Berczy Glen Geo-Exchange Project

City of Markham, Mattamy Homes and Enwave Project

Presentation to TAF Board

Final Report Meeting

April 26, 2021

PRIME STRATEGY & PLANNING

Agenda

1. Introduction
2. Objectives and Context
3. Overview
4. TAF Support Realized
5. Reflection
6. Next steps

Berczy Glen Project Site

- North Markham - Elgin Mills west of Warden Ave
- 64 Acre Site
- Approximately 312 homes
- Geo-exchange System is currently only being developed for Phase 1 (i.e. highlighted area)

Project Context

- Project initiated in November 2018
- Collaborative – Early and frequent engagement with project partners and stakeholders to establish partnership synergies and commitments.
- Education first – Set principles of engagement and ensure that challenges and concerns raised by potential stakeholders are explored.
- Policy landscape – Explore policy options that inexplicitly support geo-exchange projects and related economic, social, and environmental co-benefits.
- Technical feasibility completed 2020

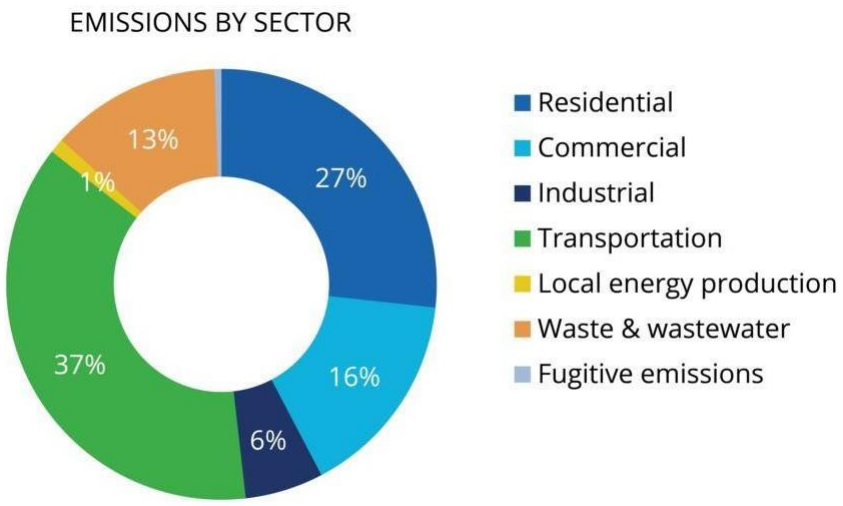
TAF Objectives

1. A public-facing report summarizing learnings and how other communities can make this type of geo-exchange feasible.
2. A knowledge transfer plan which includes activities such as publications, conferences, and other presentations, designed to share project results, processes, and lessons learned with stakeholders.

Project Team Objectives

1. Meeting expectations for Markham Net Zero Emissions Policy Objectives
2. Demonstration project to support scale up
3. Consistent with Mattamy industry leadership
4. Support Enwave's vision for growth of geo-exchange systems in the GTHA and beyond

Markham's Context



Markham emitted 1.78 MT CO_2e in 2011

- Fast growing – 23% increase to approx. 440,000 residents by 2031
- Net zero emissions by 2050 objective
- Open and flexible policy framework
- Future Urban Area – 1,300 Ha of land, 12,000 residential units, 38,000 people, 19,000 jobs
- Strong political will and senior level support to innovate and battle climate change
- Resulted in ability to partner with Mattamy, Enwave and TAF to bring this project to reality

Berczy Glen Geo-Exchange System Milestones

- 2017, Mattamy and Enwave proposes geo-exchange opportunity to Markham staff
- 2018, joint press release to announce project collaboration between the partners
- 2019, attended conferences (i.e. OPPI) as panelists to discuss partnership, early lessons learned and opportunities
- 2020, finalize key Municipal Access Agreement (MAA) points between Enwave and City of Markham to progress project
- 2021, Mattamy to launch sales centre and marketing for geo-exchange technology and homes to the public


APEX

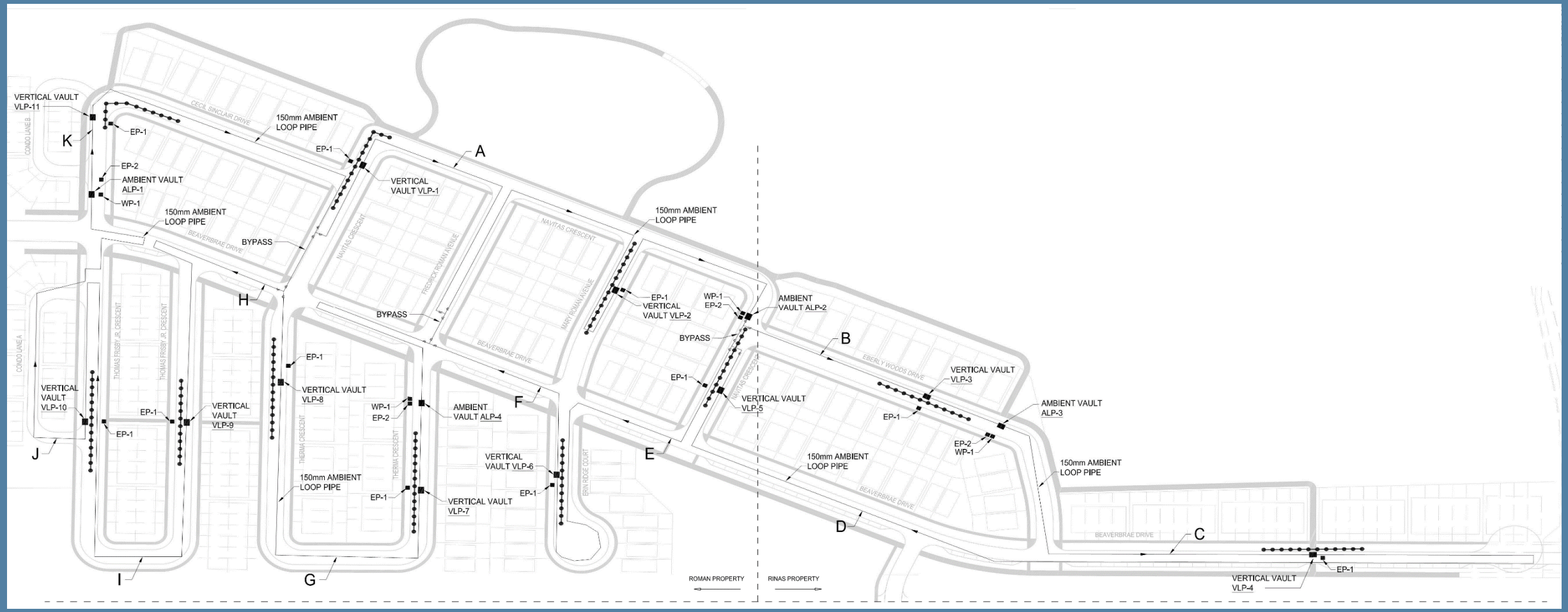
Design Options

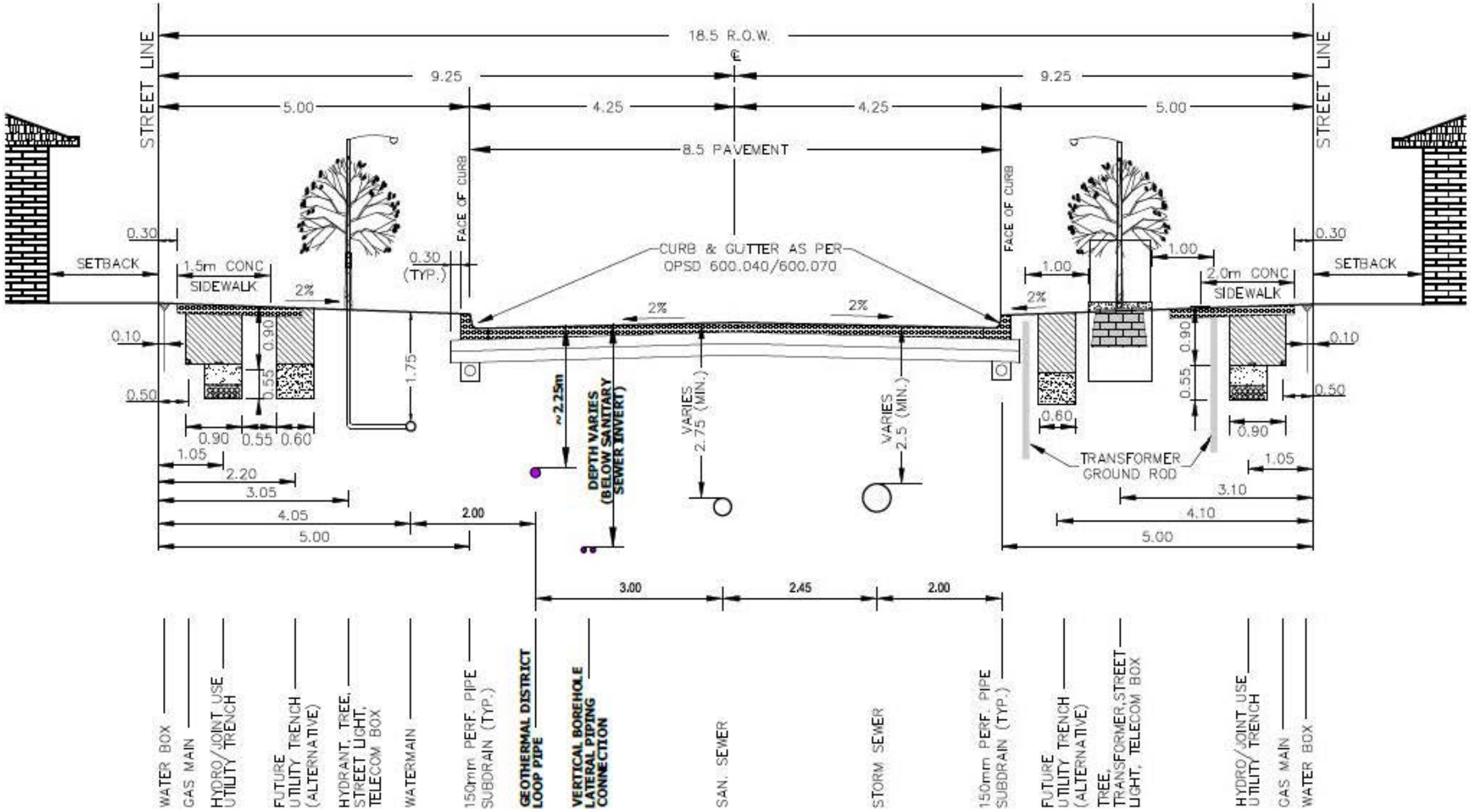
We explored three types of geo-exchange to supply thermal energy:

1. Geo-exchange boreholes;
2. Horizontal geo-exchange fields; and
3. Open loop geo-exchange wells.

The design team settled on a simplified design of geo-exchange boreholes due to the more complex approvals, construction complexity and operational variability of horizontal or open loop.

District Infrastructure





18.5m RESIDENTIAL LOCAL ROAD

TAF Support

- Accessing funding to initiate innovation is essential for projects like this
- Partners become jelled around the opportunity supported by incentives
- Commitment from stakeholders and governments to a process is amplified by incentives
- TAF Funding was important to initial workshop/meeting process engagement with stakeholders internal and external
- Incentive commitments can drive scale up from successful demonstration

Project Reflection

- Implemented integrated design process
- Explored multiple design options
- Limited public space
- Setback refinement required
- Integrated within existing development process
- Municipal Access Agreement was critical
- Geo-exchange is just another utility
- City resources and Champions
- Wholistic natural gas infrastructure assessment
- TAF Support was critical to get past conceptual designs

Next Steps

- Continue construction with anticipated home closings in Q1 of 2022.
- Continue assessing real data of costs and implementation.
- Assess the feasibility of continuing geo-exchange in future phases.