CITY OF Thunder Bay
Superior by Nature

Committee of the Whole Meeting
Agenda

Monday, July 14, 2025, 6:30 p.m.
S.H. Blake Memorial Auditorium

Pages

1. **Closed Session in the McNaughton Room**
   Committee of the Whole – Closed Session was cancelled as the confidential agenda item was re-scheduled to a future meeting.

2. **Open Session (Operations) in the S.H. Blake Memorial Auditorium at 6:30 p.m.**
   Chair: Councillor Trevor Giertuga

3. **Disclosures of Interest**

4. **Confirmation of Agenda**
   WITH RESPECT to the July 14, 2025 Committee of the Whole meeting, we recommend that the agenda as printed, including any additional information and new business, be confirmed.

5. **Presentations**

   5.1 **Indigenous Advisory Council** — 8
   Memorandum from Manager - Indigenous Relations Tanis Thompson dated July 2, 2025 requesting the opportunity for Elder Sheila Decorte to provide a presentation on behalf of the Indigenous Advisory Council.

   5.2 **Synergy North and Thunder Bay Hydro Corp** — 9 - 61
   Memorandum from Synergy North President and CEO Rene Gallant dated July 4, 2025 requesting the opportunity to provide a presentation on the strategic plan for Synergy North and Thunder Bay Hydro Corporation.

6. **Items Arising from Closed Session**

7. Reports of Committees, Boards and Outside Agencies

7.1 EarthCare Advisory Committee Minutes

62 - 68

Minutes of meeting 05-2025 of the EarthCare Advisory Committee held on May 21, 2025, for information.

7.2 Waterfront Development Committee Minutes

69 - 74

Minutes of meeting 05-2025 of the Waterfront Development Committee held on May 20, 2025, for information.

8. Reports of Municipal Officers

8.1 Investment of Municipal Funds and Investment Policy Statement Update

75 - 145

Report 185-2025-Corporate Services-Finance recommending that the Investment Policy Statement (IPS), as amended and appended to this report as Attachment A, be approved and included in the Corporate Policy Manual.

WITH RESPECT to Report 185-2025-Corporate Services-Finance, it is recommended that the Investment Policy Statement (IPS), as amended and appended to this report as Attachment A, be approved and included in the Corporate Policy Manual;

AND THAT the necessary by-law be presented to City Council for ratification.

8.2 2024 Operating Budget Q4 Financial Status and Reserve and Reserve Fund Update

146 - 160

Report 186-2025-Corporate Services-Finance providing an update on the 2024 Operating Budget Q4 Financial Status and Reserve and Reserve Fund, for information.

8.3 Northwest Arterial – Environmental Study Report Addendum

161 - 167

Report 169-2025 Infrastructure & Operations – Engineering advising that an updated Addendum Report is now ready to be filed with the City Clerk and will be available for public review and comment for 30 days following the publication of the Notice of Addendum, for information.

Memorandum from Director-Engineering Matthew Miedema dated May 12, 2025 requesting the opportunity to provide a presentation.

8.4 Delaney Arena Expanded Scope - NOHFC

168 - 170

Report 219-2025-Infrastructure & Operations-Engineering recommending that Administration submit a Stage 2 application for funding to the Northern Ontario Heritage Fund Community Enhancement Program for Delaney Arena Improvements.

WITH RESPECT to Report 219-2025-Infrastructure & Operations-Engineering, we recommend that Administration submit a Stage 2 application for funding to the Northern Ontario Heritage Fund Community Enhancement Program for Delaney Arena Improvements;

AND THAT the City be responsible for mitigating funding shortfalls related to this project;

AND THAT the Manager, Capital Facility Construction be identified as the signing authority for the application;

AND THAT any necessary by-laws be presented to City Council for ratification.

8.5 Automated Meter Reading Case Study

171 - 335

Report 234-2025-Infrastructure & Operations-Environment recommending the implementation of Advanced Metering Infrastructure (AMI) technology to automate the water meter reading system.

Memorandum from Director – Environment Division Michelle Warywoda and Water & Wastewater Engineer Joshua Daniels dated June 23, 2025 requesting the opportunity to provide a presentation.

WITH RESPECT to Report 234-2025-Infrastructure & Operations-Environment we recommend the implementation of Advanced Metering Infrastructure (AMI) technology to automate the water meter reading system;

AND THAT the project costs be included in the 2026-2028 Waterworks and Wastewater rate-supported capital budgets;

AND THAT the City Manager be authorized to sign any necessary agreements related to this Report;

AND THAT any necessary by-laws be presented to City Council for ratification.

9. Outstanding Items List for Operations 336

Memorandum from Director-Legislative Services & City Clerk Krista Power, dated July 2, 2025, for information.

10. Open Session (Community Services)

Chair: Councillor Shelby Ch'ng

11. Reports of Committees, Boards and Outside Agencies

11.1 The District of Thunder Bay Social Services Administration Board Minutes 337 - 355

Minutes of Meetings 07-2025 (Regular Session) and 08-2025 (Closed Session) and Meetings 09-2025 (Regular Session) and 10-2025 (Closed Session) of The District of Thunder Bay Social Services Administrative Board held on April 17, 2025 and May 15, 2025 respectively, for information.

12. Reports of Municipal Officers

12.1 Report Back - Temporary Shelter Village Initiative - Alternate Locations 356 - 371

At the April 28, 2025 Committee of the Whole meeting Report 143-2025–Growth–Strategy & Engagement – Report Back – Temporary Village Initiative – Site Location Comparison was presented and a resolution to approve Kam River Heritage Park as the site for the Temporary Shelter Village Initiative was passed and then ratified at the May 5, 2025 City Council meeting.

At the June 23, 2025 City Council meeting a resolution to rescind the decision ratified by Council on May 5, 2025 was passed.

Also, at the June 23, 2025 City Council meeting a resolution was passed recommending that Administration review alternate locations for the Temporary Village that may include locations previously reviewed by City Council.

Report 239-2025-Growth-Strategy & Engagement recommending that 114 Miles Street East be approved as the site for the Temporary Shelter Village Initiative.

WITH RESPECT to Report 239-2025, we recommend that 114 Miles Street East be approved as the site for the Temporary Shelter Village Initiative;

AND THAT the Director, Strategy & Engagement have delegated authority to make decisions regarding operationalizing the Temporary Shelter Village Initiative;

AND THAT the Director, Strategy & Engagement be authorized to execute documents for the Temporary Shelter Village Initiative for the duration of the project, on terms satisfactory to the City Solicitor and City Manager;

AND THAT the municipally owned property at 142 Simpson Street and immediately adjacent property be excluded in the future identification process for recognized encampment locations;

AND THAT the Miles Street and Simpson Street be added to the Eye on the Street program’s Code of Practice, pending a public consultation process;

AND THAT a recurring financial contribution, reviewed annually, of $125,000 be included in the 2026 Fort William Business Improvement Association (BIA) Budget to support their revitalization efforts and address concerns related to security and cleanliness;

AND THAT Appropriation Change Order 07-2025 be approved;

AND THAT any necessary by-laws be presented to City Council for ratification.

13. Petitions and Communications

13.1 Planet Youth Thunder Bay: Community Prevention Initiative

372 - 374

Memorandum dated June 4, 2025 from Louisa Costanzo, Manager - Community Safety and Well-Being recommending that the Corporation of the City of Thunder Bay sign a Declaration of Support to formalize the collaborative relationship advancing a locally driven and community-tailored model for Planet Youth Thunder Bay, an initiative focusing on upstream prevention, aiming to reduce youth substance use by strengthening protective factors across families, schools, peer groups, and the broader community, for Council's consideration.

Memorandum from Climate Action Specialist Danielle Thom dated July 3, 2025 requesting the opportunity for Desiree Green, Community Collaboration Manager – United Way Thunder Bay, and Sheena Albanese, Health Promotion Planner – Thunder Bay District Health Unit, to provide a presentation.

WITH RESPECT to the Memorandum from Louisa Costanzo, Manager – Community Safety & Well-Being, dated June 4, 2025, we recommend that Mayor sign the Declaration of Commitment for Planet Youth Thunder Bay;

AND THAT the City support this initiative through participation in planning activities, grant development, and public engagement in alignment with existing roles and resources;

AND THAT any necessary by-laws be presented to City Council for ratification.

13.2 **Memorandum of Understanding Youth Wellness Hub Initiative** 375 - 378

Memorandum dated June 2, 2025 from Kim Begin, Supervisor – Aquatics, Wellness, Children & Youth recommending the Corporation of the City of Thunder Bay enter into a Memorandum of Understanding and subsequent Service Agreement with Children's Centre Thunder Bay to formalize a collaborative relationship focused on supporting youth mental health and wellness through the Thunder Bay and District Youth Wellness Hub, for Council's consideration.

Memorandum from Director - Recreation & Culture Leah Prentice dated June 2, 2025 requesting an opportunity for Supervisor- Aquatics, Wellness, Children and Youth Kim Begin and Children's Centre Thunder Bay, Manager – Child and Family Counselling and Therapy Leslie Hatton to provide a presentation.

WITH RESPECT to the Memorandum from Kim Begin, Supervisor – Aquatics, Wellness, Children & Youth, dated June 2, 2025, we recommend that authority be delegated to the Commissioner Community Services to execute a Memorandum of Understanding (MOU) and Service Agreement with Children's Centre Thunder Bay for

the Thunder Bay and District Youth Wellness Hub to the satisfaction of

the City Solicitor;

AND THAT any necessary by-laws be presented to City Council for ratification.

14. Outstanding Items List for Community Services

There are currently no listed Outstanding Items for the Community Services Session.

15. New Business

16. Adjournment

Memorandum

TO:	Krista Power, City Clerk	**FILE:**
FROM:	Tanis Thompson, Manager of Indigenous Relations |Strategy & Engagement| Growth	
DATE:	07/02/2025	
SUBJECT:	Request for Presentation – City of Thunder Bay Indigenous Advisory Council Roles & Responsibilities	
MEETING & DATE:	Committee of the Whole – 07/14/2025	

We respectfully request that the City of Thunder Bay's Indigenous Advisory Council be provided with an opportunity to present on the Indigenous Advisory Council's roles and responsibilities of the Council to Indigenous Relations office and within the Corporation at the Committee of the Whole meeting scheduled for July 14, 2025.

The presentation will be delivered by Sheila Decorte, Elder/Bundle Carrier and esteemed member of the Indigenous Advisory Council.

Thank you,

Tanis Thompson
Manager of Indigenous Relations | Strategy & Engagement | Growth

cc Cynthia Olsen, Director, Strategy & Engagement – Growth
Dana Earle, Manager - Legislative Services / Deputy City Clerk
Crystal DePeuter, Council & Committee Coordinator

SYNERGY NORTH

THE POWER OF THE NORTH

2025-2028 STRATEGIC PLAN



NOTE FROM
CEO AND BOARD CHAIR

TO OUR CUSTOMERS AND EMPLOYEES AND SHAREHOLDERS:

The customers of SYNERGY NORTH expect their electric utility to deliver safe, reliable and affordable power, and to be ready for innovation and change in energy use and options. We share those expectations, which is why we are pleased to present this 2025-2028 Strategic Plan.

At Synergy North, safety is our top priority. No business interest is more important than the safety of our employees, contractors and customers. We are building a safe, modern grid to support electrification and maintain system resilience through proactive investment, cybersecurity, and risk management.

This Strategic Plan outlines the key goals and activities for the future of Synergy North. The plan builds on our successful past and is based on our approved investment plan and electricity rates that will be in place for the length of the plan. It is an approach that requires dedication, resources and hard work by our team, and it is achievable.

This plan describes a future in which the demand for electricity and innovation is growing and the customers of Synergy North have even higher – and appropriately so – expectations for service, support, and reliability. We are planning and investing to strengthen and modernize our distribution grid so that we can respond to increased demand for technologies like electric vehicles, batteries, heat pumps and other home-based energy products and systems.

We are building our capabilities with a workplace that is inclusive and a workforce that is focused on safety, well trained and professional and responsive to customers. Synergy North will be relentlessly focused on exceeding customer expectations.

Working together, our employees are driven by **Safety, Reliability, Community and Excellence.** We are grateful for your support for Synergy North, and we welcome questions and dialogue about the energy future that we will build together.

Customers choose Synergy North to power their lives with outstanding energy services, delivered in a safe, reliable and trusted manner.



Rene Gallant,
President & CEO



Barb Eccles, HBSc, JD, LLM, ICD.D
Board Chair



EXECUTIVE SUMMARY

Powering Communities, Partnering for a Smart Energy Future

As we look ahead to 2025 and beyond, SYNERGY NORTH stands at a pivotal moment in our journey as a municipally owned utility. The next five years will be shaped by rapid electrification, rising customer expectations, emerging digital technologies, and a growing call for environmental and economic resilience.

Over the 2022–2024 strategic cycle, SYNERGY NORTH demonstrated operational excellence and strong regulatory performance. With a successful Cost of Service application and a new Distribution System Plan in place, we have built a solid foundation to deliver value to our customers and to our shareholders — **the City of Thunder Bay and the City of Kenora**. Our organization is more efficient, customer-focused, and aligned to future needs than ever before.

Above all, safety remains our highest priority. We are proud of our industry-leading safety culture, and we continue to champion the well-being of our employees, our contractors, and the communities we serve. As our systems grow more complex and weather events more intense, our commitment to safety will continue to guide every decision we make.

Yet we know the future will look different. Customers are demanding more from their utility — more reliability, transparency, flexibility, and support. The energy transition is accelerating, and our communities are increasingly dependent on electricity to fuel their homes, vehicles, and businesses.

This **2025–2028 Strategic Plan** lays out our road map to meet these challenges with confidence. It builds upon our strengths — our people, our reliability, and our deep commitment to community — and aligns with provincial and national energy priorities. We have identified key strategic initiatives that will help us modernize the grid, support distributed energy resources, empower our employees, and deliver an exceptional customer experience.

SYNERGY NORTH is not just adapting to change — we are helping lead it. Together with our employees, partners, and stakeholders, we are ready to power the future — safely, reliably, and sustainably.



OUR BUSINESS

Local Service. Provincial Impact. Community Value.

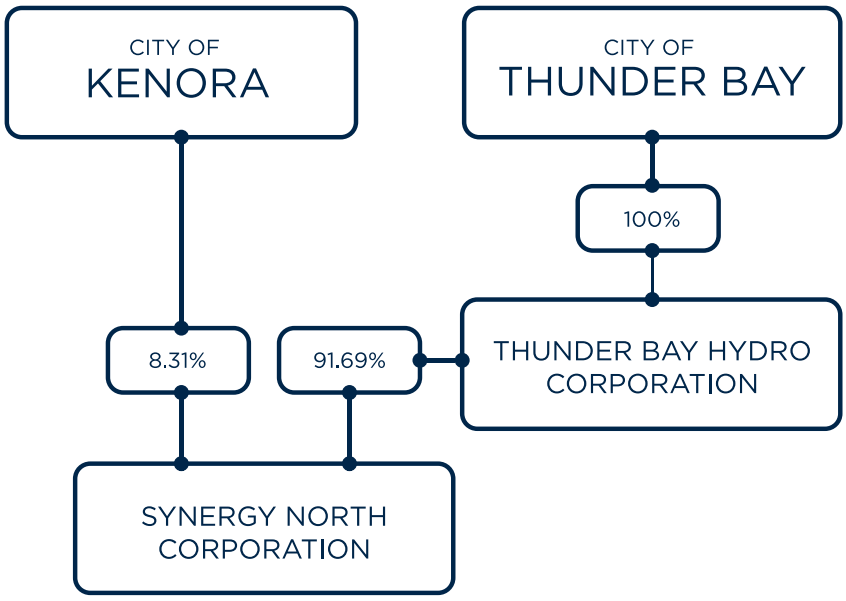
SYNERGY NORTH Corporation is the local face of Ontario's electricity system for over 56,000 customers in the cities of Thunder Bay and Kenora. We own and operate a distribution network of more than 1,400 kilometers of overhead and underground power lines across diverse terrain and weather conditions in Northwestern Ontario.

Our role is more than just wires and poles. We are the trusted utility that customers turn to for meter reading, billing, conservation and electrical safety education, outage support, and energy advice. Whether it's supporting new housing developments, connecting electric vehicles, or modernizing infrastructure to serve growing needs, SYNERGY NORTH plays a vital role in building resilient, livable communities.

As a municipally owned distribution utility, we are governed with public accountability and guided by our shareholder municipalities: the City of Thunder Bay and the City of Kenora. We operate with a long-term view, aiming to return value not only to our customers, but also to the broader communities we serve.

Through operational excellence, safety leadership, and deep community roots, we continue to evolve to meet the changing needs of our customers while delivering reliable, cost-effective electricity.

CORPORATE STRUCTURE




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VISION

Your trusted partner for energy and related services.

We envision a future where SYNERGY NORTH continues to lead as a reliable, innovative, and community-minded utility — one that customers choose and trust to power their homes, businesses, and future.

MISSION

Customers choose SYNERGY NORTH to power their lives with outstanding energy services delivered in a safe, reliable and trusted manner to our communities.

This mission reflects our commitment to excellence in everything we do — from maintaining a safe and dependable electricity grid to supporting our customers through personalized service and local presence.

This Strategic Plan serves as the roadmap to achieving our Vision and Mission. The initiatives outlined will be translated into actionable business and execution plans, integrated with our capital and financial planning to ensure a balanced approach that delivers measurable outcomes while maintaining affordability for our customers.

CORE VALUES



RELIABLE

Supply our products and services in a trustworthy, fair and dependable manner



SAFETY

Promote, work and live safely



COMMUNITY

Lead by example to build a strong community



EXCELLENCE

Pursue being better in everything we do

OUR CURRENT INITIATIVES INVESTMENTS SUCCESSES

DELIVERING ON OUR 2022–2024 STRATEGIC PLAN

SYNERGY NORTH made significant progress under the 2022–2024 Strategic Plan, successfully advancing our operational, regulatory, and organizational goals. This period was marked by a sharpened focus on system reliability, regulatory excellence, and community safety. Some of the signature milestones achieved during this time include:

SUCCESSFUL COST OF SERVICE (COS) APPLICATION:

Our COS rate application was approved by the Ontario Energy Board, ensuring the financial sustainability of our operations while maintaining fair and stable rates for our customers for the 2024-2028 period. The approval reflected the strength of our planning, evidence-based submission, and stakeholder engagement process.

UPDATED DISTRIBUTION SYSTEM PLAN (DSP):

We submitted and received approval for a comprehensive five-year DSP (2024–2028), which outlines key investments in grid modernization, the completion of our 25kV conversion program, and other critical system renewal projects. This plan reinforces our commitment to maintaining a safe, reliable, and responsive distribution network. Between 2024 and 2028, SYNERGY NORTH plans to invest approximately **$86 million** in gross capital expenditures, reflecting our continued focus on system performance, affordability, and long-term asset sustainability.

ENHANCED VEGETATION MANAGEMENT PLAN:

In response to increasing climate-related threats, particularly from extreme weather events, we strengthened our vegetation management program. This initiative contributed directly to improved system reliability and public safety, particularly during storm seasons.

SAFETY EXCELLENCE:

We continued to uphold a strong safety culture, achieving industry benchmarks in employee safety performance. Our proactive approach to hazard identification, safety training, and incident prevention has resulted in low injury frequency rates and consistently strong safety outcomes across our operations.

ENTERPRISE RISK MANAGEMENT PROGRAM:

SYNERGY NORTH's Enterprise Risk Management (ERM) was implemented in 2023 to integrate risk awareness and controls into decisionmaking, planning, and operations, ensuring that risks are proactively identified, assessed, and managed. The purpose of the program is to protect and create organizational value by enabling informed decision-making, enhancing performance, and supporting the achievement of corporate objectives.

STRATEGIC CONTEXT

THE ENERGY LANDSCAPE IS CHANGING — RAPIDLY AND PERMANENTLY

The electricity sector is undergoing a profound transformation. Across Ontario, Canada, and globally, five key forces are reshaping how utilities operate, plan, and serve:



DECARBONIZATION

Climate change demands action. Provincial and federal governments are accelerating the shift to a net-zero electricity grid and economy. Electrification of transportation, heating, and industry is expanding demand and changing how the grid must perform. Utilities are expected to lead, not follow, in enabling the clean energy transition.



DIGITALIZATION

The convergence of operational and information technology is revolutionizing how utilities monitor, manage, and serve. Digital tools improve reliability, customer experience, outage response, and efficiency — but also increase cyber risks and require investment in platforms, processes, and people.



DECENTRALIZATION

Customers are no longer just consumers — they are producers, storers, and managers of their own electricity through distributed energy resources (DERs). The traditional one-way grid model is being replaced by a dynamic, two-way network requiring new planning and operational approaches.



DIVERSIFICATION

Utility business models are expanding. Customers expect more than just power — they want energy advice, cost control, environmental solutions, and digital service. Regulators are exploring performance-based incentives and innovation funding models, pushing LDCs to evolve and partner differently.



DEMOGRAPHICS & COMMUNITY EXPECTATIONS

In an era of talent competition and flat population growth, particularly in Northern Ontario, utilities must be employers of choice and community leaders. Customers expect transparency, affordability, local support, and alignment with their values — especially on sustainability and reconciliation.

This plan is SYNERGY NORTH's proactive response to these realities — a road map that balances innovation and affordability, reliability and resilience, community focus and operational excellence.

OUR THREE ASPIRATIONAL GOALS & AREAS OF FOCUS

We prioritize what truly matters—our people, our customers, and reliability —all at the core of our strategic plan. These areas of focus drive the strategic initiatives SYNERGY NORTH



RELIABILITY

WE ARE BUILDING A MODERN GRID THAT SUPPORTS ELECTRIFICATION.

Continued investment in the Distribution System Plan, readying the company and assets for a future with growing operational technologies and digitalization, and ensuring we continue to maintain reliability through business continuity tactics and attention to cybersecurity and risk.



CUSTOMERS

WE ARE A TRUSTED PARTNER THAT DELIVERS EXCEPTIONAL SERVICE. SYNERGY NORTH Corporation exists to provide reliable electricity supply and related services to our customers and our community. Meeting this obligation requires an understanding of our customer's needs and expectations, and a commitment to delivering a high level of service in a trustworthy, fair and dependable manner. It also entails being in the communities we serve in a visible and meaningful way outside of just providing electricity and related services.



PEOPLE

A GREAT PLACE TO WORK AND GROW

Our employees are important to us. They are the ones who service our customers. We need them and we are committed to ensuring them a healthy and safe working environment in all aspects. Safety is our number one priority and SYNERGY NORTH Corporation has established itself as an industry and community leader in the area of Health & Safety. This culture is not for work alone but also for our employees' personal lives and within the broader communities we serve.


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BEFORE YOU DIG

STRATEGIC PRIORITIES:

OUR 8 KEY INITIATIVES FOR GROWTH

Our strategy calls on SYNERGY NORTH to continue to execute with excellence on existing strategic initiatives described above within our last strategic cycle, such as our Customer Service Strategy, our Public Safety Strategy, and Asset Planning & Management Strategy. Our Aspirational Goals provide high level guidance about where we will emphasize our efforts and investment over the coming years. The Strategic Initiatives described below are how we will achieve our vision.

1 SYSTEM INVESTMENT

MAINTAIN AND MODERNIZE OUR INFRASTRUCTURE TO MEET GROWING CUSTOMER DEMAND AND SUPPORT ELECTRIFICATION.

SYNERGY NORTH will operate the business in a fiscally responsible manner to sustain continued financial viability. SYNERGY NORTH will continue investing in infrastructure upgrades, system expansions, and modernization projects to enhance reliability, resilience and efficiency, while ensuring these capital investments are reflected in the regulated rate base to support long-term financial sustainability and customer service improvements.

New infrastructure improves reliability and resilience while reducing maintenance costs and risk. SYNERGY NORTH will continue investing in infrastructure to complete our voltage conversion program to decommission end-of life substations in this strategic planning cycle. This will reduce system losses, complexity and costs while improving reliability and safety.

KEY INITIATIVES FOR GROWTH

2 ADVANCING TECHNOLOGY

ACCELERATE DIGITAL TRANSFORMATION TO ENABLE A SMARTER GRID, EMPOWER EMPLOYEES, AND ELEVATE THE CUSTOMER EXPERIENCE.

SYNERGY NORTH will drive operational efficiency and scalability by optimizing technology integration and streamlining processes through digitalization. Additionally, we will enhance customer experience by adopting innovative digital tools that improve accessibility, engagement, and service delivery.

The fast-paced evolution and integration of electronics and information technology are reshaping how utilities operate. Both operational and IT systems are rapidly advancing, with a growing move toward digital, mobile-enabled, and cloud-based solutions across frontline and back office functions. Automation is playing a pivotal role in this transformation, paving the way for a more intelligent and autonomous electric grid. These technological changes open new opportunities for SYNERGY NORTH, including the potential to launch innovative service offerings driven by advanced data analytics.

3 RISK: BUSINESS CONTINUITY

STRENGTHEN SYNERGY NORTH'S ABILITY TO ANTICIPATE, WITHSTAND, AND ADAPT TO RISK.

SYNERGY NORTH's will strengthen its resilience against severe climate events by investing in infrastructure, prioritizing safety, and integrating sustainable practices to minimize environmental impact. Robust cybersecurity measures will ensure the protection of critical systems and data. Risk mitigation and management will continue to remain a high priority for management.

The severity of recent weather events, and the damage they cause to electrical infrastructure, requires that increased grid resiliency standards and rapid power restoration capabilities be adopted by system operators.

SYNERGY NORTH will maintain strong collaboration with industry partners and security agencies, supported by a best-in-class cybersecurity program. By leveraging both internal expertise and external resources, SYNERGY NORTH remains committed to proactively mitigating cyber risks and safeguarding mission-critical systems.



4 DER ENABLEMENT AND ELECTRIFICATION PLANNING

ANTICIPATE AND MEET GROWING DEMAND FOR ELECTRICITY FROM EVS, TRANSIT, HEAT PUMPS, AND INDUSTRY.

SYNERGY NORTH will ensure that it can meet new or increased demand from electrification of transportation, commercial and building infrastructure. SYNERGY NORTH will develop a clear vision and plan for energy transition and take a cost-effective long-term approach to the anticipated changes to our system. SYNERGY NORTH will make plans to manage demand and future usage projections, while not overbuilding and increasing costs too rapidly. SYNERGY NORTH will continue to move towards development and implementation of a DSO model to meet customer needs at the most reasonable cost to overall electricity bills, making affordability a continuing area of focus.



Distributed Energy Resources

EMPOWER CUSTOMERS TO GENERATE, STORE, AND MANAGE ENERGY FLEXIBLY.

SYNERGY NORTH anticipates increased customer demand for distributed energy resources including electric vehicles, solar generation, batteries, heat pumps and other “whole home” electric technologies. We will undertake the planning necessary to deliver on customer expectations and make the process of DER integration easy for customers, whether residential or commercial.

Ensuring operations are equipped for two way market participation to be successful. Innovation advancements will be required to accommodate the changing operation of utility grids, enabling new players to enter market in the form of microgrids, battery storage, other DER’s and providing the customers with more options behind the meter.



5 CUSTOMER EXPERIENCE AND VALUE

BUILD TRUST THROUGH TRANSPARENCY, EDUCATION, AND LOCAL PRESENCE.

Ensure customers are educated on SYNERGY NORTH 's value proposition to respond to sensitivities to the cost and reliability of electricity. Increasing customer dependence on electricity due to electrification will require consistent attention to the value of a safe and reliable distribution system. SYNERGY NORTH will implement a proactive customer education strategy on electrification and decarbonization through community engagement and communication initiatives to enhance awareness, address misconceptions, and empower customers to make informed energy choices.

6 EMPLOYEE ENGAGEMENT AND SAFETY

CHAMPION A CULTURE OF SAFETY, TEAMWORK, AND SHARED PURPOSE.

Engaged and satisfied employees working safely lead to the overall success of the organization including increased productivity, innovative ideas, and strong customer service. SYNERGY NORTH will address communication and collaboration barriers in the organization. SYNERGY NORTH will educate all staff in the SYNERGY NORTH regulated business model to ensure employees understand regulatory requirements and revenue mechanisms promoting regulatory awareness and operational excellence.





7 WORKFORCE DEVELOPMENT

ATTRACT, RETAIN, AND EMPOWER TOP TALENT WHILE DRIVING OPERATIONAL EFFECTIVENESS.

SYNERGY NORTH must continue to operate our business efficiently and foster a culture of excellence and continuous improvement. SYNERGY NORTH will engage all staff to look for ways to improve efficiency and reduce costs through innovation.

A highly skilled, properly trained, and knowledgeable workforce is essential to SYNERGY NORTH 's continued success. SYNERGY NORTH 's recruitment and retention strategy will be aimed at anticipating and fulfilling current and potential employee needs, through planning, talent attraction, effective deployment of resources, performance management, and development.

8 COMMUNITY PARTNERSHIP

ENGAGING OUR CUSTOMER BASE THROUGH COLLABORATION AND LEADERSHIP

SYNERGY NORTH will cultivate strategic, long-term partnerships with local communities, municipalities, businesses, and stakeholders that drive growth by fostering innovation, enhancing energy reliability, and strengthening economic and social resilience.

ENABLING STRATEGIES

The future of SYNERGY NORTH will be shaped by our ability to lead in two key areas:

Environmental, Social & Governance (ESG) performance, and the effective application of **Technology & Innovation.** These two enablers underpin our eight key priorities and are critical to navigating the energy transition responsibly and effectively.

We will bring greater focus to our enabling strategies and ensure our work in these areas is based on a growth-mindset:

Environmental, Social and Governance

we will develop a set of ESG standards to guide corporate practices and behaviors, ensuring transparency, accountability, ethical governance, and long-term environmental and social responsibility.

Technology and Innovation

SYNERGY NORTH will establish a digital strategy that prepares the company, leadership and employees for the next level of digitalization and innovation in our business. Continued evolution of cybersecurity measures will ensure the protection of critical systems and data. We will prioritize investment in our technology platforms, within a prudent investment framework, to ensure we can continue to meet the needs of the business and our customers over the long term.

LOOKING AHEAD

SYNERGY NORTH's 2025–2028 Strategic Plan is both a continuation and a transformation. It builds on our proven foundation of safe, reliable electricity service — while embracing the opportunities and challenges that come with an evolving energy system, changing customer expectations, and new demands on infrastructure.

Our plan is rooted in the needs of the communities we serve: Thunder Bay and Kenora. It reflects the realities of our region, the insights of our employees, and the input of our stakeholders. It also prepares us for a future where our role expands — as a distribution system operator, a community energy partner, and a leader in electrification and innovation.

We know the path ahead will involve complexity, change, and uncertainty. But we also know that our strengths — our people, our values, our commitment to safety, and our deep local connections — position us to thrive.

Through this plan, we will:

- Deliver essential investments in system renewal, reliability, and DER readiness
- Advance a culture of innovation that integrates smart tools, customer insights, and digital operations
- Support electrification and growth while ensuring affordability and long-term value
- Strengthen community partnerships and create new opportunities for collaboration
- Lead with safety, accountability, and purpose

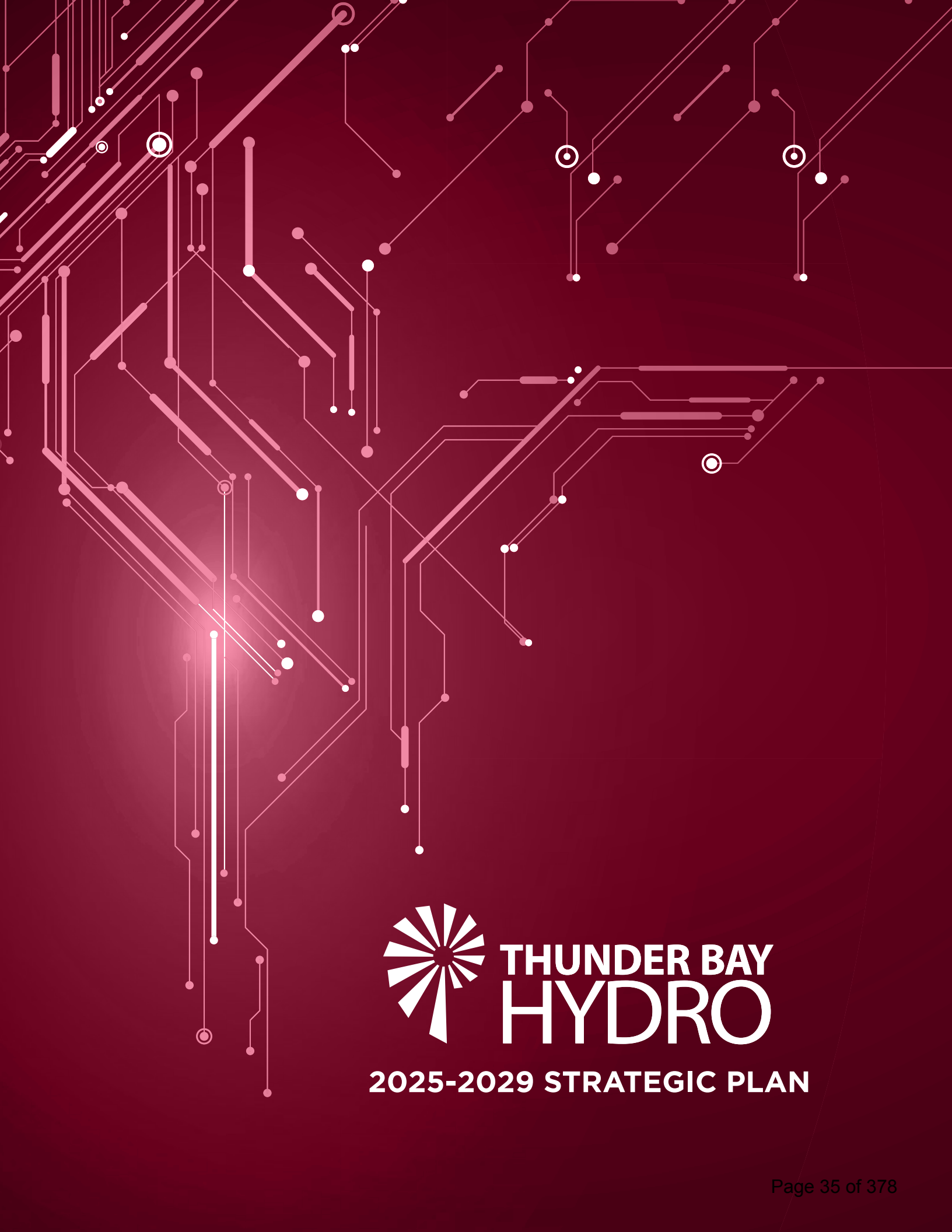
The energy landscape is changing. SYNERGY NORTH is ready to lead that change — responsibly, strategically, and in partnership with the people and places we serve.

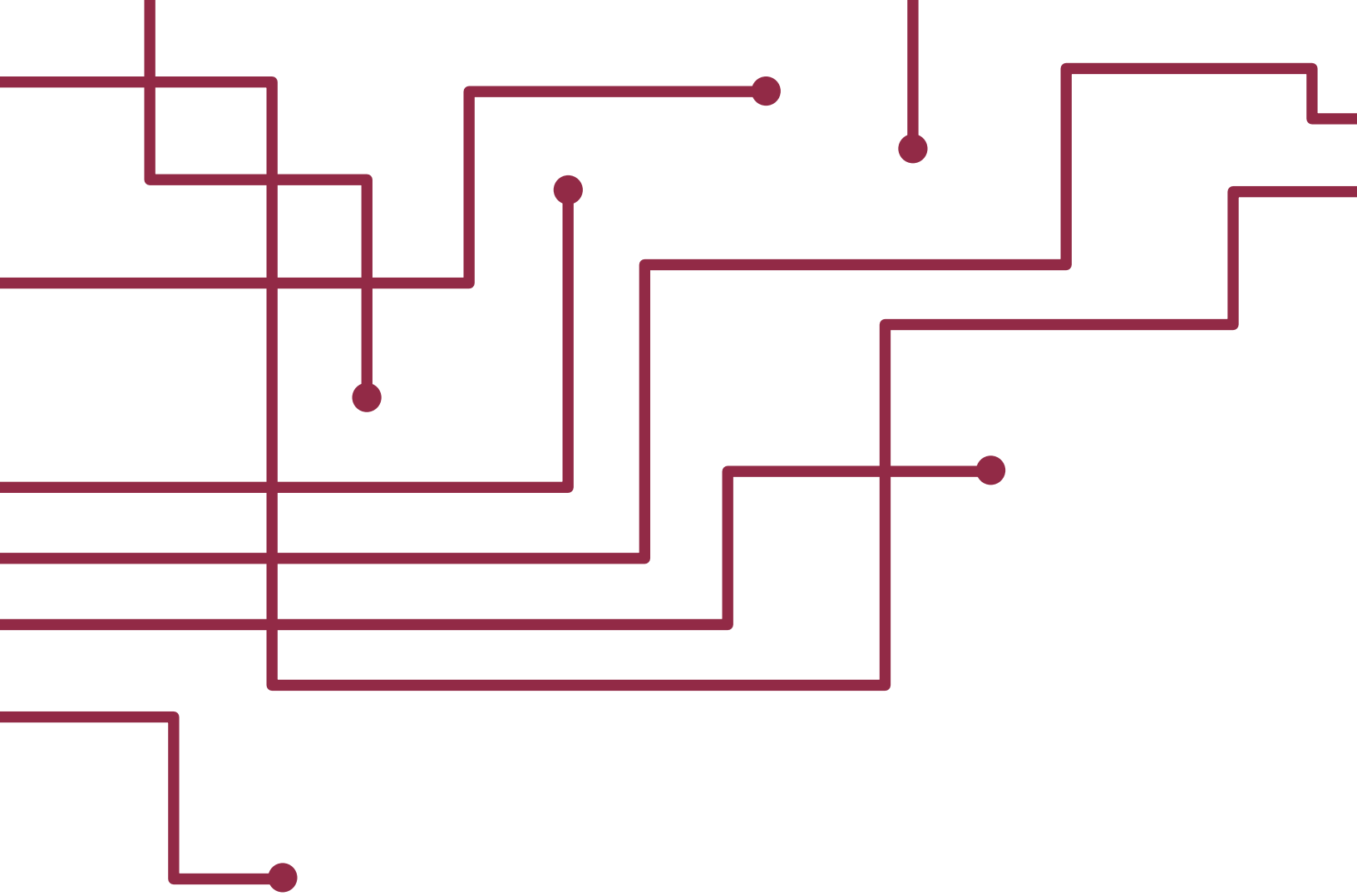




SYNERGY NORTH
THE POWER OF THE YOUTH

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THUNDER BAY
HYDRO
2025-2029 STRATEGIC PLAN



NOTE FROM CEO AND BOARD CHAIR

TO OUR CUSTOMERS, EMPLOYEES AND SHAREHOLDER:

Thunder Bay Hydro Corporation (Hydro Corp) has been an asset to the citizens and City of Thunder Bay for over fifty years. With the execution of this plan, it will become a valuable platform for long-term economic growth, and will continue to be a trusted steward of public value.

The plan is shaped by the rapid evolution of the energy sector, the need for climate resilience, and growing community and shareholder expectations. This is Hydro Corp's first formal strategy and sets the direction for the next phase of the corporation's evolution as a municipally owned holding company committed to local impact, energy leadership, and responsible growth.

The process to develop the strategic plan has been based on engagement and listening. The company held sessions with City Officials, board members of the corporation, the executive management team, a large majority of subsidiary staff, external expert energy consultants, and banking and finance advisors.

The future customers of Hydro Corp and its subsidiaries need support to meet the challenges of transitioning to a low-carbon future. Many have net-zero or greenhouse gas reduction goals and are looking for comprehensive solutions. Some may be struggling with increased costs and regulation relating to energy delivery and management. Others see energy efficiency and new resources like electric vehicles, heat pumps and solar panels as part of a better future and are not sure where to begin.

This Strategic Plan outlines the key goals and activities for the future of Thunder Bay Hydro Corporation. The plan builds on our successful past, owning a top-tier electricity distribution company, an energy services corporation, and renewable generation.

Working together, the employees of Thunder Bay Hydro Corporation will be driven by

SUSTAINABILITY, INTEGRITY, COLLABORATION, COMMUNITY AND SAFETY.

This is our Vision:

CREATE ENDURING VALUE THROUGH SUSTAINABLE GROWTH AND POSITIVE COMMUNITY IMPACT.

We are grateful for your support for Thunder Bay Hydro Corporation, and we welcome questions and dialogue about the energy future that we will build together.

Rene Gallant,
President & CEO

Barb Eccles, HBSc, JD, LLM, ICD.D
Board Chair

EXECUTIVE SUMMARY

Hydro Corp's 2025 Strategic Plan marks the company's first formal strategy cycle—a foundational document that sets the course for our next phase of growth, innovation, and public value creation. As a municipally owned holding company, Hydro Corp is well positioned to oversee and grow a portfolio of businesses that deliver energy, utility services, and sustainable infrastructure to the communities we serve.

This plan is rooted in our dual role: as a community asset entrusted with advancing local prosperity and sustainability, and as a strategic investment for our shareholder, the City of Thunder Bay. We are guided by a long-term vision to drive economic development, enable the energy transition, and generate stable returns through disciplined growth and operational excellence.

The development of this strategy has been shaped by the rapidly evolving energy landscape, the need for climate resilience, and the opportunities emerging from electrification, decarbonization, and digitalization. It is also informed by the proven capabilities of our operating companies, the strength of our governance, and the ambition to be a trusted leader in public infrastructure transformation.

This plan lays out three aspirational goals, six core strategic initiatives, and a set of enabling strategies to ensure alignment across governance, operations, technology, and community impact. Together, these elements provide a roadmap for delivering long-term value while remaining agile and responsive in a changing world.

Hydro Corp is Ready to Act—to scale our capabilities, expand our impact, and partner with others to build a smarter, cleaner, and more resilient future.



VISION

Create enduring value through sustainable growth and positive community impact.

Hydro Corp serves as both a valuable community resource and a strategic investment for our shareholder, the City of Thunder Bay. As a community asset, we are committed to delivering efficient, dependable services and an exceptional customer experience while maintaining a strong partnership with the City to support its goals for economic growth, development, and environmental sustainability. As an investment, our focus is on generating stable, consistent, and increasing returns, enhancing shareholder value over both the short and long term.

MISSION

We offer full service and trusted solutions that help customers meet the challenges of energy transition. From planning and engineering to construction and maintenance, our utility sector expertise and deep industry relationships ensure long-lasting contributions to a modern, efficient and low-carbon energy future.

A growing portfolio of companies and projects providing energy and utility services and sustainable infrastructure to the communities we serve by leveraging trusted utility sector expertise, strategic partnerships, and a vision for an enduring energy transition

At Hydro Corp, we are committed to an organizational environment that fosters and demonstrates ethical business conduct at all levels and reflects our shared values of sustainability, integrity, collaboration, community and safety.

OUR ORGANIZATIONAL VALUES



SUSTAINABILITY

A compelling vision for a sustainable energy future



INTEGRITY

Delivering customer focused solutions in a trustworthy, fair and dependable manner



COLLABORATION

Working together to rise to energy challenges and find affordable solutions



COMMUNITY

Strengthening our communities through growth and giving back



SAFETY

Our top priority is to work and live safely

CORPORATE OVERVIEW

WHO WE ARE

Hydro Corp (Thunder Bay Hydro Corporation) is a municipally owned holding company, 100 percent owned by the City of Thunder Bay and incorporated under Ontario's Business Corporations Act. As a private company, Hydro Corp is governed by an independent Board of Directors, appointed by City Council.

Thunder Bay Hydro Corp currently owns and operates three primary subsidiary companies, around which our core businesses are organized: electricity distribution, renewable energy generation, and energy and utility services. With the Corporation focused on growth and diversifying our business, other operating companies will be established or acquired over the course of this planning period.

ROLE OF HYDRO CORP

As the strategic link between the City of Thunder Bay and its operating companies, Hydro Corp is responsible for setting direction, guiding corporate priorities, and maintaining open, two-way communication with its subsidiaries. Its core responsibilities include:

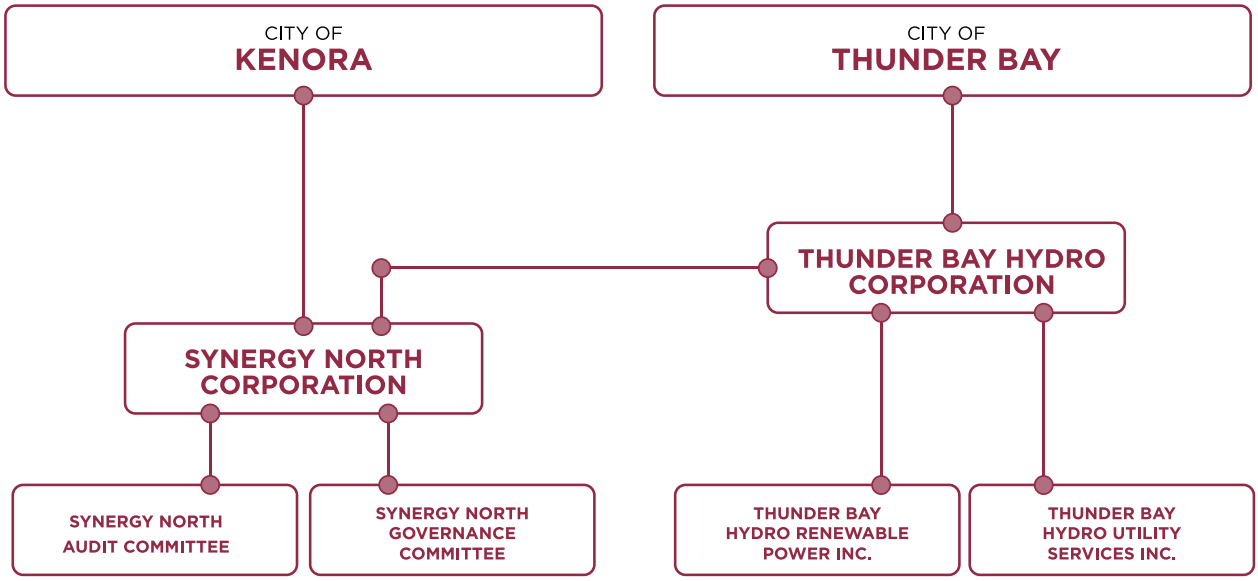
- To act as the conduit between the subsidiary businesses and the City of Thunder Bay (as the shareholder), facilitated two-way communication on shareholder needs and expectations and company strategies and performance.

- To set the strategic priorities for the portfolio of subsidiary companies to maximize their value to the shareholder. Particularly with respect to the long-term view of the companies, their business strategies and plans, risk appetite and management, and resource allocation.

- To oversee the subsidiary companies in their execution of the strategic priorities, including execution on shareholder expectation, corporate objectives, performance measurement, and recalibration of corporate objectives based on performance.

This governance structure ensures that Hydro Corp operates with both strategic oversight and the operational autonomy required to succeed in a dynamic infrastructure and energy environment.

CORPORATE STRUCTURE



Hydro Corp currently oversees three primary operating subsidiaries, organized around our core lines of business:

SYNERGY NORTH CORPORATION

A regulated electricity distributor serving over 56,000 customers in the Cities of Thunder Bay and Kenora. It manages over 1,400 km of overhead and underground power lines, and delivers frontline services including metering, billing, conservation programs, and 24/7 emergency response.

THUNDER BAY HYDRO UTILITY SERVICES INC.

Provides utility support services across Northwestern Ontario, including metering, underground locates, IT hosted systems, billing support, and program delivery. It is known for its flexible, regionally oriented service offerings to other utilities in the region.

THUNDER BAY HYDRO RENEWABLE POWER INC.

Owns and operates the Mapleward Renewable Generating Station, a landfill gas-to-energy facility under Ontario's RESOP program.

As the Corporation evolves, current offerings will expand and new operating companies will be considered to support growth in emerging sectors such as energy consulting, distributed energy, and engineering services.

HISTORY OF THUNDER BAY HYDRO CORPORATION

1970

The Port Arthur Public Utilities Commission, which also controlled the water, telephone and public transportation systems, and the Hydro Electric Commission of Fort William ran independent hydro systems until they were ordered to amalgamate, along with the cities, in 1970.

2006

Started Utility Services Inc. a billing and Meter Service Provider company.

2000

Went from a public utility to two companies under the Ontario Business Corporation Act-- Thunder Bay Hydro Holding Company Inc. (holding company) and Thunder Bay Hydro Electricity Distribution Inc. (local distribution company). Privatization was required as part of the province's deregulation of the electricity industry. As a result, the elected Hydro Commission was replaced by a Board of Directors, appointed by City Council (Feb. 2001).

2007

Subsidiary THBRPI Received a 20 yr contract to generate electricity from Landfill gas

2010

Established SEE Initiative (Sustainable Electric Energy Development). Sold hot water tank division because of provincial regulations. Solar development agreement with the City signed. Mapleward Renewable Generating Station came online in August using landfill gas to supply the grid, under the RESOP plan with the province.

2013

The Solar Operations were set up as a SEED (Sustainable, Electric, Energy Development) Initiative, to develop renewable energy in our region. Six projects have been installed, totalling 779kW.

2015

USI takes on the locates services for tbaytel.

2019

Thunder Bay Hydro Electricity Inc and Kenora Hydro merge to create Synergy North.

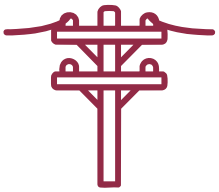


STRATEGIC
CONTEXT

Hydro Corp's strategy emerges at a pivotal moment for the energy and infrastructure sectors. Across Canada and globally, utilities and municipalities are facing rapid transformation driven by climate policy, new technologies, evolving customer expectations, and a fundamental shift toward decarbonization and electrification.

Locally, the City of Thunder Bay is positioning itself for sustainable growth, economic diversification, and infrastructure renewal. Hydro Corp is uniquely positioned to support this transformation—serving as a strategic investment vehicle and an operational platform for community-focused, future-ready infrastructure solutions.

KEY DRIVERS INFLUENCING OUR STRATEGY



DECARBONIZATION AND ELECTRIFICATION

Governments at all levels are setting aggressive climate targets, accelerating the shift away from fossil fuels toward net-zero infrastructure. As communities electrify buildings, vehicles, and industrial systems, there is a growing need for integrated solutions—energy efficiency, renewable generation, distributed energy systems, and low-carbon technologies. Hydro Corp's mandate aligns with this direction, enabling investments that lower emissions and modernize local energy systems.



UTILITY SECTOR REALIGNMENT

Across Ontario, utility sector consolidation and shared services models are reshaping the industry. Hydro Corp will continue to evaluate local distribution company (LDC) acquisitions and service area expansion opportunities. The Corporation is also positioned to support other utilities and municipalities with consulting, engineering, metering, and digital services that reflect emerging needs.



CUSTOMER EXPECTATIONS AND DIGITALIZATION

Customers and communities are demanding more from their utility providers: clean energy, smart systems, resilient infrastructure, and exceptional service. Hydro Corp's subsidiaries must respond with innovative, customer-centric offerings—particularly in behind-the-meter services, EV infrastructure, energy data, and smart energy consulting.



STRATEGIC GOVERNANCE AND PUBLIC VALUE

As a municipally owned corporation, Hydro Corp is accountable to the public. We operate with transparency, sound governance, and a long-term orientation—balancing community impact with financial sustainability. Our growth must support public value, and promote inclusive economic development in our communities.

ASPIRATIONAL GOALS

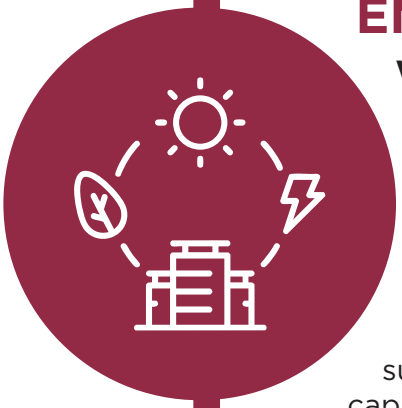
Hydro Corp's strategic direction is driven by a clear set of aspirations that reflect our purpose as both a community asset and a platform for growth. These goals guide our decisions, define success, and shape the impact we aim to deliver over the long term.



CAPACITY AND CULTURE

WE ARE BUILDING A COMPANY THAT IS READY TO ACT

Hydro Corp is evolving from a legacy structure into a purpose-built holding company capable of delivering sustainable value and leading transformative infrastructure projects. This requires intentional investment in governance, leadership, organizational design, and internal systems. We aim to build an entrepreneurial and responsive company culture—one that reflects our values, embraces innovation, and has the capacity to execute on growth.



ENERGY TRANSITION

WE GROW THROUGH ELECTRIFICATION, ENERGY TRANSITION AND BY OFFERING COMPLETE SOLUTIONS

Hydro Corp is positioned to lead the regional shift toward net-zero infrastructure. By expanding into consulting, engineering, and project delivery services, we will support municipalities, commercial customers, and industrial clients in planning and implementing electrification strategies. We will also pursue renewable energy generation investments that align with longterm decarbonization trends and financial sustainability that reflects our values, embraces innovation, and has the capacity to execute on growth.



CUSTOMERS

WE ARE A TRUSTED COMMUNITY PARTNER THAT DELIVERS EXCEPTIONAL VALUE AND SERVICE

Hydro Corp's success is rooted in its ability to respond to evolving customer needs, contribute to local prosperity, and strengthen community well-being. Our strategy includes the development of behind-the-meter solutions, expanded utility services, and collaborative partnerships that deliver measurable benefits. Whether through improved infrastructure, strategic partnerships, or Indigenous economic development, Hydro Corp will remain focused on community impact.


H2
H2

KEY INITIATIVES FOR GROWTH

To support this agenda, our strategy emphasizes strategic growth in our core strengths, ensuring we have the scale, financial resources, and innovative culture needed for success. Our growth agenda involves three components: Building Capacity and Culture, Mergers and Acquisitions and New Market Growth.

CAPACITY AND CULTURE

These actions are about ensuring we have the supports, capabilities and structures in place to deliver on the growth agenda and achieve the Vision of the Strategic Plan. We are building the company essentially from the foundation, although we are fortunate to have financial capacity and strong Board and executive leadership to put the rest of the infrastructure in place.

The key initiatives that fall under Capacity and Culture:

1 GOVERNANCE AND ADMINISTRATION

To support Hydro Corp's expanding role in the energy transition, we must modernize our governance and build the internal capacity to execute the strategy. Strengthening our governance framework will enhance transparency, risk management, and strategic oversight. This includes addressing board composition to ensure we have an adequate number of experienced directors with relevant sector expertise and diversified skills. With no dedicated staff currently in place, Hydro Corp will need to develop a human resources plan and begin building a team capable of delivering on our strategic objectives. There are other aspects of the organization to consider, including branding and customer experience, that will require investment over the longer term.

The current governance model—consisting of a four-member Board of Directors appointed by City Council—will be enhanced to reflect the evolving scope of the Corporation. Hydro Corp will review and strengthen board composition to include sector expertise, governance experience, and strategic oversight capabilities. The development of internal corporate systems, staffing, and brand identity will also be critical to positioning the organization for success.

2 INVESTOR RELATIONS

Hydro Corp will establish strong, transparent relationships with its shareholder, financing partners, and key stakeholders to support long-term growth. A revised Unanimous Shareholder Agreement (USA) and Shareholder Declaration will clarify governance roles while enabling operational autonomy. We will also adopt a renewed dividend policy aligned with shareholder expectations and long-term financial sustainability, always retaining Board discretion to issue dividends. To support future investments, we will build relationships with financial institutions and advisors, being prepared to access capital lending when opportunities arise. Strategic partnerships will further enhance our capacity; unlocking access to new technologies, markets, and funding streams to advance our electrification goals and deliver value to the community.

ENERGY TRANSITION

We grow through electrification, energy transition and by offering Complete Solutions.

These activities include clearly telling our story about customer and community value. We will ensure the company is ready to enable the net-zero goals of our community partners and deliver on Canadian and Provincial government mandates. We will support electrification of all types, including electric vehicles, batteries, heat pumps and other aspects of electrifying homes and businesses. We will deliver a world class customer experience.

3 BUSINESS DEVELOPMENT

Hydro Corp will establish a disciplined framework to guide its strategic growth and business development efforts in support of the energy transition. We will implement a structured merger and acquisition framework to identify and pursue ventures that complement our core strengths and accelerate long-term value creation. Hydro Corp will prepare to lead new energy infrastructure developments, including greenfield projects that support increased energy needs and sustainable growth. We will strengthen internal expertise in project development, regulatory processes, and technical design, while establishing a clear framework to evaluate opportunities. We will consider participation in or development of renewable energy generation projects— both independently and through strategic partnerships—aimed at increasing the supply of clean energy while generating strong, stable returns for our shareholder.

Hydro Corp is committed to building a dynamic portfolio that creates long-term value for its shareholder and delivers relevant, future-ready services. This includes expanding the reach and impact of existing subsidiaries while identifying and pursuing new opportunities that align with our core strengths.

Business development at Hydro Corp will follow a structured framework—focused on alignment with the energy transition, risk-managed returns, and synergies with municipal goals. We will assess opportunities in adjacent service areas such as sustainable heating and cooling, distributed energy systems, energy consulting, demand management and infrastructure engineering. In parallel, we will prepare the organization to participate in greenfield development or acquisitions when there is a clear strategic and financial benefit.

This initiative is critical to diversifying revenue streams, improving resiliency, and positioning Hydro Corp as a trusted public infrastructure partner.

4 ENERGY TRANSITION AND ENGINEERING

Hydro Corp will build the expertise to serve customers and lead the shift to net-zero by delivering low-carbon solutions and supporting electrification across municipal, commercial, and industrial sectors. Through targeted service expansion, including energy management, consulting, engineering, and turnkey implementation, Hydro Corp will support customers in reducing emissions and improving efficiency, positioning itself as a comprehensive, one-stop shop for energy transition solutions. We will develop a clear vision and plan for energy transition that takes a cost-effective long-term approach to changes anticipated by customers.

Hydro Corp is preparing to play a key role in enabling electrification and decarbonization across the municipal, commercial, and institutional sectors. As communities transition to low-carbon infrastructure, there is growing demand for trusted partners who can guide planning, provide technical insight, and eventually deliver full-service solutions. Hydro Corp is positioning itself to meet this demand.

This initiative focuses on building the internal expertise and strategic foundation needed to support customers in their energy transition journeys. While Hydro Corp is not yet delivering large-scale solutions, we are actively advancing our understanding of market needs, identifying high-potential service areas, and initiating early-stage engagements. Over time, this platform will evolve to offer integrated planning, engineering, and turnkey implementation services that reduce emissions, improve efficiency, and modernize local infrastructure.

CUSTOMERS

We are a trusted Community Partner that delivers exceptional value and service.

Continued diversification of our products, services, and customer base is critical to our success. The fast-changing energy landscape requires us to stay ahead of evolving customer needs and deliver tailored solutions. As demand grows for offerings such as data management, building retrofits and automation, EV charging, distributed generation, energy storage, and greenhouse gas reduction, Hydro Corp will broaden its portfolio to meet these expectations. This expansion will be further strengthened by our own transition to net zero, which will enhance our sustainability expertise and service capabilities.

These initiatives will ensure that TBHC companies will continue to view safety as the top priority and will emphasize that our employees are our greatest strength. We will attend to relationships with external partners as we anticipate future growth, including our collaboration with municipal partners, First Nations communities and post-secondary institutions.

The following initiatives will be taken to pursue new market growth:

5 UTILITY SERVICES EXPANSION

Hydro Corp will focus on maximizing the return and growth potential of its current investments and assets by ensuring they are fully optimized, strategically aligned, and leveraged to support future expansion opportunities.

Hydro Corp is focused on expanding its utility services footprint and growing a diverse, resilient revenue base. Building on the strong performance and trusted service delivery of Thunder Bay Hydro Utility Services Inc. (TBHUSI), we will seek to increase our customer base for metering, back-office support, and locate services across Northwestern Ontario and beyond.

Hydro Corp will continue to explore opportunities to expand its footprint of local distribution companies as part of a broader strategy to grow our service territory and reach new customers through acquisitions where there is a clear benefit to our customers and our shareholder.

As communities modernize their infrastructure and seek regional support, there is significant opportunity to broaden the customer base and service offerings of TBHUSI. This initiative focuses on scaling existing strengths, exploring new service opportunities, and improving operational readiness to support a more diversified and sustainable revenue stream for Hydro Corp.

6 BEHIND THE METER SOLUTIONS

As customer needs evolve and energy systems decentralize, behind-the-meter (BTM) solutions —such as rooftop solar, battery storage, electric vehicle (EV) charging infrastructure, and advanced energy management systems—are becoming increasingly prominent. Hydro Corp recognizes the potential of these solutions to empower customers, enhance grid efficiency, and support electrification goals. Building on our understanding of utility-customer relationships, we will explore opportunities to offer value-added customer centric energy services. TBHC will cultivate strategic, long-term partnerships with local communities, municipalities, businesses, and stakeholders that drive growth based upon what customers want for their own energy planning.

This initiative positions Hydro Corp to explore and evaluate a future role in this space. As the market matures and technology becomes more accessible, there is an opportunity to evolve from passive asset ownership to a proactive service provider that empowers customers to achieve sustainability goals. In the near term, Hydro Corp will focus on assessing market needs, understanding regulatory considerations, and identifying partnerships that could accelerate future service delivery.

These solutions will be especially relevant in Northern Ontario, with small to mid-sized municipalities that seek decarbonization pathways but may lack the capacity to act independently. Hydro Corp's goal is to support that transition by building out the platform, tools, and partnerships required to become a trusted solutions provider.

ENABLING STRATEGIES

TECHNOLOGY AND INNOVATION

A vision for digitalization and innovation that supports energy transition

Through a vision for digitalization and innovation that prepares the company, leadership and employees for the future. By building a digitally enabled company, Hydro Corp will remain agile, efficient, and responsive in a rapidly changing energy landscape. Our strategic human resources plan will incorporate a culture of innovation including leadership strength and execution expertise appropriate for the growth plan. A highly skilled, properly trained, and digitally sophisticated workforce is essential to TBHC's success. At all times, safety will remain the top priority. We will prioritize investment in our technology platforms, within a prudent investment framework, to ensure we can meet the growth needs of the business and our customers over the long term. With the right mindset and skilled employees Thunder Bay Hydro can use technology and innovation to work with partners on new ideas to meet the demands of electrification, energy efficiency, and climate change.

Equipping the organization with the digital tools, systems, and culture needed for modern leadership.

Hydro Corp will adopt a digital-first mindset to support future service delivery, data-driven decision-making, and operational efficiency. This includes investing in scalable technologies, modern business systems, and a culture of continuous improvement that allows the organization to adapt, grow, and serve diverse customer needs across its subsidiaries.



COMMUNITY ENGAGEMENT

A COLLABORATIVE COMMUNITY PRESENCE BASED ON PARTNERSHIP

At Hydro Corp, community engagement is foundational to our role as both a trusted energy partner and a catalyst for local growth. We are committed to fostering deep, collaborative relationships with the communities we serve, grounded in transparency, shared goals, and mutual benefit. Working alongside municipalities, Indigenous partners, institutions, and local businesses, we will create solutions that address today's energy challenges while preparing for the future. Whether through integrated infrastructure projects, education and outreach, or joint planning for sustainable development, our approach is guided by a long-term commitment to strengthening communities, supporting economic resilience, and advancing a just energy transition. We will strengthen relationships with local First Nation communities with a focus on listening, learning and reconciliation while seizing opportunities to jointly foster economic projects and investments.

BUILDING TRUSTED RELATIONSHIPS WITH MUNICIPALITIES, INDIGENOUS PARTNERS, AND REGIONAL INSTITUTIONS.

Hydro Corp recognizes that success is rooted in strong relationships, shared goals, and inclusive community development. As a municipally owned corporation, we are accountable to the public and committed to creating lasting community impact. We will continue to engage in authentic, transparent dialogue with our shareholder, municipal clients, Indigenous partners, and postsecondary institutions.



THE PATH FORWARD

Hydro Corp's inaugural Strategic Plan establishes a bold yet disciplined foundation for sustainable growth, public value, and long-term financial performance. This plan reflects our readiness to lead—strategically guiding a portfolio of companies that deliver critical infrastructure, energy solutions, and innovation to the communities we serve.

This document does not mark the end of our strategic efforts—it marks the beginning. Over the coming months and years, Hydro Corp will implement the actions outlined across our core initiatives, build the internal capacity required for execution, and regularly engage with our shareholder and stakeholders to ensure transparency, accountability, and alignment.

We are committed to measuring our progress and refining our approach as the landscape evolves. Governance frameworks will be strengthened, financial tools will be modernized, and community partnerships will be deepened. With a focus on electrification, renewable energy, customer solutions, and regional growth, Hydro Corp is prepared to act on opportunities that serve both the public interest and our shareholder's long-term goals.

Above all, Hydro Corp will remain grounded in its dual purpose: to be a trusted community asset and a platform for responsible, enduring growth.



THUNDER BAY
HYDRO

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SYNERGY NORTH
THE POWER OF THE NORTH
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MEMORANDUM

PRESIDENT'S OFFICE

Date:	**July 4, 2025**
To:	**The Office of the City Clerk**
From:	**Rene Gallant, CEO**
RE:	**Strategic Plan Presentations for Synergy North Corporation and Thunder Bay Hydro Corporation**

Please accept this memo requesting an opportunity to provide a presentation on

- Thunder Bay Hydro Corporation strategic plan
- Synergy North Corporation strategic plan

The presentations will take place on Monday July 14, 2025 at the Committee of the Whole meeting.

EarthCare Advisory Committee Meeting Minutes

Wednesday, May 21, 2025, 4:32 p.m.
McNaughton Room - 3rd Floor, City Hall

1. EarthCare Advisory Committee Meeting 05-2024

Chair: Keira Essex

2. Members

Shannon Costigan
Kiera Essex
Councillor Andrew Foulds
Sandra Stiles

3. Guests

Kayla Dixon, Commissioner - Infrastructure & Operations
Cynthia Olsen, Director - Strategy & Engagement
Jason Sherband, Manager - Solid Waste & Recycling

4. Officials

Jacob Porter, Climate Adaptation Coordinator
Danielle Thom, Climate Action Specialist
Lori Wiitala, Committee Clerk/Legislative Specialist

5. Land Acknowledgement

Keira Essex, Chair of the EarthCare Advisory Committee provided a Land Acknowledgement.

6. Disclosures of Interest

7. Agenda Approval

MOVED BY: Councillor Andrew Foulds
SECONDED BY: Sandra Stiles

WITH RESPECT to the May 21, 2025, meeting of the EarthCare Advisory Committee, we recommend that the agenda as amended, including any additional information and new business, be confirmed.

CARRIED

8. Presentations

8.1 Solid Waste and Recycling Update

Manager, Solid Waste & Recycling Jason Sherband provided a presentation on the solid waste and recycling program.

<u>The Organics Program</u>

- The Province of Ontario requires municipalities of our size to divert an additional 50% of organics from the landfill in 2025.
- The City will incorporate this new requirement by doubling Leaf and Yard Waste pick-up in 2025.
- The Curbside Organics Program launch has been delayed until 2026 due to supply chain issues. New trucks are on their way, and the processing RFP is open.
- The proposed aerobic digestion system will be the first in Northwestern Ontario. There are limited energy generation possibilities with this digester model, but the previously identified anaerobic process is not feasible for a community of this size.
- The curbside bins used in the Organics Program will feature a gravity lock to keep out common pests such as raccoons.
- Manager Sherband will provide the Committee estimates of the GHG reductions anticipated from increased organics diversion.

<u>The Auto-Cart Program</u>

- SWR will pilot a new automated curbside garbage collection program from Fall 2025 to Spring 2026.
- The pilot will be applied to 10,000 single-family homes in neighbourhoods across the City.
- Multi-residential dwellings will not be included in this program.

The Recycling Program

- The new automated curbside recycling program was successfully launched in Fall 2024.
- SWR is still developing a program to manage paper in public spaces.
- SWR intends to keep all local recycling depots operating, but this may be subject to change as the Province of Ontario introduces additional recycling regulations in Fall 2025.

9. Confirmation of Previous Minutes

The Minutes of Meeting 04-2025 of the EarthCare Advisory Committee, held on April 16, 2025, be confirmed.

MOVED BY: Councillor Andrew Foulds
SECONDED BY: Shannon Costigan

THAT the Minutes of Meeting 04-2025 of the EarthCare Advisory Committee, held on April 16, 2025, be confirmed.

CARRIED

10. Business Arising from Previous Minutes

10.1 Fleet Electrification Update

Commissioner - Infrastructure & Operations Kayla Dixon and Director - Strategy & Engagement Cynthia Olsen provided an update on Fleet Electrification and the committees intention to present a Memorandum in support of Fleet Electrification Plan implementation. It was recommended to prepare the Memorandum for presentation closer to 2026 budget deliberations.

Climate Action Specialist Danielle Thom will prepare a Memorandum in support of Fleet Electrification Plan implementation and will present this to the Committee at the June meeting for review and finalization.

10.2 Green Development Standards Update

Climate Action Specialist Danielle Thom provided an update on the Green Development Standard engagement.

The committee was provided a briefing note including the 5 options below for consideration to support Green Development Standards.

1. Receive project updates at monthly EarthCare Advisory Committee Meetings, providing input on the project as requested by the Climate Action Specialist.
2. Provide the Climate Action Specialist with a list of important community contacts to utilize during the public engagement process. This could include members from previous EarthCare Working Groups, or other interested parties.
3. Participate in important stakeholder discussions and outreach events.
4. Re-establish the EarthCare Advisory Committee's Green Building Working Group.
5. Form an ad-hoc working group to act as "special advisors" to the project once the updated Climate Change Advisory Committee Terms of Reference are approved.

The committee agreed that options 1-3 are in line with the support the committee can provide and are eager to receive this information as part of the monthly net-zero and sustainability update; the committee advised against options 4 and 5 at this time. In consideration of the current governance structure review the committee would be open to forming an ad-hoc working group if feasible following the outcome of the review.

11. Net-Zero Strategy and Sustainability Update

Danielle Thom, Climate Action Specialist provided an update on Net-Zero Strategy and Sustainability.

Maamawe – All together. We honour the truth and reconcile for the future.

- Earth Day 2025
  - Sunrise Ceremony in the Marina Park Spirit Garden had approximately 40 participants
  - Enbridge Presents: Building Beyond Code event had approximately 11 participants
  - Northwest Climate Gathering Stone Soup Potluck had approximately 60 participants
- Active Commute Challenge - June 1-30, 2025

- Event registration is open www.tbayonthemove.ca

Safety and well-being. Our community is healthy, safe, and strong.

- Energy Summit Community of Practice
  - Brainstorming meeting on May 8, 2025
  - Input survey closing June 2, 2025
  - TOR creation, member recruitment, and resource development through Summer 2025
- AgeBIG Event, “Electrify Your Future”, delayed Until Fall 2025
- Great Lakes Coastal Cleanup 2025
  - Partnering with the Great Lakes and St. Lawerence Cities Initiative to host simultaneous shoreline cleanup events across all five Great Lakes (Thunder Bay, Owen Sound, Collingwood, Chatham-Kent, Coburg) on September 28, 2025.
  - Local Grant Allocation: $11,200.00
  - Local Project Partner/Volunteer Coordinator: EcoSuperior
  - Local Cleanup Site: Fishermen’s Park

We attract and retain new and diverse businesses and community members.

- Phase 2: Home Energy Improvement Loan Program Design
  - New Project Deadline: September 1, 2025
  - Finalizing loan terms with local credit unions
  - Receiving the first draft of the design study
  - Seeking program approval at ELT and Committee of the Whole in June/July
  - Working with FCM on the implementation grant application

We advance a thriving economy and environment.

- Boulevard Garden and Maintenance By-law Education Campaign launched on April 22, 2025, 42 participants have registered
  - File closed May 15, 2025
- Green Development Standard Research
  - ICLEI Meeting on May 1, 2025
  - CityStudio Project #1: Initial Cost-Benefit Analysis
  - CityCtudio Project #2: Developing an Energy Poverty Study Design
  - CityStudio Project #3: Energy Poverty Study (Pending Match)

The committee discussed drafting a Memorandum of support to extend the CityStudio program considering the success.

MOVED BY: Shannon Costigan
SECONDED BY: Sandra Stiles

WITH RESPECT to the CityStudio Program, we recommend that the EarthCare Advisory Committee draft a Memorandum in support of extending the CityStudio Program to review and finalize at the June committee meeting;

AND THAT the Memorandum be presented with the CityStudio Coordinator's upcoming report to council on the outcomes of the program.

CARRIED

12. Climate Adaptation Update

Jacob Porter, Climate Adaptation Coordinator provided an update on Climate Adaptation.

Maamawe – All together. We honour the truth and reconcile for the future.

- Public Works week
  - Station 3 Fire Station Open House
    60 Water St. S.
    Friday, May 23
    3:30-5:30
  - Public Works Open House
    Mountdale Yard
    Saturday, May 24
    10 am – 1 pm
- Ongoing work on a climate equity lens for corporate reporting

Safety and well-being. Our community is healthy, safe, and strong.

- Currently supporting updates to the corporate Emergency Management Program and annual emergency exercise

Growth. We attract and retain new and diverse businesses and community members.

- Supporting new Climate Adaptation communities of practice through FCM, Climate Risk Institute, Tamarack, and ICLEI Canada

Sustainability. We advance a thriving economy and environment.

- Risk assessment workshops for all asset classes complete as part of the asset management plan, report to Council June 2

Discussion was held regarding service providers Synergy North and Tbaytel and the most recent emergency preparedness exercise for Thunder Bay, and it was recommended to connect with both organizations to open up discussions and provide an update at the June meeting.

13. Announcements and Upcoming Events

Active Commute Challenge 2025
June 1-30, 2025
Registration: www.tbayonthemove.ca

14. Gratitude

The Committee Members and Administration provided a roundtable of gratitude.

15. Next Meeting

The EarthCare Advisory Committee Meetings will be held the 3rd Wednesday of each month with the exception of July and August, in the McNaughton Room, at 4:00 p.m. as follows:

- Wednesday, June 18, 2025
- Wednesday, September 17, 2025
- Wednesday, October 15, 2025
- Wednesday, November 19, 2025
- Wednesday, December 17, 2025

16. Adjournment

The meeting adjourned at 6:01 p.m.

Waterfront Development Committee Meeting Minutes

Tuesday, May 20, 2025, 4:02 p.m.
McNaughton Room - 3rd Floor, City Hall

1. Waterfront Development Committee Meeting 05-2025

Chair: Timothy Hardie

Chair Timothy Hardie welcomed those in attendance and advised, that due to lack of quorum, the meeting would proceed as an information session.

2. Members

Brad DesRochers
Timothy Hardie
Warren Philp
Sean Spenrath

3. Officials

Kayla Dixon, Commissioner - Infrastructure & Operations
Guy Walter, Landscape Architect
Flo-Ann Track, Council & Committee Clerk

4. Guests

Amanda Nason, Communications Officer

5. Disclosures

None.

6. Presentations

6.1 Work Plan Update Presentation

At the February 18, 2025 meeting of the WDC discussion was held relative to WDC Action Timeline Pillar "Champion Superior Thunder Bay - Improvements to Communication and Promotion Plan".

Some of the items discussed as follows:

- International Trails Day Native Species Planting - June 7, 2025
- Representative from Trans Canada Trail attending
- Planting event - Pool 6 and Fisherman's Park locations

At the March 18, 2025 meeting of the WDC Member Warren Philp provided the following update:

Some of the Partners involved:

- Lake Superior Remedial Action Plan
- Lakehead Region Conservation Authority
- WRTCAT
- City of Thunder Bay
- 50+ volunteers

Landscape Architect Guy Walter provided the following, for information.

Public Consultation

- Festival Area
- Space has been reserved for the June 7, 2025 Event
- Administration will work with Corporate Communications to develop a communications plan: messaging, event poster, Get Involved webpage development

Communications Officer Amanda Nason appeared before the Committee, provided a Presentation relative to the above noted and responded to questions.

Document entitled "Waterfront Trail Communications Plan" was distributed separately to Members on Tuesday, May 20, 2025, for information.

Discussion was held relative to the above noted. Some of the items discussed as follows:

- Objective
- Event Names
- Key Messages

- Tactics
- Social Media Campaign
    - copies of the poster/Social Ads to be circulated amongst the Members for comment and revisions prior to publication
- City Website/Event Calendar
    - Get Involved/City Events Calendar could be used
- Media Relations
- Timeline
    - Planting Event from 10:00 a.m. to 12:00 p.m.
    - 60-80 volunteers
    - Baggage Arts Building has been reserved from 12:00 p.m. - 4:00 p.m. for story board display and engagement session
- Monitoring and Evaluation

During the discussion of the above noted item quorum was achieved.

7. Agenda Approval

Chair Timothy Hardie requested that a Motion to use the City of Thunder Bay's Get Involved webpage to promote International Trail Days Native Species Planting Event and The Waterfront Festival Area Redesign Project be added to agenda as new business.

MOVED BY: Warren Philp
SECONDED BY: Sean Spenrath

WITH RESPECT to the May 20, 2025 meeting of the Waterfront Development Committee, we recommend that the Agenda as printed, including any additional information and new business be confirmed, as amended.

CARRIED

8. Minutes of Previous Meeting

The Minutes of Meeting 04-2025 Waterfront Development Committee, held on April 15, 2025 to be confirmed.

MOVED BY: Sean Spenrath
SECONDED BY: Brad DesRochers

THAT the Minutes of Meeting 04-2025 Waterfront Development Committee, held on April 15, 2025 be confirmed.

CARRIED

9. Waterfront Master Plan Update

9.1 Highest & Best Use Study

Commissioner, Infrastructure & Operations Kayla Dixon provided the following update relative to the Highest and Best Use Study, for information:

- The Highest and Best Use Study is now available on the City's Get Involved webpage, Waterfront Master Plan Update - Pool 6 Lands | Get Involved Thunder Bay
- Next Steps - conceptual plans to Committees for feedback
- First Survey Summer/Fall 2025

10. Infrastructure Project Update

10.1 Festival Area, Cumberland Street Roundabout & Reconstruction

Commissioner, Infrastructure & Operations Kayla Dixon provided an update relative to the Festival Area Redesign, Cumberland Street Roundabout, and Transit Terminal Reconstruction projects and responded to questions.

Discussion was held relative to the above noted. Some of the items discussed as follows:

- Public service messaging will be provided to inform the public of any service disruptions and timelines relating to the following:
  - Festival Area Project to be completed in phases over 3 years outside of the event season, starting September 2025
  - Cumberland Street Roundabout construction will limit access except for construction and emergency vehicles
  - Transit Terminal construction will also impact traffic and Transit Services

11. Work Plan Update

Document entitled WDC Action Timeline - WDC Focused 20242026 Action Plan, for information.

At the April 15, 2025 WDC meeting Chair Timothy Hardie provided an overview of his Memorandum dated April 8, 2025, and attached as document entitled "WDC Action Plan Alignment with City Mgr Work Plan draft 1 v4" and requested that it be re-presented at the May 20, 2025 WDC meeting.

Memorandum dated April 8, 2025 from Timothy Hardie, Chair - Waterfront Development Committee providing information relative to potential alignment of the WDC Action Plan and the City Manager's Work Plan, re-presented.

At the April 15, 2025 WDC meeting, the Chair requested that the City's Engagement Strategy document be included for discussion at the May 20, 2025 meeting.

Document entitled 3294 Engagement Strategy Framework - FINAL FRAMEWORK" attached.

Document entitled "WDC Action Plan - May 2025_draft_v2" distributed separately to Members on Tuesday, May 20, 2025.

Chair Timothy Hardie provided an overview of the document entitled "WDC Action Plan - 2025_draft_v2" relative to proposed changes and the alignment of the WDC Action Plan with the City Manager's Work Plan.

Discussion was held relative to the above noted. Some of the items discussed as follows:

- current geographical scope
    - is there potential to expand
- potential memo from WDC or others re: Waterfront Trail expansion on private lands
    - Administration to follow up at future meeting
- Invite City Manager to future meeting

12. New Business

12.1 International Trail Days Native Species Planting Event and The Waterfront Festival Area Redesign Project Motion

MOVED BY: Sean Spenrath
SECONDED BY: Brad DesRochers

WITH RESPECT to the upcoming Waterfront Trail Days Event, to be held on June 7, 2025, we recommend that the event be promoted on the City's Get Involved webpage.

CARRIED

2025 Meeting Schedule

Meetings of the Waterfront Development Committee will be scheduled from 4 p.m. to 5:30 p.m. on the following dates:

Tuesday, June 17, 2025
Tuesday, September 16, 2025
Tuesday, October 21, 2025
Tuesday, November 18, 2025

13. Adjournment

The meeting adjourned at 6:01 p.m.

CITY OF Thunder Bay
Superior by Nature

Corporate Report

REPORT NUMBER	181-2025-Corporate Services-Finance	
DATE PREPARED	May 15, 2025	***FILE***
MEETING DATE	July 14, 2025	
SUBJECT	Investment of Municipal Funds and Investment Policy Statement Update	

RECOMMENDATION

WITH RESPECT to Report 185-2025-Corporate Services-Finance, it is recommended that the Investment Policy Statement (IPS), as amended and appended to this report as Attachment A, be approved and included in the Corporate Policy Manual;

AND THAT the necessary by-law be presented to City Council for ratification.

LINK TO STRATEGIC PLAN

This Report supports the strategic direction to plan and deliver cost-effective services, with a focus towards long-term financial sustainability, accountability, and appropriate resource allocation.

EXECUTIVE SUMMARY

The report includes information regarding the investment of municipal funds for the period January 1, 2024, to December 31, 2024.

At a minimum, Council is required to review and, if necessary, amend the Investment Policy Statement (IPS) annually. The IPS establishes a distinction between short-term funds or money required immediately (MRI) and long-term funds or money not required immediately (MNRI). The IPS (Attachment A) is a comprehensive overview that allows City Council to provide direction to the ONE Joint Investment Board (JIB).

It is through the IPS that Council ultimately controls MNRI. The IPS presented includes amendments as a result of the transition to the Outsourced Chief Investment Officer (OCIO) model through ONE Investment (agent of ONE JIB) in Q1 2025.

The consolidated portfolio rate of return for money not required immediately (MNRI) for 2024 was 8.5% and the rate of return for money required immediately (MRI) was an average of 5.0%.

Based upon a preliminary review of short-term obligations, long term projections, reserve fund balances and commitments, and 2025 budget implications, Administration does not anticipate the need for any change to MNRI. Administration will complete a more in-depth review and will be meeting with ONE Investment to confirm and review these plans to ensure investment strategies remain aligned with the broader financial framework and objectives.

ONE JIB must prepare an annual investment report for Council which is included as Attachment B.

DISCUSSION

Investment Policy Statement Review

The Investment Policy Statement (IPS), as attached to this report as Attachment A, is a comprehensive statement that allows Council to provide direction to the ONE Joint Investment Board (JIB). Using the IPS, the ONE JIB designs and implements an Investment Plan. It is through the IPS that Council ultimately controls money not required immediately.

At a minimum, Council is required to review and, if necessary, amend the IPS annually. However, if Council priorities change or fiscal circumstances require, the IPS can be reviewed and amended at any point in time.

The IPS establishes a distinction between money required immediately (MRI) and money not required immediately (MNRI). Investments classified as MRI represent funds required within 24 months and continue to be invested in appropriate Legal List Securities (see Background section) with capital preservation and high liquidity of the utmost importance.

ONE JIB invests MNRI with the objective of attaining positive returns over the long term. In addition, the Prudent Investor regime allows for the opportunity for better risk adjusted returns by building more diverse portfolios of investments. Focusing on long term goals and maintaining a well diversified portfolio can help reduce volatility while providing for the potential for growth over the long term.

The IPS, presented as Attachment A, although consistent with the IPS approved by City Council in 2024, includes updates related to the transition to the Outsourced Chief Investment Officer (OCIO) model as well as language and terminology updates.

Transition to Outsourced Chief Investment Officer Model

At its meeting on June 1, 2023, ONE JIB endorsed the transition to the Outsourced Chief Investment Officer (OCIO) model. This represents an approach where an external investment firm manages investment portfolios on behalf of clients such municipalities, foundations or pensions.

The primary purpose of ONE JIB engaging an OCIO partner was to help build an investment offering to attract large municipalities but also help ONE JIB scale up as more municipalities of all sizes join ONE JIB. This model will allow ONE Investment to focus on governance while leveraging the OCIO's expertise in investment management.

Following ONE JIB approval on July 19, 2023, ONE Investment conducted a competitive RFP process and selected PH&N Institutional (PH&N) to design and manage the OCIO solution. Participating municipalities transitioned to the new model in Q1 2025.

As sub-investment manager, PH&N is responsible for managing municipal portfolios in line with ONE JIB's approved Investment Plan and the *Municipal Act.* PH&N will work closely with ONE Investment, ONE JIB, and participating municipalities to align portfolios with municipal investment goals and risk profiles. ONE JIB will retain ultimate fiduciary responsibility under the *Municipal Act*, including responsibility to control and manage money not required immediately.

The OCIO model provides for broader investment options, including access to thirty plus funds, representing a significant increase from the five funds in the previous ONE JIB Prudent Investor program. These options also include alternative investments, such as real estate and infrastructure. Alternative investments tend to be higher-risk investments that offer potentially larger risk-adjusted returns but tend to have strong diversification benefits for longer term investment horizons.

The amended IPS permits investments in alternative investments for the purpose of management of MNRI under ONE JIB, noting that opting in does not automatically mean they will be part of the Investment Plan. The City's investment horizon and risk tolerance is taken into consideration if ONE JIB approves or excludes an alternative investment.

Administration will continue working with the Chief Investment Officer (CIO) of ONE Investment and PH&N in order to draft the City's Investment Plan. Following City Council approval of the IPS, the IPS and Investment Plan will be presented to the ONE JIB at the next board meeting scheduled for September 4, 2025.

Summary of Investments

The following chart shows the total market value of MNRI of $130.1 million by investment product as well as the total value of MRI of $120.2 million at December 31, 2024.

Investment Product	$ (millions)	% of Portfolio
ONE Canadian Government Bond Fund	19.8	15.2%
ONE Canadian Corporate Bond Fund	8.8	6.8%
ONE Global Bond Fund	41.3	31.7%
ONE Canadian Equity Fund	19.0	14.6%
ONE Global Equity Fund	41.2	31.7%
MNRI Total @ December 31, 2024	**$130.1**	**100.0%**
ONE Investment High Interest Savings Account	$120.2	100.0%
MRI Total @ December 31, 2024	**$120.2**	**100.0%**
Total MNRI and MRI @ December 31, 2024	**$250.3**	

Financial Results - MNRI

The following chart shows the total MNRI returns net of fees. MNRI is diversified among multiple asset classes which affects the risk and return characteristics of the investment portfolio. The ONE JIB invests MNRI with the objective of attaining positive returns over the long term.

The consolidated portfolio return for MNRI was 8.5% for 2024.

Investment Product	Return (Net of Fees)
ONE Canadian Government Bond Fund	4.4%
ONE Canadian Corporate Bond Fund	4.6%
ONE Global Bond Fund	3.9%
ONE Canadian Equity Fund	20.9%
ONE Global Equity Fund	11.2%
Total @ December 31, 2024	**8.5%**

The equity exposure for MNRI is 46.3%. When combined with MRI ($120.2 million), the equity exposure for the entire portfolio ($250.3 million) is 24.1%. The ONE JIB considers allocation by purpose and timeframe of the funds rather than a consolidated limit which permits a portfolio that is more tailored to the characteristics of the funds. The following chart shows the market value (MV) allocation by investment outcome and fund (in millions):

Outcome	ONE Canadian Gov't Bond Fund	ONE Canadian Corporate Bond Fund	ONE Global Bond Fund	ONE Canadian Equity Fund	ONE Global Equity Fund	Total
Cash	4.0	-	-	-	-	4.0
Contingency	1.6	1.6	7.7	5.8	12.4	29.1
Target Date: 3-5 years	10.6	3.5	16.3	1.3	2.8	34.5
Target Date: 5-10 years	2.9	3.0	13.9	7.2	15.3	42.3
Target Date: 10+ years	0.7	0.7	3.4	4.7	10.7	20.2
Total $ MV	**19.8**	**8.8**	**41.3**	**19.0**	**41.2**	**130.1**
Total Weight %	**15.2%**	**6.8%**	**31.7%**	**14.6%**	**31.7%**	**100%**

Investment income for the ONE JIB Portfolio (MNRI) totalled $4.6 million for the year ended December 31, 2024.

As of March 31, 2025, the total market value of MNRI is $130.3 million.

Financial Results - MRI

The total value of MRI at December 31, 2024, is $120.2 million. MRI is held in ONE Investment's High Interest Savings Account (HISA) and the return ranged from 5.5% in the first quarter and 4.3% in the last quarter.

Investment income for the HISA (MRI) totalled $5.2 million for the year ended December 31, 2024.

Investment Fees

ONE Investment has a competitive cost structure. Fees are not invoiced to the municipality directly but are bundled into a single fee per investment pool, with management fees ranging from 0.35% to 0.75%. As a participating municipality through ONE Investment, the City received an asset tier discount rebate on fees of $50,250 in 2024.

Fees with the OCIO model will include an investment management fee and ONE Governance Fee. The investment management fee is based on cumulative assets under management (AUM) for all municipalities. Therefore, as cumulative AUM increases, rate are tiered to decrease. Fees vary depending on the funds held and the current fee range is 0.08% to 0.43%. The ONE Governance Fee (custody, compliance, audits, administrative and governance related to ONE JIB) is a tiered level model with a base rate of 0.25% on average municipal AUM up to $10 million, then discounted at certain AUM levels.

Investment Reporting Requirements

The City's Investment Policy Statement requires the City Treasurer to report as to whether all investments were made in accordance with the IPS and as to whether all investments were made in accordance with the Investment Plan.

It is the professional opinion of the City Treasurer that all investments were made in accordance with the City's Investment Policy Statement (05-01-04) and the City's Investment Plan.

The regulation requires ONE JIB to submit an investment report to City Council in respect of the investment of long-term funds at least annually. The annual report is attached as Attachment B.

FINANCIAL IMPLICATION

Investment income, after fees, for the year ended December 31, 2024, was $9.8 million and allocated as follows: $8.0 million to reserve funds; $1.0 million to operations; and $0.8 million to trust funds.

The review and update of the IPS has no immediate financial implications.

CONCLUSION

It is concluded that the Investment Policy Statement (Attachment A) should be approved and the Annual Investment Report for the period ended December 31, 2024 (Attachment B) be presented for information purposes.

BACKGROUND

The City invested money not required immediately (MNRI) under the Legal List to March 31, 2022, and effective April 1, 2022, transitioned MNRI to the ONE Joint Investment Board (ONE JIB) in accordance with By-law 17/2022, the "Prudent Investor Enabling By-Law".

ONE Investment is the City's investment manager for the Legal List HISA and ONE JIB is the investment manager, with PH&N acting as the sub-investment manager, for the Prudent Investment portfolio.

On March 6, 2018, the Minister of Municipal Affairs announced reforms to the municipal eligible investment regulations. Effective January 1, 2019, municipalities could pass a by-law authorizing the use of the new investment power under the Prudent Investor Standard. Rather than investing in a Legal List of eligible investments set out by the province, qualifying municipalities could invest in any security, as long as it is prudent for their situation.

The Legal List is a relatively narrow list of allowable investments prescribed under Part 1 of Ontario Regulation 438/97. It restricts municipalities to low-risk, high-quality fixed income investments and limited participation in Canadian equities:

1. Government debt
2. Bank and financial institution debt, deposit receipts and notes
3. Corporate debt
4. Canadian equities through ONE Investment
5. A limited range of asset-backed securities

Investments also must have a sufficiently high credit rating. The Legal List works well for municipalities whose main objective is the preservation of capital.

The purpose of the reform is to give municipalities the opportunity to earn improved risk-adjusted rates of return by building more diverse portfolios of investments.

In addition, a municipality must diversify its investments to an extent that is appropriate for general economic and capital market conditions. It also has a duty to obtain the advice that a prudent investor would obtain under comparable circumstances. Under the Prudent Investor Standard, municipalities must delegate the management of their "money not required immediately" to an external investment board. The municipality would continue to have oversight over "money required immediately" (e.g., short-term money required for operating purposes).

A municipality that passes a by-law to adopt the Prudent Investor Standard cannot revoke that by-law and return to the Legal List unless the Lieutenant Governor in Council authorizes the municipality to do so by regulation.

ONE Investment created a ONE Joint Investment Board in order to provide municipalities of all sizes access to the Prudent Investor Standard. On May 14, 2020, ONE Investment launched Ontario's first Joint Investment Board with six founding municipalities: Bracebridge, Huntsville, Innisfil, Kenora, Muskoka, and Whitby. Any municipality can become a participating member of the board. It is designed for municipalities that wish to invest under the Prudent Investor Standard, but do not qualify on their own or are cautious about the work and cost of going it alone.

The ONE Joint Investment Board is affiliated with ONE Investment, a not-for-profit corporation formed by CHUMS Financing Authority, which is wholly owned by the Municipal Finance Officers' Association of Ontario (MFOA), and Local Authority Services (LAS), the business services arm of the Association of Municipalities of Ontario (AMO). ONE Investment currently offers investment products for Ontario municipalities under the Legal List and the Prudent Investor Standard. ONE Investment provides services to the ONE Joint Investment Board. The Board consists of a mix of investment experts and municipal finance experts.

REFERENCE MATERIAL ATTACHED

Attachment A: Corporate Policy 05-01-04 – Investment Policy Statement
Attachment B: Annual Investment Report for the period ended December 31, 2024
Attachment C: Municipal Council Memo OCIO Transition

REPORT PREPARED BY

Carly Jaremey, CPA, CA, Accountant – Corporate Services
Andrea Morrison, CPA, CA, Director Finance – Corporate Services

REPORT SIGNED AND VERIFIED BY

Keri Greaves, CPA, Commissioner – Corporate Services & City Treasurer

Date 06/13/2025 (MM/DD/YEAR)

SECTION:	FINANACE
DEPARTMENT/DIVISION:	CORPORATE SERVICES
SUBJECT:	**INVESTMENT POLICY STATEMENT**

INVESTMENT POLICY STATEMENT

FOR

THE COPORATION OF THE CITY OF THUNDER BAY (the "Municipality")

JUNE 23, 2025

It is the policy of The Corporation of the City of Thunder Bay to govern the management of the Corporation's investment portfolio.

PURPOSE

To establish a formal written Investment Policy Statement that summarizes and defines the investment objectives, risk tolerance and liquidity needs and investment horizon for the City's investment portfolio.

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The Corporation of the City of Thunder Bay

Investment Policy Statement

1. DEFINITIONS

The following capitalized terms are defined terms which have the meanings set out below:

Act: means the *Municipal Act, 2001*, S.O. 2001, c. 25, as amended from time to time.

Agent: means any administrator, Custodian, payment servicer, investment counsel, consultant, banker, broker, dealer or other service provider engaged or appointed by ONE JIB and authorized by ONE JIB to exercise any of the functions of ONE JIB pursuant to a written agreement, in the manner and to the extent provided in the Regulation and without limiting the generality of the foregoing, Agent includes ONE Investment, and the Sub-Investment Manager.

Alternative Assets: means investments outside traditional investments such as equities, fixed income, and cash which may include, hedge funds, private equity, natural resources, real estate and infrastructure. Alternative investments are typically less liquid than traditional investments, are appropriate only for allocations with a long investment horizon.

Asset Class: means a specific category of assets or investments, such as cash, fixed income, equities, alternative investments, real estate etc.

Asset Mix (or Asset Allocation): means the proportion of each Asset Class in a portfolio.

Authorizing By-law: means a by-law of the Municipality that authorizes it to invest its money and investments that it does not require immediately in the OCIO offering of ONE JIB pursuant to section 418.1 of the Act, to approve various documents, the entering into of agreements including a Prudent Effective Date Agreement and the delegation of certain powers and duties to ONE JIB/ONE Investment.

Benchmark: means an index that is representative of a specific securities market (e.g. the S&P/TSX Composite Index, the FTSE/TMX 91 Day T-bill Index, etc.) against which investment performance can be compared. Performance benchmarks refer to total return indices in Canadian dollar terms.

CHUMS Financing Corporation (CHUMS): means a subsidiary of Municipal Finance Officers' Association of Ontario (MFOA) which, in conjunction with LAS, established ONE Investment.

CFA Institute: refers to the global, not-for-profit professional association that administers the Chartered Financial Analyst (CFA) and the Certificate in Investment Performance Measurement (CIPM) curricula and examination programs worldwide, publishes research, conducts professional development programs, and sets voluntary, ethics-based professional and performance reporting standards for the investment industry.

City: means The Corporation of the City of Thunder Bay.

Custodian: means a specialized financial institution that is responsible for safeguarding a municipality's investments and is not engaged in "traditional" commercial or consumer/retail banking. Global custodians hold securities for their clients in multiple jurisdictions around the world, using their own local branches or other local custodian banks ("sub-custodians" or "agent banks").

Designated Funds means source(s) of money in which the Municipality may have an indirect interest but which the Municipality currently has no authority to invest. Designated Funds are listed in Schedule B of this IPS.

Diversification: means a risk management technique that mixes a variety of investment types within a portfolio to help mitigate portfolio risk. A diversified portfolio holds different kinds of investments to improve the risk adjusted returns.

Derivative: means a contract between two or more parties whose value is based on an agreed-upon underlying financial asset (like a security) or set of assets (like an index). Common underlying instruments include bonds, commodities, currencies, interest rates, market indexes, and stocks.

Environmental, Social and Governance (ESG) Investing: means considering and integrating ESG factors into the investment process, rather than eliminating investments based on ESG factors alone. Integrating ESG information can lead to a more comprehensive analysis of a company.

External Portfolio Managers: means external third-party investment management firms whose investment offerings are accessed by ONE JIB directly or through services provided to a Pooled Fund. External Portfolio Managers are agents authorized by ONE JIB in accordance with Part II of the Regulation.

Internal Controls: means a system of controls that may include authorities, policies, procedures, separation and segregation of duties, compliance checks, performance measurement and attribution, reporting protocols, measures for safekeeping of property and data, and the audit process.

Investment Plan: means the investment plan applicable to the MNRI and adopted by ONE JIB under the Regulation, as it may be amended from time to time.

Investment Policy Statement (IPS): means the investment policy applicable to the Municipality's investments adopted and maintained by the Council of the Municipality for MNRI under the Regulation, and for MRI, as the same may be amended from time to time. The IPS may also apply to the money and investments held by the Municipality for the benefit of persons other than the Municipality itself and may make reference to source(s) of money in which the Municipality may have an indirect interest but which the Municipality has no authority to invest.

JIB: is short for Joint Investment Board and means a joint municipal service board that is established under section 202 of the Act by two or more municipalities for the purposes of Part II of the Regulation.

Legal List Securities: means the securities and other investments and financial instruments that are included from time to time in Part I of the Regulation.

Leverage: means an investment strategy of using borrowed money—specifically, the use of various financial instruments or borrowed capital—to increase the potential return of an investment. Typically leverage also tends to increase investment risks.

Liquidity: means the ability to turn an investment into cash relatively quickly, without a substantial loss in value. For example, a savings account is more liquid than real estate.

Local Authority Services (LAS): means an entity which, in conjunction with MFOA/CHUMS, established ONE Investment.

Local Distribution Corporation or LDC: means a corporation incorporated under Section 142 of the *Electricity Act, 1998*.

Market Value: means the price at which a security is trading and could presumably be sold. Also known as Fair Value it represents the current value of the investment.

Maturity: means the date upon which the principal or stated value of an investment becomes due.

Money not Required Immediately (MNRI): means the money that is not required immediately by the Municipality that will be under the control and management of ONE JIB and as defined in this IPS that will be invested in accordance with the Prudent Investor Standard.

Money Required Immediately (MRI): means the money that is required immediately by the Municipality that remains under the control and management of the Municipality and, that can be invested in accordance with the Legal List Securities or other applicable legislation.

Municipal Services Corporation (MSC): means a corporation established under section 203 of the Act in accordance with the applicable regulation (Ontario Regulation 599/06).

Municipality: means The Corporation of the City of Thunder Bay.

OCIO Offering: means the comprehensive investment program made available through ONE Investment as agent for ONE JIB, where a qualified investment manager is engaged to advise a Participating Municipality with regard to the investment of the Participating Municipality's MNRI and to invest and manage such MNRI in accordance with the terms and conditions set out in the ONE JIB Agreement.

ONE Investment: means the not-for-profit corporation established by CHUMS and LAS which provides certain management, administrative and other services to ONE JIB as its agent.

ONE JIB: means ONE Joint Investment Board, established by certain founding municipalities under section 202 of the Act as a JIB for purposes of Part II of the Regulation, which is the duly appointed JIB for the Municipality, as constituted from time to time and which acts in accordance with the Act, the Regulation, the ONE JIB Agreement, including the Terms of Reference, this IPS and the Investment Plan.

ONE JIB Agreement: means the agreement effective as of the Prudent Effective Date, entered into in accordance with the requirements of the Regulation, pursuant to which ONE JIB has control and management of the Municipality's MNRI.

Participating Municipality: means from time to time each of the municipalities for whom ONE JIB acts as the JIB under the terms of the ONE JIB Agreement.

Pooled Fund: means a unit trust established under a trust instrument, generally not available to the public, in which institutional, sophisticated or high net worth investors contribute monies that are invested and managed by an External Portfolio Manager. Monies are pooled or combined with monies of other investors.

Portfolio: means any collection of funds that are grouped together and available to support the infrastructure needs of the Municipality.

Proxy Voting: means a legal transfer to another party of a shareholder's right to vote thereby allowing shareholders who cannot attend meetings to participate. External Portfolio Managers usually vote proxies on behalf of their clients.

Prudent Effective Date: means the mutually agreed-upon date by the Municipality and ONE Investment on which the prudent investor regime applies to the Municipality. The Prudent Effective Date shall be on or after ONE JIB approves the Municipality as a participating municipality.

Prudent Effective Date Agreement: means an agreement entered into by the Municipality and ONE Investment that sets out the day on which the prudent investor regime starts to apply to the Municipality

Prudent Investor Standard: means the standard that applies when the Municipality invests money that it does not require immediately under section 418.1 of the Act. It requires the Municipality to exercise the care, skill, diligence and judgment that a prudent investor would exercise in making such an investment and the standard does not restrict the securities in which the Municipality can invest. The Prudent Investor Standard applies the standard of prudence to the entire portfolio in respect of the Municipality's MNRI rather than to individual securities. It identifies the fiduciary's central consideration as the trade-off between risk and return as found in the CFA Institute Standards of Practice Handbook.

Rebalancing: means the process of realigning the weightings of a portfolio of assets. Rebalancing involves periodically buying or selling securities in a portfolio to maintain an original or desired level of asset allocation or risk.

Regulation: means Ontario Regulation 438/97.

Restricted Special Assets: means investments specified by this IPS and held by the Municipality as of the Prudent Effective Date, where ONE JIB is not able to exercise control. Restricted Special Assets are listed in Schedule A of this IPS and are not considered to be MNRI.

Risk: means the uncertainty of future investment returns or chance of loss of capital.

Risk Tolerance: means the financial ability and willingness to absorb a loss in return for greater potential for gains.

Safekeeping: means the holding of assets (e.g., securities) by a financial institution.

Securities Lending: means lending a security to another market participant. The borrower is required to deliver to the lender, as security for the loan, acceptable collateral with value greater than the value of the securities loaned. The Securities Lending program is managed by the Custodian or another appointed agent on behalf of investors. A Securities Lending program is widely used by institutional investors to generate additional incremental returns on the total portfolio.

Sinking Fund: means a fund established to fulfil the requirements to make annual contributions in respect of various debenture issues wherein money is to be regularly set aside for the payment of the principal of the debentures at maturity.

Sinking Fund Required Contributions (Annual Sinking Fund Requirement): means the amount of money to be set aside each year for deposit into a sinking fund or a retirement fund, as applicable, for each sinking fund debenture issue in accordance with the Municipality's debenture by-laws.

Sinking Fund Required Earnings: means the investment earnings needed for the Sinking Fund Contributions to continue to grow to a value sufficient to repay the principal at maturity for each issue of sinking fund debentures.

Sinking Fund Excess Earnings: means the investment earnings in excess of the required earnings.

Sub-Investment Manager: means an asset management firm or investment consultant, acting as a sub-investment manager for ONE JIB that provides investment advice and professional services and is involved in the implementation and operational aspects of the OCIO Offering, and that has full responsibility for the investment and management of a Participating Municipality's MNRI through ONE Investment, based on an IPS approved by the Council of the municipality.

Tbaytel: means the Municipal Service Board, established by The Corporation of the City of Thunder Bay By-law #257-2004, to govern, control, maintain, operate and manage the City's provision of telecommunication services.

Third-Party Trust Funds means money over which the Municipality exercises both management and policy control but whose assets are not owned by the Municipality. These funds are governed by a variety of agreements and, in some cases, by legislation. Some funds may have externally mandated investment policies, and some may have investment policies that are determined by the Municipality. Third-Party Trust Funds are listed in Schedule B of this IPS**.**

Treasurer: means the position of City Treasurer.

Trust Fund: means a fund which consists of assets that have been conveyed or assigned to a trustee to be administered as directed by agreement or statute. As a result, a trustee holds title to the assets for the purpose of providing benefits, and being accountable, to a beneficiary. The Municipality is the trustee of funds that are to be used for specific purposes by the Municipality or any related parties.

2. PURPOSE AND LEGISLATIVE FRAMEWORK

2.1 Purpose of Policy

This IPS governs the investment of the Municipality's MNRI and MRI. It is intended, among other things, to direct the Treasurer in the investment of MRI and to direct ONE Joint Investment Board (ONE JIB) in the investment of MNRI by implementing the Authorizing By-law 10/2022 pursuant to which the Municipality authorized the establishment of guidelines for the prudent management of the Municipality's MNRI pursuant to section 418.1 of the Act.

ln addition to the Municipality's MRI and MNRI, the Municipality is from time to time entrusted with the management of money and investments for a third-party beneficiary, or Third-Party Trust Funds. The Municipality’s Third-Party Trust Funds are listed in Schedule B of this IPS.

There are also source(s) of money in which the Municipality may have an indirect interest but which the Municipality currently has no authority to invest. Such source(s) of money, referred to in this IPS as "Designated Funds", are listed in Schedule B of this IPS. The Designated Funds and the Restricted Special Assets, listed in Schedule A of this IPS, are identified in this IPS for the sole purpose of enabling the Municipality to better see, on an aggregated basis, the various financial assets in which the Municipality has an interest.

ONE JIB is not responsible for the investment activities or performance of Third-Party Trust Funds, Designated Funds or Restricted Special Assets.

The goals of this IPS are to:

- Define and assign responsibilities for investment of MRI and MNRI;
- Describe the Municipality’s responsibilities with respect to Restricted Special Assets, Third-Party Trust Funds and Designated Funds;
- Ensure compliance with the applicable legislation;
- Direct ONE JIB as to the Municipality’s investment goals and risk tolerance;
- Provide guidance and limitations regarding the investments and their underlying risks;
- Establish a basis of evaluating investment performance and the underlying risks; and,
- Establish a reporting standard to Council.

This IPS applies to employees of the Municipality, to ONE JIB and to the employees of ONE Investment. ONE JIB, the Treasurer, and any agent, sub-investment manager, or advisor providing services to ONE JIB in connection with the investment of the portfolio shall accept and strictly adhere to this IPS.

2.2 Governing Legislation

Investments of MRI will only be made in Legal List Securities in accordance with this IPS and Section 418 of the Act. Investments of MNRI are governed by the Prudent Investor Standard in accordance with Section 418.1 of the Act. This standard is similar to that

which governs trustees and pension fund administrators and creates a fiduciary responsibility. Prudent investment in compliance with the Act and the Regulation enhances the potential for the Municipality to earn improved risk-adjusted rates of return.

The Act provides that the Municipality, and therefore ONE JIB, must consider the following criteria in planning investments of MNRI, in addition to other criteria relevant to the circumstances:

- General economic conditions;
- The possible effect of inflation or deflation;
- The role that each investment plays within the Municipality's total portfolio of investments;
- The expected total return from income and the appreciation of capital; and
- Needs for liquidity, regularity of income and preservation or appreciation of capital.

Money and investments that the Municipality holds as Restricted Special Assets, Third-Party Trust Funds or has an interest in as Designated Funds will be subject to applicable legislation and any related agreements or instruments.

2.3 Prudent Investor Standard

For MNRI, the standard to be used by the Municipality and ONE JIB shall be the Prudent Investor Standard as required by section 418.1 of the Act and Part II of the Regulation in the context of managing the Municipality's MNRI and investments thereof. Investments shall be made with the care, skill, diligence, and judgment, taking into account the prevailing circumstances, that persons of prudence, discretion and integrity would exercise in the management of investments, considering the necessity of preserving capital as well as the need for income and appreciation of capital. The Act includes a duty to obtain the advice that a prudent investor would obtain under comparable circumstances.

Officers, employees and investment agents acting in accordance with written procedures and the IPS and exercising due diligence shall take all necessary actions to optimize performance of investments on a portfolio basis, taking into account the prescribed risk and other parameters set out in this IPS and market factors. The Municipality's staff acting in accordance with written procedures and this IPS, shall be relieved of personal responsibility for an investment's performance, provided underperformance relative to expectations is reported to Council and the liquidation or sale of investments is carried out in accordance with this IPS.

3. MONEY REQUIRED IMMEDIATELY AND MONEY NOT REQUIRED IMMEDIATELY

3.1 Determination of MNRI and MRI

Determination of the Municipality's MNRI is the responsibility of Council. In making the determination, Council may consider:

- the time horizon within which the monies are needed to meet financial obligations;
- the purpose for which the monies have been collected or set aside and are to be used;
- the source of the money; or
- any combination of the foregoing

The Municipality has defined MNRI as money from the municipality's own reserves, reserve funds, sinking funds and current ONE Investment holdings that will not be required to meet financial obligations that become due within two years from the date of receipt. The purpose of the money is to fund the municipality's future capital, operational, and contingency needs.

For certainty, all money and investments of the Municipality that have not been identified as MNRI (other than Restricted Special Assets, Third-Party Trust Funds and any Designated Funds referenced in Section 2.1) shall be deemed for purposes of this IPS to be MRI.

Determination of the Municipality's MNRI and MRI may be modified at any time and from time to time by action of Council and with respect to specific money by the Treasurer in accordance with the provisions of Section 6.2.

Any changes in this IPS regarding the Municipality's MNRI and MRI must be communicated immediately in writing to ONE JIB.

3.2 Overview of Portfolios

The Municipality's portfolios represent funds available to support Municipal needs. A high-level description of each of these portfolios and their objectives is provided in Section 5 below. This IPS applies to the following money of the Municipality, its agencies, boards and commissions including:

- MRI which is invested in Legal List Securities; and/or
- MNRI which is invested under the Prudent Investor Standard.

4. ROLES AND RESPONSIBILITIES

4.1 Role of ONE JIB

ONE JIB has been appointed by the Municipality in accordance with the requirements of the Act and the Regulation and on the terms and conditions set out in the ONE JIB Agreement (Appendix 1).

ONE JIB exercises control and management of the Municipality's MNRI and the investments made by it in accordance with the objectives and risk tolerance established in this IPS.

Among the responsibilities of ONE JIB are the following:

- Reviewing this IPS;
- Adopting and maintaining an Investment Plan that complies with this IPS;
- Engaging Custodians, administrators and other investment professionals (i.e. Agents);
- Allocating the money and investments under its control and management in compliance with this IPS;
- Monitoring the performance of the OCIO Offering and Agents; and,
- Reporting to the Municipality.

The foregoing is subject to the more detailed terms and conditions contained in the ONE JIB Agreement.

4.2 Role of Municipal Staff

This IPS is approved and adopted by Council with input from the Treasurer, and from ONE JIB with respect to MNRI. MRI of the Municipality, in addition to any Third-Party Trust Funds, Designated Funds and Restricted Special Assets referenced in Section 2.1, remain under the control and management of the Treasurer.

Consistent with this IPS, the Treasurer is responsible for the implementation of the investment program and the establishment of investment procedures which shall include:

- Investment management of MRI and any Third-Party Trust Funds, Designated Funds and Restricted Special Assets referenced in Section 2.1 by, or under the direction of, the Treasurer;
- The deposit or withdrawal of MNRI, under the explicit delegation of authority regarding MNRI, and the investment thereof, to ONE JIB, which is responsible for the control and management of such funds and investments; and,
- A system of controls exercised by the Treasurer to regulate the activities of municipal staff.

No person including, without limitation, ONE JIB, may engage in an investment transaction except as provided under the terms of this IPS.

In the management of MRI of the Municipality, and any Third-Party Trust Funds, Designated Funds and Restricted Special Assets referenced in Section 2.1, the Treasurer may engage one or more agents and service providers. ONE Investment can assist with the investment of the Municipality's MRI, in Legal List Securities, and with the investment of Third-Party Trust Funds, in accordance with the terms of the applicable trust, if permitted, at the request of the Municipality.

4.3 Ethics and Conflicts of Interest

Individuals who are responsible for the Municipality's MRI Investment Portfolio shall comply with the Municipality's Conflict of Interest guidelines and any relevant professional codes of conduct (e.g., the CPA Code of Professional Conduct).

ONE JIB, in its capacity as a joint municipal service board, in addition to being a local board of each member Municipality is subject to a Code of Conduct as required by the Act. This

Code of Conduct applies to the Chair and the other Members of ONE JIB acting in their capacity as Members of ONE JIB.

5. INVESTMENT

5.1 MRI

The Municipality's MRI is described in this IPS consists of money that is needed to meet the short-term financial obligations of the Municipality and are controlled and managed by the Treasurer.

5.1.1 MRI: Investment Objectives

The main focus of the investment of MRI is cash management, and the interest income generated by the investment of these monies contribute to municipal revenues. To the extent possible, the Municipality shall attempt to match its investments with anticipated obligations.

Capital preservation is the paramount objective for MRI investments, and these investments need to be highly liquid. Consequently, only high-quality investments that are also Legal List Securities will be held in this portfolio. The Municipality may invest in fully liquid money market securities and deposit accounts. The Municipality aims to maximize returns subject to the constraints set out in Part I of the Regulation, as amended from time to time, with a view to preserving capital and to further manage risk through diversification by issuer and credit quality.

The investment objectives for MRI, ranked in priority, are as follows:

a) Security of Principal
The primary objective for MRI is to ensure the security of principal. To minimize the risk of loss, investments shall be subject to minimum credit ratings and shall be diversified by maturity, type of investment and issuer. Investing activities will be reviewed on a regular basis as actual, revised and forecasted operating and capital plans are completed. Maturity dates should be structured so that investment cash inflows occur when needed.

b) Liquidity Requirements
Liquidity is measured by the ease with which securities can be converted to cash to meet forecasted spending. The investments that are eligible under the Regulation possess different features and thus market prices will vary depending on market conditions, as well as the particular features of the type of investment.

To ensure adequate liquidity, the Municipality's investments shall be diversified by holding securities of various terms to maturity and by various types of investments and issuers and to the extent possible, the term of such investments shall match the forecasted requirements for such monies to meet expenditures.

c) Rate of Return

The Municipality's money shall be invested to maximize the rate of return within acceptable risk levels while respecting the security of principal, legal constraints and the liquidity needs of each investment portfolio.

The composition of each portfolio, including its term to maturity and type of investments, shall be adjusted within the guidelines of this IPS to take advantage of market opportunities. Such changes shall be made with the periodic interest rate outlook and target portfolio structure approved by the Treasurer.

5.1.2 MRI: Eligible Investments

MRI may be invested in high quality, investments that are also Legal List Securities available from banks, dealers and other financial institutions. Investments issued or guaranteed by approved institutions will be permitted by this IPS, as deemed eligible by the Regulation or as authorized by subsequent provincial regulations. Investments will be limited to securities issues maintaining a minimum credit rating by an appropriate credit rating agency.

Eligible investments include, but are not limited to, the following offerings by ONE Investment:

- ONE Investment High Interest Savings Account; and
- ONE Investment Canadian Government Bond Portfolio

Investment in the foregoing is subject to the Municipality entering into the prescribed Agency Agreement with LAS and CHUMS.

5.2 MNRI

The Municipality's MNRI is described in Section 3.1. In accordance with the ONE JIB Agreement and this IPS, ONE JIB has exclusive control and management of the MNRI and the investments made therewith.

From time to time, the Municipality may require money immediately to meet financial obligations and may require ONE JIB to liquidate one or more investments in order to generate money to meet those obligations. ONE JIB will select the investment(s) to be liquidated. The timing of such liquidation will be determined by ONE JIB in consultation with the Treasurer.

5.2.1 MNRI: Investment Objectives

In setting the objectives noted below, the Municipality has taken into account the following considerations:

- Preservation of capital;
- Adequate liquidity that takes into account the needs of financial obligations and reasonably anticipated budgetary requirements;
- Diversification by asset class, market, sector, issuer, credit quality and term to maturity;

- Income and capital appreciation; and,
- Macro risks, such as inflation, economic growth and interest rates.

Investment of MNRI is managed by ONE JIB in a way that balances investment objectives, expected returns, and risk to develop asset allocations that achieve the Municipality's financial objectives within stated risk tolerances.

The overall MNRI portfolio investment horizon shall be in line with the nature of the Municipality's forecasts and underlying liabilities. The portfolio should balance risk and the benefits of higher expected returns over a longer investment horizon.

Investment of MNRI is to be managed by ONE JIB in a way that balances the investment objectives with a level of risk that is appropriate for the municipality. The MNRI invested with ONE JIB will be broadly diversified to help reduce the volatility of investment returns. Returns have an impact on revenues, as well as a longer-term impact on future years' budgets and should, at a minimum, keep pace with inflation. To the extent possible, the MNRI's investment horizons are aligned with the Municipality's obligations and cash flow requirements and may consist of liquid and non-liquid securities based on future cash flow requirements.

5.2.2 MNRI: Eligible Investments

Eligible investments for MNRI include any Pooled Fund or other collective investment vehicle or institutional investment management product approved or selected by ONE Investment for the Prudent Investment Program (OCIO Offering), provided always that the products and the selection of products comply in all material respects with the IPS.

Additionally, nothing in this IPS prevents MNRI from being held in cash, short term money market instruments, including treasuries or overnight deposits.

5.2.3 MNRI: Sinking Funds

Not Applicable to this Municipality

5.2.4 Local Distribution Corporation (LDC) and Municipal Services Corporation (MSC) Securities

The Thunder Bay Hydro Corporation is wholly owned by the City and provides regulated and unregulated electric utility services and complimentary commercial services. Thunder Bay Hydro Corporation includes its majority-owned subsidiary SYNERGY NORTH Corporation and its wholly-owned subsidiaries Thunder Bay Hydro Utility Services Inc. and Thunder Bay Hydro Renewable Power Incorporated. The investment in Thunder Bay Hydro Corporation included in the City's 2023 Consolidated Financial Statements is $100.9 million. Included in this investment is a promissory note of $16.5 million.

The LDC shares and the promissory note are considered restricted, special assets and remain in the custody of the City. The LDC shares and the promissory note are to be viewed as separate standalone investments with the subject matter expertise and administrative functions remaining under the purview of the City. Council retains direct,

de facto control of the LDC shares and the promissory note and ONE JIB shall adhere to all terms and conditions as directed. More specifically, Council controls all acquisition and disposition decisions related to current and future LDC assets. Any voting related to the LDC shares will be undertaken solely by the City.

The direct investment in LDC/MSC shares and/or promissory notes, as listed in Schedule A, shall be considered to be Restricted Special Assets and shall not be held by ONE JIB as MNRI.

ONE JIB is prohibited from selling, transferring, assigning or pledging either the LDC shares or the promissory note without the authority of the Municipality.

5.2.5 Restricted Special Assets

With the exception of the Municipality's investments held in the ONE Investment Legal List Portfolios specified below, all existing assets, listed in Schedule A of this IPS and held by the Municipality on the Prudent Effective Date, shall be considered to be Restricted Special Assets, and shall *not* be held by ONE JIB as MNRI. The Treasurer may choose to liquidate these investments and determine that the proceeds are MNRI, to be invested as per this IPS and the approved ONE JIB Investment Plan.

For certainty, Restricted Special Assets are not MNRI of the Municipality, and such assets are not under the control or management of ONE JIB.

The ONE Investment Legal List Portfolio Investments, held by the Municipality, shall be considered to be MNRI and transferred to ONE JIB to be invested as MNRI, unless deemed by the Municipality to be MRI.

5.3 Third-Party Trust Funds and Designated Funds

ln addition to the Municipality's own money, the Municipality is from time to time entrusted with Third-Party Trust Funds, and the Municipality's responsibilities and obligations with respect thereto may be subject to other legislation and governed by other agreements and instruments. To the extent that there is any conflict or inconsistency between the provisions of this IPS and the terms and conditions contained in such other legislation, agreements or instruments applicable to Third-Party Trust Funds, the latter shall prevail.

The Municipality's Third-Party Trust Funds, the Designated Funds are listed in Schedule B.

For certainty, the Third-Party Trust Funds and the Designated Funds are not MNRI of the Municipality, and such assets are not under the control or management of ONE JIB.

5.4 Investment Management

5.4.1 Investment Management of MRI

The investment of MRI shall be controlled and managed by the Treasurer.

5.4.2 Investment Management of MNRI

The investment of MNRI shall be controlled and managed by ONE JIB in accordance with this IPS and the ONE JIB Agreement.

The selected Sub-Investment Manager shall enter into an agreement with ONE Investment related to the OCIO Offering, that complies with this IPS and Part II of the Regulation and will provide compliance and performance reports to ONE JIB and One Investment. ONE JIB shall make any investment management changes deemed in the best interest of the Municipality.

5.5 Transition to Prudent Investor Regime / OCIO Offering

Until the Prudent Effective Date, the Municipality will continue to control and manage its MRI, MNRI and investments in Legal List Securities. Some Legal List investments were made with MRI and some with MNRI.

During the transition to the OCIO Offering the Chair and Vice-Chair of ONE JIB have discretionary power to approve temporary investments recommended by the Sub-Investment Manager that may not be expressly described in this IPS but are, in the opinion of the Chair and Vice-Chair, in the best interests of the Municipality and are entirely consistent with their fiduciary obligations to the Municipality.

All MNRI that is not Third-Party Trust Funds, Designated Funds or Restricted Special Assets shall be provided to ONE JIB on the Prudent Effective Date.

5.6 Investment Constraints

5.6.1 Environmental, Social and Governance (ESG) Investing

The Municipality supports ESG investing for MRI and MNRI. The Municipality believes that well-managed companies are those that demonstrate high ethical and environmental standards and respect for their employees, human rights, and the communities in which they do business, and that these actions contribute to long term financial performance.

For the investment of MRI, the Municipality has chosen to monitor the developments of ESG factors and will reconsider its approach to ESG investing for the MRI Investment Portfolio as and when appropriate to do so.

For the investment of MNRI, ONE JIB is required to explore and consider how the OCIO is implementing responsible investing principles at the time of hiring and during periodic reviews. It may report on results periodically, if requested.

5.6.2 Securities Lending

For the investment of MRI, Securities Lending is not permitted.

For the investment of MNRI, the Municipality may invest in pooled funds, and other investment funds that are managed by the Sub-Investment Manager who may engage in Securities Lending if the policies of the OCIO permit such an action.

5.6.3 Derivatives

Derivatives shall not be used for the investment of MRI.

For the investment of MNRI, futures and forwards contracts, options and other derivative instruments may only be used to (a) create an asset mix position that does not leverage the portfolio, (b) replicate the performance of a capital market index, or (c) reduce risk as part of a hedging strategy

5.6.4 Use of Leverage

Nothing in this IPS prevents the use of leverage, provided it is prudent to do so. Leverage is inherent in the use of certain types of investment strategies and instruments. Where leverage is employed, ONE JIB (for MNRI) and the Treasurer (for MRI) shall have in place monitoring procedures to manage overall exposure to any counterparty. Leverages should not be exercised for speculative purposes but may be used as a hedging tool.

5.6.5 Pooled Funds

Investments in open-ended pooled funds, closed-ended pooled funds, limited partnerships and other specialist corporate structures (e.g. LLCs), are permitted provided that the assets of such funds are permissible investments under this IPS or provided that any non-permitted investments are disclosed by the Sub-Investment Manager. Within pooled funds, the External Portfolio Manager's policies will take precedence over this IPS.

5.6.6 Currency Hedging

The MRI Investment Portfolio will not utilize currency hedging.

The Municipality's funding requirements are in Canadian dollars. However, some exposure to foreign currencies in the MNRI Investment Portfolio may be advantageous to provide diversification and potentially enhance returns. Therefore, it shall not be a violation of this IPS for investments in global mandates to be unhedged, in whole or in part, where the diversification benefits embedded in the currency exposure are considered to be beneficial or desirable by ONE JIB.

5.6.7 Alternative Asset Classes

The applicable legislation does not prevent the direct / indirect placement of the MNRI in Alternative Assets Classes; this IPS permits investments in alternative investments for the purpose of management of MNRI under ONE JIB.

Alternative Asset Classes, such as infrastructure or real estate, may have uncorrelated return characteristics with traditional Asset Classes that may improve diversification within the portfolio, which may lead to better risk adjusted returns. Typically, these investments may not be fully liquid, and are only appropriate for inclusion in portfolios with long investment horizons.

5.6.8 Prohibited Investments

Investments in no event may be made in foreign direct investment in countries subject to Canadian or UN economic sanctions.

5.7 Performance Monitoring, Rebalancing and Management

5.7.1 MRI

The performance benchmarks may vary from time to time, as decided by the Treasurer, subject to the investment constraints listed in the IPS.

MRI investments are expected to achieve returns that meet or exceed their respective benchmarks over a rolling twenty-four-month period. Monitoring will include a review of portfolio performance, compliance with the MRI definition, and liquidity alignment with updated municipal cash flow forecasts on at least an annual basis as described in section 6.7. If material changes to the municipality's financial obligations are identified, the Treasurer may direct the reallocation of MRI assets to maintain appropriate liquidity and risk exposure. All monitoring and rebalancing actions will be documented and reported in accordance with the Municipality's Investment Policy.

5.7.2 MNRI

For the investment of MNRI, ONE JIB shall establish parameters for monitoring investments and rebalancing through policy or directly within the Investment Plan.

Investments are expected to achieve returns at least equal to their benchmarks measured over a rolling five-year period. At minimum, ONE JIB shall provide reporting described in Section 6.7 below that shows the Municipality's holdings, confirms compliance with this IPS, and reports on the Sub-Investment Manager's performance.

6. ADMINISTRATIVE POLICIES

6.1 Flow of Money and Annual Municipal Budget

6.1.1 Transfer to ONE JIB as Part of Annual Review Process

On an annual basis, as part of the Municipality's Annual Review process, the Municipality shall identify the amount, if any, of MNRI that it holds. Any MNRI not already under the control and management of ONE JIB shall be transferred to ONE JIB as soon as practicable.

6.1.2 Transfer to Municipality as Part of Annual Review Process

On an annual basis, ONE JIB shall be notified by the Treasurer as to the amount, if any, required by the Municipality from the MNRI then under the control and management of ONE JIB for the Municipality's operational purposes. Such amount shall be deemed to be MRI and shall be returned to the Municipality in a lump sum or by way of periodic payments, as directed by the Treasurer.

6.2 Flow of Money Otherwise than through the Budget Process

6.2.1 Surplus Funds

The MRI captures revenues received by the Municipality during each year after the approval of the Municipality's budget for the year. Any amounts deemed to be MNRI by the Treasurer at any such time during the year shall be transferred to ONE JIB to be under its management and control as MNRI. Amounts so transferred will be recorded annually in the Investment Plan and allocated by ONE JIB in accordance with the Investment Plan.

6.2.2 Contingencies

The Treasurer is authorized to direct ONE JIB to return any amounts determined by the Treasurer to be required to meet expenditures for unexpected contingencies not anticipated by the Municipality's budget in force for that year, provided however that the aggregate of the amounts to be returned to the Municipality under this Section 6.2.2 during the year shall not exceed 25% of the MNRI under the control and management of ONE JIB as at the date that the Municipality approved its budget for the year (the Budgeted MNRI). In determining the Budgeted MNRI for purposes of calculating the 25% limit, any MNRI to be transferred to the control and management of ONE JIB in accordance with that year's Annual Review pursuant to Section 6.1.1 above shall be included and any amount to be returned by ONE JIB to the Municipality pursuant to Section 6.1.2 shall be excluded. ONE Investment should be made aware of material transactions in advance to ensure the orderly sale of securities to fund withdrawals.

6.3 Valuation of Investments

Investments shall be valued according to the values provided by the Custodian(s). For the investment of MNRI, values of unitized vehicles shall be valued according to the unit values published by the Custodian. Other investments shall be valued at their market value when that is available from regular public trading. If a market valuation of an investment is not available, then a fair value shall be supplied by the Sub-Investment Manager to ONE Investment no less frequently than quarterly.

6.4 Voting Rights

The Sub-Investment Manager shall assume the responsibility of exercising voting rights in respect of the Municipality's MNRI and will report its voting policies to ONE JIB annually. The Municipality may access these policies at any time.

6.5 Internal Controls

The Treasurer shall establish an annual process of review of all investments made under this IPS. This review will provide internal control by assuring compliance with governing legislation and with policies and procedures established by the Treasurer. To the extent ONE JIB's input is needed, these requirements will be communicated in advance to ONE JIB.

6.6 Custodians

All municipal investments and assets of the investment portfolios may be held by a Custodian and any of the Custodian's sub-custodians or nominees. For MNRI, the Custodian shall be acceptable to ONE Investment. For MRI the Custodian shall be acceptable to ONE Investment, if ONE Investment is administering the investment of the Municipality's MRI; otherwise the Custodian shall be acceptable to the Municipality.

6.7 Reporting

6.7.1 MRI

For the investment of MRI, the Treasurer shall report at least annually to Council, the report to be in a form and contain such content as Council may request. The report to Council shall include investment performance during the period covered and any other information required under the Regulation and that the Treasurer may consider to be pertinent.

6.7.2 MNRI

The Regulation provides that ONE JIB shall submit an investment report to Council in respect of the investment of MNRI at least annually. This report shall include the following.

- Investment performance during the period covered by the report;
- Asset mix of the total portfolio;
- A listing of individual investments held at the fund level at the end of the reporting period showing, where appropriate, book value, market value, realized/unrealized gains/losses and actual income received;
- A list of all transactions including the security name, trade date, and the purchase and/or sale price;
- A statement by the Treasurer as to whether all investments were made in accordance with the IPS and as to whether all investments were made in accordance with the Investment Plan; and
- Any other pertinent information in the opinion of the Treasurer.

All MNRI or MRI invested on behalf of the Municipality by ONE JIB or with the assistance of ONE Investment shall be held for safekeeping in the name of the Municipality by a Custodian.

7. APPROVAL, SUBSEQUENT MODIFICATIONS AND EFFECTIVE DATE

7.1 Revocation / Amendment of Previous Investment Policy

This IPS amends, and restates as so amended, the existing Investment Policy Statement approved by Council on June 24, 2024.

7.2 Modifications to the IPS

At least annually, Council shall review the IPS and update it, if required. In the course of reviewing the IPS, Council may request comments from the Treasurer with respect to the investment of MRI and from ONE JIB with respect to the investment of MNRI.

Following the Council's review of the IPS, ONE JIB shall review the Investment Plan and update it, if required.

At a minimum, the annual IPS review will consider:

- the adequacy of funding for capital works;
- the Municipality's ability to reduce other spending;
- flexibility of the timeframe to payout; and
- sensitivity to loss.

7.3 Effective Date

The policy will be effective on the date of Council ratification.

Schedule A

Restricted Special Assets

Debt Securities

Not applicable.

Own Debt Securities

Not applicable.

LDC and other MSC Securities

The Thunder Bay Hydro Corporation, as described in 5.2.4.

Other

Not applicable.

Schedule B

Third-Party Trust Funds and Designated Funds

Third-Party Trust Funds

The Corporation of the City of Thunder Bay holds Trust Funds as outlined in the Trust Funds Financial Statements for the year ended December 31st audited by external auditors annually. Included are care and maintenance trust funds under the *Funeral, Burial and Cremation Services Act*, 2002 which are to be invested pursuant to the *Trustee Act*.

Designated Funds

The Municipality holds the following designated fund.

Tbaytel

QUARTERLY INVESTMENT REPORT

For The Period Ended December 31, 2024

Thunder Bay Prudent Investor Portfolio
500 Donald St. E., P.O. Box 80
Thunder Bay, ON
P7E 5K4

Keri Greaves
City Treasurer
keri.greaves@thunderbay.ca
(807) 625-2230

ONE Investment
155 University Ave, Suite 800
Toronto, Ontario
M5H 3B7

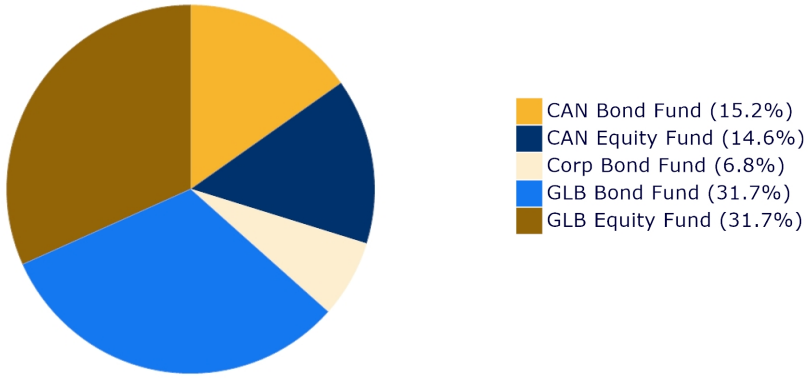
Relationship Manager
Marie Wong Takishita, Client Service Representative
416-971-9856
one@oneinvestment.ca

Thunder Bay Prudent Investor Portfolio
Executive Summary for the Quarter Ended December 31, 2024

Time-Weighted Rate of Return in CAD for Consolidated Holdings

	Quarter	Year to date	1 Year	2 Years	3 Years	5 Years	Since Inception	Inception Date
Consolidated Portfolio Returns	0.7%	8.5%	8.5%	9.7%	-	-	5.6%	04/01/2022

Overall Asset Allocation



Consolidated Portfolio Activity for Quarter

Portfolio	Starting Balance	Contribution	Withdrawals	Change in Market Value	Income	Ending Balance
CAN Bond Fund	19,632,509.24	65,000.00	-	(488,087.55)	595,117.40	19,804,539.09
CAN Equity Fund	18,743,468.23	-	400,000.00	(1,048,348.83)	1,659,369.32	18,954,488.72
Corp Bond Fund	8,766,162.75	60,000.00	-	(237,582.49)	250,420.27	8,839,000.53
GLB Bond Fund	41,546,692.19	218,808.29	-	(2,027,404.98)	1,561,486.08	41,299,581.58
GLB Equity Fund	40,524,886.17	70,000.00	-	199,052.07	447,506.40	41,241,444.64
Total	**129,213,718.58**	**413,808.29**	**400,000.00**	**(3,602,371.78)**	**4,513,899.47**	**130,139,054.56**

All returns presented in this report are net of applicable fees. Only Returns covering periods greater than 1 year have been annualized in this reporting package.

Thunder Bay Prudent Investor Portfolio
Performance History At
December 31, 2024

Performance by Fund

% Annualized Returns

	Quarter	Year to Date	1 Year	2 Years	3 Years	4 Years	5 Years	Since Inception	Inception Date
ONE Canadian Equity Fund	3.3	20.9	20.9	19.2	-	-	-	10.9	04/01/2022
ONE Global Equity Fund	1.5	11.2	11.2	14.3	-	-	-	8.8	04/01/2022
ONE Canadian Corporate Bond Fund	0.1	4.6	4.6	5.4	-	-	-	2.7	04/01/2022
ONE Canadian Government Bond Fund	0.5	4.4	4.4	3.8	-	-	-	2.3	04/01/2022
ONE Global Bond Fund	-1.1	3.9	3.9	5.2	-	-	-	2.0	04/01/2022

Performance by Outcome

% Annualized Returns

	Quarter	Year to Date	1 Year	2 Years	3 Years	4 Years	5 Years	Since Inception	Inception Date
JIB1THUCONT	1.0	10.2	10.2	11.5	-	-	-	6.6	04/01/2022
JIB2THUTD35	-0.1	5.2	5.2	6.2	-	-	-	3.5	04/01/2022
JIB3THUTD510	0.8	9.2	9.2	10.4	-	-	-	5.8	04/01/2022
JIB4THUTD10P	1.4	11.6	11.6	13.1	-	-	-	7.7	04/01/2022
JIBTHUCASH	0.5	4.4	4.4	5.7	-	-	-	4.8	04/04/2022

QUARTERLY REVIEW

Canadian equities emerged as one of the best-performing global equity markets in the fourth quarter of 2024, delivering a total return of close to 4%. This was slightly stronger than U.S. equity markets, where large-cap technology stocks performed well. Canada also outperformed most international equity markets, many of which experienced negative returns in the quarter. The ONE Canadian Equity portfolio produced returns of 3.3% in the quarter, bringing full-year returns to 20.9%.

Concerns persist about the Canadian economy's ability to achieve a soft landing, as tight monetary policy has helped address inflation issues but has also moderated economic activity. This is in contrast to the U.S. economy which has surprised to the upside in recent months. While it was widely anticipated at the start of the quarter that the US Federal Reserve would aggressively cut interest rates, positive economic surprises and strength in labour markets changed the outlook. Fewer cuts are now anticipated, and US bond yields have moved higher. This led to weakness in the Canadian dollar in the quarter.

The Canadian Technology sector was much stronger in the quarter than other sector, rallying over 20%. Shopify explained almost all of this performance as it represents nearly half of the sector by weight, rallying 41% in the quarter. The ONE portfolio holds no Shopify, so it did not benefit from its strength. The portfolio's large holding in Atkinsrealis Group had a strong positive impact on portfolio returns as this stock had returns of 38.8% in the quarter.

QUARTERLY REVIEW

In the fourth quarter, equity markets had mixed returns, with divergent patterns of returns seen across the global equity markets. Strength in equity returns was experienced in Japanese, Canadian, and US equity markets, but flat or negative returns were seen across other markets. The ONE Global Equity Fund had returns of 1.5% in the fourth quarter of 2024, bringing full-year returns to 11.2%.

The movement of currency markets also significantly impacted returns, as the US dollar strengthened in the quarter compared to other major global currencies. This was in response to economic data that suggested continued strength in the US economy and tight labour markets. This diminished the need for aggressive interest rate cuts in the future, changing the interest rate outlook. The US 10-year bond yield rose in the quarter from about 3.8% to 4.5%, contributing to the strength in the US dollar. As over half of the fund is invested in US-listed stocks, the currency effect had a significant positive impact on fund returns.

In the US market, large-capitalization technology stocks again outperformed the broader equity market with the "Magnificent 7" stocks (Alphabet, Amazon, Apple, Meta Platforms, Microsoft, NVIDIA and Tesla) up almost 16%, while the S&P 500 stocks had returns of 2.4% for the quarter. This theme has persisted for the last two years, leading to very strong returns in a very narrow segment of the market, with the rest of the market experiencing more modest returns. The Fund has limited exposure to the "Magnificent 7" stocks and was able to participate partially in their strength.

QUARTERLY REVIEW

Global bond markets had mixed returns in the fourth quarter as fixed-income markets responded to changing circumstances. The US bond markets were up about 3%, while Canadian fixed-income markets were flat in the quarter. Most other global bond markets experienced negative returns in the quarter. This pattern was reflected in the performance of ONE Investment's bond funds. The ONE Canadian Corporate Bond Portfolio produced returns of 0% in the quarter, and the ONE Canadian Government Bond Portfolio had returns of 0.3%. In comparison, the ONE Global Bond Fund had negative returns of 1.1%. For the full 2024 calendar year, the three bond funds had more substantial returns of 4.6%, 4.8%, and 3.9%, respectively.

The Bank of Canada reduced their policy interest rate twice in the quarter, with the rate dropping by 1% in total, ending the year at 3.25%. As the rate cuts were widely anticipated, they had little effect on bond prices in the quarter. The Canadian central bank has lowered interest rates aggressively in the latter half of 2024 as efforts to dampen inflation over the last few years have been successful, providing flexibility for rate cuts. Interest rates were raised aggressively in 2022 and 2023 to dampen economic growth and helping to relieve inflation pressures, but since May 2024, the overnight lending rate has declined from 5.0% to 3.25%.

The Canadian and U.S. economies are tracking very differently, with Canada facing a challenging growth backdrop compared to continued resilience in the U.S. The economic data in the third quarter indicated that the US economy is not showing signs of economic slowdown, and labour markets remain tight. This has affected the interest rate outlook, leading to rising long-term interest rates in the quarter, and the market now expects less aggressive rate cuts by the US Federal Reserve. This has led to weakness in the Canadian dollar in late 2024.

Thunder Bay Prudent Investor Portfolio
Consolidated Portfolio Holdings in CAD
As of December 31, 2024

Security	Quantity	Unit Cost	Book Value	Price	Market Value	% Weight
CAN Equity Fund	12,743.652	1,297.15	16,530,446.55	1,487.36	18,954,488.72	14.56%
GLB Equity Fund	30,545.684	1,118.46	34,164,233.63	1,350.15	41,241,444.64	31.69%
Corp Bond Fund	9,471.248	908.77	8,607,210.87	933.24	8,839,000.53	6.79%
CAN Bond Fund	20,337.251	939.68	19,110,528.13	973.80	19,804,539.09	15.22%
GLB Bond Fund	47,579.308	914.54	43,513,310.83	868.01	41,299,581.58	31.73%
					130,139,054.56	**100.00%**

Thunder Bay Prudent Investor Portfolio
Holdings by Account
At December 31, 2024

Account Name: Thunder Bay - Contingency Outcome
Account Number: 570050567

Holdings	Quantity	Unit Cost	Book Value	Price	Market Value	Weight	For the Quarter Ending December 31, 2024 Market Value Gain (Loss)	Income Received
Corp Bond Fund	1,698.01	908.63	1,542,887.07	933.24	1,584,668.76	5.4%	(42,737.24)	44,895.71
CAN Equity Fund	3,915.79	1,297.32	5,080,069.28	1,487.36	5,824,221.68	20.0%	(322,079.63)	509,881.03
CAN Bond Fund	1,596.93	942.25	1,504,730.29	973.80	1,555,107.97	5.3%	(38,353.67)	46,730.29
GLB Bond Fund	8,817.70	912.61	8,047,195.51	868.01	7,653,903.76	26.2%	(375,927.90)	289,384.65
GLB Equity Fund	9,252.93	1,117.92	10,344,106.75	1,350.15	12,492,903.51	42.9%	60,172.09	135,559.12
			26,518,988.90		29,110,805.68	100.0%	(718,926.35)	1,026,450.80

Thunder Bay Prudent Investor Portfolio
Performance History
At December 31, 2024

% Annualized Returns

	Quarter	Year to Date	1 Year	2 Years	3 Years	4 Years	5 Years	Since Inception	Inception Date
Return Net of Fees	1.0	10.2	10.2	11.5	-	-	-	6.6	04/01/2022

% Calendar Year Returns

	2024	2023	2022	2021	2020	2019
Return Net of Fees	10.2	12.9	-	-	-	-

Thunder Bay Prudent Investor Portfolio
Holdings by Account
At December 31, 2024

Account Name: Thunder Bay - Target Date 3 to 5 Year Outcome
Account Number: 570050575

Holdings	Quantity	Unit Cost	Book Value	Price	Market Value	Weight	For the Quarter Ending December 31, 2024 Market Value Gain (Loss)	Income Received
Corp Bond Fund	3,807.48	908.66	3,459,732.59	933.24	3,553,316.76	10.2%	(95,829.83)	100,670.03
CAN Equity Fund	843.31	1,297.32	1,094,061.45	1,487.36	1,254,323.45	3.6%	(69,364.55)	109,809.68
CAN Bond Fund	10,922.33	938.98	10,255,921.76	973.80	10,636,238.40	30.8%	(262,320.34)	319,614.12
GLB Bond Fund	18,791.43	916.52	17,222,835.34	868.01	16,311,255.25	47.2%	(801,546.38)	616,708.37
GLB Equity Fund	2,053.18	1,118.15	2,295,774.76	1,350.15	2,772,116.41	8.0%	13,351.97	30,079.93
			34,328,325.90		34,527,250.27	100.0%	(1,215,709.13)	1,176,882.13

Thunder Bay Prudent Investor Portfolio
Performance History
At December 31, 2024

% Annualized Returns

	Quarter	Year to Date	1 Year	2 Years	3 Years	4 Years	5 Years	Since Inception	Inception Date
Return Net of Fees	-0.1	5.2	5.2	6.2	-	-	-	3.5	04/01/2022

% Calendar Year Returns

	2024	2023	2022	2021	2020	2019
Return Net of Fees	5.2	7.3	-	-	-	-

Thunder Bay Prudent Investor Portfolio
Holdings by Account
At December 31, 2024

Account Name: Thunder Bay - Target Date 5 to 10 Year Outcome
Account Number: 570050583

Holdings	Quantity	Unit Cost	Book Value	Price	Market Value	Weight	For the Quarter Ending December 31, 2024 Market Value Gain (Loss)	Income Received
Corp Bond Fund	3,185.95	908.22	2,893,576.27	933.24	2,973,281.29	7.0%	(80,187.16)	84,236.89
CAN Equity Fund	4,847.74	1,297.32	6,289,111.87	1,487.36	7,210,370.47	17.0%	(398,734.33)	631,231.37
CAN Bond Fund	2,965.50	942.25	2,794,277.94	973.80	2,887,828.81	6.8%	(71,222.26)	86,777.94
GLB Bond Fund	16,026.23	913.81	14,645,067.06	868.01	13,911,018.52	32.9%	(683,597.24)	525,958.40
GLB Equity Fund	11,315.98	1,118.15	12,653,022.29	1,350.15	15,278,344.61	36.1%	73,586.75	165,783.65
			39,275,055.43		42,260,843.70	100.0%	(1,160,154.24)	1,493,988.25

Thunder Bay Prudent Investor Portfolio
Performance History
At December 31, 2024

% Annualized Returns

	Quarter	Year to Date	1 Year	2 Years	3 Years	4 Years	5 Years	Since Inception	Inception Date
Return Net of Fees	0.8	9.2	9.2	10.4	-	-	-	5.8	04/01/2022

% Calendar Year Returns

	2024	2023	2022	2021	2020	2019
Return Net of Fees	9.2	11.7	-	-	-	-

Thunder Bay Prudent Investor Portfolio
Holdings by Account
At December 31, 2024

Account Name: Thunder Bay - Target Date 10 Year Plus Outcome
Account Number: 570050591

Holdings	Quantity	Unit Cost	Book Value	Price	Market Value	Weight	For the Quarter Ending December 31, 2024 Market Value Gain (Loss)	Income Received
Corp Bond Fund	779.78	911.80	711,014.94	933.24	727,733.72	3.6%	(18,828.26)	20,617.64
CAN Equity Fund	3,136.80	1,296.60	4,067,203.95	1,487.36	4,665,573.12	23.0%	(258,170.32)	408,447.24
CAN Bond Fund	745.18	946.82	705,555.91	973.80	725,664.72	3.5%	(17,547.21)	21,805.91
GLB Bond Fund	3,943.94	912.33	3,598,212.92	868.01	3,423,404.05	16.9%	(166,333.46)	129,434.66
GLB Equity Fund	7,923.58	1,119.61	8,871,329.83	1,350.15	10,698,080.11	52.8%	51,941.26	116,083.70
			17,953,317.55		20,240,455.72	100.0%	(408,937.99)	696,389.15

Thunder Bay Prudent Investor Portfolio
Performance History
At December 31, 2024

% Annualized Returns

	Quarter	Year to Date	1 Year	2 Years	3 Years	4 Years	5 Years	Since Inception	Inception Date
Return Net of Fees	1.4	11.6	11.6	13.1	-	-	-	7.7	04/01/2022

% Calendar Year Returns

	2024	2023	2022	2021	2020	2019
Return Net of Fees	11.6	14.6	-	-	-	-

Thunder Bay Prudent Investor Portfolio
Holdings by Account
At December 31, 2024

Account Name: Thunder Bay - Cash Outcome
Account Number: 570050799

For the Quarter Ending December 31, 2024

Holdings	Quantity	Unit Cost	Book Value	Price	Market Value	Weight	Market Value Gain (Loss)	Income Received
CAN Bond Fund	4,107.28	937.36	3,850,042.23	973.80	3,999,699.19	100.0%	(98,644.07)	120,189.14
			3,850,042.23		3,999,699.19	100.0%	(98,644.07)	120,189.14

Thunder Bay Prudent Investor Portfolio
Performance History
At December 31, 2024

% Annualized Returns

	Quarter	Year to Date	1 Year	2 Years	3 Years	4 Years	5 Years	Since Inception	Inception Date
Return Net of Fees	0.5	4.4	4.4	5.7	-	-	-	4.8	04/04/2022

% Calendar Year Returns

	2024	2023	2022	2021	2020	2019
Return Net of Fees	4.4	6.9	-	-	-	-

TRANSACTION SUMMARY

Account Name: Thunder Bay - Contingency Outcome
Account Number: 570050567

TRANSACTION TYPE	SECURITY	TRADE DATE	SETTLEMENT DATE	QUANTITY	TRADE AMOUNT (CAD)
Buy	GLB Bond Fund	10/28/2024	10/28/2024	15.34	13,808.29
Reinvested Distributions	CAN Bond Fund	12/31/2024	12/31/2024	47.98	46,730.29
Reinvested Distributions	Corp Bond Fund	12/31/2024	12/31/2024	48.10	44,895.71
Reinvested Distributions	GLB Bond Fund	12/31/2024	12/31/2024	333.38	289,384.65
Reinvested Distributions	CAN Equity Fund	12/31/2024	12/31/2024	342.80	509,881.03
Reinvested Distributions	GLB Equity Fund	12/31/2024	12/31/2024	100.40	135,559.12

TRANSACTION SUMMARY

Account Name: Thunder Bay - Target Date 3 to 5 Year Outcome
Account Number: 570050575

TRANSACTION TYPE	SECURITY	TRADE DATE	SETTLEMENT DATE	QUANTITY	TRADE AMOUNT (CAD)
Reinvested Distributions	CAN Bond Fund	12/31/2024	12/31/2024	328.21	319,614.12
Reinvested Distributions	Corp Bond Fund	12/31/2024	12/31/2024	107.87	100,670.03
Reinvested Distributions	GLB Bond Fund	12/31/2024	12/31/2024	710.48	616,708.37
Reinvested Distributions	CAN Equity Fund	12/31/2024	12/31/2024	73.82	109,809.68
Reinvested Distributions	GLB Equity Fund	12/31/2024	12/31/2024	22.27	30,079.93

TRANSACTION SUMMARY

Account Name: Thunder Bay - Target Date 5 to 10 Year Outcome
Account Number: 570050583

TRANSACTION TYPE	SECURITY	TRADE DATE	SETTLEMENT DATE	QUANTITY	TRADE AMOUNT (CAD)
Reinvested Distributions	CAN Bond Fund	12/31/2024	12/31/2024	89.11	86,777.94
Reinvested Distributions	Corp Bond Fund	12/31/2024	12/31/2024	90.26	84,236.89
Reinvested Distributions	GLB Bond Fund	12/31/2024	12/31/2024	605.93	525,958.40
Reinvested Distributions	CAN Equity Fund	12/31/2024	12/31/2024	424.39	631,231.37
Reinvested Distributions	GLB Equity Fund	12/31/2024	12/31/2024	122.78	165,783.65

TRANSACTION SUMMARY

Account Name: Thunder Bay - Target Date 10 Year Plus Outcome
Account Number: 570050591

TRANSACTION TYPE	SECURITY	TRADE DATE	SETTLEMENT DATE	QUANTITY	TRADE AMOUNT (CAD)
Buy	CAN Bond Fund	10/08/2024	10/08/2024	65.44	65,000.00
Buy	Corp Bond Fund	10/08/2024	10/08/2024	63.38	60,000.00
Buy	GLB Bond Fund	10/08/2024	10/08/2024	226.77	205,000.00
Buy	GLB Equity Fund	10/08/2024	10/08/2024	52.40	70,000.00
Reinvested Distributions	CAN Bond Fund	12/31/2024	12/31/2024	22.39	21,805.91
Reinvested Distributions	Corp Bond Fund	12/31/2024	12/31/2024	22.09	20,617.64
Reinvested Distributions	GLB Bond Fund	12/31/2024	12/31/2024	149.11	129,434.66
Reinvested Distributions	CAN Equity Fund	12/31/2024	12/31/2024	274.61	408,447.24
Reinvested Distributions	GLB Equity Fund	12/31/2024	12/31/2024	85.97	116,083.70
Sell	CAN Equity Fund	10/08/2024	10/08/2024	253.66	400,000.00

TRANSACTION SUMMARY

Account Name: Thunder Bay - Cash Outcome
Account Number: 570050799

TRANSACTION TYPE	SECURITY	TRADE DATE	SETTLEMENT DATE	QUANTITY	TRADE AMOUNT (CAD)
Reinvested Distributions	CAN Bond Fund	12/31/2024	12/31/2024	123.42	120,189.14

Thunder Bay Prudent Investor Portfolio
COMPLIANCE CERTIFICATE
December 31, 2024

In accordance with the terms of section 8.02 of the ONEJIB Agreement dated as of July 2, 2020 (the “ONE JIB Agreement”) ONE Investment confirms as follows:

With respect to the quarter ended December 31, 2024 to the best of the knowledge and belief of ONE Investment, all assets of the Participating Municipality under the management and control of ONE JIB pursuant to the ONE JIB Agreement have been invested and are held in accordance with the terms of the ONE JIB Agreement, and in a manner consistent with the IPS and the Investment Plan of the Participating Municipality.



Keith Taylor, Chief Investment Officer, ONE Investment
On the behalf of the ONE Joint Investment Board

YEAR-END TRANSACTION REPORT

For The Period Ended December 31, 2024

Thunder Bay Prudent Investor Portfolio
500 Donald St. E., P.O. Box 80
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P7E 5K4

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City Treasurer
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(807) 625-2230

ONE Investment
155 University Ave, Suite 800
Toronto, Ontario
M5H 3B7

Relationship Manager
Marie Wong Takishita, Client Service Representative
416-971-9856
one@oneinvestment.ca

Thunder Bay Prudent Investor Portfolio
For the Period December 31, 2024
(Consolidated Holdings)

Book Value Summary by Security

Security	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Realized Gains/(Loss)	Cost Basis Adjustment	Closing Balance
CAN Bond Fund	18,450,410.73	65,000.00		595,117.40				19,110,528.13
CAN Equity Fund	15,195,342.85		400,000.00	1,659,369.32		75,734.38		16,530,446.55
Corp Bond Fund	8,284,244.56	72,546.04		250,420.27				8,607,210.87
GLB Bond Fund	41,708,945.16	242,879.59		1,561,486.08				43,513,310.83
GLB Equity Fund	33,646,727.23	70,000.00		447,506.40				34,164,233.63
Total	**117,285,670.53**	**450,425.63**	**400,000.00**	**4,513,899.47**	**0.00**	**75,734.38**	**0.00**	**121,925,730.01**

Market Value Summary by Security

Security	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Change in Market Value	Closing Balance
CAN Bond Fund	18,892,846.83	65,000.00		595,117.40		251,574.86	19,804,539.09
CAN Equity Fund	16,017,548.71		400,000.00	1,659,369.32		1,677,570.69	18,954,488.72
Corp Bond Fund	8,376,922.40	72,546.04		250,420.27		139,111.82	8,839,000.53
GLB Bond Fund	39,509,538.62	242,879.59		1,561,486.08		(14,322.71)	41,299,581.58
GLB Equity Fund	37,021,574.76	70,000.00		447,506.40		3,702,363.48	41,241,444.64
Total	**119,818,431.32**	**450,425.63**	**400,000.00**	**4,513,899.47**	**0.00**	**5,756,298.14**	**130,139,054.56**

Thunder Bay Prudent Investor Portfolio
For the Period December 31, 2024
Summary By Account

Book Value Summary by Account

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Realized Gains/(Loss)	Cost Basis Adjustment	Closing Balance
JIBTHUCASH	3,729,853.09			120,189.14				3,850,042.23
JIB1THUCONT	25,442,112.47	50,425.63		1,026,450.80				26,518,988.90
JIB2THUTD35	33,151,443.77			1,176,882.13				34,328,325.90
JIB3THUTD510	37,781,067.18			1,493,988.25				39,275,055.43
JIB4THUTD10P	17,181,194.02	400,000.00	400,000.00	696,389.15		75,734.38		17,953,317.55
Total	**117,285,670.53**	**450,425.63**	**400,000.00**	**4,513,899.47**	**0.00**	**75,734.38**	**0.00**	**121,925,730.01**

Market Value Summary by Account

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Change in Market Value	Closing Balance
JIBTHUCASH	3,828,275.62			120,189.14		51,234.43	3,999,699.19
JIB1THUCONT	26,369,364.45	50,425.63		1,026,450.80		1,664,564.80	29,110,805.68
JIB2THUTD35	32,803,326.95			1,176,882.13		547,041.19	34,527,250.27
JIB3THUTD510	38,694,635.62			1,493,988.25		2,072,219.83	42,260,843.70
JIB4THUTD10P	18,122,828.68	400,000.00	400,000.00	696,389.15		1,421,237.89	20,240,455.72
Total	**119,818,431.32**	**450,425.63**	**400,000.00**	**4,513,899.47**	**0.00**	**5,756,298.14**	**130,139,054.56**

Thunder Bay Prudent Investor Portfolio
For the Period December 31, 2024
Summary By Account for CAN Bond Fund

Book Value Summary by Account for CAN Bond Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Realized Gains/(Loss)	Cost Basis Adjustment	Closing Balance
JIB1THUCONT	1,458,000.00			46,730.29				1,504,730.29
JIB2THUTD35	9,936,307.64			319,614.12				10,255,921.76
JIB3THUTD510	2,707,500.00			86,777.94				2,794,277.94
JIB4THUTD10P	618,750.00	65,000.00		21,805.91				705,555.91
JIBTHUCASH	3,729,853.09			120,189.14				3,850,042.23
Total	**18,450,410.73**	**65,000.00**	**0.00**	**595,117.40**	**0.00**	**0.00**	**0.00**	**19,110,528.13**

Market Value Summary by Account for CAN Bond Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Change in Market Value	Closing Balance
JIB1THUCONT	1,488,457.65			46,730.29		19,920.03	1,555,107.97
JIB2THUTD35	10,180,378.77			319,614.12		136,245.51	10,636,238.40
JIB3THUTD510	2,764,059.12			86,777.94		36,991.75	2,887,828.81
JIB4THUTD10P	631,675.67	65,000.00		21,805.91		7,183.14	725,664.72
JIBTHUCASH	3,828,275.62			120,189.14		51,234.43	3,999,699.19
Total	**18,892,846.83**	**65,000.00**	**0.00**	**595,117.40**	**0.00**	**251,574.86**	**19,804,539.09**

Thunder Bay Prudent Investor Portfolio
For the Period December 31, 2024
Summary By Account for CAN Equity Fund

Book Value Summary by Account for CAN Equity Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Realized Gains/(Loss)	Cost Basis Adjustment	Closing Balance
JIB1THUCONT	4,570,188.25			509,881.03				5,080,069.28
JIB2THUTD35	984,251.77			109,809.68				1,094,061.45
JIB3THUTD510	5,657,880.50			631,231.37				6,289,111.87
JIB4THUTD10P	3,983,022.33		400,000.00	408,447.24		75,734.38		4,067,203.95
Total	**15,195,342.85**	**0.00**	**400,000.00**	**1,659,369.32**	**0.00**	**75,734.38**	**0.00**	**16,530,446.55**

Market Value Summary by Account for CAN Equity Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Change in Market Value	Closing Balance
JIB1THUCONT	4,816,698.56			509,881.03		497,642.09	5,824,221.68
JIB2THUTD35	1,037,340.31			109,809.68		107,173.46	1,254,323.45
JIB3THUTD510	5,963,060.10			631,231.37		616,079.00	7,210,370.47
JIB4THUTD10P	4,200,449.74		400,000.00	408,447.24		456,676.14	4,665,573.12
Total	**16,017,548.71**	**0.00**	**400,000.00**	**1,659,369.32**	**0.00**	**1,677,570.69**	**18,954,488.72**

Thunder Bay Prudent Investor Portfolio
For the Period December 31, 2024
Summary By Account for Corp Bond Fund

Book Value Summary by Account for Corp Bond Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Realized Gains/(Loss)	Cost Basis Adjustment	Closing Balance
JIB1THUCONT	1,485,445.32	12,546.04		44,895.71				1,542,887.07
JIB2THUTD35	3,359,062.56			100,670.03				3,459,732.59
JIB3THUTD510	2,809,339.38			84,236.89				2,893,576.27
JIB4THUTD10P	630,397.30	60,000.00		20,617.64				711,014.94
Total	**8,284,244.56**	**72,546.04**	**0.00**	**250,420.27**	**0.00**	**0.00**	**0.00**	**8,607,210.87**

Market Value Summary by Account for Corp Bond Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Change in Market Value	Closing Balance
JIB1THUCONT	1,501,809.93	12,546.04		44,895.71		25,417.08	1,584,668.76
JIB2THUTD35	3,396,068.45			100,670.03		56,578.28	3,553,316.76
JIB3THUTD510	2,841,702.19			84,236.89		47,342.21	2,973,281.29
JIB4THUTD10P	637,341.83	60,000.00		20,617.64		9,774.25	727,733.72
Total	**8,376,922.40**	**72,546.04**	**0.00**	**250,420.27**	**0.00**	**139,111.82**	**8,839,000.53**

Thunder Bay Prudent Investor Portfolio
For the Period December 31, 2024
Summary By Account for GLB Bond Fund

Book Value Summary by Account for GLB Bond Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Realized Gains/(Loss)	Cost Basis Adjustment	Closing Balance
JIB1THUCONT	7,719,931.27	37,879.59		289,384.65				8,047,195.51
JIB2THUTD35	16,606,126.97			616,708.37				17,222,835.34
JIB3THUTD510	14,119,108.66			525,958.40				14,645,067.06
JIB4THUTD10P	3,263,778.26	205,000.00		129,434.66				3,598,212.92
Total	**41,708,945.16**	**242,879.59**	**0.00**	**1,561,486.08**	**0.00**	**0.00**	**0.00**	**43,513,310.83**

Market Value Summary by Account for GLB Bond Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Change in Market Value	Closing Balance
JIB1THUCONT	7,328,296.83	37,879.59		289,384.65		(1,657.31)	7,653,903.76
JIB2THUTD35	15,696,745.31			616,708.37		(2,198.43)	16,311,255.25
JIB3THUTD510	13,386,935.20			525,958.40		(1,875.08)	13,911,018.52
JIB4THUTD10P	3,097,561.28	205,000.00		129,434.66		(8,591.89)	3,423,404.05
Total	**39,509,538.62**	**242,879.59**	**0.00**	**1,561,486.08**	**0.00**	**(14,322.71)**	**41,299,581.58**

Book Value Summary by Account for GLB Equity Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Realized Gains/(Loss)	Cost Basis Adjustment	Closing Balance
JIB1THUCONT	10,208,547.63			135,559.12				10,344,106.75
JIB2THUTD35	2,265,694.83			30,079.93				2,295,774.76
JIB3THUTD510	12,487,238.64			165,783.65				12,653,022.29
JIB4THUTD10P	8,685,246.13	70,000.00		116,083.70				8,871,329.83
Total	**33,646,727.23**	**70,000.00**	**0.00**	**447,506.40**	**0.00**	**0.00**	**0.00**	**34,164,233.63**

Market Value Summary by Account for GLB Equity Fund

Account	Opening Balance	Contribution	Withdrawals	Reinvested Income	Reinvested Capital Gains	Change in Market Value	Closing Balance
JIB1THUCONT	11,234,101.48			135,559.12		1,123,242.91	12,492,903.51
JIB2THUTD35	2,492,794.11			30,079.93		249,242.37	2,772,116.41
JIB3THUTD510	13,738,879.01			165,783.65		1,373,681.95	15,278,344.61
JIB4THUTD10P	9,555,800.16	70,000.00		116,083.70		956,196.25	10,698,080.11
Total	**37,021,574.76**	**70,000.00**	**0.00**	**447,506.40**	**0.00**	**3,702,363.48**	**41,241,444.64**

APPENDIX

ONE JIB - Outcome Framework - Target Allocations

Outcome	HISA	Canadian Equity Fund	Global Equity Fund	Canadian Government Bond Fund	Canadian Corporate Bond Fund	Global Bond Fund	Allocation			
							Equity	Fixed Income	Cash	Total
Cash	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%			100.0%	100%
Stable Return	10.0%	9.0%	21.0%	9.0%	9.0%	42.0%	30.0%	60.0%	10.0%	100%
Contingency	0.0%	18.0%	42.0%	6.0%	6.0%	28.0%	60.0%	40.0%		100%
Asset Management	0.0%	27.0%	63.0%	1.5%	1.5%	7.0%	90.0%	10.0%		100%
Target Date 3-5	20.0%	3.0%	7.0%	10.5%	10.5%	49.0%	10.0%	70.0%	20.0%	100%
Target Date 5-10	0.0%	15.0%	35.0%	7.5%	7.5%	35.0%	50.0%	50.0%		100%
Target Date 10+	0.0%	22.5%	52.5%	3.75%	3.75%	17.5%	75.0%	25.0%		100%

ONE JIB - Outcome Framework - Defined

Outcome Category	Outcome Strategy	Objective	Risk Tolerance, Liquidity	Investment Horizon	Allocation		
					Equity	Fixed Income	Cash
Cash	Cash	Preservation of Capital	Low risk; high liquidity	< 3 years			100%
Stable Return	Stable Return	Income generation: To generate returns to fund recurring needs	Moderate risk with emphasis on growth and stable returns, regular liquidity	> 5 years (Perpetual)	30%	60%	10%
Contingency	Contingency	Contributions for unexpected and infrequent events	Higher risk, emphasis on longer-term capital growth with some liquidity	> 5 years (Perpetual)	60%	40%	
	Asset mgt reserves	Contributions to generate returns to fund asset management reserves	Higher risk, emphasis on longer-term capital growth; low liquidity	> 10 years (Perpetual)	90%	10%	
Target Date	Target Date 3-5 yrs.	Preservation of capital	Low risk; high liquidity	3 - 5 years	10%	70%	20%
	Target Date 5-10 yrs.	Contributions toward capital projects, mitigate inflation impacts and meet target funding requirements	Moderate risk, liquid	5 - 10 years	50%	50%	
	Target Date 10+ yrs.	Contributions toward capital projects, mitigate inflation impacts and meet target funding requirements	Higher risk, emphasis on long term inflation-adjusted growth	> 10 years	75%	25%	

Glossary and Definitions for Quarterly Reports

Account

ONE Investment clients have one or more custodial accounts. All Prudent Investor Funds will be administered with ONE Investment's custodian, CIBC Mellon. Unlike Legal List accounts, MNRI invested in the ONE Investment Prudent Investor Funds will be under the control of the ONE Joint Investment Board. In most cases, the Prudent Investor clients will have multiple accounts with the custodian, with the account structure based on the investment outcomes assigned to each client. This will allow reporting to the municipal client based on the investment outcome framework.

Annual and Annualized Returns: please see Returns below.

Asset Allocation

Asset allocation is the single biggest driver of fund returns and should be set taking into account municipal risk tolerance. Also known as asset mix, it is the combination of asset classes in a fund and is normally shown as the percentage weights in each. Example asset classes are money market, Canadian bonds, global bonds, Canadian stocks and global stocks. Each of the ONE JIB Outcomes has an associated asset allocation that is designed to be appropriate for the intended investment Outcome.

Asset Mix: See Asset allocation.

Benchmark

The Benchmark is the standard against which investors compare their portfolio returns to understand its performance. Benchmark can be set either at the asset class level or for the overall portfolio. At the asset class level, benchmarks are usually chosen to represent the entire market; active managers seek to outperform their benchmarks by at least the amount of fees they charge.

For example, a typical benchmark for Canadian stocks is the S&P/TSX Composite Index which is calculated by Standard and Poor's (S&P) and for Canadian money market, the typical benchmark is the FTSE 182-Day Treasury Bill Index from the Financial Times Stock Exchange Group (FTSE). For a portfolio that aims to have risk halfway between these two asset classes, the total portfolio benchmark might be 50% S&P/TSX Composite Index and 50% FTSE 182-Day Treasury Bill Index.

Benchmark returns are always time weighted. (See Returns below for more detail on time weighted returns)

Blended Benchmark

A blended benchmark is a benchmark that is constructed from two or more underlying benchmarks. The weights of each underlying benchmark used in a blended benchmark remain constant over time.

Canadian Corporate Bond Fund

The ONE Investment Canadian Corporate Bond Fund holds short and mid-term Canadian bonds managed by MFS. Based on the benchmark duration at December 31, 2023, the permitted duration range is 3.67 to 6.67. MFS aims to outperform the benchmark, which is:

- 48% FTSE Canada Universe All Government Bond Index +
- 40% FTSE Canada Short-Term Corporate A Index +
- 10% FTSE Canada Universe Corporate AAA/AA Index +
- 2% FTSE Canada 91-Day Treasury Bill Index.

Canadian Equity Fund

The ONE Canadian Equity Fund holds Canadian stocks managed by Guardian Capital. Guardian aims for below-market risk, achieved with a ONE-imposed constraint on the weight of Material and Energy sectors because of the expected above-market volatility of these sectors.

Canadian Government Bond Fund

This ONE Government Canadian Bond Fund holds short-term Canadian bonds managed by MFS. Based on the benchmark duration at December 31, 2023, the permitted duration range for the Fund is 1.12 to 2.12. MFS aims to outperform the benchmark, which is:

- 60% FTSE Canada Short-Term Government Bond Index +
- 40% FTSE Canada 91-Day Treasury Bill Index.

Book Value

Book value is the Unit Cost of each holding multiplied by the number of units. It represents the amount originally paid to invest in the holding and takes into account all contributions and withdrawals.

CAD

This is a short form for “Canadian dollars”. Although the outcomes have exposure to foreign securities, all returns in the report reflect Canadian dollar-based returns. Foreign holdings will be impacted by movements in foreign currencies which may impact investment returns. This impact can be reduced by currency hedging strategies. The global equity exposure does not hedge currency exposure, but the global bond exposure may use hedging. The degree to which global bond exposure is hedged back to the Canadian dollar may vary and will reflect the currency hedging strategy of the external manager.

Consolidated Holdings

Consolidated holdings are the aggregate value of all investments with ONE Investment. Consolidated holdings detailed in this report only reflect MNRI balances invested in ONE Investment’s Prudent Investor Funds and HISA balances under the control of the ONE JIB. In certain cases, clients may hold ONE Investment Legal List portfolios or HISA which will not be reflected in consolidated holdings in this report. Additionally, ‘in-kind’ securities pledged to the ONE JIB will not be reflected in this report.

Discounts

Certain fee discounts apply for investors in the ONE Investment Prudent Investor offering. These discounts include a 4bps discount that applies to AUM of Founding Members, and ‘tier discounts’ that apply for any investors with balances in excess of certain thresholds. These discounts would not apply to HISA balances but would apply to balances in Legal List portfolios (if applicable). Discounts will be rebated to the municipalities on a quarterly basis. These discounts are not taken into consideration in the performance details in this investment report.

Distribution: a cash payment of interest or dividends made by ONE Investment from a fund.

Duration

This statistic applies to bonds and is similar in concept to term to maturity. The difference is that duration also takes into account the size and timing of interest payments. A bond with higher coupon payments will have a shorter duration than one with the same term to maturity and lower coupon payments: the reason is that the higher-coupon bond receives more of its return earlier. The higher the duration of a bond, the higher its sensitivity to interest rate movements.

Fees

Fees include all expenses involved in managing the fund: external investment manager fees, custody costs, ONE Investment's costs and administrative costs.

Global Bond Fund

The ONE Global Bond Fund is an unconstrained global bond mandate managed by Manulife Asset Management. The unconstrained nature of the mandate means that the fund will contain a mix of global government, corporate and securitized debt, including emerging markets and high-yield securities. The mandate is not constrained by sector or currency. Manulife aims to outperform the benchmark, which is Bloomberg Barclays Multiverse Index Unhedged.

Global Equity Fund

The ONE Global Equity Fund holds Global stocks managed by Mawer Investment Management. Mawer aims to outperform the benchmark, which is MSCI All Country World Index (ACWI). This mandate invests in both emerging and developed markets. Manager will allocate capital to the best global opportunities, which may include both large and small capitalization companies. This mandate is intended to be a broadly diversified portfolio of wealth-creating companies bought at discounts to their intrinsic values that typically employ a long-term holding period.

High Interest Savings Account (HISA)

This bank account is provided by CIBC. Its very short-term nature precludes it from being considered an investment. Interest income from HISA will be reflected only in the executive summary page as will a list of HISA transitions. As the HISA product is a demand deposit, its value of his does not fluctuate daily. In this way it differs from the ONE Investment fund whose price change in response to changes in the value of underlying investments. Returns for individual accounts holding HISA will not be presented in the report beyond what is disclosed in the executive summary. HISA balances held in the Prudent Investor Offering reflect MNRI and will be under the control of the ONE JIB.

Holdings: the ONE Investment funds or HISA Balances held in client accounts.

Inception Date

The inception is the first date that an investment was made. For each account, this will be the first time funds were transferred in; for funds offered by ONE Investment, it is the date the funds started. For ONE JIB Founders, the Inception date is July 2, 2020.

Income

Income is a cash flow generated by an investment and normally includes interest on bonds and dividends on stocks. It is differentiated from capital gains, which also contribute to returns, but which are not considered income.

Investment Manager

Investment managers are external firms hired by ONE Investment to create funds to our specifications. These are MFS Investment Management Canada for Canadian fixed income, Manulife Asset Management for global fixed income, Guardian Capital Group Ltd for Canadian equity, and Mawer Investment Management Ltd for global equity.

Market Value

The value of an investment at current market prices, calculated by multiplying the Price (defined below) by the number of units held.

ONE Joint Investment Board (ONE JIB)

The joint board established by founding municipalities as a municipal services board under section 202 of the Act as required under Part II of the Regulation, and is the duly appointed Joint Investment Board for the municipality, as constituted from time to time and acting pursuant to the Terms of Reference set out in the ONE JIB Agreement.

Outcome

Outcome means, in the context of the Investment Plan, the same thing as 'solution'. Investment Outcomes are a set of investment allocations with varying risk/return characteristics. The Outcomes assigned to each municipal investor are intended to reflect the needs and circumstances of the municipality. ONE JIB has five pre-defined basic outcomes:

Cash:

The Cash Outcome is designed for investments with a time horizon of less than 3 years. Preservation of capital and liquidity are the highest priorities. Investments allocated to this outcome are expected to be transferred back to the care and control of the municipal treasurer when the funds are reclassified as MRI.

Contingency:

The Contingency outcome is designed for investing contingency reserves. The funds in this outcome may be drawn upon to meet unexpected needs and infrequent events. The investment horizon for this outcome is typically greater than 5 years, with an emphasis placed on long-term growth and preservation of purchasing power is a key consideration.

Asset Management Reserves:

The Asset Management Reserve Outcome is specifically designed for very long investment horizons with a well-defined purpose. Allocations to this Outcome are intended to generate returns to help fund asset management objectives. The long-term nature of asset management reserves allows this Outcome to emphasize long-term growth.

Stable Return:

The Stable Return Outcome is designed to provide an annual income while preserving the value of the principal investment. The principal amount is often invested in perpetuity with no intent to withdraw for the foreseeable future. This outcome is frequently used by municipalities looking to replace the income stream of a utility that has been sold, with some or all proceeds of the sale acting as the principal.

Target Date:

The Target Date Outcomes are designed for contributions toward planned capital projects. There are three target date designs for different time horizons: 3 to 5 years; 5 to 10 years; and greater than 10 years. For capital projects in the 3-to-5-year range, preservation of capital is prioritized. For projects in the 5-to-10-year range, emphasis is placed on inflation mitigation and meeting target funding requirements. For projects in the greater-than-10-year range, emphasis is placed on longer-term inflation adjusted growth.

Price

The price of ONE funds is the unit price at a point in time, also known as the net asset value, which is calculated daily by CIBC Mellon. This price takes into account the last traded prices of all securities held by the manager, the bid/ask spread where no recent trade is available and a daily accrual for all fees including investment management and administration.

Prudent Investor Standard

The standard requiring ONE JIB, when investing money under section 418.1 of the Act, to exercise the care, skill, diligence and judgement that a prudent investor would exercise in making such an investment but does not restrict the securities in which a municipality can invest. The Prudent Investor standard applies to the entire portfolio of Long-Term Funds under control of ONE JIB rather than to individual securities.

Quality

This statistic refers to the creditworthiness of bonds based on ratings provided by bond rating agencies such as S&P, DBRS, Fitch and Moody's. The highest quality bonds are rated AAA and range down from there to AA, A and BBB, all of which are investment grade ratings. Ratings below BBB are considered high yield. The lower a credit rating, the higher a bond's yield to maturity and commensurate risk of default on interest payments or principal. The credit rating on an entire fund is calculated as a weighted average.

Realized and Unrealized Gains

Capital gains reflect the movement in the Price of investments as they rise over time relative to their average Unit Cost. Negative gains are losses, meaning that the Price of the units in the account is lower than the average Price paid for them (Unit Cost). Because gains / losses are calculated based on net asset values, they are diminished by the amount of fees. (Please see Fees, Price and Unit Cost.)

- **Unrealized gains** exist “on paper” until the investment is sold in return for cash, at which point they become realized.
- **Realized gains** are generated by withdrawals from accounts during the time period in question based on the unit Price compared to the Unit Cost.

Returns

Returns measure the percentage increment in value generated by investments over a period of time. Unless otherwise noted, time-weighted total returns are reported here, which include all forms of income and capital gains. There are different aspects to return calculations explained below.

- Calendar Year Return: reflects the total return generated by investments in the specified year any between January 1 to December 31.
- Annualized Returns: the total return generated by investments in each year for holding periods greater than one year. Annualized returns are the geometric average over a multi-year period, meaning they represent the compound return. For periods of one year or less, the actual return is shown without the effect of compounding.
- Returns in this report are calculated net of fees based on the Prices of the ONE Investment funds. These are calculated daily by CIBC Mellon and take into account all fees and costs associated with managing the fund.
- Return details in this report do not account for fee discounts that may apply for some Prudent Investor clients.
- Time-weighted returns: returns in this report are time-weighted in order for them to be compared to the benchmarks. Time-weighted returns are calculated in a way that excludes the effect of the timing of contributions and withdrawals (cash flows) from the fund. (To capture the effect of cash flows and measure their impact on returns, investors would instead need use dollar-weighted return calculations.)

Unit Cost

Unit Cost is the weighted average Price paid for all the Fund units held in the account and reflects the impact of units bought and sold over time.

Unrealized Gains: Please see Realized and Unrealized Gains

Value Added: The return generated by an investment manager above (or below, if negative) the benchmark.

Year to Date: The time period beginning January 1 and ending at the most recent quarter end.

MEMO

To:	ONE Joint Investment Board (ONE JIB) Participating Municipalities
From:	Judy Dezell and Donna Herridge, Co-Presidents / Co-CEOs
CC:	Denis Kelly, Board Secretary – ONE Joint Investment Board
Date:	May 8, 2025
Re:	Recent changes to your municipal investments under the Prudent Investment Offering

SUMMARY

Your municipality is one of 15 Participating Municipalities in the ONE Joint Investment Board (ONE JIB).

As a follow-up to our November 29, 2024, memo on the same topic, the ONE Investment Board and ONE JIB have fully implemented an Outsourced Chief Investment Officer (OCIO) business model for our Prudent Investment Offering, which increases the number of investment products available and enhances ONE's overall capacity to manage your investment plan as ONE JIB continues to grow.

As a Participating Municipality of ONE JIB, your municipality has successfully transitioned over to the new Prudent Investment offering in March 2025, which has resulted in the crystallization of investment gains that will have to be reported on your 2025 Financial Statements.

BACKGROUND

ONE JIB is a joint local board within the meaning of the *Municipal Act* and constitutes a local board of each Participating Municipality; currently fifteen municipalities participate in ONE JIB.

PH&N Institutional, part of RBC Global Asset Management, is the Sub-Investment Manager for ONE's new Prudent Investment Offering. They were selected through a competitive RFP process and have significant outsourced chief investment officer and Canadian municipal sector experience. All existing ONE JIB clients were informed of this change in early 2024 and updated throughout the process, including at our quarterly Participating Municipalities Meetings. This memo provides a final update on the transition.

THE DETAILS

The new Prudent Investment Offering increases the number of investment fund products available to ONE JIB and the Participating Municipalities. The new Offering also allows Investment Plans to include an additional investment class, known as alternative investments, as deemed appropriate by the Participating Municipality and ONE JIB.

As a Participating Municipality, your municipality was transitioned over to the new Prudent Investment Offering on March 5, 2025. The full transition plan was approved by ONE JIB at their November 27, 2024 meeting. This plan replicated market and risk factor exposures of the

existing Outcomes Framework benchmarks referred to in each Participating Municipality's Investment Plan.

As part of the transition, all investments held in the five ONE Investment PI Funds were sold on March 3, 2025, and units of PH&N/RBC Funds were purchased on March 5. This action resulted in significant capital gains distributions from the ONE Investment PI Funds with cumulative investment gains and losses being crystalized for all Participating Municipalities that will have to be reported on your municipal 2025 Financial Statements. There was also interest income earned on cash balances as they transitioned into the new Prudent Investment Funds operated by PH&N Institutional/RBC Global Asset Management.

ONE Investment staff, including our Chief Investment Officer (CIO) and PH&N Institutional, met individually with each Participating Municipality to discuss the transition plan, local circumstances and to confirm that there was no municipal effort required to facilitate the transition.

ONE JIB acknowledges municipal sensitivity to recognizing investment gains and losses as part of the transition but is pleased to report that all investors had positive investment results as part of the change. ONE JIB takes its fiduciary responsibility seriously and will continue to carefully exercise its fiduciary role as it considers any future investment decisions in 2025 and beyond, based on changes to the Municipal Investment Plan for any of the Participating Municipalities during the annual review process and changes to the desired model portfolios.

Following the payment of all applicable Q1 2025 investor rebates to PI Investors (as applicable), ONE Investment is in the process of closing the five existing PI Funds. The quarterly reporting packages issued to investors for Q1 2025 include a supplemental section that summarizes the gains, losses and income recognized during the transition.

As part of the transition to PH&N Funds, there are changes to investor reporting, as well as to the Investment Policy Statement. In the coming months, all Participating Municipalities will receive an overview session to highlight the new monthly and quarterly statements. Also, a revised Investment Policy Statement template will be used for all annual reviews in 2025.

ONE Investment staff is available to answer any questions, on the legislation, current market conditions or ONE's Prudent Investment program. Please have your Treasurer reach out to us as required.

Lastly, as you finalize your 2024 financial statements, you may wish to view the audited financial statements for the ONE Prudent Investment Funds – these are available on the ONE Investment website.

CITY OF Thunder Bay
Superior by Nature

Corporate Report

REPORT NUMBER	186-2025-Corporate Services-Finance	
DATE PREPARED	May 27, 2025	***FILE***
MEETING DATE	July 14, 2025	
SUBJECT	2024 Operating Budget Q4 Financial Status and Reserve and Reserve Fund Update	

RECOMMENDATION

For Information only.

LINK TO STRATEGIC PLAN

The 2024 Operating Budget Q4 Financial Status and Reserve and Reserve Fund Update supports the strategic direction to plan and deliver cost-effective services, with a focus towards ensuring accountability of the City's financial resources.

EXECUTIVE SUMMARY

Overall, the City of Thunder Bay's 12-month period ending December 31, 2024, resulted in a favourable variance. The 2024 Operating Budget had planned for a $2.9 million withdrawal from the Stabilization Reserve to fund one-time operational items. However, due to favourable variance across multiple areas, this withdrawal was ultimately not required. After accounting for this, the net variance in tax-supported operations was $38,600, representing 0.02% of the 2024 Municipal Tax Levy of $231.3 million.

In accordance with the City's Reserve and Reserve Fund Policy, the net variance has been transferred to the Stabilization Reserve.

Overall, the City of Thunder Bay's 12-month period ending December 31, 2024 resulted in a favourable variance of $1.6 million in its rate-supported operations. The variances within each rate program have been managed using the respective reserve funds in accordance with the Consolidated Reserve Fund By-law and the approved 2024 Budget.

This Report also includes the annual reserve and reserve fund update including a Non-Consolidated Statement of Continuity of Reserves and Reserve Funds (Attachment 2).

DISCUSSION

Reconciling the Q4 Financial Status Report and Audited Financial Statements

The City of Thunder Bay, like most municipalities, prepares and approve its Budget using a modified accrual basis of accounting. The unaudited financial results presented in this Corporate Report are provided on the same basis as the Municipal Budget.

In contrast, the audited financial statements are prepared under the accrual basis of accounting and Public Sector Accounting Standards (PSAS). There are significant differences between the two reporting methods due to the treatment of employee obligations and other liabilities, reserve and reserve fund transactions, and tangible capital assets.

The external audit of the City of Thunder Bay's Consolidated Financial Statements for the period ending December 31, 2024 is currently underway. Because of the differences between the two reporting methods, the financial results presented in the audited Consolidated Financial Statements will be different than the results presented in this Corporate Report.

2024 Variance Explanations

As a practice, the Corporation budgets based on a full approved staff complement. Throughout the variance explanations presented below, there is a general trend of under-expenditures in Personnel Services, totaling $4.8 million between tax- and rate-supported operations. This includes $3.1 million in WSIB costs that were over budget, which means the actual savings from staff vacancies were significantly higher. Of the total savings, $2.5 million was anticipated and built into the budget as a corporate vacancy allowance.

<u>Tax-Supported Operations</u>

For the year ended December 31, 2024, there was a favourable variance of $38,600 in the City's tax-supported operations. Attachment 1 – Q4 Financial Status Update by Division presents the net budget, year-end position, and variance for each Division. Explanations for significant variances, as noted in Attachment 1, are presented below:

1. **Corporate Revenues – Stabilization Reserve Contribution**
   The 2024 budget included a contribution of $2.9 million from the Stabilization Reserve, intended to offset one-time items. This contribution was not required due to the City's overall favourable operating variance (discussed below).

2. **Revenue**
   Favourable variance of $0.9 million in 2024 primarily in Personnel Services due to temporary staff vacancies during the year as well as higher than expected Provincial Offences Act (POA) fine revenues net of distribution to District Municipalities.

3. **Superior North Emergency Medical Services (SNEMS)**
   Favourable variance of $0.7 million in 2024 primarily in Personnel Services due to temporary staff vacancies during the year offset somewhat by higher WSIB compensation, health care, physician and administration fees. Vehicle repairs, maintenance and fuel costs were higher than budget. Provincial grants were lower than budget in 2024 as the grant amount is calculated on actual expenditures.

4. **Licensing and Enforcement**
   Favourable variance of $0.4 million in 2024 primarily in Personnel Services due to significant temporary staff vacancies during the year.

5. **Recreation and Culture**
   Unfavourable variance of $0.9 million in 2024, primarily in Personnel Services and Materials. The Personnel Services variance includes an higher WSIB costs, however the overall variance was largely due to staffing levels and compensation costs. These cost increases were partially offset by favourable revenue trends, including higher-than-anticipated federal grant funding for fully funded programs and increased user fee revenues.

6. **Transit**
   No variance is reported for 2024 as the favourable variance of $0.9 million was transferred to the Capital Transit Reserve Fund in accordance with the Consolidated Reserve Fund By-law. The favourable variance was primarily in Personnel Services due to temporary staff vacancies during the year, and favourable trends in materials. Revenues trended close to budget.

7. **Long Term Care and Senior Services**
   Favourable variance of $1.0 million in 2024, primarily due to increased provincial grants resulting from adjustments to the funding model and higher accommodation revenues. Temporary staff vacancies contributed to a favourable variance in Personnel Services, although this was offset by increased contracted services to maintain continuity of care.

8. **Engineering and Operations**
   Although an unfavourable variance of $0.9 million was reported for 2024, the Division would have ended the year in a favourable position if not for the transfer to the Winter Control Roads Reserve. Within the Division, the Winter Control area experienced a favourable variance of $1.9 million due to a

relatively mild winter. In accordance with the Reserve and Reserve Fund Policy, this amount was transferred to the Winter Control Roads Reserve.

The $0.9 million unfavourable variance was primarily driven by higher expenditures on road surface maintenance, in accordance with Roads Maintenance Objectives, and increased costs for traffic control and street lighting contracts, which were necessary to maintain service levels amid significant staff shortages.

9. **Solid Waste**
   Favourable variance of $2.0 million in 2024, primarily due to operational impacts related to the implementation of the Blue Box program. The savings were driven by a combination of factors, including lower costs for contract service agreements, most notably a significant reduction in the contract termination fee. Also, temporary staff vacancies, increased provincial grant funding, and higher user fee revenues contributed to the favourable variance.

10. **Thunder Bay Fire Rescue**
    Unfavourable variance of $0.9 million in 2024 primarily in Personnel Services due to higher overtime costs, WSIB compensation, health care, physician and administration fees, offset somewhat by temporary staff vacancies during the year.

11. **Development Services**
    Favourable variance of $0.5 million in 2024 primarily in Personnel Services due to temporary staff vacancies during the year and higher than expected permit fee revenues.

12. **Corporate Expenditures Net of General Revenues**
    Corporate Expenditures and Revenues include budgets for various items that are not necessarily attributable to any one Division, these include general personnel costs, tax write-offs, service fee to the Municipal Property Assessment Corporation (MPAC), debt servicing, legal expenses and insurance.

    Unfavourable variance of $3.0 million however it is noted that Corporate Expenditures includes the $2.5 million corporate vacancy allowance discussed above. Although these savings were expected and materialized through temporary staff vacancies within Divisions, the actual savings are recorded at the divisional level. This results in an apparent unfavourable variance within Corporate Expenditures, which is strictly a presentation issue rather than a reflection of overspending.

    This category reflects a mix of favourable and unfavourable variances. The most material items are outlined below:

- Unfavourable Tax Write offs: $0.8 million
- Unfavourable Insurance Claims and associated fees: $1.3 million
- Favourable investment earnings: $2.4 million

13. Police Services Operations

Favourable variance of $0.3 million in 2024 primarily due to favourable revenues. Provincial grants were $0.7 million favourable, user fee revenue for paid duty service was also $0.7 million more than budget and spending on Materials were less than anticipated due to implementation of operational changes where services are completed in house rather than outsourced. These favourable trends are partially offset by unfavourable Personnel Services, including overtime, WSIB, health care, physician and administration fees. The Personnel Services variance also includes paid duty wages which are recovered through applicable user fee revenue and vacancy savings.

Rate-Supported Operations

For the year ended December 31, 2024, overall, there was a favourable variance of $1.6 million in the City's rate-supported operations. Any under or over expenditure in these programs results in a transfer to or from their respective reserve funds.

Rate-Supported Variances ($M)			
Program	Budget Surplus Transfer to Reserve Fund	Actual Surplus/(Deficit) Transfer to/(from) Reserve Fund	Variance F/(U)
Waterworks	$8.1	$7.8	($0.3)
Wastewater (Sewer)	$4.6	$5.5	$0.9
Solid Waste (Landfill)	$0.3	$1.5	$1.2
Boaters' Services	$0.2	$0.2	$0.0
Municipal Parking Services	$0.5	$0.3	($0.2)
Total Variance	**$13.7**	**$15.3**	**$1.6**

Explanations for significant variances are presented below:

- **Waterworks**
  Unfavourable variance of $0.3 million in 2024 primarily due to lower user fee revenues, as well as higher costs for materials and contracted services. These pressures were partially offset by savings in Personnel Services resulting from temporary staff vacancies during the year.

- **Wastewater (Sewer)**
  Favourable variance of $0.9 million in 2024 primarily in Personnel Services due to temporary staff vacancies during the year and lower cost of materials, partially offset by lower than expected user fee revenues.

- **Solid Waste (Landfill)**
  Favourable variance of $1.2 million in 2024 primarily due to favourable user fee revenues and increased internal recovery from the change in application of tipping fees.
- **Municipal Parking Services**
  Unfavourable variance of $0.2 million in 2024 primarily due to lower user fee revenues due to timing of parking service changes, and the implementation of parking exemption zones.

FINANCIAL IMPLICATION

Overall, the City of Thunder Bay's 12-month period ending December 31, 2024, resulted in a favourable variance of $38,600 in tax-supported operations. This outcome reflects a more substantial favourable variance in the net operating variance as the budgeted 2024 transfer of $2.9 million from the Stabilization Reserve to operating was not required.

The Reserve and Reserve Fund Policy provides direction for the allocation of the operating surplus/deficit (year-end variance). In accordance with this policy, the $38,600 year-end surplus will be transferred to the Stabilization Reserve.

Non-Consolidated Statement of Continuity of Reserves and Reserve Funds

Attachment 2 – Non-Consolidated Statement of Continuity of Reserves and Reserve Funds, provides details of the activities in reserves and reserve funds for the year, and includes the transfer to Stabilization Reserve in the amount of the tax-supported year-end surplus in accordance with the Reserve and Reserve Fund Policy.

Reserves and reserve funds are a critical component of a long-term financial plan. Adequate levels of reserves and reserve funds demonstrate financial flexibility and an ability to adapt to fiscal challenges.

The overall increase of $9.1 million reflects contributions of $59.5 million in net funding provided for capital projects and $3.5 million in funding for operations that are offset by interest and investment earnings of $8.0 million, contributions from operations of $59.7 million and contributions from capital of $4.8 million.

Tax-supported reserve and reserve fund balances are $196.9 million (2023 - $186.6 million) and rate-supported reserve fund balances at December 31, 2024 are $49.9 million (2023 – $50.3 million).

Tax-Supported

The 2024 tax-supported reserve and reserve fund balance is $196.9 million representing an increase of $10.9 million over 2024.

The overall 2024 increase in Reserves and Reserve Funds mainly relates to:

Increases in:

- Indoor Turf Reserve Fund ($3.0 million);
- Capital Expenditure Reserve ($2.4 million);
- Winter Control Roads Reserve ($1.9 million);
- Renew Thunder Bay ($0.9 million); and
- Building Permit Reserve Fund ($0.6 million);

Offset with decreases in:

- Capital General Reserve Fund ($1.4 million);
- Event Hosting Reserve ($0.8 million);
- Insurance Reserve ($0.7 million); and
- Stabilization Reserve ($0.5 million);

The increase in Reserve and Reserve Fund balances is consistent with the City's commitment to long term financial sustainability and fiscal resilience. This strong reserve position supports the City's ability to respond to financial pressures and supports strategic capital investments.

Rate-Supported

Long-range financial plans are in place for the City’s rate-supported operations (waterworks, wastewater, solid waste, boaters’ services, and municipal parking services). User fees are based on future cash flow requirements for operating (including borrowing costs), capital, and reserve fund contributions. The long-term strategy for rate-supported operations is expected to provide for a gradual increase to reserve fund balances for future capital asset replacement.

CONCLUSION

It is concluded that the City of Thunder Bay tax-supported operations resulted in a surplus of $38,600 for the 2024 year. In accordance with the City’s Reserve and Reserve Fund Policy, this surplus has been transferred to the Stabilization Reserve.

It is further concluded that the City’s rate-supported operations generated an overall surplus of $1.6 million in 2024. In alignment with the Consolidated Reserve Fund By-law and 2024 Approved Budget, the surplus will be transferred to and from the applicable rate supported reserve funds in order to support future infrastructure and operating needs.

Administration provides the Non-Consolidated Statement of Continuity of Reserves and Reserve Funds (Attachment 2) to City Council for information purposes.

BACKGROUND

The Operating Budget for the fiscal year January 1, 2024 to December 31, 2024 was approved by City Council on February 12, 2024.

REFERENCE MATERIAL ATTACHED

Attachment 1 – Q4 Financial Status Update by Division

Attachment 2 – Non-Consolidated Statement of Continuity of Reserves and Reserve Funds (Unaudited)

REPORT PREPARED BY

Andrea Morrison, CPA, CA – Director Finance – Corporate Services

REPORT SIGNED AND VERIFIED BY

Keri Greaves, CPA, Commissioner – Corporate Services & City Treasurer

06/16/2025 (MM/DD/YEAR)

Attachment 1
The City of Thunder Bay
2024 Q4 Financial Report Update by Division

	Budget	Actual	Variance F/(U)	Note
CORPORATE REVENUES ($M)				
Tax Revenues	233.0	233.3	0.3	
Grants	37.9	38.7	0.8	
Stabilization Reserve Contribution For City Operations	2.9	-	- 2.9	*1*
TOTAL CORPORATE REVENUES	**273.8**	**272.0**	**- 1.8**	
EXPENDITURES ($M)				
CITY SERVICES				
Mayor and City Council				
Mayor's Office	0.4	0.4	-	
City Council	0.9	1.0	- 0.1	
City Manager's Office				
City Manager's Office	0.8	1.0	- 0.2	
Strategic Initiative and Engagement	2.3	2.0	0.3	
City Clerks	1.7	1.6	0.1	
Human Resources	0.9	0.6	0.3	
City Solicitor	1.5	1.6	- 0.1	
Corporate Services				
Administration	0.6	0.6	-	
Office of the City Treasurer	1.7	1.6	0.1	
Revenue	1.7	0.8	0.9	*2*
Corporate Information Technology	0.7	0.4	0.3	
Internal Audit	0.3	0.2	0.1	
Superior North EMS	13.4	12.7	0.7	*3*
Licensing and Enforcement	1.8	1.4	0.4	*4*
Supply Management	-	0.1	- 0.1	
Community Services				
Administration	0.4	0.4	-	
Central Support	0.8	0.7	0.1	
Child Care	1.4	1.1	0.3	
Facilities	-	-	-	
Fleet	0.2	-	0.2	
Recreation and Culture	16.1	17.0	- 0.9	*5*
Transit	15.8	15.8	-	*6*
Long Term Care and Senior Services	6.8	5.8	1.0	*7*
Infrastructure, Development, and Operations				
Administration (including Central Support)	0.6	0.8	- 0.2	
Engineering and Operations	0.4	0.2	0.2	
Capital Facilities Construction	0.2	-	0.2	
Roads	20.8	21.7	- 0.9	*8*
Parks	12.1	11.9	0.2	
Solid Waste	9.6	7.6	2.0	*9*
Thunder Bay Fire Rescue	36.9	37.8	- 0.9	*10*
Development Services	3.7	3.2	0.5	*11*
Corporation Expenditures Net of Corporate Revenues				
General Corporate Expenditure Net of General Revenues	8.0	11.0	- 3.0	*12*
SUBTOTAL CITY SERVICES	**162.5**	**161.0**	**1.5**	
LOCAL BOARDS AND AGENCIES				
The District of Thunder Bay Social Services Administration Board	17.7	17.7	-	
Thunder Bay District Health Unit	2.9	2.9	-	
Lakehead Region Conservation Authority	1.7	1.7	-	
Police Services Operations	57.2	56.9	0.3	*13*
Police Services Board	1.0	1.0	-	
Thunder Bay Public Library	6.9	6.9	-	
Community Economic Development Commission	3.2	3.2	-	
Business Improvement Areas	0.2	0.2	-	
Victoriaville Centre	0.3	0.3	-	
SUBTOTAL LOCAL BOARDS AND AGENCIES	**91.1**	**90.8**	**0.3**	
CAPITAL OUT OF REVENUE	**20.2**	**20.2**	**-**	
TOTAL EXPENDITURES	**273.8**	**272.0**	**1.8**	
FAVOURABLE/(UNFAVOURABLE)	**-**	**-**	**-**	

THE CORPORATION OF THE CITY OF THUNDER BAY
NON-CONSOLIDATED STATEMENT OF CONTINUITY OF RESERVES AND RESERVE FUNDS
Schedule 2
For the Year ended December 31, 2024

(Unaudited - Prepared by Management)

	Reserves & Reserve Funds Total	55+ Centre	55+ Centre Food Program	55+ Centre Southside	Boater Services Capital	Building Faster Fund	Building Permit	Canada Community Building Fund	Capital Arthur Street	Capital General	Capital Transit
Balance at beginning of year	**$ 236,955,445**	**1,656,277**	**16,954**	**147,417**	**424,805**	**-**	**2,921,499**	**14,430,607**	**104,632**	**16,221,891**	**5,888,507**
Revenue											
Interest earned	**7,979,831**	75,039	780	6,781	22,814	14,021	144,524	665,208	4,813	698,377	291,586
Contribution from revenue fund	**59,740,048**	-	-	-	180,289	609,623	440,666	6,950,705	-	1,497,200	900,643
Transfer from reserves and reserve funds	**3,474,703**	-	-	-	-		-		-	-	-
Transfer from Trust Fund	**10,290**	-	-	-	-	-	-	-	-	-	-
Contribution from capital fund	**4,810,583**	-	-	-	-	-	-	-	-	-	-
Contribution from developers	**113,933**	-	-	-	-		-	-	-	-	-
Total revenue	**76,129,388**	75,039	780	6,781	203,103	623,644	585,190	7,615,913	4,813	2,195,577	1,192,229
Expenditures											
Contribution to capital fund	**59,468,169**	-	-	-	38,009		-	6,889,840	-	2,076,774	-
Transfer to capital fund	**-**	-	-	-	-		-	-	-	-	-
Transfer to reserves and reserve funds	**3,474,703**	-	-	-	-		-	-	-	1,500,000	-
Contribution to revenue fund	**3,256,072**	50,000	-	-	-	-	-	-	-	-	-
Total expenditures	**66,198,944**	50,000	-	-	38,009	-	-	6,889,840	-	3,576,774	-
Balance at end of year	**$ 246,885,889**	**1,681,316**	**17,734**	**154,198**	**589,899**	**623,644**	**3,506,689**	**15,156,680**	**109,445**	**14,840,694**	**7,080,736**

THE CORPORATION OF THE CITY OF THUNDER BAY
NON-CONSOLIDATED STATEMENT OF CONTINUITY OF RESERVES AND RESERVE FUNDS
Schedule 2
For the Year ended December 31, 2024

(Unaudited - Prepared by Management)

	CEDC Project	Clean Green & Beautiful	Community Centres	Community Partnership	Corporate Energy Innovation	CIT	Dedicated Gas Tax	Digital Parcel Mapping	Fire Rescue Apparatus	Fire Training Centre
Balance at beginning of year	**760,722**	**1,088,056**	**37,681**	**1,691,413**	**728,244**	**2,685,982**	**5,652,922**	**11,823**	**510,033**	**34,555**
Revenue										
Interest earned	-	52,779	-	80,105	30,882	125,100	120,270	544	24,981	1,583
Contribution from revenue fund	200,000	220,800	-	100,000	42,511	1,146,281	1,439,172	-	72,536	
Transfer from reserves and reserve funds	-	-	-	-	-	-	-	-	-	-
Transfer from Trust Fund	-	-	-	-	-	-	-	-	-	-
Contribution from capital fund	-	-	-	-	-	-	-	-	-	-
Contribution from developers	-	-	-	-	-	-	-	-	-	-
Total revenue	200,000	273,579	-	180,105	73,393	1,271,381	1,559,442	544	97,517	1,583
Expenditures										
Contribution to capital fund	-	102,163	-	-	156,321	1,079,108	472,814	-	6,460	278
Transfer to capital fund	-	-	-	-	-	-	-	-	-	-
Transfer to reserves and reserve funds	-	-	37,681	-	-	-	-	-	-	-
Contribution to revenue fund	960,722	-	-	-	-	-	-	-	-	-
Total expenditures	960,722	102,163	37,681	-	156,321	1,079,108	472,814	-	6,460	278
Balance at end of year	**-**	**1,259,472**	**-**	**1,871,518**	**645,316**	**2,878,255**	**6,739,550**	**12,367**	**601,090**	**35,860**

THE CORPORATION OF THE CITY OF THUNDER BAY
NON-CONSOLIDATED STATEMENT OF CONTINUITY OF RESERVES AND RESERVE FUNDS
Schedule 2
For the Year ended December 31, 2024

(Unaudited - Prepared by Management)

	Ft William Stadium	Fuel Farm	Hillcourt Estates	Indoor Turf	McKellar Mall Capital	MTO Capital Transit	Municipal Accommodatior Tax	Ontario Community nfrastucture Fur	Ontario Municipal Cycling	Parking	Parkland Dedication	Pioneer Ridge Capital
Balance at beginning of year	**101,805**	**84,683**	**782,709**	**11,152,172**	**379,262**	**165,796**	**1,163,051**	**6,403,815**	**113,725**	**692,127**	**728,113**	**2,650,736**
Revenue												
Interest earned	-	3,665	36,005	569,105	18,711	7,627	53,221	285,333	5,231	38,019	36,114	127,184
Contribution from revenue fund	-	18,880	-	-	55,000	-	1,847,714	10,000,000	-	268,730	-	228,279
Transfer from reserves and reserve funds	-	-	-	2,669,300	-	-	-	-	-	-	-	-
Transfer from Trust Fund	-	-	-	-	-	-	-	-	-	-	-	-
Contribution from capital fund	-	-	-	-	-	-	-	-	-	-	-	-
Contribution from developers	-	-	-	-	-	-	-	-	-	-	113,933	-
Total revenue	-	22,545	36,005	3,238,405	73,711	7,627	1,900,935	10,285,333	5,231	306,749	150,047	355,463
Expenditures												
Contribution to capital fund	-	28,891	-	229,895	-	-	176,842	10,401,828	-		-	-
Transfer to capital fund	-	-	-	-	-	-		-	-	-	-	-
Transfer to reserves and reserve funds	101,805	-	-		-	-	1,169,300	-	-	-	-	-
Contribution to revenue fund	-	-	-	-	-	-	513,700	-	-	-	-	-
Total expenditures	101,805	28,891	-	229,895	-	-	1,859,842	10,401,828	-	-	-	-
Balance at end of year	**-**	**78,337**	**818,714**	**14,160,682**	**452,973**	**173,423**	**1,204,144**	**6,287,320**	**118,956**	**998,876**	**878,160**	**3,006,199**

THE CORPORATION OF THE CITY OF THUNDER BAY
NON-CONSOLIDATED STATEMENT OF CONTINUITY OF RESERVES AND RESERVE FUNDS
Schedule 2
For the Year ended December 31, 2024

(Unaudited - Prepared by Management)

	Police Capital Projects	PRO Kids	Post Retirement Benefits	Recreation & Culture Capital	Recreation Trails	Renew Thunder Bay	Sick Pay Liability	Simpson Street BIA	Solid Waste Landfill	SNEMS Capital	TBCA	Tournament Centre
Balance at beginning of year	**14,417**	**1,072,838**	**5,708,508**	**-**	**43,592**	**27,247,597**	**2,174,813**	**20,597**	**3,289,840**	**1,592,248**	**102,000**	**282,000**
Revenue												
Interest earned	663	51,532	262,591	7,573	2,005	1,244,413	100,041	947	136,905	80,257	8,142	8,606
Contribution from revenue fund	-	110,481	-	40,000	39,500	530,871	-	-	1,492,925	1,230,500	150,000	50,000
Transfer from reserves and reserve funds	-	-	-	139,486	-	-	-	-	-	665,917	-	-
Transfer from Trust Fund	-	-	-	10,290	-	-	-	-	-	-	-	-
Contribution from capital fund	-	-	-	-	-	-	-	-	-	-	-	-
Contribution from developers	-	-	-	-	-	-	-	-	-	-	-	-
Total revenue	663	162,013	262,591	197,349	41,505	1,775,284	100,041	947	1,629,830	1,976,674	158,142	58,606
Expenditures												
Contribution to capital fund	-	-	-		39,500	921,139	-	-	2,120,237	1,591,488	-	19,681
Transfer to capital fund	-	-	-		-	-	-	-	-	-	-	-
Transfer to reserves and reserve funds	-	-	-		-	-	-	-	-	-	-	-
Contribution to revenue fund	-	15,645	-		-	-	-	-	-	-	-	220,125
Total expenditures	-	15,645	-	-	39,500	921,139	-	-	2,120,237	1,591,488	-	239,806
Balance at end of year	**15,080**	**1,219,206**	**5,971,099**	**197,349**	**45,597**	**28,101,742**	**2,274,854**	**21,544**	**2,799,433**	**1,977,434**	**260,142**	**100,800**

THE CORPORATION OF THE CITY OF THUNDER BAY
NON-CONSOLIDATED STATEMENT OF CONTINUITY OF RESERVES AND RESERVE FUNDS
Schedule 2
For the Year ended December 31, 2024

(Unaudited - Prepared by Management)

	Vested Property	Victoriaville Capital	Wastewater	Waterfront Capital	Waterworks	Whalen Building	WSIB	Reserve Funds Total
Balance at beginning of year	**5,369,505**	**72,172**	**24,449,158**	**223,615**	**22,158,493**	**1,894,907**	**2,286,228**	**177,434,542**
Revenue								
Interest earned	253,245	3,320	1,055,042	10,861	1,017,888	94,142	101,256	**7,979,831**
Contribution from revenue fund	271,635	-	5,483,578	25,000	7,764,547	329,857	250,000	**43,987,923**
Transfer from reserves and reserve funds	-	-	-	-	-	-	-	**3,474,703**
Transfer from Trust Fund	-	-	-	-	-	-	-	**10,290**
Contribution from capital fund	-	-	1,187,013	-	3,623,570	-	-	**4,810,583**
Contribution from developers	-	-	-	-	-	-	-	**113,933**
Total revenue	524,880	3,320	7,725,633	35,861	12,406,005	423,999	351,256	**60,377,263**
Expenditures								
Contribution to capital fund	-	-	9,697,515	-	11,449,083	26,521		**47,524,387**
Transfer to capital fund	-	-	-	-	-	-	-	**-**
Transfer to reserves and reserve funds	-	-	-	-	-	-	-	**2,808,786**
Contribution to revenue fund	-	-	-	-	-	-	420,000	**2,180,192**
Total expenditures	-	-	9,697,515	-	11,449,083	26,521	420,000	**52,513,365**
Balance at end of year	**5,894,385**	**75,492**	**22,477,276**	**259,476**	**23,115,415**	**2,292,385**	**2,217,484**	**185,298,440**

THE CORPORATION OF THE CITY OF THUNDER BAY
NON-CONSOLIDATED STATEMENT OF CONTINUITY OF RESERVES AND RESERVE FUNDS
Schedule 2
For the Year ended December 31, 2024

(Unaudited - Prepared by Management)

	Animal Control Donations	Capital Expenditure	Election	Event Hosting	Fleet & Equipment Replacement	Insurance	Legal Fees	Stabilization	Tax Assessment Appeals	Winter Control Roads	Working Capital	Reserves Total
Balance at beginning of year	**169,704**	**26,353,684**	**272,350**	**960,124**	**958,179**	**2,120,769**	**3,001,463**	**12,204,825**	**7,003,892**	**2,175,913**	**4,300,000**	**59,520,903**
Revenue												
Interest earned	-	-	-	-	-	-	-	-	-	-	-	**-**
Contribution from revenue fund	-	12,922,505	150,000	156,554	92,193	-	237,819	288,552	-	1,904,502	-	**15,752,125**
Transfer from reserves and reserve funds	-	-	-	-	-	-	-	-	-	-	-	**-**
Transfer from Trust Fund												
Contribution from capital fund	-	-	-	-	-	-	-	-	-	-	-	**-**
Contribution from developers	-	-	-	-	-	-	-	-	-	-	-	**-**
Total revenue	-	12,922,505	150,000	156,554	92,193	-	237,819	288,552	-	1,904,502	-	**15,752,125**
Expenditures												
Contribution to capital fund	-	10,520,722	-	-	748,060	-	-	675,000	-	-	-	**11,943,782**
Transfer to capital fund	-	-	-	-	-	-	-	-	-	-	-	**-**
Transfer to reserves and reserve funds	-	-	-	-	-	665,917	-	-	-	-	-	**665,917**
Contribution to revenue fund	-	-	-	960,077	-	-	-	115,803	-	-	-	**1,075,880**
Total expenditures	-	10,520,722	-	960,077	748,060	665,917	-	790,803	-	-	-	**13,685,579**
Balance at end of year	**169,704**	**28,755,467**	**422,350**	**156,601**	**302,312**	**1,454,852**	**3,239,282**	**11,702,574**	**7,003,892**	**4,080,415**	**4,300,000**	**61,587,449**

CITY OF Thunder Bay
Superior by Nature

Corporate Report

REPORT NUMBER	169-2025-Infrastructure & Operations-Engineering		
DATE PREPARED	May 12, 2025	***FILE***	0289.044
MEETING DATE	July 14, 2025		
SUBJECT	Northwest Arterial – Environmental Study Report Addendum		

RECOMMENDATION

For information only.

LINK TO STRATEGIC PLAN

This Report directly supports the 'Safety and Well-being' pillar of the 2023-2027 Corporate Strategic Plan by providing safe and accessible road designs.

It also aligns with the 'Growth' pillar by supporting the development of new housing supply options and encouraging urban intensification. Additionally, the report promotes walkable community through the introduction of new active transportation links.

This Report also supports the 'Sustainability' pillar of the plan by promoting environmentally friendly designs, such as green infrastructure into the project.

EXECUTIVE SUMMARY

The Northwest Arterial (NWA) was first proposed in the City's 1987 Transportation Study to address road network and traffic issues in the northwest part of the City and to integrate the City's traffic network with the Ministry of Transportation's proposed Thunder Bay Expressway improvements. A Class Environmental Study Report (ESR) was completed in 1989, followed by an Addendum in 1992 to review specific concerns and new information. The recommendation from these studies was the NWA roadway with a preferred alignment connecting Golf Links Road to Dawson Road.

Significant time has passed since these reports were filed, and an updated Addendum is now required under the Municipal Class Environmental Assessment (MCEA) process. This addendum is necessary to update the prior studies to reflect current planning, environmental conditions, land use, and community needs.

The updated Addendum confirms the original preferred alignment with several design improvements to enhance safety and support active transportation. Key updates include reduced speed limits, sidewalks, multi-use trails, and improved intersection spacing.

As required by the MCEA process, the Addendum Report is now ready to be filed with the City Clerk. It will be available for public review and comment for 30 days following the publication of the Notice of Addendum.

DISCUSSION

The Northwest Arterial (NWA) was first recommended in the City's 1987 Transportation Study to help address road network concerns in the northwest portion of the City and to integrate the City's traffic network with the Ministry of Transportation's proposed Thunder Bay Expressway improvements. A Class Environmental Study Report (ESR) was completed in 1989. This report outlined the planning process and established the NWA as the preferred alternative to address these issues. In 1992, an Addendum was issued to address specific areas of the original ESR that required further study and to consider new information before moving forward with the design. The conclusion of this Addendum maintained the original recommendation of the proposed NWA and preferred alignment.

A significant amount of time has lapsed without this project being implemented. As a result, another update (Addendum) to the original ESR is required. This update reviews the planning, design, and environmental conditions of the area and follows the process outlined in the Municipal Class Environmental Assessment (MCEA).

The purpose of the Addendum is to review the preferred alignment of the NWA Road and update the study to reflect current environmental conditions and new legislation. The review included looking at:

- Natural and Cultural Heritage
- Ecology
- Adjacent Land uses
- Road Corridor and Geometrics
- Transportation
- Future Growth
- Stormwater Management
- Noise
- Climate Change and Air Quality
- Construction Staging

Public Consultation and Engagement

As part of the study, the City consulted with property owners, utilities, agencies, and Indigenous communities. A public open house was held in December 2024 to share information about the project and gather public input. Meetings were also conducted with adjacent community members and relevant agencies. In addition, members of Indigenous communities were consulted and involved in the field investigations of the study area. Following the public open house, presentation materials were made available on the City's Get Involved webpage for further public review and comment.

Preferred Solution

The preferred solution presented in the 1989 ESR and 1992 Addendum is still recommended, with some updates to improve safety of the roadway and promote active transportation (walking and cycling). The changes to the original NWA design are summarized below:

- Urban arterial cross-section
- Road right of way width of 30 to 40 metres
- Four travel lanes with curb and gutter
- Posted speed limits of 50 km/hr and 60 km/hr
- Sidewalk and Multi-use trail

The alignment of the NWA remained the same from the prior studies, with the exception of a change between Pioneer Drive and Paquette Road. A shift in the roadway alignment at this location was necessary to improve intersection spacing along the NWA to meet current design standards. See Attachment A for the recommended alignment.

The intersections at Pioneer Drive, Hutton Park Drive and John Street Road will have access to the NWA and be controlled using traffic signals, roundabouts, or stop signs. The final type of intersection control will be decided during the detailed design stage. There is also the opportunity for additional intersections to support new development and growth in the area. These growth areas are located between Pioneer Drive and Dawson Road, and between the McIntyre River and Highway 11 /17.

To ensure adequate spacing between intersections, the approaches of Piccard Avenue and Biloski Road will be closed to the NWA. As a result, a new secondary access road to the Cherry Ridge Subdivision is proposed under this project.

A new bridge across the McIntyre River is also required. The two options for the new bridge include a single-span or multi-span bridge. The final bridge design and profile will be further studied in the detail design phase.

Next Steps

As required by the MCEA process, the Addendum Report is now ready to be filed with the City Clerk. It will be available for public review and comment for 30 days following

the publication of the Notice of Addendum. A copy of the report will also be provided to City Council under separate cover. Following the 30-day public review period, all comments received will be reviewed and addressed. If necessary, clarifications or minor updates may be made to the Final Addendum Environmental Study Report. If no requests for an order under Section 16 of the Environmental Assessment Act are submitted, the project may proceed to implementation.

LINK TO EARTHCARE SUSTAINABILITY PLAN

This Report aligns with the 2014-2020 EarthCare Sustainability Plan, which outlines the steps Thunder Bay must take to reduce greenhouse gas emissions and become a more resilient, sustainable community. The NWA roadway supports several objectives and actions including, growth, minimizing urban sprawl, active transportation, and protecting waterways.

FINANCIAL IMPLICATION

The construction of the NWA road and connection to the existing road network, including the future connection to the Thunder Bay Expressway (Highway 11/17), is to be completed in stages. The estimated costs for construction of the NWA is $33,350,000.

CONCLUSION

It is concluded that the Addendum Report to the Environmental Study Report for the proposed NWA, located between Golf Links Road and Dawson Road, is complete and is to be filed with the City Clerk for public review, in accordance with the MCEA.

BACKGROUND

The 1987 City of Thunder Bay Transportation Study recommended consideration of a Northwest Arterial Roadway as a new corridor to connect Dawson Road (formerly Highway 102) and Golf Links Road.

At a Special Committee of the Whole Meeting on April 16, 1991 under Report 22/91 and Report 460/90 (Engineering), City Council approved the recommended route for the proposed Northwest Arterial alignment designated as A-1 and the Environmental Study Report.

December 6, 1999 Committee of the Whole Meeting under Report 1999.283 (Transportation and Works), City Council approved the Northwest Arterial Roadway be

included in the City's long term transportation plan, and that land acquisition for the required right-of-way proceed.

October 7, 2019 Committee of the Whole Meeting under Report 116/2019 (Infrastructure and Operations – Engineering and Operations), City Council approved the Transportation Master Plan which include the Northwest Arterial Roadway.

REFERENCE MATERIAL ATTACHED

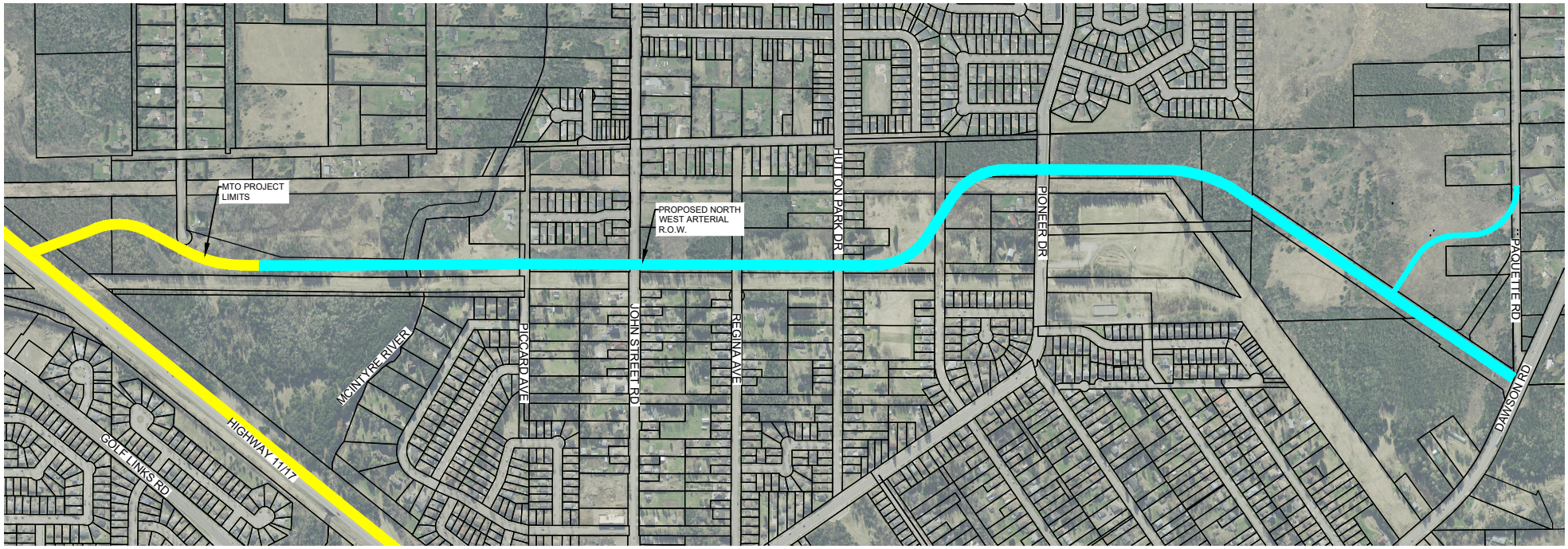
Attachment A – Northwest Arterial Roadway Plan

REPORT PREPARED BY

Matthew Miedema, P. Eng, Director Engineering Division

REPORT SIGNED AND VERIFIED BY

Kayla Dixon - Commissioner Infrastructure & Operations
07/07/2025 (MM/DD/YEAR)



BURNSIDE

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telephone 1-800-265-9662

Client

CITY OF THUNDER BAY

Drawing Title

NORTHWEST ARTERIAL
Municipal Class EA Amendment
PLAN MAP OF PROPOSED R.O.W. LOCATION

Drawn	Checked	Date	Drawing No.
MZ	DD	25/05/16	P-1
Scale		Project No.	
N.T.S.		300058128	

File: U:\058128\0000\03-PRD\058128 - 8.5x11 Map Figure.dwg Date Plotted: May 16, 2025 - 4:28 PM

CITY OF Thunder Bay
Superior by Nature

Infrastructure & Operations Department **Memorandum**

TO:	Krista Power, Director – Legislative Services & City Clerk	**FILE:**
FROM:	Matthew Miedema, Director - Engineering	
DATE:	May 12, 2025	
SUBJECT:	Northwest Arterial Update – Request to Present Information	
MEETING & DATE:	Committee of the Whole – July 14, 2025	

Please accept this memo requesting an opportunity for Administration and its consultant, RJ Burnside, to provide a presentation to Committee of the Whole on July 14, 2025 on the Northwest Arterial project, relative to Report 169-2025 – Infrastructure & Operations-Engineering.

CITY OF Thunder Bay
Superior by Nature

Corporate Report

REPORT NUMBER	219-2025-Infrastructure & Operations-Engineering	
DATE PREPARED	June 13, 2025	***FILE***
MEETING DATE	July 14, 2025	
SUBJECT	Application to NOHFC for Delaney Arena Improvements	

RECOMMENDATION

WITH RESPECT to Report 219-2025-Infrastructure & Operations-Engineering, we recommend that Administration submit a Stage 2 application for funding to the Northern Ontario Heritage Fund Community Enhancement Program for Delaney Arena Improvements;

AND THAT the City be responsible for mitigating funding shortfalls related to this project;

AND THAT the Manager, Capital Facility Construction be identified as the signing authority for the application;

AND THAT any necessary by-laws be presented to City Council for ratification.

EXECUTIVE SUMMARY

Capital Facility Construction submitted a Stage 1 application to the Northern Ontario Heritage Fund (NOHFC) Community Enhancement Program for funding to support existing work and complete additional renovations at Delaney Arena.

Administration has been informed that the Stage 1 application has been approved by the funder and the City has been invited to submit a Stage 2 application. A Council Resolution is required to complete submission of the Stage 2 application.

The planned improvements will facilitate renovations not otherwise funded in capital plans, replace equipment already at or near end of life and move the City closer to its Net Zero goals, in addition to providing functional enhancements for user groups and spectators.

DISCUSSION

In the 2025 Capital budget, a project to replace the failing cold brine slab and dasher boards at Delaney Arena was approved, and Administration began detailed design and tendering in order to have the work completed in the off-ice season (spring/summer 2025). Prior to awarding the work, an opportunity arose to apply for additional funding to support this project as well as other additional needed capital improvements at Delaney Arena, including:

- Upgrading the brine chiller system and components that are at end of life; this upgrade, combined with previous upgrades, will fully renew the ice plant at Delaney for a life cycle;
- Installing a new power feed for an electric ice resurfacer to be brought forward in the 2026 capital budget;
- Upgrading rink lighting to high efficiency LED high bay lights;
- Renewing the existing viewing stands to bring them to current code and accessibility standards, as well as provide spectator radiant heating units;
- Improving front entrance egress and mitigating seasonal flooding issues;
- Renewing skate flooring throughout the facility and lobby;
- Replacing the existing scoreboard and controller.

FINANCIAL IMPLICATION

The total anticipated project cost of these infrastructure improvements is $4,631,700 including contingency. The following funding sources are identified:

- NOHFC - $2,000,000 (pending approval)
- City of Thunder Bay - $2,631,700

The City's contribution is currently funded through the 2025 capital budget and is already approved. The project estimate includes HST and has contingencies built in to support cost overruns. If the NOHFC application is not successful, or if there are project overruns, Budget Appropriation(s) will be required in accordance with the Budget Policy. In addition, planned work can also be deferred to future capital years.

CONCLUSION

It is concluded that Administration has been successful in a Stage 1 application to the Northern Ontario Heritage Fund's Community Enhancement Program for Delaney Arena Improvements. It is further concluded that City Council should adopt a resolution to allow Administration to submit a Stage 2 application for funding.

BACKGROUND

In 2022, operators at Delaney Arena began to notice an increased failure rate in the floor chilling system, and a number of times the city had to temporarily shut down the rink to make emergency repairs to the brine chiller pipes in the slab. The same issues continued to plague the rink operation in 2023. In 2024, the city commissioned a study to determine what, if anything, could be done to reduce the number of failures that had occurred. It was determined through that study that the piping in the cold slab was failing and the recommendation was to replace the slab completely. As the original dasher board system was integrally poured into the cold slab, that system should also be replaced concurrently.

As a result of this determination, costs for a replacement plan were brought forward in the 2025 capital budget and subsequently approved. Over the summer of 2024, 22 repairs to the piping were made and the rink was put back into use for the fall season. In order to reduce the load on the ice plant, older children and adults were accommodated at other rinks and the hours were reduced for the 2024-25 operating season.

Work to replace the slab and dasher boards is currently ongoing with completion slated for the start of the 2025/26 ice season.

REFERENCE MATERIAL ATTACHED

None.

REPORT PREPARED BY

Kelvin Jankowski, Manager-Capital Facility Construction

REPORT SIGNED AND VERIFIED BY

Kayla Dixon, Commissioner – Infrastructure & Operations

07/07/2025 (MM/DD/YEAR)

CITY OF Thunder Bay
Superior by Nature

Corporate Report

REPORT NUMBER	234-2025-Infrastructure & Operations-Environment	
DATE PREPARED	June 2, 2025	***FILE***
MEETING DATE	July 14, 2025	
SUBJECT	Automated Meter Reading - Business Case Study	

RECOMMENDATION

WITH RESPECT to Report 234-2025-Infrastructure & Operations-Environment we recommend the implementation of Advanced Metering Infrastructure (AMI) technology to automate the water meter reading system;

AND THAT the project costs be included in the 2026-2028 Waterworks and Wastewater rate-supported capital budgets;

AND THAT the City Manager be authorized to sign any necessary agreements related to this Report;

AND THAT any necessary by-laws be presented to City Council for ratification.

LINK TO STRATEGIC PLAN

This report directly supports the ‘Growth’ section of the Maamawe, Growing Together City of Thunder Bay Strategic Plan 2023 – 2027. This section of the Plan identifies the goal to implement better ways of serving the public that focus on continuous improvement and delivering positive outcomes for the City. As well this report supports the ‘Prosperity and Sustainability’ section, to deliver customer-centered, digitally powered City services as indicated in the Digital Strategy.

EXECUTIVE SUMMARY

A business case study for the implementation of Automated Meter Reading for the City’s water system was conducted as recommended by the Grant Thornton Program Service Review in December 2020. The study results indicate positive improvements in the areas of customer service, revenue protection, and operational efficiency while providing a positive return on the City’s investment with the implementation of an

Advanced Metering Infrastructure (AMI) system, which is a form of automated water meter reading.

Therefore, it is recommended that the costs for the AMI project be included in the upcoming capital budget process.

DISCUSSION

The City of Thunder Bay provides drinking water and wastewater services to the community through a network that includes more than 38,000 water meters. These water meters provide the primary billing input that allows the City to determine volumetric charges for both water and wastewater services.

To determine the best approach to optimizing the water metering system, three new scenarios were evaluated. The options reviewed included a new AMR system, a city-owned radio-based AMI system, and a cellular based AMI system, in addition to continuing with the existing approach (gradual replacement of manual read meters). It was determined through a consultant assignment and extensive consultations with the City's subject matter experts that implementation of a city-owned AMI system will provide the greatest benefits to customer service, revenue protection, and operational efficiency, while providing a strong rate of return to the City.

Advanced Metering Infrastructure is a green approach which includes a network of devices that transmit readings remotely to a central system owned by the City. This system automatically collects data, reduces meter reading costs, improves customer service, and reduces the health and safety risk associated with traveling through the city to read meters.

Results of Business Case Study

<u>Customer Service Benefits</u>

Transitioning to AMI provides significant improvements to customer service delivery. AMI improves billing accuracy as it eliminates the need for estimated bills. This enhances customer satisfaction as it reduces inaccurate or delayed readings caused by inaccessible or malfunctioning meters.

AMI allows for early identification of leaks allowing customers to address leaks that might go undetected for weeks or months and would otherwise result in a high water and wastewater bill. Under an AMI system all water meters communicate their hourly readings each day, empowering customers and city staff with greater visibility to detect leaks and unusual consumption including early customer warnings, promoting water conservation and cost savings.

Many AMI systems provide online customer portals where residents can view their

water usage patterns. Customers are better able to understand their consumption patterns, identify unusual usage, and take steps to reduce usage and associated costs.

Meter Age

Mechanical water meters, such as those currently in use by the City of Thunder Bay, degrade over time, resulting in under-registration and under-billing of water consumed. The average age of meters in the City's water system is 23.5 years, with more than 4,700 meters over 40 years old. Industry practice is to replace meters when they reach 15 to 20 years of age to maintain accuracy and reduce the risk of meter failure.

A conservative estimate of meter accuracy reveals the City's Water Authority is losing $1.5 million per year in combined water and wastewater volumetric charges. This value increases with every year that the mechanical meters are left in service. Replacing these meters with non-mechanical meters that do not lose accuracy over time will protect the water and wastewater revenues over their expected twenty-year lifecycle. The revenue loss calculation is based on a meter accuracy decline of approximately 5% on average, which could be the expected annual increase for customers' water bills. The average result is an increase around $0.11 per day for a customer.

Furthermore, meters purchased prior to 2002 were manufactured with bronze alloy that contained 5% to 7% lead. The city's water system still includes 20,459 of these meter types that need to be prioritized to be removed from service.

Meter Reading

All of the City's meters are installed indoors with only 21% equipped with remote receptacles that enable them to be read without entering the premises. As a result, customers are largely responsible for submitting their own meter readings. Of the 150,000 quarterly bills issued in 2023, only 18% were generated based on a City-captured actual reading of the meter. It is industry practice to strive to capture actual readings for nearly 100% of all meters.

The fact that meters are largely read by customers adds a service burden to those customers, especially those who may have difficulty accessing the meter. In addition, without the ability to read the meters, the City is unable to confirm that the meter has been read correctly.

The automation of meter reading will allow the reduction in workforce for manual meter reading work, resulting in three (3) fewer FTEs in that function.

Of the 56 cities in Canada with populations of 100,000 or greater, only Thunder Bay and Winnipeg continue to install direct-reading meters in basement settings. Currently, the City of Winnipeg is developing a procurement to change this practice and move to an AMI system.

Facilitation of Monthly Billing

Many water utilities make the decision to move to monthly billing as this practice helps households manage their expenses more effectively. Smaller, more frequent bills are easier for most customers to budget and pay for than larger, quarterly bills, which may cause financial strain. Furthermore, unusual consumption patterns which could indicate leaks are identified sooner allowing the City and its customers to address leaks quickly, preventing wasted water and higher bills.

While a decision to move from quarterly to monthly billing will be made independent of the decision to implement AMI, by implementing an AMI system the City of Thunder Bay will have the ability to facilitate this change.

System Efficiency and Rate Stability

In 2023, the Bare Point Water Treatment Plant produced, treated, and pumped 16.1 million cubic meters of water, of which only a portion was billed to customers. The unbilled volume, referred to as Non-Revenue Water (NRW), includes a mix of real losses (such as leaks within the distribution system), apparent losses (such as meter inaccuracy), and authorized unbilled consumption - including water quality maintenance, fire suppression and existing community agreements.

Reducing the share of NRW arising from leaks and meter inaccuracies will enhance operational efficiency and help moderate future rate pressures. Implementing AMI will advance this goal by supplying accurate, near-real-time usage data. With that data, staff can locate and repair leaks more quickly, correct metering inaccuracies, and better distinguish among the various categories of unbilled water. These improvements will protect revenue, avoid unnecessary treatment and pumping costs, and contribute to long-term rate stability.

Project Costs and Net Present Value Analysis

The total capital cost of an Advanced Metering Infrastructure deployment is expected to be just under $23 million, which includes approximately $2 million in contingency to address unexpected costs for system hardware and installation. This investment is expected to yield a simple payback of 12.3 years, which is well within the expected 20-year life of the system with a net present value more than $3.4 million. In comparison, should the City opt to replace its meters over a 20-year period without improving its meter reading technology the capital cost is estimated to be $12 million, but the long-term financial benefit would be much smaller, with a net present value of only $856 thousand. This approach would also limit customer service improvements and require more staff to support monthly billing.

Environmental

Water production, treatment, and distribution is a very energy-intensive activity, representing 33% of the City of Thunder Bay's consumption of natural gas and 53% of its electricity consumption in 2023. The reduction of Non-Revenue Water will result directly in energy savings.

Reducing energy consumption has follow-on benefits of reducing greenhouse gas emissions (GHG). The result of this energy consumption is an estimated production of 4,135 tonnes of CO_2 representing 38% of the City of Thunder Bay's total greenhouse gas (GHG) emissions[1]. For every 1 million cubic meters of water produced and treated by the City, almost 257[2] tonnes of GHG are generated.

Reducing water loss effectively adds capacity to the Bare Point Water Treatment Plant capabilities by freeing up existing production capacity, which could delay the need for major capital investments to support anticipated future growth and water consumption demands of the community.

FINANCIAL IMPLICATION

The financial impact of the AMI project to the Water and Wastewater Financial Plans was evaluated. Results indicate that the project can be implemented over the course of the next four years without changing the current approved water rates. The analysis considered the recovery of lost revenue once the project is completed, the reduction in resources required for meter reading and the increase in purchased services for software and network maintenance. Key financial metrics include:

Financial Metric	Value
Capital Costs	$22,954,033
Operating Savings (annual)	$2,090,954
Net Present Value (over 20 years)	$3,451,249
Simple Payback	12.3 years

The capital costs of the project will be split between the water and wastewater rate-supported capital programs from 2026 to 2028.

[1] City of Thunder Bay, "Energy Conservation & Demand Management Plan 2024", www.thunderbay.ca/en/city-hall/resources/Energy-Management/Thunder-Bay_ECDM-Report-Final_2024.06.19-signed.pdf, accessed October 15, 2024, pp. 14 & 17.
[2] Calculated based on 4,135 tonnes of GHG generated in the production of 16.1 million m^3 of water in 2023.

LINK TO THUNDER BAY CORPORATE STRATEGIES

The AMI project aligns with the City of Thunder Bay's existing strategic initiatives and directly supports the City of Thunder Bay Digital Strategy and Climate-Forward City: Thunder Bay Net-Zero Strategy.

CONCLUSION

It is concluded that the implementation of an AMI system will enhance customer service, provide revenue protection, and increase operational efficiency. The project will remove the burden of reading meters from customers, improve their access to information on water use, and empower them to manage their water and wastewater bills. Replacement of aging, inaccurate meters is expected to enhance revenue by $1.5 million per year over the 20-year expected life of the system. The resulting reduction in Non-Revenue Water and manual meter reading costs will improve the City's efficiency in providing essential water services.

BACKGROUND

In 2020, Grant Thornton City Program and Service Review identified Automated Meter Reading to be installed to achieve efficiencies in water meter reading and revenue recovery.

REFERENCE MATERIAL ATTACHED

Appendix A – Business Case for AMI/AMR Implementation – Findings and Recommendations Report, November 26, 2024.

REPORT PREPARED BY

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REPORT SIGNED AND VERIFIED BY

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07/03/2025 (MM/DD/YEAR)

City of Thunder Bay

Business Case for AMI/AMR Implementation

Findings and Recommendations Report

November 26, 2024

Diameter Services

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ACRONYMS AND TERMS

Exhibit 1: Summary of Acronyms and Terms

Term	Abbreviation	Definition
Absolute Encoder		A type of water meter register where the remote and visual reading are referenced from the same source. This ensures that the remote and visual readings will be synchronized.
Acoustic Leak Detection	ALD	Sensors that can be deployed throughout a water distribution network to listen for and create acoustic profiles that identify leak conditions. These sensors are physically attached (using ties or magnets) to water mains, valves, or hydrants. Typically, these sensors measure the amplitude and pitch of the sound in a pipe and compare these measurements to known profiles to identify anomalies. Sometimes called Leak Loggers.
Advanced Metering Infrastructure	AMI	A system that employs a network of collectors, permanently mounted throughout the service area to capture meter readings that are transmitted by radio frequency. Generally, hourly meter readings are captured daily using an AMI system.
Alert		An indication from a system that an anomaly has been detected. Alerts may be visual or audible, and may initiate automatic notifications such as pager, text, or email messages.
American National Standards Institute	ANSI	A private organization that develops and administers standards for various industries, including the allowable level of lead in drinking water infrastructure.
American Water Works Association	AWWA	An international non-profit, scientific and educational association founded to improve water quality and supply. The parent AWWA is managed by geographic “sections” including Ontario Section and Western Canada Section.
Application Program Interface	API	A set of routines, protocols, and tools for building software applications. APIs specify how software components should interact and enable easier integration or linkage between different software components.

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Term	Abbreviation	Definition
Automatic Meter Reading	AMR	A system that uses meter readers who walk or drive through neighborhoods to capture meter readings via radio frequency transmissions from meters that are assigned to meter reading routes. Generally, meter readings are captured on a monthly, bi-monthly, or quarterly basis using mobile AMR.
Backflow		The reversal of water flow in which water or other substances from a residential, industrial, or institutional piping system flows back into the water distribution system.
Bring Your Own Device	BYOD	The practice of allowing the employees of an organization to use their own computers, smartphones, or other devices for work purposes. In the utility context this may also include the practice of using a single smart device for multiple applications including meter reading.
Building Control Valve	BCV	A water shut-off valve installed before the meter so the water entering the building can be shut-off.
Change-out	C/O	Used in connection with either a large or small meter change-out/replacement.
Customer Information System	CIS	The Utility's system, whether on-premises or cloud-based, to manage information relating to its customer base. Typically, the CIS includes the ability to calculate customer bills.
Customer Portal		A web browser and/or mobile application that provides access to customer-specific water usage and other related data. Some portals provide functionality such as bill payments, alert settings, notifications, and usage profiling. Also called a Web Portal.
Cut-In	C/I	Where a meter has never been installed and the plumbing requires modification to allow for the installation of a water meter.
Cybersecurity		Measures implemented to protect an information management system and network from unauthorized access, damage, or attack. Common examples include password protected computers, encryption, and use of anti-virus software.
Dashboard		A visual summary of key data points provided on a single screen enabling users to view key metrics at a glance.

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Term	Abbreviation	Definition
Data Collectors		A range of mobile or fixed devices capable of receiving and storing meter reading and other remotely transmitted data. Includes Handhelds, Gateways, Collectors.
Distribution system		Networks of storage tanks, valves, pumps, and pipes that transport finished water to customer connections.
District Metered Areas	DMA	A discrete part of a water distribution network. Water flowing in and out of the DMA is strictly controlled and metered to calculate a system balance and determine water loss.
Electromagnetic Flow Meter (aka Mag Meter)		Non-mechanical water meters that use electronics to generate a magnetic field inside a pipe. Electromagnetic water meters measure the voltage induced due to movement of water through a magnetic field. The amount of voltage induced is proportional to the velocity of the water.
Federal Communications Commission	FCC	US Federal agency responsible for regulating telecommunications including radio frequency systems.
Fire Service	FS	A category of water meters designed to measure water flow for both domestic use and fire protection systems. Fire service meters can utilize turbine, compound, or ultrasonic metering technologies.
Fixed Network	FN	See AMI definition.
Geospatial Information System	GIS	A system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. Also called Geographic Information System.
Global Positioning System	GPS	A satellite-based system that enables two- or three-dimensional positioning of objects on a map. GPS Coordinates enable location represented by Latitude, Longitude and optionally Elevation.
Green House Gas	GHG	The primary greenhouse gases in Earth's atmosphere are water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3). We tend to focus on the harmful types of Green House Gases – primarily CO_2.
Handheld		A portable computing device used by field service personnel to capture meter reading and other data.

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Term	Abbreviation	Definition
Head End System	HES	The system that receives data from Data Collectors. Manages the data and sends it to other systems such as the CIS.
Hydraulic Modelling		A process in which a water distribution system is modeled using physical attributes and equations. The model projects key parameters including the flow rate, pressure, and capacity of the system.
Industrial, Commercial & Institutional	ICI	A type of water consumer, who typically uses large volumes of water for non-residential purposes such as businesses, schools, hospitals, and factories.
Information Management		The processes involved in the collection, storage, access, and visualization of information. In the context of an SRS, information includes the raw data generated by SRS surveillance components, alerts generated by the components, ancillary information used to support data analysis or alert investigations, details entered during alert investigations, and documentation of Water Contamination Response activities.
Intermediate Meter	IM	Water meters with sizes of 1.5” and 2”.
Large Meter	LM	Water meters with sizes of 3” and larger.
Latency		The amount of time that is added into a process based on delays in gathering information. For example, when meters are read monthly in a mobile AMR system, there is a latency of about 30 days in capturing the meter readings.
Lead Service Line	LSL	Water services that use lead piping to deliver water. Often broken into distribution-side and customer-side depending on whether the lead piping is the responsibility of the utility or the consumer.
Managed Services		The practice of outsourcing day-to-day business functions as a method of improving operational efficiency and reducing operational costs.
Mechanical Meter		Any meter that converts the mechanical force of water into a rotation of a measuring element that is calibrated to determine water volume. Examples include positive displacement, turbine, propeller, or compound types of flow meters.

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Term	Abbreviation	Definition
Meter Data Management	MDM	A software system that performs long-term data storage and management for the vast quantities of data delivered by smart metering systems.
Meter Installation Software	MIS	Software that captures the details of the installation including meter serial #, transmitter identification #, account information of where the equipment was installed.
Net Present Value	NPV	Calculation of the value of an investment throughout its lifetime, discounted to today's dollars.
Network		The collection of devices deployed throughout the service area to collect data from transmitters.
Network-as-a-Service	NaaS	A method of AMI system deployment and management that enables the user to access the network via a subscription.
Non-Revenue Water	NRW	Water that is pumped into a distribution system, but not billed to its intended user. The Water Audit table below identifies the sources of Non-Revenue Water.
On-Demand Reading		A request by a data consumer to capture a current meter reading for a given water meter.
One-way communications		A communications path that only allows the flow of data in one direction. Also referred to as unidirectional or simplex communications.
Open Standard Communications Network		Provides an open architecture concept which expands the market of wireless devices that can operate over an AMI communication network. Examples of Open Standard Networks include LoRaWAN, Wi-SUN and Narrowband IoT. These networks are becoming increasingly common with lower energy requirements and increased coverage.
Positive Displacement	PD	A classification of mechanical meters including nutating disc and oscillating piston designs that measure water usage by capturing a specific volume of water and then counting the number of times the volume is filled and emptied.
Public Sector Accounting Board	PSAB	Established accounting standards for the public sector in order to report on the financial condition of various asset classes, including drinking water infrastructure.

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Term	Abbreviation	Definition
Propagation Study		A map that is used to estimate the number and optimal locations of collectors required to provide network coverage for a given service area. The study will normally account for topography, density of transmitters, collector height, RF signal strength, clutter (such as buildings or trees) and other factors that can affect RF transmissions. Also called a “Prop Study”.
Radio Frequency	RF	Certain electromagnetic wave frequencies that may be used as a form of communication between two or more devices. Generally categorized as licensed or unlicensed depending on the level of regulation by the FCC.
Radio Transmitter		A radio device connected to the water meter to provide meter readings for either an AMR or AMI system.
Real time		A mode of operation in which data describing the current state of a system is available in sufficient time for analysis and subsequent use to support assessment, control, and decision functions related to the monitored system.
Register		For an electromechanical meter, the device, typically at the top of the water meter that converts motion of the measuring element into units of volume. The register provides a visual and/or remote indication of the amount of water that has flowed through the measuring element.
Remote Turn On / Off		The act of remotely disconnecting or reconnecting service through a network by means of actuating an on-premises valve. Also called “remote shut off” or “remote disconnect”.
Remote Shut-off Valve (aka Remotely Controlled Valve)	RSV	Allow a utility to shut off or turn on water service at a customer or premise from the information management system. These valves could aid Water Contamination Response. response action. An action taken by a utility, public health agency or another response partner to minimize the consequences of an undesirable water quality incident. Response activities may include issuing a public notification, changing system operations, flushing the system or other actions.

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Term	Abbreviation	Definition
Simple Payback		A method for calculating how long it will take to recoup an investment's cost without considering the time value of money.
Small Meters	SM	Water meters with sizes from 5/8” to 1”.
Software-as-a-Service	SaaS	A method of software delivery and licensing in which software is accessed online via a subscription, rather than bought and installed on individual computers.
Supervisory Control and Data Acquisition	SCADA	SCADA systems collect data from important assets and their immediate environments. That data is displayed on a central computer screen available to technicians and managers.
Sustainability		The degree to which the benefits derived from the project justify the cost to implement and maintain the system.
Tampering		Unauthorized handling or damage of an AMI meter.
Theft		Unauthorized use of water.
Threshold		A value that is compared against current or recent data to determine whether conditions are anomalous or atypical of normal operations.
Drinking Water Service Area	DWSA	The City of Thunder Bay’s DWSA encompasses urban and semi-rural areas. A map is included in Appendix A – Map of Thunder Bay’s Drinking Water Service Territory.
Two-way Communications		A communications path that allows the flow of data in both directions. Also referred to as bi-directional or duplex communications. For AMI, this means that in addition to data being sent from the radio transmitter to headend system, the commands or queries can be transmitted from the head-end to the radio transmitter. A visually oriented interface that allows a user to interact with an information management system. A user interface typically facilitates data access and analysis.
Ultrasonic Meter		Non-mechanical water meters that send an ultrasonic wave through the fluid using two or more transducers to measure the velocity of the water and infer a volume.

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Term	Abbreviation	Definition
Virtual Disconnect		A method of simulating a disconnection of service by monitoring the metered usage and setting an alert if a usage threshold is exceeded.
Water Audit		A method of identifying possible sources of water loss. The AWWA and IWA developed a water audit tool that systematically breaks sources of water loss into its components to facilitate evaluation and remediation. See Non-Revenue Water.
Water Meter		A device used to measure the consumption of water through a water line. Primary components of the water meter include the meter body, measuring element and the register.
Work Type		A term used to categorize tasks that will need to be done to enable each water meter to communicate using the proposed technology.

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ACKNOWLEDGEMENTS

This analysis is greatly attributed to the support and collaborative efforts by City of Thunder Bay's stakeholders and their vested interest in investigating technology options used within the meter to cash process to benefit the City of Thunder Bay and its customers.

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1. EXECUTIVE SUMMARY AND DISCUSSION

1.1. Executive Summary

This report provides an analysis of the City of Thunder Bay's current water metering and meter reading practices and provides justification and recommendations for the upgrade of these practices. Specific focus was placed on the impacts on customer service, operational efficiency, and financial outcomes.

1.2. Discussion

The City of Thunder Bay provides drinking water and wastewater services to the community through a network that includes 37,990[1] water meters. These water meters provide the primary billing input that allows the City to determine volumetric charges for both water and wastewater services. The City of Thunder Bay invoices its customers quarterly in a combined bill that includes fixed and volumetric charges for both water and wastewater.

To determine the optimal approach to optimizing the metering system, various scenarios were evaluated including the following:

- Scenario 0: Remote Manual Reading by manually connecting to the meter from outside the customer's premises, similar to what is currently done.
- Scenario 1: Implement Automatic Meter Reading (AMR) By adding a radio frequency communication device to each meter which will be read by a vehicle equipped with a remote reader driving through the community to collect readings.
- **Recommended:**
  Scenario 2: Implement Advanced Metering Infrastructure (AMI) A much greener approach includes adding a network of communicators that transmit readings remotely to a central system completely owned and maintained by the City. This system automatically collects data, reduces meter reading costs, and reduces the health and safety risk associated with driving through the City.
- Scenario 3: Implement Advanced Metering Infrastructure (AMI) that would enable meters to be read using cellular communications. This approach reduces the need to maintain the data collection network but incurs additional operating expenses for cellular usage. This system depends on a third-party Cellular provider as well as some Corporately owned equipment.

After thorough consultation with City subject matter experts, Diameter Services recommends the implementation of Scenario 2. This option upgrades existing metering with an advanced metering system that will capture consistent and accurate readings thereby increasing revenue, and customer satisfaction by eliminating the need to call in readings or receive estimated billing. This option also

[1] As of December 31, 2023. Excludes inactive services.

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makes it possible to provide enhanced water usage and billing information to customers through a web-based platform, further supporting the corporate digital strategy.

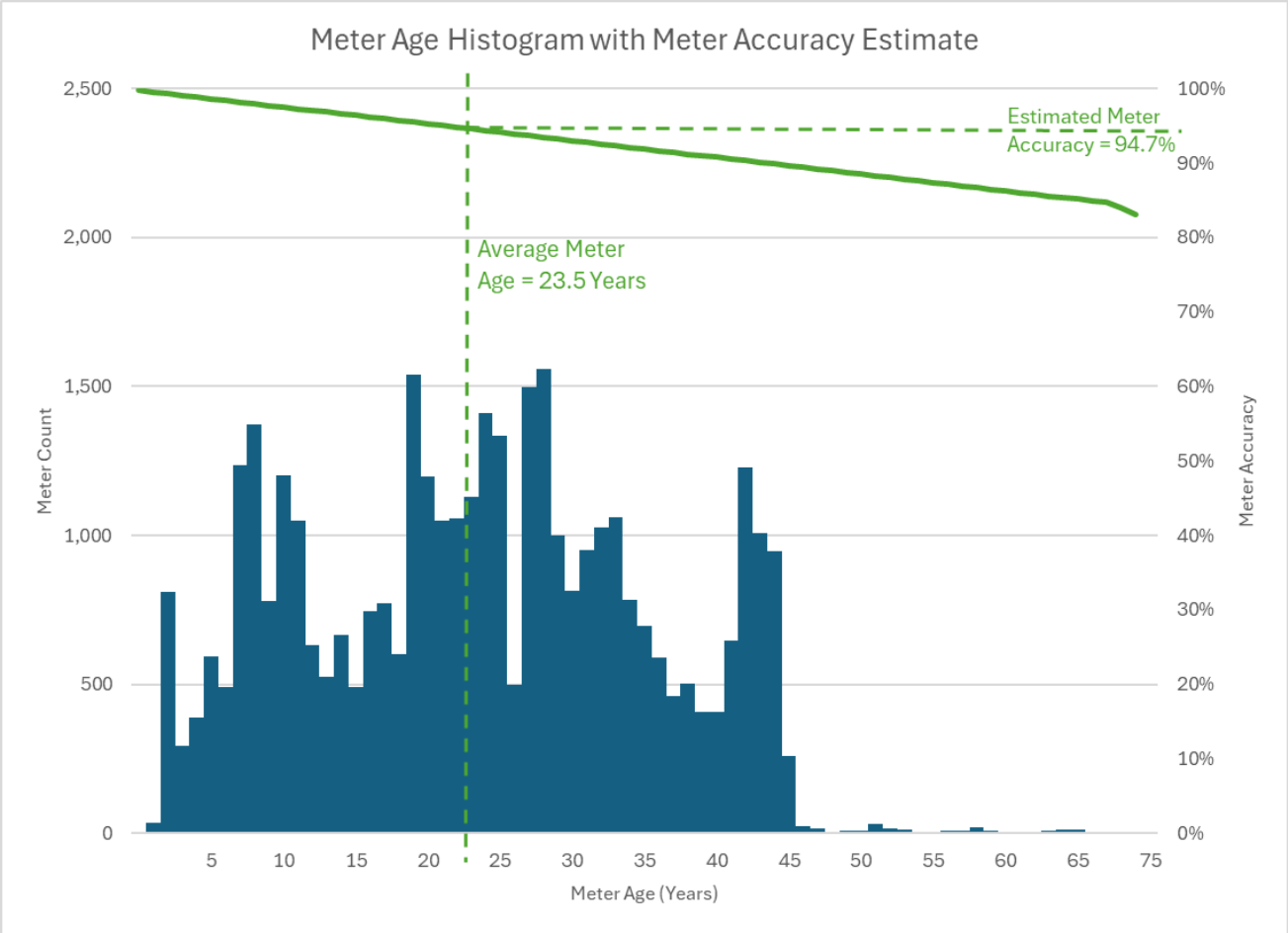
1.2.1. Meter Age

The average age of meters in the City of Thunder Bay's system is 23.5 years, with more than 4,700 meters over 40 years old. Industry practice is to replace meters when they reach 15 to 20 years of age.

Meters purchased prior to 2002 were manufactured with bronze alloy that contained 5% to 7% lead. The City's installed base includes 20,459 or 54% of its meters that contain higher levels of lead than are allowed under current regulations and should be removed from service.

Mechanical water meters, such as those currently in use by the City of Thunder Bay, degrade over time, resulting in under-registration and under-billing of water consumed. A conservative estimate of meter accuracy reveals that the City is losing $1.5 million per year in combined water and wastewater volumetric charges. This value increases with every year that these meters are left in service.

Exhibit 2: Meter Age Histogram with Estimated Average Accuracy



Generally, water meter registers cost about 60% of the cost of a completely new meter. When competitive pricing is obtained through the procurement process, if the cost of registers is higher relative to the new meter cost, the City can opt to replace more meters.

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1.2.2. Meter Technology

To increase future revenue and avoid revenue loss resulting from meter wear, non-mechanical meters using either ultrasonic or magnetic flow technologies, are recommended, as opposed to the mechanical meters that are currently in use. These technologies are proven and provide a range of advancements that help to future-proof the City of Thunder Bay's investment.

1.2.3. Meter Reading

All of the City of Thunder Bay's meters are installed indoors with only 21% equipped with remote receptacles that enable them to be read without entering the premises. As a result, customers are largely responsible for submitting their own meter readings. Of the 150,000 quarterly bills issued in 2023, only 18% were generated based on a City-captured actual reading of the meter. It is industry practice to strive to capture actual readings for nearly 100% of all meters.

The fact that meters are largely read by customers adds a service burden to those customers, especially those who may have difficulty accessing the meter.

In addition, without the ability to read the meters, the City is unable to confirm that the meter has been read correctly.

1.2.4. Customer Service Benefits

One of the key benefits that customers will receive from an AMI system is the elimination of surprise bills. Under an AMI system all water meters communicate their hourly readings each day, providing greater visibility to leaks and unusual consumption that might otherwise result in a high water and wastewater bill.

1.2.5. Facilitation of Monthly Billing

Many water utilities make the decision to move to monthly billing, as monthly billing helps households manage their expenses more effectively. Smaller, more frequent bills are easier for most customers to handle than larger, quarterly bills, which may cause financial strain.

With monthly bills, unusual consumption patterns which could indicate leaks, are identified sooner. This allows both utilities and customers to address leaks quickly, preventing wasted water and higher bills.

While a decision to move from quarterly to monthly billing will be made independent of the decision to implement AMI, by implementing an AMI system the City of Thunder Bay will facilitate this change as no new staff will be required to read meters once AMI is deployed.

1.2.6. Affordability

In 2023, the City of Thunder Bay produced, treated, and pumped 16.1 million m^3 of water. Of that, only about 2/3 (10.7 million m^3) was billed to the consumer. The other 1/3 of the water produced was lost due to leakage, meter inaccuracy, unmetered usage, and other causes. Until the City of Thunder Bay takes steps to understand the causes of "Non-Revenue Water", it will be challenging to implement solutions to address this loss. Lost water effectively increases the rates that all customers pay for their

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water, so improving the efficiency of the system can have the impact of stabilizing rates over the long term.

AMI provides the City of Thunder Bay with data that enables tracking and troubleshooting of lost water.

1.2.7. Environmental

The City of Thunder Bay produced 16.1 million m^3 of water in 2023 and billed 10.7 million m^3 of that water, representing 5.4 million m^3 or 33% non-revenue water. Reducing this amount of lost water has significant environmental benefits for the City of Thunder Bay.

First, reducing water loss would allow the City of Thunder Bay to reduce its energy consumption. Water production, treatment, and distribution is a very energy-intensive activity, representing 33% of the City of Thunder Bay's consumption of natural gas and 53% of its electricity consumption in 2023.

Reducing energy consumption has follow-on benefits of reducing greenhouse gas emissions (GHG). The result of this energy consumption is an estimated production of 4,135 tonnes of CO_2 representing 38% of the City of Thunder Bay's total greenhouse gas (GHG) emissions[2]. For every 1 million m^3 of water produced and treated, almost 257[3] tonnes of GHG are generated.

Finally, reducing water loss effectively adds capacity to the City of Thunder Bay's treatment capabilities without the need for additional capital investment to support future growth and the needs of the community.

1.2.8. Financial Headlines

The total cost of an Advanced Metering Infrastructure deployment for the City of Thunder Bay is expected to be just under $23 million, which includes approximately $2 million in contingency to address unexpected costs for system hardware and installation.

A full analysis of the costs and benefits of each scenario showed that the recommended AMI technology would provide a simple payback of 12.5 years, which is well within the expected 20-year life of the system. Further, the net present value of this investment is expected to exceed $3.6 million, compared with a net present value of only $856 thousand for scenario 0 which is a continuation of the City's current meter reading practices.

[2] City of Thunder Bay, "Energy Conservation & Demand Management Plan 2024", www.thunderbay.ca/en/city-hall/resources/Energy-Management/Thunder-Bay_ECDM-Report-Final_2024.06.19-signed.pdf, accessed October 15, 2024, pp. 14 & 17.
[3] Calculated based on 4,135 tonnes of GHG generated in the production of 16.1 million m^3 of water in 2023.

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Project Capital Costs and Net Present Value	Scenario 0 - Existing Manual Read Meters With mechanical meter replacements over a 20-year period.	Scenario 1 - AMR Drive-by With non-mechanical meter replacements over a 2-year period.	Scenario 2 - AMI (TB Owned) With non-mechanical meter replacements over a 2-year period.	Scenario 3 - AMI (Cellular) With non-mechanical meter replacements over a 2-year period.
Financial				
Capital Costs	$12,261,355	$21,608,076	$22,954,033	$22,655,240
Payback (Years)	14.1	12.0	12.3	13.7
Net Present Value	$856,576	$3,943,271	$3,451,249	$732,967
Non-Financial				
Addresses 19 business drivers	No	Only 10/19 partially	Yes: 14 fully, 5 partially	Yes: 14 fully, 5 partially
Facilitates move to monthly billing	No	Partially	Yes	Yes

The recommendations from this report are summarized in section 1.2.9 Recommendations below and discussed in detail in section 12 Recommendations (2.2.20).

1.2.9. Recommendations

WITH RESPECT to the City of Thunder Bay's decision to automate its meter reading system, we recommend the implementation of Advanced Metering Infrastructure (AMI) technology that would be owned by the City;

AND THAT the radio transmitters used in the AMI system be Installed on the exterior wall of the buildings where possible;

AND THAT the City of Thunder Bay should implement an AMI system that is independent of local utilities Synergy North and Tbaytel due to technology limitations;

AND THAT the non-mechanical meters such as ultrasonic or magnetic flow meters be utilized for any future meter replacements;

AND THAT 33,491 water meters should be replaced, 4,499 existing meters should be upgraded with AMI-compatible registers, and any meters purchased since January 2024 should be retrofitted with an AMI radio transmitter;

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AND THAT the AMI system be deployed at an accelerated pace of less than three (3) years from completion of procurement to project completion to maximize financial and customer service benefits;

AND THAT the procurement be managed through a request for proposals, not a bid or tender:

AND THAT the complete system be procured under a single, turnkey RFP that holds a single party accountable for the success of the installation and the performance of the system;

AND THAT the impacted City resources be deployed to other value-added activities within the City of Thunder Bay as the AMI system is deployed;

AND THAT the City of Thunder Bay's meter shop to be responsible for intermediate & large meters, while the contractor will be installing small meters;

AND THAT the City of Thunder Bay's Waterworks Bylaw 68-2018 Section 7.22 be amended such that the builder is responsible for wire run from the meter to the exterior wall of new construction;

AND THAT the City of Thunder Bay should continue to expand the use of the AWWA water audit software and its methodologies for water loss reduction;

AND THAT the City of Thunder Bay deploy a customer portal that supports full AMI functionality.

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2. ORGANIZATIONAL AND PROJECT GOALS

2.1. Introduction

The City of Thunder Bay retained Diameter Services to review the City's current meter reading system and examined the benefits of upgrading to either an Automated Meter Reading (AMR) system or an Advanced Metering Infrastructure (AMI) system. The purpose of this engagement as stated in the City's RFP is "…is to prepare a Business Case Report that will inform the City's decisions regarding timing and implementation of an AMI/AMR system. The first priority upon undertaking this project will be to complete a comparative analysis that evaluates and recommends either an AMI or AMR based metering system.…"

A business case of this nature is most successful when:

1. **The goals identified in the business case align with the City of Thunder Bay's goals: The** City of Thunder Bay as a whole and the Water Authority itself has stated goals that can specifically align with the results of this project. The Business Drivers outlined in this report and their respective rankings will reflect Thunder Bay's desire to "modernize how it delivers services by taking advantage of digital technologies for both internal and customer facing services". The role of both AMR and AMI technologies in addressing those Business Drivers is discussed.

2. **Functionality of the system meets the needs of the Water Authority and the communities and citizens it serves:** Just because a technology allows for certain functionality does not necessarily mean it addresses the needs of a utility and the communities it serves. The AMR and AMI business driver assessment (ranking) allows Thunder Bay to identify those technology features that address the specific and relevant needs. Both AMR and AMI are assessed to show how well each technology meets the functional need.

3. **Capital cost estimate should match the real costs:** The capital costs used in the business case should include the full scope to successfully implement the recommended approach. This cost should be revisited as the City of Thunder Bay progresses through the technology upgrade process (i.e., after procurement and at key milestones during installation phase).

4. **Benefits should extend outside just the meter to cash process:** The business drivers need to look beyond the meter to cash process. This may include benefits to the City of Thunder Bay and to the customer that may be more difficult to calculate but offer improved efficiencies, service levels or societal benefits such as a reduction in CO2 emissions.

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Understanding existing challenges and establishing priorities is fundamental to benchmarking the success of any water meter replacement and meter reading technology review. It is important that the business case clearly show the expected impact to the customer as well as to the City of Thunder Bay.

As a part of this exercise, the City of Thunder Bay and Diameter Services looked beyond the meter reading and billing functions to discover some of the broader challenges faced by the City. This process provided the opportunity to address how an AMR or AMI system will help the City of Thunder Bay address these challenges.

Current challenges and opportunities present with the City of Thunder Bay include:

- System Capacity concerns
  - plant capacity
  - seasonal issues
  - potential impact on current and future growth
- Water loss / Non-Revenue Water (NRW)
  - unmetered water users
  - unauthorized water use is difficult to identify and enforce.
  - significant City of Thunder Bay work related to leaks and pressure
  - some users on flat rate billing
- Education
  - teach residents on water use, patterns, and learn about habits
- Reduce water bill estimates
  - currently over 50% of water bills are estimated
- Customer service
  - customers are unaware of leaks
  - customer reads are not called in
  - customers receive bills in the thousands of dollars to account for inaccurate estimates or changes in use.
  - aging population lacking internet access
- Staffing capacity
  - significant resources are used to address estimate issues, attend properties, and shut off services
- Opportunity to move to more frequent billing.
  - support monthly billing to manage customer payment and budgeting
  - faster receipt of revenue (cashflow)
  - identify issues faster (e.g. leaking plumbing fixtures)
  - minimize escalations to council / senior managers
- Timeliness of data and information
  - Near real-time
  - monitor portions of the distribution system (e.g. pressure)
  - efficient resource management
- Water efficiency and conservation support
- Time savings
  - less rework of bills and consumption
  - less staff time associated with manual meter reading
- Transparency and customer satisfaction

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- Potential savings
    - reading and billing process
    - reduction in energy use from the reduction of non-revenue water
    - reduction in greenhouse gas emissions that will result from lower energy usage
- Data driven analytics

2.2. Organizational Goals and Strategies

The goal(s) of the project as outlined in the RFP included “aging and under-reporting meters, challenges in obtaining water meter readings from consumers, the inability to provide customers with detailed usage and leak detection information, and the inefficient use of staff time in obtaining reads and maintaining an aging system” were central themes in discussions with the City of Thunder Bay. These themes, either directly or indirectly, impacted virtually every aspect of this project including customer service, cost reduction and the ability to protect and maintain the City of Thunder Bay’s water source to name just a few examples.

The AMR/AMI business case project aligns with several of Thunder Bay’s corporate visions and strategies, as first mentioned in its Program and Service Review (2020) “The Automatic Meter Reading program (AMR) was mentioned in Phase One as an opportunity to raise efficiencies in meter reading and revenue recovery”.

A key exercise is to build alignment to the City of Thunder Bay’s existing strategic initiatives and how AMR/AMI can be strategically leveraged to support these plans. Strategic documents examined included:

- City of Thunder Bay Digital Strategy
- Climate-Forward City: Thunder Bay Net-Zero Strategy
- 2023 Annual Report Drinking Water Quality
- Maamawe, Growing Together City of Thunder Bay Strategic Plan 2023-2027

City of Thunder Bay Digital Strategy
From the Program and Service review, AMR technology was also identified in the Thunder Bay Digital Strategy report (2021) as part of the Digital Infrastructure workstream as a technology to adopt, subject to a business case review. The Digital Strategy report emphasizes the importance of customer focussed, efficient, accessible, digitally powered services. The development of the Digital Strategy was identified as a priority for City of Thunder Bay Council. The Digital Strategy includes a Vision for the City of Thunder Bay’s information; technology and digital programs and the project team examined the alignment of AMR/AMI with these visions resulting in 5 of the 5 visions aligning with AMR/AMI.

Vision	Description	Alignment with AMR/AMI Project
1	Collaboration is at the heart of digital success.	Yes

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Vision	Description	Alignment with AMR/AMI Project
2	City Services to the community are the core of the City of Thunder Bay.	Yes
3	Providing efficient, accessible, easy-to-use, cost-effective and digitally powered services is of core importance.	Yes
4	The City should design its services around customers, not around internal needs.	Yes
5	The City intends to modernize how it delivers services by taking advantage of digital technologies for both internal and customer-facing services.	Yes

The Digital Strategy also included 5 main workstreams of which the project team determined a strategic alignment with AMR/AMI for all 5 workstreams.

Major Workstreams	Description	Alignment with AMR/AMI Project
1	Digital Workplace	Yes
2	Digitalized Business Processes	Yes
3	Digital Infrastructure	Yes
4	GIS Data and Analytics	Yes
5	Digital Services	Yes

The AMR/AMI project was also deemed to support the following areas identified in the Digital Strategy:

- Integrated technologies
- Multiple transactions from different departments
- End-to-end, real-time transactions
- Efficient, simple, and easy-to-use processes
- Modernizing the employee experience
- Data and information providing insights to improve efficiency and improve services.

Climate-Forward City: Thunder Bay Net-Zero Strategy

The project team examined the strategic links between AMR/AMI and the City of Thunder Bay's Net-Zero Strategy. The AMR/AMI project can help to support the Net-Zero Strategy in two fundamental areas:

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Objective 16: Municipal water and wastewater processes are increasingly efficient, specifically E.31: 30% increase in water and wastewater pumping efficiency. AMR/AMI can support the City of Thunder Bay's priority action "identify opportunities to reduce energy use in water and wastewater pumping process".

2023 Annual Report Drinking Water Quality

Thunder Bay's annual Drinking Water Quality report (2023) commits the Thunder Bay Water Authority to operating and maintaining a safe, clean potable water supply to the Citizens of Thunder Bay. Part of the commitment includes "participating and encouraging water conservation initiatives." The project team deemed that the AMR/AMI project can help to support 3 of the 4 Quality Management System Policy commitments.

Commitments	Description	Alignment with AMR/AMI Project
1	Operating and maintaining a safe, clean, continuous potable water supply to the citizens of Thunder Bay	Yes
2	Meeting or exceeding applicable legislative and regulatory requirements	Yes
3	Participating in and encouraging water conservation initiatives	Yes
4	Implementing a Quality Management System consisting of policies, standard operating procedures, staff competency, and emergency contingency and response planning	N/A

Maamawe, Growing Together City of Thunder Bay Strategic Plan 2023-2027

Lastly, Thunder Bay's Strategic Plan 2023-2027 "Maamawe, Growing Together" provides a summary of City-wide values and promises that summarize the shared view of the City's future. The Strategic Plan contains 4 key pillars, Maamawe – Growing together, Safety and well-being, Growth, and Sustainability, which all contain aspects that are satisfied by this initiative. Perhaps most relevant to this project was the following statement under the growth pillar:

> "Implement better ways of serving the public that focus on continuous improvement and delivering positive outcomes for the City."

The project team deemed that the AMR/AMI project can help to support 3 of the 4 Values, 3 of the 4 Promises as well as 8 Strategic Directions and Goals.

Values	Description	Alignment with AMR/AMI Project
1	Accountability	Yes

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Values	Description	Alignment with AMR/AMI Project
2	Continuous Improvement	Yes
3	Teamwork	Yes
4	Respect	N/A

Promise	Description	Alignment with AMR/AMI Project
1	Truth and Reconciliation	N/A
2	Safety and Wellbeing	Yes
3	Prosperity	Yes
4	Sustainability	Yes

Goal	Objective	Alignment with AMR/AMI Project
1 Growth	Facilitate the development of new housing supply options.	
2 Growth	Deliver customer-centered, digitally powered City Services as indicated in the Digital Strategy.	Yes
3 Growth	Implement better ways of serving the public that focus on continuous improvement and deliver positive outcomes for clients.	Yes
4 Safety and Well-Being	Deliver public education on climate action and climate resilience opportunities as identified in the Net Zero Strategy.	Yes
5 Sustainability	Invest in green and climate-resilient infrastructure to meet the long-term needs of our community.	Yes
6 Sustainability	Accelerate initiatives to reduce our greenhouse gas emissions.	Yes

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Goal	Objective	Alignment with AMR/AMI Project
7 Sustainability	Identify the community services that are priorities and provide them at a level we can sustain.	Yes
8 Maamawe – All Together	Integrate Indigenous perspectives in City services, programs and places.	Yes

All of the previously mentioned challenges/opportunities in combination with the AMR/AMI alignment with existing goals and strategies form the justification of this project and contribute to demonstrating the value of this project.

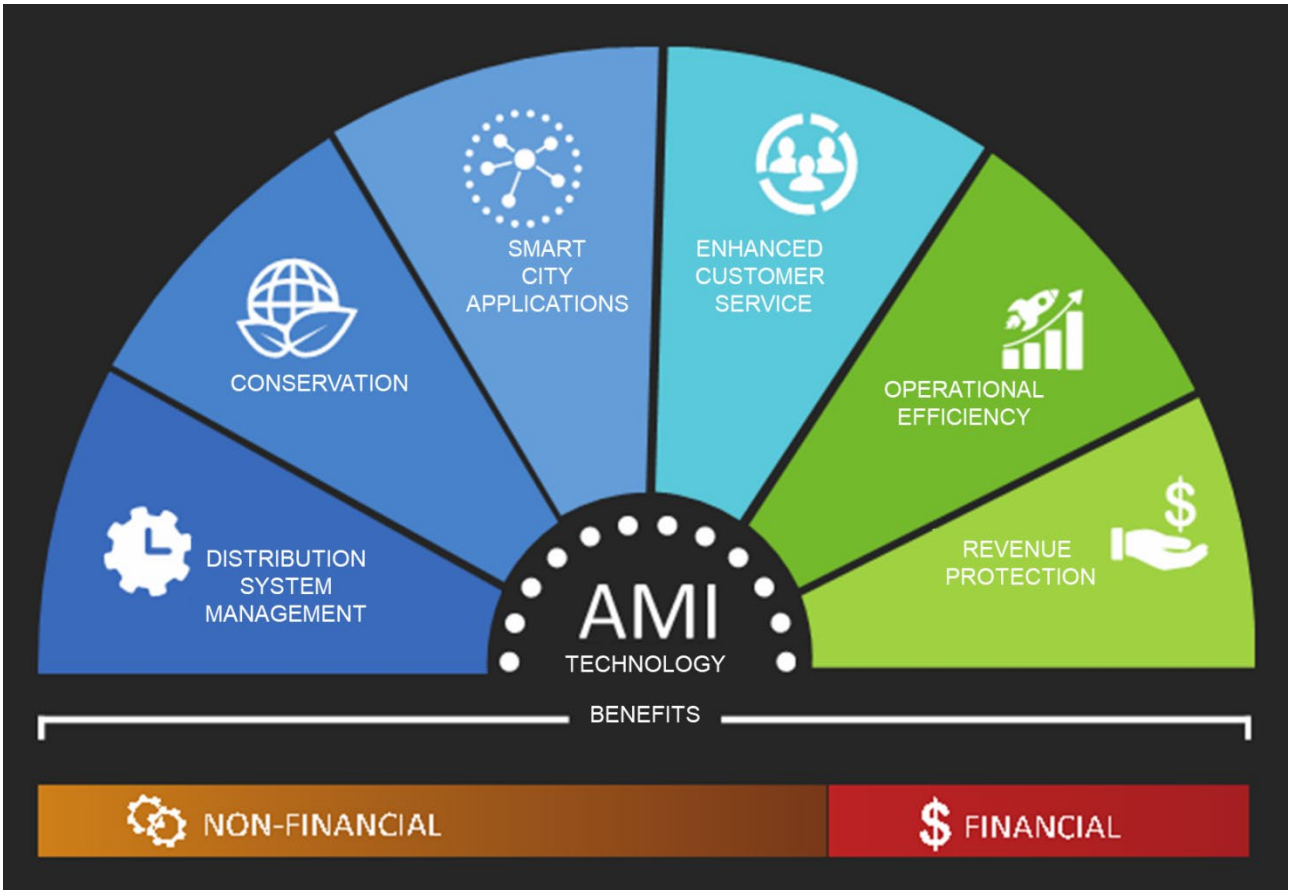
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3. BUSINESS DRIVERS

3.1. Connecting Project Goals with AMR/AMI Business Drivers

In collaboration with the City of Thunder Bay, the Diameter Services team reviewed, assessed and ranked 36 different AMI/AMR business drivers. To frame the overall analysis, Diameter Services has identified six categories where AMI/AMR technology can offer benefits:

Exhibit 3: Business Driver Categories



1. **Revenue Protection (RP)**

   Ability to identify areas of revenue improvement, reduce theft and tampering, respond more quickly to stopped meters, and an improved ability to apply the right meter technology to customer applications.

2. **Operational Efficiency (OE)**

   Improvements in response time to maintenance issues; reduced meter reading costs and hazards; reduced exceptions and estimated bills, and fewer additional trips into the field to collect data.

3. **Improved Distribution System Management (DS)**

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Improvements in the utility's ability to manage its distribution system through district leak detection, dynamic water balance, system wide leak detection, discrete water quality monitoring and more efficient code enforcement.

4. **Enhanced Customer Service (CS)**

   Improvements in customer service through the ability to provide customers' consumption information, online access to consumption, alerts to avoid high water bills or damage, and customer leak detection.

5. **Societal Benefits (SB)**

   Improvements in water conservation and carbon emissions.

6. **Smart Utility/Smart City (SC)**

   Improvements to areas beyond water consumption by leveraging the network for other organizational needs. These use cases typically apply to local governments and might involve street light controls, wastewater collection monitoring, waste bin monitoring, or traffic monitoring.

3.2. Evaluating Business Drivers

AMI and AMR technology have different features and functionality. The movement to a specific technology should be driven by evaluating the importance of various business drivers and selecting the technology that best addresses those drivers. When features or functionality within the AMI/AMR technology address a challenge or improve delivery of water service, it is considered a **business driver.**

The Diameter Services team reviewed 36 different business drivers with Thunder Bay staff to determine the organization's needs and identify the best technology fit. The development and assessment of the business drivers provides a definition of the actions Thunder Bay should expect to implement, first by identifying what is important to the utility followed by matching the technology that supports these actions.

AMI/AMR technology will improve a water utility's operations in a number of areas; some can be easily calculated, while others will show a qualitative improvement in a respective area. AMI/AMR technology should be considered a tool that the utility uses to improve how the utility operates. As noted in the introduction, Thunder Bay currently has a combination of manually collected water readings, customer provided water readings, and a significant amount of water bills calculated on estimated consumption. The areas of improvement often do not have a direct financial improvement but are still critical to the utility achieving the broader goals of the organization.

To evaluate business drivers, Diameter developed a scoring system that allowed Thunder Bay to establish the importance of each business driver and by extension the goals of the project.

Importance to the water utility is defined and scored using the table below.

Exhibit 4: Business Drivers Score and Importance to the City of Thunder Bay

Score	Importance	Description
0	Not Important	The City will not implement the business driver in the future

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1	Future	The City may implement the business driver
2	Important	The City will implement the business driver immediately
3	Essential	The City will implement the business driver immediately and it is critical to the project

AMI and AMR technologies function differently, have different operational impacts on the utility and provide different benefits partially due to the differences in data each provides. Depending on the technology, Thunder Bay will be able to either fully achieve, partially achieve, or in some cases do not achieve specific business drivers. This system of scoring is designed to accomplish two things. First it prioritizes those business drivers that are most important to Thunder Bay and secondly, it helps to define the technology alternatives that provide required functionality, which is key to developing cost/benefit results. The following criteria is used in this determination:

Exhibit 5: Scoring: Ability to Support the Business Driver

Score	Ability to Support the Business Driver	Description
○	Does not support a Driver	The business driver as described cannot be implemented using this technology.
◐	Partially supports a Driver	The business driver as described can be partially implemented using the technology.
●	Fully supports a Driver	The business driver as described can be fully implemented using the technology.

3.3. Business Driver Assessment Summary

A complete list of the business drivers and recommendation rationale are detailed later in this section which will describe the business drivers along with each technology's ability to achieve the goals of the driver.

As a preface to that in-depth discussion, and to provide a high-level overview of the workshop findings, an overview is provided below, which is designed to provide a quick snapshot of the business drivers and related priorities for the AMI/AMR project. Note that Diameter omits some drivers that, in consultation with the Thunder Bay project team, do not apply and therefore are not listed as a driver.

ID	Revenue Protections (RP)	Score
RP 1	Zero Consumption - Tampering	2
RP 2	Zero Consumption - Stopped Meter	1
RP 3	Zero Consumption (Turned off for Non-payment)	1
RP 4	Zero Consumption (Empty Pipe Alert)	2

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RP 5	Run your Water' Accounts (Known frozen services)	2
RP 6	Detect Misapplied Meters	1
RP 7	Support for Leak forgiveness Program	2
RP 8	Water Meter Accuracy Decline - separate analysis	2
ID	**Operational Efficiency (OE)**	
OE 1	Reduce Regular Meter Reading Costs	3
OE 2	Same Day Final Reads / Re-reads	1
OE 3	Improve Meter Reading Safety	2
OE 4	Meter Reading Reliability - Reduce Re-reads	3
OE 7	Remote Turn-off / Turn-on	1
ID	**Improved System Distribution Management (DS)**	
DS 1	District Metering	2
DS 2	Water Balance Calculation Frequency	1.5
DS 3	Acoustics Leak Detection (ALD) - Main Break Monitoring - Drop and Place	21
DS 6a	Detect Backflow Events (Residential)	1
DS 6b	Detect Backflow Events (ICI)	1
DS 7	By law Enforcement	1
DS 8	Pressure Monitoring (on a limited basis – 500 devices)	3
DS 9	Temperature Monitoring - Frozen Services	1
DS 10	Hydraulic Modelling	2
DS 12	Wastewater Monitoring	1
DS 13	Water Quality Monitoring	1
ID	**Customer Service Enhancements (CS)**	
CS 2	Customer Engagement - Interactive	3
CS 3	Customer Engagement - Progressive	3
CS 4	Leak Detection - Small	2
CS 5	Leak Detection - Broken Pipe	2
CS 6	Vacation Monitoring	0
CS 7	Customer Portal Adoption / Paperless Billing	3
ID	**Societal Benefits (SB)**	
SB 1	Conservation Program Support	2
SB 2	Climate Change - Reduced CO_2	3
SB 3	Climate Change - Reduced Energy	3

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SB 4	Smart Water - Sewer System	1

The following provides a summary of the business driver assessment summarizing only those ranked as Important (Score of 2) or Essential (Score of 3).

ID	Revenue Protections (RP)	Score	AMI	AMR
RP 1	Zero Consumption - Tampering	2		
RP 4	Zero Consumption (Empty Pipe Alert)	2		
RP 5	Run your Water' Accounts (Known frozen services)	2		
RP 7	Support for Leak forgiveness Program	2		
RP 8	Water Meter Accuracy Decline - separate analysis	2	**N/A**	**N/A**
	Operational Efficiency (OE)			
OE 1	Reduce Regular Meter Reading Costs	3		
OE 3	Improve Meter reading safety	2		
OE 4	Meter Reading Reliability - Reduce Re-reads	3		
	Improved System Distribution Management (DS)			
DS 1	District Metering	2		
DS 3	Acoustics Leak Detection (ALD) - Main Break Monitoring - Drop and Place	2		
DS 8	Pressure Monitoring (on a limited basis – 500 devices)	3		
DS 11	Hydraulic Modelling	2		
	Customer Service Enhancements (CS)			
CS 2	Customer Engagement - Interactive	3		
CS 3	Customer Engagement - Progressive	3		
CS 4	Leak Detection - Small	2		
CS 5	Leak Detection - Broken Pipe	2		
CS 7	Customer Portal Adoption / Paperless Billing	3		
	Societal Benefits (SB)			
SB 1	Conservation Program Support	2		
SB 2	Climate Change - Reduced CO2	3		
SB 3	Climate Change - Reduced Energy	3		

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3.4. Detailed Non-Financial Business Driver Assessment

Ref	Importance	Business	Driver & Description	Utility	AMI Technology Assessment
	Revenue Protection	**(RP)**			
RP1	**(2) Important**	**Zero Consumption - Tampering**	Common sources of Unauthorized Use of Water: • Residential customers: removal of register head or meter (zero consumption for full days in the middle of a billing period). • Commercial customers: opening of authorized meter bypasses (zero or reduced consumption compared to other similar industries or previous consumption periods). AMI technology allows a utility to detect potential unauthorized water use in several ways: • Abnormal consumption: by way of detecting consumption (or a reduction in consumption) in accounts where the City of Thunder Bay would be expecting the opposite behavior. Examples include: o A commercial property (for example a laundromat) that requires water to operate suddenly has zero consumption during peak times. o A property is vacant and should be zero consumption but unexpectedly shows consumption. o At a commercial property, the bypass is opened thereby reducing consumption through the meter. o Empty pipe alarm (specific to Ultrasonic and Mag meters) – there is no water in the meter and an alarm is sent, typically with the next reading. This would be useful to identify cases where a meter has been removed from service. Empty pipe alarm (specific to Ultrasonic and Mag meters) – there is no water in the meter and an alarm is sent.	**Discussion Points:** • Would there be any financial benefits or efficiencies with consumption-based algorithms? • Potentially capturing lost revenues due to tampers. • Alerts to property owner (high) or low consumption? **Discussion Outcomes:** • Unauthorized consumption – Multi-res example • Register removal, spacer – can be worse when time between billing and readings in relatively long (quarterly) as in Thunder Bay • Comments from the workshop: “Tampering is more prevalent than we know, but staff do not really have the authority to do much.” • Opening bypass on ICI meters can result in a significant amount of lost revenue. • Remove the register and fill a pool as an example.	**AMR (**PART) – AMR supports zero consumption flags that could be captured on a monthly basis. However, the AMR flag is limited and cannot support deeper analysis of consumption behavior. • Zero consumption is a binary Yes / No flag. • Limitation due to resolution. • Cannot determine patterns. **AMI** (FULL) – The utility can analyze consumption behavior and use anomalies to create special stopped meter or tamper reports to initiate action. • Hourly data reduces the need for “eyes on meters”. • Can build algorithms to find certain types of consumption patterns. • Grouping function in software enables comparison of similar meters (e.g., carwashes, multi-residential applications).
RP2	**(1) Nice to Have**	**Zero Consumption - Stopped Meter**	• Positive displacement meter can become jammed and stop registering consumption, requiring replacement. • Applicable to residential, light commercial or the low side of compound meters used in high consumption ICI applications. • Impact will be greatest for ICI meters with Compound meters where the low side becomes inoperable.	**Discussion Points:** • What kind of meters failures occur? • Are these estimated when they are found? **Discussion Outcomes:** • 224 Stopped meters in 2023. • Due to City of Thunder Bay’s current meter reading access issues, where only about 17% of meters are actually read by City staff each quarter, stopped meters can remain unidentified for multiple billing cycles, resulting in lost revenue and billing disputes. • Detect by reviewing billing journal to identify 0 consumption & stopped meters.	**AMR** (ZERO) - Resolves after the billing cycle. Lost revenue could be between 30 and X days. **AMI** (FULL) – Can set up a flag (e.g., 5-day) and potentially reduce the number of days these meters do not record revenues**.** • Utility moves from reactive to proactive. • Reduced latency of response leads to reduced Apparent Losses. • Eliminates uncertainty as to when a meter stopped functioning and how much consumption the property-owner has incurred.

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Ref	Importance	Business	Driver & Description	Utility	AMI Technology Assessment
				• Charge based on estimate – realize City of Thunder Bay won't recapture all lost revenue. • All stopped meters lead to field visits. • AMI will reduce latency in responding. • Algorithms can trigger response – can be customer-group specific.	• Stopped meters that go unaddressed for a longer period result in a hardship on the property-owner if the City of Thunder Bay issues an estimated catch-up bill to address the unmetered water.
RP3	**(1) Nice to Have**	**Zero Consumption – Turned off for Non-Payment**	Zero consumption: identifying those properties where the utility is expecting zero consumption. When consumption occurs, then the utility should be notified. Some examples of this occurring include: • Detector check monitoring: detect any consumption that occurs on detector check meters and monitor the amount of water, ensuring the water demand flow rate is not going through the un-metered portion of the meter. • Monitor detector check meters (Fire Services) • Ensure customers are not using fire service for domestic purposes.	**Discussion Points:** • What effort is associated with monitoring turned off customers? • Do customers turn the water back on? **Discussion Outcomes:** • The Utility would not know water has been turned back on after shut-off. • Not that many disconnects – transfer to tax handles this.	**AMR** (PART) – Meters can be monitored but reaction would be every 30 days (depending on read frequency) after the bill is produced. **AMI** (FULL) **–** Meters can be monitored as often as daily depending on how frequently the radio transmitter sends data to the data collectors. Customers using fire service for domestic purposes could be identified prior to bills are produced.

RP4	**(2) Important**	**Zero Consumption – Empty Pipe Alert**	• Detect meters removed from service.
			• Additional considerations:
			  • Would require non-mechanical meters to be in place with the capability.
			  • AMI Radio Transmitter and Meter Manufactures would need to be the same.
				Discussion Points:
				• Do meters get pulled or stolen and replaced with spacers?
				
				Discussion Outcomes:
				• Applies to non-mechanical meters.
				• Another potential water theft situation.
					AMR (ZERO) – It is unlikely an AMR radio would read this flag from the meter.
					
					AMI (PART) – Depending on the manufacturer of the product this feature may or may not be available.
					• Requires AMI transmitter ability to recognize the flag and non-mechanical Meter's ability to produce a flag.
					• Likely requires meters and AMI system to be supplied by the same vendor.

RP5	**(2) Important**	**"Run your water" Accounts**	Customers who need to run water during winter months due to risk of freezing. Effectively tracking this consumption can reduce apparent losses based on the number of customers and the amount of consumption they use in this period.	**Discussion Points:** • Does this happen in the City of Thunder Bay? • Are there ICI customers who have this issue? **Discussion Outcomes:** • Depends on the particular year – i.e., the severity of the winter. • There can be over 100 frozen services each year. • Customers are charged an estimate during that period. • Thunder Bay has fairly deep service lines and monitor the frost level frequently. • The properties susceptible to freezing are generally known by the City of Thunder Bay.	**AMR** (PART) – Limited ability to capture hourly data to capture amount of constant flow. **AMI** (FULL) – With hourly consumption data the City of Thunder Bay can monitor the flow rate of running water at a particular account, track the amount of water not being consumed for apparent loss calculation and provide the appropriate "forgiveness" to customers.
RP6	**(1) Nice to Have**	**Detect Misapplied Meters**	Misapplication of meters can result in lost revenue and increased meter repairs. Some examples include: • Turbine meters installed where a compound is needed. • Compound meters are oversized, or significant flow is going through at the cross-over point.	**Discussion Points:** • Understanding the detailed usage pattern of a customer can help to determine the appropriate meter for the application. For example, is a 3" meter appropriate instead of a 6"? Is a compound or turbine meter best for the application?	**AMR** (PART) – Can be performed manually. Field visit required. Most radio transmitters have the ability to download hourly data for an individual meter, so specific analysis can be conducted to properly size the meter.

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Ref	Importance	Business	Driver & Description	Utility	AMI Technology Assessment
			Type 1: Compound meters, uneven wear results in either the high or low side of the meter to wear out and record much less accurately. Rule of thumb 70% high side, 30% low side (smaller the consumption buckets the better; hourly vs every 30 days). **Type 2:** Compound meters, cross over: identify those meters where a significant amount of a customer's water demand flow rate around the cross-overflow rate with reduced meter accuracy. Where a large % of flow is being measured at the cross over. Could lead to a 5% to 10% accuracy loss. Hourly consumption analysis can detect this. **Type 3:** Low flow on turbine meters: meters that have a significant amount of a customer's consumption below the optimal flow rate for a turbine meter.	• Do you typically match service size with meter size? • If so, there may be some small benefit based on the number of large meters. **Discussion Outcomes:** • System can provide more data to enable proper sizing of meter. • Customer identifies their expected flow profile & customer gets to pick one of the City of Thunder Bay-spec'd meters that meets their usage. • Usage of property may change – e.g. change in cooling system away from water cooled. • Currently try to educate engineers on sizing, by using pricing as a driver to not oversize.	**AMI** (FULL) **–** No field visit required. **Type 1&2:** Consumption of both high and low dial on the compound meter can be compared to determine the percentage of flow through each register. **Type 2 & 3:** Hourly consumption can be calculated to determine approximate flow rates. Then the flow rates where the meter is operating can be compared to the meter's rated accuracy at those flow rates to determine if meter right-sizing would be beneficial (i.e., avoiding lower accuracy flow such as low flow or cross-over flows that are less accurate.)

RP7	**(2) Important**	**Support for Leak Forgiveness Program**	• Where a significant customer side leak occurs, there is a leak forgiveness program in place.
			• Pinpoint major leak to a specific event or date.
			• May lead to lower forgiveness payouts over time.
				Discussion Points:
				• Reduce the total pay-out dollars due to Alerts catching these issues sooner.
				• Data provides support for decisions that are made.
				• Initially, this may result in more people qualifying for the program and getting assistance as one requirement of program is that the last reading must be an actual reading. Often properties don't qualify because the homeowner did not call the last reading in so the leak may have occurred for longer than 1 billing period.
				• Could also help customer in detecting leak sooner to minimize the impact/bill due to leak.
				
				Discussion Outcomes:
				• Looking at AMR and AMI technologies. AMR is typically too far after the fact to pinpoint to a specific date,
				• There are really two aspects of AMI that can provide support:
				  ○ Pin-point major leak to a specific event or date.
				  ○ May lead to fewer people qualifying.
				• Customer portals can be very beneficial. And some utilities will start to restrict or remove their leak forgiveness programs.
				• Provides incentive for Portal sign up, i.e., In order for a customer to qualify for leak protection they must be signed up for the portal.
				• Big cases receive political attention.
					AMR (ZERO) – Not applicable.
					
					AMI (PART) – Would help calculate how long and how much water leaked on a customer service.
					• Customer Portal could provide a more efficient way of managing these types of programs.
					Customers who request assistance through Leak Forgiveness would be required to sign up for the Customer Portal and take responsibility for future leaks.

RP8	**(2) Important**	**Meter Accuracy Decline**	• Different meter types (positive displacement, non-mechanical) have different measurement accuracies over their lifecycles.	**Discussion Points:** • Positive Displacement meters tend to slow down over their lifecycle • Non-mechanical (e.g. ultrasonic and magnetic meters) do not lose accuracy over their lifecycle. D**iscussion Outcomes**:	**AMR** (FULL) – Not applicable. **AMI** (FULL) **–** Not applicable.

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Ref	Importance	Business	Driver & Description	Utility	AMI Technology Assessment
				• Cost analysis was made by factoring in the revenue gain of non-mechanical versus the increase in cost of non-mechanical meters. • Currently, Thunder Bay is losing approximately $1.5M per year due to meter inaccuracies. • Estimated to improve revenue by $2.12M per annum after full meter replacements are completed.	
	Operational Efficiency (OE)				

OE1	**(3) Critical**	**Reduce Regular Meter Reading Costs**	Reduces the cost to collect meter readings.	**Discussion Points:**
				• Annual costs: meter readers, maintenance, equipment, and support costs.
				
				Discussion Outcomes:
				• All customers are read and billed quarterly.
				• Readings are a combination of:
				  ○ Customer provided – 68,413 (45.6%)
				  ○ Actual – 24,525 (17.8%)
				  ○ Estimated – 54,934 (36.6%)
				• 3 FTE meter reading staff
				• 3 staff-owned vehicles are used for meter reading
				• 5 Trimble Nomad handhelds, 6 Neptune Pocket Pro readers
				• Annual meter reading costs estimated at $210,967 in 2023
					AMR (PART) – AMR mobile allows meter readings to be collected by driving in close proximity to the property. Typically, meter readings are collected for billing purposes, although some mobile AMR systems can allow daily and hourly readings to be collected at the cost of some system performance (driving speeds). Mobile data collection will also collect leak detection, tamper, and backflow flags. This provides a Yes / No response that can be incorporated into reports and CIS.
					
					AMI (FULL) – Allows for all meter readings to be collected via an AMI system. Hourly readings are transmitted in a single digital package on a frequency determined by the City of Thunder Bay. Usually a 20-year warranty provides up to 4 times daily transfer of readings. Eliminate 95% of manual reading.

OE2	**(1) Nice to Have**	**Same Day Final Reads**	• Collect Same day (off cycle) meter readings to facilitate Move In / Move Outs • AMI technology allows reading during off cycles eliminating the need to send out a meter reader. • AMI and MDM technology will allow customers to be grouped; in this case a zero-consumption group which can alert the City of Thunder Bay when consumption occurs at the property prior to the new customer setting up a new water account.	**Discussion Points:** • How many resources are dedicated to this work? • How long does it take to perform a final reading? • Are there any segments of the City of Thunder Bay's population that have a higher likelihood of off cycle reading? (e.g., university, rentals) **Discussion Outcomes:** • Final reads: 3,100 ownership sales, 402 tenant moves. • Small % of overall number of reads (5%) • Requires a field visit on the day of the reading request.	**AMR** (PART) – Still require a field visit. • Certain types of system may be able to produce a daily read through Mobile • Would require some software to store it.) **AMI** (FULL) **–** No field visit required. On-demand readings will eliminate out of cycle manual readings to accommodate the account closing or moving in dates. Virtual shut off groupings will alert the Utility to customers using water prior to setting up an account with the Utility.

OE3	**(2) Important**	**Improve Meter Reader Safety**	• Meter readers are subject to a wide range of possible safety issues including vehicle accidents, slips & falls, repetitive movements, dogs, environmental (air quality, weather), and high crime areas.	**Discussion Points:**
				• Reduce lost time injuries related to meter reading, which could include:
				  ○ Vehicle accidents.
				  ○ Dog attacks, slips/falls, snakes, spiders etc.
					AMR (PART) – AMR reduces the number of meter readers in the field and decreases some safety aspects of manual meter reading (slips and falls,

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Ref	Importance	Business	Driver & Description	Utility	AMI Technology Assessment
			• Reducing the exposure of personnel to these risks can significantly improve meter reader safety, ultimately reducing lost time injuries. • AMI technology will virtually eliminate liability associated with employees reading meters in the field. • It is important to highlight that improving meter reading safety may not drive functionality, but it is still a business driver that supports safety initiatives.	○ High crime areas. ○ Environmental: Heat, air quality during environmental events, storms. ○ Repetitive motion injuries. • Potential Liability Issues? • Does the City of Thunder Bay have concerns in this area? • Is this a contributing factor to implementing technology? • Are there any protocols in place to ensure the safety of the meter readers? **Discussion Outcomes:** • ~24,500 handheld reads annually, and meter readers typically do not enter the home for regular reads. • In some cases, meter reading staff are put at risk when reading meters in high crime areas. Such situations are currently mitigated by scheduling in the morning or pairing up with another member of staff. • Thunder Bay has a vehicle tracker system in place.	dog bites). However, it increases vehicle safety risks to meter readers and citizens. **AMI** (FULL) – Virtually eliminates all readers in the field.
OE4	**(3) Critical**	**Meter Reading Reliability / Elimination of Estimates**	• Reduce the time to re-read missed readings. • Use an estimated read due to inability to get a meter reading within the billing window.	**Discussion Points:** • What % of meter reader resources perform these re-reads? • How much time do the estimated bills take? • What % of time is spent on these tasks? **Discussion Outcomes:** • 294 re-reads due to too many estimates. • 57,446 estimates in 2023. • 2 successive estimates trigger a field visit read. • Have led to significant high water bill situations (Multiple $1000's)	**AMR** (PART) – Missed reading can occur depending on route travelled. **AMI** (FULL) – Missed readings will be significantly reduced with AMI. Furthermore, AMI will provide early notice if meter readings are not captured, allowing the City of Thunder Bay to be proactive and address reading issues before they result in estimates.
OE7	**(1) Nice to Have**	**Remote Turn-off / Turn-on**	To address non-payment, some utilities shut off water service to the customer. This can be a challenging and potentially dangerous situation for the utility employee. As a result, some cities have considered the use of Remote Shut-off Valves (RSV) to encourage payment. • A two-way AMI technology can allow a water utility to remotely shut off valves or valve enabled water meters. This would eliminate the need to send a technician out to shut off the water. • Remotely shut-off valves typically operate in three stages: ○ No flow ○ Trickle flow ○ Full flow • In addition to the technical challenges, this approach also has social and budget implications. Is the approach considered targeting disadvantaged groups if only services of slow paying customers are equipped with a valve? Does the City of Thunder Bay incur the cost of installing a device	**Discussion Points:** • Who performs turn-ons / offs? • How many people are dedicated to this? • Of the shut-offs that are occurring, are they happening in a certain area or associated with certain customers? • Would charging customers the cost of a meter technician to turn the water back on a reasonable policy? • Are there policies around the timeliness of restoring service once payment is made? • Does the City of Thunder Bay have equitability concerns? Would shut-off valves be installed on all meters or a subset of the population? **Discussion Outcomes:** • 144 shut offs in 2023. • Significant administrative time in making calls around non-payment. • Concern that some customers would circumvent the shut-off process. • Difficult technology to implement and the use of this technology can be seen as targeting certain customers.	**AMR** (ZERO) – No benefits. **AMI** (FULL) – Possible with the following conditions: • Two-way with reasonable latency (sub-hour). • Most designs incorporate a valve into a non-mechanical meter. • Others use a secondary device that would require a longer laying length. • RF encryption should be employed to prevent unauthorized use.

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Ref	Importance	Business	Driver & Description	Utility	AMI Technology Assessment
			on every home to address the minority of customers where a valve is justified?		
	Improved System Distribution	**(DS)**			
DS1	**(2) Important**	**District Metering**	• Identify and monitor real losses on the distribution system. • Perform NRW calculation on a subset (or district) of customers within a given geographic area. • Requires all distribution mains to be metered to measure water in and out of a districted metered area (DMA). • An AMI system takes all the identified customers within the DMA and subtracts consumption from the master / district meters.	**Discussion Points:** • Does the City of Thunder Bay have DMAs? • Real Losses: • Water Losses: **Discussion Outcomes:** • Currently Thunder Bay does not have DMAs. • Enhances analysis and timeliness of data. • Requires further investment. *Note: Not a true DMA, but the installation of bulk meters for the lines serving the certain communities could reduce NRW by identifying the amount of water provided.*	**AMR** (ZERO) – Not able to perform with AMR data. Does not allow this type of program to be implemented. **AMI** (FULL) – Requires: • Master meters on distribution network. • Hourly readings from all meters. • Meter Data Management (MDM) can group and calculate water loss. • Meter consumption can be grouped and compared to master meters within most high-quality MDM software if the master meters are in place.
DS2	**(1.5) Nice to Have / Important**	**Water Balance Calculation Frequency**	• Water utilities perform a water balance (AWWA Water Audit Software) to calculate NRW across their system. • With hourly AMI consumption data for all customers, this type of water balance could be performed both more accurately and on a more frequent basis, allowing utilities to identify and react to significant changes in NRW percentage. • Dynamic water balance could be implemented either on the entire system or just smaller more problematic parts of the system.	**Discussion Points:** • What is the variable production cost of water (to be applied to real losses)? • How often is this calculation performed? **Discussion Outcomes:** • Thunder Bay has utilized the AWWA water audit tool on occasion, but it is not a standard practice. • This will help monitor where we are losing water, however this does not tell us where the losses are. • Currently at 32% NRW, and this will help break this down. Ontario typically sees 20%-30% on average. • Aging infrastructure is an important topic for all water utilities. • Categorizing the losses will allow Thunder Bay to decide on what approach to use. • Note that reducing water loss has carry-on benefits through the reduction in energy consumed to treat and pump water as well as the greenhouse gases generated from that energy.	**AMR** (ZERO) – Not able to perform this calculation. Would not allow this type of program to be implemented. **AMI** (FULL) – Requires: • Meters on all water sources and to be set up as a revenue meter. • MDM can group and calculate water loss. Consumption information can be summed up and monitored on a frequency of the utility's choosing (monthly, weekly, daily) and can be compared to SCADA. MDM may be able to interface with SCADA to perform water loss calculation in a report or user interface, but this functionality is still in development within the system available.

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DS3	**(2) Important**	**Acoustic Leak Detection (ALD)**	• Acoustic Leak Detection (ALD) uses sensors to find and characterize sounds in the water system that are caused by leaks.
			• Typically, 1 ALD is required for every 10 meters (Dependent on distribution system & the technology used.)
			• Different approaches can be implemented:
			  ○ Permanent – sensors/loggers are permanently attached to the water system and transmit daily leak status. These devices may use a stand-alone communication network or may be read using an AMI network (vendor-specific).
			  ○ "Lift & Shift" – sensors are installed in an area and monitored for a period before being moved to another location.
			  ○ Leak Sensors and Headphones – crews are deployed with listening devices to survey an area.
				Discussion Points:
				• Does the City of Thunder Bay have an acoustic leak detection program?
				• What approach?
				• What is spent on this per year?
				• Potential to install permanent loggers that can be read through AMI system.
				
				Discussion Outcomes:
				• Thunder Bay utilizes a Hydrant AI leak and pressure monitoring system, currently on a pilot program basis.
				• Potential for Thunder Bay to reduce technologies related to ALD
				• The system identifies general location of potential leaks, but ground proofing is still required.
				• Pressure and transient monitoring are very valuable.
					AMR (ZERO) – Not applicable. Does not allow this type of program to be implemented.
					
					AMI (PART) **–** Can help facilitate these programs. Requires:
					• Acoustic ALD
					• Additional software to map it.
					The utility could install radio transmitters and acoustic monitoring devices on the water systems which would be collected by the AMI system along with the readings.

DS6a **DS6b**	**(1) Nice to Have** **(1) Nice to Have**	**Detect Backflow Events (Residential)** **Detect Backflow Events (ICI)**	• ICI customers often require backflow detection devices (single check, double check, reduced pressure detector, etc.) installed on certain types of water services and customers. Once installed, the devices need to be tested annually to ensure they continue to operate correctly. Depending on who is responsible for testing, the validation process may be more difficult. An AMI system can monitor certain accounts to ensure reverse flow does not exceed forward flow, indicating a backflow device is not operating correctly. These alerts or alarms then allow a water utility to monitor and respond quickly to backflow events. • Monitor those properties that have backflow. Often 5% to 10% of backflow devices can fail per year. Helps validate property owner testing programs and reduces cross contamination risks.	**Discussion Points:** • Certain meters can monitor any backflow (i.e., backflow detection) but most require more backward flow than forward flow to register the event. • What is the City of Thunder Bay's policy on backflow preventers? • Who is responsible for testing and reporting the results? What is the frequency – annually? **Discussion Outcomes:** • Who is responsible for testing and reporting the results? What is the frequency – annually? • Important to know when they occur. • Residential is fairly low risk for distributions system. • Robust backflow program in place for ICI customers. • High pressure across the City of Thunder Bay (well above average) • Sensitivity of equipment – false positives – water flows backward when hot water tank expands. • May create more issues / unnecessary concerns.	**AMR** (PART) – Reverse flow could be monitored using the flags produced by the AMR register/ transmitter. The drawbacks are that AMR will not tell you when the reverse flow occurred, how much water flowed back through the meter, and you cannot set thresholds that would filter out very small reverse flow events. **AMI** (FULL) **–** The utility could set up reports based on hourly consumption information to monitor the backflow. If an event occurred, they would be able to tell when and how much water came back into the system. Can monitor it in real time. Can set thresholds (minimize false positives).

DS7	**(1) Nice to Have**	**Bylaw Enforcement**	• Support by-law compliance with water restrictions:
			  ○ Water bans.
			  ○ Odd / even lawn watering provisions.
			  ○ Support seasonal water pricing.
			• Often bylaw enforcement is dependent on customer complaints or utility personnel driving through neighborhoods to identify customers who are in violation of a water enforcement ban.
			• AMI technology can allow for monitoring of customer consumption and highlight those who may be violating the ban. Depending on the fines issued, this may increase utility revenues. Repeat offenders could also be flagged on a separate report to monitor them more closely.
				Discussion Points:
				• Does the City of Thunder Bay have regular water restrictions?
				• Does the City of Thunder Bay enforce bylaws?
				• Potential to Increased fines – would these be considered a financial improvement?
				• Under mandatory curtailment orders, fines can be levied.
				
				Discussion Outcomes:
				• Previous program of Odd & even watering days (15 years ago)
				• It might be useful if the capacity is stretched in the summer.
				• Climate change can exacerbate the capacity concern.
				• May be an issue if housing development occurs.
				• Would require policy change – may result in higher bills for irrigation usage.
					AMR (ZERO) – Not applicable. Does not allow this type of program to be implemented.
					
					AMI (FULL) **–** MDM requires reports / alerts that can identify and compare odd / even days and compare.
					The utility could set up reports that would monitor customers during water restriction events.

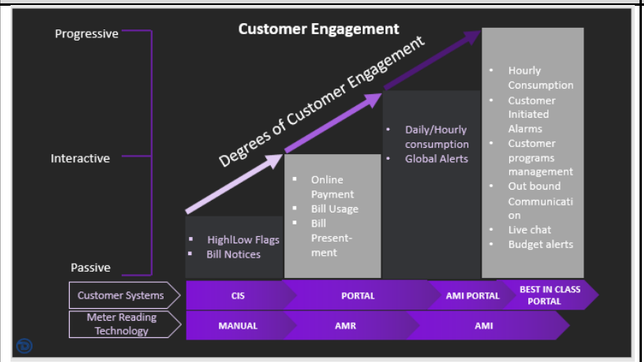
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				• Consider TOU for watering that doesn't conform to rules. • The burden of proof is quite high and may be difficult to actually take action.	

DS8	**(3) Critical**	**Pressure Monitoring**	• Monitor Pressure across the distribution system. Changes in pressure may:
			  ○ Indicate potential leaks.
			  ○ Reduce pressure - lower real water loss.
			  ○ Respond to customer complaints.
			• Pressure readings can be taken across a water system on a daily (or more frequent) basis. The pressure readings will either come from a pressure gauge or a non-mechanical water meter that is compatible with the selected AMI technology.
			• Pressure readings can be used for a few purposes:
			  ○ Better respond to customer pressure complaints.
			  ○ Monitor pressure for fire protection.
				Discussion Points:
				• Changes in pressure may:
				  ○ Indicate potential leaks.
				  ○ Reduce pressure to lower real water loss.
				  ○ Respond to customer complaints.
				• Does the City of Thunder Bay receive pressure complaints?
				• Would additional pressure information help distribution management?
				
				Discussion Outcomes:
				• Pressure drops are critical to be aware of.
				• Can identify areas that need PRVs – help guide investments.
				• Pressure runs high → leaks and fixture issues.
				• Low pressure – critical control point – pressure drops.
				• Some complaints about low pressure – may be as a result of a main break or other issues.
				• Could help with hydraulic model calibration.
					AMR (ZERO) – Not applicable. Does not allow this type of program to be implemented.
					
					AMI (PART) **–** Would require:
					• Water meter that transmits pressure or 3rd party pressure monitor that is compatible with the RF network.
					• Meter and AMI manufacture to be the same.
					• Likely need to API to interface with hydraulic modelling software.
					AMI technology needs to either have a radio transmitter that can communicate and pull pressure readings from a pressure device or the AMI technology in combination with a water meter capable of monitoring pressure (manufacture specific).

DS9	**(1) Nice to Have**	**Temperature Monitoring – Frozen Services**	• Monitor temperature on shallow services. • Be able to proactively respond to freezing temperatures.	**Discussion Points:** • To what extent is freezing an issue? **Discussion Outcomes:** • Some benefit for pipe freezing concerns. • Pipes are buried deep in Thunder Bay. • How would data be used if conditions are getting close to freezing levels (frost level). • Known areas/properties where freezing is a risk – no real value in knowing more detail.	**AMR** (ZERO) – Not applicable. **AMI** (PART) **–** Would require: • Water meter that monitors and transmit temperature (C715) • Meter and AMI manufacture to be the same. • Alerts to be emailed within a reasonable timeframe
DS11	**(2) Important**	**Hydraulic Modelling**	• Using more detailed consumption information (specific time of day or seasonal) to allow the model to better model the system.	**Discussion Points:** • How often does Thunder Bay update or use the Hydraulic Model? With 8 pressure zones, would more pressure information be valuable? **Discussion Outcomes:** • Current Model is Info Water. • More data to feed to model will better calibrate the model. • New developments, shutdowns.	**AMR** (PART) – Improve monthly consumption forecasts. **AMI** (FULL) **–** Using data to predict different types of behavior. • Current relies on API's – ad hoc reports, not a direct connection.
DS12	**(1) Nice to Have**	**Wastewater Monitoring**	• Using the network to monitor wastewater overflow. • Using the network to monitor tank and reservoir levels. • AMI Vendors have endpoints devices that can be connected to other control devices (different product that connects to water), allows a 4-20mA connection.	**Discussion Points:** • How is this performed currently? Would there be any benefit to having an AMI network support this function? **Discussion Outcomes:** • Not all residents have wastewater. • Combined System down to less than 1km	**AMR** (ZERO) – Not applicable **AMI** (PART) **–** Endpoints that connect. to 4-20mA.

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				• I&I greatly reduced after the combined sewer work. • System almost all gravity fed – only 4 lift stations. • Interested in tying in level sensors – need to do an I&I study (CLA requirement). • AMI would help to create a baseline and peak usage.	• Some meter vendors offer 4-20mA connection.
DS13	**(1)** **Nice to Have**	**Water Quality Monitoring**	• Using the network to monitor water quality (pH, chlorine, etc.) • Still very much a field in development for many vendors.	**Discussion Points:** • Would more frequent readings be of value to the City of Thunder Bay? • How common are water quality complaints? • What type (colour, pressure, taste). **Discussion Outcomes:** • Staff sample at flushing and sampling points. • Station sampling as well. • Monitor chlorine residuals.	**AMR** (ZERO) – Not applicable **AMI** (PART) – Radio transmitters that accept 4-20 mA output. • Still in development for many vendors. • There are marketing materials, but how proven they are is uncertain.
			Enhanced Customer Service (CS)		
CS1	**Not scored, see CS2, CS3 below**	**Customer Engagement** **General**	 • Utilities often start with lower levels of customer engagement usually defined as reactive responses to customer complaints or passive notices included on water bills. • As a utility starts to allow for on-line web access to water bills (for viewing and payment), this provides a higher level of service and engagement for the customer; however, the utility is reliant on the customer to initiate the engagement.	**Discussion Points:** • Thunder Bay is already at this level of customer engagement. **Discussion Outcomes:** • Critical to maintain what is happening now and improve on it as part of the AMI initiative. • 500 calls / month • New customer portal – Diane testing • Can pay bills online. • Improvement – up to level with Enbridge • Currently moving from Passive to Interactive • Aging population – may not use system. • Live chat – enables multiple communications at once.	**AMR** (FULL): AMR readings will support a passive engagement where the customer can decide to view their billable consumption. This level of engagement is usually driven more by the Customer Information System than meter reading technology. **AMI** (FULL): Would achieve the goal on a passive customer engagement. But not really required.
CS2	**(3)** **Critical**	**Customer Engagement** **Interactive**	• As a utility applies AMI technology that includes a customer portal, the engagement becomes more interactive. • Customers can access better consumption graduality (hourly buckets as compared to monthly) and potentially be sent consumption flags (continuous leak, intermittent leak) allowing them to better understand their consumption behavior. • The utility can also start to establish global leak flags that allow notifications to be proactively sent to all customer		**AMR** (PART): AMR readings will support a passive engagement where the customer can decide to view their billable consumption. Displaying consumption flags could enhance the level of engagement especially when a continuous leak flag could be displayed for a customer complaining of a high bill.

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			meeting certain consumption conditions (i.e., 500% of daily average consumption over a 5-day period) via the customer portal credentials (Email, text).		Some interactive engagement but likely would fall short in several areas. Requires a portal. **AMI** (FULL): AMI technology would allow customers to view hourly consumption to better understand their consumption behavior. This would depend on the AMI vendor's ability to provide a consumption customer portal that would receive customers' credentials from the existing customer portal or payment provider. Typically, the AMI consumption portal will include some global consumption alerts but may not distinguish between customer type or meter size (where consumption patterns may be significantly different). • Alerts and consumption views would allow more interactive. More advanced Portal is likely required
CS3	**(3) Critical**	**Customer Engagement** **Progressive**	As a utility moves towards "best in class" customer engagement, it allows: • customers to personalize their own leak or bill notifications, • provide workflows that help customers proactively investigate consumption, • consumption algorithms that can identify different types of consumption behavior (continuous overnight consumption, leaking toilet or irrigation system, on-even water ban violators) with a high degree of accuracy and provide workflows that help adjust this behavior.	**Discussion Points:** • Best in class customer portals. • AMI functionality related to consumption, leaks. • Conservation program management. • Communications **Discussion Outcomes:** • Enables customers to detect leaks. • Strong link to Council priorities (enabling customer service, digital strategy). • Paperless billing is a strong incentive. • Improving staff tools to provide enhanced service is a corporate goal. • Customers will have access to enhanced tools.	**AMR** (PART): AMR readings will support a passive engagement where the customer can decide to view their billable consumption. Displaying consumption flags could enhance the level of engagement especially when a continuous leak flag could be displayed for a customer complaining of a high bill. Some interactive engagement but likely would fall short in several areas. Requires a portal. **AMI (FULL):** AMI technology and a best-in-class customer engagement platform would provide the "personalized" service through customized alerts, and resolution workflows. The customer engagement portal would be connected to the existing customer portal seamlessly through the passing of customer credentials, completely invisible to the customer. • Improve engagement from utility. • Improve engagement from the customer.

CS4	**(2) Important**	**Leak Detection - Small**	• Two types of customer side leak detection:
			  ○ Continuous / intermediate consumption
			  ▪ High consumption for a short period of time (300% over a 3-day period)
			  ○ Utility set threshold
			  ▪ Customer set thresholds
			  ▪ Water budgets
			• Provides the utility with an improved ability to respond to customers' high-water bill complaints.
				Discussion Points:
				• This type of customer side leak detection would allow customers to avoid large bills.
				• Small leak detection might be set up to trigger an alarm over a few days vs. a broken pipe which could trigger a more immediate alarm because of higher flows.
				
				Discussion Outcomes:
				• Likely 1000s occurring throughout the distribution system.
					AMR (PART) – Would only do continuous leak detection. Need bill print adjustment or a portal to display.
					
					AMI (FULL) **–** A combination of AMI and customer portal will achieve this.
					
					Will provide hourly consumption data to use for consumption alerts that includes:

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			• AMR equipment includes algorithms that determine a continuous or intermittent leak. Different types of yes/no flags can provide a billing agent with indication that a leak has occurred at a property. • AMI system has the enhanced capability to detect in near real time. • This reactive approach helps a utility better service its customers.	• Litre precision allows for very fine / slow leak detection. • Would avoid a significant % of large water bills	• Continuous leaks over a utility defined period of time. • Intermittent leaks over a utility defined period of time. • High consumption (X% over daily average consumption) over a utility defined number of days. Utility-defined threshold that eliminate customers with very small leaks from being notified.
CS5	**(2) Important**	**Leak Detection – Broken Pipe**	• Provides a utility with the ability to set global alerts to initiate customer service or field personnel to contact a customer because it appears a pipe has broken based on the volume of water going through the meter. • Would provide a “real time” alert if the consumption match ~80% of the service capacity for a 1-to-4-hour period.	**Discussion Points:** • Would this be of value? • How many broken pipe complaints does the City of Thunder Bay receive in a year? **Discussion Outcomes** • There have been significant high bills from unintended use • Some situations involve senior management and political representations	**AMR** (ZERO) – Not applicable. **AMI** (FULL) **–** Set global leak thresholds and great alerts for when consumption meets 75% or greater hourly flow based on the service size. • Available on most • Bubble up/Wake up functionality would be important
CS6	**(0) Not Important**	**Vacation Monitoring**	• Allow a customer to set a vacation alert that will tell them if water is being used when it should not be. This would be set up through a customer portal which allows for an alert to be sent. • Customer established zero consumption alarm. • Where consumption exceeds a customer-defined amount, they receive an alarm.	**Discussion Points:** • Would this be of value to your customers? • Does the City of Thunder Bay have many seasonal residences or snowbirds? **Discussion Outcomes:** • Concern around infringing on privacy • With an advanced customer portal, this could be entirely customer controlled • Has not been a concern up to this point	**AMR** (ZERO) – Technology does not provide enough data to achieve this functionality. **AMI** (FULL) – Customer driven zero consumption monitoring. Customers can set thresholds for alerts to be sent to them. Alerts include: • Vacation/vacant notice • Customer driven zero consumption monitoring. • AMI and Customer Portal would be critical.
CS7	**(3) Critical**	**Customer Portal Adoption / Paperless Billing**	• Move customer from printed bills to paperless bills. • Added functionality to the Customer Portal can increase participation • Cost benefit of reducing printed bills.	**Discussion Points:** • Would this be of value to your customers? **Discussion Outcomes:** • Important to digital strategy. • Going paperless also builds database of email addresses. • Enables better communication. • There will be a specific customer portal discussion to assess the capabilities of Infor Dynamic	**AMR** (PART) – Technology can provide improved data presentment from current data collection system. **AMI** (FULL) – AMI with Portal can offer enhanced functionality that provides incentive to register for portal.
Water Conservation / Societal Benefi					

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ts (WC)					

SB1	**(2) Important**	**Water Conservation Program Support**	• User consumption data to support:
			  ○ Reduction of peak water demand
			  ○ Measure impact of conservation initiatives (Low flow device programs, top dressing, outreach programs, etc.)
			• There are several different types of water conservation programs that focus on changing customers' water consumption behavior. The types of programs that are implemented within a utility really depend on the challenges faced, customers groups (residential, commercial, and industrial) and the type of usage the utility is targeting (indoor usage, outdoor usage). AMI technology can promote water conservation by providing information to customers which enables them to change their behavior.
			• The greatest benefit - the ability to target customers meeting a specific consumption profile and to measure the effects water conservation programs have on reducing water consumption. As a result, program dollars can be better targeted and utilized towards programs that are proven to be the most effective.
				Discussion Points:
				• AMI by itself doesn't initiate conservation but does help support conservation programs and understand program effectiveness.
				• City of Thunder Bay conservation programs – can technology better support these programs?
				• Water conservation solutions to align with climate change, drought, stormwater, and land use planning.
				
				Discussion Outcomes:
				• Focus has been on the customer, and how can the utility assist with conserving water.
				• A customer portal can be a very useful tool in communicating water conservation practices.
				• Included in Thunder Bay's Quality Management report as a Utility goal.
					AMR (ZERO) – Not applicable.
					
					AMI (FULL) – Hourly and daily consumption data can be used to support conservation initiatives. Using hourly consumption data in combination with grouping and report functionality from an MDM, water conservation programs can be measured for their impact on water reduction.

SB2	**(3) Critical**	**Climate Change / Greenhouse Gas Reduction (GHG)**	• Ability to avoid increased CO2 and other GHG emissions (no truck rolls to collect reads with AMI). Every vehicle taken off the street results in a 10,215 lb or 4,643 kg reduction in CO2 per year. • Real water loss represents lost energy to pump water that never reaches the consumer. • Reduce NRW → reduce energy → reduce GHG.	**Discussion Points:** • Does this tie to some of the goals already discussed? • Water conservation solutions to align with climate change, drought, stormwater, and land use planning. **Discussion Outcomes:** • Thunder Bay has a goal to be carbon neutral by 2050. • The with the City of Thunder Bay's Energy Analyst helped determine energy consumption and GHG footprint.	**AMR** (ZERO) – Not applicable. **AMI** (PART) – AMI is effect in helping address Water Loss Management, customer leaks and Apparent Losses results directly in energy savings. Further, the ability to understand customer demand patterns as well as system demands might change water pumping strategies and contribute to energy savings if water can be pumped during "off peak" times.
SB3	**(3) Critical**	**Climate Change / Energy Cost Reduction**	Real water loss represents lost energy to pump water that never reaches the consumer. • Reduce NRW → reduce energy.	**Discussion Points:** • Would this be a benefit? **Discussion Outcomes:** • Thunder Bay has a goal to be carbon neutral by 2050. • It is important to understand how water pumping is powered to assess the carbon footprint. • Thunder Bay has an Energy Analyst to assist in analyzing.	**AMR** (ZERO) – Not applicable. **AMI** (FULL) • Eliminates vehicles from the meter reading process. • Reduction of water loss → less energy consumed → less GHG produced.
			Smart Cities (SC)		

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SC4	**(1)** **Nice to Have**	**Wastewater Monitoring**	• Using the network to monitor wastewater overflow. • Using the network to monitor tank and reservoir levels. • AMI Vendors have radio transmitters devices that can be connected to other control devices (different product that connects to water), Allows a 4-20mA connection.	**Discussion Points:** • How is this performed currently? • Would there be any benefit to having an AMI network support this function? **Discussion Outcomes:** • It is important to ensure we look at all accounts that do not have wastewater service (approximately 10%) • Combined sewers have essentially been eliminated. • Thunder Bay does not have a sewer overflow problem. .	**AMR** (ZERO) – Not applicable. **AMI** (FULL) **–** Radio transmitters the accept 4-20 mA inputs. • Some AMI vendors enable this capability, typically using a specialized radio transmitter or interface that converts 4-20mA single to a standard encoder protocol.

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4. DATABASE ASSESSMENT AND WORK TYPE RECOMMENDATIONS

4.1. Introduction

The data analyzed represents the City of Thunder Bay's meter population as of December 31, 2023.

Two levels of data granularity were considered. The first is at the account level and represents one record per water service. The second, at the meter reading level, represents the quarterly meter reading data for each of the accounts, so it has on average four readings for every metered service.

The raw data provided by the City of Thunder Bay was not altered. Diameter added new columns of data that enabled further clarification or classification of records. These new columns are identified in the database.

Since a decision to update the metering and meter reading system will only impact volumetric revenue, the water or wastewater charges shown in the analysis represent only the volumetric portion of the charges, exclusive of fixed charges that may also be assessed.

For the purposes of the analysis, the term "work type" is used to categorize tasks that will need to be done to enable each water meter to communicate using the proposed technology. For example, in some cases the work type will be the replacement of the meter and the installation of a radio transmitter. In other cases, the water meter may have residual value and does not need to be replaced.

4.2. Water Meter Assessment

4.2.1. Meters by Size and Type

The City of Thunder Bay's existing installed base consists of 37,990 active meters. Note that 209 records with "Account_Status" of "I" for Inactive, were excluded from the analysis.

The table below shows the City of Thunder Bay's meter count by meter size (in mm) and meter type.

Exhibit 6: Meter Count by Size and Type.

Meter Count	Meter Type				
Row Labels	Positive Displacement	Turbine	Compound	Fire Service Compound	Grand Total
SM	**37,001**				**37,001**
15	10,325				10,325
15x20	25,344				25,344
20	585				585

Meter Count Row Labels	Meter Type Positive Displacement	Turbine	Compound	Fire Service Compound	Grand Total
25	747				747
IM	**605**	**233**	**1**		**839**
40	318	138			456
50	287	95	1		383
LM		**136**	**13**	**1**	**150**
75		87	6		93
100		37	3		40
150		4	2		6
200		3			3
250		5	2	1	8
Grand Total	**37,606**	**369**	**14**	**1**	**37,990**

4.2.2. Meters and Annual Consumption by Size

The table below shows the meter count and the annual consumption of water for each meter size. This information is helpful to understand the proportion of the City of Thunder Bay's total water consumed by meter size as well as the average annual consumption by meter size.

Exhibit 7: Meter Count and Consumption by Meter Size

Row Labels	Meter Count	Annual Consumption (m^3)	Annual Consumption (m^3) per Meter
SM	**37,001**	**5,826,152**	**157**
15	10,325	1,390,174	135
15x20	25,344	3,804,146	150
20	585	177,072	303
25	747	454,760	609
IM	**839**	**1,678,013**	**2,000**
40	456	719,530	1,578
50	383	958,483	2,503
LM	**150**	**3,110,003**	**20,733**
75	93	615,822	6,622
100	40	874,828	21,871
150	6	33,720	5,620
200	3	590,981	196,994
250	8	994,652	124,332

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Row Labels	Meter Count	Annual Consumption (m^3)	Annual Consumption (m^3) per Meter
N/A[4]	**0**	**117,944**	**0**
N/A	0	117,944	0
Grand Total	**37,990**	**10,732,112**	**282**

*

4.2.3. Meters by Customer Type

The table below shows the City of Thunder Bay's meter count by account type and meter type.

Exhibit 8: Meter Count by Account Type and Meter Type.

Meter Count	Meter Type				
Row Labels	Positive Displacement	Turbine	Compound	Fire Service Compound	Grand Total
RESIDENTIAL	**33,813**				**33,813**
COMMERCIAL	**3,469**	**162**	**1**		**3,632**
MEDIUM TO LARGE COMMERCIAL	**199**	**82**	**6**	**1**	**288**
MULTIRESIDENCE	**72**	**75**	**2**		**149**
INSTITUTIONAL	**40**	**41**	**4**		**85**
LARGE INDUSTRIAL	**13**	**9**	**1**		**23**
Grand Total	**37,606**	**369**	**14**	**1**	**37,990**

The total annual consumption by account type, along with the volumetric water and wastewater charges are shown in the table below. Charges are calculated based on the City of Thunder Bay's published "2023 Sewer & Water Rates". Fixed charges are excluded. Sewer charges are based on 90% of the volumetric water charge.

Exhibit 9: Meter Count and Revenue Impact by Account Type

Row Labels	Meter Count	Annual Consumption (m^3)	Water Charge	Sewer Charge	Total Charge	Average Annual Charge
RESIDENTIAL	**33,813**	**4,775,468**	**$9,283,510**	**$8,355,159**	**$17,638,669**	**$522**
COMMERCIAL	**3,632**	**1,968,473**	**$2,358,231**	**$2,122,408**	**$4,480,638**	**$1,234**

[4] The data provided by the City includes 292 accounts that are noted not to include a meter. Many of these accounts are listed as having a private hydrant, water delivery, or flat rate. Two of these accounts, both for an industrial customer, account for the 117,944m^3 consumption in the table above.

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Row Labels	Meter Count	Annual Consumption (m^3)	Water Charge	Sewer Charge	Total Charge	Average Annual Charge
MEDIUM TO LARGE COMMERCIAL	288	1,159,720	$1,389,345	$1,250,410	$2,639,755	$9,166
MULTIRESIDENCE	149	652,263	$781,411	$703,270	$1,484,681	$9,964
INSTITUTIONAL	85	687,467	$823,585	$741,227	$1,564,812	$18,410
LARGE INDUSTRIAL	23	1,488,721	$1,783,488	$1,605,139	$3,388,627	$147,332
WATER DELIVERY	0	0	$0	$0	$0	
PRIVATE HYDRANT	0	0	$0	$0	$0	
Grand Total	37,990	10,732,112	$16,419,569	$14,777,612	$31,197,182	$821

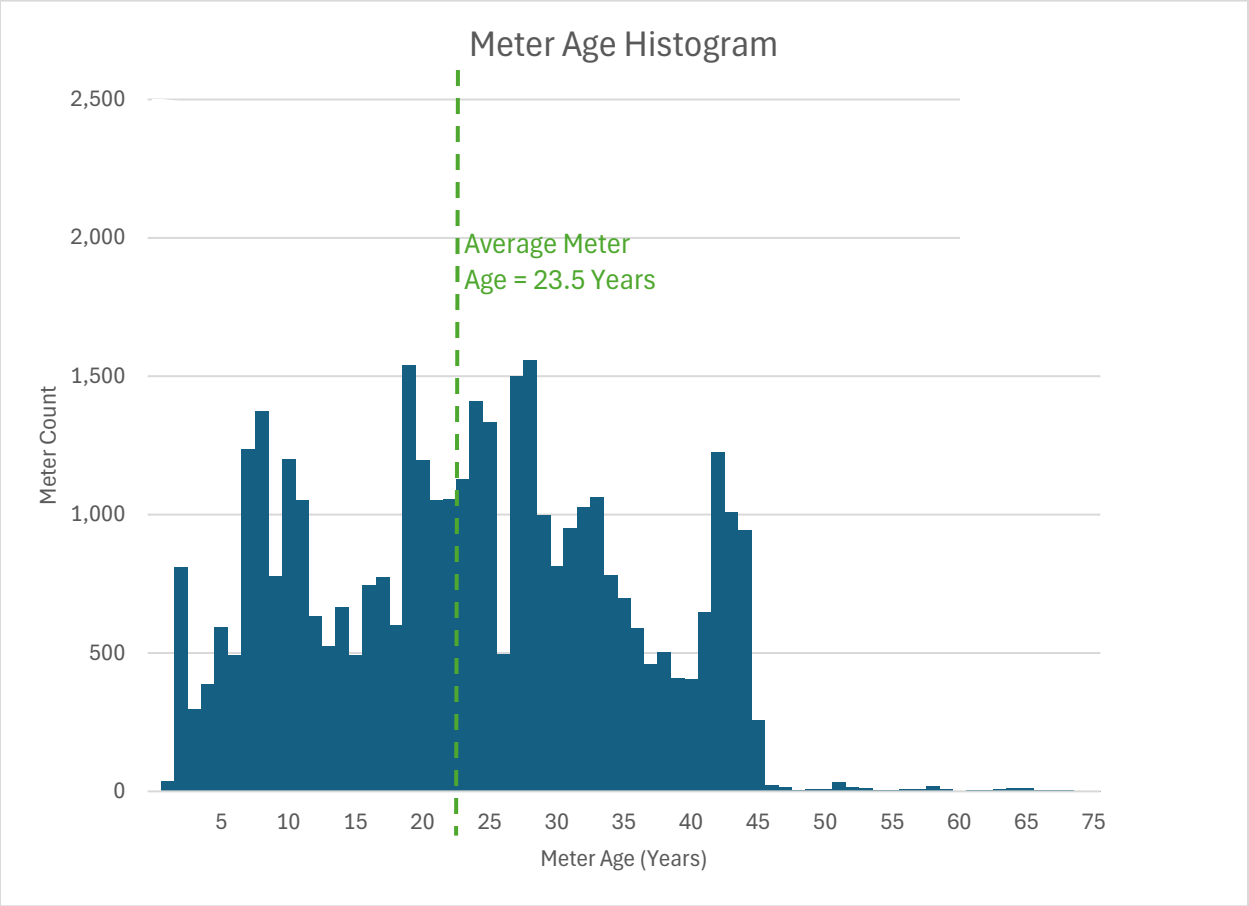
4.2.4. Meter Age

The graph below illustrates the age of the City of Thunder Bay's meter population, showing a count of meters for each year since the meters were installed. On average, the City of Thunder Bay's meter population is 23.5 years, with some meters greater than 40 years old.

While practices vary, general industry practice is to replace meters when they reach 15 to 20 years of age to ensure optimal accuracy relative to replacement cost.

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Exhibit 10: Meter Age Histogram Showing Meter Count by Age



4.2.5. Why Meter Age is Important

Water meter age is generally reflective of usage. As cumulative consumption increases, mechanical meters wear resulting in accuracy decline, causing the meters to under-register. The decline in meter accuracy for a population of meters is generally steady and predictable.

The industry standard estimate is that mechanical water meters, such as those in use throughout the City of Thunder Bay, will lose 6% measurement accuracy for every 20 years of service. For the purposes of this analysis, a more conservative assumption of 4.5% accuracy decline over 20 years was assumed, so as not to overstate the impact of a meter replacement program.

4.2.6. Estimated Water Meter Accuracy

Based on the age of the City of Thunder Bay's meter population, it is estimated that the City's overall meter accuracy is 94.7%. This level of accuracy results in annual water loss of 500,000 m^3 of water, valued at $1.5 million based on combined water & sewer volumetric charges.

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Exhibit 11: Meter Age Histogram with Overlayed Meter Accuracy Estimate

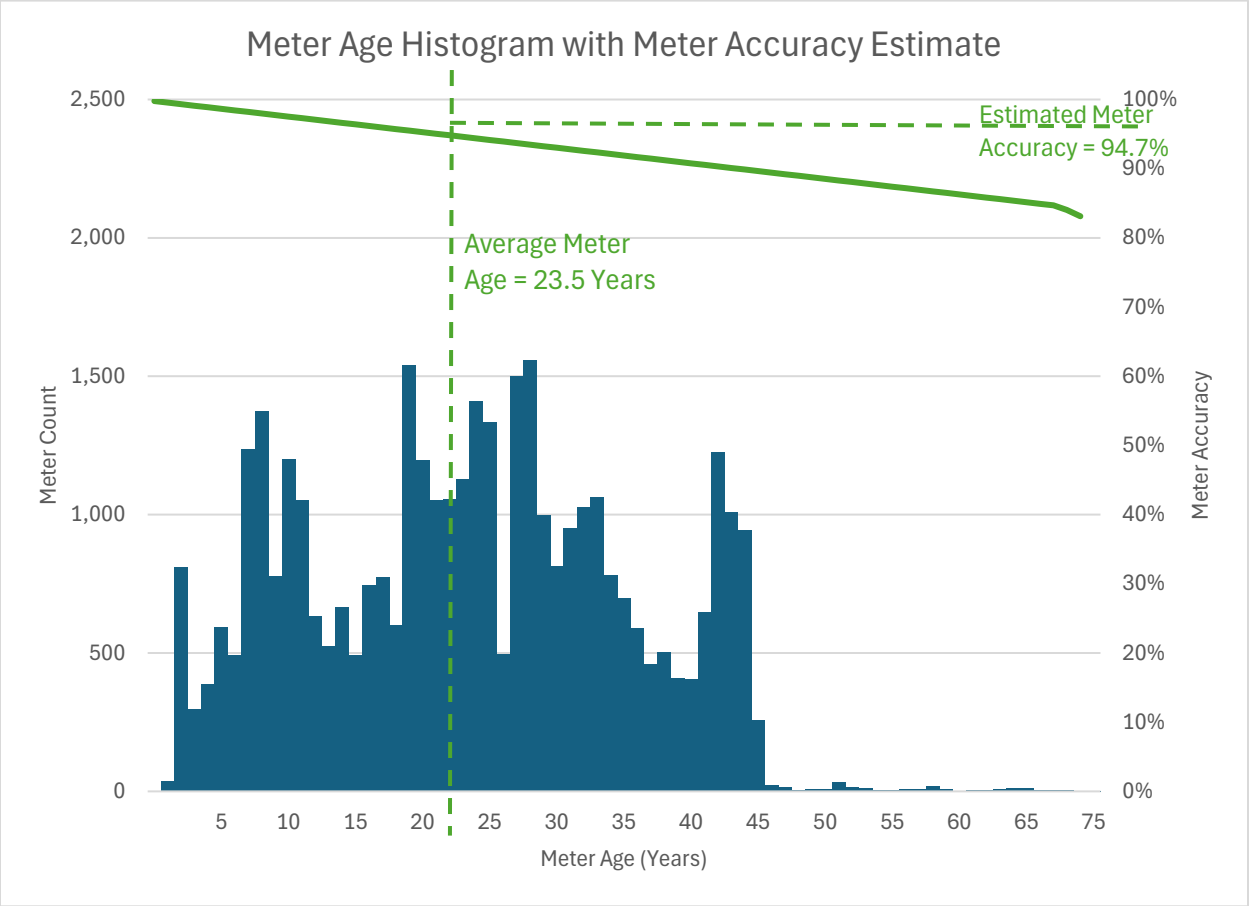
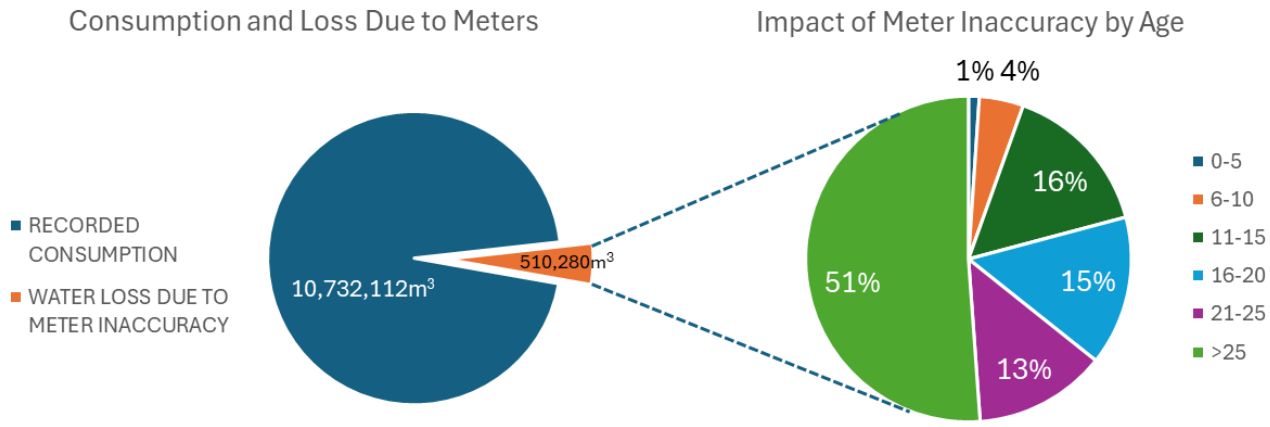


Exhibit 12: Meter Count by Work Type with Meter Accuracy, Water Loss and Revenue Loss

Work Types	Meter Count	Ave. Meter Age	Annual Consumption (m^3)	Water Loss (m^3)	Total Charge	Est. Revenue Loss
REPLACE	**33,491**	**25.8**	**10,014,433**	**501,214**	**$28,980,933**	**$1,515,880**
PRE-2002	20,459	32.7	3,940,168	305,449	$12,551,032	$980,075
PRE-2014	11,533	16.4	5,267,391	184,337	$14,147,479	$502,875
PAYBACK<5	1,219	7.5	773,264	11,275	$2,162,450	$32,388
ZENNER	267	2.0	33,610	152	$119,972	$542
N/A	13	5.2	0	0	$0	$0
UPGRADE	**4,499**	**6.0**	**717,679**	**9,066**	**$2,216,249**	**$28,316**
UPGRADE	4,499	6.0	717,679	9,066	$2,216,249	$28,316
Grand Total	**37,990**	**23.5**	**10,732,112**	**510,280**	**$31,197,182**	**$1,544,196**

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Exhibit 13: Water Loss due to Meter Accuracy by Meter Age Group



4.2.7. Lead Content

Avoiding lead exposure is a critical health issue that water utilities throughout North America are addressing. While there are many potential sources of lead in our drinking water, it should be noted that older, bronze-body water meters typically contain between 5% and 7% lead.

Meter manufacturers generally converted production from leaded bronze to lead-free bronze alloys between 2001[5] and 2005. Regulations followed to enforce this change in the market in 2008[6].

The removal from service of any meters that pre-date this change will have the benefit of further reducing any potential lead exposure in the community.

4.3. Meter Reading Data Assessment

4.3.1. Introduction

In addition to the meter-level data, the City of Thunder Bay provided quarterly meter reading data. This allowed the analysis of total consumption, volumetric revenue, and meter reading source information.

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[5] Neptune converted to no-lead bronze in 2001, Badger in 2005.
[6] NSF/ANSI/CAN 60 and 61 Through History states: “In December 2008, Annex G was introduced to NSF/ANSI 61, which set parameters for meeting 0.25% lead content requirements. This allowed product manufacturers to show compliance with laws with lead content requirements, such as California law AB 1953. The requirements of Annex G were moved to NSF/ANSI 372. Annex G became only a reference to NSF/ANSI 372 if lead content verification methods were required.” https://www.nsf.org/knowledge-library/nsf-ansi-can-60-61-history, accessed November 7, 2023.

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4.3.2. Meter Reading Sources

With most of the City of Thunder Bay's meters located in basements with no remote reading capability, the City relies heavily on customers to provide readings (45.6%) and when those readings are not provided, estimates are made by the City (36.6%). As a result, only 17.7% of all readings were actually generated by a City meter reader.

The table below provide details on the breakdown of meter readings and their sources.

Exhibit 14: Meter Reading by Source Detail for 2023

Source	Definition	Count	%
Customer	Interactive Voice Response - customer reading	37,152	24.8%
Customer	Customer enters reading via WEB interface	21,354	14.2%
Customer	Customer Phoned in reading	8,944	6.0%
Customer	FINAL reading - homeowners call in - out & in reads	1,749	1.2%
Customer	CARD read - customer sends in card with reading	963	0.6%
Readings Subtotal		**70,162**	**45.6%**
Estimate	Estimate	54,776	36.5%
Estimate	Manual Estimate calculation	154	0.1%
Estimate	FLAT rate	4	0.0%
Subtotal		**54,934**	**36.6%**
Actual	HandHeld	24,525	16.4%
Actual	Correction	294	0.2%
Actual	Actual reading from the meter shop team	44	0.0%
Actual	Meter Exchange	1	0.0%
Actual	Vacant premises	1	0.0%
Subtotal		***24,865***	***17.7%***
Total:		**149,961**	**100.0%**

For comparison purposes, most water utilities measure their meter reading performance against a standard approaching 100% of all meters in each reading cycle.

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4.3.3. Zero Consumption Meters

In 2023, there were 86 meters that showed zero consumption for the entire year. Zero consumption is typically caused by one of three different reasons:

- Vacant property
- Unauthorized use of water
- Meter malfunction

Diameter has provided a list of these meters to the City of Thunder Bay for follow up.

4.4. Work Type Recommendations

4.4.1. Introduction

In order to determine the cost of a metering program, it is important to break the work by work type and determine which meters need to be replaced, which can be upgraded, and which can be retrofitted. The evaluation outlined in section 4.2 Water Meter Assessment has resulted in the recommendation to replace approximately 33,500 meters and upgrade the remaining 4,500 meters.

The table below provides a summary of the logic.

Exhibit 15: Work Type Summary

Work Type	Description	Logic	Meter	Register	Radio
REPLACE	The existing meter has limited residual value and will be replaced with a new meter and installation of a radio on the outside of the building.	• Meters pre-2014: lead content of meters (pre-2002) + lower accuracy *(Qty = 32,005)* • Payback <5 years: meters post-2014 that have high enough revenue loss to justify replacement *(Qty = 1,219)* • Zenner meters: these meters are not compatible with high resolution encoders *(Qty = 267)*			

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Work Type	Description	Logic	Meter	Register	Radio
UPGRADE	The existing meter body has residual value and will be upgraded with a new register and installation of a radio on the outside of the building.	• Meters purchased prior to January 2024 that do not meet qualifiers for replacement *(Qty = 4,499)*			
RETROFIT	The existing meter is AMI-compatible and will be retrofitted with the installation of a radio on the outside of the building.	• The specification for meters purchased by the City of Thunder Bay after January 2024 was changed to ensure that these meters are “AMI compatible” and can be retrofitted with a radio transmitter. *(Qty = 0 since no meters in 2023 database are AMI-compatible.)*			

4.4.2. Water Meter Replacements

Meter replacement entails the full replacement of the existing meter body and register with a new meter and high-resolution register and installation of an AMR/AMI radio transmitter.

Diameter recommends replacing meters that are 10 years old and older as these meters have little residual value. Furthermore, by the end of a 20-year system upgrade, these meters will be approaching 30 years of age.

Additionally, the City of Thunder Bay has a population of meters that, based on their high annual consumption, should be considered for replacement as well. A secondary analysis was performed to identify meters where replacing the meter resulted in a payback of less than 5 years, and these meters should also be targeted for replacement.

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In a previous meter bid, the supplier provided approximately 500 Zenner meters, 267 of which had been installed as of January 2024. These meters are not upgradeable with high-resolution encoder registers, and therefore do not support migration to AMR or AMI. Diameter recommends that these meters be replaced, even though they have only been in service for about 2 years.

4.4.3. Water Meter Upgrades

A water meter upgrade entails reuse of the existing meter body, with the retrofit of a high-resolution register and installation of a radio transmitter. Diameter recommends the upgrade of existing meters that are less than 10 years old and that do not have high annual usage.

It should be noted that the City of Thunder Bay can alter this strategy and increase the number of replacements if the price differential between a replacement meter and a replacement register is low.

4.4.4. Water Meter Retrofits

A water meter retrofit would be considered where the water meter has residual value, and a high-resolution encoder register that is capable of supporting an upgrade to AMR or AMI.

No meters in the City of Thunder Bay's meter population as of January 2024 are recommended for retrofit.

Note that meters the City of Thunder Bay has purchased since January 2024 can be upgraded to AMR or AMI. It is our understanding that these meters are currently being deployed and would be included in future meter database exports, should an AMI/AMR project proceed to the next stage.

4.4.5. Work Types

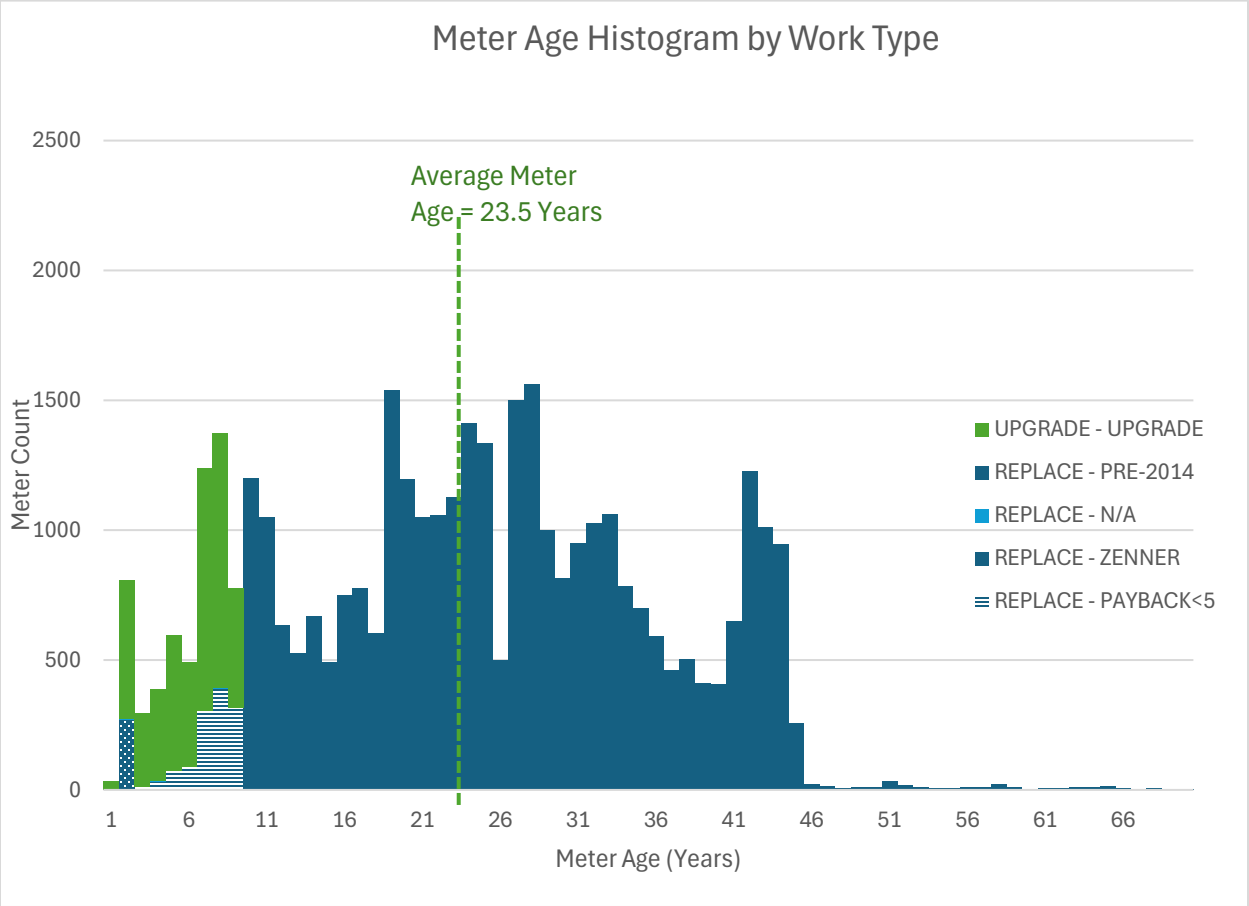
Based on the criteria outlined above, and analyzing Thunder Bay's meter inventory, the following work types have been determined.

- Replace 33,491 meters
- Upgrade 4,499 existing meters with AMI-compatible registers
- Retrofit any new meters purchased since January 2024 with a radio transmitter since these meters are already AMI-compatible.

Graphically, the work types are shown below in Exhibit 16: Meter Age Histogram by Work Type.

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Exhibit 16: Meter Age Histogram by Work Type



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5. CAPITAL AND LIFECYCLE COST ESTIMATES

5.1. Introduction

The financial assessment builds on the database analysis. The financial model that was developed incorporates both the initial capital costs and the financial and operational impacts on the key Utility functions including: meter reading, meter maintenance, customer service and billing, Information Technology (IT) and distribution system management. The financial model allows the City of Thunder Bay to compare the financial implications of the key technologies that are the most applicable. Each technology has been set up as a different scenario.

5.2. Scenarios

The financial model compares three technology scenarios to the existing meter reading scenario at the City of Thunder Bay. The three scenarios area 1. AMR Mobile (Drive By), 2. AMI (Thunder Bay owned), 3. AMI (Cellular). For comparison purposes, the scenarios, technology, and key assumptions are detailed below:

Exhibit 17: Financial Model Scenarios

Scenarios	Description
Scenario 0 – Existing Situation – Manual Meter Reading with meter replacements over a 20-year period.	This scenario assumes that the City of Thunder Bay will replace 2,000 meters per year. This scenario also assumes that a remote reading device will be installed during the replacement and Thunder Bay will assume responsibility for reading all meters.
Scenario 1 – AMR Drive By	This scenario assumes that City of Thunder Bay will install radio transmitters as well as perform meter replacements over a 31-month period (6-month startup, 25-month production). This will allow Thunder Bay to read all meters using a mobile data collector solution. Water meters would be replaced according to the replacement criteria (Section 4.4.5).

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Scenarios	Description
Scenario 2 – AMI Thunder Bay Owned	This scenario assumes that Thunder Bay will install radio transmitters as well as perform meter replacements over a 31-month period (6-month startup, 25-month production). This assumes a standalone AMI system is deployed across the City's entire service territory. Water meters would be replaced according to the replacement criteria (Section 4.4.5).
Scenario 3 – AMI Cellular Network	This scenario assumes that Thunder Bay will install radio transmitters as well as perform meter replacements over a 31-month period (6-month startup, 25-month production). It further assumes the network infrastructure would be owned by a third party and operate across a cellular (or similar) network. Thunder Bay would pay a monthly fee to access the network. Water meters would be replaced according to the replacement criteria (Section 4.4.5).

5.3. Revenue Improvement

One way to improve revenue is to replace aging meters. As mechanical water meters become older their component parts wear and the meter becomes less accurate over time.

Testing all meters is not practical due to the cost and disruption of customers. There are, however, industry estimates based on large-scale testing that can be applied to provide an approximation of the metering system's accuracy.

It is a common assumption that mechanical meter accuracy declines at a rate of 6% over a 20-year period. In order to take a conservative approach to the meter accuracy improvements associated with the project, we have downgraded this approximation by 75%. In other words, we only assume that meter accuracy will decline by 4.5% over 20 years.

5.4. Revenue Improvement Calculation

The chart below shows the annual revenue improvements that can be expected by replacing the City of Thunder Bay's existing mechanical water meters with new mechanical meters. While mechanical meters generally have a life expectancy of about 20 years before needing to be replaced, the goal of

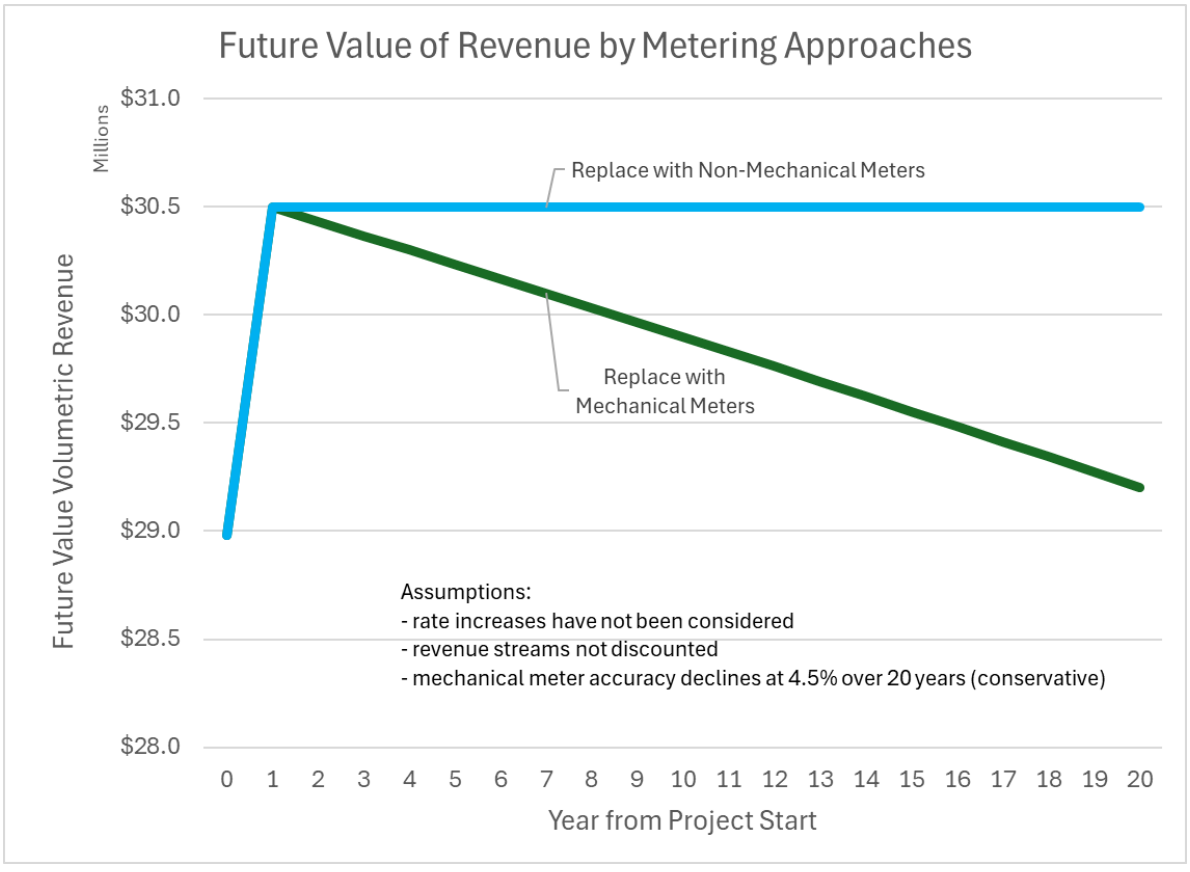
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the revenue improvement calculation is to show the accuracy improvement / revenue impact of the meters that will be changed.

It is expected that 33,491 meters will be changed as part of this project and the average age of those meters being replaced is 25.8 years old. While replacement mechanical meters are generally very close to 100% accurate upon installation, they too will wear and experience the same accuracy loss over time as the meters being replaced. That is, in 25.8 years the new meters will be no more accurate than the meters being removed as part of this project.

A graph is provided below to show the revenue projection over 20 years when installing mechanical meters and non-mechanical meters. For clarity, rate increases have not been considered. In 2023, the City of Thunder Bay's meters generated approximately $29 million in volumetric water and sewer revenue. As noted earlier, a conservative estimate of mechanical meter accuracy is that they decline 4.5% over 20 years. Once the City of Thunder Bay's meters are replaced with new non-mechanical meters which will capture roughly 100% of the available revenue, the expected volumetric revenue will increase to about $30.5 million per year. This is true for both mechanical and non-mechanical meters. While non-mechanical meters will retain their accuracy, mechanical meters will wear over time and result in the same 4.5% accuracy loss over 20 years. As noted in Section 6.7.8, non-mechanical meters require battery power and have an expected life of 20 years.

Exhibit 18: Revenue Projection Over 20 years



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5.5. Operational Impacts

Some operational cost calculations can be easily determined. If these costs are eliminated, there is a direct impact on the utility's operational budget. Other costs can be more difficult to estimate, especially when they are based on time estimates or a theoretical efficiency calculation. Both types of costs are included in the operational financial impact calculations.

The financial impact calculation for each technology scenario is expected to deliver an estimate; some savings may be tangible, and others may be intangible if they create efficiencies where headcount reductions may not be desired. The assumed changes, and the overall financial impact of these changes, are summarized by function: meter reading, customer service and water billing, and meter maintenance, distribution system management and IT support costs.

The assumptions and calculations for each functional area are detailed below.

5.5.1. Meter Reading Impact

The City of Thunder Bay's current meter reading process obtains water meter readings by three methods: manually obtained water readings by City staff, customer provided reads, and estimated meter reads. Meter reading frequency is quarterly and has an annual cost of $210,967, based on 2023 data.

The estimated meter reading costs and financial impact for Scenario 0 (Current Scenario) as compared to Scenarios 1, 2, and 3 when using AMR / AMI is summarized below.

Exhibit 19: Meter Reading Cost Impact by Scenario

	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Meter Reading Costs	$210,967	$69,303	$0	$0
Financial Impact	$0	$141,664	$210,967	$210,967

** The financial impact is what was used in the cashflow analysis.*

Note: A positive number is considered a "savings", a negative number is considered a "cost".

Scenario 1 would reduce the City of Thunder Bay's meter reading costs by $141,664 while Scenarios 2 and 3 would eliminate the entire $210,967 meter reading costs.

5.5.2. Water Billing and Customer Service

Within the customer service and water billing functions, there were several areas identified that could be impacted by the application of AMR / AMI technology. Some of these situations include estimated administration costs. Where technology may reduce the amount of effort required to resolve, we have calculated this as a cost reduction. In fact, it may be unlikely that the City of Thunder Bay will reduce their costs by these amounts, therefore they represent productivity improvements (efficiencies) or reductions.

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An explanation of the situations is as follows:

- Water Bill Estimates: where the billing agent could not obtain a valid reading, and they are required to estimate the water bill based on past consumption.
- High bill complaint: where a customer calls to complain about a high-water bill. This requires a truck roll in some instances and call center time with the customer.
- Zero Consumption: where consumption has not changed between the current and past reading.
- Non-Payment: costs associated with collecting payments.

Following review with the City of Thunder Bay's customer service and billing department project team members, the estimated impact that new technology will have on the above activities is summarized in the table below by Scenario.

Exhibit 20: Water Billing and Customer Service Impact by Scenario

Assumptions	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Change of Ownership (final read)	5% reduction	90% reduction	90% reduction
Meter Read High/Low bills	10% reduction	50% reduction	50% reduction
Meter Read High/Low bills - truck rolls	10% reduction	50% reduction	50% reduction
Meter Reading Corrections	90% reduction	90% reduction	90% reduction
Bill arrears activities	5% reduction	50% reduction	50% reduction
City Review Customer Provided Reading (IVR)	100% reduction	100% reduction	100% reduction
City Review Customer Provided Reading (WEB)	100% reduction	100% reduction	100% reduction
City Review Customer Provided Reading (PHONE)	100% reduction	100% reduction	100% reduction
City Review Customer Provided Reading (CARD)	100% reduction	100% reduction	100% reduction
Bill Dispute	10% reduction	90% reduction	90% reduction
Water Leak Credit process	10% reduction	65% reduction	65% reduction
Water invoices mail out	10% reduction	25% reduction	25% reduction
Estimates - too many consecutive	90% reduction	100% reduction	100% reduction
Non-working meters	50% reduction	50% reduction	50% reduction
Meter Exchanges	50% reduction	50% reduction	50% reduction

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Based on Diameter's experience in working with other water utilities, it is expected that AMI data will allow the City of Thunder Bay to find other efficiencies within this department by better identifying and implementing improved customer service functions.

Exhibit 21: Water Billing and Customer Service Financial Impact by Scenario

Customer Service	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Change of Ownership (final read)	$30,976	$14,713	$1,549	$1,549
Meter Read High/Low bills	$1,769	$796	$442	$442
Meter Read High/Low bills - truck rolls	$9,496	$8,546	$221	$221
Meter Reading Corrections	$2,600	$260	$260	$260
Bill arrears activities	$4,423	$4,201	$2,211	$2,211
City Review Customer Provided Reading (IVR)	$98,585	$0	$0	$0
City Review Customer Provided Reading (WEB)	$56,664	$0	$0	$0
City Review Customer Provided Reading (PHONE)	$39,556	$0	$0	$0
City Review Customer Provided Reading (CARD)	$4,259	$0	$0	$0
Bill Dispute	$3,317	$2,985	$332	$332
Water Leak Credit process	$995	$896	$348	$348
Water invoices mail out	$174,754	$157,279	$131,066	$131,066
Estimates - too many consecutive	$637	$64	$0	$0
Non-working meters	$6,864	$3,432	$3,432	$3,432
Grand Total	**$434,894**	**$193,172**	**$139,861**	**$139,861**
Financial Impact	**$0**	**$241,721**	**$295,033**	**$295,033**

Note: A positive number is considered a "savings", a negative number is considered a "cost".

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5.5.3. Water Meter Maintenance

Applying technology to the City of Thunder Bay's water meter maintenance group may impact several tasks that are the responsibility of the department. In reviewing these tasks with City of Thunder Bay staff, financial benefit can be calculated and would be considered an efficiency gain where staff would be freed up for other tasks. Other areas, such as the loss of water/wastewater revenue due to zero consumption or reduced truck rolls, would be considered a positive budgetary impact.

The benefits that had value and their respective impacts are identified below:

Exhibit 22: Water Meter Maintenance Impact by Scenario

	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Radio Transmitter - Maintenance/replacement (Labour)	N/A	0.4% of installations	0.4% of installations	0.4% of installations
Radio Transmitter - Maintenance/replacement (Product)	N/A	0.4% of installations	0.4% of installations	0.4% of installations
Turn-Off - Too many estimates (Labour)	No Impact	50% reduction	90% reduction	90% reduction
Turn-Off - Too many estimates (Truck roll)	No Impact	50% reduction	90% reduction	90% reduction
Turn-off (For Repair)	No Impact	90% reduction	90% reduction	90% reduction
Turn-off (For Repair)	No Impact	90% reduction	90% reduction	90% reduction
Turn on (For Repair)	No Impact	25% reduction	40% reduction	40% reduction
Turn on (For Repair)	No Impact	25% reduction	40% reduction	40% reduction
Exchange Meter	No Impact	75% reduction	75% reduction	75% reduction
Exchange Meter	No Impact	75% reduction	75% reduction	75% reduction
Exchange Meter	No Impact	75% reduction	75% reduction	75% reduction

The financial impacts are calculated in the table below. Some of the line items impact efficiencies whereas others have a financial impact. For example, radio transmitter maintenance/replacements is a task City of Thunder Bay staff currently does not undertake but will be required with AMR/AMI. This will not have a budgetary impact since no new staff will be required for this task but there is labour involved in the new work affecting efficiencies. Product for radio transmitter replacements will have a budgetary impact. Billing issues and High Consumption phone calls are expected to be reduced creating an efficiency gain whereas lost revenues associated with meters showing "zero consumption" or reduced truck rolls have a budgetary impact on the City of Thunder Bay.

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Exhibit 23: Water Meter Maintenance Financial Impact by Scenario

	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Radio Transmitter - Maintenance/replacement (Labour)	$0	$6,078	$6,078	$6,078
Radio Transmitter - Maintenance/replacement (Product)	$0	$14,132	$14,132	$14,132
Turn-Off - Too many estimates (Labour)	$1,911	$955	$191	$191
Turn-Off - Too many estimates (Truck roll)	$13,674	$6,837	$1,367	$1,367
Turn-off (For Repair)	$9,287	$929	$929	$929
Turn-off (For Repair)	$66,472	$6,647	$6,647	$6,647
Turn on (For Repair)	$9,287	$6,966	$5,572	$5,572
Turn on (For Repair)	$66,472	$49,854	$39,883	$39,883
Exchange Meter (Labour)	$2,335	$584	$584	$584
Exchange Meter (Truck roll)	$16,713	$4,178	$4,178	$4,178
Exchange Meter (Product)	$17,600	$4,400	$4,400	$4,400
Grand Total	**$203,752**	**$101,561**	**$83,963**	**$83,963**
Financial Impact	**$0**	**$102,191**	**$119,789**	**$119,789**

Note: A positive number is considered a "savings", a negative number is considered a "cost".

5.5.4. Distribution System Management

Meter reading technology can be used to better manage and potentially monitor system-wide NRW. Consumption data that an AMI system provides is an opportunity for utilities to focus on reducing NRW. District metering, for example, enables the utility to compare water being consumed in a district during a specific time period (e.g. 2 a.m. to 4 a.m.), with the water being provided to the district over the same time period so water losses can be determined. This requires not only a district meter with an AMI transmitter but also time stamped interval data (15 minute or hourly data) at the district meter as well as the consumption points with the appropriate resolution so water losses can be calculated.

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A second way for a utility to improve distribution system management would be to structure the AMI fixed network to collect acoustic leak detection sensors, allowing the City of Thunder Bay to identify when and where a distribution system leak is occurring.

The proposed meter changeouts will generate the greatest benefit in reducing apparent losses by improving meter accuracy. Additionally, with daily consumption information, utilities can identify unauthorized water consumption much sooner through meters which have potentially stopped or where bypasses may have been opened.

Water Loss Management using AMI and more accurate metering would allow the City of Thunder Bay to have an impact on NRW (Both real and apparent water losses). The NRW calculation is detailed in the table below.

Exhibit 24: Distribution System Management Estimated Real and Apparent Water Losses

Description	Variables	Value
Total Water Produced (m^3)	16,142.000	
Total Water Billed (m^3)	10,757,185	$31,291,026
Non-Revenue Water (m^3)	5,384,815	
Real Losses *Value calculated based on marginal cost of water production*		
Real Losses (m^3) estimate	4,722,181	$849,993[7]
Real Losses (%)	29.3%	
Apparent Losses *Value calculated based on lost water & sewer volumetric revenue*		
Metering Inaccuracies (m^3) estimate	501,214	$1,515,880
Metering Inaccuracies (%)	5.0%	
Unauthorized Consumption (m^3) estimate	161,420	$596,221[8]
Unauthorized Consumption (%)	1.0%	
Total		**$2,962,093**

Preparing a water audit report, similar to the one above, on a frequent basis would allow the City of Thunder Bay to better measure changes in NRW. The ability to identify events contributing to water losses can help the City of Thunder Bay focus better on reduction efforts. The impact technology can have on reducing both real and apparent water losses is estimated in the table below.

[7] It is industry practice to calculate real water losses based on the marginal cost to produce the water which is $0.18 per m^3.

[8] Apparent losses represent water that was delivered to the consumer but did not generate revenue for the City. Apparent losses are valued based on the revenue that the City would have received if the consumer paid for the water received. Therefore, apparent losses are valued at the average water and sewer rate paid by the consumer.

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Exhibit 25: Distribution System Management Impact by Scenario

	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Current Real Losses	29.3%	29.3%	29.3%	29.3%
Improvement in Real Losses	No impact	No impact	No impact	No impact
Current Apparent Losses: Meter Inaccuracies	5.0%	5.0%	5.0%	5.0%
Improvement in Apparent Losses (meter replacements)	No impact	100%	100%	100%
Apparent Losses (meter replacements)	5.3%	0.0%	0.0%	0.0%
Current Apparent Losses: Unauthorized Consumption	1.0%	1.0%	1.0%	1.0%
Improvement in Apparent Losses	No impact	5%	20%	20%
Apparent Losses (leveraging technology)	No impact	0.95%	0.8%	0.8%

The financial impact of achieving these NRW for water targets is calculated in the table below. These amounts are used in the net present value calculation.

Exhibit 26: Distribution System Management Financial Impact

Non- Revenue Water	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Real Losses	$849,993	$849,993	$849,993	$849,993
Apparent Losses: Meter Inaccuracies	$1,515,880	$0	$0	$0
Apparent Losses: Unauthorized Consumption	$596,221	$566,410	$476,977	$476,977
Total Non-Revenue Water	$2,962,093	$1,416,403	$1,326,969	$1,326,969
Total Financial Impact	**$80,000**	**$1,545,691**	**$1,635,124**	**$1,635,124**

Note: A positive number is considered a “savings”, a negative number is considered a “cost”.

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5.5.5. IT Operational Costs

Meter reading software and equipment currently in use by the City of Thunder Bay requires very little IT support to operate and maintain.

The introduction of AMI technology will require additional IT support due to the number of software applications being added and the interfaces that need to be supported. Most of the water AMI vendors are moving (or have moved) to a Software as a Service (SaaS) model, which significantly reduces the responsibilities of Thunder Bay IT staff. For this reason, we have assumed all software will be SaaS where the license cost is calculated on an annual basis based on the number of transmitters. The table below summarizes the IT support assumptions:

Exhibit 27: IT Support Assumptions by Scenario

IT Software Activities	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Manual Meter Reading Software	Assumes 100% of costs	Assumes 100% of costs	Assumes 20% of costs	Assumes 20% of costs
AMI Collection Software (SaaS)	Not Required	Not Required	$2.20 / Endpoint / Year	Not Required
Cellular Reading Charge	Not Required	Not Required	Not Required	$11.52 / Year
Customer Portal SaaS	Not Required	Not Required	Not Required	Not Required
RF License	Not Required	Not Required	Not Required	Not Required
Handheld Support Cost	Assumes 100% of costs	Assumes 20% of costs	Assumes 20% of costs	Assumes 20% of costs
Network maintenance	Not Required	Not Required	$3,750 / Collector / Year	Not Required

The financial improvements or additional expenses (negative savings) are summarized below.

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Exhibit 28: IT Financial Impact by Scenario

IT Software Costs	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Manual Meter Reading Software	$3,211	$3,211	$642	$642
AMI Collection Software (SaaS)	$0	$0	$83,578	$0
Cellular Reading Charge	$0	$0	$0	$437,645
Customer Portal SaaS	$0	$0	$0	$0
RF Licence	$0	$0	$0	$0
Handheld Support Cost	$6,000	$1,200	$1,200	$1,200
Network maintenance	$0	$7,500	$93,750	$0
Grand Total	**$9,211**	**$11,911**	**$179,170**	**$439,487**
Total Financial Impact	$0	**($2,700)**	**($169,959)**	**($430,276)**

Note: A positive number is considered a "savings", a negative number is considered a "cost"

5.5.6. Summary of Operational Impacts

The financial impact of AMI technology plays a big role in the benefit to the utility. The table below summarizes the departmental financial impact detailed above. Each scenario outlines the operational cost change to what is deployed today and is the value put into the net present value calculation.

Exhibit 29: Operational Financial Impact Summary

Operational Cost Category	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Operational - Meter Reading	$0	$141,664	$210,967	$210,967
Operational - Meter Maintenance	$0	$102,191	$119,789	$119,789
Operational - Customer Services	$0	$241,721	$295,033	$295,033
Operational - System Management Improvements	$80,000	$1,545,691	$1,635,124	$1,635,124
Operational - IT Costs	$0	-$2,700	-$169,959	-$430,276
Total Financial Impact	**$80,000**	**$2,028,568**	**$2,090,954**	**$1,830,637**

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Note: A positive number is considered a "savings", a negative number is considered a "cost"

5.6. Capital Costs

The capital cost of Scenarios 1, 2, and 3 assume the project will be done as a single continuous project with no delays or pauses in the deployment as this would lead to increased costs (i.e. Project Management). Where finance capacity is unavailable, alternative deployment strategies can be explored. Scenario 0 assumes meter changeouts are carried out over a 20-year period at the rate of 2000 per year.

The capital cost assumes the project is done with external resources. Project support is provided through a combination of internal and external (consulting) support resources.

Capital Costs assume the Procurement Phase, Startup, Proof of Concept and Main Deployment will be done over a 41-month timeframe.

5.6.1. Project Scope

A project of this nature is not a typical engineering project. It is a combination of products, services and software applications that need to be supported by both internal and external resources. When planning for an AMR/AMI project, the main cost categories would include:

- Installation Costs
- AMI/AMR Supply and Implementation Costs including software licensing and implementation
- Water Meter Supply Costs
- Project Support – Consulting Costs
- Project Support – Internal Resource Costs
- Contingency

At the end of the cost section, we compare total capital costs (all categories) for the three replacement criteria to provide some understanding of the cost impacts of the different strategies.

The financial model has several variables and assumptions. The scenarios may differ based on the type of technology being deployed.

5.6.2. Installation Cost

With any water meter project, there are always complications that can prevent the meter replacement or radio transmitter installation from happening. These issues usually include the water meter being enclosed behind a finished wall, valves not being operational, plumbing fittings that need to be replaced, or changes to the meter pit or pit lid to complete the work. The ability to convert as close to 100% of the water meters to the new technology as possible is a fundamental measurement of a successful program. To achieve this level of completion, the City of Thunder Bay needs to allow the installation contractor to overcome most of the above issues. Allowing for carpentry, plumbing, and valve replacement will support the project in achieving over 97% completion. Not including this work in the project would likely reduce the conversion to below 90%.

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The table below summarizes the installation cost for all scenarios. It should be noted that these costs are expected to be the same regardless of technology.

Legend:
SM = Small Meter (15mm – 25mm)
IM = Intermediate Meter (40mm – 50mm)
LM = Large Meter (75mm and greater)
C/O = Changeout

Exhibit 30: Capital Cost - Installation Cost Summary

	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
ALL	$9,500	$589,293	$623,022	$614,848
SM - C/O	$2,787,310	$3,069,215	$3,069,215	$3,069,215
SM Extra Work	$1,949,260	$2,236,450	$2,236,450	$2,236,450
INT - C/O	$289,750	$286,450	$286,450	$286,450
INT Extra Work	$44,480	$51,405	$51,405	$51,405
LM - C/O	$242,150	$241,130	$241,130	$241,130
LM Extra Work	$62,625	$70,600	$70,600	$70,600
Grand Total	**$5,385,075**	**$6,544,543**	**$6,578,272**	**$6,570,098**

Meter change-outs for small meters (SM - C/O) for 15mm, 20mm and 25mm meters, intermediate meters (40mm and 50mm) and large meters (75mm and above) include the installation portion of the change out. Note that register upgrade installation costs are included for Scenarios 2 and 3.

The Extra Work where required (based on assumptions) is for valve replacement, plumbing, wire replacement, carpentry, freezing pipe in lieu of curb stop operation (if allowed), meter pit repairs, excavation, confined and crawl space entry. Since there can be multiple Extra Work line items at a single installation – such as valve replacement, minor construction/remediation work and crawl space entry at the same location – the number of Extra Work line items is expected to exceed the number of meters being changed out.

5.6.3. AMI Technology Cost

Scenarios 1, 2, or 3, are applicable to any AMR or AMI system manufacturer. The AMI/AMR project costs are summarized below by category. Note that Scenario 0 is not applicable for this table as there are no technology costs associated with that Scenario.

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Exhibit 31: AMI Technology Cost Summary

	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
SM - Radio	N/A	$4,069,900	$4,069,900	$4,626,325
IM - Radio	N/A	$92,220	$92,220	$105,275
LM - Radio	N/A	$24,582	$24,582	$29,085
Fixed Network Collectors	N/A	$0	$807,500	$0
Handheld	N/A	$16,600	$10,800	$10,800
Mobile	N/A	$94,000	$0	$0
Implementation	N/A	$7,500	$160,000	$160,000
Software	N/A	$15,000	$0	$0
Training	N/A	$5,000	$27,500	$27,500
Hardware	N/A	Not required. Covered under service agreement.		
Grand Total	**$0**	**$4,324,802**	**$5,192,502**	**$4,958,985**

The software implementation costs would be associated with interfacing to the Infor IPS CIS, the chosen Customer Portal and the AMI data collection software / MDM. The interface costs also include those required during the installation phase between Infor IPS and the installer's Meter Installation System (MIS). Interface costs are vendor associated costs and do not include the City of Thunder Bay's effort required in the interface development. While the interface costs are based on similar municipal projects, it should be noted that given the current Infor IPS implementation, higher than average efforts may be required.

The additional cost of building a standalone AMI network (Scenario 2) is associated with the data collectors required for this scenario. Scenario 2 assumes vendors could leverage existing properties and/or towers from the City of Thunder Bay properties and Scenario 3 assumes existing cell towers would be utilized.

5.6.4. Water Meter Supply Cost

Existing water meter replacement criteria is defined by meter age and the presence of a high-resolution register. It is understood that in the City of Thunder Bay case, only meters installed in 2014 or later are to be retained since they are fitted with encoder registers with the appropriate resolution. Based on this meter replacement criteria, the meter supply costs only (not including AMI technology costs) are summarized below:

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Exhibit 32: Capital Cost Water Meter Supply Cost Summary

	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Small Meters	$4,797,975	$4,913,625	$4,913,625	$4,913,625
Intermediate Meters	$285,260	$520,450	$520,450	$520,450
Large Meters	$550,825	$566,840	$566,840	$566,840
Grand Total	**$5,634,060**	**$6,000,915**	**$6,000,915**	**$6,000,915**

Scenario 0 meter supply costs include remote reading devices but do not assume non-mechanical meters. The remaining costs for Scenarios 1, 2, and 3 assume non-mechanical meters, as detailed in Chapter 13 - Recommendations. All scenarios have an additional $67,000 in meter accessories (additional parts) for large meter replacements.

5.6.5. Project Support – Internal Resources Costs

The internal City of Thunder Bay costs were calculated based on salary and benefit information provided.

The following table provides an explanation of the FTE (Full Time Equivalent) effort associated with each type of role during the project.

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Exhibit 33: Internal Project Support Impact

Project Support Assumptions	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Project Manager	Current staffing allocation	During Startup and Project: 100% FTE for 28 months	During Startup, POC, and Project: 100% FTE for 31 months	During Startup, POC, and Project: 100% FTE for 31 months
Curbstop Operation	Current staffing allocation	During Startup and Project: 25% FTE for 28 months	During Startup and Project: 25% FTE for 28 months	During Startup and Project: 25% FTE for 28 months
Data Collector Coordination	N/A	N/A	During Startup and Project: 75% FTE for 6 months	N/A
AMI/AMR Analyst/Champion	N/A	N/A	During Startup and Project: 25% FTE for 28 months	During Startup and Project: 25% FTE for 28 months
IT SME - Applications	N/A	During Startup: 100% FTE (2) for 6 months	During Startup: 100% FTE (2) for 6 months	During Startup: 100% FTE (2) for 6 months
IT SME - Interface	N/A	During Startup: 100% FTE (2) for 6 months	During Startup: 100% FTE (2) for 6 months	During Startup: 100% FTE (2) for 6 months
Public Outreach	Current staffing allocation	During Startup and Project: 15% FTE for 25 months	During Startup and Project: 15% FTE for 25 months	During Startup and Project: 15% FTE for 25 months
Billing and Customer Service Supervisor	Current staffing allocation	During Startup, POC, and Project: 100% FTE for 31 months	During Startup, POC, and Project: 100% FTE for 31 months	During Startup, POC, and Project: 100% FTE for 31 months
Billing and Customer Service Billing Agent	Current staffing allocation	During Startup, POC, and Project: 100% FTE for 31 months	During Startup, POC, and Project: 100% FTE for 31 months	During Startup, POC, and Project: 100% FTE for 31 months

The internal project support costs over the duration of the project are summarized in the table below.

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Exhibit 34: Internal Project Support Financial Impact

Internal Support Costs	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
PM	$140,833	$335,833	$335,833	$335,833
CIS Support	$120,867	$133,817	$208,475	$208,475
Communications	$36,000	$33,750	$33,750	$33,750
Facilities	$0	$0	$33,750	$0
IT Support	$0	$200,000	$250,000	$250,000
Meter Department	$71,183	$63,556	$63,556	$63,556
Grand Total	**$368,883**	**$766,956**	**$925,364**	**$891,614**

Some of the above roles, such as the Meter Department (field support), may be budgeted already within existing positions. If this is the case this additional cost may not be required within the financial plan. Note that Scenario 0 costs were condensed into the same project timeline as Scenarios 1 to 3 for comparison purposes only.

5.6.6. Project Support – Consulting Costs

The AMI/AMR subject matter expert consulting services costs for the entire project are summarized below:

Exhibit 35: Project Consulting Support Cost

Consulting Costs	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Phase 2 - Procurement	N/A	$167,500	$193,750	$193,750
Phase 3 - Start Up	N/A	$233,750	$275,000	$275,000
Phase 4 - POC	N/A	$148,750	$175,000	$175,000
Phase 5 - Installation	N/A	$750,000	$750,000	$750,000
Phase 5 - Field Inspections	N/A	$325,000	$325,000	$325,000
Phase 6 - Close Out	N/A	$25,000	$25,000	$25,000
Disbursements	N/A	$92,500	$92,500	$92,500

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Grand Total	N/A	**$1,742,500**	**$1,836,250**	**$1,836,250**

The procurement includes the development of a single procurement document and process. Where the procurement is broken into more than one procurement additional cost may apply.

Program management assumes a full-service project lead that includes contract management, interfacing support, installation Contractor management, public outreach, meeting management, key performance indicator monitoring and quality assurance.

5.6.7. Contingency

A project of this nature does require some contingency for unexpected installation, meter costs, or AMI technology costs. Given recent high inflation levels, Diameter has provided a 10% contingency on the supply of meters and radio transmitters. A 15% contingency on installations was applied to accommodate for slightly higher pricing due to the relative distance of the City of Thunder Bay from other population centres.

Exhibit 36: Capital Cost Contingency

Project Contingency Assumptions	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Meter and AMR/AMI supply – 10%	$0	$1,060,072	$1,156,442	$1,133,090
Installation – 15%	$806,337	$893,288	$893,288	$893,288
Grand Total	**$806,337**	**$1,953,360**	**$2,049,729**	**$2,026,378**

5.6.8. Summary of Capital Costs

The table below provides a capital cost estimate based on a non-mechanical water meter.

Exhibit 37: Capital Cost Summary by Category

Capital Summary	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Install	$5,385,075	$6,544,543	$6,578,272	$6,570,098
Meter Supply	$5,634,060	$6,000,915	$6,000,915	$6,000,915

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Capital Summary	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Meter Accessories	$67,000	$67,000	$67,000	$67,000
AMR/AMI Supply	$0	$4,324,802	$5,192,502	$4,958,985
CIS Support	$0	$208,000	$304,000	$304,000
Consulting	$0	$1,742,500	$1,836,250	$1,836,250
Project Support	$368,883	$766,956	$925,364	$891,614
Contingency	$806,337	$1,953,360	$2,049,729	$2,026,378
Grand Total	**$12,261,355**	**$21,608,076**	**$22,954,033**	**$22,655,240**

The above costs were used in the Cashflow analysis and spread out according to the deployment schedule.

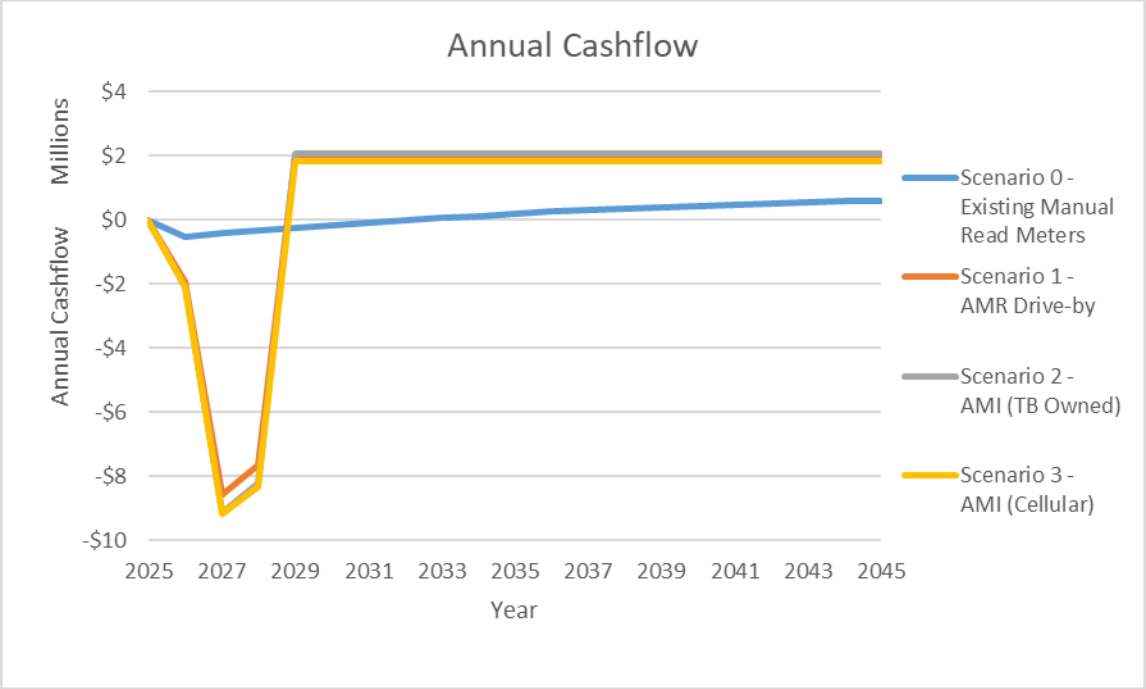
5.6.9. Cashflow

Both the capital costs and operational financial impacts were considered in developing a long-term financial cashflow model.

The graph below, in Exhibit 38: Annual Cashflow by Scenario, shows the annual impact of each scenario. The capital-intensive approaches in Scenarios 1, 2, and 3 see a significant investment in capital in the first 3 years, which results in an improvement in operating benefits over the remaining life of the system. We can see that the investment in AMR is nearly as much as the investments in AMI.

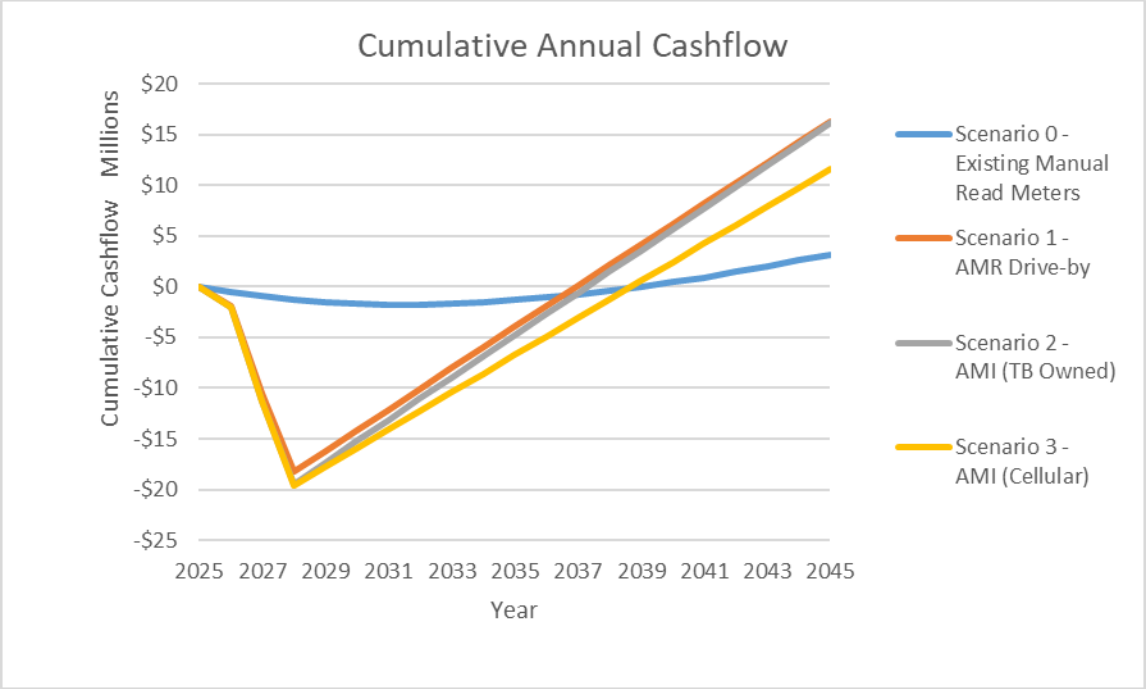
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Exhibit 38: Annual Cashflow by Scenario



Considering the cumulative impact on cashflow over the 20-year life of the system, we can see that the operating costs of the Scenario 3, cellular AMI, have a significant impact on the overall cashflow of the project and extend the breakeven point by approximately 14 months.

Exhibit 39: Cumulative Annual Cashflow by Scenario



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5.6.10. Results

Combining the financial impact estimated by area (meter reading, customer service and billing, meter maintenance, distribution system management, and IT) and the capital costs allows the total life cycle cost to be calculated. The Net Present Value (NPV) provides a good comparison between scenarios; an NPV of zero or greater would mean that over the 20-year life of the system, the capital cost was paid off by the annual benefits of revenue and operational improvements.

The table below shows a positive NPV for all Scenarios. Based on NPV solely, Scenario 1 (AMR) has the highest NPV based on slightly lower capital costs. Scenario 3 (AMI Cellular) is expected to be the worst-case scenario because of the high operational costs of cellular radio transmitters. The difference in the NPV between Scenario 2 (AMI TB Owned) and Scenario 3 is a result of the additional infrastructure costs required in Scenario 2.

Scenario 2 is the recommended approach for the City of Thunder Bay.

Exhibit 40: Capital Cost and NPV for the Entire Project using Mechanical Meters

Summary	Scenario 0 - Existing Manual Read Meters	Scenario 1 - AMR Drive-by	Scenario 2 - AMI (TB Owned)	Scenario 3 - AMI (Cellular)
Capital Costs	$12,261,355	$21,608,076	$22,954,033	$22,655,240
NPV	**$856,576**	**$3,943,271**	**$3,451,249**	**$732,967**

Combining the financial analysis with the non-financial implications of each scenario, we summarize the options below.

Exhibit 41: Financial and Non-Financial Implications by Scenario

Scenarios	Financial Implications	Non-Financial Implications
Scenario 0 – Existing Situation – Manual Meter Reading with mechanical meter replacements over a 20-year period.	• Lowest capital investment • Modest improvement in meter accuracy over time	• Does not address the essential or important business drives • Does not facilitate a move to monthly reading
Scenario 1 – AMR Drive By with non-mechanical meter replacements over a 2-year period	• High capital investment, comparable to AMI • Significant improvement in meter accuracy	• Only partially addresses 10 of 19 essential or important business drivers • Only partially facilitates a move to monthly reading

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Scenarios	Financial Implications	Non-Financial Implications
Scenario 2 – AMI City Owned with non-mechanical meter replacements over a 2-year period	• High capital investment, comparable to AMR • Significant improvement in meter accuracy	• Fully or partially addresses all business drivers • Facilitates a move to monthly reading
Scenario 3 – AMI Cellular Network with non-mechanical meter replacements over a 2-year period	• High capital investment, comparable to AMR • Significant improvement in meter accuracy • High operating costs for monthly cellular charges impact project's return	• Fully or partially addresses all business drivers • Facilitates a move to monthly reading

Advanced Metering Infrastructure (AMI) provides a myriad of benefits to help improve a water utility's performance in areas such as metering, customer service, water loss management, pressure and backflow management. In addition, one of the major benefits of AMI is to help the City of Thunder Bay with its "customer experience" associated with the provision of water services. While there is tangible value in doing so, measuring the dollar value of a "happier customer' is challenging and therefore is not included in the NPV calculations but contribute to achieving the City of Thunder Bay's business drivers and customer service strategy.

As a result, Scenario 2, which includes a City-owned AMI system with non-mechanical meter replacements implemented over a 2-year period, is the recommended approach for the City of Thunder Bay.

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6. OVERVIEW OF AMI/AMR AND METROLOGY

6.1. Introduction

This chapter provides a detailed discussion of the functionality, benefits, and implications for the City of Thunder Bay relating to Advanced Metering Infrastructure (AMI) and Automatic Meter Reading (AMR) technologies.

Meter reading technologies are discussed in more detail below and includes the following:

- Radio Frequency (RF)
- Automatic Meter Reading (AMR) Technology
- Advanced Metering Infrastructure (AMI) Technology
- Meter Data Management (MDM) Software
- Customer Engagement Portal (CEP)
- Water Meters & Registers
- Other Devices

Note that this section is a general overview of the types of technologies available on the market today and not a review of vendor-specific technologies. The latter will be conducted as part of the Procurement process. As such, items such as radio transmitter safety, and data security – which vary by vendor – will be discussed in more detail at the time of RFP preparation and review of proposals submitted.

6.2. Radio Frequency (RF)

6.2.1. Radio Frequency Overview

The use of radio frequency technologies is a proven approach to the wireless communication of meter reading data in North America since the late 1980s. RF is used in Automatic Meter Reading (AMR), Advanced Metering Infrastructure (AMI), and cellular AMI systems. Tens of millions of AMR or AMI devices using RF technology have been deployed in the North American water utility market[9] with even more in use by electric and gas utilities.

6.2.2. Radio Frequency Emissions

Radio waves are considered a form of electromagnetic radiation. Electromagnetic radiation is categorized as follows:

- Ionizing – High-energy radiation including x-rays, gamma rays and ultraviolet rays. These forms of radiation have enough energy to remove an electron from (ionize) an atom. This can damage the DNA (genes) inside of cells, which can sometimes lead to cancer.

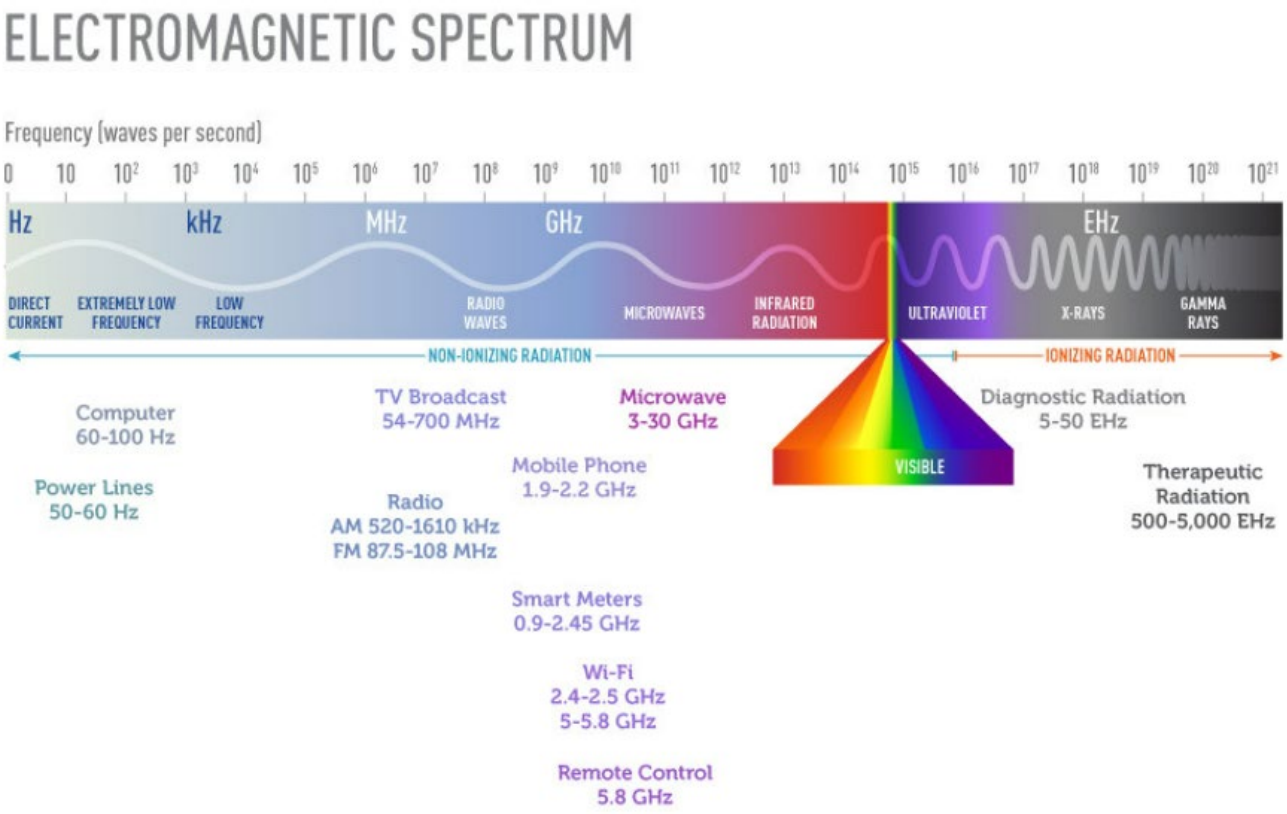
[9] Diameter Services, based on data from The Scott Report through 2019 and estimated unit shipments from 2019 through 2022.

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- Non-ionizing – Lower energy radiation that has enough energy to move atoms in a molecule around or cause them to vibrate, but not having enough energy to damage DNA directly. AMR/AMI radio transmitters and cell phones fall into this category.

"Because the amount of RF radiation you could be exposed to from a smart meter is much less than what you could be exposed to from a cell phone, it is very unlikely that living in a house with a smart meter increases risk of cancer."[10]

Exhibit 42: Electromagnetic Spectrum[11]



Radio transmitters (noted in the graphic above as "Smart Meters" emit less radio frequency energy than commonly used wireless devices such as cell phones, baby monitors and microwave ovens. Unlicensed frequency devices have a power limitation of 1W per transmission while licensed frequency radio transmitters can provide up to 2W of power.

---

[10] American Cancer Society, https://www.cancer.org/healthy/cancer-causes/radiation-exposure/smart-meters.html, accessed November 13. 2023.
[11] National Cancer Institute, sourced from https://www.cancer.org/healthy/cancer-causes/radiation-exposure/radiofrequency-radiation.html, accessed November 13, 2023.

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The US Federal Communications Commission (FCC) implemented standards in 1985 to limit human exposure and protect against thermal effects of RF emissions. The FCC has adopted maximum permissible exposure (MPE) limits for radio transmitters of all types including smart meters. This rule limits RF products to 0.6mW.cm2, but most smart meter products only operate at 2% to 5% of this limit ensuring a large factor of safety.

Innovation, Science and Economic Development Canada (ISED) has similar requirements and only technologies that meet FCC and ISED standards will meet the specifications that will be included in the City of Thunder Bay's AMR/AMI Project.

The Health Canada website states the following regarding "smart meters" which is another name for AMI endpoints:

> *"There are no health risks from exposure to Radio Frequency (RF) Electric & Magnetic Fields (EMF) from smart meters. These devices must meet standards to ensure they do not exceed radio frequency EMF exposure limits.*
>
> *As with any device that emits radio frequency EMF, you will absorb some of the energy emitted by smart meters if you are nearby. The amount of energy you absorb depends largely on how close your body is to a smart meter.*
>
> *Your exposure to radio frequency EMF from smart meters is very low. This is because:*
>
> - *smart meters emit relatively low power signals,*
> - *there is distance between your body and smart meters,*
> - *smart meters transmit data in short bursts, not continuously, and*
> - *when smart meters are not transmitting a signal, they do not emit radio frequency "EMF"*[12]

The following link contains further information from Heath Canada as it relates to Smart Meters:

> https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/everyday-things-emit-radiation/smart-meters.html.

Furthermore, Diameter recommends installing radio transmitters outdoors. While the reason for this recommendation is not radio transmission safety, it may address concerns of some residents.

[12] Health Canada, https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/everyday-things-emit-radiation/smart-meters.html, accessed November 15, 2022.

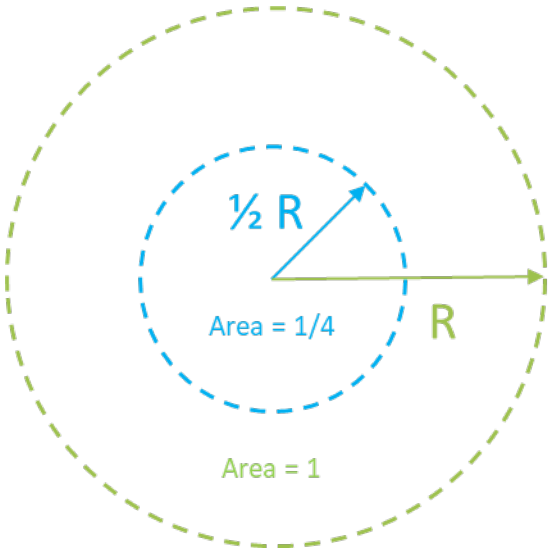
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6.2.3. Radio Transmitter Installation

Radio frequency signals can be impacted by a range of factors, not the least of which being obstructions between the transmitter and the receiver. To maximize system performance, radio transmitters should, where possible, be installed on the exterior wall of the building. Installation of the radio transmitter inside a wall, and often below grade, will likely have a significant impact on AMI system performance.

For illustration, if the range of the radio transmitters is cut in half (from R to ½ R), the area covered by that radio transmitter is reduced by ¾ (from 1 to ¼). As a result, four times as many data collectors are required to achieve the same system performance.

Exhibit 43: Impact of Reduction in Range on System Performance



6.2.4. Implications for the City of Thunder Bay

Even with substantiated evidence that supports the safety of AMI and AMR devices, some customers will voice concerns about the safety of the products. A small percentage of the City of Thunder Bay's customers will never be completely convinced that these products are safe to use. A very vocal minority can have a major impact on the deployment of an AMI/AMR project.

While this concern will be voiced by a small number of customers, the City of Thunder Bay should plan for this issue to arise and have a public outreach plan that includes information on the safety of the selected system and frequently asked questions. Further, the City of Thunder Bay will likely need to consider a compliance plan and opt-out program that addresses those few customers who refuse to allow a meter and radio transmitter to be installed.

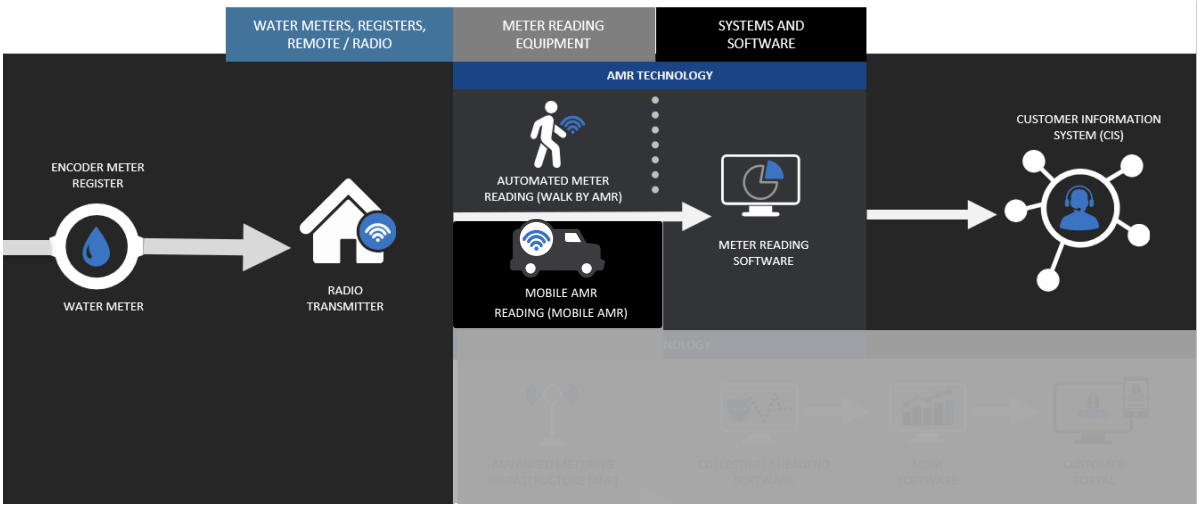
6.3. AMR Technology

6.3.1. Technology Overview

The diagram below shows the critical components of an AMR system.

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Exhibit 44: Walk-by System Diagram



6.3.2. Functionality

AMR technology collects meter readings from a radio transmitter that is attached to the water meter register and transmits the readings via RF to the handheld meter receiver. The readings will automatically associate with each property through the radio transmitter identification number. A meter reader travels through the meter reading area, either in “walk-by” mode using a handheld data collector or in a vehicle using a mobile data collector. This technology eliminates some of the inherent risks relating to meter reading on private property while increasing reading accuracy.

Regardless of how the readings make it into the data collector, at the end of each day, the readings are uploaded to the City of Thunder Bay’s Customer Information System (CIS) via manufacturer-specific meter reading/route management software. This software not only collects meter readings to provide to the CIS but receives the meter reading routes assigned to the field devices from the CIS. This same software may have the ability to download and upload reads/routes from the field in some cases.

6.3.3. Features and Benefits

Radio transmitters provide several features and benefits that are not available with direct read or touch pad technology. These features are the same regardless of the device that reads them (AMR walk-by or AMR mobile).

Typically, the radio transmitter will read the meter every 15-minutes and store 96 readings per day in its internal memory. Algorithms in the radio transmitter use this data to create alerts including those listed below:

6.3.3.1. Continuous Use (aka Leak) Flag

If the radio transmitter identifies that all or most of the 96 readings show water consumption, a flag will be set to alert that continuous usage is suspected at the meter.

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6.3.3.2. Reverse Consumption Detection Flag

If the radio transmitter identifies negative consumption, caused by water flowing backwards through the meter, a reverse flow flag will be set. Some systems distinguish between major and minor reverse flow conditions depending on the volume of recorded reverse flow.

The reverse flow flag can be a sign of plumbing issues that could result in contamination of the water supply. It could also be a sign of meter tampering if the customer attempted to show lower consumption by reversing the meter in the service.

6.3.3.3. Low Radio Transmitter Battery Flag

Most manufacturers' radio transmitters monitor expected battery life of their radio transmitter and issue alarms prior to expected device failure. There are two basic approaches to these alarms, neither of which are perfect, but may be useful if the City of Thunder Bay understands the technology's shortcomings.

It should be noted that a battery failure in the radio transmitter does not result in lost water, as the meter is typically still capturing consumption, even if the radio transmitter is not sending these readings. The consumption will still be captured by the meter and an accurate reading will be transmitted once the radio transmitter is replaced.

- Monitoring the voltage level of the battery and sending an alarm a short period of time before it is expected to no longer function (3 to 12 months). This may provide some notice to the City of Thunder Bay to initiate a work order to replace the radio transmitter/battery unit before the battery failure, so that fewer readings are missed. One drawback to this approach is that the standard battery technology, Lithium-ion tends to have a very stable voltage until the end of its useful life, so this approach may not provide much warning of coming failure.
- Time-based flags are used by some manufacturers to alert several months before the 20-year expected life. This approach also has its drawbacks in that it does not measure the actual voltage, it assumes that the device has operated in a statistically predictable manner. This approach cannot fully account for influences like temperature extremes, component variations or usage variations such as demand readings or over-the-air firmware upgrades.

6.3.3.4. Tamper Flag

Radio transmitters can determine if there is a communication error between the radio transmitter and the encoder register. Some systems can decipher between a cut wire, an incorrectly wired register, and a programming error/issue with the register. This flag may indicate potential meter tampering or other maintenance issues. These flags would initiate a response in the field to investigate and resolve the issue.

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6.3.3.5. Data Logging

Certain manufacturers' radio transmitters store the daily and hourly readings for the last 30 to 90 (dependent on manufacturer) days. This additional information can be used to resolve customer complaints. This data logging feature can provide the same type of hourly reading information an AMI system produces for individual customers who may request this information.

6.3.4. Implications for the City of Thunder Bay

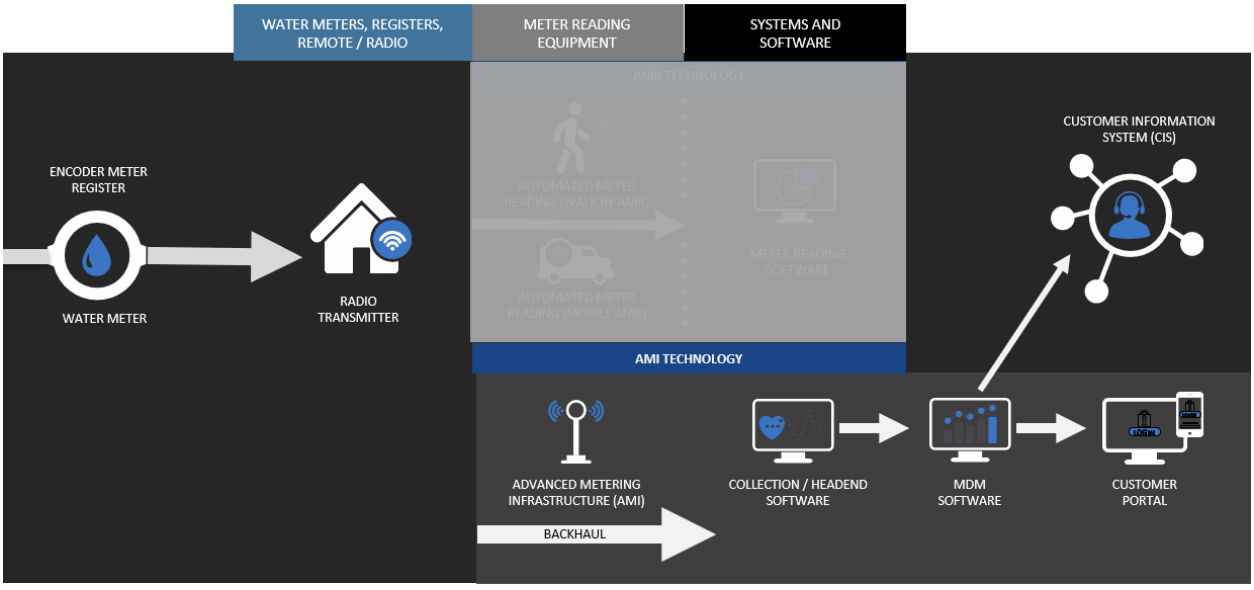
AMR would improve meter reading efficiency and effectiveness for the City of Thunder Bay over the current manual reading approach. Meter reading access issues, the need for customers to submit readings, and the need to estimate bills would largely be eliminated by AMR technology. Meter reader safety would also improve, as the need to enter customer property would be eliminated.

6.4. AMI Technology

6.4.1. Technology Overview

The diagram below shows the critical components of an AMI system.

Exhibit 45: AMI System Diagram



In an Advanced Metering Infrastructure, radio transmitters are read by permanently installed receivers or data collectors. These data collectors are strategically deployed in the geographic area by mounting them on poles, towers, or utility-owned buildings. The data collectors are connected to the collection software using a wide area network (WAN). The type of WAN utilized may vary but fiber, or cellular would-be typical examples. The collectors constantly receive data from the radio transmitters deployed and provide the information to the head-end data collection software.

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For comparison, the big difference between AMR and AMI technologies is in the amount and timeliness of the information provided by each system. For example, an AMI radio transmitter reads the water meter register on an hourly basis (720 reads / month) compared to just once (1 read / month) with AMR mobile technology. And with AMI, these hourly readings are received daily along with relevant flags as opposed to every 30 days with AMR mobile. Reading transmissions are time-stamped as they are captured by the network.

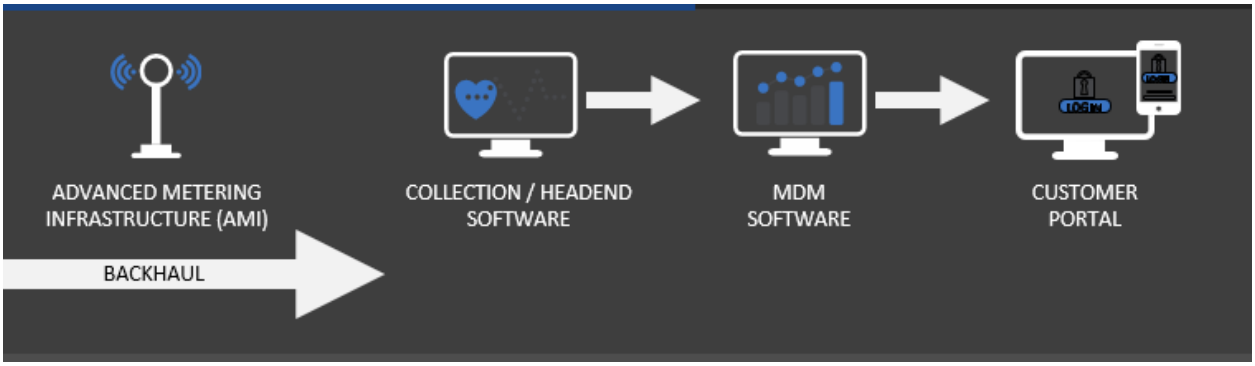
Interestingly, while AMI provides greater volumes of data compared to AMR, AMI networks typically have less radio noise than does AMR. This stems from the fact AMR radios are constantly broadcasting a meter reading (roughly every 8 – 15 seconds) in case the mobile collector is in the vicinity. To preserve battery life, AMI radio transmitters are programmed to transmit data daily or perhaps a few times per day.

6.4.2. Functionality

For comparison, AMR readings are collected when a meter reader's receiver, whether in a vehicle or in the meter reader's hand, passes within range of the radio transmitter. An AMI system collects these meter readings constantly and passes this data back to the utility at least once per day.

To accomplish this an AMI system comprises a Data Collection Network, Collection Software (also known as headend software), Meter Data Management (MDM) software, and often a Customer Portal application. The Customer Portal is not technically part of an AMI system, but it provides a valuable interface enabling customers to benefit from the AMI system with access to enhanced data, analytics, and alerts.

Exhibit 46: AMI Network Components



These four components have some unique considerations that should be understood when selecting an AMI solution best suited to a water utility. An AMI system can be deployed where the software applications are presented as a single application. This relatively simple configuration is less complex, allowing the system to be set up quickly. However, it may lack some of the functional elements required by certain utilities. Larger water utilities may find that best-in-class functionality is desired and will maximize the features available to the customer. This more complex configuration may lead to the water utility selecting an AMI Network and Headend software separate from the

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MDM and Customer Portal. Often the Customer Portal is procured separately to ensure a best-in-class application has all the functionality the utility wants to provide for their customers.

Understanding the key considerations related to each component (Data Collection Network, Collection software, Meter Data Management Software, Customer Portal Software) is detailed in the sections below.

6.4.2.1. Data Collection Network

An AMI data collection network requires all water meter radio transmitters across the utility's service territory to be heard by at least one data collector. There are several approaches to obtaining this network coverage and considerations include whether the City of Thunder Bay or the vendor is responsible for the initial purchase and deployment of data collectors and who is responsible for the monitoring, maintenance, and support of the AMI network.

Establishing the data collection network of an AMI system can be one of the more challenging parts of a deployment effort. Finding and receiving the appropriate approval for locations that meet all the right conditions to allow the AMI network to collect readings for the metered population is often much more difficult than utilities anticipate.

Propagation - Planning the appropriate number and location of data collectors is determined through a propagation study. This "prop" study provides a theoretical performance of the system based on many factors including: the topography of the geographic area being covered, the strength and frequency of transmissions, location of the radio transmitter (inside or outside), foliage, building "clutter", and the number, location, and height of data collectors.

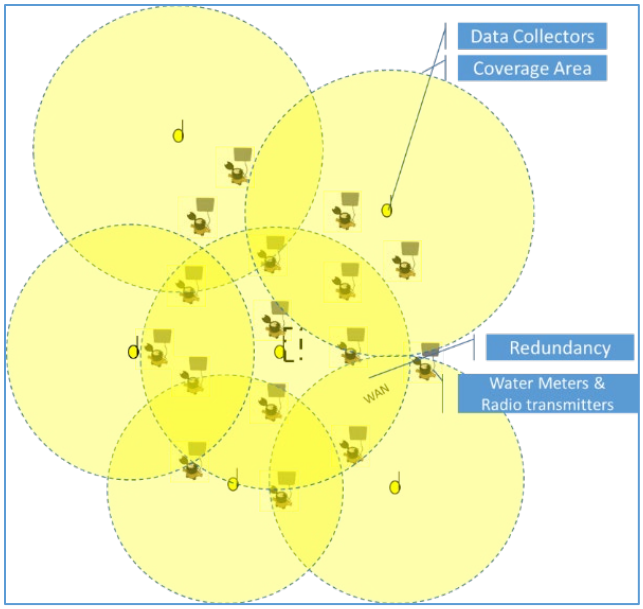
Diameter will provide an initial "prop" study to inform the City of Thunder Bay's decisions on deployment challenges and system budgets.

As part of the procurement process, each vendor will be asked to provide a propagation study for the system that they are offering. This additional propagation study is valuable for two reasons. First, the vendors' study will be designed specifically for their system. Secondly, the vendor-provided propagation study will become a key part of the contractual agreement enabling the City of Thunder Bay to hold the vendor accountable for the cost and performance of their system.

Redundancy - Once a radio transmitter is installed, there are many factors that can disrupt the successful transmission and reception of the meter reading. To mitigate this risk, many AMI systems are designed to include a level of redundancy where any single radio transmitter can be "heard" by multiple collectors, ensuring that if one data collector misses a radio transmission, another is in a position where it can receive it.

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Exhibit 47: Overlapping Data Collection Coverage Areas



Data Collector Location - Most utilities prefer to mount the system's data collectors on buildings, pump houses, and water towers that the utility owns. Installing data collectors on the roof of these locations (City-owned buildings, pump houses, water towers, and reservoirs, etc.) often avoids rental fees when installing the devices.

Alternating current (AC) power is also required at these locations and relatively easy to wire to the device. Another advantage to these locations is that the utility's intranet may be available for backhaul eliminating additional data costs. To achieve the level of redundancy required, it is very likely that these locations will not allow for the propagation study to cover the entire area, and more locations will need to be considered.

After considering its own existing buildings, the City of Thunder Bay could identify City-controlled unbuilt land that where poles could be installed specifically for the installation of data collectors. It should be noted that the installation of a new pole or tower infrastructure may be considered unsightly by community members. Irrespective to how unappealing this option is, a certain portion of the network will likely require newly installed poles to achieve the desired coverage.

Engineering Drawings and Approvals - Understanding the complete approval process that must be taken to install data collection equipment is important. Often very specific engineering drawings are required for approval and some municipalities may not have a defined process for approving network locations and installations. Some approval processes require extensive review or public notices and input.

Ensuring the process for approval is clear and well documented, regardless of the type of data collector, is vital for smooth deployment.

Wide Area Network/Backhaul - When planning for an AMI system, backhaul consideration is required to allow the collectors to pass data back to the collection software. Usually, the most cost-

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efficient WAN process would be to connect the data collector to the utility's intranet. This option would eliminate additional data charges; however, it could also introduce some network security risks. A utility may also have an existing fiber optic network that can allow access to their intranet. If this is the case, then the access points would need to be identified, so preferred locations could be planned around them. Cellular is often the most popular way to backhaul a data collector, especially if the data collector is installed on poles or privately-owned properties.

Shared and/or Third-Party AMI Network

A water utility's willingness to take on the risk and responsibility associated with AMI networks leads utilities to consider both a shared and/or third-party AMI network. Often shared or third-party networks are owned and operated by someone other than the water utility, but the water utility would leverage the network for its AMI deployment. The typical shared and/or third-party AMI network options include:

- *Cellular AMI Network (Shared & Third Party):* where the cellular radio transmitter communicates directly to the cellular provider that has adequate coverage across the service territory.

- *Overlapping Utility AMI Network (Shared & Third Party):* where the local electric or gas utility has already implemented an AMI network, and the water utility chooses the same AMI technology with the same RF frequency. This is not a likely scenario for the City of Thunder Bay as it would likely require cooperation with SynergyNorth and conformation with their technology decisions.

- *Vendor-owned AMI Network (Dedicated & Third Party):* where the AMI vendor proposes to stand-up and own the AMI network for the duration of the system's life and charges the utility a subscription fee.

Some detailed considerations for each type of approach are discussed below.

Cellular AMI Network:

Not all AMI/AMR vendors offer cellular AMI systems for the water market and those that do have different strategies. Some vendors offer cellular as their primary AMI solution while others use cellular transmitters to augment coverage (i.e., gap fill) for their dedicated RF AMI system. There are some benefits to using a cellular network including not having to worry about maintaining a separate network and no additional backhaul costs.

Some AMI vendors do market cellular radio transmitters using a newly released CAT-M chip, but some limit the product warranty and may not support a 20-year product life. Where the cellular product is supported by a 20-year warranty (10 full replacement value + 10 prorated replacement value) and the price of the radio transmitter is market competitive, this technology may compete with other proprietary RF systems. The cost of a cellular system needs to be evaluated over the full 20-year life, because the annual cost to operate this system can be higher than that of a standalone RF system. In recent procurements the cost of both the cellular product and the on-going operational costs have continued to decline making the cellular choice more competitive with proprietary RF

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systems. Usually, cellular AMI systems are more cost effective for small water utilities (less than 25,000 services).

Another option for deploying cellular radio transmitters could be to install them only in parts of the distribution system where the meters are dispersed or there is no cost-effective data collector location. This approach can benefit the overall system cost by eliminating the need for data collectors for only a few radio transmitters.

A consideration of cellular radio transmitters is on-going compatibility with cellular networks. That is, cellular networks continue to evolve with the purpose of providing more data at greater speeds but ensuring the utility's investment in cellular AMI technology over the expected 20 years is something vendors need to contend with. The last limitation that should be highlighted is regarding latency. A cellular radio transmitter is not always awake, so the latency of a command (remote shut off) could be delayed between 4 and 24 hours depending on the vendor.

Overlapping Utility AMI Network

As water utilities start to contemplate whether to implement AMI, they often look for efficiencies in partnering with the local gas or electric utility. However, if the water utility is a stand-alone utility and is not a multi-commodity utility the reality of cost savings is often smaller than expected. The entire cost of an AMI system consists of radio transmitters (85% of the total cost), AMI network (10% of the total costs), AMI software and implementation (5% of the total cost). If the water utility chooses this approach outside a procurement process, there would be reduced competitiveness for the radio transmitter price as fewer vendors address multi-utility AMI, which could quickly raise the cost of the overall system. Another challenge with this approach is that the parties involved in the partnership will likely have different objectives, budgets, data requirements, and service areas at some points in the expected 20-year life of the system. As a result, one or more of the partners could decide to take an alternate path in their AMI technology, potentially stranding the assets of the other party.

Vendor-owned AMI Network

AMI vendors may provide the option to own and operate the AMI network on behalf of the City of Thunder Bay. Although this option typically comes at a higher cost, it could be incorporated into procurement documents and compared against Utility-owned AMI networks.

Collection Software

An AMI system requires collection or headend software that receives the reading information from the collection network. This software monitors the network devices (collectors and radio transmitters) and can display and report on the different components in the field and their status. This software also passes the daily billable and hourly interval readings required to the MDM application, usually daily. Headend software is also typically used to perform network management (in proprietary networks) such as time synchronization messages to the various components of the network.

Some AMI software vendors limit the number of years hourly consumption data can be stored in this system due to its impact on performance as the database gets larger overtime.

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As discussed within the Smart City AMI Network section, where a LoRaWAN technology is chosen, the collection software is replaced with the Network Management Application, and the AMI vendor application server.

6.4.2.2. Optional Capabilities

There are many manufacturers of AMI systems with some providing a unique set of features and functionalities. RFP specifications may reduce the number of systems that could compete during the procurement process. A list of necessary or preferred features would need to be discussed prior to procurement when specification documents are being developed.

Radio Transmitter Alerts and Flags

AMI radio transmitters may have algorithms within the radio transmitters that allow for various flags. Some AMI systems have not added this feature to their radio transmitters as the same functionality can be achieved at the collection/headend or MDM software by analyzing the hourly consumption data. The benefit of performing these functions through the software (collection or MDM) is that the utility can more easily change leak detection thresholds. As an example, if identifying continuous consumption of 1/100th of a cubic foot per hour creates too many events, the utility could easily alter how leaks are determined – i.e., more consumption per hour over a longer time frame. The second advantage of performing customer side leak detection with an AMI system is you do not need to wait for the water bill to identify a leak has occurred, the MDM can be configured to trigger an alarm over a much shorter time frame (say 3 days), so the alert being sent to the customer can better avoid high water bills.

Data Logging

With an AMI system, hourly reading information is delivered to the collection software. Additionally, some systems have designed their radio transmitters to store readings, which can act as another means of data redundancy within the overall system. These radio transmitters will transmit past readings as well as new ones. If a transmission is not heard by a data collector, the headend software can backfill these readings during a future transmission.

Software as a Service (SaaS) versus On-Premises Software

Data Collection, MDM and Customer portal software are all capable of being installed in-house on utility provided server hardware or in a professionally managed / hosted environment referred to as Software as a Service (SaaS). The decision to host or not to host certain pieces of software depend on several factors that include the following considerations:

- Reliability and Security,
- System Support and utility expertise,
- System maintenance,
- Help desk,
- Total life cycle,
- Scalability, and
- Customization.

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These considerations and their levels of importance to the utility should be reviewed because hosting can increase the operational cost of the system. This will ensure that the utility gets all the information they require from the vendors to make the correct decision.

Time-Synchronized Readings and Two-way Communication

All currently marketed AMI systems are considered two-way communication systems. The functionality of two-way AMI systems is:

Time Synchronized Top of the Hour Readings – "clocks" in radio transmitters tend to drift and become inaccurate. Synchronization ensures that the timestamping of consumption is accurate, but it requires a two-way radio transmitter to receive the time stamp from the network. Meter readings can be time-synchronized to allow all readings in the utility's network to be read at the same time. An AMI system schedules these readings at the top of the hour (12:00, 1:00, 2:00, etc.) which allows hourly consumption periods to be easily compared.

On-demand Read – Some AMI systems allow a utility to request an on-demand reading. The reading may come from the data collector (in which case the reading may be a "few" hours old) or some systems may allow direct interrogation of the radio transmitter - understanding latency may be a factor in receiving the meter read quickly. That is, due to battery management, AMI radio transmitters are generally not always "listening" because of battery drain. However, when they "wake-up" to transmit data, they can remain "on" for a period to accept commands from the head-end software via the data collector. This might include meter reading for example. Most utilities are looking to obtain readings for final bills and a daily read pulled from the data collector would suffice. Final Bill reading can be accomplished by all AMI vendors in one way or another.

6.4.3. Implications for the City

As noted in chapter 3 Business Drivers (2.2.9), the City of Thunder Bay has a number of financial and non-financial reasons for considering the upgrade of its metering system and automation of its meter reading processes. Some non-financial reasons for considering automation include improvement in customer service and the ability to enhance distribution system monitoring. These business drivers are best achieved using AMI.

6.5. Meter Data Management (MDM) Software

6.5.1. Technology Overview

Meter Data Management software is required in an AMI system due to the large amount of readings and consumption data that needs to be stored, accessed, and reported on. This software can be procured from the AMI vendor as part of the AMI system, as part of a CIS application or can be procured separately as a standalone application. The MDM has several functions:

1. Data Repository – The software is optimized to store years' worth of data that an AMI system produces. For an AMI system that provides hourly readings, the MDM will need to store 8,760 readings and any alerts produced by the radio each year for every customer. Analyzing consumption patterns over a period of months or years necessitates the management of a large

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amount of data that needs to be accessed and reported quickly. Most utilities store between three and five years of consumption data upon which time the data is generally aggregated and then deleted.

2. Validations, Editing and Estimation (VEE) – Depending on what the data is being used for, a utility may want the software to identify gaps in data or problem data and display estimates for that period of missing or suspect data. An MDM with VEE functionality can often define the types of data validations that can be performed, whereby a utility is able to create routines on how to handle the different situations. For example, if only 50% of the readings were received for a certain period, the validation will identify what is missing and then create estimates for the missing data. This will ensure when a customer graphs the data, it does not appear like there were large periods of no consumption. This functionality is often employed for electric smart meters. The need for this with a water utility may only be beneficial when displaying data through a customer web portal.
3. Reporting – Another function of an MDM is the ability to produce different types of reports in an efficient manner in comparison to custom SQL queries. Given the amount of data that is accessible, report generation can be problematic and can take up significant IT resources. MDMs provide a standard set of reports, in addition to a custom report builder which allows users to add fields of data or additional criteria and groupings.

   More advanced MDMs have built dashboards within their applications to display the data for the user, minimizing or eliminating reports being generated. More and more water based MDMs are better understanding how to make the data usable and actionable without giving the utility data overload. Water based MDMs continue to see significant development in functionality, which is why most manufacturers are leaning toward Software as a Service (SaaS), to allow for an agile approach to software development.
4. Utility Management – MDMs used for water utilities usually have modules that perform water utility functions such as: district metering, leak detection, misapplied meters, and water consumption program monitoring. Ideally, the MDM will have a Reports and User Interface application that will allow the user to easily use and modify this functionality.

MDM and collection software can also be interfaced with other utility systems such as geographic information system (GIS), supervisory control and data acquisition (SCADA), 311/CIS and works management software. These interfaced connections to other systems need to be well planned to ensure the costs and effort to develop the interface is matched or exceeded by the benefits provided. For example, it may be very critical to be able to open a work order for field personnel to investigate a high-water consumption event that the MDM has identified. In this case an interface from the work management software to the MDM may avoid manual entries and multiple staff engagement steps to resolve the problem in the field.

6.5.2. Enhanced Functionality

Larger utilities often have options beyond an AMI vendor-supplied MDM. For example, many Customer Information Systems (CIS) have an integrated MDM to make data management and implementation easier.

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Larger utilities have also decided to procure a best-in-class MDM, which requires them to have a separate procurement for MDM. This allows the utility to choose the MDM that best meets the desired functionality.

The enhanced MDM functionality can include the following elements:

1. Meter and Radio transmitter asset management – the MDM can store all water meter and radio transmitter assets. This link to the account and premise numbers associated with the CIS is used for water billing. Some asset management applications can store maintenance history, RMA, warranty, and testing information.
2. Service orders based on the asset – once an asset has been identified as having a potential issue, the MDM would allow the utility to issue a service order to investigate and repair the asset. Depending on the MDM, this functionality may only issue the work order and may rely on a separate existing utility work order system in the field. This approach varies by vendor.
3. Customer Relationship management: the MDM would hold key customer information that is associated with the account and premises. This would allow communication to be sent to specific or subset group of customers (boil water alert, water outage, water conservation messages)
4. Water Billing and collection: where the MDM is an integrated application with the CIS, some water utilities implement MDM prior to CIS, then build on the functionality later.

6.5.3. Implications for the City of Thunder Bay

Diameter Services recommends the implementation of an AMI system with an integrated Meter Data Management (MDM) capability. The AMI systems on the market today are very well suited to provide the functionality and capacity required by the City of Thunder Bay, without the need for the additional expense of a separate MDM system.

6.6. Customer Engagement Portal (CEP)

6.6.1. Technology Overview

Most water utilities currently allow their customers to log in to view or download their water bill. Customers continue to expect more functionality through their internet and smart phone devices. Public utility operators (electric, gas, water) have been starting to address this expectation through more advanced customer portals.

With AMI, portals give customers access to their data to allow them to better understand their consumption. Portals allow them to set alarms and alerts to avoid unexpectedly large bills. This on-line experience differs depending on the type of customer facing application(s) selected. If the utility wants a seamless experience without the need for the customer to be redirected to different applications for consumption information, billing, and payments, then a third-party application is likely the best approach.

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6.6.2. Implications for the City of Thunder Bay

The City of Thunder Bay is currently implementing a new billing system (CIS), transitioning to Infor IPS. This new CIS has an optional Customer Engagement Portal (CEP). As the City of Thunder Bay considers this change, the discussion on business drivers, detailed in Chapter 3 Business Drivers (2.2.9), will help to guide this decision. The City of Thunder Bay has determined that it will be important to provide an interactive experience for its customers, necessitating the portal to provide a range of functionality from bill viewing and payment to interactive usage monitoring and alerts.

6.7. Water Meter Technology

6.7.1. Introduction

Metrology within the water industry has been around for more than 100 years, and some of the original types of measurement technology continue to be used today. This section will explain how each type of measurement works, the history of measurement products, product availability, and key advantages and disadvantages associated with each type of measurement. Lastly, key specifications related to each type of technology will be compared.

6.7.2. AWWA Standards

The American Water Works Association (AWWA) is an industry organization that, among other functions, provides a set of standards for the meters used by water utilities today. With no overarching regulatory bodies in Canada or the United States governing the use of water meters, it is left to the discretion of each utility to determine meter testing, accuracy, and change-out requirements.

Some newer technologies have recently been approved by the AWWA. These standards provide water utilities with a common set of key characteristics (lay length, types of threads, materials of construction, etc.) and performance standards (accuracy at certain flow rates) that can be applied for comparison purposes during competitive procurement.

It is important to note that AWWA does not make recommendations, nor does it state preferences with respect to the type of metering technology, nor does AWWA validate that meter manufacturers adequately comply with the AWWA specifications. The water metering technology selection and validation functions, therefore, remain the responsibility of the water utility.

There are two categories with respect to the types of water metering technology: 1) mechanical measurement, and 2) non-mechanical measurement. The AWWA standards for some of the relevant metering categories are listed below. The relevant AWWA Standards that the City of Thunder Bay would use for the procurements for its AMI project are shown in **bold**.

- AWWA Standards for Mechanical Measurement
    - **C700-20 – Cold-Water Meters – Displacement Type, Metal Alloy Main Case**
    - C701-19 – Cold Water Meters – Turbine Type for Customer Service
    - C702-19 – Cold Water Meters – Compound Type
    - C703-19 – Cold Water Meters – Fire Service Type

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    - C704-19 – Cold Water Meters – Propeller-Type Meters for Waterworks Applications
    - C706-96(R05) – Direct Reading, Remote-Registration Systems for Cold Water Meters
    - **C707-10(R16) – Encoder-Type Remote-Registration Systems for Cold Water Meters**
    - C708-19 – Cold-Water Meters – Multi-jet Type
    - C710-20 – Cold-Water Meters – Displacement Type, Plastic Main Case
    - C712-19 – Cold-Water Meters – Single-jet Type
- AWWA Standards for Non-mechanical Measurement
    - C713-19 – Cold-Water Meters – Fluidic Oscillator Type
    - **C715-18 – Cold-Water Meters – Electromagnetic and Ultrasonic Type, for Revenue Applications**
    - C750-19 – Transit-Time Flowmeters in Full Closed Circuits
    - C751-19 – Magnetic Inductive Flowmeters

Water utilities usually opt to use these standards during water meter procurement. Although these standards represent different types of measurement technology, many have similar applications. Some water utilities consider meters from different AWWA standards as comparable, thus different types of technologies (and AWWA standards) would be price comparable. Other water utilities restrict their procurement to a single AWWA standard for a single type of application. Because there are many manufacturers that produce meters that comply with each standard, this has a limited impact on the competitiveness of the procurement.

Although multiple standards may be allowed, the meter's performance and pricing may vary depending on the meter standard being used. Notably, the most common standard used in North America is the C700-20 positive displacement meter. Often water utilities restrict their residential water meter procurement to only allow meters that meet this standard. It is up to the water utility to decide which water meter standards will be allowed based on their experience and the manufacturer's stated product benefits.

6.7.3. Water Meters – Positive Displacement Type, Metal Alloy Main Case

Description of Measurement

Positive displacement type water meters measure the actual volume of water that flows through the measuring chamber. There are two types common in the North American industry: nutating disc and oscillating piston. Both the nutating disc and the oscillating piston measure volumes of water; the method in which they do so, however, differs slightly. Figures 8 and 9 below display how each type works.

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Exhibit 48: Nutating Disc Measuring Element

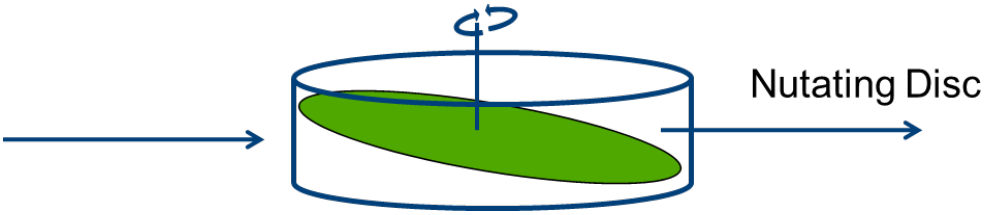
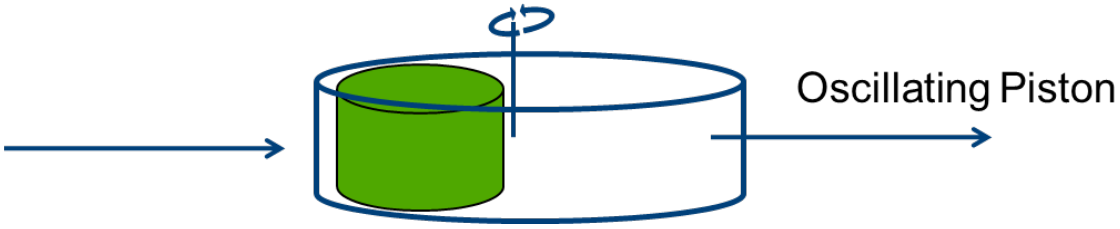


Exhibit 49: Oscillating Piston Measuring Element



As the disc or piston rotates around the axis, it turns a magnet. This movement is detected by a corresponding magnet located in the register head. This “magnetic coupling” allows both the meter body and the register head to be sealed, preventing leakage between the devices. For each manufacturer, a known number of rotations equal a unit of measure.

These meters are typically installed in a horizontal orientation, although manufacturers of piston type meters often also market a warranty for vertical installations. Nutating disc meters have been known to extend their warranty for vertical installation in special situations where this is a mandatory requirement.

History

Positive displacement type of measurement is the oldest (over 100 years in use) and most popular type of water meter used in North America. The patent for the nutating disc meter was filed by James A. Tilden in 1887 and 1888. The oscillating piston meter, patented by Lewis N. Nash in 1884, was adapted from older designs. It has proven to be a resilient and long-lasting water meter, with an expected life of between 15 and 25 years depending on the quality of the water it is measuring.

Market

There are five major domestic manufacturers of the positive displacement type water meters. These manufacturers include Badger Metering, Master Meter, Mueller, Neptune Technology Group, and Sensus Water Meters.

Advantages

Positive displacement type water meters are the most popular type of water meter in North America; most large water utilities rely on these meters for many of their residential applications.

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These meters have good accuracy at low flows, with AWWA standards requiring these meters to achieve between 95% to 101.5% accuracy when measuring normal operational flow ranges (0.5 to 25 gpm). Many water meter manufacturers exceed this standard, either by exceeding the accuracy thresholds, or meeting the accuracy standard over a larger flow range. Different manufacturers publish slightly different performance specifications; however, at minimum, all major meter manufacturers meet the published AWWA specification requirements.

The positive displacement water meters do not require a power source to measure flow. The registers for some positive displacement water meters are powered by batteries; however, the measurement of flow is not dependent on this battery power source.

It is very rare for a positive displacement meter to over-register consumption. This provides some confidence to the utility that if a meter is inaccurate, it is to the benefit of the customer. If over-registration occurs, it is usually due to an incorrect water meter register being installed.

Disadvantages

Positive displacement water meter chambers and discs/pistons wear over time. As these meters wear, they become less accurate, allowing more water to pass through the meter undetected. Depending on the quality of the water it measures, the life of a meter is usually between 15 and 25 years. At this point, replacing older meters with new ones is likely to have a reasonable payback of around five years.

Because mechanical water meters have moving parts, they can sometimes make noise as water moves through the meter. Residents may complain of a ticking sound that can vibrate throughout the plumbing of the property.

The tolerances between the disc/piston and the measuring chamber are quite tight. And while most positive displacement meters have a built-in screen on the inlet side to reduce large particles of debris from entering the measuring chamber, debris in the water can jam the meter, stop the disc/piston from turning, and restrict the available flow. When this occurs, the meter stops registering consumption and requires either repair or replacement.

6.7.4. Water Meters – Positive Displacement Type, Plastic Main Case

Description of Measurement

Plastic Main Case meters use the same measuring elements (and registers) as their bronze counterparts and only the meter body material is different.

History

The market was influenced by factors including NSF/ANSI 61 Annex G and Annex F certification, and the Safe Drinking Water Act (NSF 372) that became effective January 4, 2014. Meter manufacturers needed to comply by providing lead-free alloy. As the price of metals continued to

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rise, some meter manufacturers offered composite materials as a substitute for metal meter construction.

Market

There are two major domestic manufacturers of positive displacement type meters constructed with plastic or composite material bodies. These manufacturers include Badger Meter and Sensus with Mueller discontinuing its plastic-body meter line effective November 2022.

Advantages

Replacing the brass body meter (C700-15) with a plastic/polymer/composite body can reduce the cost of the water meter between 5% and 10%.

Some manufacturers' composite/polymer meters have a burst pressure rating that is higher than the rating for a similar brass meter. Main case strength may have limited benefit to the utility because for both metal and plastic-body meters the burst pressure far exceeds normal utility operating pressure.

Disadvantages

One of the main issues related to plastic main cases is cross-threading. Installation issues are encountered when the plastic meter is threaded with brass meter tailpieces. If the meter is not aligned perfectly, the threads can be cross threaded, which makes the meter unusable until either the threads are repaired, or the meter is replaced. Cross-threading is not typically covered by the product warranty.

A second disadvantage reported by utilities is the inability for plastic/composite/polymer meters to withstand over torquing. Often a brass meter can withstand some torque due to the somewhat malleable nature of brass, whereas plastic/composite/polymer meters may break when subjected to the same conditions. In some cases, installers may tend to under torque the meter to avoid damage which can lead to repeat visits to the meter if it begins leak at the connection point following shifting or temperature changes.

Bronze-body meters are more recyclable than plastic-body meters, and there will likely be a difference in the scrap value/cost of these different designs.

Grounding the home's electrical system is a common practice. Installation of plastic-body meters will break to continuity of the home's internal plumbing and requires the installation of a grounding strap to maintain electrical continuity.

6.7.5. Water Meters – Turbine

Description of Measurement

Turbine meters are a type of velocity meter, where the turbine blades spin about a central shaft proportional to the rate of water flow through the meter.

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History

Turbine style water meters are among the oldest metering technologies on the market.

Market

All the major North American water meter companies currently offer turbine meter technology including Badger, Master Meter, Mueller, Neptune, Sensus.

Advantages

Turbine water meters are designed for applications where flow rates are consistently moderate to high. They are less expensive than other meters of comparable size.

Disadvantages

Turbine meters are not well-suited to applications where low flow rates may be encountered due to their lower levels of accuracy at low flows. The accuracy of turbine meters can also be adversely impacted by certain plumbing conditions that cause turbulent or jetting flow. Unlike positive displacement meters, turbine meters can over-register.

6.7.6. Water Meters – Compound

Description of Measurement

Compound meters are designed to provide both low flow accuracy and high flow capacity. They do this by combining the measuring technologies of the positive displacement meter for low flow and turbine meter for high flow. As flow increases, a throttle valve directs an increasing proportion of the flow toward the turbine measuring element.

History

Compound meters have also been available for over 100 years and are the workhorse for the ICI applications for most North American water utilities.

Market

Several of the major North American meter manufacturers offer compound style meters including Badger, Mueller, Master Meter & Neptune. Sensus no longer sells compound style meters, opting to sell its OMNI C2 and F2 (fire flow) meters in those applications.

As non-mechanical meters including ultrasonic meter technologies gain traction in the market, it is expected that these will displace compound meters which are heavier, not as accurate and often more expensive.

Advantages

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Wide flow ranges make the compound meter suited to a wide range of applications. The two-register design can be useful to determine meter sizing and maintenance issues.

Disadvantages

The point where the turbine measuring element engages and takes over some measurement from the positive displacement measuring element is called the “cross-over range”. Accuracy of the meter falls, often to as low as 90%-95%, for flows in the cross-over range.

The two-register design of the compound can cause reading and billing errors if the readings for each of the meter’s measuring elements become reversed or the billing multipliers are misapplied.

6.7.7. Water Meters – Fire Service

Description of Measurement

Fire service meters may be either turbine-style or compound-style. The difference between fire service meters and their standard turbine or compound counterparts is that fire service meters are equipped with high-capacity strainers and are rated to withstand higher water pressures. These product differences enable this class of meters to be UL (Underwriters Laboratory) listed and FM (Factory Mutual) approved; designations required to meet the requirements of fire suppression applications.

History

Fire service models of turbine and compound style meters have been sold in North America for over 100 years. They have become the standard meter for a wide range of applications that require measurement of fire-flows.

Market

Like compound meters, it is expected that new non-mechanical metering technologies will displace traditional mechanical fire service designs due to improved accuracy, lower cost, and ease of installation. Currently, mechanical fire service meters are marketed in North America by Badger, Master Meter, Mueller, Neptune, Sensus.

Advantages

Designed for specific applications where low flow accuracy, broad operating range and fire flow capacity make them ideally suited for applications with wide flow ranges that also serve fire suppression lines.

Disadvantages

Fire service meters are designed to meet harsh operating conditions and are therefore bulky and expensive.

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6.7.8. Water Meters – Electromagnetic and Ultrasonic Type, for Revenue Applications

Description of Measurement

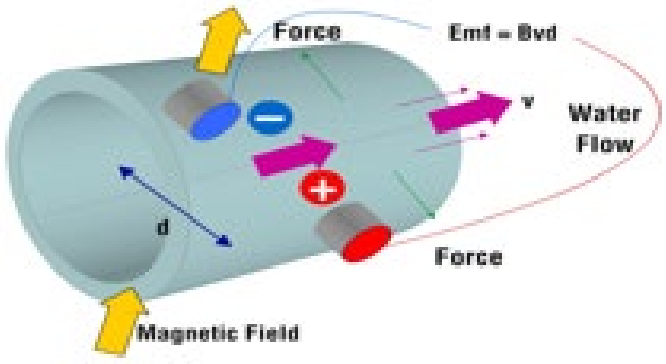
This AWWA standard applies to both Ultrasonic and Electromagnetic meters.

Electromagnetic water meters measure the voltage induced due to movement of water through a magnetic field. The amount of voltage induced is proportional to the velocity of the water. By determining the velocity of the water, and factoring in the cross-sectional area of the pipe, an algorithm then determines consumption for the flowrate. As a result, the sampling rate (i.e., how frequently the flow rate is determined) is important to the accuracy of an electromagnetic meter (i.e., more frequent sampling generally means higher accuracy rates).

Power is required to generate the magnetic field and for the sensors and comes from either battery or from AC depending on the manufacturer and the size of the meter.

For small meters and some large meters, the power is provided by a battery. The battery generally has a 20-year warranty, typically represented by a “10/10 warranty,” which covers 100% of the replacement value for the first 10 years, and a prorated replacement value for years 11 through 20. This battery is typically “potted” and not replaceable in small meters. Intermediate and large “mag” meters are AC or DC powered and may have replaceable batteries depending on the manufacturer.

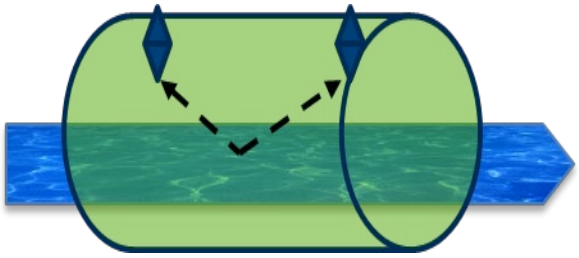
Exhibit 50: Electromagnetic Meter



Ultrasonic meters measure the time it takes for a sonic pulse to travel between two transducers. Pulses reflect off particulates in the water.

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Exhibit 51: Ultrasonic Meter (Large Size Shown)



Additional features can be incorporated into electromagnetic and ultrasonic meters such as temperature, pressure, alarms, and remote shut-off within the existing meter lay length.

History

Electromagnetic consumption meters have been available in the market for about twenty years. Ultrasonic consumption meters have been readily available in the North America market for approximately five years, in sizes up to 2-inch. In recent years, manufacturers have started introducing this technology in larger meters. Some manufacturers have announced a plan to discontinue large mechanical meters in favour of ultrasonic designs.

Market

Electromagnetic meters: The only major manufacturer of residential electronic magnetic meter is Sensus Water Meters.

Ultrasonic meters: The major manufacturers of ultrasonic meters include Badger Meter, Diehl, Honeywell/Elster, Itron, Kamstrup, Master Meter, and Neptune Technology Group.

Advantages

Key features of non-mechanical meters over positive displacement meters are improved accuracy at very low flows, and very limited deterioration of accuracy over time. Additionally, non-mechanical meters typically have a single-register design making them easier to read and bill, therefore reducing the possibility of reading errors. They are also typically significantly lighter than mechanical meters, making them easier and safer to install.

They may also offer some additional features and functionality, depending on make and model, including:

- Alarm conditions such as: Empty pipe, reverse flow, tamper, low battery, leak detection, etc.
- Temperature reading
- Pressure reading

Although these may not apply to all manufacturer products, the additional functionality described above of these meters has expanded beyond just meter readings.

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Non-mechanical meters are essentially an open pipe and unaffected by debris that can impact mechanical meter performance. Large non-mechanical meters are typically installed without strainers which is a requirement of their mechanical counterpart. The accuracy of the meter over time will not show any degradation. In theory, the meter should be as accurate at year 19 as it was on the day of shipment. So, there are no lost revenues over time, and the expected replacement date is defined which aids in capital planning.

Although there is a large discrepancy in pricing of non-mechanical meters among manufacturers, Large (non-mechanical) Meters are generally priced like mechanical meters of the same size. But, as mentioned above, Large non-mechanical meters, do not require strainers which is a cost savings.

Disadvantages

A key consideration is that this technology requires battery power to measure water flow. Typically, manufacturers offer a 20-year warranty. It is important to understand that these meters will have a known and firm product end date. This changes the water utility practice of performing meter accuracy sampling to determine the optimal replacement age. Meters in this class must be replaced prior to the end of their pre-determined (based on battery) meter age. Non-mechanical meters may provide a battery flag to the radio transmitter based on either voltage or meter age warning the utility the meter needs be changed.

Although this meter type is not new to the water industry, this is a new application of this meter type, and hence there is less history of performance and problems. It is not known/field proven if these meters will prove reliable long term.

The market has shown that Small and Intermediate electromagnetic and ultrasonic meters are typically more expensive due to lower manufacturing volumes as well as selling to water utilities based on some of the enhanced functionality. It is expected that these meters will eventually be competitively priced with positive displacement meters, but without a larger purchase volume, presently it is difficult to get the product cost to levels of a positive displacement meter.

With Large Meters, it should be noted that the cost-savings provided by eliminating the strainer may be offset by the requirement of spool pieces because of the different lay lengths of non-mechanical meters. However, most meter manufacturers have mirrored the lay lengths of mechanical meter counterparts. As an example, some 3” ultrasonic meters come in both 12” and 17” lay lengths to address both turbine and compound meter replacements. Furthermore, some non-mechanical meters do not include a test port, so a spool piece with a test port may be required.

Large Water Meter Specification Comparison

The table below shows a comparison of key performance characteristics of each type of meter technology.

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Exhibit 52: Comparisons of Each Type of Meter Technology Used for Large Meters

Consideration	Turbine	Compound	Electromagnetic	Ultrasonic
Availability in North American market	>100 years	>100 years	~20 years (battery-powered)	~2 to 5 years
Size Range	1-1/2” to 12”	2” to 8” (10” fire service compound available)	1-1/2” to 24”	5/8” to 12”
Estimated meter life	20 to 30 (soft end-of-life with meter accuracy degrading over time)	20 to 30 (soft end-of-life with meter accuracy degrading over time)	20 (hard end-of-life with meter stopping when the battery dies)	20 (hard end-of-life with meter stopping when the battery dies)
Strainer Required	Yes	Yes	No	No
Power Source	None	None	Battery	Battery
Number of Suppliers	5+	5+	3+	4+
For the specifications below, a 4” meter was chosen as a representative meter size.				
Flow Range (100% +/- 1.5% accuracy)	10 to 1,200 gpm	1 to 1,000 gpm	5 to 1,250 gpm	1.5 to 1,250 gpm
Low flow (minimum 95% accuracy)	10 gpm	0.5 gpm	1.25 gpm	0.75 gpm
Accuracy Drops at Crossover?	No	Yes	No	No
Weight	52 lbs	100 lbs	37.4 lbs	51 lbs

6.7.9. Meter Register Technology

Introduction

The foundation of an AMI system is the water meter and register technology. The register head tracks and displays the total volume of water that has passed through the water meter. Many registers allow remote meter reading. Advances in register technology have enabled the introduction of many other features and benefits since the inception of AMI. Different meter manufacturers present different options. Diameter reviewed the key features of the different technologies and discussed the benefits.

Encoder Registers

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Encoder technology is the most common water meter register used as the foundation of an AMI system. The AWWA standard that governs encoder registers is C707-10(R16). This technology allows the meter to be read directly from an AMI radio transmitter opposed to a pulse-type AMI-compatible register; an encoder register ensures that consumption is being recorded and read from a single source – the register.

Older encoder registers were limited by the mechanical nature of their designs and could only provide encoding of the 6-digit odometer. Newer designs that are more reliant on solid-state technology, can encode 8-digits of resolution, making the consumption data much more useful for usage analysis including leak detection. For example, the current 8-digit resolution on a typical residential meter allows remote reading to the nearest 1/100th of a cubic foot.

Encoder registers do have some compatibility limitations. There are two main encoder protocols that are now standard in the North American market: Sensus protocol (all meters except Neptune) and Neptune protocol. Fortunately, compatibility between encoder registers and radio transmitters has been enabled by various licensing agreements between the main players. Today, most radio transmitters are capable of reading both protocols. When procuring any encoder technology, water utilities must fully understand the limitations of what and who is able to read a meter register.

Digital Display

Some encoder registers are available with a digital display instead of a mechanical odometer display. These new registers may also allow for a toggle of the display, so the property owner or service personnel can see the flow rate, in various units, of water passing through the meter while it is being inspected together with any active alarm flags. This is a helpful feature that is often used during meter testing or when property owners want to understand a leak that may be at their building/residence.

One drawback of some digital displays is that they can be difficult to manually read or require a light source (flashlight) to view the display; this problem can be more pronounced in low light areas (meter pits, crawl spaces, etc.) or where dirt and water can impair visibility of the register (meter pits).

Detection Flags

Some advanced encoder meter registers and most AMI radio transmitters have detection flags (i.e., alarms conditions) embedded in the product. They have algorithms that detect certain simply defined conditions; once those conditions are met, a “Yes” flag is transmitted to the radio transmitter and data collector.

Common flags include a continuous consumption flag, a backflow detection flag, and a zero-consumption flag. The majority of meter and AMI manufacturers have designed the radio transmitter to perform the algorithms necessary to produce these flags, however a couple manufacturers perform these functions in the meter register. When flags are produced using the register head, often only that manufacturer’s AMI radio transmitter can access them. As a result, if an encoder register is responsible for performing these algorithms, then the utility may tie itself to a specific radio

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transmitter and water meter manufacturer if it chooses this kind of solution. On the other hand, when the radio transmitter performs these functions, the utility can continue to competitively procure a wider variety of water meters in the future.

Diameter recommends that the utility seek a solution that allows these flags to be generated and provided by the MDM or the radio transmitter rather than a solution where flags are provided by the encoder register.

High Resolution Encoder Registers

A high-resolution water meter register allows for more precise increments to be recorded (e.g. 1 litre) and communicated through the AMI radio transmitter. Most meter manufacturers have standardized high resolution encoder registers since they best address many of the common business needs of the water market such as leak detection. As a result, this specification will not limit procurement to a single manufacturer and will not impact the cost of the meter.

Exhibit 53: Reading Resolution by Meter Size of High Resolution (8-Digit) Encoders

Registration in cubic metres	Movable Encoded Digits ← Most Significant				Highest Resolution →				Optional Not Encoded
Register Digit →	1	2	3	4	5	6	7	8	9
16mm – 25mm	10,000	1,000	100	10	1	0.1	0.01	0.001	0.0001
38mm – 100mm	100,000	10,000	1,000	100	10	1	0.1	0.01	0.001
150mm and up	1,000,000	100,000	10,000	1,000	100	10	1	0.1	0.01

As an example, to demonstrate the difference between high- and low-resolution registers, a typical residential sized (i.e., 5/8” to 1”) meter with a low-resolution register would provide a remote reading to the nearest 500 litres (depending on the age and design of the register). A high-resolution register provides resolution to the nearest 1 litre. See the comparison of relative register resolutions in Exhibit 54: Comparison of Low and Encoder Registers.

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Exhibit 54: Comparison of Low- and High-Resolution Encoder Registers

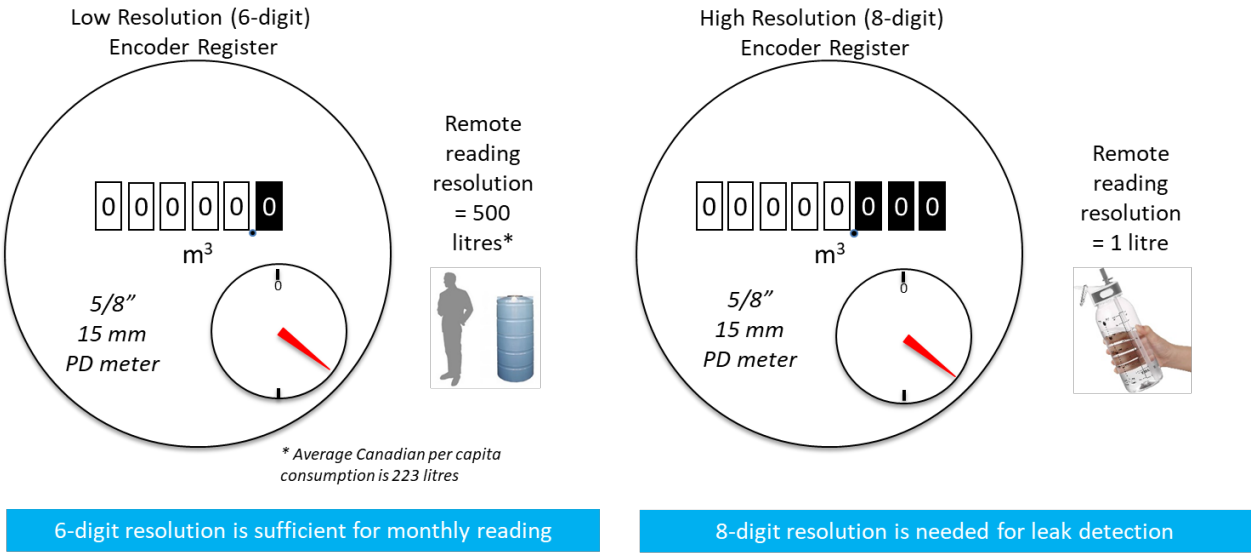
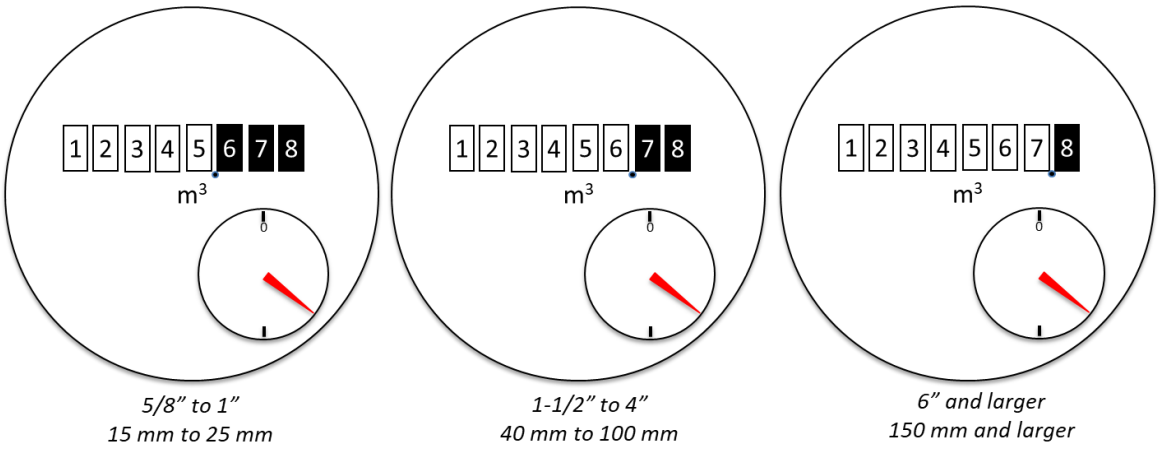


Exhibit 55: High Resolution Encoder Registers by Size shows the register resolution for various meter sizes.

Exhibit 55: High Resolution Encoder Registers by Size



Billing read:	12345 m³	123456 m³	1234567 m³
Remote resolution:	1 litre	10 litres	100 litres

In Exhibit 56: Continuous Flow Condition - High vs Low Resolution Encoder Registers, data from an actual AMI system on the left (8-Digit Encoder) is compared to how that same scenario would have been graphed if the water meter was equipped with a 6-Digit Encoder (right). The high-resolution encoder allows the user to clearly identify that consumption on an hourly basis never reaches zero – a key indicator of a continuous flow conditions such as a customer-side leak.

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Exhibit 56: Continuous Flow Condition - High vs Low Resolution Encoder Registers

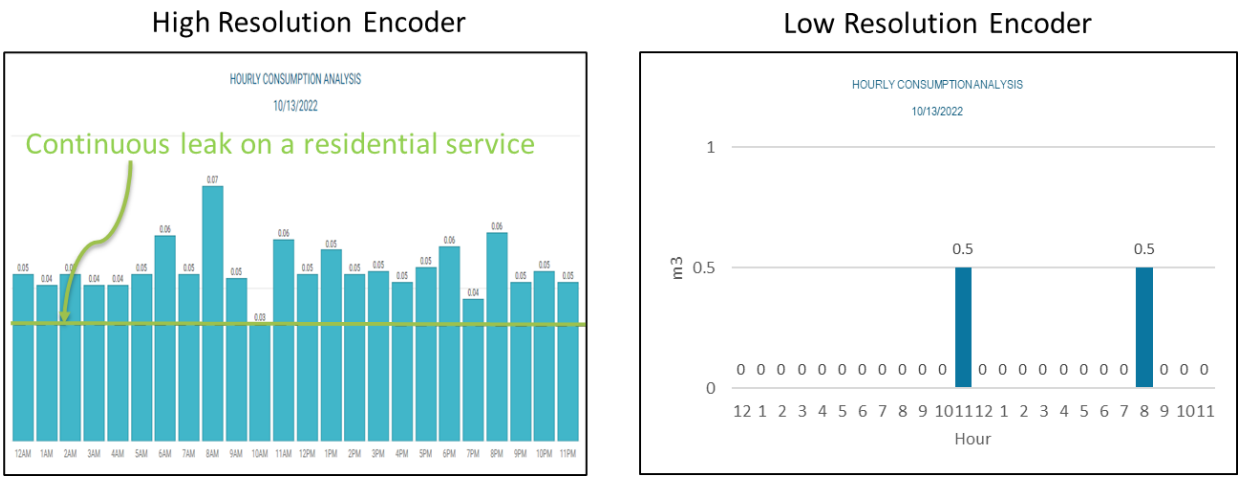
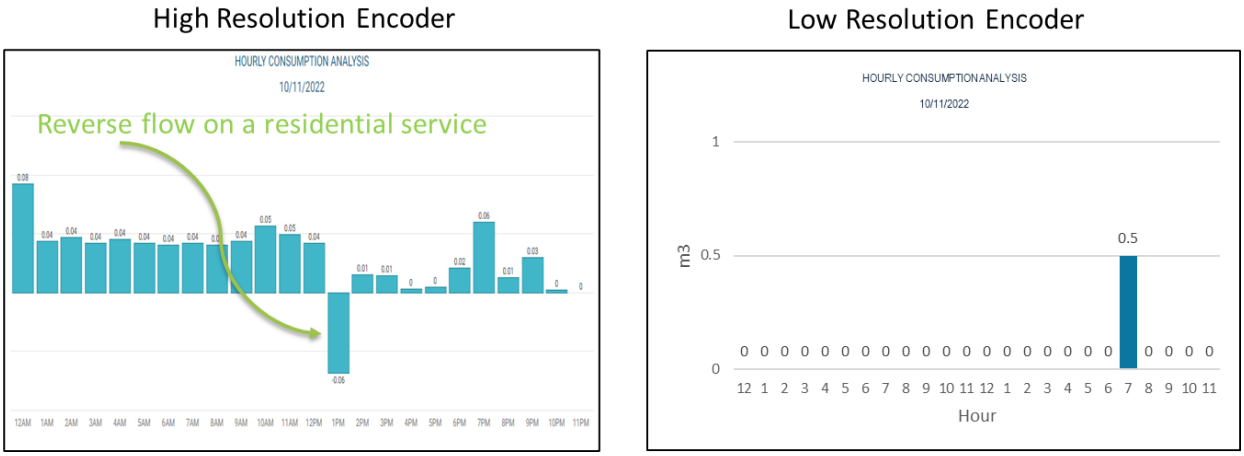


Exhibit 57: Reverse Flow - High vs Low Resolution Encoder Registers illustrates the comparison of high versus low resolution encoder registers and their ability to identify a reverse flow condition. The high-resolution encoder on the right clearly catches the reverse flow condition while the low-resolution encoder does not.

Exhibit 57: Reverse Flow - High vs Low Resolution Encoder Registers



Integrated Radio with Register

Some meter manufacturers offer integrated encoder registers with a built-in radio transmitter (often referred to as “radio under the glass”). The single product comes shipped attached to a water meter and requires no installation of the radio transmitter itself. Some manufacturers require the installer to activate the radio transmitters by sweeping a magnet across a location on the register, while others detect water moving through the meter which activates the radio transmitter.

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The main benefit of this type of product is ease of installation. The installer does not have to run a wire, connect the wire to the meter encoder, and at times program the radio transmitter. An integrated radio transmitter and encoder register does not require these additional installation steps and there is no future maintenance required for the wiring.

A disadvantage to an AMI solution that is built on an integrated radio transmitter and encoder register is that this type of product eliminates competitive water meter purchases for the entire life of the system (typically 15 to 20 years). An AMI system already has restrictive RF protocols that prevent a utility from using radio transmitters from a different supplier. Combining a radio transmitter with the integrated water meter register puts the same procurement restriction on the water meter purchase. In the future, if issues develop relating to product quality or pricing the utility will have limited options for alternatives.

Another disadvantage of the integrated radio transmitter and encoder register is that the radio is located in the same environment as the water meter, i.e., in a basement or under a meter box lid. In order to not reduce the range of the radio's communication, these devices should offer the ability to connect to a remote antenna that can be installed on the exterior surface of the building or meter box lid.

Some ultrasonic meters have an integrated radio transmitter with the meter register, allowing a single battery to perform the reading and transmission functions. These should be evaluated with the additional risk discussed above.

For these reasons, Diameter recommends caution in considering a solution that requires an integrated radio transmitter and encoder register. The short-term benefits (ease of installation) may expose a utility to long-term risk.

Manufacturers who market an integrated radio transmitter with the register are:

- Neptune R900i product
- Sensus Ally electro-magnetic meter
- Kamstrup MULTICAL 21 / FlowIQ 21xx water meter
- Diehl
- Master Meter

Registers that Adapt / Program to Different Meter Manufacturers

Some companies offer encoder registers that can be installed on other manufacturers' water meters. These registers can be programmed to specific gear ratios (number of rotations / units of measure) and record the water moving through the meter. The programming depends on the installer selecting the correct meter manufacturer, meter model, and size. Any issues with this programming can lead to high or low registration. Some manufacturers also include the AMI radio transmitter integrated into this register.

While the flexibility of this register design is attractive on the surface, there are significant disadvantages to this type of product:

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- Programming can be problematic, and any type of installation error could lead to significant billing issues. If the public loses confidence in the water meter used by the utility, it could force a 100% inspection to ensure that programming is correct on all meters.
- Neither the meter manufacturer nor the retrofit register manufacturer will cover warranty coverage the combined product as installed, meaning that any issue with meter accuracy or readings are the problem of the water utility.

Manufacturers of these types of products include:

- Master Meter 3G Interpreter, Elinx Interpreter
- Metron-Farnier i8

Due to the high impact of installation programming errors, and the loss of warranty coverage, this category of product is not recommended by Diameter.

6.7.10. Implications for the City of Thunder Bay

Diameter Services recommends that high resolution encoder registers be the standard for all future meter purchases. The higher resolution along with the frequent reading capability of AMI, offer a range of benefits including continuous flow, reverse flow, and leak detection indications that are extremely helpful in troubleshooting various water usage situations.

For meters that are being retrofitted with new registers, those registers should be provided by the same manufacturer as the meter. Any other combination of meter and register can lead to errors and loss of product warranty.

6.8. Other Field Sensor Technology

6.8.1. Remote Shut-off Valves

Using their two-way communications capabilities, some AMI systems enable the use of remote shut off valves. These valves would be able to reduce flow to a site or turn off completely without the need for someone to visit the property.

Due to the challenges and expense of manual disconnection and reconnection of service, some utilities find this an attractive option. There are drawbacks, however. These devices are expensive, adding significant cost to each installation. There are also social ramifications and if these devices are not installed on all water services, the utility may be perceived as targeting customers who are economically disadvantaged.

Installation of these devices can also be more challenging, as they will likely require changes to the meter setting or installing a specific manufacturer water meter that includes a remote shut off device within the meter itself.

Some water meters have recently been introduced with remote shut off capability within the standard water meter lay length, which would address some of the increased cost of installing this feature.

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Some good applications for these products would include:

- Tenant properties with high tenant turn over. Some university or college areas may have many new customers every year and it could be challenging and costly to utilize collection agencies and transfer charges to Tax Roll.
- Parent and child meters, some utilities have properties with a single curb stop but multiple customers, so if a single customer does not pay their bill there is no means for the utility to shut them off.
- Seasonal services – where the water is shut off and turned on twice or more each year, having a remote shut off meter may help reduce truck rolls.

6.8.2. Acoustic Leak Detection

An optional addition to an AMI/AMR system is the installation of acoustic leak detection (ALD) devices across part or all the utility's water system. These devices could be permanent or temporary installations where the devices are picked up and relocated on a regular basis. These devices measure the noise of the water flowing in the system and send these acoustic readings through several radio transmitters in the network. It will then make its way back to a leak detection software that will place each device on a GIS map. Leaks in the system are detected by the pitch and change in acoustic readings from each reporting device. Typically, depending on the density of the devices and the type of material used for the water mains, an ALD device would be installed for every 10 water meters in the system.

6.8.3. Temperature and Pressure Monitoring

Temperature: A water utility whose temperature can drop below freezing may benefit from the ability to monitor water temperature for meters situated in meter pits, crawl spaces, or other exposed environments. Early warning of potential freezing conditions could prompt a "run your water" alert that avoids possible burst pipes and property damage.

Among other factors, residual chlorine levels in water supply are affected by temperatures: the higher the temperature, the faster the chlorine degrades. The ability to monitor temperatures can be an indicator of potential water quality issues.

Pressure: Water utilities with numerous pressure zones or limited SCADA points find it expensive to collect pressure readings. Pressure reading collected in more locations of a water system provide several benefits:

- Ensure adequate pressure to avoid water quality issues and customer complaints.
- Drop in pressure as an indicator of main or water service breaks.
- Provide pressure inputs to the hydraulic model to better understand the distribution system.
- Reduce pressure within a specific pressure zone to reduce the leakage within the system while still maintaining minimum fire pressure levels.

Many vendors offer non-mechanical meters with integrated pressure and temperature monitoring that can be communicated through the AMI system. In other cases, pressure sensors are available that are compatible with AMI systems

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It should be noted that not all meters and AMI systems are fully compatible when in the case of pressure sensing, so the need for this compatibility should be clearly stated in the AMI system and meter procurements.

6.8.4. Implications for The City of Thunder Bay

The City of Thunder Bay typically experiences about 100 frozen services per year. Monitoring temperature in an effort to provide alerts to customers at risk of freezing could prove to be a valuable customer service initiative that could be addressed with AMI and strategic installation of meters capable of sensing temperature. A customer engagement portal with the ability to manage customer outreach could be used to proactively alerts customers whose service is at risk of freezing.

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7. SYSTEM INTERFACE AND INTEGRATION REQUIREMENTS

7.1. System Assessment – Existing

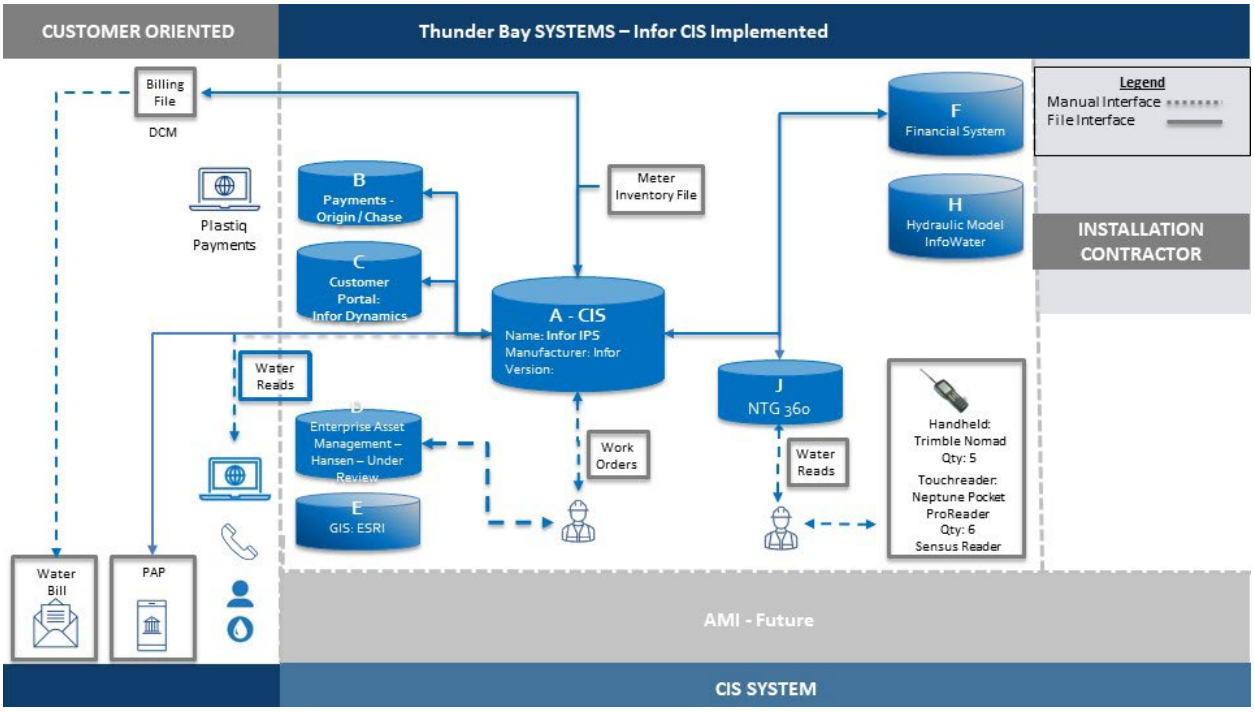
7.1.1. System Assessment – Existing Description

Through workshop activities, Diameter performed a system review with the City of Thunder Bay's project team. The purpose of this assessment was to identify the systems currently in use and those systems that may be impacted with the implementation of AMR or AMI technology. In addition, risks and challenges were identified as well as opportunities to improve the customer's experience. This current system diagram is augmented with Transition and Future system design diagrams. These diagrams are not intended to be the final solution as different vendors may propose different types of system architecture. It is intended to give the City of Thunder Bay a good idea of the scale of the impact this project may have on their systems. This document is an initial step in understanding the level of integrations the City of Thunder Bay should anticipate supporting this organizational change.

The City of Thunder Bay is currently undergoing the implementation of a new CIS system called Infor IPS. It is anticipated that Infor IPS will be in production within the next 6-12 months at the time of this report. For the purposes of the workshops and this report, it was assumed Infor IPS was the active CIS system for the City of Thunder Bay. Figure 13 below represents the system diagram of the City of Thunder Bay's existing state and serves as the starting point for both the AMR and AMI transition and future diagrams.

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Exhibit 58: Existing State System Diagram



7.1.2. CIS Systems

The main purpose of the Infor IPS system is to support the meter to cash process including water, sewer billing and collections, perform Customer Relationship Management (CRM) and service order management activities. Infor IPS will be considered the system of record for water meter and radio transmitter information. The current service order process relies on a combination of the City of Thunder Bay's CIS and the Hansen work order system and is a paper-based process.

The City of Thunder Bay currently obtains meter readings by utility staff manual readings by handheld device, or customer provided readings. The remaining reads are estimates that are used for billing purposes. The current meter reading process will need to be maintained long term until more than 95% of meters have been converted to an AMR or AMI system. The software and related handheld meter reading equipment will need to be maintained through the transition, which could last up to 3 years. The City of Thunder Bay is upgrading the current Neptune N_Sight data management system used for meter reads, which is no longer supported, to the Neptune 360 platform to process manual handheld reads. Diameter has reviewed the handheld devices that are being considered as replacement and verified that for some AMI systems, a portion can be repurposed for an installation tool once AMI is fully deployed. It is still recommended for the City of Thunder Bay includes the replacement of handheld devices in the capital costs of the AMR or AMI financial model.

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7.1.2.1. Challenges and Recommendations

Infor IPS is a commonly used system for a water utility the size of the City of Thunder Bay. The integration effort will require some business requirements definition and adjustments to some processes the system currently supports (e.g. the meter reading process, customer-facing applications).

The City of Thunder Bay does plan on the adoption of Infor IPS to allow for more automated interfacing processes. Although this will open the door for improvements in some of the manual interfaces identified above, it should not be seen as a silver bullet. It will take significant effort to learn, develop, configure and test all automated interfaces.

Challenges identified:

1. **New CIS software:** At the time of this report, Infor CIS is planned to be in production by the end of Q2 2025. As opposed to a major system upgrade from the same vendor, the City of Thunder Bay has adopted a different CIS vendor which will involve new interfaces, new business processes, and a full database import from the current Vailtech CIS.

2. **Manual paperwork order process:** As the City of Thunder Bay moves toward AMR/AMI, data integrity and consistency become critically important. Changes to water meters, registers or radio transmitters using a manual paperwork process can be problematic. With monthly or hourly consumption data, updating changes to equipment in the field is very time sensitive. It is recommended to implement an automated interface between current and future installation contractors. This can be done during the startup phase of the AMR/AMI project; future contracts will then need to conform to this standard.

3. **CIS period of stabilization:** Implementing Infor IPS will be a significant change the City of Thunder Bay's water billing processes and customer service activities. Given the level of integration required with either an AMR or AMI system during both implementation and post-implementation, it is recommended that the City of Thunder Bay undergo a 6-month period of stabilization with Infor IPS prior to embarking on an AMR/AMI project. This will ensure all processes and activities are understood and performed as expected by the City of Thunder Bay's team and ultimately its water customers.

7.1.3. Customer Facing Applications

The City of Thunder Bay does not currently offer a customer-facing application or portal to access their water billing information. However, with the transition to Infor IPS the City of Thunder Bay is implementing the Infor Dynamics customer portal. This application is inherently interfaced to Infor IPS and provides some functionalities allowing customers to view and pay their current water bill and view their historical water bills. At the time of this report, the Dynamics portal does not offer the capability of storing, displaying, and analyzing hourly water consumption data.

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7.1.3.1. Challenges and Recommendations

The City of Thunder Bay's project team identified several customer service business drivers as important and/or critical to the success of the project (see Section 3 Business Drivers). Functionality from an enhanced customer portal, such abnormal consumption alarms, would allow the City of Thunder Bay to reach a progressive level of customer service and engagement.

Several AMI vendors offer customer portals that offer enhanced water consumption presentment and are inherently integrated with their MDM software. Alternatively, there are 3rd party customer portals that offer best in class functionality but would require more effort and budget for integrating with the City of Thunder Bay's CIS. Should the City of Thunder Bay proceed with an AMI system, it is recommended the City investigate AMI capable customer portal in order to realize the enhanced customer service abilities identified.

7.2. System Assessment - Transition

The diagrams below provide an overview of the systems and interfaces that will be impacted by movement to an automated meter reading system or an advanced metering system.

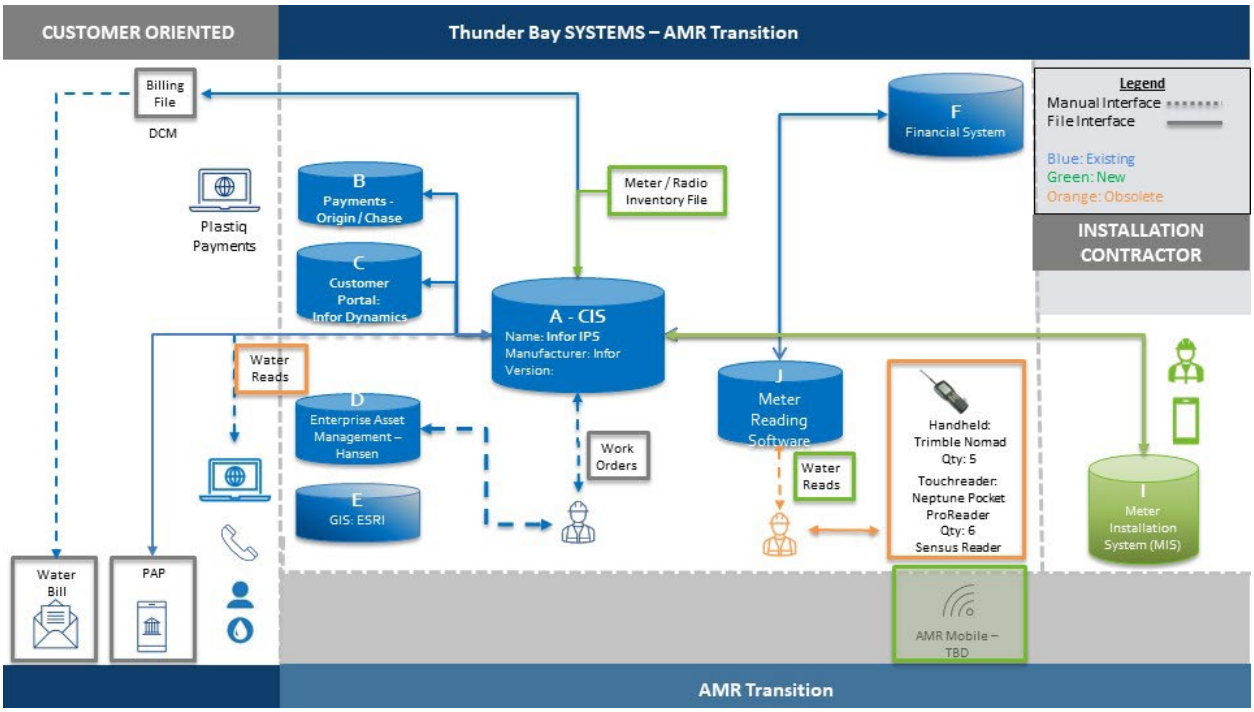
The blue systems and interfaces represent existing architecture, orange will represent transitionary systems or interfaces that will go away after the project is completed, and green represents new systems or interfaces contemplated. The solid lines represent automated interfaces that require no people interaction, the dashed lines represent a manual process that relies on manual intervention.

7.2.1. AMR Transition Description

The diagram below provides an overview of the systems and interfaces that will be impacted by movement to an AMR system.

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Exhibit 59: Transition Systems Diagram



7.2.1.1. AMR System Changes

With the adoption of an automated meter reading system, the current process of obtaining water readings through customer provided readings and manual handheld device readings will become obsolete. The application which may start to go away, depending on the successful AMR vendor, would be the Neptune 360 system (being replaced with the future AMR mobile application).

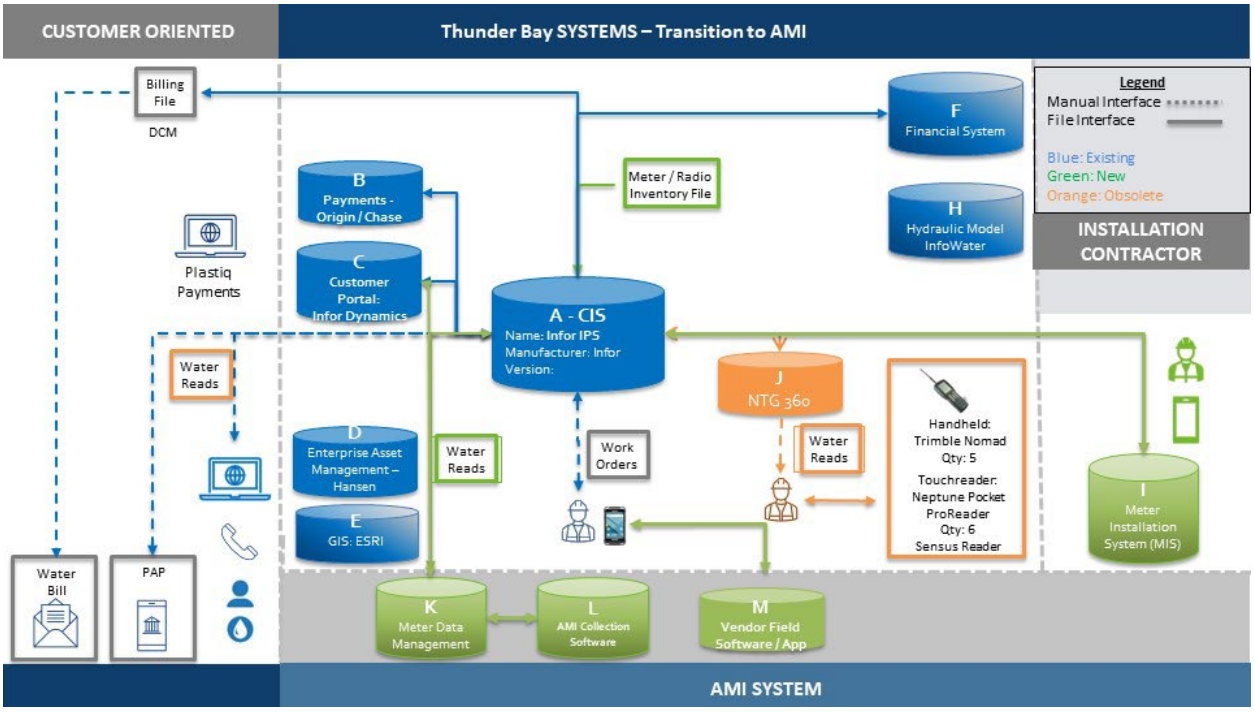
It is recommended to interface Infor IPS system and the AMR Installation contractor Meter installation system (MIS) during the start-up phase.

7.2.2. AMI Transition Description

The diagram below provides an overview of the systems and interfaces that will be impacted by movement to an AMI system.

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Exhibit 60: Transition State to AMI



7.2.2.1. AMI System Changes

Similar to the AMR system change, the adoption of an advanced metering information system will see the current process of obtaining water reads through customer provided reads and manual handheld device reads will become obsolete.

The existing Neptune 360 software will become obsolete once the meters read by manual handheld devices have been equipped with a radio transmitter.

It is recommended to interface the Infor IPS system and the AMI Installation contractor Meter installation system (MIS) during the start-up phase.

The AMI system software components (K, L, M) will be implemented and integrated with Infor IPS upon project start up.

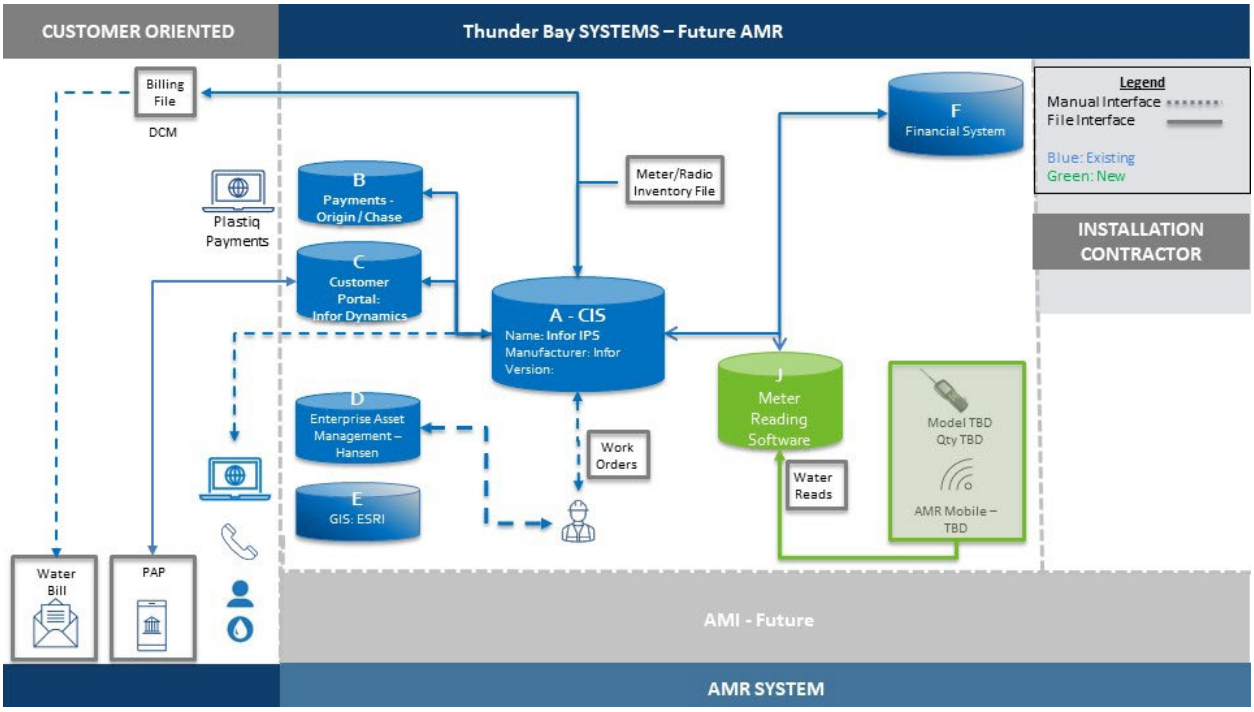
7.3. System Assessment - Future

7.3.1. AMR Future Description

The diagram below provides an overview of the City of Thunder Bay's future AMR system architecture. Should the City of Thunder Bay choose to proceed with an AMR system, this should act as a guide or reference point as the City moves forward with some of the recommendations made in this report.

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Exhibit 61: Future AMR System Diagram

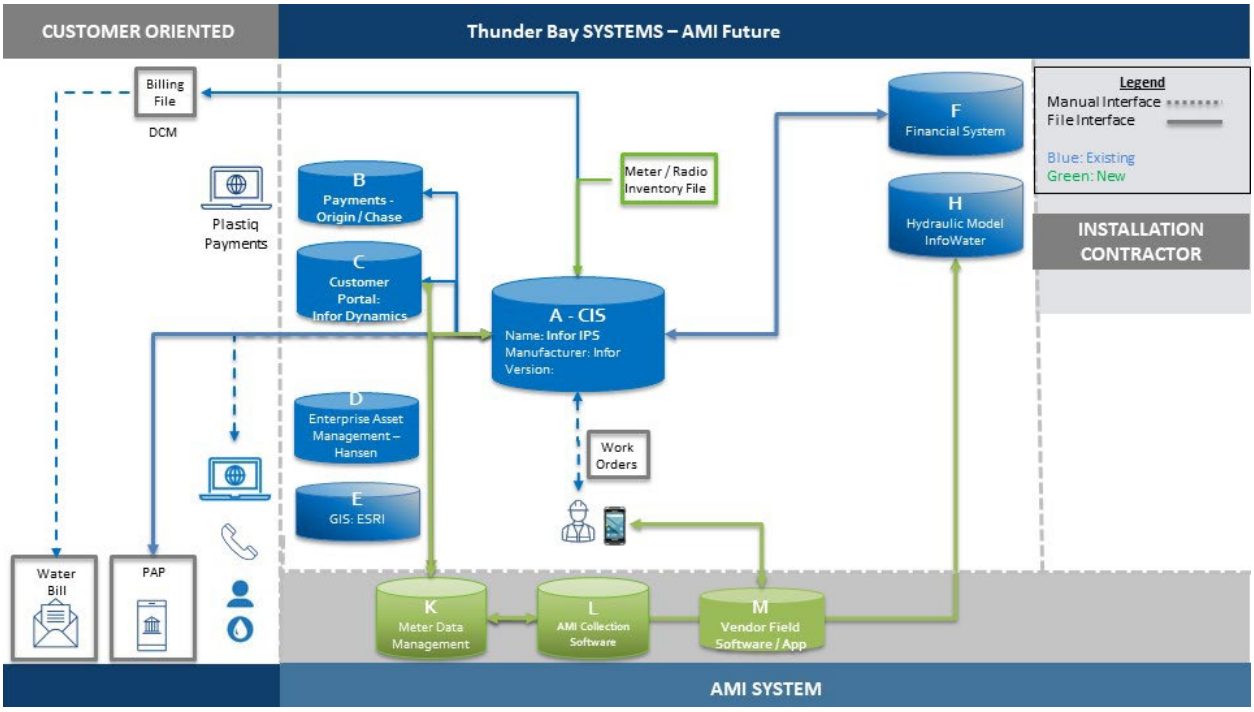


7.3.2. AMI Future Description

The diagram below provides an overview of the City of Thunder Bay's future AMI system architecture. Should the City of Thunder Bay choose to proceed with an AMI system, this should act as a guide or reference point as the City moves forward with some of the recommendations made in this report.

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Exhibit 62: Future AMI Systems Diagram



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8. PARTNERING OPPORTUNITIES

8.1. Introduction

The focus of this task is to determine if there are efficiencies to be gained by partnering with other local utilities in the sharing of infrastructure to improve system performance or reduce costs. Tbaytel and Synergy North were considered as possible partnering opportunities.

8.2. Tbaytel

Cellular AMI systems leverage certain existing cellular networks to provide communications between the meters and the utility. The City of Thunder Bay requested an investigation into the potential to work with Tbaytel to reduce deployment and operational costs.

The two primary providers of cellular AMI systems for water meter reading are Badger Meter and Neptune Technology Group. Diameter Services contacted both companies to determine their ability to support communications via the Tbaytel network. Both providers stated that they operate on the major Canadian and American cellular carriers. Both also felt that a special product would need to be developed that would allow their AMI devices to operate over other carriers.

Currently, the predominant cellular AMI systems use Cat-M (aka LTE-M) chips that are compatible with 4G LTE cellular networks.

8.3. Synergy North

Synergy North provides electricity service to the communities of Thunder Bay and Kenora, serving a total of 50,000 residential and 6,000 commercial customers. Synergy North implemented an AMI system in 2011 and the possibility of piggybacking on that system was evaluated.

The Synergy North AMI deployment was completed in 2011 using a system known as EnergyAxis supplied by Elster. The EnergyAxis system was designed to address the AMI needs of both electric, gas, and water meters.

Diameter Services does not recommend piggybacking on the Synergy North AMI network for the following reasons:

First, AMI systems have a typical life expectancy of about 20 years. Since the Synergy North implementation is already 14 years old, the City of Thunder Bay would run the risk of piggybacking on a technology that may be due for replacement before the City has recovered its investment. Should Synergy North opt to change AMI providers, the City of Thunder Bay's communication network would be removed leaving no means for the City to retrieve water meter consumption data.

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Secondly, the decision to use the existing AMI system would put the City of Thunder Bay in a sole-source situation where the only viable provider of AMI radio transmitters and software would be Honeywell, the current owner of the Elster technology[13].

[13] Honeywell Financial Release, July 28, 2015, https://investor.honeywell.com/static-files/e4d02862-b636-4e73-bbdb-53596575d8a3, accessed on September 14, 2024.

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9. CAPITAL ASSET MANAGEMENT PLAN

9.1. Introduction

AMR / AMI systems include several components that will need to be maintained and eventually replaced. The new water meters, radio transmitters and data collection equipment all have different life cycles. PSAB 3150, introduced in 2009, provides accounting standards for municipalities to track and report on their Tangible Capital Assets (TCAs), with Water Utility Equipment listed as an asset class that needs to be included.

It is recommended that the City of Thunder Bay include AMR / AMI components in the drinking water section of their Capital Asset Management Plan.

9.2. AMR/AMI Asset Class

The City of Thunder Bay's 2024 Asset Management Plan Phase 2 provides a long-term integrated approach to managing assets. Section 4.0 identifies Drinking Water as its own category of asset classes, which are placed into two groups:

- Watermains, Hydrants, and Valves
- Water Treatment & Distribution Facilities

Each asset class presents the replacement value, the asset totals, average age, and overall condition ranking. An AMR / AMI system should be considered a separate asset class, with the different components broken into several asset totals, as provided in the table below.

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Exhibit 63: Dedicated AMR/AMI Asset Class

Asset Class	Replacement Value	Asset Totals	Average Age	Average Condition
All Drinking Water Assets	887,672,000	See below	55 years	Fair
Drinking Water Assets*				
Watermains, hydrants and valves	$729,241,000	726 km watermains 9,559 valves 2,595 hydrants 37,877 service connections	55 years	Fair
Water Treatment & Distribution Facilities	$158,431,000	1 Water Treatment Plant 7 Pumping stations 4 Reservoirs 1 Standpipe 3 Water Fill Stations	37 years	Good
AMR/AMI - Meters, Radios, Reading equipment	**$11,260,417**	**37,990 Water Meters 37,990 Radio Transmitters 6 Hand held equipment devices**	**~1.5 years**	**Very Good**

Note that the replacement value of the AMR/AMI asset class was derived from the capital cost section of the financial model. The condition rating would be based on a citywide 2-year implementation program.

9.3. Asset Lifecycle

Each component in an AMR/AMI system has a unique lifecycle that is dependent on key attributes and characteristics of the asset, such as make, model, age, warranty, etc.

9.3.1. Water Meters

To establish the lifecycle and replacement costs of water meters, it is important to distinguish between different meter types (mechanical or non-mechanical) as described in section 6.7 Water Meter Technology. It should be noted that at the time of this report, the preferred meter type has yet to be determined.

Mechanical water meters

- Utilize nutating disc or oscillating piston technology to measure water consumption
- Do not require batteries

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- Primary consideration is with accuracy decline and revenue loss
- Mechanical meters are commonly replaced on a 20–25-year cycle
- Replacement value is consistent throughout the asset's life (notwithstanding inflation)

Non-mechanical water meters

- Utilize ultrasonic or magnetic technology to measure water consumption.
- Requires batteries and have a finite lifecycle.
- Maintains accurate consumption throughout the meter's life.
- Most vendors claim a 20-year lifecycle which typically includes a prorated warranty that impacts replacement value. See Appendix B: Sample Warranty Proration Table.

Regardless of the technology chosen (AMR or AMI), the water meter lifecycle and replacement costs will be determined by the meter type.

9.3.2. Radio Transmitters

Radio transmitters are typically mounted on the outside of a home or business and connected to the water meter by a wire.

- Require batteries and have a fairly predictable battery life – based on programmed activation.
- Most vendors claim a 20-year lifecycle which typically includes a prorated warranty that impacts replacement value. See Appendix B: Sample Warranty Proration Table.
- Two-way communication, and additional activation can impact the estimated lifecycle.
- Following installation best-practices can minimize premature failure.

The City of Thunder Bay can assume that radio transmitters, regardless of the technology, will last 20 years on average, with the replacement cost of the radios derived from the successful vendor's proration warranty.

9.3.3. Handheld reading devices

Both AMR and AMI systems will require handheld reading devices, and the financial model has included the devices for both scenarios. The financial model has an estimated total handheld cost of $16,600 for the AMR scenario and $10,800 for the two AMI scenarios. For the purposes of the capital asset plan it can be assumed that handheld devices will last between 5 and 7 years.

9.4. System of Record

Municipalities are required to report on their TCAs as a statement of their financial position. As such, it is important to identify and utilize the system of record for any given asset class. It is recommended that the City of Thunder Bay utilize Infor IPS (CIS) as the meter and radio system of record. Infor IPS will maintain critical asset related information such as:

- Meter make, type, size, age (meter install date)

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- Radio make, model, age (radio install date)
- Failures / replacements (replacement date)

A well-maintained system-of-record will provide the ability to meet the City of Thunder Bay's asset management plan reporting and auditing requirements.

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10. PROCUREMENT STRATEGY

10.1. Scope and Groupings

The framework for the procurement strategy is established by decisions related to what to include in the procurement scope and how to group the different procurement elements. This process begins by defining the products and services required for procurement and determining who should perform the work (City of Thunder Bay resources or outsourced resources). In the case of the City of Thunder Bay, the following elements and support structures for the AMR/AMI system, water meters and installation were discussed in a procurement workshop with Diameter to provide a broader understanding of all of the procurement elements and how they pertain to the City.

Exhibit 64: Project Scope



With an understanding of what products and services are required as part of the procurement strategy, the City of Thunder Bay's decisions shifted to determine what elements should be grouped during procurement and in which order should the various components be procured.

The primary procurement groupings include:

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A. AMI/AMR technology (which may include the MDM software),
B. Installation and deployment, and
C. Water meter supply.

The customer portal may also be procured as a component of the AMI technology if the AMI vendor's features and functionality meet the City of Thunder Bay's needs; alternatively, a fully functional (best=in-class) customer portal can be procured separately.

Based on the primary procurement groupings depicted above, there are four procurement options for the City of Thunder Bay's consideration:

Exhibit 65: Procurement Options

Options	Description
Option 1	**Turnkey** Single Procurement (A+B+C).
Option 2	Combine A (AMI/AMR Technology) + B (Installation & Deployment), and **C (Meter Supply) as a separate procurement.**
Option 3	A **(AMI Technology) as a separate procurement** and Combine B (Installation & Deployment) + C (Meter Supply)
Option 4	**All Separate** Procurements: A (AMI/AMR Technology), B (Installation & Deployment), and C (Meter Supply).

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Exhibit 66: Procurement Strategy Diagram

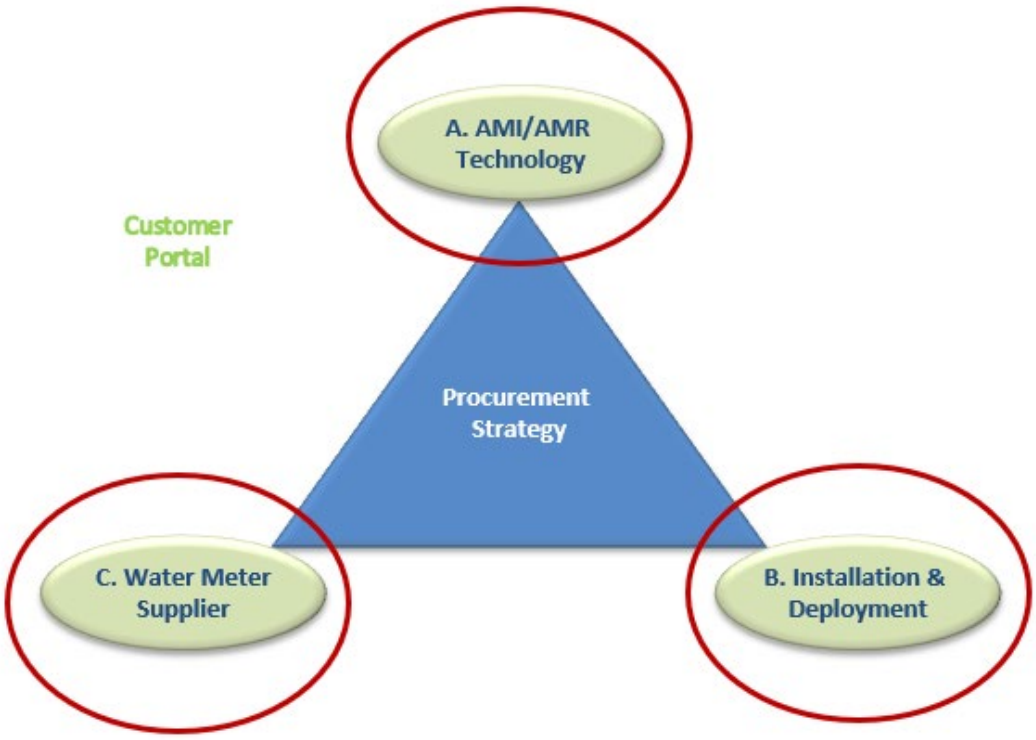
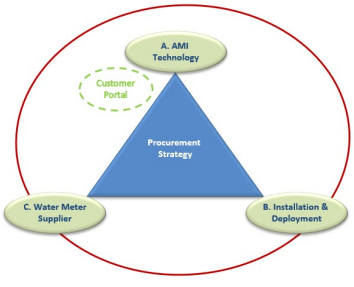
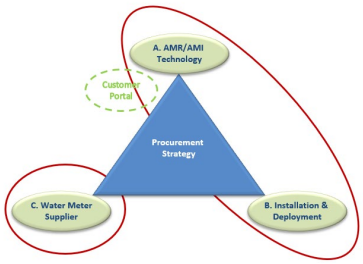


Exhibit 67: Procurement Advantages and Disadvantages

Option 1 Single Procurement Turnkey (A+B+C)	Option 2 Two Procurements AMI + Installation (A+B) Meter Supply Separate (C)	Option 3 Two Procurements AMI Separate (A) Installation + Meter Supply (B+C)
		

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Option 1 Single Procurement Turnkey (A+B+C)	Option 2 Two Procurements AMI + Installation (A+B) Meter Supply Separate (C)	Option 3 Two Procurements AMI Separate (A) Installation + Meter Supply (B+C)
Advantages (Benefits) • Responsibility for all components in a single vendor. • Product warranty can include in/out costs for the first year. • Product payment is tied to installation.	**Advantages (Benefits)** • Responsibility for AMI performance is in a single contract. • Installation remains with AMI vendor who then has complete responsibility for successful communication to collection equipment. Since Installation issues create the most risk of poor AMI performance coupling Installation with AMI is advantageous for the City of Thunder Bay. • Allows for multiple meter manufacturers and components.	**Advantages (Benefits)** • Medium cost scenario. • Provides the best selection of AMI systems.
Disadvantages (Risks) • May be higher costs due to some vendors having to put margin on margin for products. • Prime contract performance bond requirements may limit vendors (smaller companies will not be able to bid).	**Disadvantages (Risks)** • Issues with faulty meters will be a City of Thunder Bay responsibility. • Bad wiring to encoder could be blamed on meter (City of Thunder Bay responsibility). • Potential loss of some meter features	**Disadvantages (Risks)** • City of Thunder Bay will bear liability: Supplying meters • Install and AMI system working together has the most liability. • Non-mechanicals meters - AMI and meter supply need to be procured together to ensure you get all the functionality

A fourth option was also discussed whereby all elements would be separately procured however this option requires the most support and coordination between components. With this type of strategy, it can be difficult to determine responsibility should issues arise and potentially vendor finger-pointing.

There are advantages and disadvantages to options 1 to 3 and some options are more prevalent than others in the marketplace. It is important to know that the groupings can also influence the competitiveness of the marketplace and impact overall project costs and resource demands for the City of Thunder Bay. Based on recent experience with similar sized municipalities the expected market landscape follows:

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Exhibit 68: Procurement Competitive Landscape

Prime Contractor	AMI Supply	Meter Supply	Installation Contractor
KTI	Sensus	Sensus	KTI
Neptune	Neptune	Neptune	Neptune
Metercor	Kamstrup Itron	Kamstrup Zenner	Metercor
Wolseley	Badger Itron	Badger Honeywell	Metercor Wolseley
Aclara	Aclara	TBD	TBD
MasterMeter	MasterMeter	MasterMeter	TBD

Recommendations: Diameter recommends **Option 1, Single Procurement**. This aligns with the City of Thunder Bay's preference for a wholistic approach to the project with all elements accounted for under a single prime contractor who is ultimately responsible. This approach also mitigates the administrative burden of managing and aligning multiple vendors. From a competitive perspective, with a turnkey procurement strategy (option 1), it is expected the City of Thunder Bay would receive 3 to 4 submissions including the major market players.

10.2.Procurement Type

Diameter presented the City of Thunder Bay with several competitive procurement methods for consideration. It is important to mention AMR/AMI projects typically do not fall neatly into normal procurement rules. Through workshop discussions, Diameter reviewed the advantages and disadvantages of pursuing an RFP versus a tender process; notably the tender process primarily focuses on price solicitation for specific goods and services (generally commodity items), is highly structured, and leaves little room for deviation from what has been requested.

Exhibit 69: RFP Versus Tender Advantages and Disadvantages

RFP Process	Tender or Bid Process
Advantages • Allows for apples to oranges comparison • Allows for alternatives • Procurement includes strong specifications but allows for variation in the offering • Software can be difficult to compare • Most common type of AMI/AMR procurement	**Advantages** • Likely lowest price • Save time on evaluation • Could work for just water meters
Disadvantages	**Disadvantages**

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RFP Process	Tender or Bid Process
• The awarded solution may not be the lowest cost solution • Can be difficult to convince politicians as to why a higher cost solution is better	• No consideration for innovative solutions • Easy to have bidders disqualified due to a small non-compliance • Price is not the only factor with these types of projects • Quality of team and proven products need to be evaluated

Diameter does not recommend a tender process for the AMI/AMR or the installation procurement as the market offers too much variability in experience and product functionality for a tender process.

An RFP for the water meter supply allows the City of Thunder Bay to score product support and customer service levels offered post project. It could also allow the City of Thunder Bay to place value on a local presence. This approach also allows the City of Thunder Bay to evaluate product options as some manufacturers have unique features that should be given qualitative points should they align with the City of Thunder Bay's business drivers.

Recommendations: The City of Thunder Bay's Project Team expressed preference for an RFP process and the evaluation would ensure that the City would be moving forward with vendor(s) that were proven in the market.

10.3. Network Expansion / Procurement Beyond the Project

Should the City of Thunder Bay adopt AMI technology it is important to understand that AMI technologies are proprietary, and that the AMI vendor they choose for their initial roll-out will be the only vendor it can purchase AMI equipment for the next 20 years or so (assuming no seismic shift in the industry). The reality is vendors create "stickiness" whereby only they can provide radio transmitters, network infrastructure (collectors, repeaters, towers) and the head-end software for their network. This limits price competition following the project, however, that is not to say vendors can charge higher prices for their technology once a utility is "captive".

As part of the Procurement / Contract process, it is common to establish product supply pricing for equipment beyond the project scope (e.g. radio transmitters, meters, network equipment) with allowable increases based on an agreed-to index such as the Consumer Price Index. It is understood that the City of Thunder Bay may be headed for a new period of growth which may lead to the expansion of the City's water service area. Understanding the infrastructure requirements for this area should be included as part of the RFP process.

In general, network expansion is a consideration for utilities when choosing its AMI vendor. Understanding each vendor's infrastructure implications and the options they provide (i.e. cellular) for network expansion will be included in the RFP document.

Some actions the City of Thunder Bay can take to allow for both known and unknown new development:

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1. City of Thunder Bay should increase the new water meter costs that gets charged to the developer / property owner to include the AMR/AMI radio transmitter in addition to the water meter.
2. For larger scale developments over 1KM in geographic area, the City of Thunder Bay should pass on the cost of the vendor's RF propagation study and the cost of additional data collectors required to service the territory (i.e. supply and install costs). Depending on the proximity of the new development to the existing service area there may be some or no additional equipment required.
3. For new areas, we would suggest including AMI coverage as a provisional item within the original RFP.

These policy changes will help the City of Thunder Bay expand the network, including the additional equipment and ensure the cost of the AMI system is covered by Developers.

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11. IMPLEMENTATION SCHEDULE

11.1. Introduction

An AMR/AMI system implementation project is not your typical engineering project. The combination of products being supplied (often from different vendors), installation services, software applications and software integration into existing and new applications presents unique challenges. Complicating this further, the products and software application all need to be compatible with one another and provide the right data, in the right way, to the right systems, at the right time in the business process. In fact, AMR/AMI projects often more closely mirror technology projects rather than installation projects. Finally, the work needs to be done while engaging the City of Thunder Bay's customers.

These challenges support a single, dedicated and focused implementation approach. To create this focus, Diameter recommends establishing distinct project phases that, once complete, represent the progress of certain key elements of the overall project.

11.2. Project Phases

Below is a description of the project's unique phases and some key activities the City of Thunder Bay should expect within each phase. Often resource requirements may change depending on the nature of the project phase, some requiring a heavier legal, procurement or IT element.

Phase 1 – Business Case: Diameter's current assignment would represent phase 1 of the project. This phase provides the framework and foundation that will guide future phases. The completed deliverables of this engagement are the key activities required.

Phase 2 – Procurement: The procurement phase is more complicated than most. As detailed in Chapter 11 Procurement Strategy, it is recommended the City of Thunder Bay proceed with a single turnkey procurement if the City opts to proceed with a "go-fast" implementation strategy. If the City of Thunder Bay opts for a slower implementation (such 5 years), the City of Thunder Bay should consider procuring the AMI system separately.

These procurements are:

"Go-fast" Accelerated Implementation

- Procurement 1 - Turnkey Request for Proposal: AMR/AMI System, Meter Supply and Installation Services. This procurement would include the AMR/AMI radio transmitter supply, data collector supply and installation (AMI only), Headend and Meter Data Management (MDM) software (AMI only), software integration services, project management, water meter installation services, meter installation system (MIS), project call center, and material coordination activities. It would also include the supply of water meters that will be replaced as part of the project, including meters necessary for newly constructed homes and buildings necessary for maintenance that arise as a matter of course.
- Full Functionality Customer Portal application – TBD.

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- Infor IPS CIS – Integrations – the likely sole source procurement with the Infor IPS interface and testing subject matter experts to support development of the City of Thunder Bay side of the AMR/AMI, MIS and potentially customer portal interfaces.

"Go-slow" Extended Implementation

- Procurement 1 – Request for Proposal: AMR/AMI System - This procurement would include the AMR/AMI radio transmitter supply, data collector supply and installation, Headend and Meter Data Management (MDM) software, software integration services.
- Procurement 2 – Request for Proposal: Supply of Water Meters and components and Installation Services. This procurement would include project management, water meter installation services, meter installation system (MIS), project call center, and material coordination activities. It would also include the supply of residential water meters that will be replaced as part of the project.
- Full Functionality Customer Portal application – TBD.
- Infor IPS CIS – Integrations - the likely sole source procurement with the Infor IPS interface and testing subject matter experts to support development of the City of Thunder Bay side of the AMI, MIS and potentially customer portal interfaces.

Phase 3 – Start Up: This phase includes engaging Consultants and the City of Thunder Bay's internal resources as the AMR/AMI, meter and installation vendor(s) set up the facilities, software, integration services and user acceptance testing. The detailed activities of the City of Thunder Bay should expect to include:

- Setup of the local project office and warehouse to support project Phase 4.
- Development and approval of the public outreach program and materials.
- Integration development between the various new and existing systems.
- The contractor's development and internal testing of the Meter Installation System (MIS) to manage the installation work orders.
- Configuration and training on all proposed software applications.
- Inspection, planning, deployment, and configuration (as required) of the AMI collector network.
- Development of installer training policies, procedures, and training.
- Set up and training of the contractor's call center personnel in project specific protocols.
- Material planning, approval and forecasting of all water meter, radio transmitter and other required installation materials.
- Perform Initial User Acceptance Testing (IUAT) to ensure all systems are ready for installation and continued water billing. Approval of the IUAT is the milestone to ensure the new systems support the billing process and will allow the Contractor to move into Phase 4a – Proof of Concept.

Phase 4a – Installation and Deployment, Proof of Concept (POC): The project will go through a limited proof of concept where the software applications are fully integrated, and the contractor installs a limited number of water meters and AMR/AMI equipment. This is an important project

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phase to ensure the Contractor is ready to ramp up production in a controlled manner. The detailed activities that the City of Thunder Bay should expect to include:

- Perform water meter replacement, retrofit and/or upgrade activities within the pre-defined POC area. The POC area will be agreed upon with the chosen vendor with the intended purpose of testing installation processes and information tracking, integrations and data flow to ensure a continued successful billing process. As such, the POC would typically include a combination of ICI and residential customers. The POC is less about testing the technology and more about testing installation/implementation processes to ensure a successful project. The reason POCs focus on integrations and data flow is that generally speaking, AMI technologies are proven, and the system capabilities are widely understood. However, one of the major potential differences from deployment to deployment is the amount infrastructure required to ensure data is received regularly from every endpoint. As part of the RFP and contractual process, the infrastructure requirement is the vendor's responsibility and not the risk of the City of Thunder Bay.
- Once the POC has been completed, deploy and configure (as required) the AMI collector network for the entire service territory.
- The Contractor will perform quality assurance on installations performed.
- The consultant and owner's representative will perform quality inspections on up to 5% of the Contractor's installation work. Where the quality program shows issues, additional effort may be required to increase the inspection percentage.
- Implementation of the public outreach program.
- Operate a project call center to receive customer inquiries, appointment requests, and receive and manage any customer complaints.
- Planning and implementation of the Final User Acceptance Testing (FUAT) to ensure all identified AMI business drivers as well as Contractor committed functionality are achieved. Approval of the FUAT is the milestone to allow the Contractor to move into Phase 4b – Installation and Deployment.

Phase 4b – Installation and Deployment: Once the contractor has passed the Final User Acceptance test, the City of Thunder Bay and project Consultant will validate the system and contractor are meeting the specifications of the procurement. Similar to the activities of the proof of concept, this phase includes the following:

- Perform water meter replacement, retrofit and/or upgrade activities on an area-by-area basis.
- The Contractor to perform quality assurance on installations performed.
- Diameter to perform quality inspections on the Contractor's installation work.
- Implementation of the public outreach program.
- Operate a project call center to receive customer inquiries, appointment requests, and receive and manage any customer complaints.
- Achieve completion of the Project Milestones within the agreed-upon timeline.

Phase 5 – Close out: Effective management of the close out activities is an important phase in the overall project as it ensures proper closure and hand off as the system transitions from the

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implementation to the on-going ownership, operation and maintenance by the City of Thunder Bay. Effective management of close out activities should be planned and monitored prior to entering Phase 5. The activities that the City of Thunder Bay should expect to include:

- System acceptance based on the City of Thunder Bay's specifications and metrics to define contractual compliance requirements for project completion related to system acceptance.
- Project close out activities and reporting.
- Review of lessons learned.
- Transition programs to operations.

11.3. Project Phases Accelerated Duration

Diameter recommends an accelerated project duration. Converting all customers to the AMR or AMI system as quickly as possible allows the City of Thunder Bay to realize benefits sooner. The table below provides an expected duration of the above project phases considering the City of Thunder Bay's internal review and approval processes.

Exhibit 70: Project Duration by Phase

Phase	Duration (months)
Phase 2: Procurement	8 months
Phase 3: Startup Phase	6 months
Phase 4a: Proof of Concept	3 months
Phase 4b: Installation and Deployment	22 months
Phase 5: Close Out	2 months
Total	**41 months**

Phase 4b holds the biggest risk to schedule, average installations would likely need to exceed 500 per week or approximately 13 installers performing work. Refer to Appendix C for a more detailed project schedule.

Diameter recommends performing the project over a 41-month schedule due to a number of expected benefits, namely:

- Economies of Scale: If the project were to be performed over a longer period of time, the cost of the project is expected to be 10% to 15% higher. The installation services require facilities, project management and supervision to manage the project – costs that are directly linked to the project's duration. The shorter the project's duration, the lower the overhead costs.

- Proprietary AMI Systems require a single procurement. Because the AMI system is proprietary, the City of Thunder Bay will need to purchase AMI radio transmitters from a single vendor. The City of Thunder Bay has the best opportunity for cost competitive procurement prior to selecting a vendor. If the project is done over a longer period, it is likely more than one procurement will be necessary. Any future procurement would be limited to

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the previously selected AMI system, eliminating any pressure on the price of the AMI radio transmitter.

- Technology Changes: AMI technology development for water utilities has come a long way in the last five years and vendors continue to develop their products and software applications to provide more functionality. Implementing the project over a longer period than recommended leads to the risk of new products being developed with different functionality, which may lead to differing customer service levels.

- Unequal service levels: The City of Thunder Bay considers customer service enhancements to be a priority in this project. Many of the business drivers of customer service-related enhancements provide customers with new features through a fully functional customer portal. These include hourly consumption graphs, continuous leak detections, high consumption alerts, meter problem alerts, and reverse flow alarms. If the project is done over a longer period of time, certain customers will have these features while others will not. Some customers will have access to the benefits of consumption alerts which may avoid high water bills, while others will be required to pay the high-water bill because they did not have this advantage.

- Business drivers assume consistent data across all customers. Many of the business drivers require hourly consumption data from all customers, which in large part impacts whether the City of Thunder Bay can leverage its investment. When only a small percentage of the customers have this data, it provides an incomplete picture of the total system, total system demand and the ability to assess and enforce conservation initiatives. If the City of Thunder Bay decides to implement AMI over a longer period, the business drivers would need to be revisited. The technology fit assessment that was performed as part of this analysis likely may not apply and some of the functional benefits would be pushed until all meters are converted to AMR / AMI.

To conclude, an accelerated implementation of approximately 41 months is strongly recommended to realize the identified benefits and support the City of Thunder Bay's objectives for this project. Implementation schedule, procurement strategy, capital costs, and resourcing all are impacted by extending the project duration.

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12. RECOMMENDATIONS

12.1. Introduction

The recommendations within this chapter are derived from analysis and the City of Thunder Bay staff's feedback on potential direction and alternatives. The recommendations should guide the City of Thunder Bay's decisions relating to the implementation of the recommended technology.

Recommendations are grouped into the following categories:

- Technology decisions
- Deployment choices
- Procurement recommendations
- Project support
- Optimization

Recommendations are numbered and identified R01 through R13 for reference.

12.2. Recommendations

R01: Deploy AMI instead of AMR or manual reading

Diameter recommends the City of Thunder Bay implement AMI Technology to achieve both non-financial and financial benefits associated with the business drivers.

Diameter recommends the City of Thunder Bay implement AMI since only AMI will satisfy the Business Drivers and the AMR alternative, for the most part, will not. As outlined above, the City of Thunder Bay identified 20 Business Drivers that were deemed Important or Critical to the Project and all 20 were fully (14) or partially (5) satisfied by AMI whereas only 10 were partially supported by AMR.

The City of Thunder Bay identified multiple opportunities to improve the meter-to-cash process, water operations and customer service levels with water customers. Examples of improvement opportunities include increasing meter reading reliability, performing same-day final reads, improving meter reading safety, customer leak detection, distribution system pressure monitoring, better information for hydraulic modelling and conservation program support. These examples are all readily achievable with AMI.

The additional Customer functionality will provide new ways for the City of Thunder Bay to engage their water customers, reduce complaints or concerns about their water bills, and fuel a digitally powered customer service tool.

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R02: Install radio transmitters on the exterior wall

Diameter recommends that, wherever possible, the radio transmitter be installed on the exterior wall of the building. Exceptions can be made where interior finish work would make this overly costly or disruptive for the customer. While installing radio transmitters externally is a more difficult installation process, improved read success, reduced data collector count, and improved access for maintenance provide lasting benefits to the City of Thunder Bay. Refer to 6.2.3, Radio Transmitter Installation for details

R03: Implement an AMI system that is independent of other local utilities

Through the design phase of the project, the team investigated the opportunity to partner with local utilities Synergy North and Tbaytel to determine if partnering could benefit any of the parties.

The Synergy North AMI system installation was completed in 2011, meaning that it is already at least halfway through its expected service life. Piggybacking on this AMI system would also require a decision by the City of Thunder Bay to sole-source key elements of its system from the incumbent vendor. As a result, it would not be to the City of Thunder Bay's benefit to leverage Synergy North's AMI network.

Tbaytel provides cellular phone service to the City of Thunder Bay's service area. While there exists a possibility that a cellular AMI system could use the Tbaytel communications network, there remain some challenges including the cost-effectiveness of developing, testing, and supporting a specialized cellular radio transmitter for the City of Thunder Bay's use. Furthermore, cellular AMI providers use Cat-M (also referred to as LTE-M) technology that are best suited for 4G networks.

It is recommended that the City of Thunder Bay proceed with a stand-alone AMI technology.

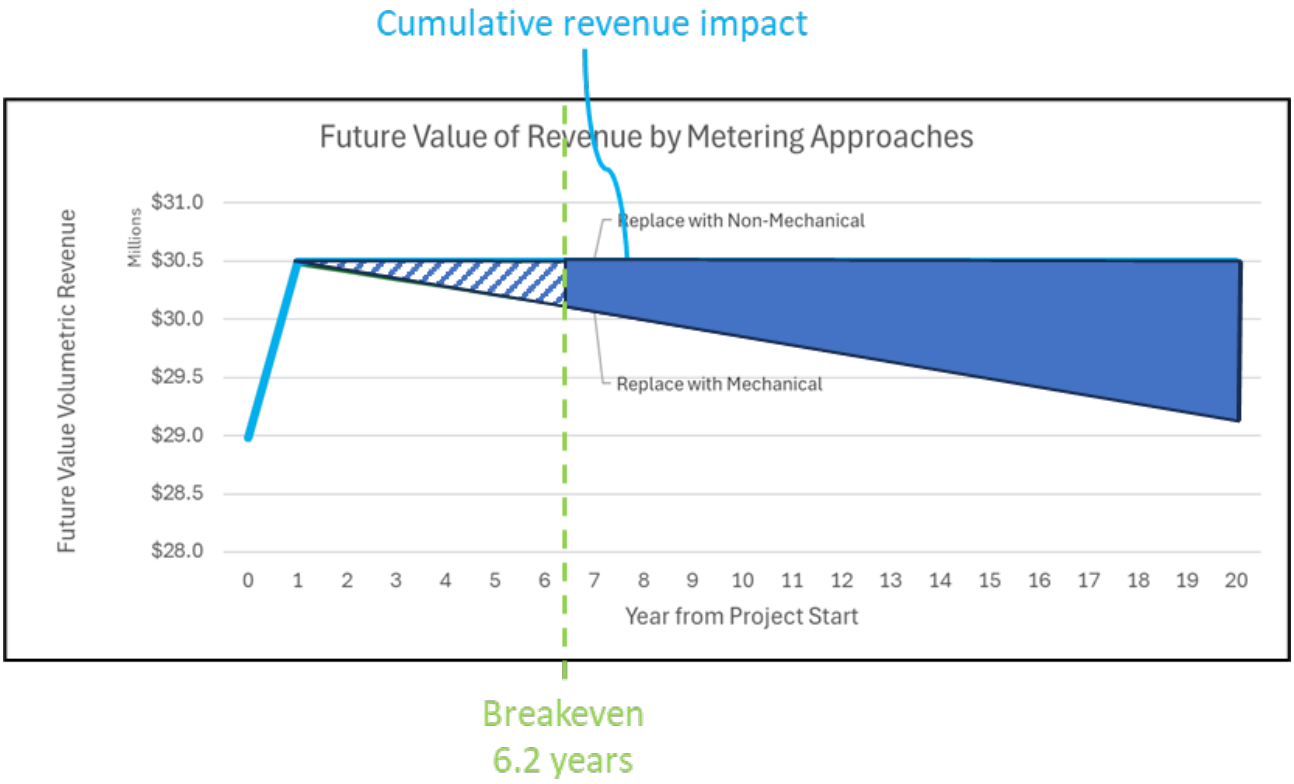
See Chapter 8, Partnering Opportunities (2.2.16) for further discussion.

R04: Deploy non-mechanical meters

An analysis of the City of Thunder Bay's meter population reveals expected revenue gains from the installation of non-mechanical meters, such as ultrasonic or magnetic flow meters, over traditional mechanical meters. Exhibit 71 below illustrates the revenue benefit over time of non-mechanical meters.

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Exhibit 71: Comparison of Mechanical and Non-mechanical Meters on Revenue



While non-mechanical meters are more expensive than their non-mechanical counterparts, the additional investment in technology is expected to provide a simple payback within 6.2 years and a net present value of $5.6 million over the life of the technology.

In addition to the financial benefits, the market is increasingly moving toward non-mechanical meters as they offer a range of enhanced features which may (specific features vary by manufacturer) include pressure, temperature, reverse flow, and empty pipe information.

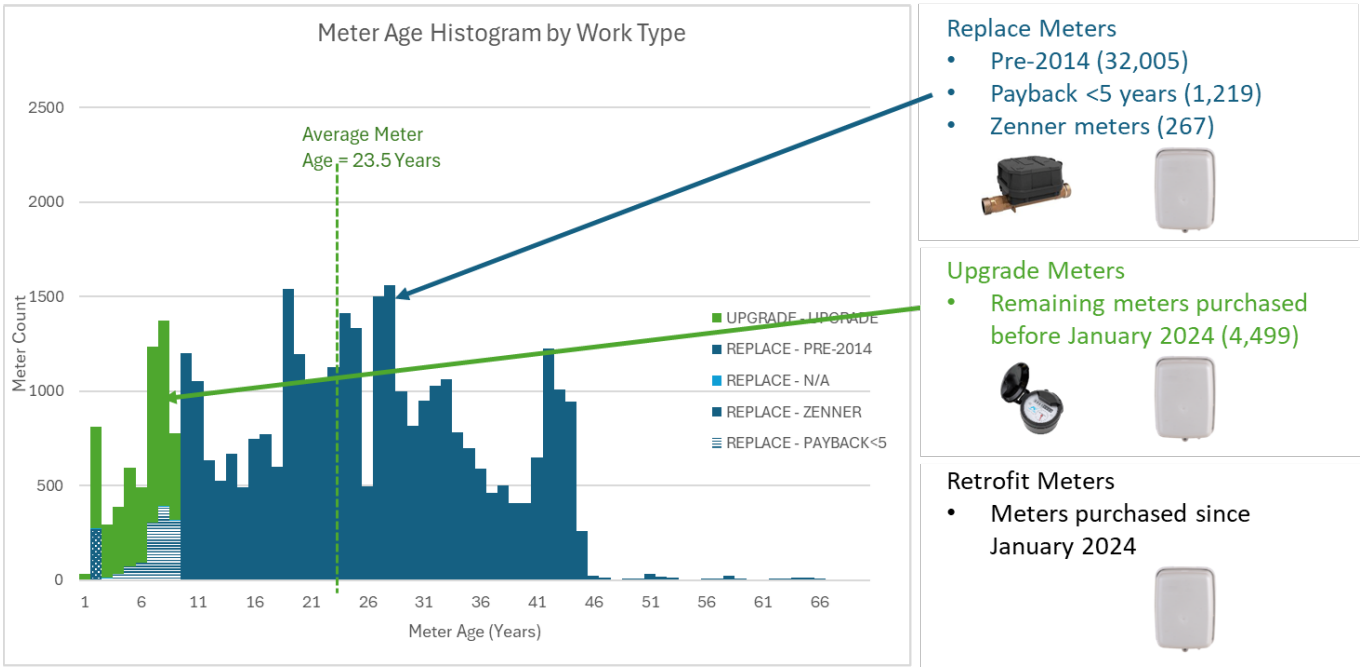
R05: Follow work type approach

Chapter 4.4, Work Type Recommendations, outlined the optimal approach to updating the City of Thunder Bay's metered services. See Exhibit 72: Work Types for a breakdown of meters by age.

- Replace 33,491 meters
- Upgrade 4,499 existing meters with AMI-compatible registers
- Retrofit any new meters purchased since January 2024 with a radio transmitter since these meters are already AMI-compatible.

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Exhibit 72: Work Types



The work types and expected quantities shown above are based on the general assumption that water meter registers cost about 60% of the cost of a completely new meter. When competitive pricing is obtained through the procurement process, if the cost of registers is higher relative to the new meter cost, the City of Thunder Bay can opt to replace more meters.

R06: Implement system quickly, not over 20 years

While a gradual deployment of the AMI system over an extended period, such as 20 years, is possible, it is not recommended. Diameter Services recommends the following deployment schedule to maximize the value of the City of Thunder Bay's investment.

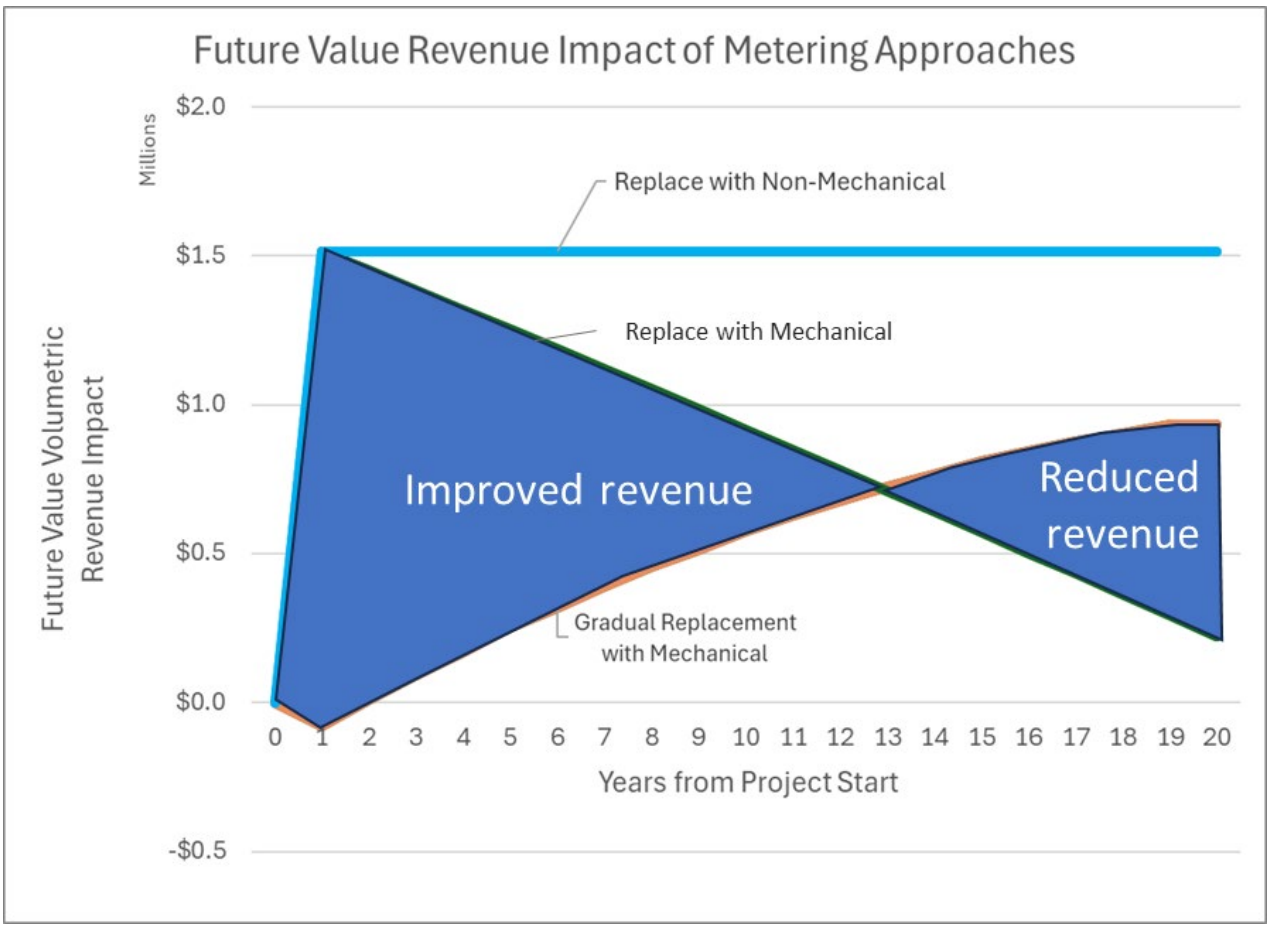
Exhibit 73: Project Duration by Phase

Phase	Duration (months)
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Phase 3: Startup Phase	6 months
Phase 4a: Proof of Concept	3 months
Phase 4b: Installation and Deployment	22 months
Phase 5: Close Out	2 months
Total	**41 months**

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Exhibit 74: Revenue Impact of Accelerated Meter Deployment, below, illustrates the benefit of improvement in meter accuracy and how an accelerated approach is more beneficial than a gradual (20 year) meter replacement program, yielding a net revenue improvement of $6.8 million.

Exhibit 74: Revenue Impact of Accelerated Meter Deployment



In addition to the revenue improvement, a range of non-financial benefits will be gained from an accelerated deployment, including lower project costs due to economies of scale, reduced impact of technology changes, and more equitable service levels for the City of Thunder Bay's customers. For a more detailed discussion of these non-financial benefits, see Section 11.3, Project Phases Accelerated Duration.

R07: Procure via a Request For Proposals, not a bid or tender

The procurement of an AMI system is a complex combination of hardware, network services, installations, and software. In addition, the various providers in the market have different approaches and strengths. As a result, the decision on the best AMI system to meet the City of Thunder Bay's needs is much more complicated than determining the lowest price offering.

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Diameter Services recommends that the system be procured using a structured and comprehensive Request for Proposals (RFP) approach that will allow the City of Thunder Bay to evaluate how well each competitive offering addresses the City's needs.

R08: Procure using a turnkey approach

Diameter Services recommends that the City of Thunder Bay issue a single RFP that includes all of the key components of the AMI system including meters, radio transmitters, AMI network, system deployment, and system software. In addition, we recommend the inclusion of an optional customer portal software that will work with Thunder Bay's CIS bill payment capabilities that the City of Thunder Bay plans to deploy in 2025 (see R13: Deploy customer portal that supports full AMI functionality).

Packaging all of the key project elements into a single RFP provides the best assurance of end-to-end compatibility and enables the City of Thunder Bay to hold a single entity responsible for the overall system success.

R09: Redeploy meter readers for other activities

A common approach for utilities implementing AMI systems is to retain, retrain, and redeploy meter reading personnel rather than eliminate these positions. Employees can often be trained on value-added functions that support the AMI system including proactive customer service activities, radio transmitter installation and troubleshooting, and support of other operational programs including valve turning, hydrant inspections, line flushing, and water sampling.

R10: Meter shop to be responsible for intermediate & large meters, contractors for small meters

The City of Thunder Bay has considerable expertise among its meter shop staff. Diameter Services recommends that while the small meter work will be contracted out, that the intermediate and large meter work should be managed by the City of Thunder Bay's crews. Intermediate and large meter work can be challenging and requires greater distribution system understanding and experience. Allowing this work to be performed by City of Thunder Bay staff ensures that this skillset is retained and enhanced.

R11: Amend City of Thunder Bay's Waterworks Bylaw so the builder is responsible for wire run

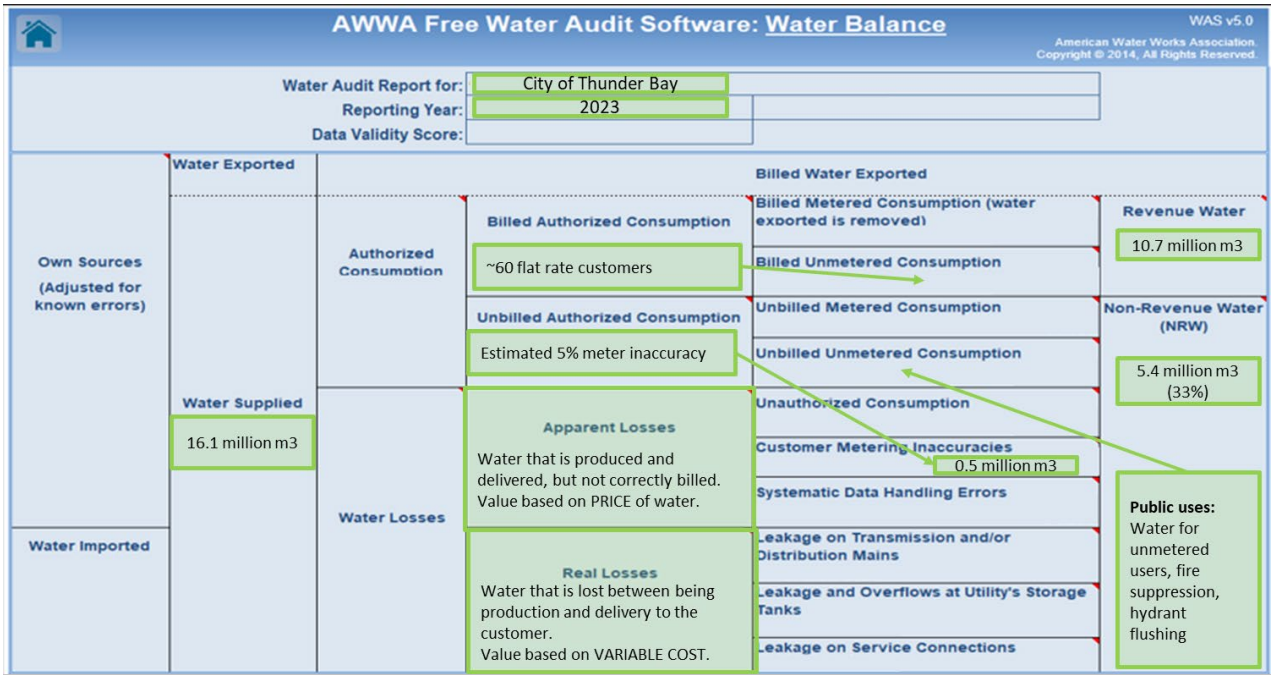
Another common approach is to update the Waterworks Bylaw to include running a wire to the outside of the building. It is much easier for the builder to do this work than to have City of Thunder Bay crews install the wire after the building's finish work is complete. City of Thunder Bay crews would then be able to install the radio transmitter on the exterior wall of the building without the need to enter the premises.

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R12: Continue to expand the use of the AWWA water audit software

The American Water Works Association (AWWA) introduced an MS Excel-based water audit software that it offers for free to the market. Diameter Services sees the value in this tool as a way to identify Non-Revenue Water (NRW) volumes and isolate sources of loss. It is recommended that the City of Thunder Bay continue to use this tool to build a baseline of water usage that will improve as the City implements AMI.

Exhibit 75: Mock-up of City of Thunder Bay Water Audit



In addition, Diameter recommends the following steps to identify some known sources of non-revenue water:

- Meter supply lines to unknown locations.
- Estimate water used in hydrant flushing, firefighting usage, and other authorized uses.
- Issue hydrant meters for contractors to track consumption.

By building a better understanding of the City of Thunder Bay's water uses, it will be easier to identify and address causes of water loss. Furthermore, a reduction in water loss offers the opportunity to reduce the energy consumed to produce and pump water that is never delivered as well as the greenhouse gases (GHG) produced in the generation of that energy.

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R13: Deploy customer portal that supports full AMI functionality

The City of Thunder Bay has undertaken an upgrade of its CIS / billing system to Infor IPS. The Infor IPS system provides an add-on customer portal that allows customers to see billing information and make payments.

In addition to this customer portal, Diameter Services recommends the introduction of a customer portal that supports the additional data and functionality provided by AMI. For example, a homeowner would be able to see their daily or hourly consumption, helping to provide early warning of water leaks or other unexpected consumption that would otherwise lead to a high bill. Adding a second customer portal that supports AMI systems can be linked to the payments portal to create a seamless customer experience.

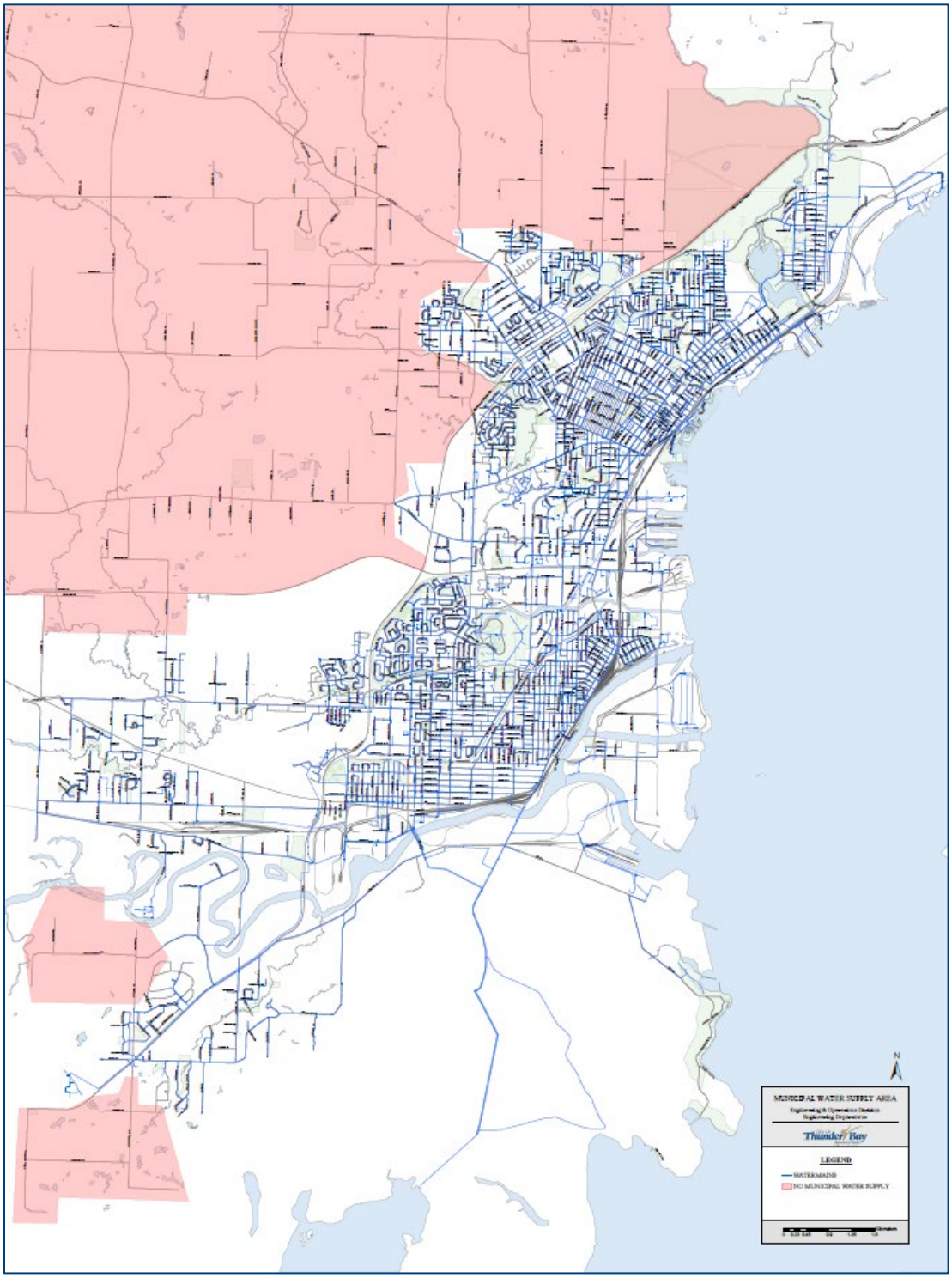
This customer portal functionality can be included as an optional element of the AMI request for proposals as noted above in section R08: Procure using a turnkey approach.

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13. APPENDICES

Appendix A: Map of Thunder Bay's Drinking Water Service Territory

Exhibit 76: Thunder Bay Drinking Water Service Territory



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Appendix B: Sample Warranty Proration Table

Exhibit 77: Sample Warranty Proration Table

Year	Proration Rate (Percentage of Average Radio Transmitter Warranty Costs to be covered by Vendor)
1	100%
2	100%
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%
10	100%
11	70%
12	70%
13	60%
14	60%
15	50%
16	45%
17	35%
18	30%
19	25%
20	25%

Note that vendor warranties may vary, and care should be taken to understand the exclusions and conditions that a vendor may include in their warranty's fine print.

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Appendix C: Recommended Project Schedule

Exhibit 78: Recommended Project Schedule

Task Name	Duration	Start	Finish
Thunder Bay - AMI / AMR Implementation	**1196 days**	**Thu 24-03-14**	**Thu 28-10-12**
Design Stage - Phase 1: Project Planning / Detailed Design	**233 days**	**Thu 24-03-14**	**Mon 25-02-03**
RFP / Negotiate Consulting Support for Procure and Manage	**45 days**	**Tue 25-02-04**	**Mon 25-04-07**
Procurement Stage - Phase 2: Procurement	**164 days**	**Mon 25-04-14**	**Thu 25-11-27**
Project Management	**164 days**	**Mon 25-04-14**	**Thu 25-11-27**
Progress Meetings (1 hour remote meeting every 2 weeks)	164 days	Mon 25-04-14	Thu 25-11-27
Procurement Stage Kickoff Meeting	**2 days**	**Mon 25-04-14**	**Tue 25-04-15**
Risk Management Monitoring	**164 days**	**Mon 25-04-14**	**Thu 25-11-27**
Specification Development	**48 days**	**Wed 25-04-16**	**Fri 25-06-20**
AMI / AMR and Installation Specification, Water Meter Specification & RFP Development	**48 days**	**Wed 25-04-16**	**Fri 25-06-20**
Prepare 1st Draft of RFP	15 days	Wed 25-04-16	Tue 25-05-06
Submit first 1st Draft RFP	**7 days**	**Wed 25-05-07**	**Thu 25-05-15**
Prepare 2nd Draft of RFP	10 days	Fri 25-05-16	Thu 25-05-29
Submit first 2nd Draft RFP	**16 days**	**Fri 25-05-30**	**Fri 25-06-20**
Procurement	**100 days**	**Fri 25-07-04**	**Fri 25-11-21**
Manage Stage - Phase 3, 4, 5	**753 days**	**Tue 25-11-25**	**Thu 28-10-12**
Program Management	**753 days**	**Tue 25-11-25**	**Thu 28-10-12**
Communication and Project Coordination	753 days	Tue 25-11-25	Thu 28-10-12
Document Control	753 days	Tue 25-11-25	Thu 28-10-12
Diameter's Project Playbook	753 days	Tue 25-11-25	Thu 28-10-12

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Draft Meeting Agenda, Attendance and Minutes	753 days	Tue 25-11-25	Thu 28-10-12
Progress Meetings	753 days	Tue 25-11-25	Thu 28-10-12
Manage Action Log, Change Orders, Tasks and follow up	753 days	Tue 25-11-25	Thu 28-10-12
Contract Management	753 days	Tue 25-11-25	Thu 28-10-12
Project Scope Management and Contractor Change Orders	753 days	Tue 25-11-25	Thu 28-10-12
Project Budget Management	753 days	Tue 25-11-25	Thu 28-10-12
Contract Schedule Management	753 days	Tue 25-11-25	Thu 28-10-12
Monitor and Report Quality of Inspection Program	753 days	Tue 25-11-25	Thu 28-10-12
Review Installation Data Quality	753 days	Tue 25-11-25	Thu 28-10-12
QA Post Installation Approvals	753 days	Tue 25-11-25	Thu 28-10-12
QA Field Inspections	753 days	Tue 25-11-25	Thu 28-10-12
Support Complaints Process (Liaison to Installation Vendor)	753 days	Tue 25-11-25	Thu 28-10-12
Direct Contractor	753 days	Tue 25-11-25	Thu 28-10-12
Review and Approval of Invoices	753 days	Tue 25-11-25	Thu 28-10-12
Coordinate, Inspect and Approve Data Collector Installations	753 days	Tue 25-11-25	Thu 28-10-12
Validation of Future Process and Metrics	753 days	Tue 25-11-25	Thu 28-10-12
Assist with Implementation of Future Business Processes	753 days	Tue 25-11-25	Thu 28-10-12
Assist with Execution of Organizational Change Management Plan	753 days	Tue 25-11-25	Thu 28-10-12
Risk Management Monitoring	753 days	Tue 25-11-25	Thu 28-10-12
Materials Handling (Optional)	753 days	Tue 25-11-25	Thu 28-10-12
Steering Committee Support	753 days	Tue 25-11-25	Thu 28-10-12
Phase 3: Start-up	**160 days**	**Mon 25-12-08**	**Fri 26-07-17**
Diameter - Kickoff Meeting	1 day	Mon 25-12-08	Mon 25-12-08

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Project Kickoff Meeting (Vendor, Thunder Bay, Diameter)	2 days	Mon 25-12-15	Tue 25-12-16
Project Start-up Meetings	5 days	Wed 25-12-17	Tue 25-12-23
Progress Meetings (Weekly)	146 days	Tue 25-12-23	Tue 26-07-14
Steering Committee Meetings	**148 days**	**Wed 25-12-24**	**Fri 26-07-17**
System Integrations Workstream	**125 days**	**Fri 25-12-26**	**Thu 26-06-18**
Network and Software Deployment Workstream	**127 days**	**Wed 25-12-24**	**Thu 26-06-18**
Public Outreach Workstream	**96 days**	**Wed 25-12-24**	**Wed 26-05-06**
Installation Readiness Workstream	**80 days**	**Wed 26-01-21**	**Tue 26-05-12**
Testing	**10 days**	**Fri 26-06-19**	**Thu 26-07-02**
Initial Appointment Communications	**11 days**	**Fri 26-07-03**	**Fri 26-07-17**
Pre-Construction Meeting	1 day	Fri 26-07-10	Fri 26-07-10
Phase 4: Proof of Concept, Installation and Deployment	**545 days**	**Fri 26-07-17**	**Fri 28-08-18**
Proof of Concept (POC)	**60 days**	**Fri 26-07-17**	**Fri 26-10-09**
First Installation	0 days	Fri 26-07-17	Fri 26-07-17
Installations (POC)	12 wks	Mon 26-07-20	Fri 26-10-09
Progress Meetings / Dashboarding	12 wks	Mon 26-07-20	Fri 26-10-09
Quality Assurance Program	12 wks	Mon 26-07-20	Fri 26-10-09
Pre-Installation Approvals	12 wks	Mon 26-07-20	Fri 26-10-09
Installation Data Management Review	12 wks	Mon 26-07-20	Fri 26-10-09
Post Installation Approvals	12 wks	Mon 26-07-20	Fri 26-10-09
Progress Claim Approvals	12 wks	Mon 26-07-20	Fri 26-10-09
Incomplete (Task) Management Approvals	12 wks	Mon 26-07-20	Fri 26-10-09
Liaison for the District	12 wks	Mon 26-07-20	Fri 26-10-09
Business Process Redesign	12 wks	Mon 26-07-20	Fri 26-10-09
Final User Acceptance Test (F-UAT)	**15 days**	**Mon 26-09-21**	**Fri 26-10-09**
Installation and Deployment	**480 days**	**Mon 26-10-19**	**Fri 28-08-18**

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Installations	96 wks	Mon 26-10-19	Fri 28-08-18
Public Education / Communication / Open houses	96 wks	Mon 26-10-19	Fri 28-08-18
Progress Meetings (Weekly)	96 wks	Mon 26-10-19	Fri 28-08-18
Steering Committee Meeting (Quarterly)	**480 days**	**Mon 26-10-19**	**Fri 28-08-18**
Contract Management (Program Management)	**480 days**	**Mon 26-10-19**	**Fri 28-08-18**
Approvals and Oversight	**480 days**	**Mon 26-10-19**	**Fri 28-08-18**
Quality Management	**480 days**	**Mon 26-10-19**	**Fri 28-08-18**
Phase 5: Close Out	**39 days**	**Mon 28-08-21**	**Thu 28-10-12**
Clean up Installations	4 wks	Mon 28-08-21	Fri 28-09-15
System Acceptance	10 days	Mon 28-09-18	Fri 28-09-29
Project Close Out and Reporting	1 day	Mon 28-10-02	Mon 28-10-02
Lessons Learned	5 days	Mon 28-10-02	Fri 28-10-06
Transition Program to Operations	9 days	Mon 28-10-02	Thu 28-10-12

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CITY OF Thunder Bay
Superior by Nature

Infrastructure & Operations Department **Memorandum**

TO:	Krista Power, Director – Legislative Services & City Clerk	**FILE:**	
FROM:	Joshua Daniels, Water & Wastewater Engineer and Michelle Warywoda, Director – Environment Division		
DATE:	June 23, 2025		
SUBJECT:	Automated Meter Reading - Business Case Study Presentation Request		
MEETING & DATE:	Committee of the Whole – July 14, 2025		

I respectfully request the opportunity to make a presentation relative to Corporate Report 234-2025-Infrastructure & Operations-Environment to the Committee of the Whole at the meeting on July 14, 2025. Joshua Daniels, Water & Wastewater Engineer and Michelle Warywoda, Director – Environment Division will be providing a PowerPoint presentation on the topic.

CITY OF Thunder Bay
Superior by Nature

Memorandum

Office of the City Clerk
Fax: 623-5468
Telephone: 625-2230

TO: Mayor & Council

FROM: Krista Power, Director – Legislative Services & City Clerk

DATE: Wednesday, July 2, 2025

SUBJECT: Outstanding List for Operations Session as of July 2, 2025
Committee of the Whole – July 14, 2025

The following items are on the outstanding list for Operations Session:

Reference Number (yyyy-nnn-MTG)	**Department/Div**	**Outstanding Item Subject**	**Resolution Report Back Date - (on or before date)**	**Revised Report Back Date - (on or before date)** (Memos presented at COW updating or delaying Item)
2020-047-INO	Infrastructure & Operations / Engineering & Operations	Electric Scooter Pilot Participation	Dec-01-2026	Feb-01-2027
2023-104-INO	Infrastructure & Operations/Engineering & Operations	Leland Avenue Median Naturalization	Dec-07-2026	
2025-100-INO	Infrastructure & Operations / Engineering & Operations	Request for Review - River Terrace Parking	Jan-31-2026	

MINUTES OF BOARD (REGULAR SESSION) MEETING NO. 07/2025
OF
THE DISTRICT OF THUNDER BAY SOCIAL SERVICES ADMINISTRATION BOARD

DATE OF MEETING: April 17, 2025

TIME OF MEETING: 10:25 a.m.

LOCATION OF MEETING: Microsoft Teams &
3rd Floor Boardroom
TBDSSAB Headquarters
231 May Street South
Thunder Bay, ON

CHAIR: Brian Hamilton

PRESENT:

Albert Aiello
Ken Boshcoff
Anne Marie Bourgeault
Chris Eby
Kasey Etreni
Brian Hamilton
Greg Johnson
Kathleen Lynch
Elaine Mannisto
Jim Moffat
Dominic Pasqualino
Jim Vezina

REGRETS:

Meghan Chomut
Mark Thibert

OFFICIALS:

Ken Ranta, Chief Executive Officer
Georgina Daniels, Director, Corporate Services Division
Crystal Simeoni, Director, Integrated Social Services Division
Shari Mackenzie, Manager, Human Resources
Tafadzwa Mukubvu, Manager, Finance
Marty Farough, Manager, Infrastructure & Asset Management
Dianne Lampi, Manager, Housing Operations
Carole Lem, Communications & Engagement Officer
Diana Hennel, Administrative Assistant
Bindiya Patel, Communications Assistant
Glenda Flank, Recording Secretary

GUESTS:

Note: For the purposes of the Minutes references to TBDSSAB or the Board refers to The District of Thunder Bay Social Services Administration Board of Directors as relevant to specific agenda items; references to TBDHC or the Board refers to the Directors of Thunder Bay District Housing Corporation as relevant to specific agenda items. References to CEO refer jointly to the Chief Executive Officer of TBDSSAB and Senior Administrator of TBDHC.

BOARD MEETING

DISCLOSURES OF INTEREST

None.

NEW BUSINESS

None.

CONFIRMATION OF BOARD MEETING AGENDA

Resolution No. 25/26

Moved by: Albert Aiello
Seconded by: Greg Johnsen

THAT with respect to the agendas for the Board Regular and Closed Session meetings of The District of Thunder Bay Social Services Administration Board for April 17, 2025, we approve the agendas as presented;

AND THAT we approve any additional information and new business.

CARRIED

MINUTES OF PREVIOUS MEETINGS

Board Meetings

Minutes of Meeting No. 05/2025 (Regular Session) and Meeting No. 06/2025 (Closed Session) of The District of Thunder Bay Social Services Administration Board, held on March 20, 2025, were presented for confirmation.

Resolution No. 25/27

Moved by: Jim Moffat
Seconded by: Kathleen Lynch

THAT the Minutes of Meeting No. 05/2025 (Regular Session) and Meeting No. 06/2025 (Closed Session) of The District of Thunder Bay Social Services Administration Board, held on March 20, 2025, respectively, be confirmed.

CARRIED

CLOSED SESSION MEETING

Administration recommended that the Board adjourn to a closed meeting relative to receipt of information with respect to security of the property of the Board regarding the

confidential attachment to the 2024 Fourth Quarter Financial Report and Program Levy Surplus Disposition.

Resolution No. 25/28

Moved by: Albert Aiello
Seconded by: Kathleen Lynch

THAT the Board adjourns to a closed meeting relative to receipt of information with respect to security of the property of the Board regarding the confidential attachment to the 2024 Fourth Quarter Financial Report and Program Levy Surplus Disposition.

CARRIED

At 10:36 a.m. the meeting reconvened in Regular Session.

REPORTS OF ADMINISTRATION

2024 Fourth Quarter Financial Report and Program Levy Surplus Disposition

Report No. 2025-13 (Corporate Services Division) was presented to the Board providing the 2024 Fourth Quarter Financial Report and Program levy surplus disposition.

Ken Ranta, CEO provided a brief introduction to the report.

Georgina Daniels, Director Corporate Services Division provided a brief overview and responded to questions.

Resolution No. 25/29

Moved by: Ken Boshcoff
Seconded by: Jim Vezina

THAT with respect to Report No. 2025-13 (Corporate Services Division) we, The District of Thunder Bay Social Services Administration Board, approve the transfer of the net levy surplus of $24,367 to the Levy Stabilization Reserve Fund.

CARRIED

2024 Investment Portfolio Performance

Report No. 2025-14 (Corporate Services Division) was presented to the Board providing information relative to the performance of the Board's investment portfolio for the 2024 year.

Ken Ranta, CEO provided a brief introduction to the report and responded to questions.

Georgina Daniels, Director Corporate Services Division provided a brief overview and responded to questions.

Certificate of Incumbency

Memorandum from Tafadzwa Mukubvu, Manager, Finance dated March 27, 2025 was presented to the Board providing information relative to the requirement of a Certificate of Incumbency.

At 10:58 a.m. Tafadzwa Mukubvu, Manager, Finance left the meeting and Marty Farough, Manager, Infrastructure & Asset Management and Dianne Lampi, Manager, Housing Operations joined the meeting.

Vale Community Centre Update

Memorandum from Georgina Daniels, Director, Corporate Services Division dated March 24, 2025 was presented to the Board providing an update on the results of the divestment of the Vale Community Centre.

Georgina Daniels, Director, Corporate Services Division provided an overview of the Vale Centre update and responded to questions.

Resolution No. 25/30

Moved by: Albert Aiello
Seconded by: Kathleen Lynch

THAT we, The District of Thunder Bay Social Services Administration Board, approve up to $30,000 for costs associated with the Vale Community Centre property be financed from the Levy Stabilization Reserve Fund.

CARRIED

FIRST REPORT: 167 Greenmantle Drive
(Nipigon) Direct Owned Housing Property
Options

Report No. 2025-15 (Corporate Services and Integrated Social Services Divisions) was presented to the Board providing the Board with options for the direct-owned housing property.

Ken Ranta, CEO provided a brief overview and responded to questions.

Georgina Daniels, Director, Corporate Services Division responded to questions and provided further information.

Crystal Simeoni, Director, Integrated Social Services Division provided further information and responded to questions.

Resolution No. 25/31

Moved by: Kasey Etreni
Seconded by: Elaine Mannisto

THAT with respect to Report No. 2025-15, (Corporate Services and Integrated Social Services Divisions), we The District of Thunder Bay Social Services Administration Board approve the receipt of the FIRST REPORT – 167 Greenmantle Drive, Nipigon, ON Direct-Owned Housing Property Options;

AND THAT the Board directs Administration to prepare a report with an action plan to explore options for the property to be presented at a Board meeting in the fall 2025.

CARRIED

At 11:15 a.m. Marty Farough, Manager, Infrastructure & Asset Management and Dianne Lampi, Manager, Housing Operations left the meeting.

Northern Ontario Service Deliverers'
Association Annual General Meeting
Attendance & Nominations

Memorandum from Ken Ranta, CEO, (Chief Executive Officer Division) dated March 27, 2025 was presented to the Board providing information regarding attendance at the 2025 NOSDA AGM and nominations to the NOSDA Board.

Ken Ranta, CEO provided an explanation of the process and responded to questions.

Resolution No. 25/32

Moved by: Kasey Etreni
Seconded by: Jim Moffat

THAT with respect to the Northern Ontario Service Deliverers Association 2025 Annual General Meeting, the following Members of the Board are appointed to serve as Members of NOSDA and to attend as voting delegates:

1. Brian Hamilton
2. Anne-Marie Bourgeault

AND THAT if the Chair is unable to attend, the following Members will be contacted to attend as voting delegates in the Chair's place:

1. Jim Vezina
2. Kathleen Lynch

AND THAT the following nominations for the 2025 NOSDA Executive are as follows:

NOSDA Vice-Chair: Anne-Marie Bourgeault

CARRIED

At 11:42 a.m. Kathleen Lynch, Board Member left the meeting.

Appointment to the Homelessness
Prevention Program Advisory Table

Memorandum from Ken Ranta, CEO, (Chief Executive Officer Division) dated April 3, 2025 was presented to the Board regarding the requirement to appoint a Board Member to the TBDSSAB Homelessness Prevention Program Advisory Table.

Ken Boshcoff, Board Member advised the Board that he would be remaining on the Homelessness Prevention Program Advisory Table.

Resolution No. 25/33 - Withdrawn

Moved by:
Seconded by:

THAT the following Member of The District of Thunder Bay Social Services Administration Board be appointed to the Homelessness Prevention Program Advisory Table, effective April 17, 2025, for the term ending December 31, 2025:

TBDSSAB 2024 Annual Report

Memorandum from Ken Ranta, CEO, (Chief Executive Officer Division) dated April 3, 2025 was presented to the Board providing the 2024 Annual Report.

Ken Ranta, CEO provided a brief overview of the process of producing the 2024 Annual Report and responded to questions.

Carole Lem, Communications and Engagement Officer responded to questions.

A discussion was held regarding having copies of the 2024 Annual Report printed for distribution. On consensus, Administration to review the ability and cost to have copies printed and communicate the outcome to the Board Members prior to the next Board Meeting.

Resolution No. 25/34

Moved by: Dominic Pasqualino
Seconded by: Ken Boshcoff

THAT with respect to the memorandum dated April 4, 2025 from Ken Ranta, Chief Executive Officer, we, The District of Thunder Bay Social Services Administration Board (TBDSSAB) approve the 2024 Annual Report as presented;

AND THAT the 2024 Annual Report be posted to the TBDSSAB website and a notification be sent to partners and stakeholders.

CARRIED

At 11:53 a.m. Greg Johnsen, Board Member left the meeting.

Appointment of Designate Ontario Works
Administrator and Senior Administrator

Memorandum from Ken Ranta, CEO (Chief Executive Officer Division) dated March 26, 2025 was presented to the Board providing Administration's recommendation regarding the appointment of the designate Ontario Works Administrator for TBDSSAB and designate Senior Administrator for TBDHC.

Resolution No. 25/35

Moved by: Ken Boshcoff
Seconded by: Jim Moffat

THAT with respect to Section 1997, c. 25, Schedule A, s. 43., of the Ontario Works Act, effective June 1, 2025, Crystal Simeoni, Director, Integrated Social Services be appointed as the designate Administrator to replace Georgina Daniels, Director, Corporate Services;

AND THAT, effective June 1, 2025, Crystal Simeoni, Director, Integrated Social Services be appointed as designate Senior Administrator for the Thunder Bay District Housing Corporation to replace Georgina Daniels, Director, Corporate Services;

AND THAT Administration is directed to communicate these changes as appropriate.

CARRIED

CORRESPONDENCE

Homelessness Crisis

Correspondence from The Corporation of the Town of Hearst, dated March 24, 2025, to the Premier of Ontario advising of the Town of Hearst's support for the District of Cochrane Social Services Administration Board's position regarding the Homelessness Crisis, was presented to the Board.

BY-LAWS

NEXT MEETING

The next meeting of The District of Thunder Bay Social Services Administration Board was confirmed to be held on Thursday, May 15, 2025 at 10:00 a.m., in the 3rd Floor Boardroom, TBDSSAB Headquarters, 231 May Street South, Thunder Bay, Ontario and via Microsoft Teams.

ADJOURNMENT

Resolution No. 25/36

Moved by: Albert Aiello
Seconded by: Jim Moffat

THAT the Board Meeting No. 07/2025 of The District of Thunder Bay Social Services Administration Board, held on April 17, 2025, be adjourned at 12:05 p.m.

CARRIED

Chair

Chief Executive Officer

MINUTES OF BOARD (CLOSED SESSION) MEETING NO. 08/2025
OF
THE DISTRICT OF THUNDER BAY SOCIAL SERVICES ADMINISTRATION BOARD

Vc DATE OF MEETING:	April 17, 2025
TIME OF MEETING:	10:28 a.m.
LOCATION OF MEETING:	Microsoft Teams & 3rd Floor Boardroom TBDSSAB Headquarters 231 May Street South Thunder Bay, ON
CHAIR:	Brian Hamilton

PRESENT:

Albert Aiello
Ken Boshcoff
Anne Marie Bourgeault
Chris Eby
Kasey Etreni
Brian Hamilton
Greg Johnson
Kathleen Lynch
Elaine Mannisto
Jim Moffat
Dominic Pasqualino
Jim Vezina

REGRETS:

Meghan Chomut
Mark Thibert

OFFICIALS:

Ken Ranta, Chief Executive Officer
Georgina Daniels, Director, Corporate Services Division
Crystal Simeoni, Director, Integrated Social Services Division
Shari Mackenzie, Manager, Human Resources
Tafadzwa Mukubvu, Manager, Finance
Carole Lem, Communications & Engagement Officer
Diana Hennel, Administrative Assistant
Bindiya Patel, Communications Assistant
Glenda Flank, Recording Secretary

GUESTS:

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BOARD MEETING

DISCLOSURES OF INTEREST

None.

REPORTS OF ADMINISTRATION

Fourth Quarter Financial Report and
Surplus Disposition

Memorandum from Georgina Daniels, Director, Corporate Services Division dated April 4, 2025 was presented to the Board providing the confidential attachment to Report No. 2025-13 containing the details of the approved carryforward of Capital Projects.

Georgina Daniels, Director, Corporate Services Division provided an overview of the capital carryforward projects and responded to questions.

ADJOURNMENT

Resolution No. 25/CS04

Moved by: Kathleen Lynch
Seconded by: Albert Aiello

THAT the Board (Closed Session) Meeting No. 08/2025 of The District of Thunder Bay Social Services Administration Board, held on April 17, 2025, be adjourned at 10:36 a.m., to reconvene in Regular Session to consider the remaining agenda items.

CARRIED

Chair

Chief Executive Officer

THE DISTRICT OF THUNDER BAY
SOCIAL SERVICES ADMINISTRATION BOARD

BOARD MINUTES

MINUTES OF BOARD (REGULAR SESSION) MEETING NO. 07/2025
OF
THE DISTRICT OF THUNDER BAY SOCIAL SERVICES ADMINISTRATION BOARD

DATE OF MEETING: May 15, 2025

TIME OF MEETING: 10:00 a.m.

LOCATION OF MEETING: Microsoft Teams &
3rd Floor Boardroom
TBDSSAB Headquarters
231 May Street South
Thunder Bay, ON

CHAIR: Brian Hamilton

PRESENT:

Albert Aiello
Anne Marie Bourgeault
Meghan Chomut
Chris Eby
Kasey Etreni
Brian Hamilton
Greg Johnson
Kathleen Lynch
Elaine Mannisto
Jim Moffat
Dominic Pasqualino
Jim Vezina

OFFICIALS:

Ken Ranta, Chief Executive Officer
Georgina Daniels, Director, Corporate Services Division
Crystal Simeoni, Director, Integrated Social Services Division
Shari Mackenzie, Manager, Human Resources
Tafadzwa Mukubvu, Manager, Finance
Marty Read, Manager, Infrastructure & Asset Management
Tomi Akinyede, Supervisor, Research & Social Policy
Carole Lem, Communications & Engagement Officer
Bindiya Patel, Communications Assistant
Glenda Flank, Recording Secretary

GUESTS:

Richard Jagielowicz

REGRETS:

Ken Boshcoff
Mark Thibert

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BOARD MEETING

DISCLOSURES OF INTEREST

None

NEW BUSINESS

None

CONFIRMATION OF BOARD MEETING AGENDA

Resolution No. 25/37

Moved by: Kasey Etreni
Seconded by: Chris Eby

THAT with respect to the agendas for the Board Regular and Closed Session meetings of The District of Thunder Bay Social Services Administration Board for May 15, 2025, we approve the agendas as presented;

AND THAT we approve any additional information and new business.

CARRIED

MINUTES OF PREVIOUS MEETINGS

Board Meetings

Minutes of Meeting No. 07/2025 (Regular Session) and Meeting No. 08/2025 (Closed Session) of The District of Thunder Bay Social Services Administration Board, held on April 17, 2025, were presented for confirmation.

Resolution No. 25/38

Moved by: Kathleen Lynch
Seconded by: Greg Johnsen

THAT the Minutes of Meeting No. 07/2025 (Regular Session) and Meeting No. 08/2025 (Closed Session) of The District of Thunder Bay Social Services Administration Board, held on April 17, 2025, be confirmed.

CARRIED

Draft Minutes of the TBDSSAB Twenty-Second Annual General Meeting held on April 17, 2025 were presented, for information only.

PRESENTATION

Integrated Landscaping Beautification
Plan Results

A presentation was provided by Joel Sypkes and Kelly Prebble, Aquafor Beech Ltd regarding the Beautification Study conducted by Aquafor Beech Ltd., for information only. A copy of the presentation was provided at the meeting.

Report No. 2025-16, (Corporate Services Division) was presented to the Board providing the Board with the results of the Integrated Landscaping Beautification Plan completed for certain TBDSSAB properties.

Georgina Daniels, Director, Corporate Services provided an introduction to the presentation outlining the various reasons for the study to be conducted.

Joel Sypkes, Aquafor Beech Ltd provided an overview of the presentation agenda, beautification study overview and the approach to recommendations and responded to questions.

Kelly Prebble, Aquafor Beech Ltd provided further information regarding the draft recommendations and responded to questions.

Joel Sypkes, Aquafor Beech Ltd provided an overview of the recommendation framework and responded to further questions.

At 10:53 a.m. Elaine Mannisto, Board Member left the meeting.

Ken Ranta, CEO provided clarification and responded to questions.

At 11:06 a.m. Chris Eby, Board Member left the meeting.

Ken Ranta, CEO, Crystal Simeoni, Director, Integrated Social Services and Georgina Daniels, Director, Corporate Services responded to questions.

At 11:20 a.m. Joel Sypkes and Kelly Prebble, Aquafor Beech Ltd and Marty Read, Manager, Infrastructure & Asset Management left the meeting.

CLOSED SESSION MEETING

Administration recommended that the Board adjourn to a closed meeting relative to receipt of information with respect to identifiable individuals including members of Administration regarding the Chief Executive Officer Performance Evaluation update.

Resolution No. 25/39

Moved by: Jim Vezina
Seconded by: Albert Aiello

THAT the Board adjourns to a closed meeting relative to identifiable individuals including members of Administration regarding the 2024 Chief Executive Officer Performance Evaluation verbal update.

CARRIED

At 12:08 p.m. the meeting reconvened in Regular Session and Brian Hamilton, Board Chair called for a break for lunch.

At 12:29 p.m. the meeting reconvened and Tafadzwa Mukubvu, Manager, Finance and Tomi Akinyede, Supervisor, Research & Social Policy joined the meeting.

REPORTS OF ADMINISTRATION

2025 First Quarter Financial Report

Report No. 2025-17 (Corporate Services Division) was presented to the Board providing the 2025 First Quarter Financial Report and projection to year-end and progress of Key Performance Indicators.

Ken Ranta, CEO provided a brief introduction to the report.

Georgina Daniels, Director Corporate Services Division provided an overview of the report and highlighted the change in format within the report outlining the Key Performance Indicators separately.

At 12:34 p.m. Tafadzwa Mukubvu, Manager, Finance left the meeting.

2025 First Quarter Operational Report

Report No. 2025-18 (Integrated Social Services Division) was presented to the Board providing information containing the trends within TBDSSAB programs and services.

Ken Ranta, CEO provided a brief introduction to the report.

Tomi Akinyede, Supervisor, Research & Social Policy provided a brief overview of the report and responded to questions.

Crystal Simeoni, Director, Integrated Social Services Division provided clarification.

At 12:41 p.m. Tomi Akinyede, Supervisor, Research & Social Policy left the meeting.

2024-27 Strategic Plan – 2025 First Quarter Update

Report No. 2025-19 (Chief Executive Officer Division) was presented to the Board providing the quarterly update on the progress of the 2024-27 Strategic Plan as at March 31, 2025.

Ken Ranta, CEO provided a brief introduction to the report.

Carole Lem, Communications & Engagement Officer responded to questions.

Crystal Simeoni, Director, Integrated Social Services Division provided further information.

Resolution No. 25/40

Moved by: Dominic Pasqualino
Seconded by: Meghan Chomut

THAT with respect to Report No. 2025-19 (Chief Executive Officer Division) we, The District of Thunder Bay Social Services Administration Board, receive the 2024-27 Strategic Plan – 2025 First Quarter Update for information only.

CARRIED

CORRESPONDENCE

None

BY-LAWS

None

NEXT MEETING

The next meeting of The District of Thunder Bay Social Services Administration Board was confirmed to be held on Thursday, June 19, 2025 at 10:00 a.m., in the 3rd Floor Boardroom, TBDSSAB Headquarters, 231 May Street South, Thunder Bay, Ontario and via Microsoft Teams.

ADJOURNMENT

Resolution No. 25/41

Moved by: Dominic Pasqualino
Seconded by: Kathleen Lynch

THAT the Board Meeting No. 07/2025 of The District of Thunder Bay Social Services Administration Board, held on May 15, 2025, be adjourned at 12:44 p.m.

CARRIED

Chair

Chief Executive Officer

THE DISTRICT OF THUNDER BAY
SOCIAL SERVICES ADMINISTRATION BOARD

BOARD MINUTES

MINUTES OF BOARD (CLOSED SESSION) MEETING NO. 10/2025
OF
THE DISTRICT OF THUNDER BAY SOCIAL SERVICES ADMINISTRATION BOARD

DATE OF MEETING: May 15, 2025

TIME OF MEETING: 11:21 a.m.

LOCATION OF MEETING: Microsoft Teams &
3rd Floor Boardroom
TBDSSAB Headquarters
231 May Street South
Thunder Bay, ON

CHAIR: Brian Hamilton

PRESENT:

Albert Aiello
Anne Marie Bourgeault
Meghan Chomut
Chris Eby
Kasey Etreni
Brian Hamilton
Greg Johnson
Kathleen Lynch
Jim Moffat
Dominic Pasqualino
Jim Vezina

OFFICIALS:

Shari Mackenzie, Manager, Human Resources

GUESTS:

REGRETS:

Ken Boshcoff
Elaine Mannisto
Mark Thibert

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BOARD MEETING

DISCLOSURES OF INTEREST

None.

REPORTS OF ADMINISTRATION

Chief Executive Officer Performance Evaluation

Brian Hamilton, Board Chair and Shari Mackenzie, Manager, Human Resources provided a verbal update to the Board regarding the summary of the CEO performance evaluation for 2024. The CEO Performance Evaluation Summary was provided separately.

A discussion was held and on consensus, the Board Chair and Vice-Chair to proceed as directed.

ADJOURNMENT

Resolution No. 25/CS04

Moved by: Kasey Etreni
Seconded by: Meghan Chomut

THAT the Board (Closed Session) Meeting No. 10/2025 of The District of Thunder Bay Social Services Administration Board, held on May 15, 2025, be adjourned at 12:08 p.m., to reconvene in Regular Session to consider the remaining agenda items.

CARRIED

Chair

Chief Executive Officer

CITY OF Thunder Bay
Superior by Nature

Corporate Report

REPORT NUMBER	239-2025-Growth-Strategy & Engagement	
DATE PREPARED	July 3, 2025	***FILE***
MEETING DATE	July 14, 2025	
SUBJECT	Report Back - Temporary Shelter Village – Alternate Locations	

RECOMMENDATION

WITH RESPECT to Report 239-2025, we recommend that 114 Miles Street East be approved as the site for the Temporary Shelter Village Initiative;

AND THAT the Director, Strategy & Engagement have delegated authority to make decisions regarding operationalizing the Temporary Shelter Village Initiative;

AND THAT the Director, Strategy & Engagement be authorized to execute documents for the Temporary Shelter Village Initiative for the duration of the project, on terms satisfactory to the City Solicitor and City Manager;

AND THAT the municipally owned property at 142 Simpson Street and immediately adjacent property be excluded in the future identification process for recognized encampment locations;

AND THAT the Miles Street and Simpson Street be added to the Eye on the Street program's Code of Practice, pending a public consultation process;

AND THAT a recurring financial contribution, reviewed annually, of $125,000 be included in the 2026 Fort William Business Improvement Association (BIA) Budget to support their revitalization efforts and address concerns related to security and cleanliness;

AND THAT Appropriation Change Order 07-2025 be approved;

AND THAT any necessary by-laws be presented to City Council for ratification.

LINK TO STRATEGIC PLAN

Strategic Direction: All Together. We honour the truth and reconcile for the future.

- Goal: Strengthen the City's relationships with Indigenous communities, leaders and organizations to advance Truth & Reconciliation priorities together.

- Goal: Work toward inclusion, diversity, equity, and respect for all. Strategic Direction: Safety and Well-being. Our community is healthy, safe, and strong.

Strategic Direction: Safety and Well-being. Our community is healthy, safe, and strong.

- Goal: Improve access to supports for priority populations to narrow gaps in equity.
- Goal: Enhance safety and well-being at the community level through climate action and environmental design.
- Goal: Create and maintain strong neighbourhoods and Indigenized spaces where people connect and engage.

Additionally, this work connects with the following City Council approved strategic plans:

Community Safety & Well-Being Plan

- Priority 2: Housing and Homelessness; Targeted Outcomes: Reduce Indigenous homelessness by 50 percent by 2027; Increase transitional and supportive housing opportunities in Thunder Bay

Indigenous Relations & Inclusion Strategy

- Pillar 1: Respectful relations; 2. Honour & foster relations with Fort William First Nation, Metis, and local Indigenous Partners
- Pillar 2: Responsive city; 5. Inclusive research & policy development
- Pillar 4: Community prosperity; 9. Provide guidance to make City services responsive to needs of Indigenous Peoples; 10. Improve outreach & communications on City services; 11. Advocate & work with governments & local partners to improve outcomes

Thunder Bay Drug Strategy

- Housing Pillar: Advocating for more supportive housing for people with complex needs; Contributing to the understanding of homelessness in Canada.

EXECUTIVE SUMMARY

The Temporary Shelter Village Initiative (the Village) is funded by municipal and external contributions, which currently includes $2.8 million from an external funder. Recognizing site selection delays, a project extension to March 31, 2026, has been approved. The extension requires the delivery of 40 units for a phased approach to occupancy by December 15, 2025, with all units complete by February 27, 2026. This is the final opportunity to proceed within the funder's timeline. Should a site not be approved, the City risks losing the $2.8 million in funding, as no further extensions will be granted.

Administration undertook a comprehensive and exhaustive review of previously identified and new site options. The internal review identified three plausible options – Miles Site, Cumberland Site, and Hillyard Site – that underwent further analysis, including external safety assessments. Through this process, 114 Miles Street East

(Miles Site) emerged as the best location to support the safe, timely, and cost-effective delivery of the Village.

In comparison, both the Cumberland and Hillyard Sites are far less suitable and present significantly greater risks to the project's success. These locations raise concerns related to safety, emergency access, and proximity to essential services. Challenges also include adjacency to recovery-oriented services, external hazards, lack of pedestrian infrastructure, and high-traffic roadways. Addressing these issues would require costly and time-consuming mitigation measures that would jeopardize project timelines and funding.

Administration recommends the Miles Site for the following reasons:

- It is the most fiscally responsible choice with projected capital and construction costs estimated at $4.0 - $4.5 million;
- The site's size supports an efficient, manageable layout that accommodates up to 80 units and shared facilities, without leaving excess unused land;
- It is the preferred site from a Crime Prevention Through Environmental Design (CPTED) professional;
- It is the site TBPS identified as posing the least risk to residents;
- The area is familiar to the population and its proximity to the South Core provides easy access to over 14 supportive services and a transit hub;
- The land is already zoned to permit emergency shelter uses which aligns with the City's Official Plan and Zoning By-law;
- The location has consistently emerged as the top choice in engagement efforts with the public, service providers, and public safety officials;
- It is the location with the most known environmental information and presents the least risk of an unidentified issue arising that could jeopardize the project's viability; and
- It supports broader downtown revitalization efforts by reducing visible homelessness in the South Core, enabling the decommissioning of a nearby encampment, and offering private units and shared gathering spaces that encourage residents to spend time on-site rather than in surrounding areas.

Administration has carefully considered previously raised concerns and remains committed to implementing mitigation efforts. These include establishing a Neighbourhood Liaison Committee, excluding a nearby area as a recognized encampment location, providing $125,000 annually to the Fort William BIA for the duration of the project, and investing in initiatives to support cleanliness and maintenance in the South Core.

Overall, the Miles Site represents the best location for the Village based on key factors such as safety, cost, operational feasibility, land use compatibility, and community input. It is also the most realistic option to meet project timelines, which is necessary to access the full amount of external funding.

DISCUSSION

External Funding Update

The external funder has granted a project extension to March 31, 2026. As part of the extension request, a revised Project Completion Plan was submitted and approved. The Plan identifies that the Village will be partially operational by December 15, 2025, with at least 40 units available for a phased approach to occupancy. The remaining units must be delivered, installed, and fully operational by February 27, 2026.

While the extension provides additional time to complete construction-related activities, delaying site selection would jeopardize the ability to meet these extended deadlines. This is the final opportunity to proceed within the funder's timeline. Should site approval not be granted at this stage, the City risks losing $2.8 million in funding. Additionally, the funder confirmed no further extensions will be granted.

Administration continues to actively pursue additional sources of external funding with local foundations and charities, and other levels of government.

Alternative Sites Review Process

Administration undertook a comprehensive and exhaustive review of potential sites that included internal and external participation. Internal participants included staff from Engineering, Development Services, Parks & Open Spaces, Recreation & Culture, Strategy & Engagement, Superior North EMS, and Thunder Bay Fire Rescue. External participants included the Thunder Bay Police Service (TBPS) and a Crime Prevention through Environmental Design (CPTED) professional.

Prior to engaging externally, Administration reviewed:

- Sites already recommended to or by City Council (i.e., Miles Site and Cumberland Site);
- Sites from the ranked properties list appended to Report 057-2025, placing less emphasis on proximity to supportive services while considering transportation enhancements; and
- Sites not previously identified which were ultimately dismissed due to risks of undermining the City's Housing Accelerator Fund targets and disrupting strategic growth plans for industrial lands.

Three plausible options resulted from the internal review – the Miles Site, Cumberland Site, and Hillyard Site. Subsequently, each site underwent a preliminary safety review, which included soliciting safety assessments from TBPS and the CPTED professional.

Site Options

Administration's obligation is to recommend the site that best positions this project for success, balancing cost, safety, operational feasibility, community input, and long-term

benefit. The right site will be key to ensuring the Village meets its objectives in providing pathways out of homelessness and into housing, reducing unsheltered homelessness, better managing encampments in public spaces, and improving public health and safety for all.

Option 1: Miles Site – Recommended

Based on the exhaustive review, Administration recommends the Miles Site because it offers the strongest combination of cost-effectiveness, operational viability, safety, and proximity to supportive services. All of which are important project success factors.

Key Features

Key features positioning the Miles Site as the best option include:

- It scored 87% in the ranked properties list, which was the highest overall.
- Capital and construction costs are estimated at $4.0 - $4.5 million, which is under budget and represents the most cost-effective option compared to the other site estimates.
- The site's size supports an efficient, manageable layout that accommodates up to 80 units and shared facilities, without leaving excess unused land.
- The site is in an area familiar to the population which increases the likelihood of individual's wanting to reside in the Village. It also ensures that residents are within walking distance of a transit hub and 14+ supportive services.
- Under the 2022 Zoning By-law that underwent significant public consultation, the site is zoned to permit emergency shelter use. This demonstrates alignment with the City's Official Plan and land use compatibility.
- This site has the most comprehensive environmental data of all options with remediation costs within budget and estimated at $500,000. Costs may decrease pending the current investigation's results, and investing in site remediation supports future development opportunities.
- The site supports downtown Fort William revitalization efforts by reducing unmanaged encampments and providing a supervised and well-managed alternative where residents are encouraged to spend time in their own space rather than in the surrounding area. The Village will also facilitate the decommissioning of a nearby encampment which is anticipated to contribute to improved safety, cleanliness, and overall community well-being.
- The site has undergone the most public consultation efforts and was the clear preference in two separate online surveys. It is consistently identified by service providers as the best option, and some area residents and business owners have also expressed support for the location.

- It is the most viable option to meet project timelines, as it requires minimal extension of services compared to other sites and no tree clearing. Environmental concerns are known, and remediation efforts are confirmed as feasible within the approved budget.

Importantly, assessments from the TBPS and a CPTED professional identified the Miles Site as the safest option with the least risk. Highlights from their safety assessments include:

- The site offers strong multi-directional visibility, with public roadways along its boundaries providing clear sightlines and optimizing opportunities to observe and report suspicious activity.

- The layout ensures quick emergency response and facilitates ongoing police patrol monitoring capability.

- The site benefits from being in an established urban area. Surrounding occupied properties enhance informal monitoring and support timely reporting of safety concerns.

- The built-up setting allows for efficient lighting installation and flexibility in fixture placement to enhance site security.

- No concerns related to railway and waterway proximity.

Notably, the CPTED professional's report states:

> *"The site that offers the best combination of beneficial CPTED characteristics to support safe usage with the fewest drawbacks is the site located at 114 Miles Street. In my opinion, the selection of this site to host the temporary housing village offers the best combination of attributes that can ensure safety, security, and well-being optimization for all involved stakeholders. Its configuration offers an optimal degree of design flexibility to achieve the best possible outcome for the temporary housing village that gets constructed. The other two sites simply do not possess the same magnitude of strengths as the 114 Miles Street property."*

Challenges

All sites will have challenges. However, the Mies Site has the least challenges and can be addressed more readily than those of the other plausible sites, including:

- The site is included in the Call for Proposals issued by Realty Services early last month. While Administration has received two (2) general inquiries regarding the site, no formal submissions have yet been received. The buildingthunderbay.ca website has been updated to reflect that the site is currently suspended from the Call for Proposal process.

- Nearby industrial properties that may be vacant during certain periods, posing a risk of property crime.

- The site is in an urban, non-naturalized area and will require beautification and light landscaping to support resident wellness.

Mitigating Community Concerns

Administration has carefully considered previously raised concerns. Alongside future measures that may be identified as the project progresses, subject to Council approval where required, Administration is committed to implementing the following:

- Establishing a Neighbourhood Liaison Committee to support communication and continuous improvements;

- Allocating $125,000 annually to the Fort William BIA for the duration of the project to support security enhancements at their discretion (i.e., lighting, cameras, or personnel);

- Allocating $50,000 in the City's budget for enhanced cleanliness initiatives in the South Core;

- Excluding the property at 142 Simpson St and immediately adjacent property in the future identification process for recognized encampment locations; and

- Installing cameras associated with the Eye on the Street Program where possible.

It is Administration's position that this recommendation not only provides a practical response to the immediate crisis but also represents an investment in improving public health and safety and supporting downtown Fort William revitalization. Importantly, as a modular and time-limited initiative, the Village is not permanent. If the site proves untenable, relocation remains an option subject to Council approval.

Option 2: Cumberland Site

The Cumberland Site was one of the higher-scoring sites in the ranked properties list. However, further analysis highlights challenges that greatly limit its viability. Feedback from the CPTED and Thunder Bay Police Service safety assessments are included in the summaries below.

Key Features

The Cumberland Site offers the following features that contribute to its plausibility as an option:

- It scored 76% in the ranked properties assessment, representing the fourth highest overall score.

- The site is located in a naturalized area, which may support resident wellness by providing access to green space.
- It is situated near an area that has experienced some encampment-related activity, although at a much lower scale compared to the activity near the Miles Site.
- Projected construction and capital costs are within the approved budget, estimated between $4.5 and $5.0 million.
- The site backs onto an active municipal Parks and Open Spaces yard, which may offer opportunities for natural surveillance and passive oversight.
- The site benefits from a long, open sightline along Cumberland Street which is a busy roadway that supports visual accountability.

Challenges

While the Cumberland site could be viable with further study to determine appropriate mitigation measures, it presents considerable challenges, such as:

- It is near Boulevard Lake and the dam spillway which are vast unmonitored areas that present safety risks. These risks are compounded during spring when water levels rise, and the area is identified as an emergency zone in the event of a dam failure, presenting significant logistical challenges in the event of an emergency.
- The site fronts onto Cumberland Street, a four-lane arterial road with no sidewalks or crosswalks. This introduces pedestrian safety risks and would require unplanned infrastructure investment which may unsustainably increase the project's capital costs.
- The site currently hosts an encampment. Relocations could cause significant delays, complicating timelines and increasing costs.
- Clients from the Salvation Army have raised concerns about the site's compatibility and the Salvation Army has raised concerns regarding their ability to manage anticipated additional demand on their services.
- The absence of necessary environmental studies that would introduce additional costs and delays that the project's timeline and budget cannot absorb.

Option 3: Hillyard Site

The Hillyard Site, next to 8th Avenue, was included in the ranked properties list as a potential location; however, it is the least viable of the options under consideration. Feedback from the CPTED and Thunder Bay Police Service safety assessments are included in the summaries below.

Key Features

The Hillyard Site was included in the ranked properties list and offers the following features that contribute to its plausibility as an option:

- It scored 73% in the ranked properties evaluation, representing the fifth highest score overall.
- Physical separation from high-traffic roadways reduces the risk of unsafe interactions between residents and vehicles.
- The site is located in an area with limited nearby residential properties, which may help mitigate potential neighbourhood concerns.
- The surrounding area includes some naturalization, which may enhance resident wellness and there are no railways nearby.
- Two neighbouring properties are City-owned assets, which may reduce neighbouring property conflicts.
- Estimated construction and capital costs are within the approved budget – projected between $4.5 - $5.0 million.

Challenges

Additionally, the Hillyard Site presents the most significant challenges and uncertainties:

- There is limited information about environmental conditions. Unforeseen environmental issues may arise and carry the potential to exceed the project budget.
- The site’s adjacency to both a publicly accessible Active Transportation Corridor and a public off-leash dog park creates land use conflicts and heightens safety concerns, increasing the risk of negative interactions between Village residents and corridor or park users, particularly in these discreet, lightly populated areas where few witnesses would be present in the event of an incident.
- The site is isolated from public view which may increase resident vulnerability. It has only one viable access point for emergency services. The site borders unmonitored forest and a major drainage channel.
- The site is distant from healthcare and social services which necessitates enhanced transportation resources that are beyond the current project budget.
- No public or service provider feedback has been received on this site unlike the other two options.
- Surrounding properties are primarily commercial and industrial, which are often unoccupied for extended periods, increasing the site’s vulnerability to loitering,

trespassing, vandalism, and other property crimes, with limited passive surveillance to support timely reporting to police.

- The area is not typically frequented by large numbers of people living unsheltered, and its unfamiliarity may pose a barrier to individuals accepting residency in the Village. Introducing a significant number of people unfamiliar with the surroundings could also create risks for the broader area.

Next Steps

If City Council approves the Miles Site, Administration will continue working through the procurement process for the two associated Request for Proposals. Site preparation and construction are targeted to begin in August to meet the project's timelines.

Administration will also continue implementing the Enhanced Encampment Response Action Plan; and move forward with public engagement and education through a variety of methods, including in-person meetings, illustrative videos, infographics, podcast appearances, event attendance, and social media updates.

CONSULTATION

Public and Stakeholder Engagement

Administration could not undertake broader public engagement due to time constraints. However, this project and the City's response to encampments has undergone extensive public engagement, generating over 2400 points of engagement through public surveys, meetings, and focus groups.

These engagements have highlighted consistent themes, including:

- The urgency to address encampments and frustration with delays.
- Concerns regarding community safety and well-being.
- The importance of access to supports, services, and public transit.
- Potential impacts on neighbourhoods and businesses.
- The need to reduce stigma and support community integration.
- Concerns about project costs and clarity on government responsibility.

Additionally, the Miles Site emerged as the top preferred location in both online surveys related to site selection. The first survey asked respondents to identify their preferred location between the Miles Site (68%) and the Kam River Heritage Park (32%) via a close-ended question. The survey also identified on-site staff and security (70%), garbage cleanup in the surrounding areas (52%), and proximity to supportive services for residents (43%) as the most important priorities to support a positive addition to the neighbourhood.

The second survey asked respondents to suggest locations via an open-ended question. Of the respondents that identified a specific location, the Miles Site (28%) was

most commonly suggested, followed by the former Lakehead Psychiatric Hospital grounds (19%), and Kam River Heritage Park (14%). This survey also identified a preference for locations in the South side (36%) and locations near supportive services and public transit (24%).

Targeted engagement efforts, detailed below, were also undertaken with select stakeholders.

Alpha Court

Administration engaged with the Executive Director of Alpha Court on the Miles Site, given the proximity of their Tiny Homes project. Alpha Court expressed that they are not opposed to the Miles Site. However, without further details on mitigation strategies, they raised concerns about the possibility of revenue loss with their commercial tenants. They also noted that, having experienced community pushback with their own project, they see value in working together to address shared challenges. With a clearer understanding of planned mitigation measures, they identified a strong opportunity for collaboration to enhance safety and well-being for all.

Canadian Pacific Kansas City (CPKC)

CPKC was consulted regarding the Miles Site and Cumberland Site given their relative proximity to railyards. They reiterated their objections to the Kam River Park due to their belief residents would cross their active railyard to access the Village. In contrast, they noted that the Miles Street and Cumberland Street sites present more manageable safety considerations and encouraged Administration to assess these locations against railway proximity guidelines and mitigation measures. CPKC verbally confirmed they would not firmly oppose these alternatives as they did with Kam River Park and expressed willingness to support further safety assessments.

Fort William Business Improvement Association

Administration met with the FW BIA Board to provide an update on the project and the recommended site. Discussion items included concerns about potential impacts on BIA membership, the mitigation measures outlined earlier in this report, and the need to enhance public communication and education around the Village.
At the time of writing, the FW BIA had not yet taken a formal position of support or opposition, citing the need to consult with its membership. To support this consultation, Administration provided a detailed email communication outlining the project and the City’s related commitments.

Salvation Army

The Executive Director of the Salvation Army was engaged regarding the Cumberland Street site. While not opposed to the location, several concerns were identified. Clients of the Journey to Life Centre, many of whom are in recovery from problematic substance use, have expressed feeling vulnerable and worry that placing a non-

abstinence-based shelter next to a recovery-oriented program could create unease and risk to clients' sobriety.

The Salvation Army also expressed concerns about reputational risk, noting that when the Cumberland Site was approved, the Village was being associated with their organization despite not being their project. They also identified resource and capacity challenges, emphasizing that locating the Village next to their facility would likely increase demand for their services without any corresponding support or funding. Lastly, they raised safety concerns related to the lack of sidewalks and pedestrian crossings, combined with heavy traffic volumes on Cumberland Street.

Future Engagement

Administration remains committed to ongoing engagement as the project advances. A Neighbourhood Liaison Committee will be established to support continued dialogue, transparency, and collaboration with local stakeholders, businesses, and residents. This committee will provide a forum to address concerns, share updates, and promote the success of the Temporary Shelter Village.

In addition to the committee, Administration will attend ward and at-large meetings, and host drop-in style community events to provide opportunities for residents to learn more, ask questions, and share feedback. For example, staff were present at the *Thunder Bay Talks* event earlier this spring to engage directly and similar outreach will continue.

Members of the public with questions or feedback can directly contact the project team at sheltervillage@thunderbay.ca.

FINANCIAL IMPLICATION

The 2025 Capital Budget included the $5.0 million Temporary Village project financed by the Renew Thunder Bay Reserve Fund as contemplated in Report 395-2024 Temporary Village Initiative – Human Rights-Based Community Action Plan.

Subsequent to the 2025 Budget approval, the City was successful in securing $2.8 million in external funding towards the construction of the Temporary Village. Budget appropriation 07-2025, presented as Appendix A, establishes the external funding source. The municipal contribution from the Renew Thunder Bay Reserve Fund would be reduced from $5.0 million to $2,199,513. If approved, $2,800,487 of the budget commitment would be released back into the Renew Thunder Bay Reserve Fund.

CONCLUSION

After a comprehensive and exhaustive analysis which included extensive internal review, stakeholder consultation, and police and CPTED assessments, the Miles Site emerges as the only site capable of supporting the Village's safe, timely, and cost-effective delivery within funding deadlines and budget constraints.

While the Cumberland Site and Hillyard Site are plausible options, both present significant risks and limitations. Each would require extensive additional study, consultation, and mitigation that cannot be achieved within the required timeframe, placing funding and project success in jeopardy.

Administration therefore recommends that Council approve the Miles Site (114 Miles Street East) as the location for the Village.

BACKGROUND

June 27, 2022, Memorandum from C. Olsen, Manager – Community Strategies, was presented at Committee of the Whole on June 27, 2022, requesting an opportunity to provide an update relative to the ongoing collaborative approach responding to unsheltered homelessness in the community. Executive Director Holly Gauvin -Elevate NWO, and Staff Sergeant Jason Anderson – Community Outreach - Thunder Bay Police Service provided an overview relative to the above noted and responded to questions.

August 8, 2022, Memorandum from C. Olsen, Manager – Community Strategies, was presented to Committee of the Whole and a resolution was passed, and ratified at City Council on August 22, 2022 that approved the financial support for an Unsheltered Homelessness Pilot Project, maintaining peer involvement and appropriate amenities provided to Elevate NWO and authorized the General Manager of Development and Emergency Services and the City Clerk to execute necessary documents.

February 13, 2023, Susan Lester and Jeanne Adams appeared before Committee of the Whole and provided a PowerPoint presentation, relative to encampments on the McVicar Creek Recreational Trail, and responded to questions.

May 1, 2023, City Council ratified a resolution to adopt a human-rights based approach to responding to encampments, including a $20,000 expansion in the Operating Budget for 2024, and directing Administration conduct community consultation to better understand the feasibility of designated/supported encampments, and to work with the Intergovernmental Affairs Committee to advocate to the provincial government.

September 25, 2023, Memorandum from C. Olsen, Acting Director – Strategic Initiatives & Engagement, was presented to Committee of the Whole and provided an update on the response to unsheltered homelessness, including preparations for the upcoming winter months.

April 22, 2024, Corporate Report 137-2024 from C. Olsen, Director – Strategy & Engagement and R. Willianen, Policy & Research Analyst, was presented to Committee of the Whole and provided an update on the feasibility of designated encampment locations, including community consultation results.

May 6, 2024, Council directed that the City conduct an environmental scan of municipal approaches to designated and sanctioned sites, undertake an assessment of recommendations to municipalities by the Office of the Federal Housing Advocate, update the Encampment Response Protocol, further define designated encampments for the City, and continue to coordinate a human-rights based encampment response.

June 24, 2024, Corporate Report 252-2024 from R. Willianen, Policy & Research Analyst and C. Olsen, Director Strategy & Engagement was presented to Committee of the Whole and provided recommendations related to adopting distance guidelines, and advocacy items to other orders of government related to encampments and unsheltered homelessness.

July 15, 2024, Memorandum dated July 5, 2024, from C. Olsen, Director Strategy & Engagement was presented and proposed amended distance guidelines to include 20 metres away from private non-residential property and 5 metres away from rivers and railway tracks as they were not originally reflected. The final recommendation as presented in the memorandum was approved and ratified.

August 12, 2024, Corporate Report 312-2024 from R. Willianen, Policy & Research Analyst and C. Olsen, Director Strategy & Engagement was presented and recommended to Council that the encampment distance guidelines for trails, sidewalks, parking lots and bridges remain at 5 metres, and that they be included in the overall Distance Guidelines that were approved and ratified on July 15, 2024.

October 7, 2024, Corporate Report 384-2024 from C. Olsen, Director Strategy & Engagement was presented as a first report and proposed an enhanced encampment response through a ten-part Human Rights-Based Community Action Plan.

October 21, 2024, Corporate Report 384-2024 from C. Olsen, Director Strategy & Engagement was represented and recommended that the Human Rights-Based Community Action Plan be approved, and that a copy of the resolution be sent to the Office of the Federal Housing Advocate, and provincial and federal members of parliament.

October 21, 2024, Corporate Report 394-2024 from R. Willianen, Encampment Response Lead was presented and recommended that the Temporary Village Initiative be approved conditional on final site approval by City Council, and that Administration conduct further analysis and time-limited consultations on the two proposed site locations.

November 25, 2024, Corporate Report 425-2024 from R. Willianen, Encampment Response Lead was presented and recommended that 114 Miles St E be approved as the site for the Temporary Shelter Village Initiative. City Council did not accept the recommendation and referred the report back to Administration to determine alternate sites that are achievable within the approved Operating and Capital cost envelopes, in ranked priority, with the level of alignment based on the existing site selection criteria.

April 7, 2025, Corporate Report 057-2025 from R. Willianen, Encampment Response Lead was presented and recommended that a portion of 1111 Fort William Rd be approved as the site for the Temporary Shelter Village Initiative. City Council amended the resolution to identify the Cumberland Site as the location. The amendment was approved by City Council.

April 14, 2025, City Council did not ratify the amendment identifying the Cumberland Site as the Village's location. City Council directed Administration to report back on April 28, 2025, with a comparison and recommendation between 1111 Fort William Rd and Kam River Heritage Park.

April 28, 2025, Corporate Report 143-2025 from R. Willianen, Encampment Response Lead was presented and recommended that Kam River Heritage Park be approved as the site for the Temporary Shelter Village Initiative.

June 23, 2025, Memorandum dated June 19, 2025, from C. Olsen, Director Strategy & Engagement was presented and advised that Kam River Heritage Park is no longer considered a viable location for the Temporary Shelter Village (the Village) due to the cost-prohibitive nature of safety mitigation measures required to satisfy external partners.

June 23, 2025, City Council rescinded its decision via a Notice of Motion to Rescind the approval of Kam River Heritage Park as the site for the Temporary Shelter Village that was ratified on May 5, 2025, and directed Administration to review alternate locations for the Temporary Shelter Village Initiative that may include locations previously reviewed by City Council.

REFERENCE MATERIAL ATTACHED

Appendix A: Appropriation Change Order 07-2025

REPORT PREPARED BY

Rilee Willianen, Encampment Response Lead – Growth

REPORT SIGNED AND VERIFIED BY

Kerri Marshall, Commissioner - Growth

Date (07/08/2025)

The City of Thunder Bay

DATE: July 8/2025

DEPARTMENT:
Growth

DIVISION:
Strategic Initiatives & Engagement

REQUEST FOR APPROPRIATION CHANGE [ ]

REQUEST FOR ADDITIONAL APPROPRIATION [X]

7-2025 Rev
APPROP NO.

WBS ELEMENT	DESCRIPTION	BUDGET AVAILABLE	INCREASE	DECREASE	**ADMIN USE** IM Position	Fund Code
CMO-CSS-250015-ST-001	Temporary Village (Renew TB RF)	5,000,000		(2,800,487)	9.2	90
CMO-CSS-250015-ST-002	External Funding	-	2,800,487		9.2	75
			2,800,487	(2,800,487)		

EXPLANATIONS/REASONS:

Report 239-2025
Temporary Village 2025 Capital Project
Reduce planned contribution from Renew Thunder Bay.

EFFECT ON LEVEL OF SERVICE:

DECREASE	INCREASE	MAINTAINED
	X	

DATE: July 8, 2025

RECOMMENDED/APPROVED

Keri Greaves
Keri Greaves
COMMISSIONER & CITY TREASURER

John Collin
John Collin
CITY MANAGER

PREPARED BY: *Bev Monteith*

REVIEWED BY: *Rilee Willianen*

VERIFIED BY:
A Morrison
Andrea Morrison
Director Finance

COMMITTEE OF THE WHOLE

APPROVED	NOT APPROVED

DATE:_____

CITY OF Thunder Bay
Superior by Nature

Growth Department

Memorandum

TO:	Krista Power, Director – Legislative Services & City Clerk	**FILE:**	
FROM:	Louisa Costanzo, Manager Community Safety and Well-Being, Strategic and Engagement Division – Growth Department		
DATE:	06/04/2025 (mm/dd/yyyy)		
SUBJECT:	Declaration of Support- Planet Youth Thunder Bay		
MEETING & DATE:	Committee of the Whole - 07/14/2025 (mm/dd/yyyy)		

Since 2023, staff from the Strategy & Engagement Division and Recreation & Culture Division have been working with a group of community partners, led by the United Way Thunder Bay, to explore the feasibility of adapting the Icelandic Prevention Model (IPM) in Thunder Bay. The IPM is an internationally recognized, evidence-informed approach designed to reduce youth substance use by strengthening protective factors across families, schools, peer groups, and the broader community. The model emphasizes early intervention, long-term prevention, and sustained cross-sector collaboration, guided by local data and responsive to community priorities.

Locally, the Planet Youth Thunder Bay initiative is working to adapt this model in a manner that reflects the unique cultural, social, and geographic realities of Thunder Bay. Particular emphasis is being placed on ensuring cultural responsiveness, with Indigenous leadership and community voices guiding much of the early discussion and design.

This work has included early planning meetings, stakeholder engagement, knowledge exchange with communities in Canada and internationally who have successfully implemented similar prevention-based models. Community partners are working toward a multi-year, collaborative implementation strategy supported by local data and guided by youth, families, educators, and service providers.

The Planet Youth Thunder Bay initiative aligns with the City’s ongoing commitment to advancing community safety, well-being, and youth development through prevention, collaboration, and cross-sector partnerships.

As part of the next phase of development, the City of Thunder Bay is being asked to formally sign the attached Declaration of Support to demonstrate its commitment to this collaborative process. The City's role would include:

- Providing support through the Strategy & Engagement Division and Recreation & Culture Division to assist with grant applications related to the initiative.
- Administration from the Strategy & Engagement Division and Recreation & Culture Division participating on the executive committee, planning committee and ongoing development discussions through public engagement – to encourage and support participation by residents and community organizations in the design, planning, and eventual implementation of the model.

The Declaration outlines three primary areas of commitment:

- Exploration & Collaboration
- Awareness & Education
- Cultural & Community Responsiveness

By endorsing the Declaration, the City acknowledges the importance of youth well-being as a collective responsibility and affirms its role as a partner in the early development of Planet Youth Thunder Bay.

Therefore, it is recommended that the Corporation of the City of Thunder Bay sign the Declaration of Support to formalize a collaborative relationship in advancing a locally driven and community-tailored model for Planet Youth Thunder Bay. This initiative focuses on upstream prevention, aiming to reduce youth substance use by strengthening protective factors across families, schools, peer groups, and the broader community.

RECOMMENDATION

WITH RESPECT to the Memorandum from Louisa Costanzo, Manager – Community Safety & Well-Being, dated June 4, 2025, we recommend that Mayor sign the Declaration of Commitment for Planet Youth Thunder Bay;

AND THAT the City support this initiative through participation in planning activities, grant development, and public engagement in alignment with existing roles and resources;

AND THAT any necessary by-laws be presented to City Council for ratification.

Memorandum

TO:	Krista Power, Director – Legislative Services & City Clerk	**FILE:** 226-2025-Growth-Strategy & Engagement
FROM:	Danielle Thom, Climate Action Specialist Strategy & Engagement – Growth	
DATE:	07/03/2025	
SUBJECT:	Planet Youth Presentation	
MEETING & DATE:	Committee of the Whole – 07/14/2025	

I would like to request the opportunity for Desiree Green, Community Collaboration Manager – United Way Thunder Bay, and Sheena Albanese, Health Promotion Planner – Thunder Bay District Health Unit, to provide a presentation relative to the Planet Youth Program at the July 14, 2025, Committee of the Whole meeting.

CC: Louisa Costanzo, Manager of Community Safety & Wellbeing – Growth
Cynthia Olsen, Director Strategy & Engagement – Growth

CITY OF Thunder Bay
Superior by Nature

Community Services Department **Memorandum**

TO:	Krista Power, Director – Legislative Services & City Clerk	**FILE:**	
FROM:	Kim Begin, Supervisor – Aquatics, Wellness, Children & Youth Community Services Department – Recreation & Culture Division		
DATE:	06/02/2025 (mm/dd/yyyy)		
SUBJECT:	Youth Wellness Hub Memorandum of Understanding and Service Agreement		
MEETING & DATE:	Committee of the Whole - 07/14/2025 (mm/dd/yyyy)		

Since November 2023, the Recreation and Culture Division and Strategy & Engagement Division have been working with a group of community partners led by Children's Centre Thunder Bay (CCTB) on the development of a Youth Wellness Hub for Thunder Bay and District. After significant work and a successful funding request, the local Hub is anticipated to open later this summer.

The Hub has been developed as part of Youth Wellness Hubs Ontario (YWHO), an integrated youth services initiative designed to address the service gaps in the youth mental health and substance use sectors in Ontario. YWHO's provide young people aged 12 to 25 with access to a full range of integrated services that support their individual needs, including mental health and substance use supports, primary care, education, employment, housing and other social services in one youth-friendly space. YWHO's model is designed to improve experiences and outcomes for youth by:

- Increasing access to rapid, low-barrier services;
- Reducing transitions by providing care in one location; and,
- Providing tailored, high-quality programs co-developed with youth to meet their needs.

Children's Centre Thunder Bay (CCTB) has collaborated with an extensive list of youth-serving community organizations, youth, families, and community members to develop the Hub. The project has received funding from the Ontario Ministry of Health to support development of their site and programs. Children's Centre Thunder Bay is now developing Memorandums of Understanding, to be followed by Service Agreements, with community partners that will be involved in programming and services at the Hub.

The Recreation and Culture Division supports providing in-kind health and wellness services for the Hub given that the project aligns with our mandates and work plans. In-kind supports may include:

- Access to Recreation & Culture Division spaces for pop-ups and provision of wrap around programs and services in collaboration with existing recreation programs and services. Spaces may include Canada Games Complex, Kinsmen Youth Centre and others.
- Year-round Recreation & Culture programming for youth and families at the Hub, delivered by Youth Move as part of Youth Move's existing annual programming.
- Outreach and system navigation supports to connect youth and families to the Hub and related services providers, offered through the Youth and Family Support Program: Youth and Family Systems Collaborator, Youth Navigator and Youth Mentor.
- Encouraging and supporting participants in City of Thunder Bay youth programs to participate in the development and ongoing implementation of the Hub.

These in-kind supports are within the Division's existing work so there are no new financial implications associated with entering the MOU or Service Agreement.

Therefore, it is recommended that the Corporation of the City of Thunder Bay enter into a Memorandum of Understanding and subsequent Service Agreement with Children's Centre Thunder Bay to formalize a collaborative relationship focused on supporting youth mental health and wellness through the Thunder Bay and District Youth Wellness Hub.

RECOMMENDATION

WITH RESPECT to the Memorandum from Kim Begin, Supervisor – Aquatics, Wellness, Children & Youth, dated June 2, 2025, we recommend that authority be delegated to the Commissioner Community Services to execute a Memorandum of Understanding (MOU) and Service Agreement with Children's Centre Thunder Bay for

the Thunder Bay and District Youth Wellness Hub to the satisfaction of the City Solicitor;

AND THAT any necessary by-laws be presented to City Council for ratification.

CITY OF Thunder Bay
Superior by Nature

Community Services Department **_Memorandum_**

TO:	Krista Power, Director – Legislative Services & City Clerk	**FILE:**
FROM:	Leah Prentice, Director – Recreation & Culture Community Services Department	
DATE:	06/02/2025 (mm/dd/yyyy)	
SUBJECT:	Presentation Request – Youth Wellness Hub Memorandum of Understanding and Service Agreement	
MEETING & DATE:	Committee of the Whole - 07/14/2025 (mm/dd/yyyy)	

I am requesting permission for Kim Begin, Supervisor- Aquatics, Wellness, Children and Youth, and Leslie Hatton, Manager – Child and Family Counselling and Therapy, Children's Centre Thunder Bay, to provide a presentation along with the Youth Wellness Hub Memorandum of Understanding and Service Agreement Memo at Committee of the Whole on July 14, 2025.

Sincerely,

Leah Prentice