purchase
If an Ongoing/Replacement Purchase what was the prior year expenditure $ _____	

SECTION I

Completion of this form is required in advance of all Sole Source/Product Standard purchases (procurements) in excess of $7,500 from Local/Miramar Businesses or $5,000 from all other vendors.

Check one of the following that best describes the proposed procurement:

☒ Only one source (supplier) exists for the required product/service ("sole source").
☐ Product Standardization (add definition)
☐ Other reason deemed to be in the best interests of the City (Commission Approval Required)

1. In 'layman's terms', describe the required product or service that is being procured and the purpose or function. (Minimum 3 sentences required.)

The Utilities Department is procuring a specialized leak detection and pipeline condition assessment service from Pure Technologies U.S INC. This service uses the Sahara® system, a tethered device that is inserted into pressurized water mains to detect areas of stress or deterioration within the pipe wall that may lead to leaks or failures. The purpose of this service is to help the Utilities Department proactively identify and address potential issues, improve system reliability, reduce water loss, and prevent costly emergency repairs.

2. If the particular product or service was not available or could not be procured, how would the department proceed with its work? (Minimum 3 sentences required.)

If this specialized product or service were not available, the Utilities Department would have to rely on more traditional inspection methods, such as external visual assessments or indirect monitoring techniques, which may not accurately detect early-stage pipe wall deterioration. This could result in undetected leaks or failures, increasing the risk of unexpected pipeline breaks and service disruptions. As a result, the department would likely experience higher maintenance and repair costs, reduced system reliability, and potential impacts to service delivery for residents.

City of Miramar
SOLE SOURCE/PRODUCT STANDARDIZATION JUSTIFICATION FORM

Sole Source

3a. Explain why **the product/service** is the only product/service that can satisfy your requirements and explain why alternatives are unacceptable. Be specific with regard to unique specification, unique features, characteristics, requirements, capabilities, and compatibility. Describe what steps have been undertaken to make this decision. (Minimum 4 sentences required.)

The Sahara® system developed by Pure Technologies U.S INC. is the only known technology that allows for in-line, real-time inspection of pressurized water mains without requiring the pipeline to be taken out of service. Its tethered design enables continuous data collection over long distances while maintaining operation under live system conditions, which is critical for the Utilities Department to avoid service interruptions. Additionally, the system is supported by proprietary technology and patented methodologies that provide highly accurate detection of internal pipe wall stress and early-stage deterioration, capabilities that are not available through conventional inspection methods or alternative vendors. Alternative technologies either require pipeline shutdowns, provide only indirect or external assessments, or do not offer the same level of precision and reliability, making them operationally and technically unacceptable. The department has evaluated available industry technologies and determined that no other provider offers a comparable solution that meets the requirements for accuracy, and continuity of service, leading to the conclusion that this is a sole source service.

3b. Explain why this **vendor** is the only practicable available source from which to obtain this product or service and describe the efforts that were made to verify and confirm whether or not this is so. (Obtain a current letter from the manufacturer confirming claims for the product or service being a sole source.) (Minimum 3 sentences required.)

Pure Technologies U.S.INC is the only practicable source for this service as the Sahara® system is proprietary technology developed, owned, and exclusively provided by the vendor, with no authorized resellers or equivalent providers. The Utilities Department has conducted market research, including a review of available industry technologies and vendors, and determined that no other company offers a comparable in-line inspection solution capable of operating in pressurized mains without service interruption. Efforts to identify alternative providers confirmed that other technologies either do not meet the required technical capabilities or would require operational conditions that are not feasible for the City's system. Pure Technologies U.S. INC. has provided a letter to formally confirm they are the sole source provider of this product and service.

Product Standardization (Standards Committee Meeting is Required)

4. Explain why the product/service requested can best satisfy your requirements and explain why a waiver of competitive bidding is in the best interest of the City. Be specific with regard to unique specification, unique features, characteristics, requirements capabilities and compatibility. (Minimum 3 sentences required.)

N/A

City of Miramar
SOLE SOURCE/PRODUCT STANDARDIZATION JUSTIFICATION FORM

Sole Source and Product Standardization

5. Provide a description of the market survey conducted and the results, or a statement of the reasons a market survey was not conducted. (Minimum 4 sentences required.)

The Utilities Department conducted a market survey to identify potential vendors capable of providing in-line leak detection and condition assessment services for pressurized water mains. This effort included a review of industry providers, available technologies, and consultation of publicly available information regarding pipeline inspection solutions. The results of the survey determined that while there are other companies offering leak detection or pipeline assessment services, none provide a solution equivalent to the Sahara® system. Alternative technologies were found to be limited to external assessments. Based on these findings it was determined the Pure Technologies U.S INC was the only vendor capable meting the City's needs.

6. Explain why the price for this product or service is fair and reasonable and describe the negotiations efforts, if any, that have been made with the vendor/provider to obtain the best possible price.

The price for this product and service is considered fair and reasonable based on a review of industry standards for specialized pipeline inspection technologies and the proprietary nature of the Sahara® system. Due to the advanced capabilities, patented technology, and the ability to perform inspections without interrupting service, the cost reflects the high level of expertise, equipment, and data accuracy provided. The Utilities Department has reviewed the vendor's pricing structure and compared it with similar services to the extent available, confirming that the pricing is consistent with the value and unique capabilities offered. Additionally, the Department has engaged in discussions with the vendor to evaluate scope and pricing components to ensure that the City is receiving the most cost-effective solution available. Based on these efforts, the price has been determined to be fair, reasonable, and in the best interest of the City.

7. Will this purchase obligate the City to a particular vendor/provider for future purchases? (Either in terms of maintenance that only this vendor will able to perform and/or renewals if we purchase this item. Will the City need more "like" items or services in the future to match this one?)

No, this purchase will not obligate the City to purchase from this particular vendor in the future. If other competitors enter the market, the City will be able to seek proposals from other vendors.

8. Describe the actions the department will take to overcome the present barriers to competition prior to any future procurement of this product or service.

To address barriers to competition for future procurements, the Utilities Department will continue to monitor the market for emerging technologies and potential vendors that may offer comparable pipeline inspection solutions. The Department will document lessons learned from the current procurement and assess whether alternative methods or technologies become available over time. Additionally, the Department will engage in ongoing communication with industry associations, conferences, and technology providers to identify innovations that could increase competition. These actions will help ensure that any future procurement of similar services is conducted in a manner that encourages competitive participation while still meeting the City's technical and operational requirements.

City of Miramar
SOLE SOURCE/PRODUCT STANDARDIZATION JUSTIFICATION FORM
PLEASE ALSO ATTACH ADDITIONAL SHEETS OR INFORMATION AS NEEDED

Name of the person who prepared this request and justification:

Name: Mark Williams Position: Utilities Field Operations Manager

Department: Utilities Date: 2/25/2026

I hereby certify that the above request and Justification is accurate and complete to the best of my knowledge and belief.

DocuSigned by:
_Francois Domond Francois Domond 3/25/2026
40F1C123E25841...

Department Director (Print Name) Signature Date

For Procurement Department Use Only

This approval is effective for 9.30.26 **days**

A good faith review of available sources has been conducted by:

☐ User Department ☐ Procurement Department ☐ Standards Committee

I concur that this contract is not suitable for competitive bids or proposals

Chief Procurement Officer 3.30.26 Date

pure TECHNOLOGIES
a xylem brand

March 9, 2026

City of Miramar
13900 Pembroke Road
Miramar, FL 33027

Attention: Mark Williams, Utility Field Operations Manager

Subject: **Pure Technologies Leak Detection Services**

Dear Mr. Williams,

Pure Technologies Ltd. ("**Pure**") has created various leak detection and condition assessment technologies that are protected by various North American and international patents and form an integral part of Pure's intellectual property portfolio.

Sahara®

Pure's Sahara platform is a tethered tool used to identify stress in the pipe wall of pressurized mains which is an indicator of where the pipe will be damaged.

The applicable U.S. patents are:

Deployment of Equipment into Fluid Containers and Conduits

Patent No. 6,889,703
Issue Date: 5/10/2005

Patent No. 7,331,215
Issue Date: 2/19/2008

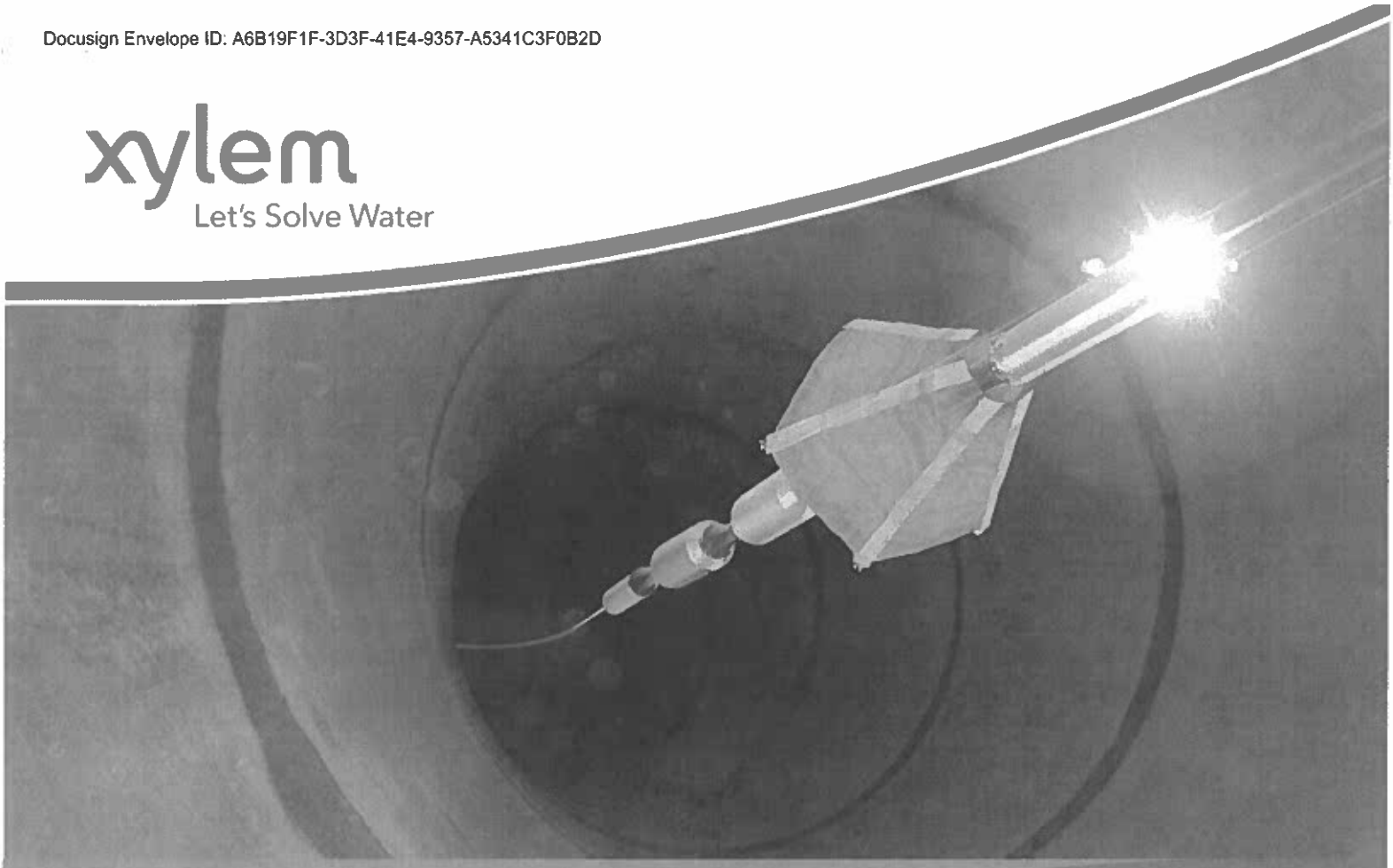
Pure can state with confidence that we are the only company within the United States or elsewhere offering pipeline inspection platforms with these capabilities, features and accuracy that adhere to the patent above. This technology is proprietary and forms an integral part of our Intellectual Property Portfolio.

If you require any further information, please feel free to contact me or Jennifer Leone at jennifer.leone@xylem.com.

PURE TECHNOLOGIES U.S. INC.

Mike Garaci
Director, Business Development-Assessment Services
Mike.Garaci@xylem.com

xylem
Let's Solve Water



Proposal for

IN-SERVICE WATER PIPELINE LEAK DETECTION, VISUAL INSPECTION

36-inch Raw Water and 20-inch Potable Water Pipelines

Sahara®

pure TECHNOLOGIES
a xylem brand

In-Service Leak Detection

March 4, 2026

Mr. Mark D. Williams
Utility Field Operations Manager
City of Miramar
13900 Pembroke Road
Miramar, FL 33027

RE: SW 136th Avenue - 36-inch Raw Water and 20-inch Potable Water Pipelines Culvert Crossing

Dear Mark:

Pure Technologies U.S. Inc., a Xylem brand is pleased to offer our services to the City of Miramar for inline leak and air pocket detection and visual inspections of a portion of the 36-inch raw water main and the 20-inch potable water main located just north of the West Water Treatment Plant (WTP). The project scope includes the inspection of approximately 150 linear feet (LF) of 36-inch diameter raw water pipeline and approximately 150 LF of 20-inch potable water pipeline.

For the raw water pipeline, the planned inspection will begin on the north side of the canal (SW 41st Street and SW 136th Avenue) and end at Blue Gill Road and SW 136th Avenue. For the potable water pipeline, the planned inspection will begin on the south side of the canal (Blue Gill Road and SW 136th Avenue) and end at SW 41st Street and SW 136th Avenue.

We propose using our Sahara® tethered inspection platform to complete this project. Sahara inspects in service pipelines, detects acoustic activity associated with leaks and pockets of trapped air and provides real-time internal visual condition information.

Pure Technologies continually strives to set the standard with the most trusted, technologically advanced tools operated by our highly experienced team. We look forward to addressing any questions you may have and look forward to working with you on this project.

Jennifer Leone, P.E.
Business Development Manager
Pure Technologies U.S. Inc.
Jennifer.Leone@xylem.com

Will Craven, P.E.
Business Development Manager - East
Pure Technologies U.S. Inc.
william.craven@xylem.com

In-Service Pipeline Leak Detection and Visual Inspection

Inline leak detection is the best solution for detecting leaks in large diameter pipelines as it brings the leak detection sensor directly to the source of the leak, providing greater sensitivity and accuracy no matter the pipeline material. The Sahara inspection platform can be deployed in an active line, avoiding the inconveniences associated with disrupting service for the duration of the inspection. Pure Technologies has used the Sahara inspection platform to locate thousands of leaks saving millions of gallons of water.

Known Leak Resolution. Finding and resolving a known leak can be a challenge for any utility. Evidence of leaks can be misleading, making them difficult to locate and sometimes resulting in a public relations issue. Inline leak detection can confirm or deny the existence and locate a known leak with absolute confidence.

Visual Inspection. Internal visual assessment allows pipeline owners to evaluate the condition of pipe joints, internal linings, and suspected blockages. Real-time visual inspection allows points of interest and pipeline features to be identified and correlated to above-ground positions. Live video during the inspection allows for inspections of pipelines to be completed that would otherwise be too risky for a free-swimming tool.

Sahara

The Sahara inspection platform is a tethered, nondestructive inline inspection technology that detects acoustic activity associated with leaks and pockets of trapped air in pressurized pipelines as shown in **Figure 1**. The platform is equipped with closed-circuit television (CCTV) for visual inspection of the pipeline interior and can be located from above ground to provide real-time locating of leaks, points of interest, and optional pipeline mapping.

Since 1998, utilities around the world have relied on the Sahara platform to inspect more than 4,800 miles of pipeline and detect over 6,650 leaks.

The Sahara tool is typically inserted through a 2-inch, or larger, valve into an active line. Once deployed, the Sahara sensor is propelled by the hydraulic flow for distances up to 5,000 feet and can navigate bends, tees, diameter changes, profile changes, and vertical risers. After achieving the target distance, the sensor is pulled back using a winch; all leaks or points of interest are investigated a second time during this retrieval process.

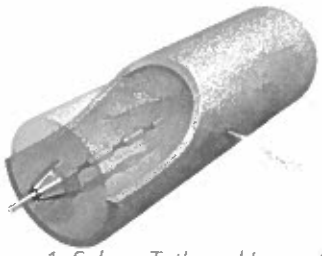


Figure 1: Sahara Tethered Inspection Platform for Pipeline Leak and Air Pocket Detection, Visual Inspection, and Mapping

The precise location of acoustic and visual points of interest can be identified and marked above ground by positioning the Sahara sensor in the pipe at the location of interest and using the Sahara Locator to determine the above-ground location directly above the sensor.

An overview of the Sahara platform inspection process is shown in **Figure 2**.

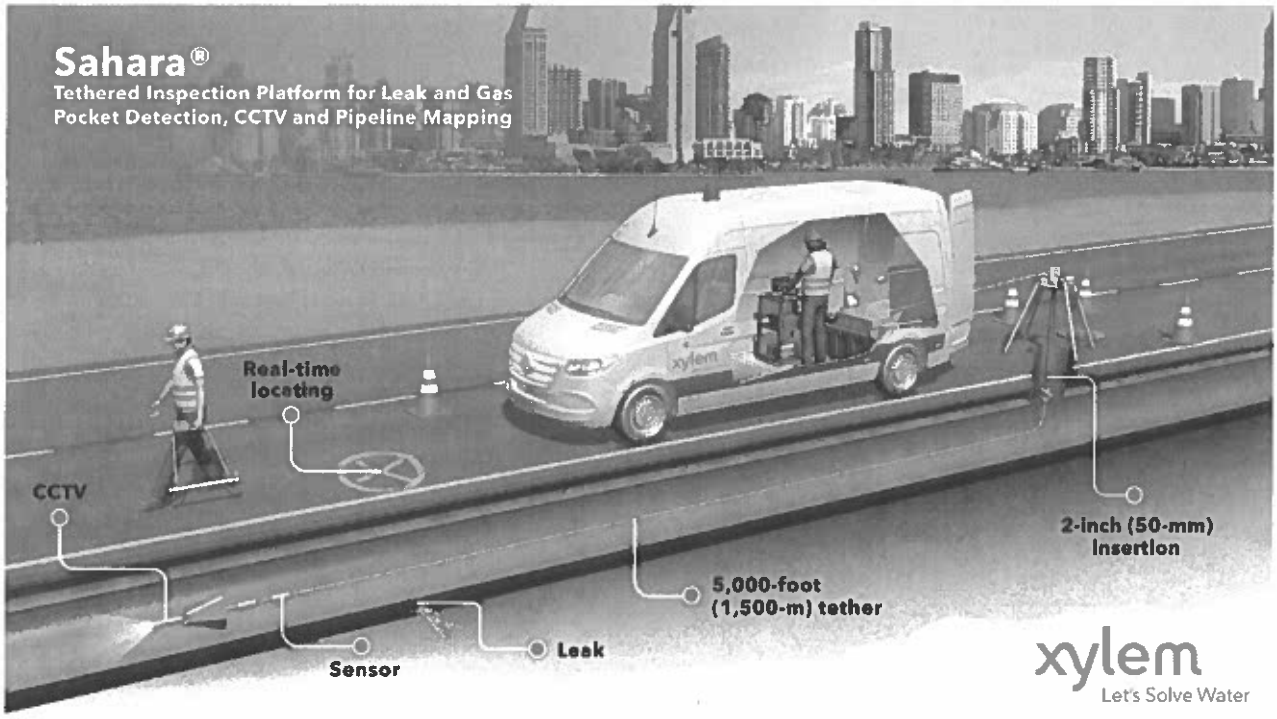


Figure 2: Sahara Inspection Overview

Project Milestones and Deliverables

Additional details regarding insertion, extraction and tracking of the inspection tools are provided in Appendix A, Inspection Considerations.

Planning and Mobilization

The planning process is an integral element of a successful project. It allows the team to identify features of the site or the pipe that could prevent a successful inspection. Actions can then be implemented to mitigate any potential risk.

Pure Technologies will meet with the City of Miramar (City) to perform a site visit to assess access to the pipeline and identify potential challenges and risks. As much information as possible on the pipeline will be requested during the planning process. It is important at this point to collect data on bends and flow rates and to understand the required number of insertions. It is our understanding that the City will facilitate all civil activity for pipeline access, which may require modification to existing features, excavation, tapping, traffic control, scaffolding and other activities identified during the planning process necessary to access pipeline features determined to be critical to the inspection. Pure Technologies will make every effort to utilize existing pipeline features where feasible.

Activities undertaken as part of the planning and mobilization process include, but are not necessarily limited to the following:

- Project document review
- Project planning site visit and review
- Pre-inspection coordination/meetings
- Planning document development, including tracking plan
- Equipment and staffing logistics
- Tool preparation
- Pre-inspection activities required in advance of the scheduled inspection date

Based on the information gathered from the project planning site visit and all available documents, a detailed Project Planning Document (PPD) outlining the inspection plan, including insertion procedures and requirements to track the Sahara sensor from above ground will be submitted prior to commencing the work. The PPD will be submitted to the City in electronic portable data format (PDF) format at least two weeks prior to the inspection, dependent on the receipt of project data, or as soon as possible in cases of urgent mobilization. The City should review and provide comments or approval of the PPD prior to mobilization. Any changes to the scope that arise in the planning process which impact the pricing in this proposal will be discussed with the City and mutually agreed upon before proceeding.

Flow Rate Verification. Onsite verification of flow rates under inspection conditions will be conducted prior to inspection. This is an essential step to verify that operating conditions in the pipeline are suitable for inline inspection.

Planning and Mobilization Deliverables

1. Project Planning Document that outlines the inspection plan.

Inspection

The inspection is anticipated to take 2 days to complete. Immediately preceding the insertion of the Sahara tool, Pure Technologies personnel will measure the flow speed, flow direction, and pipeline operating pressure to verify the conditions in the pipeline. Coordination with City operations staff will be required throughout the duration of the inspection, particularly for activities such as valve operation, pump management, etc. These activities will be outlined in the PPD.

The sensor is inserted through an access point with a minimum diameter of 2 inches using the Sahara insertion assembly. The sensor is propelled by the hydraulic flow in the pipeline using a drag chute that carries the tethered sensor head. As the communication cable is unreeled from the cable drum, it is continuously disinfected by an onboard sanitation bath.

The Sahara Locator, shown in **Figure 3**, is used above ground to track the Sahara sensor in the pipe during the inspection at set intervals and at select points of interest.

A Sahara technician follows the Sahara sensor above ground using the Sahara Locator and marks the ground with paint or a survey stake at the location of all leaks and points of interest. The Sahara probe can be accurately located with up to 33 feet of ground cover in all pipe materials. If required, the City will provide traffic control during the inspection as the technician walks above the pipeline.

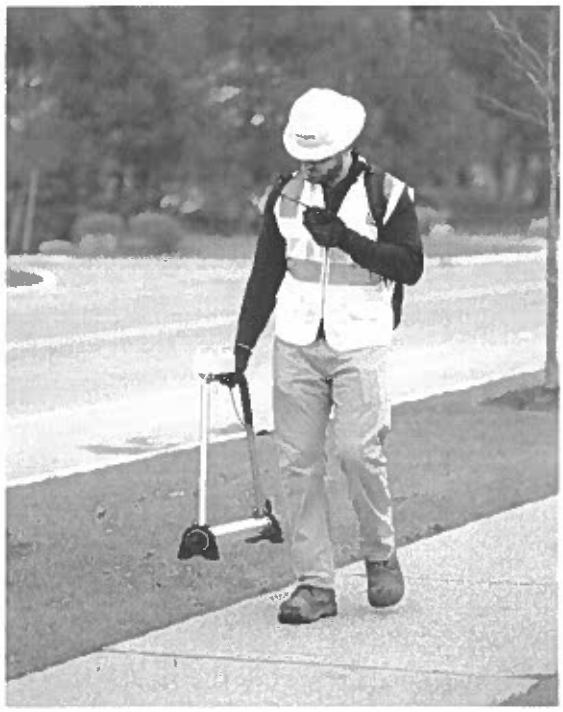


Figure 3: Sahara Technician and Sahara Locator

Leaks are detected both audibly and visually. The Sahara system's acoustic signal processor software converts the audio signal from the Sahara sensor into visual form, displaying the signal amplitude, frequencies, sensor position, and velocity. The Sahara operator can isolate acoustic event locations, estimate leak magnitude qualitatively, and identify the limits of air pockets.

In addition to leak detection, the Sahara operator can identify pipeline features or other points of interest using CCTV. As with leaks, the Sahara operator can indicate the above-ground position of visual points using the Sahara Locator. External factors that affect video quality include turbidity, flow regime (i.e., laminar or turbulent), pipe wall condition and color, and internal diameter.

The onboard camera system was specially designed to provide superior performance in underwater low light conditions. The resulting video quality is uniquely superior because the fiber optic tether prevents any noticeable degradation of the video signal as it travels from the Sahara sensor through the 5,000-feet tether; quality that is unachievable by conventional CCTV systems equipped with copper wire-based tethers.

Further details on considerations related to the pipeline inspection such as pressure, flow requirements, or insertion requirements can be found in Appendix A, Inspection Considerations.

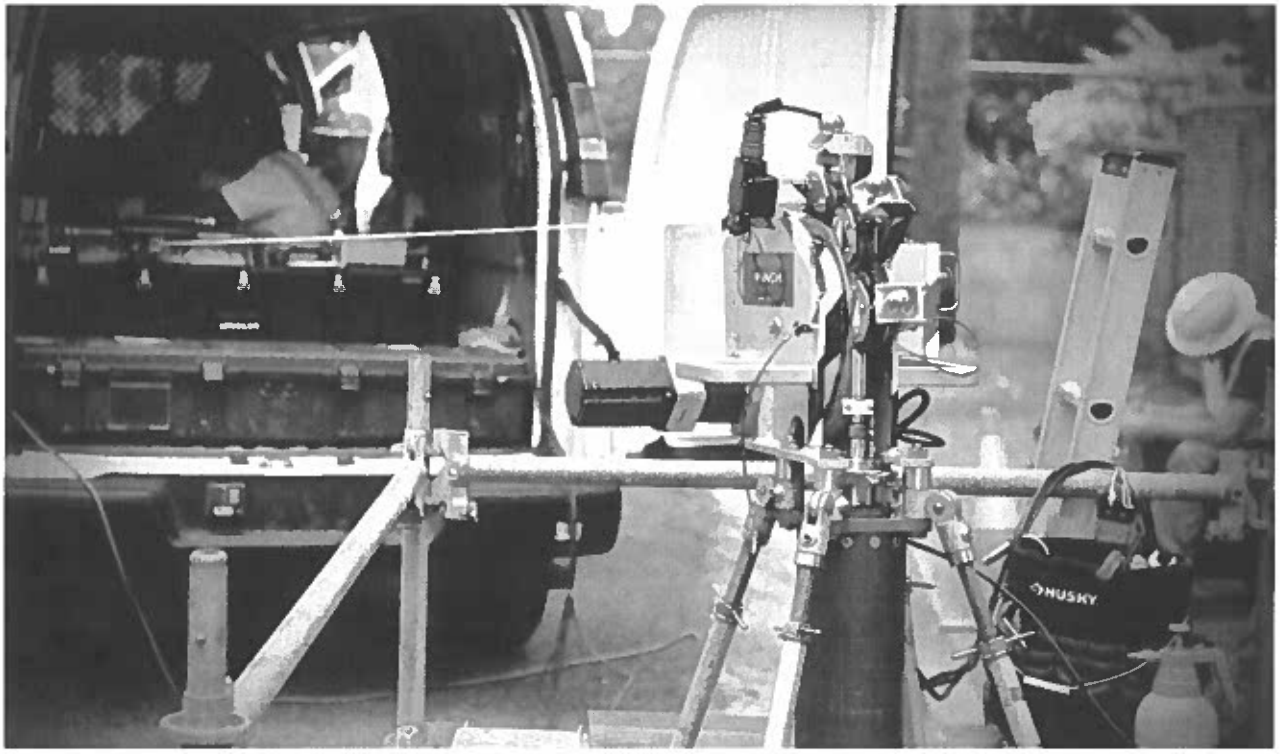


Figure 4: Sahara Insertion Assembly, Winch, and Cable Drum with Continuous Sanitation

Inspection Deliverables

1. Letter Report including details of inspection such as start and end points and pipeline specifications, detected leak locations, and brief description of any observed anomalies.

2. Draft Inspection Report including:
    - Project background and comprehensive summary tables detailing each insertion
    - Details of acoustic events including acoustic intensity plots and locations
    - Video file and full observation notes recorded by the Sahara operator during the inspection

3. Final Inspection Report incorporating comments from the City.

City of Miramar Responsibilities

It is expected that the activities listed below will be completed by the City. Requirements will be determined in more detail during the inspection planning process.

- Provide information about the pipeline at least four weeks prior to the inspection date including, but not limited to, plan and profile drawings, lay sheets, shop drawings, manufacturing details, and details of access structures and appurtenances – if available.
- Obtain any required legal right-of-entry on the property.
- Provide support personnel during the inspection for locating the access structures, traffic control, valve operation, pump operation, and other support as necessary.
- Provide Pure Technologies with the typical flow velocities and pressures for pipeline operation, and the expected minimum and maximum values for each. If this data is unavailable, Pure Technologies would like the opportunity to verify flow velocities recommended prior to performing the inspection.
- Provide and maintain safe and reasonable access to all work sites throughout the inspection and obtain permits as required.
- Prepare and/or modify existing pipeline fittings and structures as indicated by Pure Technologies to accommodate insertion of the equipment as outlined in the PPD.
- Render confined space areas safe for the services, including lockout tagout of pumps, valves and motors; dewatering chambers and vaults to permit movement of persons and equipment; and vector and rodent control as necessary.
- Excavate, dewater, shore up, and/or provide scaffolding of job area and other civil activity as necessary in compliance with Occupational Safety and Health Administration and local standards and regulations.
- Provide pumping services to allow for insertion of the Sahara tool through a hydrant, if necessary.
- Operate the pipeline in a manner that will achieve the minimum required flow velocity indicated in the Planning Document throughout the inspection.

Project Schedule

A typical schedule for this project is shown below.

Project Schedule	
Task	**Timing**
Site visit	2-3 weeks following Notice to Proceed (NTP)
Project Planning Document	2 weeks prior to inspection
Inspection	2-3 weeks following Project Planning Document Approval
Inspection Results	Real-time during inspection; includes above ground marking of leaks and points of interest
Draft Report	4 weeks following inspection
Final Report	2 weeks after receipt of comments on Draft Report *If no response to the Draft Report is received within 30 days of submittal, the report will be finalized and submitted to the City.*

Proposed Fee and Payment Schedule

The estimated cost for this project is based on the information provided at the time of this proposal and detailed in the table below.

Project Pricing					
Item	**Description**	**Unit**	**Unit Price**	**Quantity**	**Total Price**
1	Project Planning and Mobilization	EA	$41,355.00	1	$41,355.00
2	Flow Testing	EA	$4,759.00	2	$9,518.00
3	Inspection (assumes one day per pipeline)	DAY	$16,429.00	2	$32,858.00
4	Reporting	EA	$8,498.00	1	$8,498.00
			Estimated Total Project Cost		**$92,229.00**

Notes and Assumptions

- All travel, shipping and related expenses are included in the mobilization and field data collection/inspection fees.
- If additional work is required due to circumstances outside of Pure Technologies' control or based on additional requests from the City, a mutually agreed change order will be required.
- A charge of 25% of the planning and mobilization fee will apply should the work be delayed by the City within two weeks prior to agreed mobilization date. A project

delayed into the next calendar year may incur a price increase in the amount of the local Consumer Price Index.

- A charge of 50% of the planning and mobilization fee will apply should the work be cancelled by the City within two weeks prior to agreed mobilization date. Any other charges incurred prior to the cancellation scenario shall be invoiced in full.
- A stand-by charge of $10,815 per crew day will apply if the project is delayed for 24 hours or more by the City after mobilization.
- Pricing does not include custom equipment fabrication, traffic control, civil works, permitting, confined space rescue support, lighting for night inspections, or valve exercising. These tasks and their respective costs are the responsibility of the City unless otherwise agreed, or is included in the project estimate above.
- Suitable access points for insertion of the inspection tool are the responsibility of the City.
- Cost associated with pipeline mapping appropriate only as add-on service to inspection, not a standalone mapping project.
- Please note that Project Pricing included herein is valid for 120 days from the date of this proposal.
- Pure Technologies' liability and insurance for this project are standard as detailed in the Standard Terms & Conditions included with this proposal. Non-standard conditions may be subject to a surcharge fee equal to 5% of the total project estimate.
- All taxes, levies, duties, tariffs and other governmental charges, and any incremental increases thereto, shall be paid by the City. Pure Technologies reserves the right to adjust pricing and schedule of the affected goods to reflect any impact resulting from tariffs not already included in the proposed pricing. Pure Technologies is not obligated to deliver the goods and/or services until an agreement on the new price and/or schedule has been reached.

Payment Schedule

Invoicing Schedule		
Service	**Fee**	**Invoicing Period**
Project Planning and Mobilization	$41,355.00	Upon submittal of the Project Planning Document
Flow Testing	$4,759.00/pipeline	Upon completion of the flow testing
Inspection	$16,429.00/day	Upon completion of the Inspection
Reporting	$8,498.00	Upon submittal of the report

Standard Terms and Conditions

CONDITIONS OF ENGAGEMENT FOR THE PROVISION OF SERVICES

(North America)

The Proposal is issued upon and is subject to these Conditions of Engagement. If the Proposal is accepted by the Client, these Conditions of Engagement and the Proposal will be deemed to form part of the Contract between the Client and Pure.

1. DEFINITIONS

In these Conditions of Engagement the following definitions apply:

"Client"	means any person or persons, firm or company engaging Pure to provide the Services.
"Contract"	means the agreement awarded to Pure as a result of the Proposal.
"Pure"	means Pure Technologies Ltd., Pure Technologies U.S. Inc., PureHM Inc., PureHM U.S. Inc. or any of their affiliates, as the case may be, which submitted the Proposal and is a party to the Contract.
"Proposal"	means Pure's offer to carry out the Services and includes all related correspondence plus agreed written variations or amendments thereto.
"Services"	mean those services of whatever nature to be supplied by Pure under the Contract.
"Site"	means the facility, land, installation or premises to which Pure is granted access for the purposes of the Contract and may include any combination of the foregoing.

2. PURE'S OBLIGATIONS

2.1 Pure will perform the Services in accordance with the procedures described in the Proposal, using reasonable skill, care and diligence and consistent with industry standards.

2.2 Pure will ensure that the equipment used in performing the Services is in a good and functional state.

3. CLIENT'S OBLIGATIONS

3.1 The Client will provide to Pure full, good faith co-operation to assist Pure in providing the Services. Unless otherwise specified in the Proposal and without limiting the generality of the foregoing, the Client will at its own expense:

(i) ensure, if required, access to private land will be given to Pure and that any official permits or permissions required for Pure to have access to the Site or carry out the Services are obtained and are in force for the duration of the Services;

(ii) inform Pure in writing of any special circumstances or danger which the execution of the Services may entail or which are inherent in the Site, including the existence and identity of any known hazardous substance or material;

(iii) perform such additional duties and responsibilities and provide such information and resources as are described in the Proposal.

3.2 The description of the Services and related compensation amount set out in the Proposal will be based upon information that the Client shall have provided to Pure, and assumptions that Pure shall have identified in the Proposal. The Client acknowledges that if any such information provided by Client is materially incomplete or inaccurate, or if the assumptions identified by Pure are not correct, then the parties will modify the Proposal to reflect the actual information, assumptions, and Services required, and the compensation to Pure will be adjusted accordingly using the change order process set out in the Contract, or if there is no such process, on an equitable basis.

3.3 Client will pay Pure within 30 days of Client's receipt of an invoice therefrom. Client acknowledges that Pure is entitled to payment for any and all Services performed hereunder up and until the date of the full completion of such Services.

3.4 Upon Client's termination of the provision of Services or any goods by Pure hereunder, Pure will be entitled to payment for any and all goods and Services provided up to and until the date Pure receives notice of termination from Client. Such payments will be at the rates as provided to Client in the Proposal.

3.5 The pricing provided in the proposal shall remain firm for 12 months from the date hereof. Thereafter, in recognition of the current inflationary environment and potential of labor and component cost increases to Pure, a price adjustment may be requested by Pure to account for such cost increase.

4. PROPRIETARY AND CONFIDENTIAL INFORMATION

4.1 All reports generated in the performance of the Services and delivered by Pure to the Client will become the property of the Client.

4.2 Pure's equipment which is made available to the Client in connection with the Contract and the raw data generated in the performance of the Services will remain the sole and exclusive property of Pure. The Client will not acquire any proprietary rights in Pure's equipment, systems, software, technology, inventions (whether or not patentable), patents, patent applications, documentation, specifications, designs, data, databases, methods, processes or know-how ("Pure's Proprietary Technology"). Any modifications or improvements to the Pure's Proprietary Technology made during the performance of the Services will be the sole and exclusive property of Pure.

4.3 Both parties agree to keep confidential all documentation and information provided by the other during the performance of the Contract. The obligations set out in this clause 4.3 will remain in full force and effect after any termination or expiry, as the case may be, of the Contract.

4.4 Notwithstanding anything herein to the contrary, Contractor will have a limited, non-exclusive, royalty-free license to utilize data collected and received in the performance of services hereunder for purposes of (a) providing services, (b) analyzing and improving the services, and (iii) internal research and development for the benefit of Contractor and Client's clients.

5. LIABILITY AND WARRANTIES

5.1 Pure will indemnify and hold the Client harmless against any expense, demand, liability, loss, claim, lawsuit or proceeding whatsoever in respect of personal injury to or the death of any person, or any loss, destruction or damage to any tangible property and arising directly or indirectly from the negligence of Pure, its employees, servants or agents except to the extent caused by the negligence of the Client or any person for whom the Client is responsible. The Client will similarly indemnify Pure.

5.2 Pure will not be liable for any loss of production, loss of use of property, loss of revenue or profit, equipment downtime, business interruption, loss of goodwill, loss of anticipated savings, cost of procurement of substitute goods or services, or for any consequential, indirect,

incidental, or special loss or damage suffered by the Client or any third party, or for any punitive damages, even if advised of the possibility thereof and notwithstanding the failure of essential purpose of any remedy.

5.3 Pure's cumulative liability hereunder, whether in contract, tort, or otherwise, will in no event exceed the greater of (i) the aggregate consideration paid by the City to Pure for the portion of the Services that gave rise to the liability, or (ii) $2 million; provided, however, that this clause shall not limit Pure's indemnification obligations hereunder. The report(s) and any other recommendations or advice made by Pure relating to the pipeline or the Services will be made in accordance with the procedures described in the Proposal, using reasonable skill, care and diligence consistent with industry standards, but do not and will not constitute a warranty of the pipeline's quality, capacity, safety or fitness for purpose. Pure will not be liable to the Client for any liability or damages that arise from the Client's reliance upon or application or use of such final report or recommendations or advice made by Pure in relation to the pipeline or Services, and the Client will indemnify Pure against any liability to third parties resulting therefrom.

5.4 Pure's warranties for the Services will be set out in the Contract. Pure disclaims all implied or statutory warranties or conditions, including of merchantability, merchantable quality, durability, or fitness for particular purpose to the extent allowed by applicable law. This means Pure's warranty obligations will be limited to what is expressly set out in the Contract.

6. Insurance

Pure will provide the Client with a certificate of insurance evidencing the following coverages:

6.1	Commercial General Liability	$2,000,000
6.2	Automobile Liability	$1,000,000
6.3	Workers Compensation	Statutory
6.4	Professional Liability	$500,000

7. Solicitation of Employees

Pure and Client (the "Parties") agree that, for the term of Client's engagement of Pure, and for one (1) year thereafter, the Parties will not:

7.1 directly or indirectly solicit, or attempt to solicit or endeavour to cause any employee, volunteer or consultant of the other Party to leave his or her employment, volunteer or consulting relationship; or

7.2 directly or indirectly induce or attempt to induce any customer or prospective customer of the other Party to cease doing business in whole or in part with the other Party or solicit the business of any customer or prospective customer of the other Party for a purpose which is competitive with the Party's business.

8. Special Conditions/Acknowledgement of Events.

Each Party acknowledge and agree that the global COVID-19 pandemic ("COVID-19") is ongoing, dynamic, unpredictable, and as such may impact the ability of Pure to meet its obligations under this Agreement. The Parties agree that, for so long as there is an impact of COVID-19 on Pure's performance, all performance efforts by Pure will be on a reasonable efforts basis only and Pure shall not be responsible for failure to meet its obligations, to the extent that it is precluded from doing so as a result of COVID-19. The Parties shall work, in good faith, to make any reasonable adjustments that may be required as a result of COVID-19.

Appendix A: Inspection Considerations

Pipeline Pressure

Inline leak detection technology is inherently more sensitive than external methods and correlators because it brings the acoustic sensor within one pipe diameter of the leak. Acoustic leak detection functions by detecting the acoustic signature generated by the sudden drop in pressure of water exiting the pipeline at the site of a leak. Sahara technology requires a minimum pressure differential between internal and external pipeline conditions of 15 psi for acoustic leak detection. For pipelines in high water tables or river crossings, the resultant hydrostatic head acting against the exterior of the pipe wall must be taken into consideration.

During the Sahara inspection, City staff will need to operate the system to maintain pipeline pressures as necessary to accommodate the needs of its customers. A review of the pipeline will be performed as part of the planning process to identify potential areas where the pressure may drop below the minimum required pressure differential for acoustic leak detection. Additional factors that affect acoustic leak detection include tunnels and encasements where the sudden drop in pressure that causes the acoustic signature generated by the leak may not occur at the site of the leak inside the pipeline, but rather at the point where the fluid exits the tunnel or encasement if the 'leak path' becomes pressurized between the pipe wall and the tunnel or encasement. Approximate pressure measurements may be requested prior to and/or during the inspection to ensure the pipeline is operating within expected conditions.

Insertion Requirements

The Sahara tool requires a 2-inch or larger, full bore valve with a female national pipe thread (NPT) connection. For flanged valves, a concentric 2-inch female NPT flange adapter is required. The valve should have direct access to the pipeline with no bends in the connecting riser.

Figure 5 shows a typical insertion set-up with a 2-inch ball valve. The maximum riser height of 76 inches indicated in the figure is for the standard insertion assembly. Access points with greater riser heights can be accommodated if necessary.

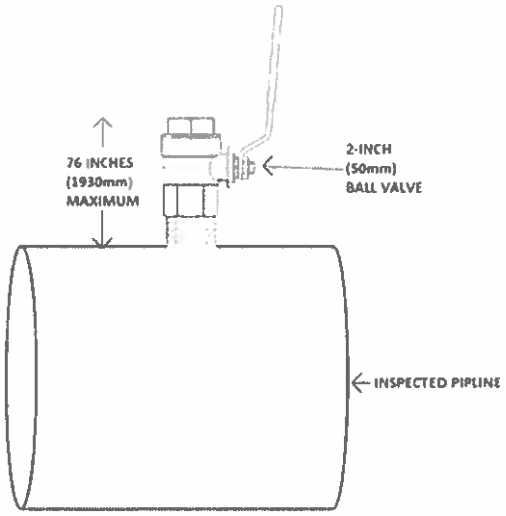


Figure 5: Typical Sahara Insertion Set-up

Tracking

The Sahara Locator is used above ground to track the Sahara sensor in the pipe during the inspection at set intervals and at select points of interest. The Sahara Locator can accurately locate the Sahara sensor with a ground cover of up to 33 feet for all pipe materials.

A Sahara technician follows the Sahara sensor above ground, locating the sensor when as directed by the Sahara operator–typically at a leak, air pocket, or other location of interest. If required, the City will provide traffic control during the inspection as the technician walks above the pipeline.

Accuracy of above-ground location of the Sahara sensor is typically +/- 18 inches (+/- 500mm); however, location accuracy can be affected by heavily wooded areas, steep slopes, or the presence of large amounts of metal in or on the ground such as railroad tracks, rebar, or very thick metallic pipe walls.

Flow Requirements

The Sahara inspection platform requires a minimum fluid velocity in the pipeline of 1 to 10 feet per second. City staff will control the flow rate to provide the required product flow velocity during the inspection. Pure Technologies will also evaluate pumping rates and cycle times to determine if supplemental water will be required to complete the inspection. It should be noted leak and air pocket detection should be performed under typical operating conditions where possible.

Live Pipeline Inspection Risks

Despite meticulous planning and preparation, live pipeline inspection carries an inherent risk that cannot be avoided. There is a possibility that the inspection platform could encounter problems during the inspection run that could lead to loss of data, requiring a re-inspection or at worst the tool getting stuck in the pipeline due to unforeseen or unknown obstructions. The planning process is used to mitigate any potential risks.

Inspection Environment

The inspection environment within the pipeline may affect the ability for a tethered inline inspection tool, such as Sahara, to complete the desired inspection scope. Should the inspection tool encounter abrasive tuberculation or internal obstructions, the tool may become damaged, the full inspection scope may not be achievable, or the tool may become stuck in the pipeline. Should the tool become stuck in the pipeline, it may be necessary to shut the pipeline down and depressurize to facilitate removal of the tool.

The City shall indicate if any of the following conditions are expected to be encountered:

- *Excessive tuberculation.* This type of tuberculation is most commonly found in unlined cast iron pipes (CIP). Excessive tuberculation poses the largest risk to a successful Sahara inspection as it may damage the drogue, sensor probe, or cable.
- *Spike repairs.* One method for repairing leaks on in-service pipelines is performed by forcing a wooden spike through a leak to stop the flow of water and protecting the spike externally before the pipe is buried. The protruding object remaining inside the pipeline poses an entanglement risk for Sahara.
- *Fiber optic cable installations.* Continuous monitoring systems using a free-floating cable poses an entanglement risk for Sahara.

- *Stulls.* Temporary internal bracing or "stulls" are used to prevent damage to a pipe during transportation and handling prior to installation. These bracing devices pose an entanglement risk for Sahara if they were not removed.

Pure Technologies will review the supplied data and implement operational procedures to limit risk during the inspection.

No-flow (Pull Tape) Requirements

In a "no-flow" inspection, the Sahara sensor is pulled through the pipe utilizing a Kevlar muletape. A hydraulic winch at the insertion site feeds the Sahara sensor and tether into the pipeline while a hydraulic capstan winch at the pull site pulls the sensor along the length of the pipeline. The hydraulic capstan and winch operators work together to deploy and retrieve the cable and sensor head, stopping at 3-feet intervals to listen for leaks.

A minimum 2-inch pipeline access with full port valve is required for each insertion site and pull-site. A 2-inch ball valve is preferred, to allow the valve to close on the muletape without severing it.

No-flow inspections are typically performed at intervals up to 2,000 feet due to added tension on the sensor tether. Longer intervals are possible but must be reviewed and approve by Pure Technologies staff. A typical pull tape setup is shown in **Figure 6**.

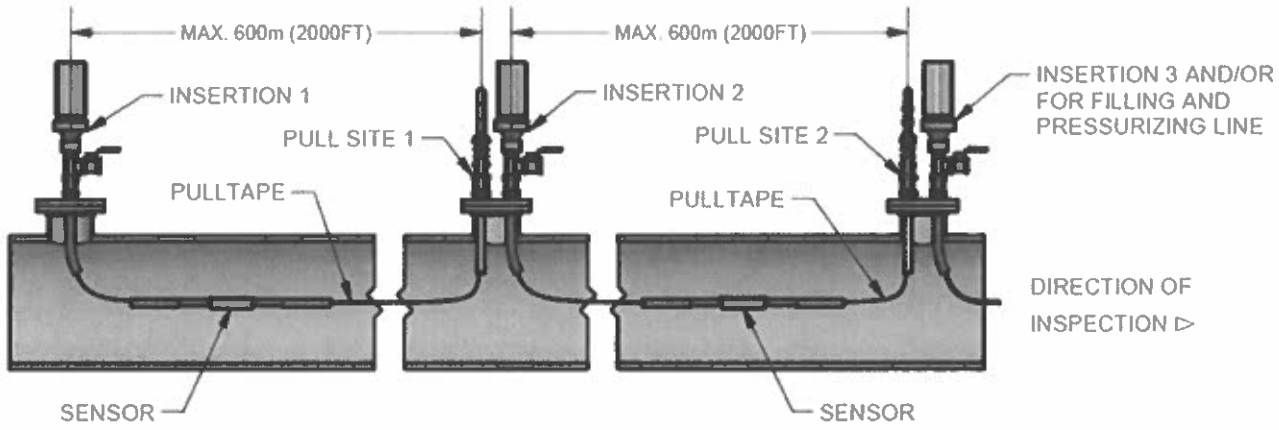


Figure 6: Typical Sahara Pull Tape Setup

Prior to mobilizing Sahara equipment and personnel, the City shall deploy a continuous segment of 5/8-inch Kevlar muletape provided by Pure Technologies through each portion of the pipeline to be inspected. The muletape shall exit the pipeline through the 2-inch valves at each end of the portion of the pipeline to be inspected. If multiple portions of the pipeline are to be inspected, each portion must contain its own continuous segment of muletape.

Pure Technologies will also supply a guide tube and sealing gland to be attached to the 2-inch valve at each pull site. The guide tube is a 1-inch poly tubing that is inserted through the valve and meant to protect the muletape from being severed by the weir of the pipe and flange. The sealing gland consists of compression fittings and tapered rubber grommets that allow the muletape to exit the valve and create a seal around the muletape that can withstand up to 300 psi, allowing for the pipeline to be refilled and pressurized prior to mobilization of Sahara equipment and personnel.

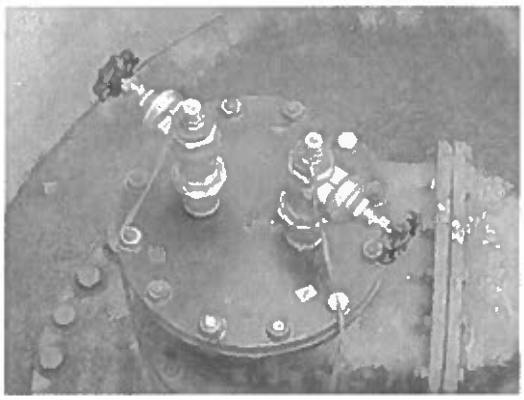


Figure 7: Combination Insertion and Pull Site

When utilizing a single pipeline access point as both an insertion site and pull site, as shown in the center of **Figure 6**, the access point must be at least 6 inches in diameter. An example of a 6-inch blind flange equipped with two 2-inch valves with muletape exiting the valves, is shown in **Figure 7**.

xylem
Let's Solve Water

Proposal for

IN-SERVICE WATER PIPELINE LEAK DETECTION, VISUAL INSPECTION

36-inch Raw Water and 20-inch Potable Water Pipelines

Sahara®

pure TECHNOLOGIES
a xylem brand

March 4, 2026

Mr. Mark D. Williams
Utility Field Operations Manager
City of Miramar
13900 Pembroke Road
Miramar, FL 33027

RE: SW 136th Avenue - 36-inch Raw Water and 20-inch Potable Water Pipelines Culvert Crossing

Dear Mark:

Pure Technologies U.S. Inc., a Xylem brand is pleased to offer our services to the City of Miramar for inline leak and air pocket detection and visual inspections of a portion of the 36-inch raw water main and the 20-inch potable water main located just north of the West Water Treatment Plant (WTP). The project scope includes the inspection of approximately 150 linear feet (LF) of 36-inch diameter raw water pipeline and approximately 150 LF of 20-inch potable water pipeline.

For the raw water pipeline, the planned inspection will begin on the north side of the canal (SW 41st Street and SW 136th Avenue) and end at Blue Gill Road and SW 136th Avenue. For the potable water pipeline, the planned inspection will begin on the south side of the canal (Blue Gill Road and SW 136th Avenue) and end at SW 41st Street and SW 136th Avenue.

We propose using our Sahara® tethered inspection platform to complete this project. Sahara inspects in service pipelines, detects acoustic activity associated with leaks and pockets of trapped air and provides real-time internal visual condition information.

Pure Technologies continually strives to set the standard with the most trusted, technologically advanced tools operated by our highly experienced team. We look forward to addressing any questions you may have and look forward to working with you on this project.

Jennifer Leone, P.E.
Business Development Manager
Pure Technologies U.S. Inc.
Jennifer.Leone@xylem.com

Will Craven, P.E.
Business Development Manager – East
Pure Technologies U.S. Inc.
william.craven@xylem.com

In-Service Pipeline Leak Detection and Visual Inspection

Inline leak detection is the best solution for detecting leaks in large diameter pipelines as it brings the leak detection sensor directly to the source of the leak, providing greater sensitivity and accuracy no matter the pipeline material. The Sahara inspection platform can be deployed in an active line, avoiding the inconveniences associated with disrupting service for the duration of the inspection. Pure Technologies has used the Sahara inspection platform to locate thousands of leaks saving millions of gallons of water.

Known Leak Resolution. Finding and resolving a known leak can be a challenge for any utility. Evidence of leaks can be misleading, making them difficult to locate and sometimes resulting in a public relations issue. Inline leak detection can confirm or deny the existence and locate a known leak with absolute confidence.

Visual Inspection. Internal visual assessment allows pipeline owners to evaluate the condition of pipe joints, internal linings, and suspected blockages. Real-time visual inspection allows points of interest and pipeline features to be identified and correlated to above-ground positions. Live video during the inspection allows for inspections of pipelines to be completed that would otherwise be too risky for a free-swimming tool.

Sahara

The Sahara inspection platform is a tethered, nondestructive inline inspection technology that detects acoustic activity associated with leaks and pockets of trapped air in pressurized pipelines as shown in **Figure 1**. The platform is equipped with closed-circuit television (CCTV) for visual inspection of the pipeline interior and can be located from above ground to provide real-time locating of leaks, points of interest, and optional pipeline mapping.

Since 1998, utilities around the world have relied on the Sahara platform to inspect more than 4,800 miles of pipeline and detect over 6,650 leaks.

The Sahara tool is typically inserted through a 2-inch, or larger, valve into an active line. Once deployed, the Sahara sensor is propelled by the hydraulic flow for distances up to 5,000 feet and can navigate bends, tees, diameter changes, profile changes, and vertical risers. After achieving the target distance, the sensor is pulled back using a winch; all leaks or points of interest are investigated a second time during this retrieval process.

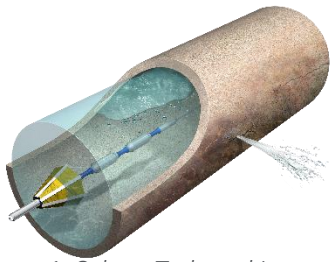


Figure 1: Sahara Tethered Inspection Platform for Pipeline Leak and Air Pocket Detection, Visual Inspection, and Mapping

The precise location of acoustic and visual points of interest can be identified and marked above ground by positioning the Sahara sensor in the pipe at the location of interest and using the Sahara Locator to determine the above-ground location directly above the sensor.

An overview of the Sahara platform inspection process is shown in **Figure 2**.

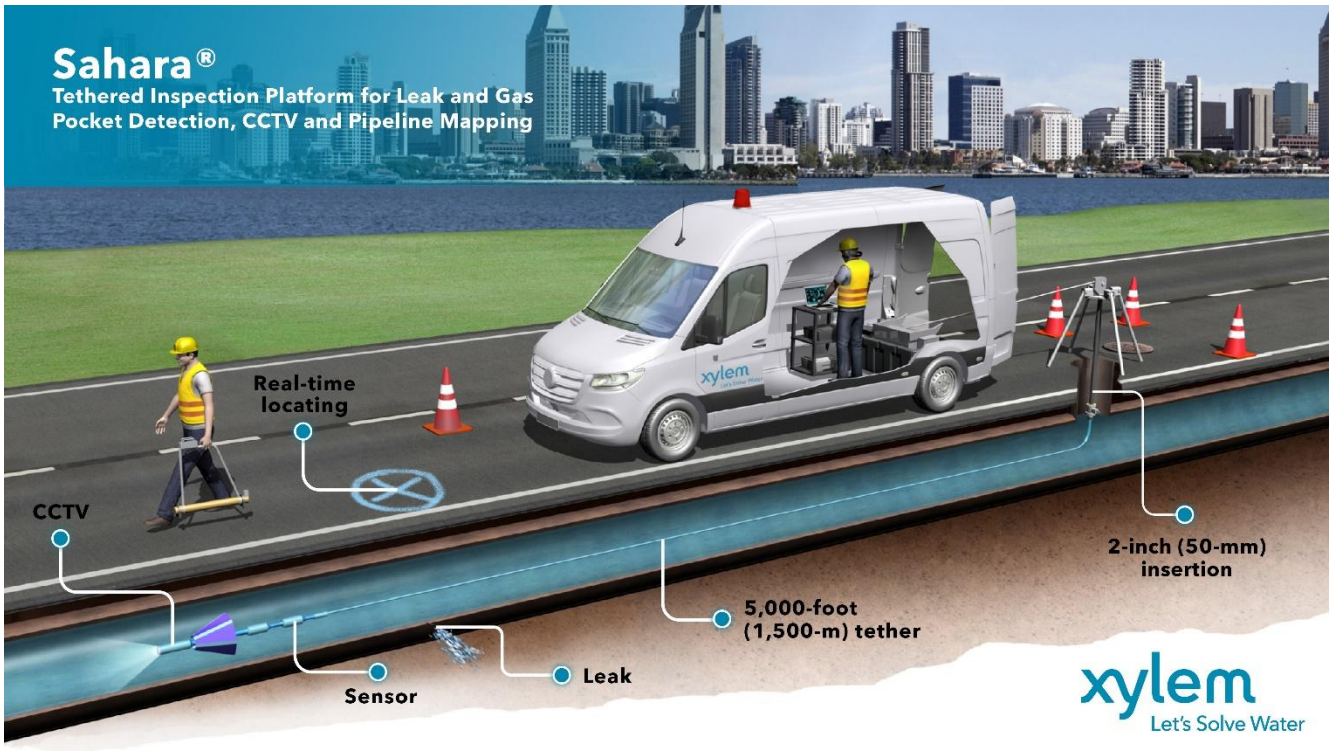


Figure 2: Sahara Inspection Overview

Project Milestones and Deliverables

Additional details regarding insertion, extraction and tracking of the inspection tools are provided in Appendix A, Inspection Considerations.

Planning and Mobilization

The planning process is an integral element of a successful project. It allows the team to identify features of the site or the pipe that could prevent a successful inspection. Actions can then be implemented to mitigate any potential risk.

Pure Technologies will meet with the City of Miramar (City) to perform a site visit to assess access to the pipeline and identify potential challenges and risks. As much information as possible on the pipeline will be requested during the planning process. It is important at this point to collect data on bends and flow rates and to understand the required number of insertions. It is our understanding that the City will facilitate all civil activity for pipeline access, which may require modification to existing features, excavation, tapping, traffic control, scaffolding and other activities identified during the planning process necessary to access pipeline features determined to be critical to the inspection. Pure Technologies will make every effort to utilize existing pipeline features where feasible.

Activities undertaken as part of the planning and mobilization process include, but are not necessarily limited to the following:

- Project document review
- Project planning site visit and review
- Pre-inspection coordination/meetings
- Planning document development, including tracking plan
- Equipment and staffing logistics
- Tool preparation
- Pre-inspection activities required in advance of the scheduled inspection date

Based on the information gathered from the project planning site visit and all available documents, a detailed Project Planning Document (PPD) outlining the inspection plan, including insertion procedures and requirements to track the Sahara sensor from above ground will be submitted prior to commencing the work. The PPD will be submitted to the City in electronic portable data format (PDF) format at least two weeks prior to the inspection, dependent on the receipt of project data, or as soon as possible in cases of urgent mobilization. The City should review and provide comments or approval of the PPD prior to mobilization. Any changes to the scope that arise in the planning process which impact the pricing in this proposal will be discussed with the City and mutually agreed upon before proceeding.

Flow Rate Verification. Onsite verification of flow rates under inspection conditions will be conducted prior to inspection. This is an essential step to verify that operating conditions in the pipeline are suitable for inline inspection.

Planning and Mobilization Deliverables

1. Project Planning Document that outlines the inspection plan.

Inspection

The inspection is anticipated to take 2 days to complete. Immediately preceding the insertion of the Sahara tool, Pure Technologies personnel will measure the flow speed, flow direction, and pipeline operating pressure to verify the conditions in the pipeline. Coordination with City operations staff will be required throughout the duration of the inspection, particularly for activities such as valve operation, pump management, etc. These activities will be outlined in the PPD.

The sensor is inserted through an access point with a minimum diameter of 2 inches using the Sahara insertion assembly. The sensor is propelled by the hydraulic flow in the pipeline using a drag chute that carries the tethered sensor head. As the communication cable is unreeled from the cable drum, it is continuously disinfected by an onboard sanitation bath.

The Sahara Locator, shown in **Figure 3**, is used above ground to track the Sahara sensor in the pipe during the inspection at set intervals and at select points of interest.

A Sahara technician follows the Sahara sensor above ground using the Sahara Locator and marks the ground with paint or a survey stake at the location of all leaks and points of interest. The Sahara probe can be accurately located with up to 33 feet of ground cover in all pipe materials. If required, the City will provide traffic control during the inspection as the technician walks above the pipeline.

Figure 3: Sahara Technician and Sahara Locator

Leaks are detected both audibly and visually. The Sahara system's acoustic signal processor software converts the audio signal from the Sahara sensor into visual form, displaying the signal amplitude, frequencies, sensor position, and velocity. The Sahara operator can isolate acoustic event locations, estimate leak magnitude qualitatively, and identify the limits of air pockets.

In addition to leak detection, the Sahara operator can identify pipeline features or other points of interest using CCTV. As with leaks, the Sahara operator can indicate the above-ground position of visual points using the Sahara Locator. External factors that affect video quality include turbidity, flow regime (i.e., laminar or turbulent), pipe wall condition and color, and internal diameter.

The onboard camera system was specially designed to provide superior performance in underwater low light conditions. The resulting video quality is uniquely superior because the fiber optic tether prevents any noticeable degradation of the video signal as it travels from the Sahara sensor through the 5,000-feet tether; quality that is unachievable by conventional CCTV systems equipped with copper wire-based tethers.

Further details on considerations related to the pipeline inspection such as pressure, flow requirements, or insertion requirements can be found in Appendix A, Inspection Considerations.

Figure 4: Sahara Insertion Assembly, Winch, and Cable Drum with Continuous Sanitation

Inspection Deliverables

1. Letter Report including details of inspection such as start and end points and pipeline specifications, detected leak locations, and brief description of any observed anomalies.

2. Draft Inspection Report including:
    - Project background and comprehensive summary tables detailing each insertion
    - Details of acoustic events including acoustic intensity plots and locations
    - Video file and full observation notes recorded by the Sahara operator during the inspection
3. Final Inspection Report incorporating comments from the City.

City of Miramar Responsibilities

It is expected that the activities listed below will be completed by the City. Requirements will be determined in more detail during the inspection planning process.

- Provide information about the pipeline at least four weeks prior to the inspection date including, but not limited to, plan and profile drawings, lay sheets, shop drawings, manufacturing details, and details of access structures and appurtenances – if available.
- Obtain any required legal right-of-entry on the property.
- Provide support personnel during the inspection for locating the access structures, traffic control, valve operation, pump operation, and other support as necessary.
- Provide Pure Technologies with the typical flow velocities and pressures for pipeline operation, and the expected minimum and maximum values for each. If this data is unavailable, Pure Technologies would like the opportunity to verify flow velocities recommended prior to performing the inspection.
- Provide and maintain safe and reasonable access to all work sites throughout the inspection and obtain permits as required.
- Prepare and/or modify existing pipeline fittings and structures as indicated by Pure Technologies to accommodate insertion of the equipment as outlined in the PPD.
- Render confined space areas safe for the services, including lockout tagout of pumps, valves and motors; dewatering chambers and vaults to permit movement of persons and equipment; and vector and rodent control as necessary.
- Excavate, dewater, shore up, and/or provide scaffolding of job area and other civil activity as necessary in compliance with Occupational Safety and Health Administration and local standards and regulations.
- Provide pumping services to allow for insertion of the Sahara tool through a hydrant, if necessary.
- Operate the pipeline in a manner that will achieve the minimum required flow velocity indicated in the Planning Document throughout the inspection.

Project Schedule

A typical schedule for this project is shown below.

Project Schedule	
Task	**Timing**
Site visit	2-3 weeks following Notice to Proceed (NTP)
Project Planning Document	2 weeks prior to inspection
Inspection	2-3 weeks following Project Planning Document Approval
Inspection Results	Real-time during inspection; includes above ground marking of leaks and points of interest
Draft Report	4 weeks following inspection
Final Report	2 weeks after receipt of comments on Draft Report *If no response to the Draft Report is received within 30 days of submittal, the report will be finalized and submitted to the City.*

Proposed Fee and Payment Schedule

The estimated cost for this project is based on the information provided at the time of this proposal and detailed in the table below.

Project Pricing					
Item	**Description**	**Unit**	**Unit Price**	**Quantity**	**Total Price**
1	Project Planning and Mobilization	EA	$41,355.00	1	$41,355.00
2	Flow Testing	EA	$4,759.00	2	$9,518.00
3	Inspection (assumes one day per pipeline)	DAY	$16,429.00	2	$32,858.00
4	Reporting	EA	$8,498.00	1	$8,498.00
				Estimated Total Project Cost	**$92,229.00**

Notes and Assumptions

- All travel, shipping and related expenses are included in the mobilization and field data collection/inspection fees.
- If additional work is required due to circumstances outside of Pure Technologies' control or based on additional requests from the City, a mutually agreed change order will be required.
- A charge of 25% of the planning and mobilization fee will apply should the work be delayed by the City within two weeks prior to agreed mobilization date. A project

delayed into the next calendar year may incur a price increase in the amount of the local Consumer Price Index.

- A charge of 50% of the planning and mobilization fee will apply should the work be cancelled by the City within two weeks prior to agreed mobilization date. Any other charges incurred prior to the cancellation scenario shall be invoiced in full.
- A stand-by charge of $10,815 per crew day will apply if the project is delayed for 24 hours or more by the City after mobilization.
- Pricing does not include custom equipment fabrication, traffic control, civil works, permitting, confined space rescue support, lighting for night inspections, or valve exercising. These tasks and their respective costs are the responsibility of the City unless otherwise agreed, or is included in the project estimate above.
- Suitable access points for insertion of the inspection tool are the responsibility of the City.
- Cost associated with pipeline mapping appropriate only as add-on service to inspection, not a standalone mapping project.
- Please note that Project Pricing included herein is valid for 120 days from the date of this proposal.
- Pure Technologies' liability and insurance for this project are standard as detailed in the Standard Terms & Conditions included with this proposal. Non-standard conditions may be subject to a surcharge fee equal to 5% of the total project estimate.
- All taxes, levies, duties, tariffs and other governmental charges, and any incremental increases thereto, shall be paid by the City. Pure Technologies reserves the right to adjust pricing and schedule of the affected goods to reflect any impact resulting from tariffs not already included in the proposed pricing. Pure Technologies is not obligated to deliver the goods and/or services until an agreement on the new price and/or schedule has been reached.

Payment Schedule

Invoicing Schedule		
Service	**Fee**	**Invoicing Period**
Project Planning and Mobilization	$41,355.00	Upon submittal of the Project Planning Document
Flow Testing	$4,759.00/pipeline	Upon completion of the flow testing
Inspection	$16,429.00/day	Upon completion of the Inspection
Reporting	$8,498.00	Upon submittal of the report

Standard Terms and Conditions

CONDITIONS OF ENGAGEMENT FOR THE PROVISION OF SERVICES

(North America)

The Proposal is issued upon and is subject to these Conditions of Engagement. If the Proposal is accepted by the Client, these Conditions of Engagement and the Proposal will be deemed to form part of the Contract between the Client and Pure.

1. DEFINITIONS

In these Conditions of Engagement the following definitions apply:

"Client"	means any person or persons, firm or company engaging Pure to provide the Services.
"Contract"	means the agreement awarded to Pure as a result of the Proposal.
"Pure"	means Pure Technologies Ltd., Pure Technologies U.S. Inc., PureHM Inc., PureHM U.S. Inc. or any of their affiliates, as the case may be, which submitted the Proposal and is a party to the Contract.
"Proposal"	means Pure's offer to carry out the Services and includes all related correspondence plus agreed written variations or amendments thereto.
"Services"	mean those services of whatever nature to be supplied by Pure under the Contract.
"Site"	means the facility, land, installation or premises to which Pure is granted access for the purposes of the Contract and may include any combination of the foregoing.

2. PURE'S OBLIGATIONS

2.1 Pure will perform the Services in accordance with the procedures described in the Proposal, using reasonable skill, care and diligence and consistent with industry standards.

2.2 Pure will ensure that the equipment used in performing the Services is in a good and functional state.

3. CLIENT'S OBLIGATIONS

3.1 The Client will provide to Pure full, good faith co-operation to assist Pure in providing the Services. Unless otherwise specified in the Proposal and without limiting the generality of the foregoing, the Client will at its own expense:

(i) ensure, if required, access to private land will be given to Pure and that any official permits or permissions required for Pure to have access to the Site or carry out the Services are obtained and are in force for the duration of the Services;

(ii) inform Pure in writing of any special circumstances or danger which the execution of the Services may entail or which are inherent in the Site, including the existence and identity of any known hazardous substance or material;

(iii) perform such additional duties and responsibilities and provide such information and resources as are described in the Proposal.

3.2 The description of the Services and related compensation amount set out in the Proposal will be based upon information that the Client shall have provided to Pure, and assumptions that Pure shall have identified in the Proposal. The Client acknowledges that if any such information provided by Client is materially incomplete or inaccurate, or if the assumptions identified by Pure are not correct, then the parties will modify the Proposal to reflect the actual information, assumptions, and Services required, and the compensation to Pure will be adjusted accordingly using the change order process set out in the Contract, or if there is no such process, on an equitable basis.

3.3 Client will pay Pure within 30 days of Client's receipt of an invoice therefrom. Client acknowledges that Pure is entitled to payment for any and all Services performed hereunder up and until the date of the full completion of such Services.

3.4 Upon Client's termination of the provision of Services or any goods by Pure hereunder, Pure will be entitled to payment for any and all goods and Services provided up to and until the date Pure receives notice of termination from Client. Such payments will be at the rates as provided to Client in the Proposal.

3.5 The pricing provided in the proposal shall remain firm for 12 months from the date hereof. Thereafter, in recognition of the current inflationary environment and potential of labor and component cost increases to Pure, a price adjustment may be requested by Pure to account for such cost increase.

4. PROPRIETARY AND CONFIDENTIAL INFORMATION

4.1 All reports generated in the performance of the Services and delivered by Pure to the Client will become the property of the Client.

4.2 Pure's equipment which is made available to the Client in connection with the Contract and the raw data generated in the performance of the Services will remain the sole and exclusive property of Pure. The Client will not acquire any proprietary rights in Pure's equipment, systems, software, technology, inventions (whether or not patentable), patents, patent applications, documentation, specifications, designs, data, databases, methods, processes or know-how ("Pure's Proprietary Technology"). Any modifications or improvements to the Pure's Proprietary Technology made during the performance of the Services will be the sole and exclusive property of Pure.

4.3 Both parties agree to keep confidential all documentation and information provided by the other during the performance of the Contract. The obligations set out in this clause 4.3 will remain in full force and effect after any termination or expiry, as the case may be, of the Contract.

4.4 Notwithstanding anything herein to the contrary, Contractor will have a limited, non-exclusive, royalty-free license to utilize data collected and received in the performance of services hereunder for purposes of (a) providing services, (b) analyzing and improving the services, and (iii) internal research and development for the benefit of Contractor and Client's clients.

5. LIABILITY AND WARRANTIES

5.1 Pure will indemnify and hold the Client harmless against any expense, demand, liability, loss, claim, lawsuit or proceeding whatsoever in respect of personal injury to or the death of any person, or any loss, destruction or damage to any tangible property and arising directly or indirectly from the negligence of Pure, its employees, servants or agents except to the extent caused by the negligence of the Client or any person for whom the Client is responsible. The Client will similarly indemnify Pure.

5.2 Pure will not be liable for any loss of production, loss of use of property, loss of revenue or profit, equipment downtime, business interruption, loss of goodwill, loss of anticipated savings, cost of procurement of substitute goods or services, or for any consequential, indirect,

incidental, or special loss or damage suffered by the Client or any third party, or for any punitive damages, even if advised of the possibility thereof and notwithstanding the failure of essential purpose of any remedy.

5.3 Pure's cumulative liability hereunder, whether in contract, tort, or otherwise, will in no event exceed the greater of (i) the aggregate consideration paid by the City to Pure for the portion of the Services that gave rise to the liability, or (ii) $2 million; provided, however, that this clause shall not limit Pure's indemnification obligations hereunder. The report(s) and any other recommendations or advice made by Pure relating to the pipeline or the Services will be made in accordance with the procedures described in the Proposal, using reasonable skill, care and diligence consistent with industry standards, but do not and will not constitute a warranty of the pipeline's quality, capacity, safety or fitness for purpose. Pure will not be liable to the Client for any liability or damages that arise from the Client's reliance upon or application or use of such final report or recommendations or advice made by Pure in relation to the pipeline or Services, and the Client will indemnify Pure against any liability to third parties resulting therefrom.

5.4 Pure's warranties for the Services will be set out in the Contract. Pure disclaims all implied or statutory warranties or conditions, including of merchantability, merchantable quality, durability, or fitness for particular purpose to the extent allowed by applicable law. This means Pure's warranty obligations will be limited to what is expressly set out in the Contract.

6. Insurance

Pure will provide the Client with a certificate of insurance evidencing the following coverages:

6.1	Commercial General Liability	$2,000,000
6.2	Automobile Liability	$1,000,000
6.3	Workers Compensation	Statutory
6.4	Professional Liability	$500,000

7. Solicitation of Employees

Pure and Client (the "Parties") agree that, for the term of Client's engagement of Pure, and for one (1) year thereafter, the Parties will not:

7.1 directly or indirectly solicit, or attempt to solicit or endeavour to cause any employee, volunteer or consultant of the other Party to leave his or her employment, volunteer or consulting relationship; or

7.2 directly or indirectly induce or attempt to induce any customer or prospective customer of the other Party to cease doing business in whole or in part with the other Party or solicit the business of any customer or prospective customer of the other Party for a purpose which is competitive with the Party's business.

8. Special Conditions/Acknowledgement of Events.

Each Party acknowledge and agree that the global COVID-19 pandemic ("COVID-19") is ongoing, dynamic, unpredictable, and as such may impact the ability of Pure to meet its obligations under this Agreement. The Parties agree that, for so long as there is an impact of COVID-19 on Pure's performance, all performance efforts by Pure will be on a reasonable efforts basis only and Pure shall not be responsible for failure to meet its obligations, to the extent that it is precluded from doing so as a result of COVID-19. The Parties shall work, in good faith, to make any reasonable adjustments that may be required as a result of COVID-19.

Appendix A: Inspection Considerations

Pipeline Pressure

Inline leak detection technology is inherently more sensitive than external methods and correlators because it brings the acoustic sensor within one pipe diameter of the leak. Acoustic leak detection functions by detecting the acoustic signature generated by the sudden drop in pressure of water exiting the pipeline at the site of a leak. Sahara technology requires a minimum pressure differential between internal and external pipeline conditions of 15 psi for acoustic leak detection. For pipelines in high water tables or river crossings, the resultant hydrostatic head acting against the exterior of the pipe wall must be taken into consideration.

During the Sahara inspection, City staff will need to operate the system to maintain pipeline pressures as necessary to accommodate the needs of its customers. A review of the pipeline will be performed as part of the planning process to identify potential areas where the pressure may drop below the minimum required pressure differential for acoustic leak detection. Additional factors that affect acoustic leak detection include tunnels and encasements where the sudden drop in pressure that causes the acoustic signature generated by the leak may not occur at the site of the leak inside the pipeline, but rather at the point where the fluid exits the tunnel or encasement if the 'leak path' becomes pressurized between the pipe wall and the tunnel or encasement. Approximate pressure measurements may be requested prior to and/or during the inspection to ensure the pipeline is operating within expected conditions.

Insertion Requirements

The Sahara tool requires a 2-inch or larger, full bore valve with a female national pipe thread (NPT) connection. For flanged valves, a concentric 2-inch female NPT flange adapter is required. The valve should have direct access to the pipeline with no bends in the connecting riser.

Figure 5 shows a typical insertion set-up with a 2-inch ball valve. The maximum riser height of 76 inches indicated in the figure is for the standard insertion assembly. Access points with greater riser heights can be accommodated if necessary.

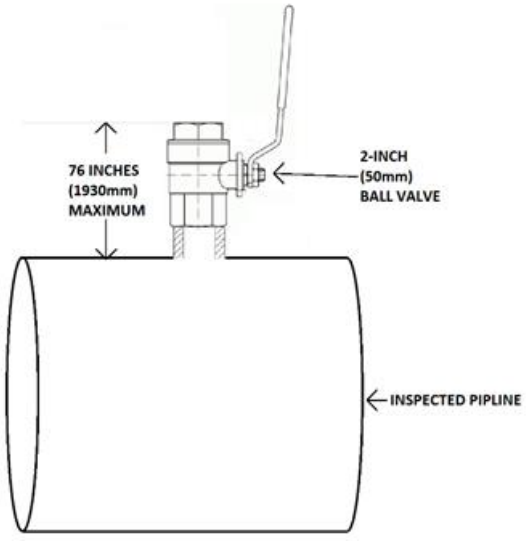


Figure 5: Typical Sahara Insertion Set-up

Tracking

The Sahara Locator is used above ground to track the Sahara sensor in the pipe during the inspection at set intervals and at select points of interest. The Sahara Locator can accurately locate the Sahara sensor with a ground cover of up to 33 feet for all pipe materials.

A Sahara technician follows the Sahara sensor above ground, locating the sensor when as directed by the Sahara operator—typically at a leak, air pocket, or other location of interest. If required, the City will provide traffic control during the inspection as the technician walks above the pipeline.

Accuracy of above-ground location of the Sahara sensor is typically +/- 18 inches (+/- 500mm); however, location accuracy can be affected by heavily wooded areas, steep slopes, or the presence of large amounts of metal in or on the ground such as railroad tracks, rebar, or very thick metallic pipe walls.

Flow Requirements

The Sahara inspection platform requires a minimum fluid velocity in the pipeline of 1 to 10 feet per second. City staff will control the flow rate to provide the required product flow velocity during the inspection. Pure Technologies will also evaluate pumping rates and cycle times to determine if supplemental water will be required to complete the inspection. It should be noted leak and air pocket detection should be performed under typical operating conditions where possible.

Live Pipeline Inspection Risks

Despite meticulous planning and preparation, live pipeline inspection carries an inherent risk that cannot be avoided. There is a possibility that the inspection platform could encounter problems during the inspection run that could lead to loss of data, requiring a re-inspection or at worst the tool getting stuck in the pipeline due to unforeseen or unknown obstructions. The planning process is used to mitigate any potential risks.

Inspection Environment

The inspection environment within the pipeline may affect the ability for a tethered inline inspection tool, such as Sahara, to complete the desired inspection scope. Should the inspection tool encounter abrasive tuberculation or internal obstructions, the tool may become damaged, the full inspection scope may not be achievable, or the tool may become stuck in the pipeline. Should the tool become stuck in the pipeline, it may be necessary to shut the pipeline down and depressurize to facilitate removal of the tool.

The City shall indicate if any of the following conditions are expected to be encountered:

- *Excessive tuberculation.* This type of tuberculation is most commonly found in unlined cast iron pipes (CIP). Excessive tuberculation poses the largest risk to a successful Sahara inspection as it may damage the drogue, sensor probe, or cable.
- *Spike repairs.* One method for repairing leaks on in-service pipelines is performed by forcing a wooden spike through a leak to stop the flow of water and protecting the spike externally before the pipe is buried. The protruding object remaining inside the pipeline poses an entanglement risk for Sahara.
- *Fiber optic cable installations.* Continuous monitoring systems using a free-floating cable poses an entanglement risk for Sahara.

- *Stulls.* Temporary internal bracing or "stulls" are used to prevent damage to a pipe during transportation and handling prior to installation. These bracing devices pose an entanglement risk for Sahara if they were not removed.

Pure Technologies will review the supplied data and implement operational procedures to limit risk during the inspection.

No-flow (Pull Tape) Requirements

In a "no-flow" inspection, the Sahara sensor is pulled through the pipe utilizing a Kevlar muletape. A hydraulic winch at the insertion site feeds the Sahara sensor and tether into the pipeline while a hydraulic capstan winch at the pull site pulls the sensor along the length of the pipeline. The hydraulic capstan and winch operators work together to deploy and retrieve the cable and sensor head, stopping at 3-feet intervals to listen for leaks.

A minimum 2-inch pipeline access with full port valve is required for each insertion site and pull-site. A 2-inch ball valve is preferred, to allow the valve to close on the muletape without severing it.

No-flow inspections are typically performed at intervals up to 2,000 feet due to added tension on the sensor tether. Longer intervals are possible but must be reviewed and approve by Pure Technologies staff. A typical pull tape setup is shown in **Figure 6**.

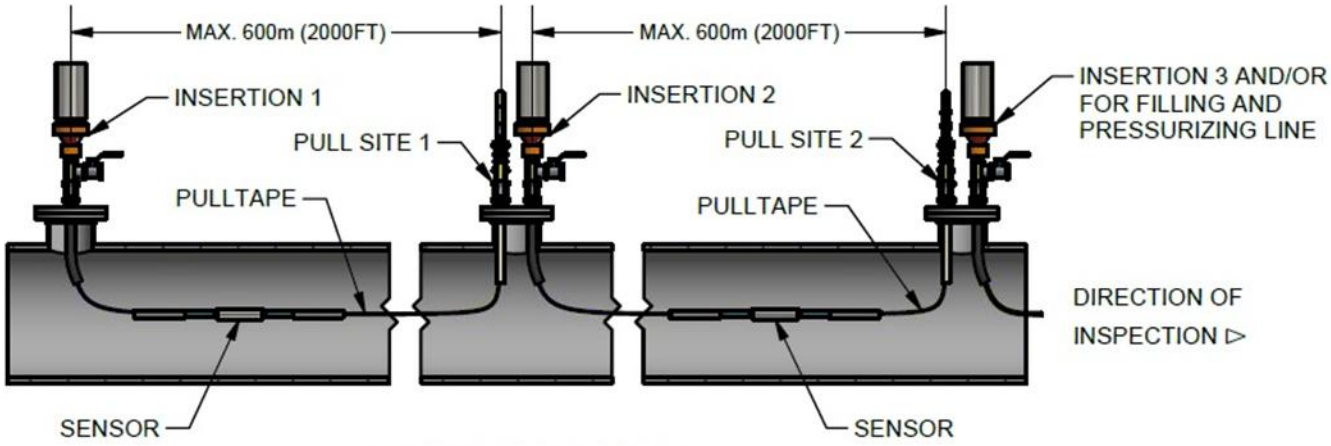


Figure 6: Typical Sahara Pull Tape Setup

Prior to mobilizing Sahara equipment and personnel, the City shall deploy a continuous segment of 5/8-inch Kevlar muletape provided by Pure Technologies through each portion of the pipeline to be inspected. The muletape shall exit the pipeline through the 2-inch valves at each end of the portion of the pipeline to be inspected. If multiple portions of the pipeline are to be inspected, each portion must contain its own continuous segment of muletape.

Pure Technologies will also supply a guide tube and sealing gland to be attached to the 2-inch valve at each pull site. The guide tube is a 1-inch poly tubing that is inserted through the valve and meant to protect the muletape from being severed by the weir of the pipe and flange. The sealing gland consists of compression fittings and tapered rubber grommets that allow the muletape to exit the valve and create a seal around the muletape that can withstand up to 300 psi, allowing for the pipeline to be refilled and pressurized prior to mobilization of Sahara equipment and personnel.

Figure 7: Combination Insertion and Pull Site

When utilizing a single pipeline access point as both an insertion site and pull site, as shown in the center of **Figure 6**, the access point must be at least 6 inches in diameter. An example of a 6-inch blind flange equipped with two 2-inch valves with muletape exiting the valves, is shown in **Figure 7**.