



Calgary

City Auditor's Office

Utilities Delivery – Deer Run Lift Station Project Management Audit

April 3, 2025



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Audit Objective

The objective of this audit was to assess the effectiveness of the capital project management processes of the Deer Run Lift Station Upgrade project.

Why it Matters

The City of Calgary (The City) manages a total of 67 lift stations, including 39 wastewater lift stations and 28 stormwater lift stations located across neighborhoods and commercial areas. Lift stations are considered essential components of The City's wastewater and stormwater management systems. Several lift stations are approaching the end of their expected service life and will require upgrades to meet modern standards and current lift station guidelines.

A strong project management framework is critical to ensuring these infrastructure projects are delivered efficiently on time and within budget, while maintaining the long-term reliability of the wastewater and stormwater systems.

What We Concluded

The Deer Run Lift Station Upgrade project, classified as a Level 2 project, adhered to the Corporate Project Management Framework (CPMF) standards for this classification. No instances of non-compliance were identified. In some cases, the project exceeded expectations by incorporating guidance typically associated with Level 3 projects. This proactive approach not only ensured compliance with project management practices, but also contributed to the effective delivery of the project within budget and schedule.

Utilities Delivery adheres to CPMF-aligned structures and processes for delivery of capital projects. The Project Charter and Project Management Plan included the required standards, such as defined roles and responsibilities, deliverables, and success criteria.

Project risk management involved developing and updating a risk register with monthly reporting on identified risks. Progress was monitored monthly, covering project status, schedule, financials, and risks/issues. A formal change order process managed changes in scope, quality, schedule, and budget.

Project Quality Management documentation outlined success criteria and metrics. Inspections were conducted, including engineering assessments, sediment and erosion reports, occupational health and safety evaluations, and project site inspections.

We identified three opportunities to further enhance Utilities Delivery's preparedness for future lift station projects. Recommendations include establishing a lessons learned repository, documenting risk assessment criteria, and defining an escalation process. Additionally, formalizing quality management guidelines, specifying inspection frequencies and reporting requirements will help new Project Managers by providing clear guidance, ensuring consistency and supporting successful project delivery.

Utilities Delivery has agreed with our recommendations and plans to implement them by September 30, 2025.

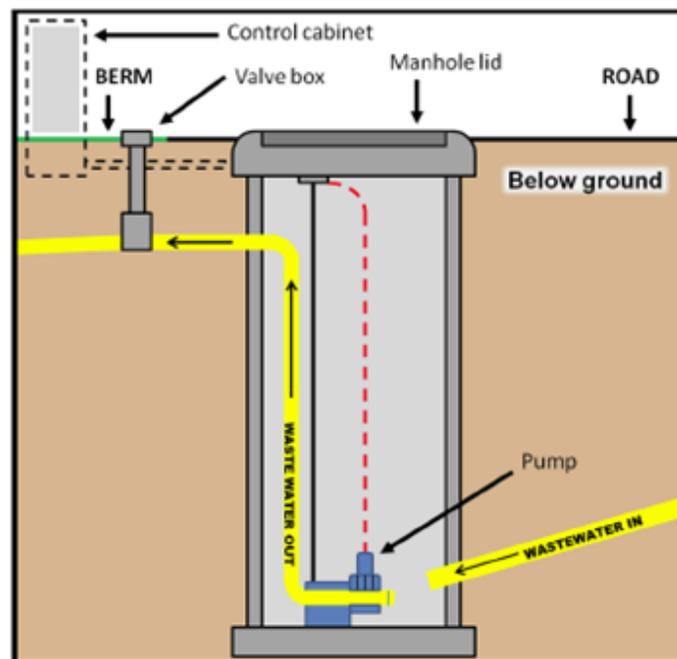
Background

The City manages 67 lift stations located across neighborhoods and commercial areas. These stations move wastewater from lower to higher elevations, using gravity to transport it to one of Calgary's wastewater treatment plants, or move stormwater from lower to higher elevations, using gravity to transport it to our rivers. Lift stations are essential to the City's wastewater and stormwater management systems. Several lift stations are approaching the end of their service life and will require upgrades to meet modern standards and current lift station guidelines. The City plans to upgrade one to two lift stations annually as part of the Lift Station Electrical and Controls Upgrades program, focusing on electrical, instrumentation, and controls upgrades.

Deer Run Sanitary Lift Station

The Deer Run Sanitary Lift Station, built in 1976 and designed to meet the standards of that time, needs a new, larger backup generator to ensure sufficient power during utility outages. A second building is being added to house the new generator and electrical equipment, segregated from the wet well. This upgrade meets current safety and operational guidelines, ensuring continued high-level sanitary service for Calgarians¹. The Project Charter estimated a budget of \$3.9M (Class 4 Estimate). The following diagram shows the key components and functions of a sanitary lift station, illustrating its role in the wastewater management system.

Figure 1 – Sanitary Lift Station



Source: Dublin San Ramon Services District

¹ <https://www.calgary.ca/planning/water/deer-run-sanitary-lift-station-upgrade.html>

Scope & Approach

The scope of the audit is the project management of the Deer Run Lift Station upgrade project from May 5, 2020, to October 31, 2024.

We evaluated the design and operating effectiveness of key processes and controls utilized in project management, including schedule, cost, quality, change control, reporting and governance, and their alignment with recommended CPMF guidance.

We selected this project to be audited as Utilities Delivery will be conducting multiple similar future Level 2 lift station upgrade projects. The focus of the audit was to identify effective practices from this specific project, and provide recommendations to support the success of future lift station upgrade projects.

We did not assess the technical quality of the project (e.g., quality of materials used) or the Lift Station Electrical and Controls Upgrades, including the prioritization and scheduling of individual projects.

Results

To evaluate the effectiveness of the capital project management processes, we reviewed compliance with the Corporate Project Management Framework (CPMF) standards, additionally using the Project Management Institute (PMI) guidelines as benchmarks for best practices. Below, we detail the key CPMF standards evaluated and summarize our audit findings for each standard.

Project Charter & Project Management Plan

The Deer Run Lift Station Upgrade project used a Project Charter and Project Management Plan that followed CPMF standards. These documents outlined the scope, deliverables, milestone schedule, project governance, and high-level risks. The Project Management Plan also included strategic alignment, performance quality metrics, and identification of key stakeholders.

Estimation, Contingency & Schedule

The project used a Baseline Schedule that listed all activities with their start, finish, and total float dates. Key milestone dates were also included, and activities were organized by work breakdown tasks. Monthly progress reports provided updates on the status of milestone and schedule adjustments.

Cost estimates followed CPMF standards, using a five-class system. Reviewing the design estimates, we noted that the 90% design estimate was based on a class 1 estimate, while the 60% design estimate used a class 3 estimate. The project cost and timelines were monitored throughout the project, and the project was delivered within budget and schedule.

Project Risk Management

The project follows a structured risk management process, identifying risks during planning, maintaining a risk register, and conducting monthly risk reporting. The CPMF recommends a Risk Management Plan that outlines risk identification and assessment. To enhance this process, we recommended (Recommendation 1) the development of a risk management framework that defines risk assessment criteria and establishes a clear escalation process. This framework can help with the consistent identification, assessment, and management of risks, improving the project's ability to address potential issues proactively. Additionally, while lessons learned exercises are conducted at project closures, Utilities Delivery does not maintain a centralized repository to document and review lessons. A centralized repository can help capture valuable insights from completed projects, allowing future projects to benefit from past experiences (Recommendation 2).

Project Change Control

The CPMF Project Change Control Standard recommends a standardized and consistent method for managing project changes. This approach helps identify, evaluate, approve, and track changes, ensuring that only thoroughly reviewed and authorized modifications are implemented.

For the Deer Run Lift Station Upgrade project, a change order control process was used. A change order log documented all changes, both accepted and declined. A review of two change orders confirmed that the changes were approved by the appropriate authority levels as outlined in the Project Management Plan.

Quality Management

Project Quality Management documentation outlined success criteria and metrics for measuring outcomes. Various inspections were conducted, including engineering assessments, sediment and erosion reports, occupational health and safety evaluations, and project site inspections.

To position future lift station projects for success, we recommend formalizing quality management guidelines, specifying inspection frequencies, and outlining reporting requirements (Recommendation 3). These steps will provide clear guidance for new Project Managers, ensuring consistency and supporting successful project delivery.

Progress Reporting

The CPMF Progress Reporting Standard requires projects to submit a monthly progress report, covering an overview of the project, current status, schedule, financials, risks and issues, and environmental and safety information.

Our review confirmed that progress reports were submitted monthly, included all required sections outlined in the CPMF standards, and were in alignment with CPMF requirements for Level 2 projects.

Observations & Recommendations

#1: Risk Management	
OBSERVATION	RECOMMENDATION
<p>The project has an established risk management process that involves identifying risks during the planning phase, maintaining a risk register, and monthly risk reporting. However, the process lacks clear guidelines for assessing risks, such as detailed criteria for evaluating the impact and likelihood of risks, defining thresholds for risk significance, and outlining escalation procedures. The CPMF recommends a Risk Management Plan which defines the risk identification and assessment. The absence of these guidelines means that the evaluation and prioritization of risks may be inconsistent, and it does not provide enough guidance for new project managers during onboarding.</p> <p>Establishing a risk management framework for lift station projects, including defining methodologies for assessing risks, establishing criteria for assessing risk impact and likelihood, setting thresholds for risk significance, and outlining clear escalation processes, would provide clear guidance for future lift station project managers.</p>	<p>The Leader, Electrical, Instrumentation and Controls to develop a risk management framework for future lift station projects, including risk assessment criteria and outlining a defined escalation process.</p> <p>MANAGEMENT RESPONSE Agreed.</p> <p>Utilities Delivery acknowledges that this audit pertains specifically to the Deer Run Lift Station Electrical Upgrades project, as well as the broader lift station electrical upgrades program. The risk management recommendations arising from this audit may have broader applicability beyond the scope of the lift station electrical upgrades program. In response, Utilities Delivery will engage with our enabling partners to evaluate whether adjustments to the Corporate Project Management Framework (CPMF) are warranted to enhance future lift station upgrades, as well as other related projects and programs.</p> <p>LEAD Utilities Delivery Project Management Specialist</p> <p>SUPPORT Leader, Electrical, Instrumentation and Controls</p> <p>COMMITMENT DATE September 30, 2025</p>
#2: Lessons Learned Repository	
OBSERVATION	RECOMMENDATION
<p>Currently, lessons learned exercises are conducted at the end of project closures, but Utilities Delivery does not maintain a centralized repository to document and review lessons learned from completed projects. The absence of a centralized repository for documenting and reviewing lessons learned means that valuable insights may be</p>	<p>The Leader, Electrical, Instrumentation and Controls to develop a centralized lessons learned repository for documenting and sharing lessons learned from similar projects and</p>

<p>lost, leading to inefficiencies, recurring issues, and missed opportunities for improving future projects.</p> <p>The Project Management Institute (PMI) emphasizes the importance of organizational knowledge sharing to promote continuous improvement across projects. Maintaining a lessons learned repository allows Project Managers to easily access insights from similar projects when planning for future projects and ensures lesson learned are not lost when team members leave or transition to other projects.</p>	<p>integrating these insights into future projects.</p> <p>MANAGEMENT RESPONSE Agreed.</p> <p>Utilities Delivery recognizes the value of incorporating lessons learned from previous projects as a means of continually improving project execution. At present, project managers have access to and are aware of the lessons learned from prior projects. The process for capturing and documenting lessons learned is outlined in the Project Closeout section of the Corporate Project Management Framework (CPMF), and a repository for lessons learned is maintained through the Water Information Management Standard utilized by Utilities Delivery. The establishment of a centralized repository for lessons learned may enhance accessibility and streamline the process for future projects. Utilities Delivery is committed to pursuing this recommendation in collaboration with our enabling partner, Water Information Management, to assess the need for a centralized repository and to determine the most effective implementation strategy.</p> <p>LEAD Utilities Delivery IM Coordinator</p> <p>SUPPORT Leader, Electrical, Instrumentation and Controls</p> <p>COMMITMENT DATE September 30, 2025</p>
<p>#3: Quality Management</p>	
<p>OBSERVATION</p>	<p>RECOMMENDATION</p>
<p>The Project Management Plan included a quality section covering key success metrics and types of inspections (e.g., site inspections, architectural/engineering inspections). However, it lacked clarity regarding the frequency of inspections and the required format or timeline for inspection reports.</p>	<p>The Leader, Electrical, Instrumentation and Controls to develop quality instructions to support future lift station projects that include:</p>

<p>Current project managers rely on their expertise to implement these aspects informally, but this information is not formally documented. Although focused on Level 3 projects, the CPMF recommends a comprehensive quality management plan, which should include detailed inspection schedules and reporting protocols. Without a clearly established schedule for inspections and a structured reporting framework, there's a potential for inconsistent quality management, especially when transitioning to a new project manager. This could result in overlooked inspections and delays in addressing necessary corrections. Documented quality instructions would mitigate this risk and benefit future project managers when planning upcoming lift station upgrade projects.</p>	<ol style="list-style-type: none"> 1. Inspection Frequency: Define how often each type of inspection (e.g., site inspections, architectural reviews) should occur. 2. Reporting Requirements: Standardize the format, timelines, and responsible parties for submitting inspection reports. <p>MANAGEMENT RESPONSE Agreed.</p> <p>Similar to Recommendation #1, Utilities Delivery acknowledges that this audit is focused on the lift station electrical upgrade program. The quality management recommendations identified in this audit may extend beyond the scope of the lift station electrical upgrades program. In response, Utilities Delivery will engage with our enabling partners to evaluate whether adjustments to the Corporate Project Management Framework (CPMF) are necessary to support future lift station upgrades, as well as other projects and programs.</p> <p>LEAD Utilities Delivery Project Management Specialist</p> <p>SUPPORT Leader, Electrical, Instrumentation and Controls</p> <p>COMMITMENT DATE September 30, 2025</p>
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Acknowledgements

The City Auditor's Office conducts projects, including this audit, in conformance with the International Standards for the Professional Practice of Internal Auditing.

The City Auditor's Office would like to thank staff from Utilities Delivery for their cooperation and support during this audit.