LANARK COUNTY

Public Works Departmental Review

Final Report

DILLON CONSULTING

PERFORMANCE CONCEPTS CONSULTING

January 2023 – 22-4587

January 25, 2023

DILLON
CONSULTING

177 Colonnade Road
Suite 101
Ottawa, Ontario
Canada
K2E 7J4
Telephone
613.745.2213
Fax
613.745.3491

Lanark County Public Works Department
99 Christie Lake Road
Perth, Ontario
K7H 3C6

Attention: Terry McCann
Public Works Director

Public Works Departmental Review Final Report - Draft

Dillon Consulting Limited (Dillon) and Performance Concepts Consulting Inc. are pleased to submit our Final Report for the Public Works Departmental Review, which includes the review of the Lanark County Trail System and Structures.

The Report includes a comprehensive review of the fleet, operations, winter control activities and roads maintenance of the Public Works Department. The analysis begins with an "As Is" Current State snapshot and proceeds to an "As Should Be" set of recommendations positioned across a Do Now/Do Soon/Do Later implementation road map. The final version of the Report will contain a standalone review of the Lanark County Trail System and Structures which includes a 10-year capital plan for the recreational trails. This section will be submitted as part of the subsequent draft.

Should you have any questions or need assistance with the implementation of the Report's road map of recommendations, please feel free to contact our team.

Sincerely,

DILLON CONSULTING LIMITED

Bill Harvey

Bill Harvey
Structural Eng. Technologist

MLG:rrk
Enclosure (Report)

Our file: 22-4587

Table of Contents

Figures

Tables

Appendices

Executive Summary

Dillon Consulting Limited with Performance Concepts Consulting Inc. was retained by the County of Lanark to undertake an operational review of the Public Works Operations. The objective of the review was to evaluate/adjust service levels, enhance service delivery processes, and rationalize the stream of operating and capital costs generated within the Public Works Operations and Fleet Department. In short, the mission was to optimize value-for-money in the delivery of core Departmental services.

Ancillary to this Departmental review, Dillon completed condition assessments of Lanark-owned and maintained segments of the Ottawa Valley Recreational Trail (OVRT) and Tay-Havelock Trail, 62 km and 23 km in length, respectively. Data collected through these assessments and inspections was used to identify current condition of major components, estimate remaining useful life of the assets, and develop a 10-year capital plan for trail and structure maintenance.

The operational review was funded through the Provincial Municipal Modernization Program (MMP) administered by the Ministry of Municipal Affairs and Housing. Under the MMP, the Province is making funding available through 2022-2023 to help small and rural municipalities conduct third party impartial service delivery reviews, implement recommendations from previous reviews, and undertake a range of projects, such as IT solutions or process improvements, to achieve cost savings and efficiencies.

The Dillon/Performance Concepts team executed an operation review that included the following components/deliverables:

- Review organization design/structure for the Fleet and Operations Department, lines of reporting and staffing levels in order to identify potential changes to enhance service and right-size staffing levels;
- Review operational procedures/processes (procurement, work order management, scheduling, fleet and equipment (including Climate Change initiatives), budgeting, activity reporting, CVOR processes, etc. to identify potential areas of efficiency for the Fleet and Operations Departments;
- Undertake data analytics on road maintenance activities to document/evaluate historical patterns and trends that can be used to adjust the Lanark's available resources and budgeting approach;
- Review service levels in comparison to the Provincial Minimum Maintenance Standards to identify potential opportunities to revise current service level standards including the following: Plow Route and Patrol Route Optimization, and Seasonal Road Restrictions;
- Benchmark Lanark's operating costs to selected comparator municipalities in order to gain insights around relative performance;
- Review standard operating procedures and job descriptions in order to identify potential changes that could support operational efficiencies for the Fleet and Operations Department;
- Assess the cost-effective use of third-party service providers vs. internal staffing/resources;

- Identify new technologies that could be used to rationalize operating costs and enhance operational efficiencies, including the following systems: electronic document management, Work Orders, GPS, Radio Communication and Traffic Signal Optimization;
- Identify potential shared service opportunities, including Inter-Municipal and Upper Tier Boundary Bridges; and,
- Develop a 10-year forecast of capital and personnel requirements for the Lanark County Trail system, with associated strategies to ensure cost minimization.

The operational review used an evidence-based methodology to ensure go-forward Recommendations are informed by the results of staff consultation, research/peer review, data analytics, and a third party expert review of existing operations.

This Report integrated the following framework and tools to generate a robust set of Recommendations:

- Current State Documentation and Analysis – an *As Is* snapshot
- Peer Survey/Scan;
- Future State Design and Recommendations – an *As Should Be* change plan; and,
- Do Now/Do Soon/Do Later Implementation Roadmap.

Peer municipalities were chosen due to their similar size and/or proximity to Lanark. The survey/scan results were examined to develop an understanding of operations and methodology deployed by similar municipalities and aid in the formation of Recommendations.

Performance Improvement Recommendations

The Recommendations have been organized within the following overall themes:

- Protecting Road Assets;
- Sustainable Winter Control; and,
- Organizing for Results.

Protecting Road Assets

Recommendation #1: Set Annual (Minimum) Targets for Hardtop and Safety Maintenance

- Lanark should set minimum targets for Hardtop and Safety maintenance hours (over the next three years) that approach 50% of total maintenance hours. Annual reporting should compare actual Hardtop and Safety hours delivered versus targets established during the annual budget process.

Recommendation #2: Review Scheduling/Allocation of Summer Vacation

- Given the problematic impacts of Winter OT lieu time on staff availability/capacity, Lanark should review its scheduling/allocation of vacation time across June to August – ensuring any staffing capacity impacts are well understood and are deemed operationally acceptable by Lanark's management.

Sustainable Winter Control

Recommendation #3: Contracted and Shared Services

- Lanark should design and execute a *managed competition model* to determine Winter Control service delivery across the current five contracted routes. Lanark staff should prepare bids to provide Winter Control services for these 5 routes, and these bids should be compared to existing contractor pricing models and/or competing contractor bids. Bid pricing should consider the need for new plow/spread units to potentially replace contractor units (amortized across a 10-year contract period with a 5-year mid-point for renewal).

Recommendation #4: Winter Event Tracking

- Lanark should Implement a storm management/reporting model that tracks the following three standardized critical points in a winter event response:
  - Date/time of initiating a system-wide winter event response (versus amount of accumulated precipitation as per *Ontario Regulation (O.Reg.) 239*)
  - Date/time winter event ended (requires tracking at multiple County locations)
  - Date/time a full system-wide clean-up pass has been completed.

Recommendation #5: End-of-Season Winter Control Reporting

- Lanark should implement annual end-of-season Winter Control results reporting to the CAO and Council using Key Performance Indicators derived from *O.Reg. 239* mandated standards. Reporting should tie back to targets established in the seasonal Winter Control plan/budget.

Recommendation #6: Update Winter Control Policy

- Lanark should update the 2010 Winter Control policy to recognize current requirements of *O.Reg. 239* and its own internal service delivery performance targets.

Recommendation #7: Realign Winter Level of Service to MMS

- Establish Lanark's measurable service levels for Winter Control to align with Class 2-5 Minimum Maintenance Standards set out under *O.Reg. 239/02*. Set Lanark's measurable performance target for post-event system clean-up at *12 to 16 hours* after the tracked end-time of the event/storm (depending on depth of accumulation and road class).

Recommendation #8: Winter Stabilization Reserve

- Lanark should execute a Winter Stabilization Reserve analysis in preparation for the next budget cycle. The Winter Stabilization Reserve analysis should consider a range of seasonal "severity scenarios" and produce options around Reserve target balances, accumulation timeframes, and annual contribution levels.

Recommendation #9: Winter Maintenance Simulation Modelling

- Lanark should consider the results of the study completed for incremental implementation. The study can be valuable resource for future yard utilization and route optimization. The study found operating out of very few benefits or drawbacks to operating out of Mississippi Mills Township Yard instead of Almonte Depot. In addition to this combine Route 11 and Route 16 into a single route yields favorable increases in efficiency with slight reduction in level of service.

Organizing for Results

Recommendation #10: Modern Work Order System

- Lanark should purchase and implement a modern/robust work order system to replace its current system. Granular activity-based data tracking and reporting must be maintained in the cross-over to a new vendor/Work Order tool. This may require completing a Request for Information (RFI) to allow a number of possible vendors to submit info tailored to Lanark's needs. Based on the information received during the RFI stage Lanark should then create a specific RFP for the work order system.

Recommendation #11: Link Hardtop Maintenance Activities

- Lanark should update its Work Order technology system to link its tracked Hardtop maintenance activities to inventoried and PCI rated road sections/assets. Planned Hardtop maintenance activities can then be strategically directed to priority road sections/assets in order to achieve high performance results, meet KPI defined targets and optimize PCI pavement condition scores.

Recommendation #12: KPI Tracking and Reporting to Council

- Lanark should implement KPIs for tracking Public Works service delivery results and reporting them to Council. To ensure greater accountability and to provide the right data for managing operational budgets moving forward, KPIs should focus on mandated timeframes, countable activity inputs, and the level of service results… including both staff and contractor delivered services.

Recommendation #13: Modernize Budgeting Approach

- Lanark should modernize its approach to activity-based budgeting. The Public Works budget should itemize planned activity-based work outputs as well as planned activity-based spending. Budgeted activity-based work outputs and spending should be reconciled at year-end with actual work outputs and spending. Budget data sets should be presented for winter and non-winter seasons – not just for calendar derived fiscal years. Winter season work outputs and budgets will cross calendar-based fiscal years, while Non-winter seasonal budgets will exist within a single calendar-defined fiscal year.

Recommendation #14: Additional Seasonal Labour

- Lanark should secure additional seasonal labour during the winter season (ideally via a series of three-month contracts) and build this new capacity into an expanded evening shift. Initial funding for 3-4 three-month contracts can be secured within the existing budget via reduced staff OT spending. Potential additional funding room in future budget years could be freed-up via reduced reliance on expensive contractor route spending (see Recommendation 4).

Recommendation #15: Corporate Performance Improvement Analyst

- Lanark should establish a new Corporate Performance Improvement Analyst (FTE) for the County and initially assign the Analyst to coordinate implementation of this Report's recommendations around Performance Measurement and data-informed decision-making in Public Works.

Recommendation #16: Fleet Asset Management Strategy

- Lanark should implement an asset management strategy for fleet and equipment based on asset lifecycle will minimize disruption in service delivery. The strategy to manage equipment and fleet assets and capital expenditures can spread costs effectively across years and rationalize operational costs annually.

Recommendation #17: Fleet Asset Management Policy

- Create and implement a Fleet Management Policy and execute Fleet Reserve Fund analysis in preparation for the next budget cycle.

The Implementation Roadmap contained in this Report sets out a multi-year phased approach to implementation that balances the urgency for timely change with the County's finite capacity to make change happen.

1.0 Introduction and Background

1.1 Purpose of the Review

Dillon and Performance Concepts were retained by Lanark County to undertake an operational review of its Public Works Operations and Fleet Departments. The objective of the review was to adjust service levels, enhance operational processes and decrease the overall operating and capital costs associated with the Public Works Operations and Fleet Departments. Key drivers for the review are the increasing pace of technological change, combined with the impacts of climate change on road maintenance activities. Public Works is the largest single municipal service in terms of operating costs.

The County of Lanark 2022 Public Works Departmental Review is being conducted under the auspices of the Province's Municipal Modernization Program. The focus of the Review is on Public Works operations/service delivery. Lanark provides for a safe and efficient transportation network to keep the community and economy moving and manages programs that support and optimize the transportation network through proper maintenance, operations and safety programs, according to legislation and municipal standards.

Lanark is responsible for management of road infrastructure and service delivery activities include: pothole repair, culverts, winter control, undertaking road maintenance, capital road reconstruction, ditching, grass cutting, etc. The road network consists of over 550 lane km and is a critical component of the provision of safe and efficient transportation services. Road assets represent the highest $ value asset category in Lanark's asset portfolio. The roads asset category includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including sidewalks, and streetlights.

The purpose of the Final Report is to provide Lanark with strategies/actions to secure cost management and improve service delivery results via operating efficiencies, enhancement of Lanark's risk management processes, enhancement of longer-term financial sustainability, improvement of customer service, improvement of regulatory and legislative compliance, and identifying opportunities for shared service arrangements. The Review began by identifying the "As Is" state of the Public Works Operations and Fleet Departments through data collection and interviews with Public Works staff. Following this the "As Should Be" state was determined identifying possible service delivery improvements resulting in an optimal future state. The Review was informed by peer benchmarking and a winter control route modeling exercise. Input from Lanark Public Works staff regarding "As Is" vs. "As Should Be" was provided through a facilitated Vision Workshop. A Test Drive Workshop was then executed to refine/confirm opportunities for improvement; focusing on draft recommendations based on rigorous analysis. This Report includes an evaluation of all recommendations against a range of financial and non-financial benefit categories.

1.1.1 Outline Strategies for Cost Management and Capacity Gains through Operating Efficiencies

Developing strategies for Lanark to increase operational efficiencies including service level changes, staffing model changes, different vehicle acquisition strategies, potential shared service arrangements, operational process changes and modernized technology implementation. Potential cost management opportunities and/or operational improvements are identified for each recommendation as appropriate.

1.1.2 Enhance County's Risk Management Processes

Review of service standards and level of service in comparison to provincially mandated Minimum Maintenance Standards (MMS) will enhance Lanark's risk management processes and improve data collection relating to road maintenance activities and it is expected to mitigate the risk of financial loss due to litigation.

1.1.3 Enhanced Longer-Term Financial Sustainability

Reviewing Lanark's current operations and trail system leading to an enhancement of longer-term financial sustainability through improved operational planning, capital planning, and forecasting.

1.1.4 Improved Customer Service

Identifying/securing a higher level of customer service by better aligning Lanark's service delivery to customer expectations.

1.1.5 Improved Regulatory and Legislative Compliance

Through enhanced planning, operational decision making, and alignment between Lanark's operations and Provincial regulations.

1.1.6 Opportunities for Shared Service Arrangements

Identify potential shared service opportunities with neighbouring municipalities and other public sector entities.

1.2 An Evidence Based Methodology

Figure 1 sets out the evidenced based methodology adopted by Dillon and Performance Concepts in the delivery of the Lanark 2022 Public Works Review. This methodology has been refined across a number of Modernization Reviews focused on municipal Road Maintenance service delivery models.

Figure 1: Evidence Based Methodology

The Interim Report focused on the "As Is" service delivery model. A robust data was obtained by Dillon/Performance Concepts to build-out the Current State profile, and refinements to the data set have been secured via back-and-forth interactions with County staff. County staff are to be commended for their commitment to robust data tracking across Roads Winter and Non-Winter operations.

"As Is" Current State operations have been documented using a combination of data analysis and staff interviews. Data quality has been evaluated and potential gaps have been identified where they exist. Service level measurement has been evaluated and potential improvements have been identified. The Interim Report confirmed service delivery accomplishments by Lanark while setting the scene for performance improvement working sessions and Findings/Recommendations found in this Final Report.

The Vision Workshop was used to determine the "As Should Be" Future State by identifying what is possible moving forward based on analysis, peer benchmarking, an informed input from Lanark staff. Refinement of recommendations was secured via a Test Drive Workshop to refine proposed opportunities for improvement. The result was a stress testing of draft recommendations that aligned with the "As Should Be" vision for the Department.

Successful municipal Service reviews are rooted in the following two overarching principles: Doing the Right Things, and Doing Things Right. See **Table 1** for description and example of these principles.

Table 1: Overarching Principles for Service Reviews

Principles	Description
Doing the Right Things	Identify "who does what" and whether the activities deliver the desired outcomes. Do the activities deliver the expected service levels? Are there non-core tasks that can be shed or shared with others? Reprioritize service levels.
Doing Things Right	Form follows function: align organizational design/decision-making with effective/efficient service delivery.

Winter Control and Roads Maintenance services will benefit from a review that considers both principles. Rationalizing "who does what from where" and committing to sustainable/measurement supported service delivery standards is critically important (*Doing the Right Things*). Equally important is establishing a culture of excellence in execution – optimizing staffing levels, reducing risk, investing in technology and focusing on predictable/measurable results targets (*Doing Things Right*).

Transformation from a traditional "doing our best" level of effort delivery model to an optimal/results driven service delivery model will require strategic investments in IT tools, LEAN process changes, and a cultural shift towards measurement and accountability reporting. *Doing Things Right* is not easy or cheap - but the transition to results based management secures value-for-money over the medium term instead of false efficiencies in the short term.

2.0 Protecting Road Assets – "As Is" Current State Service Delivery Model

2.1 Road Network Overview (Road Class + Surface Material)

The table below sets out Lanark's road network using two sets of criteria are shown in **Table 2**:

- Surface material; and,
- *O.Reg. 239* classifications based on posted speed limits and average annual daily traffic volumes.

Table 2: O.Reg. 239/02 Classification by Lanes and Roadside Environment

Surface Material	Lane-kms Class 2	Lane-kms Class 3	Lane-kms Class 4	Lane-kms Class 5	Total-kms	% OF TOTAL
HCB (Asphalt)	35.91	255.89	78.56	0.39	370.75	66.0%
HCB/LCB	0.00	7.21	22.6	5.03	34.84	6.2%
LCB (Surface Treatment)	0.00	29.17	105.39	21.22	155.78	27.7%
Total	**35.91**	**292.27**	**206.55**	**26.64**	**561.37**	
% OF TOTAL	***6.4%***	***52.1%***	***36.8%***	***4.7%***		

The majority of the Lanark road network is asphalt surfaced and is concentrated in the Provincially defined Class 3-4 categories.

2.2 Lanark System Profile – Road Surface Quality Challenges

Sustainable road surface quality levels are critically important to taxpayers and the travelling public. Initial capital investments in the County road network should not be squandered by allowing the network pavement quality to erode over time. Planned maintenance activities stretch the life-cycle of any given road section and deliver significant cashflow advantages when it comes to lifecycle replacement capital investments. **Figure 2** below documents the benefits of planned/preventative maintenance of road asset quality and an expanded effective life.

Figure 2: Typical Asset Decay Curve

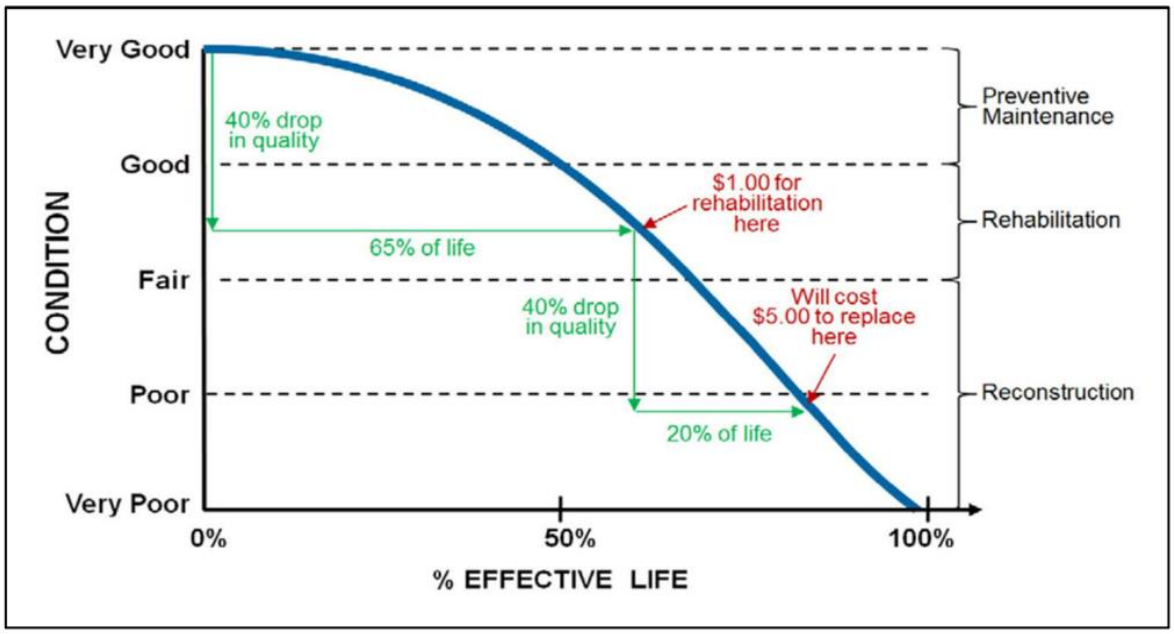
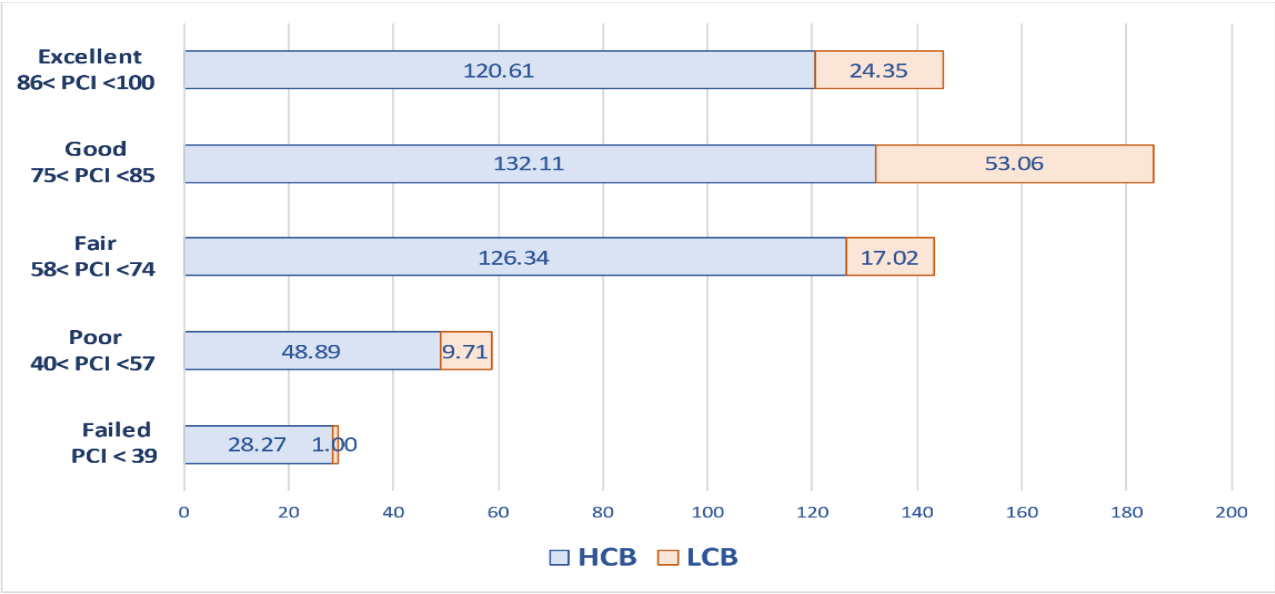


Table 3 shown below documents the pavement quality ratings for the Lanark road network. The majority of the road network demonstrates a Pavement Condition Index rating of "Good" or "Excellent". A key priority moving forward will be to maintain or improve the share of the network in the Good/Excellent range and avoid any "Fair" rated lane kilometres from deteriorating into the "Poor" category. This pavement quality strategic objective can be achieved via a blend of timely capital rehab projects and an emphasis on planned/focussed Hardtop Maintenance.

Table 3: Pavement Quality Ratings



2.3 Non-Winter Road Maintenance – Seasonal Staffing Pattern

Excessive Winter Control resource consumption (staff hours) during an average or severe winter season can have a negative impact non-winter Road Maintenance service delivery capacity. This negative impact carries forward from the winter season as OT lieu time. OT lieu time plus scheduled summer vacation time erodes the capacity of Lanark to deliver planned activity-based maintenance across the road system and other asset classes such as bridges or trails. As Lanark struggles to deliver necessary non-winter road maintenance activities under the combined burdens of OT lieu time and vacation time, it resorts to using a second installment of non-winter OT. The net impact is an annual Winter Control OT expense spike necessitated by staffing capacity deficits that occur annually across winter/non-winter seasons.

2.4 Non-Winter Roads Maintenance – Workload Trends

In **Table 4** shown below it documents Lanark's staff service hours delivered across the 2019 to 2021 non-winter seasons. Some activities demonstrate consistent work effort totals across the three seasons – the Hard Top activities are prime example. Other active groupings demonstrate significant swings in expended effort – Roadside for example generated annual staff hours of effort between 6,000 and 11,000 hours.

Relatively lower value activities like grass cutting, weed control and tree/brush removal consumed more than 8,600 s of effort in 2021 – orders of magnitude more effort than in 2019 or 2020.

Non-winter OT ranged between 179 hours and 334 hours per season.

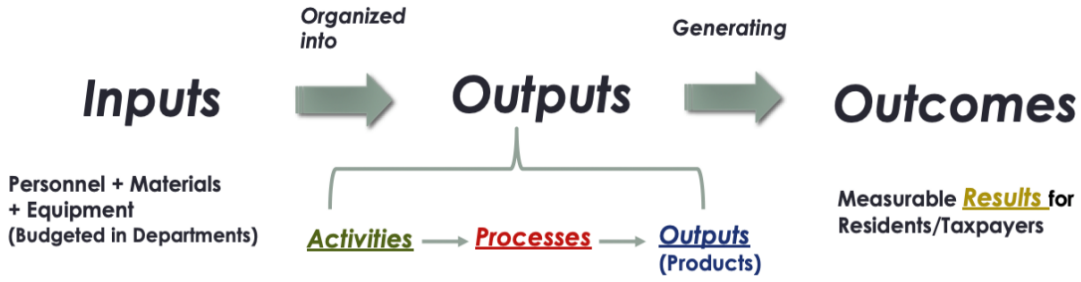
Table 4: County Staff Service Hours Delivered Across the 2019 to 2021 Non-Winter Seasons

Maintenance Activity HOURS	Hours 2019	O/T 2019	Hours 2020	O/T 2020	Hours 2021	O/T 2021
Structures						
Bridge Repairs	251		33		78	
Total Structures	**251**	-	**33**	-	**78**	-
Drainage						
Culvert Inspection & Cleaning	321	16	190	1	166	-
Culvert Installation	82	24	87	1	6	-
Beaver Control	52	-	124	-	121	3
Ditching	438	18	201	16	129	-
Curb, Gutter, S. Sewer, C. Basin	127	31	75	2	212	5
Winter Drainage	-	-	-	-	-	-
Total Drainage	**1,019**	**88**	**676**	**18**	**634**	**8**
Hardtop						
Cold Mix Patching	1,955	1	2,004	-	1,480	-
Hot Mix Patching	-	-	-	-	80	-
Base Repairs	223	30	212	-	134	26
Crack Sealing						
Shoulder Stabilization	29	-	30	-	108	-
Shoulder Gravel	143	-	332	6	1,143	8
Shoulder Grading	885	-	1,040	-	899	1
Shoulder Washouts	384	5	931	2	367	
Sweeping	702	4	756	5	677	9
Total Hardtop	**4,319**	**40**	**5,304**	**13**	**4,885**	**43**
Safety Devices						
Other Pavement Markings	28				7	
Centreline & Edgeline Marking	-	-	60	-	-	-
Sign Installation & Maintenance	401	9	513	4	1,186	6
Sign Fabrication & Purchase	-	-	2	-	14	-
Load Restriction Signs	78	-	64	-	55	-
Railway Crossing Maintenance	2	-	-	-	-	-
Barrier Maintenance & Repairs	66	-	97	-	593	-
Barrier Inspections	244	-	174	-	84	-
Traffic Signal & Warning Light Maintenance	45	14	60	31	102	33
Intersection Illumination		-		-		-
ID Sign Maintenance	59	-	80	-	134	-
ID Sign Purchase/Installation	-	-	-	-	13	-
Total Safety Devices	**922**	**23**	**1,049**	**35**	**2,188**	**38**
Roadside						
Mowing	750	1	464	1	411	
Whipper Snipping	437	1	251		616	2
Tree & Brush Removal	1,516	72	2,227	82	2,214	31
Litter Pick Up	253	6	238	9	331	22
Dead Animal Pickup	483	3	340		620	1
Municipal Consents						
Weed Control	2,813	102	3,935	88	5,800	19
Climate Action	-	-	627	5	894	16
Species at Risk	-		181		24	
Total Roadside	**6,251**	**184**	**8,260**	**184**	**10,910**	**90**
Totals	**12,763**	**334**	**15,321**	**249**	**18,694**	**179**

2.5 Activity-Based Expenditure Trends

Activity based management is a best practice for any municipal Public Works operation. Inputs organized into Departmental business units (people and non-people resources) generate a range of planned activities in order to produce outputs consumed by residents/businesses and taxpayers. *A Public Works Department is best viewed as an activity-based service delivery SYSTEM.*

Figure 3: Activity-Based Service Delivery System



Lanark uses its existing Work Order solution to operate in an activity-based fashion. Maintaining this activity-based view of service planning/delivery/reporting is critically important for productivity and accountability objectives.

In **Table 5** shown below, sets out the County's activity based $ budgets and $ actuals for calendar years 2019 to 2021.

Patterned expenditures over these three years are clustered into three primary groupings:

1. *Hardtop Maintenance* where annual spending in the range of $430k to $506k consistently outstrips annual budgets under $300k;
2. *Signs and Safety Devices* where annual spending in the $455K to $520k range tracks fairly closely to annual budgets; and,
3. *Roadside Maintenance* where annual spending in the $294k to $442 range consistently outstrips budget in the $143k range.

It is unclear why multi-year actuals that far outstrip budgets have not generated new/revised activity-based budget targets that better reflect actual experience. It is also unclear how $ budget totals have been developed if planned service-hour budgets have not been created at the beginning of the non-winter season and installed in the County work-order system.

A final observation – the annual Public Works administration budget of $1.5M to $1.7M is under-spent by more than $1M annually. This surplus off-sets the activity-based budget deficits already noted. Administration budget surpluses have not been re-deployed into the activity-based budgets for *Hardtop Maintenance* and *Roadside Maintenance.*

Table 5: County Activity Based Budget and Actuals (2019 to 2021)

Maintenance Activity DOLLARS	Budget 2019	Acutal 2019	Budget 2020	Actual 2020	Budget 2021	Actual 2021
Structures						
Bridge Repairs	6,000	62,807	25,000	4,449	25,000	9,467
Total Structures	**6,000**	**62,807**	**25,000**	**4,449**	**25,000**	**9,467**
Drainage						
Culvert Inspection & Cleaning	-	12,828	-	12,887	-	8,739
Culvert Installation	20,500	12,627	20,500	25,280	20,500	30,123
Beaver Control	9,000	6,365	-	-	9,000	10,506
Ditching	20,000	45,277	9,000	12,948	20,000	13,357
Curb, Gutter, S. Sewer, C. Basin	6,000	24,260	20,000	21,058	6,000	19,794
Winter Drainage	-	28,520	6,000	8,445	-	8,482
Total Drainage	**55,500**	**129,877**	**55,500**	**16,683**	**55,500**	**91,001**
Hardtop						
Cold Mix Patching	15,000	86,527	15,265	99,570	12,000	68,708
Hot Mix Patching	11,000	4,105	11,000	10,257	20,000	6,140
Base Repairs	1,000	13,687	1,000	8,897	1,000	4,816
Crack Sealing	230,000	223,872	200,000	205,555	200,000	203,520
Shoulder Stabilization	-	1,119	-	950		65,954
Shoulder Gravel	15,000	7,035	15,000	21,829	17,500	53,041
Shoulder Grading	-	32,863	-	39,185		33,223
Shoulder Washouts	10,000	16,265	10,000	40,459	20,000	17,562
Sweeping	16,000	45,202	16,000	51,803	22,000	53,351
Total Hardtop	**298,000**	**430,674**	**268,265**	**478,506**	**292,500**	**506,315**
Safety Devices						
Other Pavement Markings	279,000	10,800	279,000	21,651	289,000	302,255
Centreline & Edgeline Marking	-	219,146	-	282,026	-	-
Sign Installation & Maintenanc	3,000	20,608	3,000	25,509	3,000	62,445
Sign Fabrication & Purchase	30,000	28,703	30,000	16,966	30,000	29,789
Load Restriction Signs	- 10,000	- 10,203	- 10,000	- 8,213	- 10,000	- 10,059
Railway Crossing Maintenance	3,500	3,497	3,500	3,918	4,000	3,918
Barrier Maintenance & Repairs	142,000	136,855	142,000	100,983	142,000	89,608
Barrier Inspections	-	8,931	-	5,996	-	2,768
Traffic Signal & Warning Light Maintenance	70,300	34,297	42,300	32,383	43,600	25,066
Intersection Illumination	-	3,445	-	4,183	-	3,684
ID Sign Maintenance	- 1,000	- 221	- 1,000	5,184	- 1,000	10,515
ID Sign Purchase/Installation	1,300	- 566	1,300	- 1,974	1,300	471
Total Safety Devices	**518,100**	**455,292**	**490,100**	**488,611**	**501,900**	**520,460**
Roadside						
Mowing	33,000	44,809	30,000	36,911	30,000	35,385
Whipper Snipping	-	10,585	-	5,585	-	14,801
Tree & Brush Removal	33,000	76,288	35,500	114,107	35,500	118,140
Litter Pick Up	3,200	8,659	3,200	8,944	4,000	11,851
Dead Animal Pickup	-	15,470	-	11,336	-	20,175
Municipal Consents	-		-	-	-	-
Weed Control	74,000	139,041	74,000	140,008	74,000	232,045
Climate Action	-		-	-	-	10,165
Species at Risk	-		-	4,761	-	366
Total Roadside	**143,200**	**294,851**	**142,700**	**321,651**	**143,500**	**442,928**
Totals	**1,020,800**	**1,373,501**	**981,565**	**1,309,899**	**1,018,400**	**1,570,171**
PW ADMINISTRATION	**1,564,782**	**291,802**	**1,612,456**	**320,535**	**1,743,687**	**350,529**

2.6 Lanark Yards Configuration

Lanark currently operates its road operations and winter maintenance from four depots:

- Perth Depot: 99 Christie Lake Road, Perth, Ontario;
- Union Hall Depot: 1982 Wolf Grove Road, Almonte, Ontario;
- Almonte Depot: 4752 County Road 29 North, Almonte, Ontario; and,
- McDonald's Corners Pit: 4705 McDonald's Corners, Ontario K0G 1M0.

The majority of work is completed out of Perth Depot and Union Hall. The two satellites Almonte Depot and McDonald's Corners Pit are mainly used for winter maintenance.

2.6.1 Perth Depot

The Perth Depot is located at 99 Christie Lake Road, Perth, Ontario. The site features a 9,800 ft² two-bay garage that includes office space, a break room, a 6,800 ft² Quonset storage building and a 3,800 ft² Quonset storage building on this 6.5-acre property. The depot has a refuelling station on the property as well as camera security systems installed and operational. The property is not fenced and access controlled with an entrance road with no locking gate.

2.6.2 Union Hall Depot

The Union Hall Depot is located at 1982 Wolf Grove Road, Almonte, Ontario. The site features 2,800 ft² 3-bay garage that includes a 10,500 ft² Quonset storage building; and a 6,200 ft² Quonset storage building on this 3.0-acre property. The depot has a refuelling station on the property and camera security systems are installed and operational. The property is completely fenced and access is controlled with two separate locking gates.

2.6.3 Almonte Depot

The Almonte Depot is located at 4752 County Road 29 North, Almonte, Ontario. This site is owned by MTO and rented by Lanark County. The site features a 4,400 ft² 5-bay garage that includes office space and break room; a 7,000 ft² Quonset storage building; and a 1,000 ft² storage building on this 10-acre property. The depot has refuelling station and no active camera security system is installed. The property is fenced with the exception of the side along County Road 29 North and access controlled with a locking gate.

2.6.4 McDonald's Corners Pit

The McDonald's Corners Pit is located at 4705 McDonald's Corners, Ontario K0G 1M0. The site features a 7,400 ft² Quonset storage building on this approximately 20-acre property. The depot has a refuelling station and does not have an active camera security system. The property is fenced along the front of the property and access controlled with a locking gate.

3.0 Sustainable Winter Control – "As Is" Current State Delivery Model

Winter Control is a core service delivered by Lanark Public Works to the travelling public. At its core, Roads Winter Control is all about risk management. In the experience of the Dillon/Performance Concepts team, it is not uncommon for Ontario municipalities to struggle in their attempts to optimize public safety and mandated service levels that mitigate risk within a sustainable/efficient budgetary envelope. This section reviews if Lanark manages public safety and liability risk generated by Winter Weather Events in a cost-effective manner.

3.1 Lanark County Winter Control Profile

Winter Control requires a *seasonal* planning and delivery model to ensure cost-effective service delivery. This model cuts across calendar years – combining a "little winter" consisting of November/December in Year 1 with a "big winter" extending across January-April in Year 2. Similar to many municipalities, Lanark organizes its Winter Control planning and budgeting on a calendar-year basis. The result is annual calendar-year budgeting and financial reporting that is not aligned with seasonal operational realities.

3.1.1 Winter Expenditure Trends: Calendar-Year versus Seasonal Budget Lens

Lanark's calendar-year driven spending and budgeting is documented in the **Figure 4** below. It is not possible to identify/understand the seasonal drivers of winter control spending variation from this data set. Which winters were more or less severe in terms of required workload? Why is there a pronounced over-expenditure in 2019 and large under-expenditures in 2020 and 2021? Are expenditure variations a function of split seasonal workloads or fluctuations in winter event workload or both?

Figure 4: 2019 – 2021 Budget and Actuals

	Budget				Actual			
Budget Year	County Patrol and Routes	Maintenance Contracts	Loader Rental	Total	Cty Patrol and Event Response	Maintenance Contracts	Loader Rental	Total
2019	1,599,102	89,461	67,200	**1,755,763**	1,963,946	67,699	69,299	**2,100,944**
2020	1,961,440	65,761	72,500	**2,099,701**	1,662,776	51,830	72,504	**1,787,110**
2021	1,887,000	67,010	72,500	**2,026,510**	1,527,801	52,673	72,504	**1,652,978**

The figure below (not yet populated by County accounting structures) represents an adjusted budgeting/reporting model adopted by modernized municipalities seeking to align operational planning/financial management with the realities of a seasonal delivery model. This seasonal approach to data management requires the segmentation of calendar-year $ data into a "little winter" and a "big winter". Once this is accomplished, the little winter $ data set from 2019 can be aligned with the data

set for big winter of 2020. This alignment requires monthly tracking of budgeted resources and actuals. It also requires monthly tracking of winter event responses and expended man hours/pass kilometres of service delivery outputs.

The seasonal operational planning/budgeting model is dependent on the timeliness/technical quality of monthly accrual accounting and monthly work order systems datasets working in close alignment.

Figure 5: Example of Budgets and Actuals Based on Season

	Budget				Actual			
Season	County Patrol and Routes	Maintenance Contracts	Loader Rental	Total	Cty Patrol and Event Response	Maintenance Contracts	Loader Rental	Total
2019/20								
2020/21								
2021/22								

3.2 Minimum Maintenance Standards

Provincial *O.Reg. 239* establishes minimum maintenance standards for winter control and non-winter maintenance as shown in **Tables 6-7.** Each Road has its own specific winter and non-winter maintenance service level standards. The *O.Reg. 239* service level standards set minimum response timeframes for municipalities regarding specific types of winter event responses and non-winter road surface hazards, such as potholes. From both public safety and a municipal liability perspective the Winter Control minimum maintenance standards are of critical importance for Lanark.

Table 6: Snow Accumulation

Class of Highway	Event Response Snow Trigger Depth (cm)	Post-Event Clean-up Time (Hrs)
1	2.5	4
2	5	6
3	8	12
4	8	16
5	10	24

Table 7: Ice Prevention/Treatment

Class of Highway	Event Response Snow Trigger Depth (cm)	Post-Event Clean-up Time (Hrs)
1	6	3
2	8	4
3	16	8
4	24	12
5	24	16

3.2.1 *O.Reg. 239* Ice Prevention

Ice prevention maintenance standards require the municipality (if practical) to complete an anti-icing response when road ice formation on roads is deemed a "substantial probability" in the judgement of staff, (see **Table 6** above). In the case of Lanark, the Category 3-5 timeframes of 16-24 hours apply for ice prevention.

Ice treatment for already icy roads require faster response times from municipalities. Lanark's Category 2-5 roads should be returned to a safe state of repair within 3-16 hours from the initial identification of the ice hazard.

3.2.2 *O.Reg. 239* Snow Accumulation

O.Reg. 239 addresses winter snow events in two ways. It establishes accumulated snow "triggers" for a municipal plowing/sanding/salting event response. The regulation also establishes a clean-up time for the municipality to return the road to navigable condition following the end of the snow event. Lanark's Category 3-5 roads feature 6-10 cm snow accumulation response triggers and 6–24-hour post-event clean-up times as noted above in **Table 7**.

3.2.3 *O.Reg. 39* Compliance Measurement Challenges

Documenting municipal compliance with *O.Reg. 239* snow accumulation service standards is critically important from an accountability perspective to the public – demonstrating value-for-money and confirming acceptable public safety results. Measuring compliance is also critical from a liability management perspective during a winter accident litigation or an insurance action – thereby providing evidence of appropriate municipal service delivery effort/performance and protecting taxpayers from excessive $ payouts.

In order to demonstrate compliance with *O.Reg. 239,* snow accumulation performance standards, three key data points must be tracked:

- *Data point one*: when did accumulated snow reach the event-response trigger point and did the initiation of an event response align with this time-point? This data tracking requirement aligns winter weather tracking with event response callout tracking;
- *Data point two:* when did the winter storm event end? While it is appropriate to deploy plow units to maintain navigable roads *during* a storm event, the *O.Reg.,* standard focuses on returning the road to safe/navigable condition *after the storm event is finished.* This data tracking requirement requires active winter event tracking at more than one location since a storm event may well end at different times in a large jurisdiction like Lanark; and,
- *Data point three*: after the end-of-event "clock" is tuned on, how long does it take for the municipality to execute a system-wide clean-up plowing pass? Any time delay in getting plow units on the road once the storm event is over must be added to the actual system pass time required to do the work. The time-of-day the storm event ends (or day of week) can materially

impact the actual clean-up times. Compliance is not guaranteed simply by tracking the time required to implement a system pass at some point after the end of a winter storm event.

Dillon/Performance Concepts often encounter Public Works staff teams who are confident they comply with *O.Reg. 239* service level standards for snow accumulation (i.e., they understand their timeframe for executing a system-wide plowing pass), but do not track the three data points required to definitively document compliance for purposes of litigation or disputed insurance claims.

3.3 Lanark's Winter Control Service Delivery Model

3.3.1 Season Length and Work Outputs

Lanark's recent winter control season lengths, and the workload outputs associated with those seasons are documented below in **Table 8** and **Table 9**.

Season lengths are tracked according to first/last event response - thus the variation in lengths across the three seasons. This data does not document the readiness date of County crews/equipment versus these "activation" dates.

Proactive Salting-Anti-icing seasonal workload ranged from 70 to 124 event responses. These event responses generated 1,843 to 3,345 route passes of output across the season. This equates to 26.3 to 32.8 route passes per Salt-Anti Icing response across the seven seasons. Lanark is to be commended for its rigorous tracking of route passes (work outputs) across the system each season - this level of data granularity is indicative of detail-oriented system management.

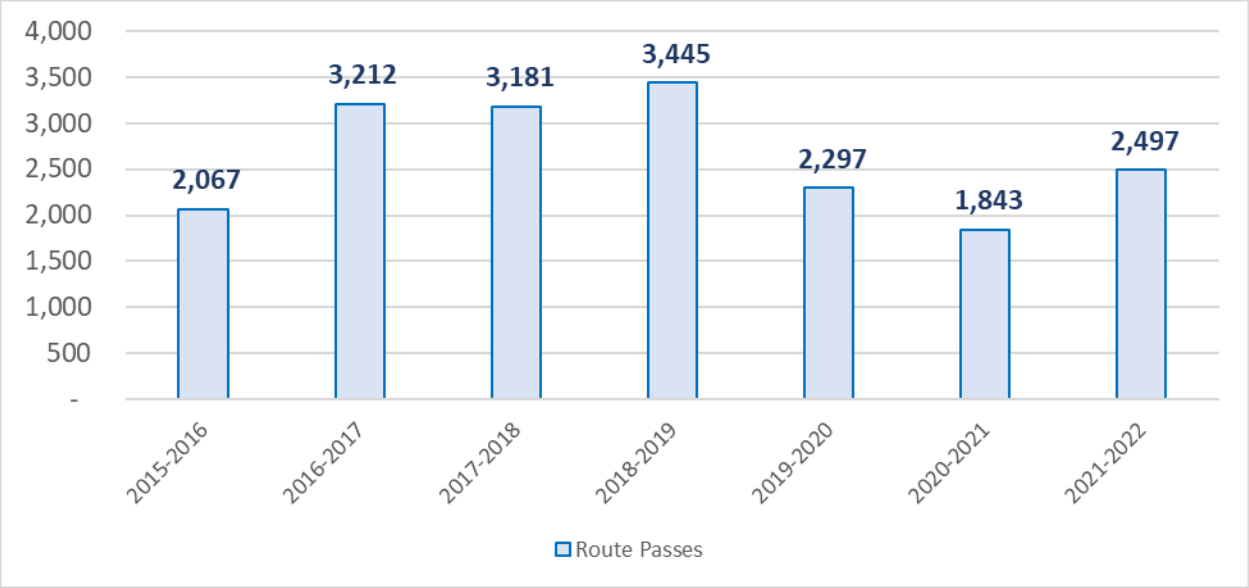
Table 8: Winter Control Season Lengths and Workload Outputs

Season	Start Date	End Date	# of Days	Salt-Anti Ice Responses	Route Passes
2015-2016	24-Nov-15	12-Apr-16	140	82	2,067
2016-2017	27-Oct-16	07-Apr-17	162	98	3,212
2017-2018	10-Nov-17	18-Apr-18	159	107	3,181
2018-2019	28-Oct-18	11-Apr-19	165	124	3,445
2019-2020	11-Nov-19	22-Apr-20	167	84	2,297
2020-2021	02-Nov-20	21-Apr-21	170	70	1,843
2021-2022	19-Nov-21	31-Mar-22	132	76	2,497

The graph below in **Table 9** demonstrates the inherent challenge of Winter Control operations for Ontario municipalities. The number of winter weather events (requiring an event response by the municipality) varies significantly across each winter season. Therefore, the route passes of output

(generating staffing and non-staffing costs) also varies significantly. In the 2020-2021 winter season (mild) the low number of 70 event responses required 1,843 route passes. In contrast, the 2018-2019 season (severe) required 87% more route passes of output to respond to 77% more winter events requiring a response. This variability drives seasonal and calendar year expenditure variation that makes accurate year-over-year budgeting challenging. Significant over/under spending actuals versus a budget (based on an average of actuals) is inevitable.

Table 9: Winter Control Season Lengths and Workload Output Graph



***Caveat*:** Data sets currently provided by the County to Dillon/Performance Concepts do not breakout winter event responses that featured a plowing response to a winter snow event (in addition to anti-icing).

3.3.2 Route Profiles and Route Specific Workload Outputs

Lanark's Winter Control route profiles and associated staffing hour workload outputs are set out in the **Table 10**, **Table 11**, **and Table 12.** Lanark staff and contractors expended work hours per winter season are tracked by the specific routes generating those work hours. Work hours are also presented on a per lane kilometre basis for each route. Average route length is 38.9 km with little difference in average length between Contractor routes (39.6 km) and County staff routes (38.6 km).

Lanark staff deliver minor workload outputs (not surprising) across Contractor routes 2, 7, and 10. This effort ranges from 1.2 hours/lane km to 2.7 hours per lane km. However, Contractor routes 11 and 12 feature County staff effort per lane km at considerably higher levels. This anomaly is particularly evident for route 12 where more than 1,300 hours of Lanark staff effort have bee n expended across three seasons on a Contractor designated route.

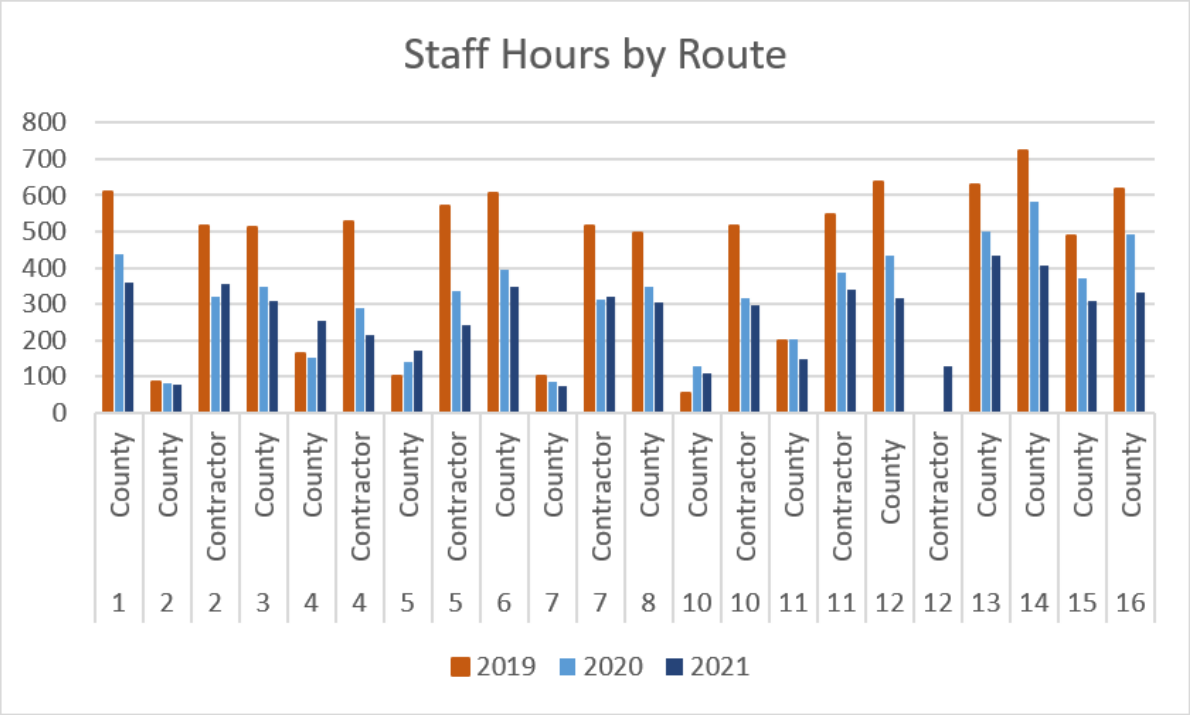
Table 10: County Completed Winter Control Route Breakdown

			2019		2020		2021	
Route	Service Provider	Lane-km	Staff hours	Staff hours/ lane km	Staff hours	Staff hours/ lane km	Staff hours	Staff hours/ lane km
1	County	35.1	609	17.3	438	12.5	359	10.2
2	County	40.6	85	2.1	82	2.0	76	1.9
3	County	38.9	511	13.1	348	8.9	310	8.0
4	County	43.7	163	3.7	153	3.5	252	5.8
5	County	35.1	100	2.8	142	4.0	170	4.8
7	County	42.3	101	2.4	87	2.1	74	1.7
6	County	38.5	606	15.7	393	10.2	346	9.0
8	County	38.3	497	13.0	349	9.1	304	7.9
10	County	47.1	56	1.2	130	2.7	110	2.3
11	County	33.5	200	6.0	203	6.1	149	4.4
12	County	34.7	636	18.3	434	12.5	315	9.1
13	County	45.7	630	13.8	499	10.9	435	9.5
14	County	45.8	724	15.8	584	12.7	407	8.9
15	County	33.6	489	14.5	373	11.1	307	9.1
16	County	31.0	619	20.0	492	15.9	333	10.7
	TOTALS	**583.9**	**6024**	**10.3**	**4704**	**8.1**	**3945**	**6.8**

Table 11: Contractor Completed Winter Control Route Breakdown

			2019		2020		2021	
Route	Service Provider	Lane-km	Staff hours	Staff hours/ lane km	Staff hours	Staff hours/ lane km	Staff hours	Staff hours/ lane km
2	Contractor	40.6	517	12.7	321	7.9	357	8.8
4	Contractor	35.8	529	14.8	290	8.1	214	6.0
5	Contractor	35.1	572	16.3	335	9.6	242	6.9
7	Contractor	42.3	515	12.2	313	7.4	319	7.5
10	Contractor	47.1	517	11.0	318	6.7	296	6.3
11	Contractor	33.5	546	16.3	388	11.6	340	10.1
12	Contractor	34.7	0	0.0	0	0.0	128	3.7
	TOTALS	**269.1**	**3196**	**11.9**	**1965**	**7.3**	**1894**	**7.0**

Table 12: Winter Control Staff Hours per Route



In **Table 12** shown above is instructive from an operational and data management perspective. Because the above staff hours data is gathered/reported on a calendar-year basis it is not possible to generate firm conclusions about workload or winter season severity on a seasonal basis (thereby aligning with other seasonal data sets maintained by Lanark).

Alignment of all operational data sets on a seasonal basis (as well as a calendar-year basis) will support robust analysis and value-added workload monitoring and reporting. Seasonal data reporting can then support the real-world challenges of Operations staff leaders who manage, and plan winter work based on self-contained seasons that cross budget years. This approach will also support Lanark staff who may face challenges of exhaustion/burnout during a severe winter season.

3.4 Winter Control Overtime and Lieu Time Trends/Pressures

3.4.1 A Winter Overtime Driver: Lanark's Current 2-Shift Model

Winter Control service levels and work outputs are dependent on winter weather. Different winter seasons feature differing levels of weather severity and events requiring a deployed event response. Given the impossibility of accurately forecasting required staff-hours of response (the budget), seasonal fluctuations are unavoidable. Municipalities face a challenge in when to deploy their straight-time staff/contracted resources and when to deploy overtime funded resources.

Lanark's scheduled primary shift (7:00 am to 3:30 pm) is significantly more robust than its secondary shift (7:00 pm to 3:30 am). This differential resourcing across shifts reflects widespread municipal practice in Ontario. The lighter resourced Secondary recognizes the benefit of staff work/live balance as well as the County's traffic activity levels during the Monday-Friday work week commuting period.

The net impact of the Weighted two-shift model is the generation of overtime cost/hours associated with winter events requiring a response outside the core hours of the Primary shift. These overtime (OT) hours are set out below on a calendar-year basis.

OT hours generated during the winter season range from 1,639 in 2021 to 2,382 in 2019 as shown in **Table 13**. Winter OT represents almost 90% of total OT in any particular year. Presumably the variation in total OT hours in any given year reflect differences is seasonal winter severity - although this hypothesis is difficult to verify when OT tracking by budget year does not align with actual winter seasons. Typically, Winter OT in Lanark corresponds to the straight-time Winter season work output of two to three staff/FTEs. Across 2019-2021 almost 5,700 hours of Winter OT were expended.

Table 13: Breakdown of Overtime Hours for Winter and Non-Winter Operations

	2019	2020	2021
Non Winter Operations Total	334	249	179
Winter Operations Total	2,382	1,648	1,639
Total OT	2715	1897	1818
Non-Winter as % Total	12.29%	13.13%	9.86%
Winter as % Total	87.71%	86.87%	90.14%
$ Value of Overtime	112,920	80,084	78,878

The Non-winter OT totalled 762 hours across 2019-2021. This premium-priced effort can also be linked to Winter Control realities. A large share of Winter Control OT is taken as lieu-time in summer. The result is a deficit in required summer maintenance hours versus available summer maintenance hours when lieu time + scheduled vacation time layer on top of each other.

Table 14 below provides additional granular information on OT generation by Winter route/function. Through discussions with Lanark it was noted that Route 4 and Route 5 became an employee route in November 2021. Route 12 became a contractor route in November 2021.

Table 14: Breakdown of Overtime Hours by Winter Route

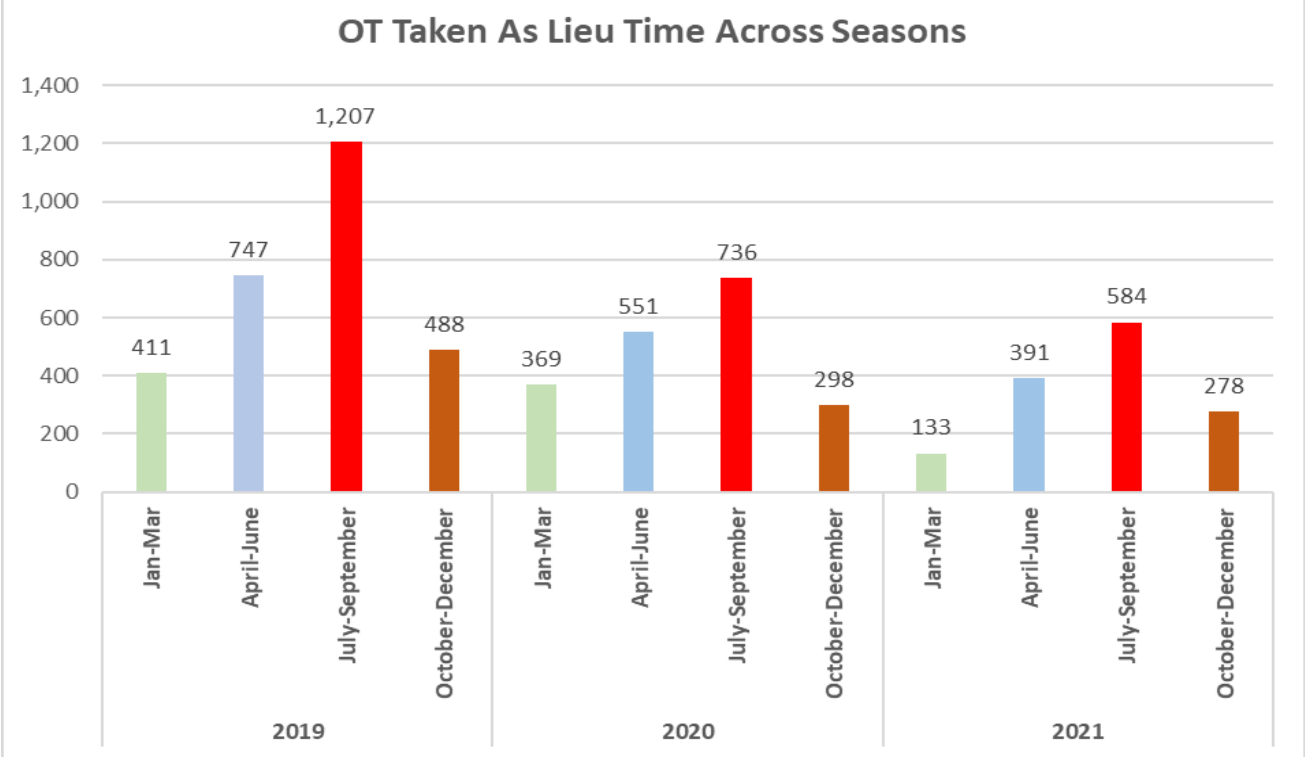
Winter Operations	2019	2020	2021
Route 1	226	182	148
Route 10	5	12	14
Route 11	15	9	22
Route 12	224	152	94
Route 13	265	178	188
Route 14	291	178	163
Route 15	221	160	156
Route 16	239	164	146
Route 2	5	5	8
Route 3	226	174	162
Route 4	7	4	47
Route 5	12	20	65
Route 6	249	173	171
Route 7	8	4	1
Route 8	204	148	134
Salt,Sand,Grit Stockpile Maint	33	1	15
Summer & Winter Road Patrol	108	83	108
Winter Drainage	46	4	1
Winter Operations Total	2,382	1,648	1,639

3.4.2 Cross-Seasonal Impacts of Winter Control Overtime

Below in **Table 15** it documents the ripple effect of Winter Control shift design on staffing availability across the entire year. Winter Control lieu time cannibalizes staffing availability during the summer period when scheduled vacation absences are common (red bars below in each year). Acros s 2019 to 2021 a total of 2,527 service hours were lost during a period where scheduled vacations already erode staffing capacity. The result is a significant resourcing gap. This gap equated to approximately three FTE-s of lost effort during July-September in 2019.

Given current winter shift scheduling, any severe winter (like 2019) will generate summer OT lieu-time totals large enough to significantly compromise Road Maintenance staffing capacity and trigger expensive summer overtime during the prime scheduled staff vacation season.

Table 15: Overtime Taken as Lieu Time across Seasons



3.5 Winter Control Technology Tools

3.5.1 Municipal Adoption of GPS/AVL Solutions across Ontario

Municipalities across Ontario are adopting GPS technology solutions to manage winter event storm responses. GPS tools are being imbedded across winter control fleets to deliver Automatic Vehicle Location (AVL) capabilities. GPS/AVL can be employed in combination with electronic groundspeed spreaders to monitor and optimize the use of salting materials across a road network. Salt management plans that are informed by this technology can secure consistent spread rates, generate significant $ savings, and improve public safety on higher risk road sections. A common/shared technology toolkit positions a group of peer municipalities to benchmark their route productivity/sand/salt usage. Route optimization within each peer municipality could improve actual performance relative to *O.Reg. 239* targets.

3.5.2 Winter Storm Reporting

The final piece of a modernized/shared winter control technology toolkit is storm reporting software. Reporting software on-boards the GPS/AVL/ data stream and generates standardized reports. These reports can/should be generated after each winter event and at the conclusion of each winter season. Documented performance records are critical to managing liability, reducing deductible payments, and cutting premiums. Many GIS/AVL winter control solutions feature robust storm reporting functionality and specifically reference Ontario Minimum Maintenance Standards.

Many municipalities have purchased GPS/AVL software solutions but are not yet maximizing the toolkit to its full extent. For instance, Lanark reports that it is tracking the location of its winter fleet but is not tracking blade up/blade down work productivity across its routes. Lanark requires a Storm Management software solution to secure the operational/reduced liability benefits of its GPS/AVL investment. Data must be turned into usable information to support operations.

3.5.3 Understanding AVL Toolkit and Controls

Winter Control GPS/AVL plowing solutions are as varied as the Ontario municipalities they support. The functionality capabilities of these solutions can be categorized as Gold/Silver/Bronze.

i. Bronze Functionality
   - Basic GPS/AVL vehicle tracking (location + time);
   - No blade up/down data tracking so no feedback on productivity or actual work accomplishments; and,
   - No calibrated spreader technology so not useful for salt/material management tracking of spread rates.

ii. Silver Functionality
- Integrates GPS/AVL with properly calibrated electronic spreaders;
- Tracks material usage and enhances *O.Reg. 239,* compliance reporting and claims defence; and,
- Can operate in cellular and non-cellular data environments.

iii. Gold Functionality
- Builds on Silver by adding vehicle diagnostics and driver patterns/trends; and,
- Advanced spreader diagnostics and application patterns customized to specific site locations on specific routes.

Dillon and Performance Concepts believes that winter control Gold functionality is suited to larger Ontario municipalities with more complex operations/routing in highly urbanized settings. Gold functionality may create information overload in smaller Ontario municipalities or less urbanized Counties. Performance Concepts also believes Bronze functionality fails to secure liability reduction and material management benefits that are required by many Ontario Counties. A Silver functionality solution represents a "best fit" for Lanark and any peer benchmarking partners.

How Electronic Spreaders Work

Modern spreaders use electronic groundspeed spreader controls to provide consistent, accurate application rates. The truck speed is monitored from the truck's speedometer drive, and the spreader output is adjusted to maintain a steady output at the set rate per kilometre. Both open loop and closed loop systems are available to monitor material flow and provide increased accuracy of the spread rate (closed loop systems provide confirmation of the actual application rate).

Modern controllers incorporate global positioning systems (GPS) for automated vehicle location (AVL) and to identify where the material was discharged (either generating a passive history or a live transmission).

3.5.4 Lanark's Current AVL/GIS Solution

Ace Electronics – A Non-Cellular Option

Ace Electronic provides an integrated GPS/AVL + electronic spreader solution for numerous Ontario municipalities.

The *Infobite GPS/AVL solution* provides a plowing/spreading/patrol solution suitable for the North Shore MMP partners. This solution can run in a cellular network configuration, or it can run outside of the cellular network. Running outside the cellular network secures better data accuracy since cellular coverage dead spots have no negative impact. A non-cellular model functions by collecting GPS/AVL and spread rate data streams onboard and then downloading it to a server at the Public Works yard at the

conclusion of a winter event response. While location tracking during the event is not possible, the final data set for each winter event response is far more dependable for accident claims defence and documenting *O.Reg. 239* compliance.

The Transportation Association of Canada's *Synthesis of Best Practices for Road Salt Management* supports on-board data collection:

> *"On-board data storage helps to manage transmission costs, deal with communication gaps and ensure data integrity."*

Figure 6: Infobite GPS/AVL

The EcoBite 2 Pro calibrated spreader solution integrates with InfoBite GPS/AVL and provides open loop/closed loop material spread accuracy/control configurations. Lanark's material spread datasets are highly beneficial from a liability reduction point of view. This spreader generated material consumption dataset also provides Lanark with a measurable baseline for potential material reductions (if appropriate) moving forward.

Figure 7: EcoBite 2 Pro

Lanark has made an appropriate decision opting for the non-cellular version of the current Ace technology solution. A cellular option was/is not feasible given the likely coverage holes and data gaps that would result. While upload glitches from the non-cellular solution are always possible, the benefits of stable/retained data sets that demonstrate appropriate winter control effort (during a storm event) are largely being realized by Lanark.

3.5.5 Savings/Avoided Costs of Lanark's Winter Technology

A measurable reduction in the Lanark's Total Cost of Risk (TCoR) is secured via its winter control GPS/AVL + electronic spreader solution. The reduction in Lanark's TCoR generates fewer payable accident claims, lower deductible payments, and reduced/flat General Liability premiums.

After dialogue with a highly regarded insurance industry subject matter expert, Performance Concepts offers the following observations:

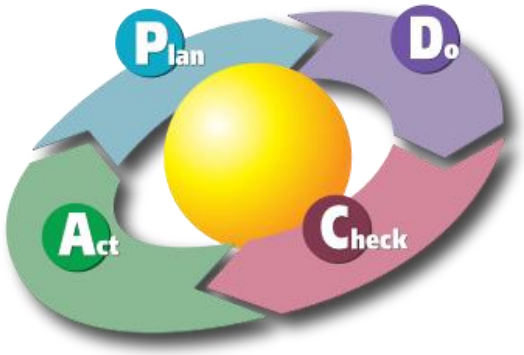
- A winter control GPS/AVL solution will not by itself deliver reduced claim payments or insurance premium reductions. Municipal partners need to ensure they continue to deploy adequate winter control resources to achieve Minimum Maintenance Standards as per *O.Reg. 139*. If this is the case, the GPS/AVL solution will act as compelling evidence/verification – in essence bulletproofing the North Shore partners from frivolous claims.

- GPS/AVL risk "armour" is becoming increasingly important to manage TCoR. Many lawyers bringing forward claims operate under the "You don't pay, if we don't win" business model. These lawyers dig deep into the municipal winter event response data set to probe for weak spots in the claim defence. A robust, well configured winter technology solution is needed to counter these aggressive legal probes. AVL plow unit location is simply not enough. Data streams/reports on blade up/down, spreader on/off, and actual material spread rates are required to protect the municipality from claims and trigger potential reductions/flatlining of general liability insurance premiums.

3.6 Winter Control Performance Measurement and Data Tracking

Key Performance Indicators (KPIs) are used by progressive municipal governments to set performance targets and then compare actual measured results against these targets. By using KPIs a municipality can develop a results-driven culture and inform annual budget decisions via a "results contract" between staff and Council.

Figure 8: Plan-Do-Check-Act Model



Municipalities that are committed to results-based management operate according to a Plan-Do-Check-Act annual cycle. Measurable targets drive planning/budgeting. Service delivery execution is tracked during the "Do" stage. Actual results are evaluated against targets during the "Check" stage. The "Act" stage fine tunes targets and resources for the subsequent cycle. Winter control is a measurement friendly, repetitive core municipal service. Units of work are countable and trackable, as are response times for completing work. End of season results reporting can inform the upcoming budget cycle.

3.6.1 Data Tracking Capabilities

Lanark currently tracks a series of data elements that would support KPIs around Outputs, unit costs, and efficiency of operations.

However, staff interviews indicate that Lanark does not yet track post-event road system clean-up times as defined in *O.Reg. 239*. Data tracking against the 3 data points for MMS Winter reporting already documented in this Report could be integrated into the Operations plan for the upcoming winter season.

3.6.2 Performance Targets/Results Reports

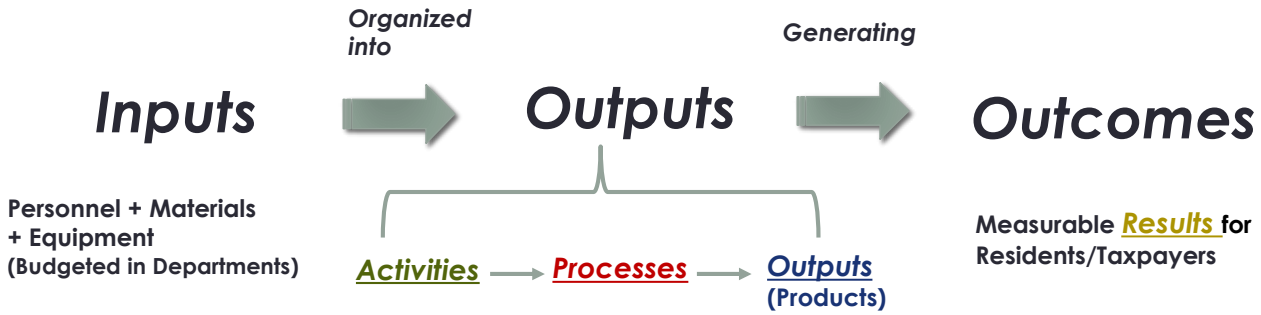
Lanark does not currently set KPI derived targets for Winter Control, nor does it report KPI results within Public Works or publicly to Council. Taxpayers/residents do not have access to value-for-money information about Winter Control services they fund via property taxes.

3.6.3 Operational Planning/Budgeting Challenges

Lanark does not create a winter season operational scorecard to evaluate its Winter Control performance against MMS derived targets/service levels. There is no alignment of KPI data with the annual budget process. Highlighting Winter Control targets/results at the presentation of the Public Works budget would generate strong value-for-money accountability.

Winter Control (also Non-winter road maintenance) are best understood from a systems perspective. Municipal inputs (staff hours, fleet, sand/salt) are organized into activities and processes that produce countable units of output (pass kilometres). The final outcome is an effective winter event response that culminates in the timely return to a safe, navigable road network. **Figure 9** summarizes the components of Lanark's service delivery system.

Figure 9: Understanding Lanark County as a Service Delivery System



The traditional (non-modernized) approach to operational planning and budgeting is the *level of effort* model. This model deploys a finite level resources based on notions of affordability. Property tax impacts, rather than winter control outcomes/service levels, are the primary driver of planning and budgeting decisions. The traditional single shift deployment model found across many Ontario municipalities is associated with level of effort planning and budgeting. In the case of Lanark, level of effort budgeting explains why two out of every seven days feature no deployed winter control resources. The probability of a winter event on a Saturday or Sunday is the same as the probability of a winter event Monday to Friday.

The modernized approach to winter control operational planning and budgeting is the *results-based management* model. This model begins with defined/measurable service levels and targeted results/outcomes. It then logically moves backwards across the service delivery system to establish required budgeted inputs. It begins with the *end* in mind.

The results-based model transforms the annual budget exercise from being inputs focused to being outputs and outcomes focused. The budget becomes a contract between Council and staff – and between the municipality and the taxpaying public. In exchange for spending $ amount X on winter control, the municipality commits to delivering measurable result Y. Measurable result Y could best be

expressed using KPI data on the number of planned service units, the cost per service unit, and the timeliness of event response completion.

Winter Budget Contract Example:

*Lanark will deploy **X,XXX** hours of Winter Event Response capacity across the 2022-2023 season according to a standardized deployment schedule.*

*Winter Event responses will be triggered by **X** centimetres of accumulated precipitation – regardless of the time-of-day of the storm.*

*Lanark will strategically deliver pass kilometers of plowing/material spread across the road network during a winter storm, and will return the road network to safe, navigable condition within **X** hours of the storm ending.*

3.6.4 Winter Control Stabilization Reserve

Since results-based budgeting commits to a targeted service delivery outcome, as opposed to a targeted spending ceiling, actual spending may not reflect budget. In a mild winter the number of event responses will be low and the variable costs in the budget (e.g., fuel and materials) will generate a surplus. In a severe winter the number of event responses will be high and the variable costs in the budget will generate a deficit. Budgets simply cannot track against actuals when weather variation is a cost driver of required pass kilometres of work.

A winter reserve fund is an appropriate tool for managing budget-to-actual fluctuations across an entire winter season (or fiscal calendar year). A winter reserve fund should be supported by a policy defining usage – when to make contributions and when to make withdrawals. A winter reserve fund should also feature a target financial balance, including a multi-year financial strategy for achieving that balance. The target balance is typically expressed as a dollar value or as a multiple of a typical winter season's operating cost. As the impacts of climate change render historic winter weather patterns obsolete, the utility of a winter reserve to manage weather uncertainty grows. Freeze/thaw patterns that seem increasingly prevalent pose a risk to road surface infrastructure, making timely winter control important from a preventative maintenance perspective.

In **Equation 1** the Dillon/Performance Concepts team sets out a technically sound methodology for determining the required $ amount for reserve contributions.

Equation 1: Reserve Contribution

- Winter Reserve funding is a component of the budgeting process since typical or below average expenditure years should be expected to subsidize heavy expenditure years - as dictated by the Winter Reserve Policy.

$$Winter\ Control\ Budget = \sum_{Activity} (Rate_{Activities} \times Hours_{Activity}) + \sum_{Material\ Type} Material\ Cost_{Material\ Type} + Reserve\ Contribution$$

- Winter Reserve contributions should be budgeted to generate enough surplus in non-severe winters to cover the higher cost severe winters based on an expected frequency of occurrence.

$$Reserve\ Contribution = \frac{Winter\ Control\ Cost_{Severe} - Winter\ Control\ Cost_{Non-Severe}}{Expected\ Frequency\ of\ Severe\ Winters}$$

4.0 Organizing for Results – "As Is" Current State

4.1 Organization Form and Function

The optimal organization design for the Lanark Public Works Department cannot be separated from Lanark's service delivery processes and workload. The key to optimizing organization design is to ensure "*Form follows Function*". Therefore, the "As Is" Current State assessment must include both an operational perspective and an *organization structure redesign* perspective.

4.2 Reporting Relationships

The existing organization design of the Lanark Public Works Department is documented in **Appendix A**. Administrative, Climate, and Facilities functions are delivered by small, specialized business units. Capital programs are overseen by a four FTE business unit led by the Public Works Manager. Maintenance and service delivery to the public are the focus of the Operations business unit.

The Operations business unit within the Department is the focus of the "As Is" Current State assessment. The sections below document the season adjusts/configurations adopted by the Operations business unit across its two primary service delivery seasons (winter and non-winter).

4.3 Operations Unit – Org Design Adjustments Across Seasons

Lanark County Operations staff are deployed annually across Winter and Non-Winter seasons. The Winter and Non-Winter staffing models are documented below in **Table 16**, **Table 17**, and **Table 18**.

Table 16: Winter Control

	Primary Shift	Secondary Shift	Patrol
Winter Control Shift Structure	• 7:00 a.m. to 3:30 p.m. • Deploy from four distinct locations (Perth/McDonald's Pit/Union Hall/Almonte)	• 7:00 pm to 3:30 am • Deploy from two locations (Perth and Union Hall Yards)	• Rotating shift work (four shifts delivering 24- hour coverage) • Monday to Friday, eight hours on Saturday and 19 hours on Sunday
	Primary Shift Positions	Secondary Shift	Patrol Positions
Staff Deployed for Winter Control	• Two Supervisors • One Mechanic • Three Equipment Operators + one Plow	• One Supervisor providing evening coverage	• One Full-Time and two TFT Patrollers

	Primary Shift	Secondary Shift	Patrol
	Operators/Labourers (Perth) • One Equipment Operator + one Plow Operator/Labourer (M-Pit) • Two Equipment Operators + one Plow Operators/Labourers (Union Hall) • One Equipment Operator (Almonte)	(2:30 p.m. to 11:00 p.m.) • One Plow Operators/ Labourers (for both Perth and Union Hall)	

Table 17: Non-Winter Maintenance (April to November)

	Primary Shift	Secondary Shift	Patrol
Non-Winter Maintenance Shift Structure	• 7:00 a.m. to 3:30 a.m. • Deploy from two distinct locations (Perth and Union Hall)	• NOT APPLICABLE	• Days only

Table 18: Staff Deployed for Non-Winter Maintenance

	Primary Shift Positions	Secondary Shift Positions	Patrol Positions
Staff Deployed for Non-Winter Maintenance	• Three Supervisors • One Mechanic • Three Equipment Operators + three Plow Operators/Labourers (Perth) • Three Equipment Operators + three Plow Operators/Labourers (Union)	• NOT APPLICABLE	• One Patroller • (7:00 am to 3:30 pm)

4.4 Fleet

The Department's fleet is comprised of 65 active vehicles and attachments. There are two main categories: licensed and unlicensed vehicles. Of the total 65 active vehicles, 40 are licensed vehicles while 25 are unlicensed vehicles. Licensed vehicles include all plated vehicles. Unlicensed vehicles include heavy equipment and miscellaneous equipment. See **Table 19** for summary of fleet vehicles.

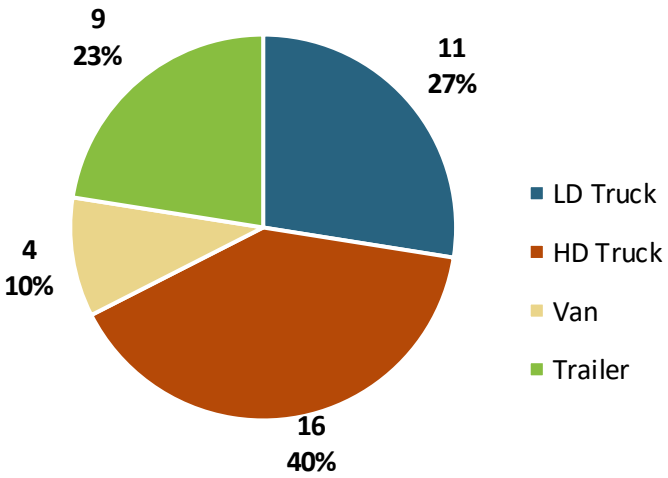
Table 19: Summary of Fleet Vehicles

Licensed Vehicles (40)	Unlicensed Vehicles (25)
Licensed vehicles include the following fleet types: • Light Duty (LD) Truck; • Heavy Duty (HD) Truck; • Van; and, • Trailer.	Unlicensed vehicles: include the following fleet types: • Heavy Duty Equipment (Skid steers, mowers, utility vehicles, excavators, graders, backhoes, etc.); and, • Miscellaneous equipment (sweepers, variable signs, brooms, etc.).

The classifications described above, reflect those used in the Public Works departments maintenance fee breakdown by vehicle type. Dillon further classified licensed vehicles based on their gross vehicle weight rating (GVWR). According to the Province of Ontario's definition of 'commercial vehicle', LD trucks have a GVWR of 4,500 kg or less while HD trucks have a GVWR greater than 4,500 kg.

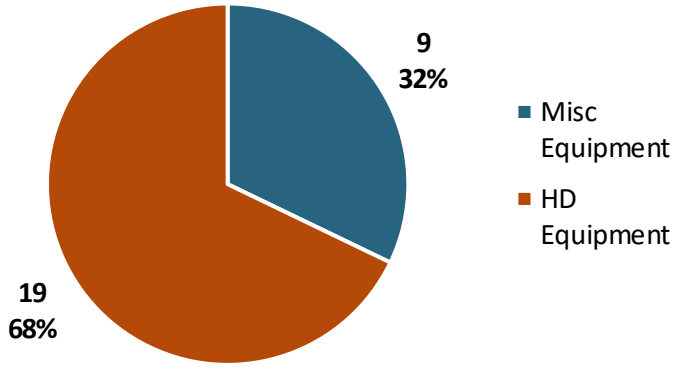
The distribution of the current inventory of licensed vehicles is presented below by classification in **Figure 10**.

Figure 10: Licensed Vehicle Distribution by Classification



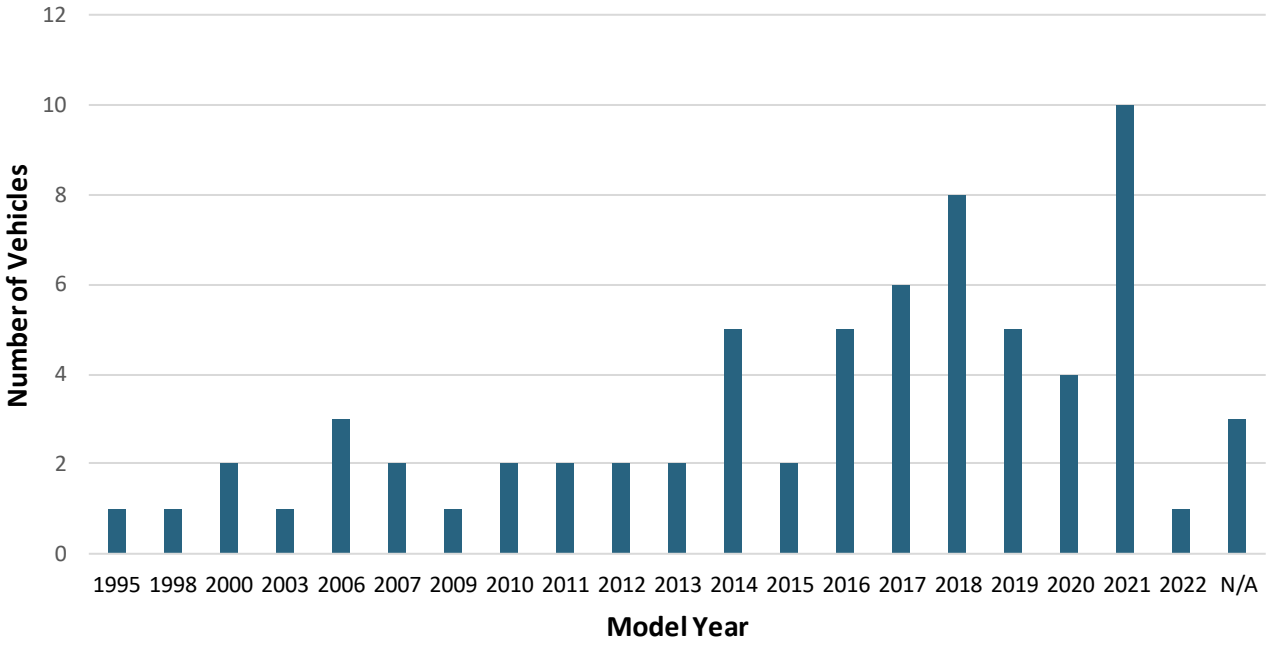
See **Figure 11** for the distribution of unlicensed vehicles by classification.

Figure 11: Unlicensed Vehicle Distribution by Classification



The fleet is composed of vehicles with model years ranging from 1995 to 2022. The distribution of the vehicles and model years can be found in **Figure 12**.

Figure 12: Vehicle Distribution by Model Years (Licenced and Unlicensed)



As fleet assets age the cost of maintenance increases. The average age of all licensed and unlicensed vehicles within the Public Works Department's is fleet is eight years. The individual average ages can be found in **Table 20.**

Table 20: Average Age of Licensed and Unlicensed Vehicles

LICENSED VEHICLES			
Vehicle Classification	**Asset Count**	**Average Year Manufactured**	**Average Age of Assets**
Light Duty Truck	11	2017	6 years
Heavy Duty Truck	16	2017	6 years
Van	4	2013	10 years
Trailers	9	2010	13 years
UNLICENSED VEHICLES			
Vehicle Classification	**Asset Count**	**Average Year Manufactured**	**Average Age of Assets**
Heavy Duty Equipment	19	2014	9 years
Miscellaneous Equipment	9	2016	7 years

It is known that that continual use past that expected useful lifespan (EUL) can lead to risks such as a reduction in the expected level of service, higher maintenance costs, and public safety issues. The Department did not provide EULs for their vehicles, but Dillon evaluated the Department's vehicles based on EULs provided by similar Municipalities. The EUL for each type of vehicle and equipment is summarized in **Table 21**.

Table 21: Vehicle and Equipment Estimated Useful Life (EUL)

Type of Equipment	Expected Useful Life (EUL)
Pickup Trucks (LD and HD Trucks)	10 years
Vans	10 years
Tandem and Plow Truck Assemblies	10 years
Excavators	10 years
Backhoes	10 to 15 years
Graders	15 years
Trailers	15 years
Other equipment	10 to 15 years

Based on the EULs provided by the Department, the percentage of useful life for most of their assets can be determined and is shown in **Table 22**.

Table 22: Vehicle and Equipment Remaining Useful Life

Vehicle Classification	Average % of Remaining Useful Life	Average Expected Years Remaining
LD Trucks	42%	4 years
HD Trucks	36%	4 years
Vans	3%	>1 year
HD Equipment	40%	6 years
Miscellaneous Equipment	51%	8 years
Trailers	12%	2 years
Attachments	25%	6 years

These values indicate that the fleet assets, except for LD Equipment, have less than 50% of their EUL remaining and will need replacement within the next six years.

4.4.1 Fleet – Expenditure Trends

Lanark provided their 2022 Public Works department breakdowns by sub-departments. The fleet accounted for $1,164,332 and $1,237,708, with is 8.3% and 8.4% of the total Public works department for 2021 and 2022, respectively. Of this budget for 2022, $402,000 (32.5%) was for vehicle fuel, maintenance and repairs and towing expenses.

On September 26th, 2022, the Public Works Department provided their Fleet Maintenance costs for 2019 to 2021, broken down by costs per vehicle. The data was reviewed and analyzed, the findings found that the larger vehicle classes, HD Truck, HD Equipment and LD Truck, had the highest maintenance fees each year. It was also found that vehicles with 0-50% of their EUL remaining had the highest maintenance fees year over year. Refer to **Figure 13** and **Figure 14**.

Figure 13: Maintenance Costs by Vehicle Classification (2019 to 2021)

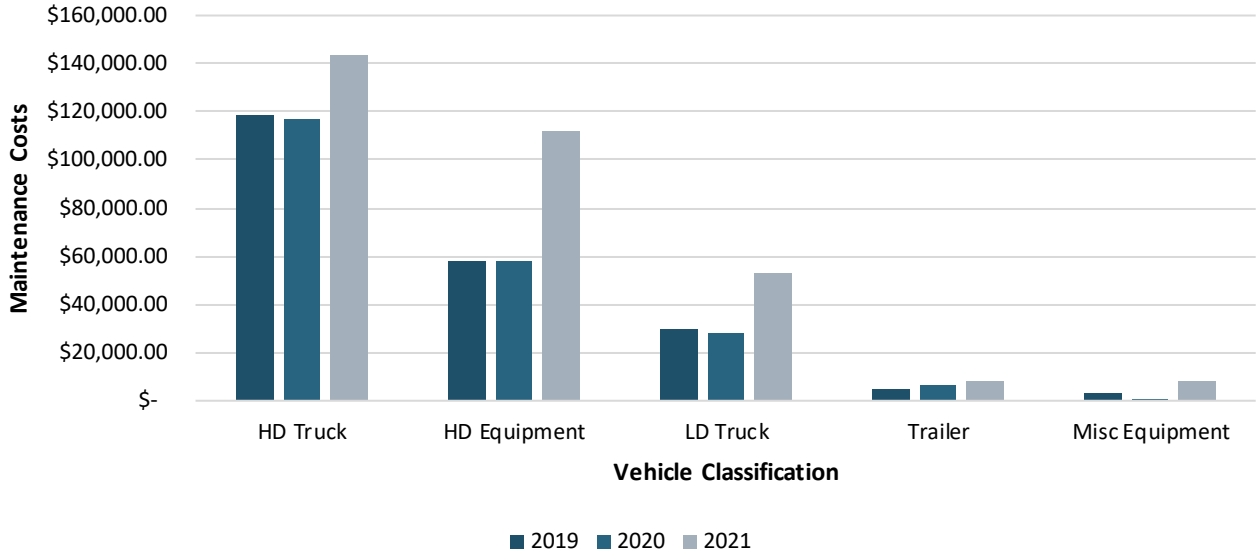
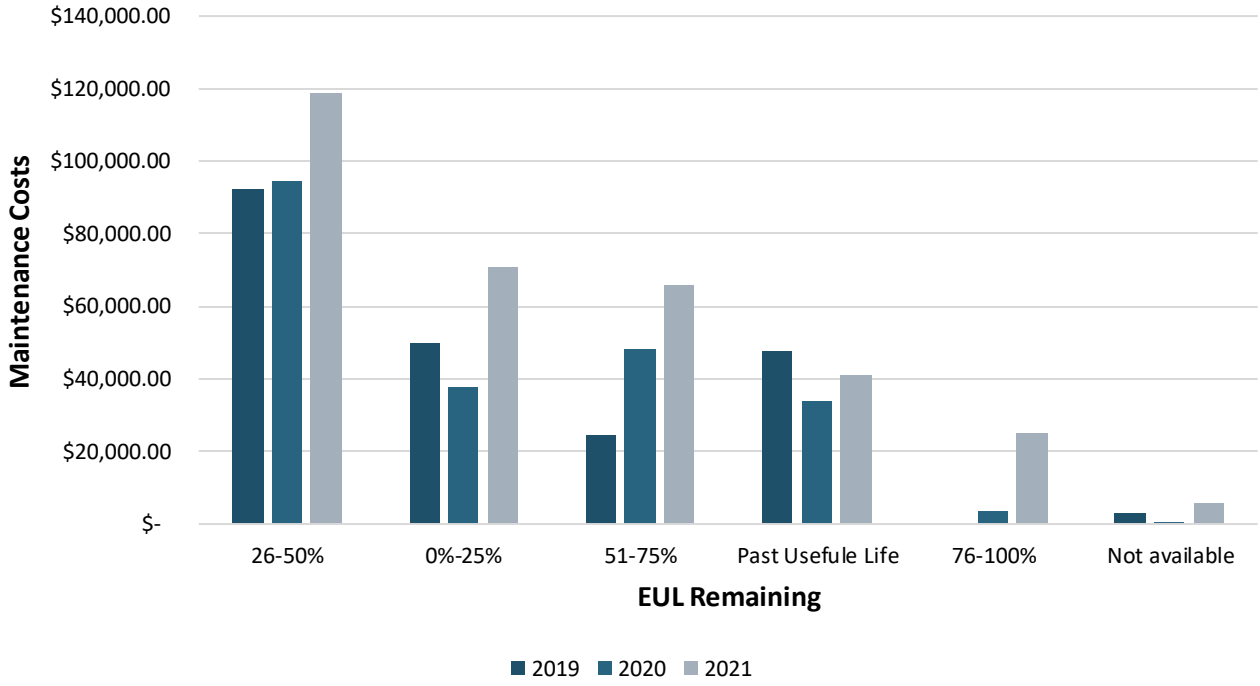


Figure 14: Maintenance Costs by EUL (2019 to 2021)



5.0 Peer Municipal Benchmarking

The selection of peer municipalities was guided by those of similar size, being predominantly rural, and having similar jurisdictional characteristics to Lanark's. Comparative data is still being received from participating municipalities. Relevant observations from the peer discussions and research will be incorporated into this report. Invitations to participate as a peer municipality were sent to seven municipalities. We received Peer Survey responses from the following municipalities:

- United Counties of Prescott and Russell;
- Bruce County; and,
- Rideau Lakes Township.

A summary of the key findings of the Peer Survey relative to Lanark's performance tracking and Winter Reserve Funds are included within this section of the report.

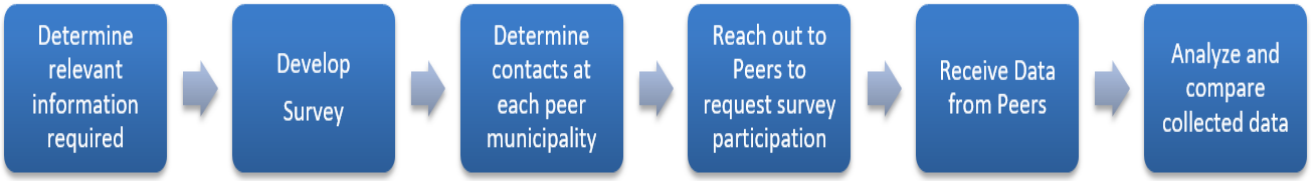
Table 23: Characteristics of Peer Municipalities compared with Lanark

	Population	Roads (km)	Gravel (%)	Asphalt (%)
United Counties of Prescott and Russell	95,639	1166	0	100
Bruce County	73,396	1382	2	98
Rideau Lakes Township	11,000	439	44	56
County of Lanark	75,625	558	0	100

5.1 Peer Municipality Survey

A Peer Survey was developed to collect best practices and experiences of other municipalities in how they run their Public Works programs. The Peer Survey sought information regarding road operations data, winter control, levels of service provided, financial rates, and Winter Reserve data. The process for undertaking the Peer Survey was as shown in **Figure 15.**

Figure 15: Peer Survey Process



Peer benchmarking can be an effort intensive process for municipalities, and the technical challenges of apples versus oranges data can be significant. Relative performance comparisons/conclusions should be approached with caution. The following highlights from the completed Rideau Lakes survey package are worth noting:

- Lanark had a larger road maintenance budget in comparison to Counties of Prescott-Russell and Rideau Lakes Township;
- Lanark was the respondent to provide approximate deployed maintenance hours by road classification;
- Lanark and Bruce County have similar approximate deployed maintenance hours by activity;
- Lanark's end date for a typical winter control season is earlier than all other respondents;
- Rideau Lakes has the highest application rate with 500 kg/km (Sand 93% and Salt 7%) versus Lanark's 130 kg/km (salt) and 220 kg/km (sand);
- Lanark and Rideau Lakes have similar depth of snow to trigger a system wide event response at 3 cm;
- No municipalities tracked post clean even clean up to measure compliance with MMS and level of service;
- Bruce County was the only respondent including Lanark that uses a winter reserve fund;
- None of the municipalities have a designated winter reserve policy;
- Lanark and Rideau Lakes Township budget for winter control and seasonal variance by using a 5-year average;
- Bruce County only municipality to have formal Fleet Management Policy in place;
- All respondents including Lanark manage their fire, emergency services, and/or transit fleet separately from other corporate fleets;
- Lanark and Bruce County complete majority of their fleet maintenance internally; and,
- Counties of Prescott and Russell only municipality to have formal fleet reserve found established.

Detailed summary matrix of the Peer Benchmarking survey is provided in **Appendix B**.

6.0 Yard Rationalization: Winter Maintenance Routing Simulation

Transnomis was tasked with conducting a Winter Control route optimization simulation using their proprietary modeling software. The results of the routing simulation have informed Winter Control recommendations set out in this Report. A summary of the Transnomis modeling work appear below.

Lanark currently operates its winter maintenance from five depots:

- Union Hall – 1982 Wolf Grove Road, Almonte, Ontario;
- Perth Depot – 99 Christie Lake Road, Perth, Ontario;
- Almonte Depot – 4752 County Road 29 North, Almonte, Ontario;
- McDonald's Corners Pit – 4705 McDonald's Corners, Ontario; and,
- Montague Depot – 6547 Roger Stevens Dr, Smith Falls Ontario.

Lanark has 15 winter maintenance routes. A winter maintenance vehicle would start from its assigned home depot, and will return to its assigned home depot after each completion of the route to refill its sand. Lanark is looking at the potential of making changes to depot locations, removing depots, or altering routes. The purpose of this simulation is to look at the operational impact of these changes.

The purpose of this simulation is to look at the operational impact of these changes. The scenarios tested are as follows:

- **Scenario 1:** Status Quo;
- **Scenario 2:** Remove Almonte Depot and run the trucks out of Mississippi Mills Township Yard (175 Five Arches Drive, Pakenham);
- **Scenario 3:** Remove Almonte Depot and run the trucks out of Union Hall;
- **Scenario 4:** Combine Route 11 and Route 16 and run the combined route out of Almonte Depot – status quo depot configuration;
- **Scenario 5:** Combine Route 11 and Route 16 and run the combined route out of Mississippi Mills Township Yard – scenario 2 depot configuration; and,
- **Scenario 6:** Combine Route 11 and Route 16 and run the combined route out of Union Hall – scenario 3 depot configuration.

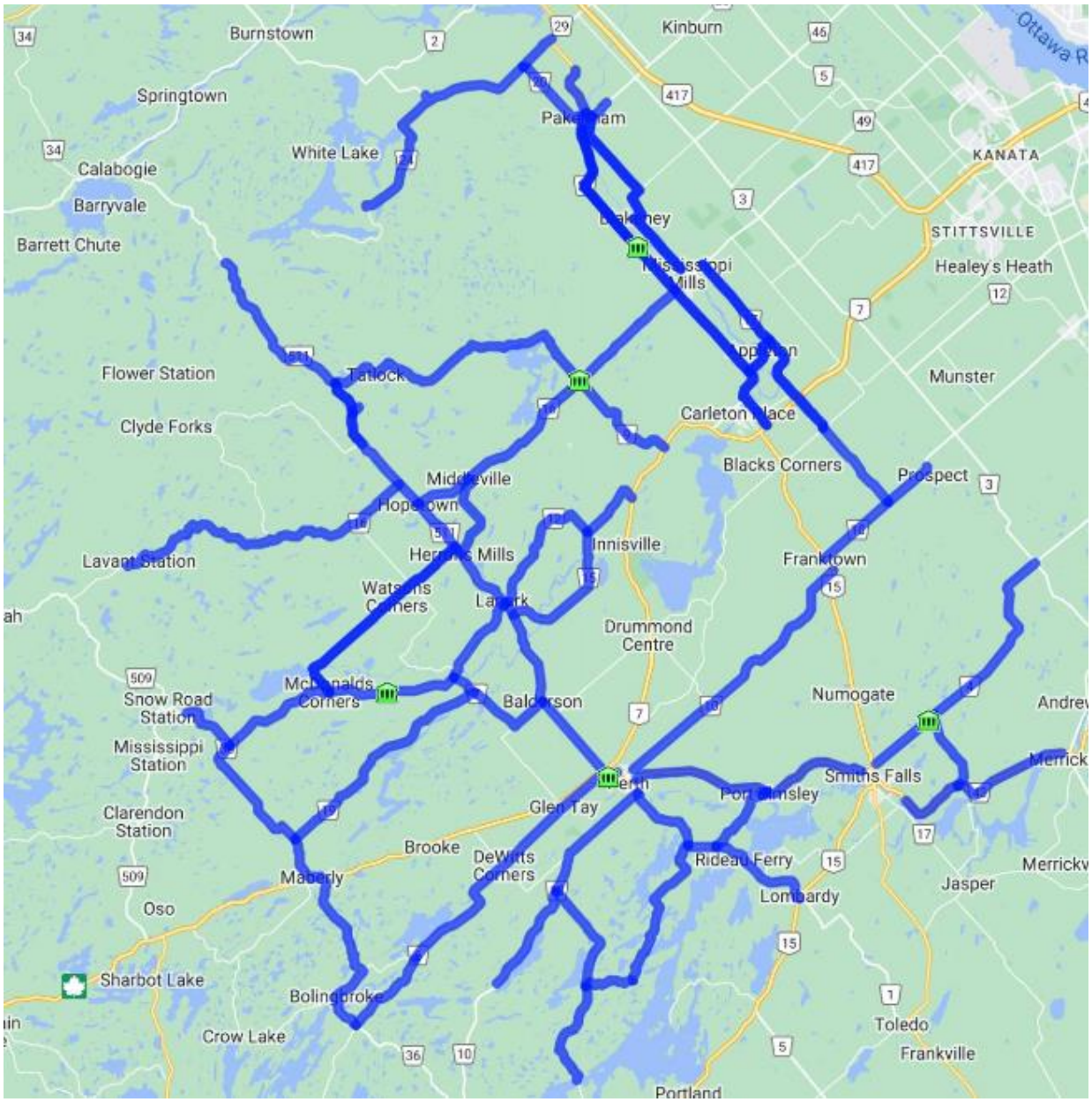
The detailed results of the analysis are included in **Appendix C** of this report, and a summary of the modelled findings is provided below.

6.1 Methodology

In order to simulate the truck movements, the winter maintenance routes are imported into Transnomis Solutions Inc.'s ITS Central system. The routes reference Lanark's route maps and descriptions for each of the fifteen routes.

A map of all the imported routes (blue line segments), alongside the five existing depots (green building icons) may be seen below in **Figure 16.**

Figure 16: Imported Plow Routes



In order to create a tractable simulation, a number of assumptions/simplifications are made:

- Traffic congestion, signal timing, etc. are not considered;
- One crew per route operating concurrently;
- Same travel speed for all roads (speed dependent on vehicle and current action: productive or non-productive travel);
- The only consumable resource considered in the analysis is sand; and,
- Costs of running depots are not considered.

The parameters used for the simulation are provided in **Table 24**.

Table 24: Simulation Parameters

Parameter	Value
Storm duration	12 hours
Time to refill	10 minutes
Salt capacity	70 km (enough to complete one pass of all routes)
Vehicle speed when plowing/applying material (productive)	25 km/hr
Vehicle speed when traveling (non-productive)	40 km/hr

Each simulation scenario consists of a route and an assigned home depot. The home depot assignments are given by Lanark County's route description documents.

A route consists of the individual road segments outlined in the corresponding Lanark County route map, description, and shapefile. At the start of the simulation, a (simulated) truck begins its journey at its assigned depot. An optimal path is determined for the route in which each segment must be completed in both directions, and material is applied only on the second pass of the segment.

At the start of the simulation, a (simulated) truck begins its journey at its assigned depot. It drives to the closest point of a road segment within its assigned route. That distance is counted toward a "non-productive distance" and that travel time is counted toward a "non-productive time". The truck will then complete the segment. That distance is counted toward a "productive distance" and that travel time is counted toward a "productive time". When one segment is complete, it picks the next segment that is closest to its current location. The time/distance of travel required to get to the next segment is counted as non-productive time/distance respectively. The simulated truck completes all of the assigned route's road segments.

The truck will complete its given route, and then return to one of two locations. If the shift timer has expired (i.e., more than eight hours have passed since the start of this driver's shift), or the storm duration has passed, then the truck will return to its home depot. If neither of the prior two conditions

occurred, the truck will travel to the start of the route to begin another trip. Each time the truck completes its route, a counter increments the number of trips completed.

Before starting to plow a road segment, the truck evaluates if it has enough sand to cover the next road segment. If it does not, it will travel (with the distance and time counting towards non-productive distance and time) to the nearest (or the only) refill station to refill its material. The truck will remain there for a defined amount of time to refill materials, before departing again. The time spent refilling and travelling to and from the refill station is counted toward "non-productive time". Each truck has a sand capacity of 70km, as specified in the simulation parameters below.

An individual truck's simulation is complete when the truck has finished its route and is not able to reach the first segment of the route before the end of the storm duration.

6.2 Depot Location Modelling/Simulation Findings

The key performance metrics calculated for each simulation are:

- Productive distance/time;
- Non-productive distance/time;
- Total time;
- Number of trips completed; and,
- Number of refills required.

By comparing with Status quo, Lanark can measure impacts to the performance metrics above in each alternative scenario.

The results of the status quo are displayed in **Table 25** and used as a frame of reference against which other scenarios are measured.

Table 25: Status Quo Simulation Results

Route	# Trips	Prod Dist	Non-Prod Dist	Total Dist	% Prod Dist	Prod Time	Non-Prod Time	Total Time	% Prod Time	Single Trip Time
-------Scenario 1: Status Quo-------										
Route 1	4	283,814	19	283,833	99.99%	11:21:09	0:30:02	11:51:11	95.78%	02:27:48
Route 2	4	320,351	5	320,356	100.00%	12:48:51	0:30:00	13:18:51	96.24%	02:49:43
Route 3	4	310,071	27,563	337,634	91.84%	12:24:10	1:11:21	13:35:31	91.25%	02:53:53
Route 4	4	346,707	19	346,726	99.99%	13:52:06	0:30:02	14:22:08	96.52%	03:05:32
Route 5	4	281,305	35,961	317,266	88.67%	11:15:08	1:23:56	12:39:04	88.94%	02:39:46
Route 6	4	317,209	22,003	339,211	93.51%	12:41:18	1:03:00	13:44:18	92.36%	02:56:05
Route 7	4	339,898	57,169	397,067	85.60%	13:35:45	1:55:45	15:31:31	87.57%	03:22:53
Route 8	4	308,304	23,067	331,371	93.04%	12:19:56	1:04:36	13:24:32	91.97%	02:51:08
Route 10	3	283,307	108,672	391,979	72.28%	11:19:56	3:03:01	14:22:57	78.79%	04:27:39
Route 11	4	267,015	63,179	330,194	80.87%	10:40:50	2:04:46	12:45:36	83.70%	02:41:24
Route 12	4	364,025	3,035	367,060	99.17%	14:33:40	0:34:33	15:08:13	96.20%	03:17:03
Route 13	4	332,456	199	332,655	99.94%	13:17:54	0:30:18	13:48:12	96.34%	02:57:03
Route 14	4	370,557	272	370,828	99.93%	14:49:20	0:30:24	15:19:45	96.69%	03:19:56
Route 15	5	336,042	28,835	364,877	92.10%	13:26:30	1:23:15	14:49:45	90.64%	02:17:57
Route 16	6	328,169	42	328,210	99.99%	13:07:36	0:50:04	13:57:40	94.02%	01:29:37
TOTAL	**62**	**4,789,230**	**370,040**	**5,159,267**	**92.83%**	**7 23:34:09**	**17:05:03**	**8 16:39:14**	**91.81%**	**1 19:37:26**
AVERAGE	**4.13**	**319,282**	**24,669**	**343,951**	**93.13%**	**12:46:17**	**01:08:20**	**13:54:37**	**91.80%**	**02:54:30**

Since the scenarios involve a reduction of facility, the results are expected to demonstrate:

- An increase of non-productive time/distance for some routes;
- An overall decrease of efficiency (% productive distance/time); and,
- An increase in total time taken to complete a trip of some routes.

The number of round trips represents the noticeable service impact to citizens as it means that some routes will be plowed/salted fewer times in a storm event. Percent productive distance is a good surrogate for fuel use efficiency. Percent productive time represents efficiency from a staff time perspective.

Overall simulation results for each scenario are included in **Table 26**.

Table 26: Scenario Overall Simulation Results

Scenario #	Scenario Name	# Round Trips	Total Distance (m)	Productive Distance	Productive Time
1	Status Quo	62	5,159,267	92.83%	91.81%
2	Remove Almonte Depot and run the trucks out of Mississippi Mills Township Yard (175 Five Arches Drive, Pakenham)	61	5,099,919	92.84%	91.85%
3	Remove Almonte Depot and run the trucks out of Union Hall	59	5,194,032	88.35%	89.10%
4	Combine Route 11 and Route 16 and run the combined route out of Almonte Depot – status quo depot configuration	55	4,876,125	93.49%	92.51%
5	Combine Route 11 and Route 16 and run the combined route out of Mississippi Mills Township Yard – scenario 2 depot configuration	55	4,889,403	93.24%	92.35%
6	Combine Route 11 and Route 16 and run the combined route out of Union Hall – scenario 3 depot configuration	54	4,924,700	90.72%	90.81%

The impacts of the result of each scenario are summarized in **Table 27.**

Table 27: Simulated Impacts to Service Delivery for Each Depot Configuration Scenario

Scenario #	Scenario Description	# Round Trips of Work	Productive Distance	Non-Productive Distance	Productive Time	Non-Productive Time
2	Remove Almonte Depot and run the trucks out of Mississippi Mills Township Yard (175 Five Arches Drive, Pakenham)	-1	-1.14%	-1.26%	-1.14 %	-1.66%
3	Remove Almonte Depot and run the trucks out of Union Hall	-3	-4.18%	63.55%	-4.18%	31.48%
4	Combine Route 11 and Route 16 and run the combined route out of Almonte Depot – status quo depot configuration	-7	-4.81%	-14.20%	-4.81%	-13.54%
5	Combine Route 11 and Route 16 and run the combined route out of Mississippi Mills Township Yard – scenario 2 depot configuration	-7	-4.81%	-10.61%	-4.81%	-11.60%
6	Combine Route 11 and Route 16 and run the combined route out of Union Hall – scenario 3 depot configuration	-8	-6.72%	23.52%	-6.72%	5.91%

A copy of the full analysis can be found in **Appendix C.**

6.3 Preferred Routing/Depot Location Options

The simulation offers some significant insight on how the five considered changes to the status quo can affect the service levels and efficiency of the winter maintenance operation. The charts and route level comparisons seen above unanimously confirm the following conclusions.

When looking at service level and efficiencies in isolation there are very few benefits or drawbacks to operating out of Mississippi Mills Township Yard instead of Almonte Depot. The two depots perform nearly equivalently in aggregate. Almonte offers a slightly greater service level and Mississippi Mills Township Yard offers slightly better efficiencies, though both effects are extremely small.

When looking at service level and efficiencies in isolation there are no benefits to operating out of Union Hall instead of Almonte Depot. There are considerable negative impacts to both service levels and time/distance efficiencies associated with this change.

If improving efficiencies is of high value, then combining Route 11 and Route 16 into a single route yields favorable increases in efficiency. This comes at the cost of a reduced service level. These effects apply when combining the route reduction with other depot configurations as well.

7.0 Protecting Roads – "As Should Be" Future State Service Delivery Model

7.1 Findings and Recommended Performance Improvement Opportunities

"As Should Be" Future State recommendations are informed by data, industry practices, peer-benchmarking, and the Review team's 3rd party expertise and experience conducting Road Operations reviews.

7.1.1 Set Annual (Minimum) Targets for Hardtop and Safety Maintenance (Recommendation #1)

Lanark should set minimum targets for Hardtop and Safety maintenance hours (over the next three years) that approach 50% of total maintenance hours. Lanark should set annual targets for planned maintenance hours associated with high-priority Hardtop and Road Safety activity categories. Lanark should report actual maintenance hours delivered for targeted Hardtop and Road Safety activity categories during the annual budget process.

Estimated Benefit:

- Across 2019-2021 Lanark road maintenance hours for Hardtop activities represented only 26% to 35% of total maintenance hours. In contrast, lower value-added Roadside activities like mowing or weed removal totaled 49% to 58% of total maintenance hours;
- Lanark's current operational model provides no targets around Non-winter season planned maintenance hours versus unplanned/reactive maintenance hours;
- Increased hardtop maintenance hours will help ensure "Fair" lane kilometres do not erode into the "Poor" PCI category and may well improve the total share of Lanark's lane kilometres positioned in the "Good" PCI category;
- Improved accountability around actual results versus planned results – creating activity-based service delivery performance "contracts" as part of the annual budget cycle; and,
- County Council and taxpayers will have access to transparent information about what they fund versus what actually gets done.

7.1.2 Review Scheduling/Allocation of Vacation (Recommendation #2)

Lanark should review its scheduling/allocation of vacation time across June to August – ensuring any staffing capacity impacts are well understood and are deemed operationally acceptable by Lanark's management.

Estimated Benefit:

- Confirmation that staffing is capacity is adequate to achieve all road maintenance activities during the summer months and generating the least amount of OT as possible ; and,
- Improved accountability around actual results versus planned results – creating activity-based service delivery performance "contracts" as part of the annual budget cycle.

8.0 Sustainable Winter Control – "As Should Be" Service Delivery Model

8.1 Findings and Recommended Performance Improvement Opportunities

"As Should Be" findings and recommendations are informed by data, industry practices, peer-benchmarking, and the review team's expertise and experience conducting road modernization reviews.

8.1.1 Contracted and Shared Services (Recommendation #3)

Lanark should design and execute a managed competition model to determine service delivery across the current five contracted routes. County staff should prepare bids to provide Winter Control services for these five routes, and these bids should be compared to existing contractor pricing models and/or competing contractor bids. Bid pricing should consider the need for new plow/spread units to potentially replace contractor units (amortized across a 10-year bid period with a 5-year mid-point for renewal).

Estimated Benefit:

- Lanark currently relies on multiple contractors to deliver Winter Control services across 5 their 15 routes;
- Public Works management reports that Winter Control contractors are significantly more expensive than County staff on both an hourly and per pass km basis;
- Cost stabilization/improved service level stability via managed competition and potential in-sourcing is achievable;
- Reduced Winter Control hourly coverage costs;
- Reduced Winter Event response costs per pass km of work executed; and,
- More dependable Winter Event response capacity secured via potential in-sourcing.

8.1.2 Winter Event Tracking (Recommendation #4)

Implement a storm management/reporting model that tracks the following three (3) standardized critical points in a winter event response:

- **Date/time of initiating a system-wide event response (versus amount of precipitation as per *O.Reg. 239*);**
- **Date/time winter event ended (requires tracking at multiple County locations); and,**
- **Date/time a full system-wide clean-up pass has been completed.**

Estimated Benefits:

- Reduced liability risk and insurance $ payouts via improved results reporting and documented compliance with *O.Reg. 239*; and,
- Lanark needs to improve its existing season-by-season winter event results tracking and reporting in order to minimize liability risk and insurance $ payouts.

8.1.3 End-of-Season Winter Control Reporting (Recommendation #5)

Implement annual end-of-season Winter Control results reporting to Council using Key Performance Indicators derived from *O.Reg. 239* mandated standards. Reporting should tie back to targets established in the seasonal Winter Control plan/budget.

Estimated Benefits:

- Pursuing formal tracking metrics will allow Lanark to better understand the departments operations on a year-over-year basis and track spending relative to key inputs and the resulting outputs.

8.1.4 Update Winter Control Policy (Recommendation #6)

Update the 2010 Winter Control policy to recognize current requirements of *O.Reg. 239*.

Estimated Benefits:

- Provides the public transparency in regards to winter control and level of service to be provided throughout Lanark; and,
- Reduced liability risk and insurance $ payouts via improved results reporting and documented compliance with *O.Reg. 239*.

8.1.5 Realign Winter Level of Service to MMS (Recommendation #7)

Establish Lanark's measurable service levels for Winter Control to align with Class 2-5 Minimum Maintenance Standards set out under *O.Reg. 239*. Set Lanark's measurable performance target for post-event system clean-up at *12 to 16 hours* after the tracked end-time of the event/storm (depending on depth of accumulation and road class).

Estimated Benefits:

- Aligning the level of service is expected to reduce banked overtime hours (resulting in staff time-off in summer) and make staff available for productive work during the summer season; and,
- Currently, the value of winter control overtime is estimated to be approximately $79,000 based on winter control overtime costs and value of banked overtime in 2021.

8.1.6 Winter Stabilization Reserve (Recommendation #8)

Lanark should execute a Winter Stabilization Reserve analysis in preparation for the next budget cycle. The Winter Stabilization Reserve analysis should consider a range of seasonal "severity scenarios" and produce options around Reserve target balances, accumulation timeframes, and annual contribution levels.

Estimated Benefits:

- Financial volatility/risk around impossible-to-forecast winter season variations in costs and workload will be proactively managed; and,
- Taxpayer affordability, public safety, and service level sustainability will be secured/stabilized.

8.1.7 Winter Maintenance Simulation Modelling (Recommendation #9)

Lanark should consider the results of the winter maintenance simulation modelling completed for this assignment for incremental implementation of routing efficiencies. The study can also be valuable for yard utilization, route optimization, and future planning by Lanark.

Estimated Benefit:

- The combination of Route 11 and Route 16 into a single route yields favorable increases in efficiency with slight reduction in level of service; and,
- The study found operating out of very few benefits or drawbacks to operating out of Mississippi Mills Township Yard instead of Almonte Depot.

9.0 Organizing for Results – "As Should Be"

9.1 Findings and Recommended Performance Improvement Opportunities

"As Should Be" findings and recommendations are informed by data, industry practices, peer-benchmarking, and the review team's expertise and experience conducting road modernization reviews.

9.1.1 Modern Work Order System (Recommendation #10)

Lanark should purchase and implement a modern work order system. Granular activity-based data tracking and reporting must be maintained in the cross-over to a new vendor/Work Order tool. This may require completing a Request for Information (RFI) to allow several possible vendors to submit info tailored to Lanark's needs. Based on the information received during the RFI stage Lanark should then create a specific RFP for the work order system.

Estimated Benefit:

- In order to track relevant KPIs Lanark requires a modernized system to track and archive date;
- Modern work order system would allow Lanark to better track performance metrics, be more off hands and time saved in regard to tracking and prioritizing common tasks, and provides the ability to increase fleet and equipment maintenance; and,
- This system is anticipated to provide efficiencies through reducing staff time required, resulting in approximately four to five hours per week savings.

9.1.2 Link Hardtop Maintenance Activities (Recommendation #11)

Lanark should update its Work Order technology system to link Hardtop and Safety maintenance activities to inventoried and PCI rated road sections/assets. Planned Hardtop maintenance activities can then be strategically directed to priority road sections/assets in order to achieve high performance results, meet KPI defined targets and optimize PCI pavement condition scores.

Estimated Benefit:

- Lifecycle driven capital replacement funding will be optimized by ensuring appropriate planned maintenance activities stretch the lifespan of targeted road sections with concerning PCI scores; and,
- Asset management and activity-based maintenance planning/delivery will align around evolving municipal sector Best Practices.

9.1.3 KPI Tracking and Reporting to Council (Recommendation #12)

Implement KPIs for tracking Public Works operations and reporting to Council. To ensure greater accountability and to provide the right data for managing operational budgets moving forward, KPIs should focus the time per deliverable and cost inputs and the level of service output including both staff and contractor services.

Estimated Benefit:

- Pursuing formal tracking metrics will allow Lanark to better understand the departments operations on a year-over-year basis and track spending relative to key inputs and the resulting outputs;
- Performance metrics will allow for evidence-based budgeting based on the level of effort required to maintain the desired levels of service, aligning with the requirements of *O.Reg. 588/17* for municipal asset management; and,
- Tracking will aid in informing equipment asset management strategies by allowing for better estimations of lifecycle costs.

9.1.4 Modernize Budgeting Approach (Recommendation #13)

Lanark should modernize its approach to activity-based budgeting. The Public Works budget document should itemize planned activity-based work outputs as well as planned activity-based spending. Budgeted activity-based work outputs and spending should be reconciled at year-end with actual work outputs and spending.

Budget data sets should be presented for winter and non-winter seasons – not just for calendar derived fiscal years. Winter season work outputs and budgets will cross calendar-based fiscal years, while non-winter seasonal budgets will exist within a single calendar-defined fiscal year.

Estimated Benefit:

- Transparency and accountability for results will improve significantly. Council will make informed decisions around budgets that link spending to actual results. Taxpayers will have access to information that confirms a value-for-money "results contract" is actually being fulfilled; and,
- Staff will benefit from the improved line of sight between their actual work outputs versus the expected level of measurable success they are striving to achieve. Focus and morale will move upwards as staff keep score and "win".

9.1.5 Additional Seasonal Labour (Recommendation #14)

Lanark should secure additional seasonal labour during the winter season (ideally via a series of three-month contracts) and build this new capacity into an expanded evening shift. Initial funding for 3-4 three-month contracts can be secured within the existing budget via reduced staff OT spending. Potential additional funding room in future budget years could be freed-up via reduced reliance on expensive contractor route spending.

Estimated Benefit:

- Improved evening shift straight-time Winter Event coverage with no event response risk related to a sub-standard OT callout if burned out staff choose not to respond during a long/severe winter season;
- Each avoided Winter OT spending hour funds 1.5 to 2 hours of straight time coverage from part-time contracts;
- Reduced OT lieu-time in June-August resulting in an increase in non-winter maintenance hours of output; and,
- Reduced Non-winter OT spending since additional hours maintenance hours available.

9.1.6 Corporate Performance Improvement Analyst (Recommendation #15)

A new Corporate Performance Improvement Analyst (FTE) for the County should be established and initially assigned to implement this Report's recommendations around Performance Measurement and data-informed decision-making in Public Works.

Estimated Benefit:

- Further modernizing the Public Works performance metrics and data-driven decision making;
- Once performance measurement related toolkits and Plan/Do/Check/Act processes have been implemented in Public Works, the County has an opportunity to expand data-informed decision-making to other services/business units; and,
- The design and implementation of KPIs and other recommended data-driven decision-making improvements may stall without dedicated resourcing.

9.1.7 Fleet Asset Management Strategy (Recommendation #16)

Implement an asset management strategy for fleet and equipment based on asset lifecycle will minimize disruption in service delivery. The strategy to manage equipment and fleet assets and capital expenditures can spread costs effectively across years and save operational costs annually.

Estimated Benefit:

- A formal equipment and fleet asset management strategy will allow for more effective capital planning and reduce annual operations costs (such as vehicle maintenance and labour) ; and,
- Asset management will aid in maximizing the outputs per hour worked for staff by reducing time spent on repairing equipment and taking it in for service.

9.1.8 Fleet Management Policy and Fleet Reserve Fund (Recommendation #17)

Create and implement a Fleet Management Policy and execute Fleet Reserve Fund analysis in preparation for the next budget cycle.

Estimated Benefit:

- Implementing asset management strategy and policy based on asset lifecycle will minimize disruption in service delivery; and,
- Fleet reserve fund acts as fail safe in case of unfortunate circumstances and increase transparency with the public.

10.0 Trail Condition Assessment

The County owns and maintains several trails for recreational usage, including 23 km of the Tay-Havelock Trail and 62 km of the Ottawa Valley Recreation Trail (OVRT). In addition to the review of the Public Works Department, Dillon completed condition assessments of these two segments of networks throughout the late summer / fall of 2022. Condition assessments were completed along the OVRT and Tay-Havelock Trail in order to develop a 10-year forecast of capital and personnel requirements for the County's trail systems, with associated strategies to ensure cost minimization.

The condition assessments were completed to determine the current state ("as is") of the trails. The current state assessment provided a platform to evaluate opportunities for extending the useful life of the assets while identifying operations and maintenance activities to maintain level of service expectations and performance.

10.1 Methodology

The intents is for the results of the assessments and the reported findings to be used to ensure that the following items are properly addressed with respect to the County's trail assets:

- Ensure that the County's trail components remain at an acceptable level of safety;
- Ensure that the useful life of the components are optimized;
- Ensure that maintenance, repair, and rehabilitation needs are identified; and
- Ensure that the County has adequate economic and technical information to effectively plan for studies, repairs and/or replacement of the structures.

Field assessments were completed during 5 individual site visits. The work was carried out in accordance with the Occupational Health and Safety Act, and in accordance with the Ontario Traffic Control Manual Book 7 – Temporary Conditions.

The assessment process included a visual examination of each individual component (ie. trail tread, gates, signs, and non-structural culverts) of the trail assets. The visual inspections of the components were conducted from within an arm's-length, where accessible. As a means of checking concrete soundness, the inspections included physically tapping concrete surfaces with a hammer, where accessible.

Binoculars, digital camera, tape measures, chest waders, flotation vest, chipping hammer, paint markers, and chalk were used to complete the inspections.

During the visual assessments, a variety of maintenance needs were noted. Examples of these needs include addressing roadway and embankment erosion, vegetation overgrowth, addressing minor collision damage, culvert cleanouts, repainting, replacing reflective tape, and repairing/installing slope

protection. Areas of deterioration or maintenance needs for each component were noted and documented/supported with photographs.

Dillon's trail condition assessments consisted of a review of existing documents provided by the County in addition to visual assessment of the trails components. Detailed, non-destructive visual assessment for the trail assets was completed by vehicle and documented within Survey123 with GPS referencing. Performance, condition rating, and general information was documented while surveying the trail systems at regular intervals or at the following points of interest:

- Change in trail surface material;
- Change in trail width;
- Areas of excessive rutting, potholes, or erosion;
- Gates;
- Signage;
- Structures and culverts;
- Trail and roadway / entrance intersections; and
- Unique attributes (e.g. maintenance hole within trail right-of-way).

Assets documented as part of the trail assessments were provided condition ratings ranging from Excellent, Good, Fair, and Poor based on the condition of the asset. The ratings were used to identify a timeline for maintenance and repairs within the 10-Year Plan. Each component was assigned a prioritized maintenance and repair timeline depending on the rating a component received and its estimated remaining useful life. The suggested timeline for the prioritized maintenance and repair is categorized as follows:

- Short Term (1 to 3 years);
- Mid Term (3 to 5 years);
- Long Term (5 to 10 years); and
- No Action Required (greater than 10 years, outside of the Capital Plan window).

10.2 Assumptions and Limitations

It should be noted that there are some limitations which will affect the overall accuracy of the 10 Year Capital Plan. Limitations to the overall accuracy of the 10 Year Capital Plan as it relates to operations and maintenance recommendations include:

- Both trail systems feature structural culverts (>3.0m span) and bridges that require maintenance and rehabilitation in order to keep the trails operational. The condition of the structural culverts and bridges can affect the experience of trail users significantly. However, these assets are outside of the scope of the 10 Year Capital Plan;
- Trail components with ratings of excellent may fall outside the timing and scope of the 10 Year Capital Plan based on their expected remaining useful life; and,
- Cost estimate pricing is based on similar past projects and is subject to fluctuations.

It should be noted that there are some limitations which have the potential to affect the overall accuracy of the 10-Year Capital Plan. Limitations to the overall accuracy of the 10-Year Capital Plan as it relates to operations and maintenance recommendations include:

- Both trail systems feature structural culverts (>3.0 m span) and bridges that require maintenance and rehabilitation in order to keep the trails operational. The condition of the structural culverts and bridges can affect the experience of trail users significantly. However, these assets are not included in this memorandum and will be completed under a separate assignment;
- Inspections are non-invasive and non-destructive;
- No confined space entry was completed as part of the inspections for assets such as non-structural culverts. Visual inspection was completed from the most accessible point when possible; and
- Trail components with ratings of Excellent or Good may fall outside the timing and scope of the 10-Year Plan based on their estimated remaining useful life.

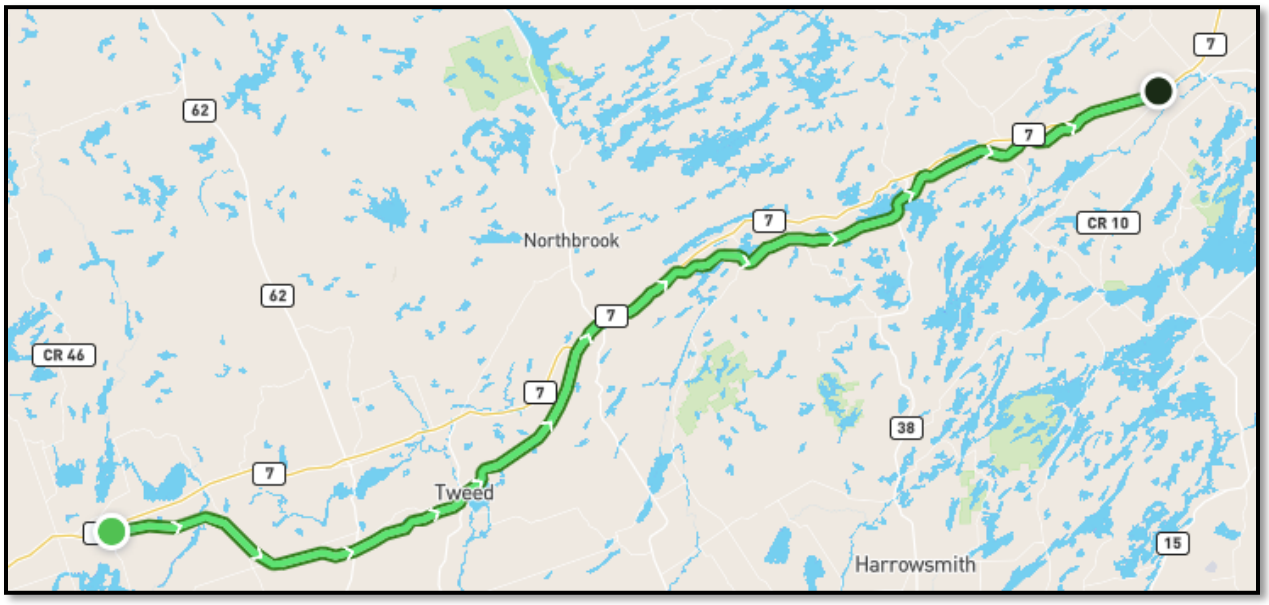
Asset management considers lifecycle activities required to continue or extend the useful life of an existing component. The base assumption is that a like-for-like replacement will occur and the required investment improves the current condition of the existing asset, making the asset fit for purpose.

10.3 Inventory, Condition Ratings and Capital Plans

10.3.1 Tay-Havelock Trail

The Tay-Havelock Trail is a 23 km multi-use trail in the east-west direction within Lanark County that utilizes an abandoned rail bed. The County's portion of the Tay-Havelock Trail starts just east of Perth with a Trail Head parking lot located on the south side of Highway 7 (500 m west of the Highway 7 traffic signals at Glen Tay Road). The trail continues west following an abandoned rail bed for approximately 23 km. The trail features a stone dust surface with varying widths ranging from 2.2 m to 4.5 m. In general, the trail system was found to be in generally good condition.

Figure 17:Tay-Havelock Trail



See **Table 1** for an inventory and condition ratings of the Tay-Havelock Trail assets.

Figure 18: Tay-Havelock Trail Inventory

Item	Quantity	Unit	Excellent	Good	Fair	Poor
Trail Length	23	km	0	9	9	5
Gates	3	each	0	0	3	0
Signage	113	each	3	104	6	0
Non-Structural Culverts	6	each	0	2	1	3

10.3.1.1 Cost Estimate

The 10-Year Capital Plan for the operations and maintenance of the Tay-Havelock Trail is based on the rating system and suggested timeline noted in the previous section, and is supplemented with a cost estimate for the recommended work. The 10-Year Capital Plan and list of all components and recommendations for the Tay-Havelock Trail are included in **Appendix D** of this report.

A summary of the 10-Year Capital Plan can be found below in **Table 28.**

Table 28: Tay-Havelock Trail 10-Year Capital Plan Summary

Tay-Havelock 10-Year Capital Plan						
Year	Trail	Signs	Gates	Non-Structural Culverts	ANNUAL TOTAL	CUMULATIVE TOTAL
2023	$40,000	$400	$300	$39,000	$79,700	$79,700
2024	$30,000	$300	$350	$38,000	$68,650	$148,350
2025	$23,000	$400	$500	-	$23,900	$172,250
2026	$23,000	-	-	-	$23,000	$195,250
2027	$23,000	$1,900	$300	$27,000	$52,200	$247,450
2028	$23,000	-	-	-	$23,000	$270,450
2029	$23,000	$400	$300	-	$23,700	$294,150
2030	$23,000	-	$300	-	$23,300	$317,450
2031	$23,000	$400	$300	-	$23,700	$341,150
2032	$23,000	-	-	$21,000	$44,000	$385,150

The cost estimates represent Class "D" (Indicative) Estimates prepared with an expected accuracy of 25% +/-. The estimates were prepared using previous completed tenders of similar work, experience with similar projects, previous quotes from contractors, and factoring in the recent high levels of inflation. The scope of any particular recommendation is made without the benefit of coordinated asset upgrades; consequently, the scope of specific recommendations should be verified as part of any detailed project planning.

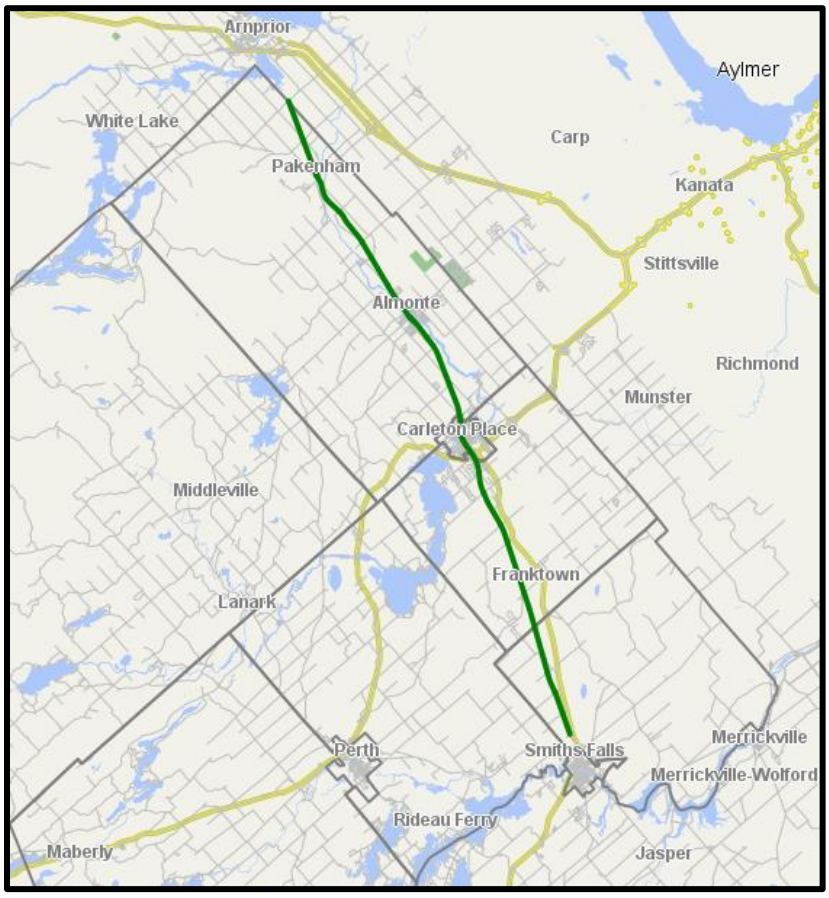
All cost estimates are an opinion of probable costs in current dollars (i.e. year 2023) and are provided for budgeting purposes only. Accurate figures can only be obtained after further investigation, preparing detailed specifications, tendering, and receiving competitive quotes from qualified contractors. Life expectancy projections are based on visual review during the site visits. The costs were developed with the following assumptions:

- Contingency of 10% was included for materials and anticipated line items;
- Contingency of 15% was included for engineering services associated with works; and
- Internal management costs, contractor indirect costs and economic factors are excluded.

10.3.2 Ottawa Valley Recreational Trail

The OVRT is a 62 km multi-use trail in the north-south direction within the Lanark County that makes use of a section of the former Canadian Pacific Railway year-round. The County's section of the OVRT commences north of Smiths Falls on Sturgess Road approximately 250 m west of Highway 15, and extends north for approximately 62 km terminating in Arnprior at a Highway 417 overpass approximately 510 m south of Decosta Street. The trail features a stone dust surface with varying widths ranging from 2.7 m to 6.3 m. In general, the trail system was found to be in Good to Fair condition.

Figure 19 – OVRT



See **Table 29** for an inventory and condition ratings of the OVRT assets.

Table 29: Ottawa Valley Recreational Trail Inventory

Item	Quantity	Unit	Good	Fair	Poor
Trail Length	62	km	33	16	13
Gates	30	each	0	30	0
Signage	393	each	328	27	38
Non-Structural Culverts	34	each	14	9	11

10.3.2.1 Cost Estimate

The 10-Year Capital Plan for the operations and maintenance of the OVRT is based on the rating system and suggested timeline noted in the previous section, and is supplemented with a cost estimates for the recommended work. The 10-Year Capital Plan and list of all components and recommendations for the OVRT trail are included in **Appendix D** of this report.

A summary of the 10-Year Capital Plan can be found below in **Table 30.**

Table 30: Ottawa Valley Recreational Trail 10-Year Capital Plan

Ottawa Valley Recreational Trail 10-Year Capital Plan						
Year	**Trail**	**Signs**	**Gates**	**Non-Structural Culverts**	**ANNUAL TOTAL**	**CUMULATIVE TOTAL**
2023	$ 100,000	$ 5,400	$ 1,000	$ 89,500	**$195,900**	**$195,900**
2024	$ 100,000	$ 1,500	$ 750	$ 101,500	**$203,750**	**$399,650**
2025	$ 61,000	$ 2,300	$ 1,500	$ 133,000	**$197,800**	**$597,450**
2026	$ 61,000	$ 1,500	$ 3,000	$ 55,000	**$120,500**	**$717,950**
2027	$ 61,000	$ 2,300	$ 3,000	$ 31,000	**$97,300**	**$815,250**
2028	$ 61,000	$ 2,340	$ 1,000	$ 4,000	**$68,340**	**$883,590**
2029	$ 61,000	$ 3,140	-	$ 20,000	**$84,140**	**$967,730**
2030	$ 61,000	$ 2,340	-	-	**$63,340**	**$1,031,070**
2031	$ 61,000	$ 3,140	-	-	**$64,140**	**$1,095,210**
2032	$ 61,000	$ 2,340	$ 1,000	-	**$64,340**	**$1,159,550**

The costing is prepared at a Class D level with an expected accuracy of +/- 25%. The estimates were prepared based on previous completed tenders of similar work, experience with similar projects, and previous quotes from manufacturers. The scope of any particular recommendation is made without the benefit of coordinated asset upgrades; consequently, the scope of specific recommendations should be verified as part of any detailed project planning.

All cost estimates are an opinion of probable costs in current dollars and are provided for budgeting purposes only. Accurate figures can only be obtained after further investigation, preparing detailed specifications, tendering, and receiving competitive quotes from qualified contractors. Life expectancy projections are based on visual review during the site visits. The costs were developed with the following assumptions:

- Contingency of 10% was included for materials and anticipated line items;
- Contingency of 15% was included for engineering services associated with works; and
- Internal management costs, contractor indirect costs and economic factors are excluded.

11.0 Impacts and Benefits of Future State Recommendations

11.1 Potential Impacts and Benefits

The benefits of implementing the "As Should Be" recommendations extend beyond financial impacts. Benefits can be categorized into four broad categories:

- Cost Control (reduced or avoided costs);
- Operational Improvement (freed-up resources that can be redeployed);
- Reduced Liability Risk (reputational/regulatory/litigation risks); and,
- Improved Accountability (transparency of results driving change).

Each Recommendation has been evaluated using this 4-ategory evaluation matrix.

Recommendation #1 – Set Annual (Minimum) Targets for Hardtop and Safety Maintenance

- ✕ **Cost Control:** N/A
- ✓ **Operational Improvement:** Lanark's current operational model provides no targets around non-winter seasonally planned maintenance hours versus unplanned/reactive maintenance hours.
- ✓ **Reduced Liability Risk:** Increased hardtop maintenance hours will help ensure "Fair" lane kilometres do not erode into the "Poor" PCI category and may well improve the total share of Lanark's lane kilometres positioned in the "Good" PCI category.
- ✓ **Improved Accountability:** Targets linked to measurable/actual performance. Align budgeting with annual/seasonal operational planning. Promote Council and taxpayer accountability for service delivery results versus budgeted costs.

Recommendation #2 – Review Scheduling/Allocation of Summer Vacation

- ✕ **Cost Control:** N/A
- ✓ **Operational Improvement:** Optimal deployment of staff/contractor resources by ensuring any staffing capacity impacts are well understood and are deemed operationally acceptable by Lanark's management.
- ✓ **Reduced Liability Risk:** Ensuring non-winter season maintenance is completed in productive manner to comply with legislative mandates.
- ✕ **Improved Accountability:** N/A

Recommendation #3 – Contracted and Shared Services

- ✓ **Cost Control:** Potential of reduced winter control hourly coverages as well as a reduction in winter event response costs per pass km of work executed. Cost stabilization/improved service level stability via managed competition and potential in-sourcing is achievable.
- ✓ **Operational Improvement:** The managed competition model will potentially lead to more dependable winter event response capacity secured via potential in-sourcing.
- ✗ **Reduced Liability Risk:** N/A
- ✓ **Improved Accountability:** Promote accountability and transparency to Council and taxpayers.

Recommendation #4 – Winter Event Tracking

- ✓ **Cost Control: Improved tracking of compliance against *O.Reg 239* service standards will avoid expensive future $ liability claims and $ litigation awards.**
- ✗ **Operational Improvement:** N/A
- ✓ **Reduced Liability Risk:** Lanark does not track the three key data points in a winter event that are required to confirm compliance with *O.Reg. 239*. post-winter event road network clean-up times. Tracking these three critical points will reduce liability risk and potential insurance payouts via improved results reporting and documented compliance with *O.Reg. 239.*
- ✓ **Improved Accountability:** Promote accountability and transparency to Council and taxpayers.

Recommendation #5 – End-of-Season Winter Control Reporting

- ✗ **Cost Control:** N/A
- ✗ **Operational Improvement:** N/A
- ✓ **Reduced Liability Risk:** Tracking and reporting Winter Control results to Council using Key Performance Indicators derived from *O.Reg. 239* mandated standards will reduce liability risk and potential insurance payouts.
- ✓ **Improved Accountability:** Pursuing formal tracking metrics will allow Lanark to better understand the departments operations on a year-over-year basis and track spending relative to key inputs and the resulting outputs. Promote accountability and transparency to Council and taxpayers.

Recommendation #6 – Update Winter Control Policy

- ✗ **Cost Control:** N/A
- ✗ **Operational Improvement:** N/A
- ✗ **Reduced Liability Risk:** N/A
- ✓ **Improved Accountability:** Provides the public transparency in regards to winter control and level of service to be provided throughout Lanark.

Recommendation #7 – Realign Winter Level of Service to MMS

- ✓ **Cost Control:** Currently, staff work overtime hours in the winter to maintain the current winter level of service in Lanark. Aligning the level of service is expected to reduce banked overtime hours (resulting in staff time-off in summer) and make staff available for productive work during the summer season.
- ✗ **Operational Improvement:** N/A
- ✓ **Reduced Liability Risk:** Establishing measurable service levels for winter control to align with Class 2-5 Minimum Maintenance Standards set out under *O.Reg. 239/02* will ensure these requirements are meant.
- ✓ **Improved Accountability:** Reduced liability risk and insurance payouts via improved results reporting and documented compliance with *O.Reg. 239*.

Recommendation #8 – Winter Stabilization Reserve

- ✓ **Cost Control:** Financial volatility/risk around impossible-to-forecast winter season variations in costs and workload will be proactively managed.
- ✗ **Operational Improvement:** N/A
- ✓ **Reduced Liability Risk:** Taxpayer affordability, public safety, and service level sustainability will be secured/stabilized therefore reducing potential liability risks.
- ✗ **Improved Accountability:** N/A

Recommendation #9 – Winter Maintenance Simulation Modelling

- ✗ **Cost Control:** N/A
- ✓ **Operational Improvement:** The combination of Route 11 and Route 16 into a single route yields favorable increases in efficiency with slight reduction in level of service. In addition to this the yard utilization scenarios will allow for more fact-based planning of plowing and yard resources.
- ✗ **Reduced Liability Risk:** N/A
- ✗ **Improved Accountability:** N/A

Recommendation #10 – Modern Work Order System

- ✗ **Cost Control:** N/A
- ✓ **Operational Improvement:** Modern work order system would allow Lanark to better track performance metrics, be more off hands and time saved in regards to tracking and prioritizing common tasks, and provides the ability to increase fleet and equipment maintenance.
- ✗ **Reduced Liability Risk:** N/A
- ✓ **Improved Accountability:** Establishing and tracking KPI targets linked in measurable/actual performance will provide budget transparency to Council and taxpayers.

Recommendation #11 – Link Hardtop Maintenance Activities

- ✕ **Cost Control:** N/A
- ✓ **Operational Improvement:** Linking hardtop activities to inventoried & PCI rated road sections/assets has potential to allow optimal deployment of staff/contractor resources.
- ✕ **Reduced Liability Risk:** N/A
- ✓ **Improved Accountability:** Asset management and activity based maintenance planning/delivery will align around evolving municipal sector Best Practices.

Recommendation #12 – KPI Tracking and Reporting to Council

- ✕ **Cost Control:** N/A
- ✕ **Operational Improvement:** N/A
- ✕ **Reduced Liability Risk:** N/A
- ✓ **Improved Accountability:** Implementing KPIs would allow staff to better track operations and report performance to Council. In association with Recommendation #9 (work order system), Lanark will be able to download the applicable data to track the KPIs. As this recommendation reflects tracking of data and the effort required is assumed to be absorbed as part of staff duties, no change in operating costs is applicable.

Recommendation #13 – Modernize Budgeting Approach

- ✓ **Cost Control:** Budgeted activity-based work outputs and spending reconciled at year-end with actual work outputs and spending will potentially lead to a reduction of operating costs or future cost avoidance. Reduced costs can be re-invested to meet other emerging operational priorities.
- ✓ **Operational Improvement:** Staff will benefit from the improved line of sight between their actual work outputs versus the expected level of measurable success they are striving to achieve. Focus and morale will move upwards as staff keep score and "win".
- ✕ **Reduced Liability Risk:** N/A
- ✓ **Improved Accountability:** Transparency and accountability for results will improve significantly. Council will make informed decisions around budgets that link spending to actual results. Taxpayers will have access to information that confirms a value-for-money "results contract" is actually being fulfilled.

Recommendation #14 – Additional Seasonal Labour

- ✓ **Cost Control:** Each avoided Winter OT spending hour funds 1.5 to 2 hours of straight time coverage from part-time contracts. These reduced costs can be re-invested to meet other emerging operational priorities.
- ✓ **Operational Improvement:** Reduced OT lieu-time in June-August resulting in an increase in non-winter maintenance hours of output.
- ✓ **Reduced Liability Risk:** Additional seasonal will ensure Lanark's winter plowing crews will avoid burnout, this leads to more engaged and attentive operators. This will ensure all legislative mandates are being met and tracked to avoid potential liability risk and potential insurance payouts.
- ✗ **Improved Accountability:** N/A

Recommendation #15 – Corporate Performance Improvement Analysist

- ✓ **Cost Control:** Further modernizing the Public Works performance metrics and data-driven decision making leading to a potential reduction in operating costs or future cost avoidance.
- ✓ **Operational Improvement:** The design and implementation of KPIs and other recommended data-driven decision-making improvements may stall without dedicated resourcing.
- ✗ **Reduced Liability Risk:** N/A
- ✓ **Improved Accountability:** Once performance measurement related toolkits and Plan/Do/Check/Act processes have been implemented in Public Works, the County has an opportunity to expand data-informed decision-making to other services/business units. This will promote Council and taxpayer accountability for service delivery results versus budgeted costs.

Recommendation #16 – Fleet Asset Management Strategy

- ✓ **Cost Control:** The strategy to manage equipment and fleet assets and capital expenditures can spread costs effectively across years and save operational costs annually.
- ✗ **Operational Improvement:** N/A
- ✓ **Reduced Liability Risk:** Asset management will aid in maximizing the outputs per hour worked for staff by reducing time spent on repairing equipment and taking it in for service.
- ✓ **Improved Accountability:** Reduced time spent repairing or replacing equipment will ensure all legislative mandates are being complied with, leading to reduced liability risk and potential insurance payouts.

Recommendation #17 – Fleet Management Policy and Fleet Reserve Fund

- ✓ **Cost Control:** The policy and reserve will ensure Lanark has fleet and equipment to maintain the level of service that is expected during potential unfortunate circumstances. Implementing asset management strategy and policy based on asset lifecycle will minimize disruption in service delivery and potentially lead to reduction of operating costs or future cost avoidance.
- ✗ **Operational Improvement:** N/A
- ✓ **Reduced Liability Risk:** Fleet reserve fund acts as fail safe in case of unfortunate circumstances and increase transparency with the public
- ✗ **Improved Accountability:** N/A

Table 31: Summary of Impacts and Benefits of Future State Recommendations

No.	Recommendation	Cost Control	Operational Improvement	Reduced Liability Risk	Improved Accountability
1	Lanark should set minimum targets for Hardtop & Safety maintenance hours (over the next 3 years) that approach 50% of total maintenance hours. Annual reporting should compare actual Hardtop and Safety hours delivered versus targets established during the annual budget process.	✗	✓	✓	✓
2	Lanark should review its scheduling/allocation of vacation time across June to August – ensuring any staffing capacity impacts are well understood and are deemed operationally acceptable by Lanark's management	✗	✓	✓	✗
3	Lanark should design and execute a managed competition model to determine service delivery across the current five (5) contracted routes.	✓	✓	✗	✓
4	Implement a storm management/reporting model that tracks the three (3) standardized critical points in a winter event response.	✓	✗	✓	✓
5	Implement annual end-of-season Winter Control results reporting to Council using Key Performance Indicators derived from O Reg 239 mandated standards	✗	✗	✓	✓
6	Update the 2010 Winter Control policy to recognize current requirements of O Reg. 239.	✗	✗	✗	✓
7	Establish Lanark's measurable service levels for Winter Control to align with Class 2-5 Minimum Maintenance Standards set out under *O.Reg. 239/02*.	✓	✗	✓	✓
8	Lanark should execute a Winter Stabilization Reserve analysis in preparation for the next budget cycle.	✓	✗	✓	✓
9	Lanark should consider the results of the winter maintenance simulation modelling completed for this assignment for incremental implementation.	✗	✓	✗	✗
10	Lanark should purchase and implement a modern work order system	✗	✓	✗	✓
11	Lanark should update its Work Order technology system to link Hardtop maintenance activities to inventoried & PCI rated road sections/assets.	✗	✓	✗	✓
12	Implement KPIs for tracking Public Works operations and reporting to Council.	✗	✗	✗	✓
13	Lanark should modernize its approach to activity based budgeting.	✓	✓	✗	✓
14	Lanark should secure additional seasonal labour during the winter season (ideally via a series of three -month contracts) and build this new capacity into an expanded evening shift.	✓	✓	✓	✗
15	A new Corporate Performance Improvement Analyst (FTE) for Lanark should be established and initially assigned to implement this Report's recommendations around Performance Measurement and data-informed decision-making in Public Works.	✓	✓	✗	✓
16	Implement an asset management strategy for fleet and equipment based on asset lifecycle will minimize disruption in service delivery.	✓	✗	✓	✓
17	Create and implement a Fleet Management Policy and execute Fleet Reserve Fund analysis in preparation for the next budget cycle	✓	✗	✓	✗

12.0 Implementation Roadmap…A Phased Approach to Change Management

The majority of the Future State recommendations were designed to be implemented across the Do Now/Do Soon timeframes to maximize the probability of successful change management. Momentum is crucial to successful change management.

It is recommended Lanark should continue to gather data and evaluate potentially feasible options for maximizing return on capital beyond the scope of these Future State recommendations. Lanark needs to champion implementation through focused leadership, assigning appropriate resources, and setting achievable timeframes for implementing the Recommendations. It is expected that the Director, Operation Managers, and Public Works Manager will lead implementation and allocate resources as necessary.

With regard to measuring success, Lanark's implementation of KPIs will provide the ability to better track timelines and effectiveness of implementing the recommendations. Feedback received from Lanark's residents is also expected to support reporting on success from the "customer/ client" perspective.

Change is hard. Change management projects must strike a balance between focused/decisive action and an awareness of limited implementation capacity. The Implementation Roadmap strikes this balance with a phased approach: **DO NOW** (2023-2024), **DO SOON** (2024-2025), and **DO LATER** (2025-2027).

12.1 Protecting Road Assets

Table 32: Protecting Roads Recommendations Implementation Roadmap

Recommendation	DO NOW	DO SOON	DO LATER
Minimum Target for Hardtop Maintenance (Recommendation #1)			
Lanark should set minimum targets for Hardtop and Road Safety Maintenance hours (over the next three years) that approach 50% of total maintenance hours. Lanark should set annual targets for planned maintenance hours associated with high-priority Hardtop and Road Safety activity categories.	✓		
Review Scheduling/Allocation of Vacation (Recommendation #2)			
Lanark should review its scheduling/allocation of vacation time across June to August – ensuring any staffing capacity impacts are well understood and are deemed operationally acceptable by Lanark's management.	✓		

12.2 Sustainable Winter Control

Table 33: Sustainable Winter Control Recommendations Implementation Road Map

Recommendation	DO NOW	DO SOON	DO LATER
Contracted and Shared Services (Recommendations #3)			
Lanark should design and execute a managed competition model to determine service delivery across the current five contracted routes.	✓		
Winter Event Tracking (Recommendation #4)			
Implement a storm management/reporting model that tracks the following three standardized critical points in a winter event response: • Date/time of initiating a system-wide event response (versus amount of precipitation as per *O.Reg. 239)* • Date/time winter event ended (requires tracking at multiple County locations) • Date/time a full system-wide clean-up pass has been completed	✓		
End-of-Season Winter Control Reporting (Recommendation #5)			
Implement annual end-of-season Winter Control results reporting to Council using Key Performance Indicators derived from *O.Reg. 239* mandated standards. Reporting should tie back to targets established in the seasonal Winter Control plan/budget.	✓		

Recommendation	DO NOW	DO SOON	DO LATER
Update Winter Control Policy (Recommendation #6)			
Update the 2010 Winter Control policy to recognize current requirements of *O.Reg. 239*.	✓		
Realign Winter Level of Service to MMS (Recommendation #7)			
Establish Lanark's measurable service levels for Winter Control to align with Class 2-5 Minimum Maintenance Standards set out under *O.Reg. 239*.	✓		
Winter Stabilization Reserve (Recommendation #8)			
Lanark should execute a Winter Stabilization Reserve analysis in preparation for the next budget cycle		✓	
Winter Maintenance Simulation Modelling (Recommendation #9)			
Lanark should consider the results of the winter maintenance simulation modelling completed for this assignment for incremental implementation.		✓	

12.3 Organizing for Results

Table 34: Organizing for Results Implementation Road Map

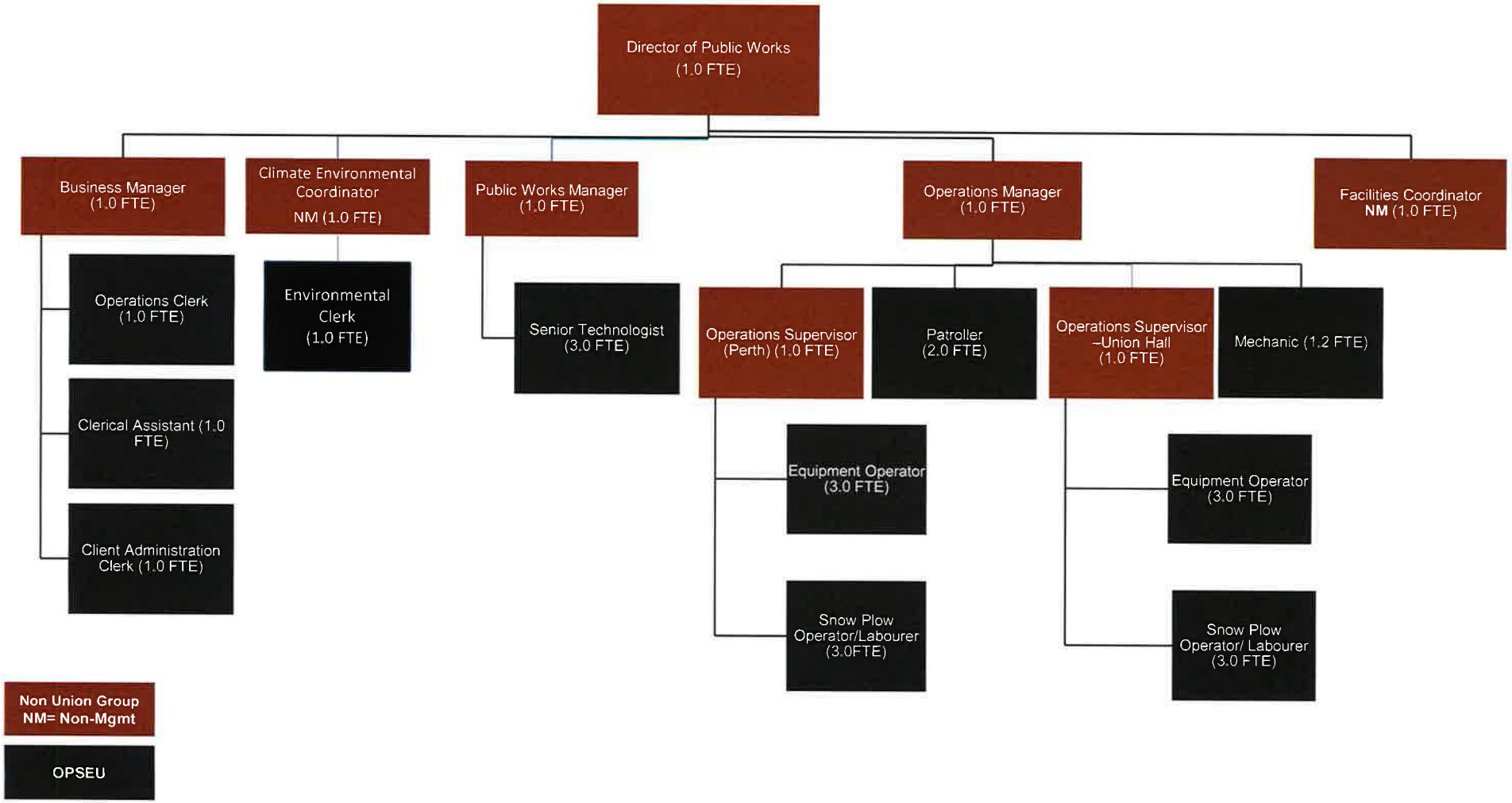
Recommendation	DO NOW	DO SOON	DO LATER
Modern Work Order System (Recommendation #10)			
Lanark should purchase and implement a modern work order system.		✓	
Link Hardtop Maintenance Activities (Recommendation #11)			
Lanark should update its Work Order technology system to link Hardtop maintenance activities to inventoried and PCI rated road sections/assets.			✓
KPI Tracking and Reporting to Council (Recommendation #12)			
Implement KPIs for tracking Public Works operations and reporting to Council.	✓		
Modernize Budgeting Approach (Recommendation #13)			
Lanark should modernize its approach to activity based budgeting. The Public Works budget document should itemize planned activity-based work outputs as well as planned activity-based spending		✓	

Recommendation	DO NOW	DO SOON	DO LATER
Additional Seasonal Labour (Recommendation #14)			
Lanark should secure additional seasonal labour during the winter season (ideally via a series of three-month contracts) and build this new capacity into an expanded evening shift.			✓
Corporate Performance Improvement Analyst (Recommendation #15)			
A new Corporate Performance Improvement Analyst (FTE) for the County should be established and initially assigned to implement this Report's recommendations around Performance Measurement and data-informed decision-making in Public Works.		✓	
Fleet Asset Management Strategy (Recommendation #16)			
Implement an asset management strategy for fleet and equipment based on asset lifecycle will minimize disruption in service delivery.		✓	
Fleet Management Policy and Fleet Reserve Fund (Recommendation #17)			
Create and implement a Fleet Management Policy and execute Fleet Reserve Fund analysis in preparation for the next budget cycle.		✓	

Appendix A

Organizational Chart

SCHEDULE "C" – PUBLIC WORKS



Appendix B

Peer Benchmarking Matrix

APPENDIX A: PEER BENCHMARKING MATRIX

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
Roads - Operations					
How many lane kilometres of each road classification (O. Reg. 239/02) are in your system?	• Class 1 – 0 km Class 2 – 71 km Class 3 - 584 km Class 4 – 414 km Class 5 – 54 km	• Class 1 – 35 km Class 2 – 141 km Class 3 - 586 km Class 4 – 395 km Class 5 – 9 km	• Class 1 – 0 km Class 2 – 24 km Class 3 - 904 km Class 4 – 454 km Class 5 – 0 km	• Class 1 – 0 km Class 2 – 0 km Class 3 - 0 km Class 4 – 211 km Class 5 – 97 km Class 6 – 131 km	• Bruce County maintains the largest system • Road networks similar as majority of roadworks fall under Class 3 & 4
Equipment and person hours for deployed road maintenance.	• Equipment: 50,000 hrs/yr. Person: 8,400 hrs/yr.	• Equipment: 5,695 hrs/yr. Person: 5,739 hrs/yr.	• Equipment: N/A • Person: 47,000 hrs/yr.	• Equipment: N/A • Person: N/A	• Prescott-Russell deploys the least amount of equipment and person hours for road maintenance.
Costs assigned for equipment, materials, and labour for road maintenance.	• Equipment: $1.8 million Materials: $1.8 million Labour: $1.3 million	• Equipment: $244,382 Materials: $131,702 Labour: $174,459 (without benefits)	• N/A	• N/A	• Lanark has a much higher assigned costs for equipment, materials and labour compared to Prescott-Russell
Approximate budget for and actual spending for road maintenance	• Road Maintenance Budget: $4.79 million • Road Maintenance Actual: $3.57 million	• Road Maintenance Budget: $585,000 • Road Maintenance Actual: $713,612	• 9.5 million for all operating costs combined. Admin non-union time for the department is included. Additional $900k per year for vehicle and equipment purchases. Capital construction not included.	• Road Maintenance Budget = $567,000 • Road Maintenance Actual = $565,287	• Lanark's budgets are high in comparison to next work size • Rideau Lakes has the lowest road maintenance budget by a good margin
Approximate deployed maintenance hours by road classification	• Class 1 – 0 hrs. Class 2 – 15,000 hrs. Class 3 - 25,000 hrs. Class 4 – 10,000 hrs.	• Class 1 – N/A Class 2 – N/A Class 3 - N/A Class 4 – N/A	• Class 1 – N/A Class 2 – N/A Class 3 - N/A Class 4 – N/A	• Class 1 – N/A Class 2 – N/A Class 3 - N/A Class 4 – N/A	• Lanark was the only one to provide data.

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
		Class 5 – N/A	Class 5 – N/A	Class 5 – N/A	
What percentage of lane kilometres are paved? Unpaved	• Paved Roads: 100%	• Paved Roads: 100%	• Paved Roads: 98% • Unpaved Roads: 2%	• 56% Paved Roads • 44% Unpaved Roads	• All three respondents have a similar high % of paved roads
Approximate deployed maintenance hours by activity	• Surface Maintenance (Paved) – 20,000 • Roadside Maintenance – 15,000 • Line Painting – 0 • Signage - 15,000	• Surface Maintenance (Paved) – 5,739 • Surface Maintenance (Unpaved) – N/A • Roadside Maintenance – 3,711 • Line Painting – 104 (contracted out) • Signage – 2,323	• Surface Maintenance (Paved) – 46,710 (includes paved surface maintenance, roadside maintenance, line painting and signage. • Surface Maintenance (Unpaved) 290	• N/A	• Bruce County and Lanark have similar deployed maintenance hours
Winter Control - Operations					
How many winter control routes are currently in use? What is the average route length?	• Number of Winter Control Routes: 15 • Average Route Length: 80 km	• Number of Winter Control Routes: 13 • Average Route Length: 110 km	• Number of Winter Control Routes: 16 • Average Route Length: 86 km	• Number of Winter Control Routes: 15 • Average Route Length: 97 km	• Bruce County has the most winter control routes • Prescott-Russell have the highest average route length
What are typical start and end dates of the winter control season? (across two calendar years)	• Start of Season (year 1): Nov 1 • End of Season (year 2): April 1	• Start of Season (year 1): Second Sunday in November • End of Season (year 2): Second Saturday in April	• Start of Season (year 1): Nov. 1st • End of Season (year 2): Apr. 20th	• Start of Season (year 1): Oct. 31st • End of Season (year 2): Apr. 30th	• Similar start times with Prescott-Russel having the latest start time • Similar end dates with Bruce County having the latest end date
How many plow/sand/salt machine hours are deployed across the most recent season?	• Direct Machine Hours: N/A • Contacted Machine Hours: 750	• Direct Machine Hours: 19,187 • Contacted Machine Hours: N/A	• Direct Machine Hours: 11,200 • Contacted Machine Hours: 315	• N/A	• Prescott-Russell have the most direct machine hours • The County has the most deployed contacted machine hours

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
How much de-icing material is budgeted during a machine hour of work (spread rate)? How much is typically consumed during a machine hour of work?	• Salt 130 kg/km • Sand 220 kg/km • 130 Budgeted Material • 220 Consumed Material	• Salt: 100 kg/km • Sand: Minimal (600 tonnes yearly total for all the Counties • N/A Budgeted Material • 3 tonnes/hr Consumed Material	• N/A	• Salt 7% • Sand 93% • Application rate 500 kg/km	• Lanark has the highest budgeted salt
Indicate the number of units that belong to the winter fleet that are manned, on patrol, and readily available for Full System Event Response?	• Pick-ups: 3 • Plows: • Sanders: • Combo-units: 17 • Other: N/A	• Pick-ups: 6 • Plows: N/A • Sanders: N/A • Combo-units: 17 • Other: 2 spare combo units	• Pick-ups: 4 • Plows: N/A • Sanders: N/A • Combo-units: 14 • Other: 2 contract plows and 3 spare plows	• Full System Event Response ○ 5 - 3 ton trucks ○ 15 combo-units	• Bruce County has the largest winter fleet
Level of Service					
How many centimetres of accumulation is required to trigger a system wide event response?	• 3 cm	• No consistent trigger decided by patrollers, weather, time of day, pavement temperature, and type of event.	• No consistent trigger, patrollers make a call based on current conditions and weather forecast.	• 3 cm	• Prescott-Russell and Bruce make a call based on weather conditions • The County has the only quantitative accumulation trigger
Indicate the typical number of times that anti-icing, de-icing, and plowing plus material spread activities are undertaken as part of both partial and full system wide responses.	• Plowing plus material spread • Partial <12 Hours : 2 • Partial >12 Hours : 4	• Difficulty assessing but average responses for last 2 years: 2021-2022: 96 responses 2020-2021 85 responses 2019-2020 103	• N/A	• N/A	• Not comparable results
After a full winter event ends, what is your post event clean-up LOS (i.e. bare pavement, centre-bare, etc.) for each road class	• Class 2: Bare – 3 hours • Class 3: Bare – 3 hours • Class 4: Centre Bare – 3 hours	• Class 1: Bare – 4 hours • Class 2: Bare – 4 hours Class 3: Bare – 4 hours Class 4: Bare – 4 hours	• Same for all roadway classes. Centre bare within 24 hours of and MMS for paved. Snow pack conditions for unpaved roads.	• N/A	• Lanark has the highest-level LOS for achieving bare pavement.

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
and how many hours does it take to achieve it?		Class 5: Bare – 4 hours	• Does not currently record this state. Reasoning is that it varies depending on severity of storm.		
How do you measure compliance with your LOS and if so, how? For example, do you record when the snow event ends and the duration of clean-up activities?	• No but believe their complying with MMS and beyond.	• By patrolling until they achieve our desired level of service which is bare pavement.	• Review of random routes every 2 weeks to ensure we are meeting MMS timelines. Since reviews have been done, we do not have a record of not meeting MMS timelines. We do not review every route/road for every event. We do not currently record or measure an events start or end.	• All roads cleared within 24hrs of event (10-12hrs to complete)	• None of the municipalities currently record the majority of the snow times and durations.
Financial					
What are your hourly operating rates for winter control?	• Direct Delivery Rate (without overhead and material costs): • $ 0 Standby • $ hourly wage Callout • Average Contracted Delivery Rate: • $100 /day Standby • $200 /hr Callout	• Direct Delivery Rate (without overhead and material costs): • Average Contracted Delivery Rate: N/A • $0 /day Standby • $0 /hr Callout	• Direct Delivery Rate (without overhead and material costs): • N/A Standby • N/A Callout • Average Contracted Delivery Rate: • $150/day Standby • $106.50/hr Callout	• 100.00 (standby)	• Bruce County has the highest daily standby rate. • Lanark has the highest hourly callout rate.
What is the cost of your salt/sand?	• $100 per ton salt / $45 per ton sand	• $ 86.30 + HST per ton	• 69.25/tonne coarse, $96/tonne treated – delivery not included	• $26.01/t (salt/sand)	• Lanark has the highest cost per ton salt.
Winter Reserve Fund					

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
Do you have a winter reserve?	• No	• No	• Yes, first year for a reserve. Reserve is anticipated to be depleted in 2022.	• No	• Bruce County is the only municipality with a winter reserve.
Do you have a designated winter reserve policy?	• No	• No	• No	• No	• All four municipalities do not have a winter reserve policy.
What is your winter reserve target balance?	• N/A	• N/A	• Previous 5 year average cost of a winter maintenance season.	• N/A	• Bruce County is the only municipality with s winter reserve target balance.
How do you budget for winter control and seasonal variance due to weather? Is there an expected annual reserve contribution included within the budget?	• Use a five-year average	• N/A	• 10-year linear regression.	• Use a five-year average	• Both Lanark and Rideau use a five-year average to budget for winter control.
Does your Winter Reserve Policy restrict the use of funds? If so, how?	• N/A	• N/A	• Not at this time. A reserve policy is proposed for next year.	• N/A	• Bruce County is the only municipality to provide an answer.

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
If you don't have a reserve how do you budget for winter control and seasonal variance due to weather? For example, do you use a five year average? Is there an expected annual surplus included within the budget?	• N/A	• They look at the previous year to budget for the next because of price increases. The average 5 years not used in this case because the salt prices varies. Furthermore, after the Jan., Feb., Mar. and Apr. months they have the option to adjust our budget in June. If the department determines that the first 4 months (Jan., Feb., Mar., Apr.) were not expensive they can allow more funds to other operational projects. If the first 4 months were expensive they usually cancel other operation projects.	• N/A	• N/A	• Prescott-Russell has a procedure that differs from a typical reserved fun to budget for variance.
How do you fund winter control overages?	• N/A	• By the overall Public Works Department surplus, if any. • If none, by the overall corporation surplus, if any. • If none, by the working reserve fund.	• Winter Maintenance reserve. If no funds in reserve, tax stabilization.	• Winter control overages are funded with yearly budget.	• Lanark is the only municipality to no provide an answer to fund winter control overages.
Technology					

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
What existing technology or software is currently being used by your departments? Is the technology or software currently meeting your needs?	• Work Tech • Acetech • Mesh • Meeting their needs for the majority but aging with lack of support.	• Geotab for GPS in trucks, dickey john control point in all combo units, road watch infrared thermometer on all patrol and foreman pick-ups, Weather Network and Environment Canada, sometimes RWIS stations from MTO.	• Geotab and Microsoft Excel	• City Wide for their Asset Management Plans. • Mesh used for tracking weather winter conditions. • Road Telematics for fleet GPS	• Lanark noted they have aging software and may need to upgrade due to lack of support.
Fleet Management					
Please provide your Fleet Management Policy, if you have one.	• N/A	• They don't have a specific fleet management policy however they follow their asset management plan. • The plow trucks are replaced every 7 years and the equipment (plow, box, harness) is transferred from the replaced truck to new truck (cab and chassis) for a life cycle of 21 years. Sometimes the 21 years is not achievable depending of the truck therefore they purchase a new combo unit. • Foreman and patrol pick-up trucks are replaced every 4 years • Service trucks are replaced every 8 years	• Yes	• N/A	• Bruce County the only respondent to have a formal Fleet Management Policy in place.

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
Are fire, emergency services, and/or transit fleet managed separately from other corporate fleets?	• Yes	• Yes	• Yes	• Yes	• All municipalities have fire, emergency services, and/or transit fleet managed separately from other corporate fleets
Is the fleet equipped with analytics/data units? If yes, **a) What is recorded (e.g. fuel consumption, kilometers, idling, GPS location, driving behaviours such as hard breaking or fast acceleration, etc.)?** **b) Are telematics included (e.g. real time data on driving behaviours?)** **c) Does this include fire, emergency services, and/or transit?** **d) How do you refuel your vehicles? Pumps a depots? Corporate cards?** **e) Do you have any hybrid/electric vehicles, ie. Green fleet, alternate fuels, etc?**	• a) fuel consumption, kilometers, idling, GPS location b) No c) No d) County depots e) No	• a) Kilometers, idling, GPS Location, plow up/plow down, salting on/salting off, pre-wetting liquid on/ pre-wetting liquid off, beacon light on/beacon light off. b)Yes c) No d) Both. Pumps at depot for diesel vehicles and equipment. Cards for all unleaded fuel vehicles e) Not public works but yes (only one) for paramedics	• a) Yes to all b)Yes c) No d) Own pumps – PFO's e) no	• a) Trackmatics route info, refuelling vehicles pumps at depots b) Yes, telematics mainly used for location, however can record road temperatures for patrol vehicles, grader, and plowing and sanding actions c) No d) Township depots e) No	• All municipalities use analytic/data units • Lanark does not have telematics included. • All municipalities do not include telematics for fire, emergency services and/or transit. • Only one EV for Prescott-Russell.

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
Do you undertake fleet maintenance internally or with an external contractor?	• Majority maintenance completed internally with the exception of warranty or maintenance on larger vehicles/equipment.	• Both, all minor maintenance is done in house including oil changes for heavy trucks and equipment. All major maintenance is done externally. All pick-up trucks are brought to an external contractor.	• Internally for heavy equipment most of the time. • Externally for light duty most of the time. Some internal if staff capacity allows.	• External contractor	• Lanark and Prescott-Russell are similar in maintenance procedures.
What type of system do you use for maintaining fleet records?	• Work Tech and paper form	• Paper form which is then scanned and kept digitally	• Citywide and Sharepoint	• To maintain fleet records staff keeps records of maintenance on CVOR vehicles. Invoices are coded with vehicle/equipment identification numbers. Each piece of equipment has a maintenance book stored in it.	• The County and Prescott-Russell use pen and paper
Do you lease or rent any of the vehicles within your fleet? If so, what is the deciding factor on lease/rent vs. own?	• No	• We only rent a roller compactor for summer construction work, usage is only for 6 months.	• No	• No	• Only Prescott-Russell rents equipment.

	County of Lanark	Counties of Prescott-Russel	Bruce County	Township of Rideau Lakes	How Does the County Compare?
How do you fund replacement? **Do you have a reserve fund?** **What is your funding model?**	• Yearly budget	• Yes, we have a reserve fund. The funding model is based on the replacement costs and lifecycle replacement of our entire fleet. We adjust the funding model every year based on replacement costs and life cycle.	• Capital budget via levy. They have a reserve to fund overages as our replacement plan has big purchase years and some small. Small purchase years they put funds into reserve. Big purchase years they pull from reserve. Budget increases by inflation year to year.	• Do not have reserve, all vehicles/equipment are budgeted yearly.	• Lanark and Rideau Lakes do not have a reserve fund for their fleets.

Appendix C

Lanark Simulation Memo

MEMORANDUM

To: Bill Harvey, Dillon Consulting
From: Simon Foo, Ph.D., P.Eng.
Date: 2022-11-30
Re: Lanark County Winter Maintenance Simulation

Introduction

Lanark County currently operates its winter maintenance from five (5) depots:

- Union Hall
- Public Works Depot
- Almonte Depot
- McDonald's Corners Pit
- Montague Depot

Lanark has fifteen (15) winter maintenance routes. A winter maintenance vehicle would start from its assigned home depot, and will return to its assigned home depot after each completion of the route to refill its sand.

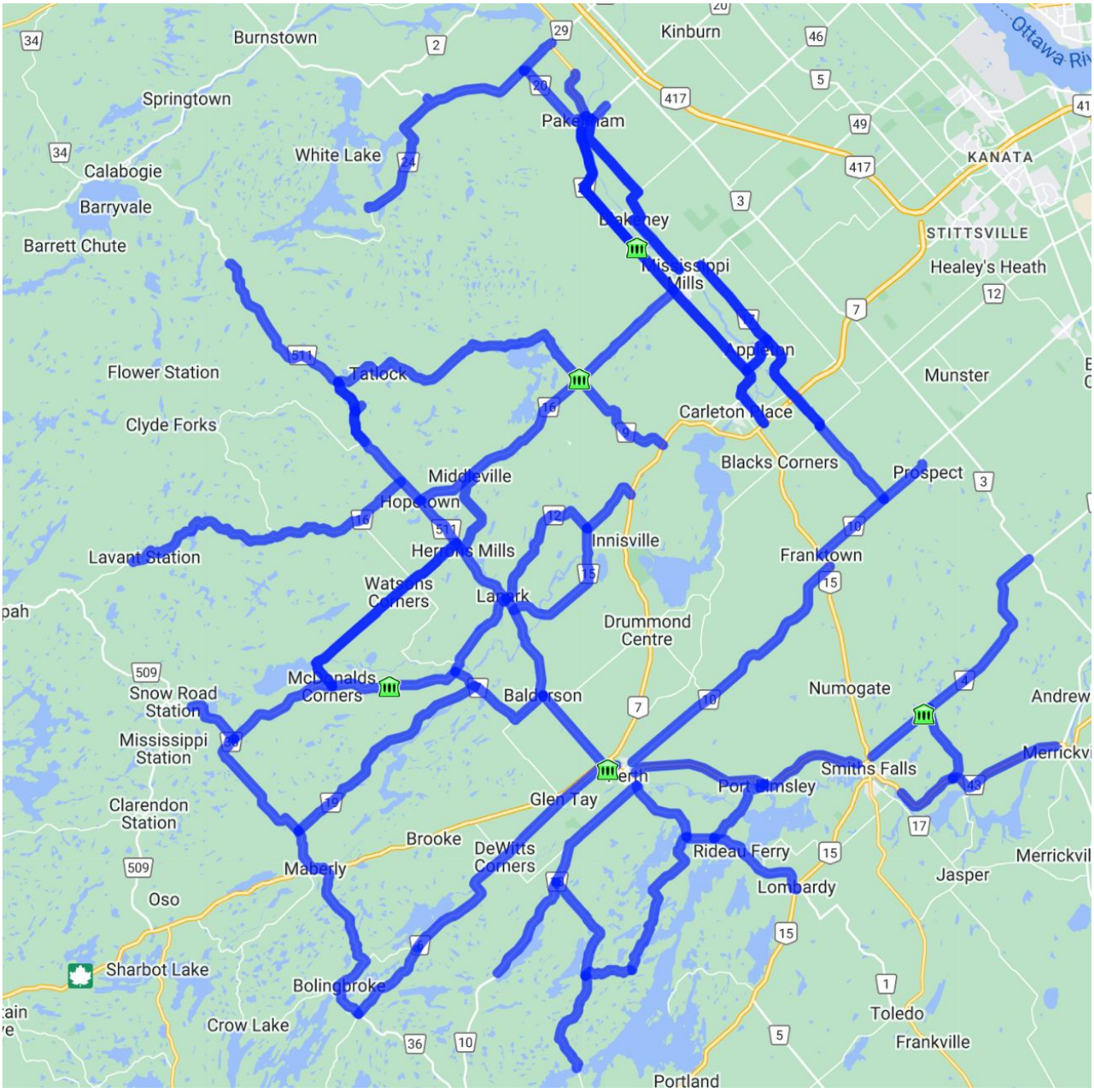
Lanark is looking at the potential of making changes to depot locations, removing depots, or altering routes. The purpose of this simulation is to look at the operational impact of these changes. The scenarios tested are as follows:

- **Scenario 1:** Status Quo
- **Scenario 2:** Remove Almonte Depot and run the trucks out of Mississippi Mills Township Yard (175 Five Arches Drive, Pakenham)
- **Scenario 3:** Remove Almonte Depot and run the trucks out of Union Hall
- **Scenario 4:** Combine Route 11 and Route 16 and run the combined route out of Almonte Depot – status quo depot configuration
- **Scenario 5:** Combine Route 11 and Route 16 and run the combined route out of Mississippi Mills Township Yard – scenario 2 depot configuration
- **Scenario 6:** Combine Route 11 and Route 16 and run the combined route out of Union Hall – scenario 3 depot configuration

Methodology

In order to simulate the truck movements, the winter maintenance routes are imported into Transnomis Solutions' ITS Central system. The routes reference Lanark County's route maps and descriptions for each of the fifteen routes.

A map of all the imported routes (blue line segments), alongside the five existing depots (green building icons) may be seen below:



A simulation program is developed to mimic the operation of the trucks along their assigned routes.

Each simulation scenario consists of a route and an assigned home depot. The home depot assignments are given by Lanark County's route description documents.

A route consists of the individual road segments outlined in the corresponding Lanark County route map, description, and shapefile.

At the start of the simulation, a (simulated) truck begins its journey at its assigned depot. An optimal path is determined for the route in which each segment must be completed in both directions, and material is applied only on the second pass of the segment.

The truck drives to the start of the first segment in its assigned route. That distance is counted toward a “non-productive distance” and that travel time is counted toward a “non-productive time”. The truck will then complete the segment. That distance is counted toward a “productive distance” and that travel time is counted toward a “productive time”. The truck then travels to the next segment in the route. The time/distance of travel required to get to the next segment is counted as non-productive time/distance respectively. The simulated truck completes all of the assigned route’s road segments.

The truck will complete its given route, and then return to its assigned depot. Each time the truck returns home, a counter increments the number of trips completed. The truck will remain there for a defined amount of time to refill materials, before departing again. The time spent refilling is counted toward “non-productive time”. The truck will then depart towards start of its route once again.

An individual truck’s simulation is complete when the truck has finished its route is not able to reach the first segment of the route before the end of the storm duration.

Simplifying Assumptions

In order to create a tractable simulation, a number of assumptions/simplifications are made:

- Traffic congestion, signal timing, etc. are not considered
- One crew per route operating concurrently
- Same travel speed for all roads (speed dependent on vehicle and current action: productive or non-productive travel)
- The only consumable resource considered in the analysis is sand
- Costs of running depots are not considered

In the Status Quo scenario, each route is assigned to a depot as a starting point, as indicated by Lanark County’s route descriptions:

Route 1: McDonald’s Corners Pit
Route 2: Montague Depot
Route 3: Public Works Depot
Route 4: McDonald’s Corners Pit

Route 5: Union Hall
Route 6: Public Works Depot
Route 7: McDonald's Corners Pit
Route 8: Public Works Depot
Route 10: Union Hall
Route 11: Almonte Depot
Route 12: Almonte Depot
Route 13: Union Hall
Route 14: Union Hall
Route 15: Public Works Depot
Route 16: Almonte Depot

Simulation Parameters

The parameters used for the simulation are as follows:

Parameter	Value
Storm duration	12 hours
Time to refill	10 minutes
Sand capacity	70km (enough to complete one pass of all routes)
Vehicle speed when plowing/applying material (productive)	25 km/hr
Vehicle speed when traveling (non-productive)	40 km/hr

Overall Results

The key performance metrics calculated for each simulation are:

- Productive distance/time
- Non-productive distance/time
- Total time
- Number of trips completed

By comparing with the Status Quo scenario, we can measure impacts to the performance metrics above in each alternative scenario.

The table below demonstrates all simulation results. All distances are in meters. Times are formatted as "days hours:minutes:seconds".

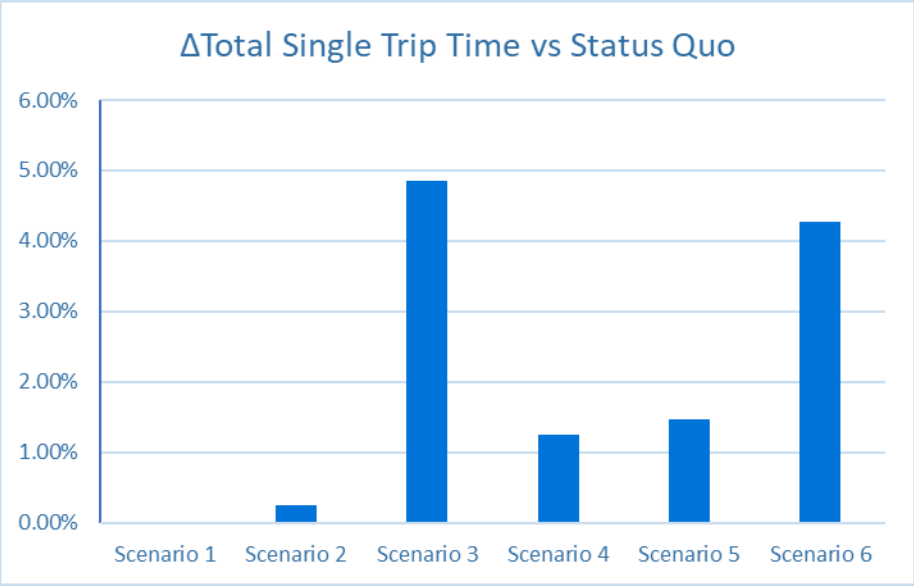
Route	# Trips	Prod Dist	Non-Prod Dist	Total Dist	% Prod Dist	Prod Time	Non-Prod Time	Total Time	% Prod Time	Single Trip Time
-------Scenario 1: Status Quo-------										
Route 1	4	283,814	19	283,833	99.99%	11:21:09	0:30:02	11:51:11	95.78%	02:27:48
Route 2	4	320,351	5	320,356	100.00%	12:48:51	0:30:00	13:18:51	96.24%	02:49:43
Route 3	4	310,071	27,563	337,634	91.84%	12:24:10	1:11:21	13:35:31	91.25%	02:53:53
Route 4	4	346,707	19	346,726	99.99%	13:52:06	0:30:02	14:22:08	96.52%	03:05:32
Route 5	4	281,305	35,961	317,266	88.67%	11:15:08	1:23:56	12:39:04	88.94%	02:39:46
Route 6	4	317,209	22,003	339,211	93.51%	12:41:18	1:03:00	13:44:18	92.36%	02:56:05
Route 7	4	339,898	57,169	397,067	85.60%	13:35:45	1:55:45	15:31:31	87.57%	03:22:53
Route 8	4	308,304	23,067	331,371	93.04%	12:19:56	1:04:36	13:24:32	91.97%	02:51:08
Route 10	3	283,307	108,672	391,979	72.28%	11:19:56	3:03:01	14:22:57	78.79%	04:27:39
Route 11	4	267,015	63,179	330,194	80.87%	10:40:50	2:04:46	12:45:36	83.70%	02:41:24
Route 12	4	364,025	3,035	367,060	99.17%	14:33:40	0:34:33	15:08:13	96.20%	03:17:03
Route 13	4	332,456	199	332,655	99.94%	13:17:54	0:30:18	13:48:12	96.34%	02:57:03
Route 14	4	370,557	272	370,828	99.93%	14:49:20	0:30:24	15:19:45	96.69%	03:19:56
Route 15	5	336,042	28,835	364,877	92.10%	13:26:30	1:23:15	14:49:45	90.64%	02:17:57
Route 16	6	328,169	42	328,210	99.99%	13:07:36	0:50:04	13:57:40	94.02%	01:29:37
TOTAL	**62**	**4,789,230**	**370,040**	**5,159,267**	**92.83%**	**7 23:34:09**	**17:05:03**	**8 16:39:14**	**91.81%**	**1 19:37:26**
AVERAGE	**4.13**	**319,282**	**24,669**	**343,951**	**93.13%**	**12:46:17**	**01:08:20**	**13:54:37**	**91.80%**	**02:54:30**
-------Scenario 2: Remove Almonte Depot and run the trucks out of Mississippi Mills Township Yard-------										
Route 1	4	283,814	19	283,833	99.99%	11:21:09	0:30:02	11:51:11	95.78%	02:27:48
Route 2	4	320,351	5	320,356	100.00%	12:48:51	0:30:00	13:18:51	96.24%	02:49:43
Route 3	4	310,071	27,563	337,634	91.84%	12:24:10	1:11:21	13:35:31	91.25%	02:53:53
Route 4	4	346,707	19	346,726	99.99%	13:52:06	0:30:02	14:22:08	96.52%	03:05:32
Route 5	4	281,305	35,961	317,266	88.67%	11:15:08	1:23:56	12:39:04	88.94%	02:39:46
Route 6	4	317,209	22,003	339,211	93.51%	12:41:18	1:03:00	13:44:18	92.36%	02:56:05
Route 7	4	339,898	57,169	397,067	85.60%	13:35:45	1:55:45	15:31:31	87.57%	03:22:53
Route 8	4	308,304	23,067	331,371	93.04%	12:19:56	1:04:36	13:24:32	91.97%	02:51:08
Route 10	3	283,307	108,672	391,979	72.28%	11:19:56	3:03:01	14:22:57	78.79%	04:27:39
Route 11	4	267,015	33,315	300,330	88.91%	10:40:50	1:19:58	12:00:49	88.90%	02:30:12
Route 12	4	364,025	10,574	374,599	97.18%	14:33:40	0:45:52	15:19:31	95.01%	03:19:53
Route 13	4	332,456	199	332,655	99.94%	13:17:54	0:30:18	13:48:12	96.34%	02:57:03
Route 14	4	370,557	272	370,828	99.93%	14:49:20	0:30:24	15:19:45	96.69%	03:19:56
Route 15	5	336,042	28,835	364,877	92.10%	13:26:30	1:23:15	14:49:45	90.64%	02:17:57
Route 16	5	273,474	17,713	291,187	93.92%	10:56:20	1:06:34	12:02:54	90.79%	01:44:35
TOTAL	**61**	**4,734,535**	**365,386**	**5,099,919**	**92.84%**	**7 21:22:53**	**16:48:04**	**8 14:10:59**	**91.85%**	**1 19:44:02**
AVERAGE	**4.07**	**315,636**	**24,359**	**339,995**	**93.13%**	**12:37:32**	**01:07:12**	**13:44:44**	**91.85%**	**02:54:56**
-------Scenario 3: Remove Almonte Depot and run the trucks out of Union Hall-------										
Route 1	4	283,814	19	283,833	99.99%	11:21:09	0:30:02	11:51:11	95.78%	02:27:48
Route 2	4	320,351	5	320,356	100.00%	12:48:51	0:30:00	13:18:51	96.24%	02:49:43
Route 3	4	310,071	27,563	337,634	91.84%	12:24:10	1:11:21	13:35:31	91.25%	02:53:53
Route 4	4	346,707	19	346,726	99.99%	13:52:06	0:30:02	14:22:08	96.52%	03:05:32
Route 5	4	281,305	35,961	317,266	88.67%	11:15:08	1:23:56	12:39:04	88.94%	02:39:46
Route 6	4	317,209	22,003	339,211	93.51%	12:41:18	1:03:00	13:44:18	92.36%	02:56:05
Route 7	4	339,898	57,169	397,067	85.60%	13:35:45	1:55:45	15:31:31	87.57%	03:22:53
Route 8	4	308,304	23,067	331,371	93.04%	12:19:56	1:04:36	13:24:32	91.97%	02:51:08
Route 10	3	283,307	108,672	391,979	72.28%	11:19:56	3:03:01	14:22:57	78.79%	04:27:39
Route 11	4	267,015	105,723	372,738	71.64%	10:40:50	3:08:35	13:49:25	77.26%	02:57:21
Route 12	3	273,019	85,181	358,200	76.22%	10:55:15	2:27:46	13:23:01	81.60%	04:07:40
Route 13	4	332,456	199	332,655	99.94%	13:17:54	0:30:18	13:48:12	96.34%	02:57:03
Route 14	4	370,557	272	370,828	99.93%	14:49:20	0:30:24	15:19:45	96.69%	03:19:56
Route 15	5	336,042	28,835	364,877	92.10%	13:26:30	1:23:15	14:49:45	90.64%	02:17:57
Route 16	4	218,779	110,512	329,291	66.44%	8:45:04	3:15:46	12:00:50	72.84%	02:30:13
TOTAL	**59**	**4,588,834**	**605,200**	**5,194,032**	**88.35%**	**7 15:33:12**	**22:27:47**	**8 14:01:01**	**89.10%**	**1 21:44:36**
AVERAGE	**3.93**	**305,922**	**40,347**	**346,269**	**88.75%**	**12:14:13**	**01:29:51**	**13:44:04**	**88.99%**	**03:02:58**
-------Scenario 4: Combine Route 11 and Route 16 and run it out of Almonte Depot – status quo depots-------										
Route 1	4	283,814	19	283,833	99.99%	11:21:09	0:30:02	11:51:11	95.78%	02:27:48
Route 2	4	320,351	5	320,356	100.00%	12:48:51	0:30:00	13:18:51	96.24%	02:49:43
Route 3	4	310,071	27,563	337,634	91.84%	12:24:10	1:11:21	13:35:31	91.25%	02:53:53
Route 4	4	346,707	19	346,726	99.99%	13:52:06	0:30:02	14:22:08	96.52%	03:05:32
Route 5	4	281,305	35,961	317,266	88.67%	11:15:08	1:23:56	12:39:04	88.94%	02:39:46
Route 6	4	317,209	22,003	339,211	93.51%	12:41:18	1:03:00	13:44:18	92.36%	02:56:05
Route 7	4	339,898	57,169	397,067	85.60%	13:35:45	1:55:45	15:31:31	87.57%	03:22:53
Route 8	4	308,304	23,067	331,371	93.04%	12:19:56	1:04:36	13:24:32	91.97%	02:51:08
Route 10	3	283,307	108,672	391,979	72.28%	11:19:56	3:03:01	14:22:57	78.79%	04:27:39
Route 12	4	364,025	3,035	367,060	99.17%	14:33:40	0:34:33	15:08:13	96.20%	03:17:03
Route 13	4	332,456	199	332,655	99.94%	13:17:54	0:30:18	13:48:12	96.34%	02:57:03
Route 14	4	370,557	272	370,828	99.93%	14:49:20	0:30:24	15:19:45	96.69%	03:19:56
Route 15	5	336,042	28,835	364,877	92.10%	13:26:30	1:23:15	14:49:45	90.64%	02:17:57
Route 11/16	3	364,593	10,671	375,263	97.16%	14:35:01	0:36:00	15:11:02	96.05%	04:43:41
TOTAL	**55**	**4,558,639**	**317,490**	**4,876,126**	**93.49%**	**7 14:20:44**	**14:46:13**	**8 05:07:00**	**92.51%**	**1 20:10:06**
AVERAGE	**3.93**	**325,617**	**22,678**	**348,295**	**93.80%**	**13:01:29**	**01:03:18**	**14:04:47**	**92.52%**	**03:09:18**
-------Scenario 5: Combine Route 11 and Route 16 and run it out of Mississippi Mills Township Yard – scenario 2 depots------										
Route 1	4	283,814	19	283,833	99.99%	11:21:09	0:30:02	11:51:11	95.78%	02:27:48
Route 2	4	320,351	5	320,356	100.00%	12:48:51	0:30:00	13:18:51	96.24%	02:49:43
Route 3	4	310,071	27,563	337,634	91.84%	12:24:10	1:11:21	13:35:31	91.25%	02:53:53
Route 4	4	346,707	19	346,726	99.99%	13:52:06	0:30:02	14:22:08	96.52%	03:05:32
Route 5	4	281,305	35,961	317,266	88.67%	11:15:08	1:23:56	12:39:04	88.94%	02:39:46
Route 6	4	317,209	22,003	339,211	93.51%	12:41:18	1:03:00	13:44:18	92.36%	02:56:05
Route 7	4	339,898	57,169	397,067	85.60%	13:35:45	1:55:45	15:31:31	87.57%	03:22:53
Route 8	4	308,304	23,067	331,371	93.04%	12:19:56	1:04:36	13:24:32	91.97%	02:51:08
Route 10	3	283,307	108,672	391,979	72.28%	11:19:56	3:03:01	14:22:57	78.79%	04:27:39
Route 12	4	364,025	10,574	374,599	97.18%	14:33:40	0:45:52	15:19:31	95.01%	03:19:53
Route 13	4	332,456	199	332,655	99.94%	13:17:54	0:30:18	13:48:12	96.34%	02:57:03
Route 14	4	370,557	272	370,828	99.93%	14:49:20	0:30:24	15:19:45	96.69%	03:19:56
Route 15	5	336,042	28,835	364,877	92.10%	13:26:30	1:23:15	14:49:45	90.64%	02:17:57
Route 11/16	3	364,593	16,409	381,001	95.69%	14:35:01	0:44:37	15:19:38	95.15%	04:46:33
TOTAL	**55**	**4,558,639**	**330,767**	**4,889,403**	**93.24%**	**7 14:20:44**	**15:06:09**	**8 05:26:54**	**92.35%**	**1 20:15:47**
AVERAGE	**3.93**	**325,617**	**23,626**	**349,243**	**93.55%**	**13:01:29**	**01:04:44**	**14:06:12**	**92.38%**	**03:09:42**
-------Scenario 6: Combine Route 11 and Route 16 and run it out of Union Hall – scenario 3 depots-------										
Route 1	4	283,814	19	283,833	99.99%	11:21:09	0:30:02	11:51:11	95.78%	02:27:48
Route 2	4	320,351	5	320,356	100.00%	12:48:51	0:30:00	13:18:51	96.24%	02:49:43
Route 3	4	310,071	27,563	337,634	91.84%	12:24:10	1:11:21	13:35:31	91.25%	02:53:53
Route 4	4	346,707	19	346,726	99.99%	13:52:06	0:30:02	14:22:08	96.52%	03:05:32
Route 5	4	281,305	35,961	317,266	88.67%	11:15:08	1:23:56	12:39:04	88.94%	02:39:46
Route 6	4	317,209	22,003	339,211	93.51%	12:41:18	1:03:00	13:44:18	92.36%	02:56:05
Route 7	4	339,898	57,169	397,067	85.60%	13:35:45	1:55:45	15:31:31	87.57%	03:22:53
Route 8	4	308,304	23,067	331,371	93.04%	12:19:56	1:04:36	13:24:32	91.97%	02:51:08
Route 10	3	283,307	108,672	391,979	72.28%	11:19:56	3:03:01	14:22:57	78.79%	04:27:39
Route 12	3	273,019	85,181	358,200	76.22%	10:55:15	2:27:46	13:23:01	81.60%	04:07:40
Route 13	4	332,456	199	332,655	99.94%	13:17:54	0:30:18	13:48:12	96.34%	02:57:03
Route 14	4	370,557	272	370,828	99.93%	14:49:20	0:30:24	15:19:45	96.69%	03:19:56
Route 15	5	336,042	28,835	364,877	92.10%	13:26:30	1:23:15	14:49:45	90.64%	02:17:57
Route 11/16	3	364,593	68,104	432,697	84.26%	14:35:01	2:02:09	16:37:11	87.75%	05:12:24
TOTAL	**54**	**4,467,633**	**457,069**	**4,924,700**	**90.72%**	**7 10:42:19**	**18:05:35**	**8 04:47:57**	**90.81%**	**1 21:29:26**
AVERAGE	**3.86**	**319,117**	**32,648**	**351,764**	**91.24%**	**12:45:53**	**01:17:32**	**14:03:26**	**90.89%**	**03:14:58**

Since the scenarios involve a reduction/movement of facility or a reduction of routes and trucks utilized, the results are expected to demonstrate:

- An increase of non-productive time/distance for some routes
- An change of efficiency (% productive distance/time)
- An increase in total time taken to complete a trip of some routes

The charts below summarize the key findings from the table above.

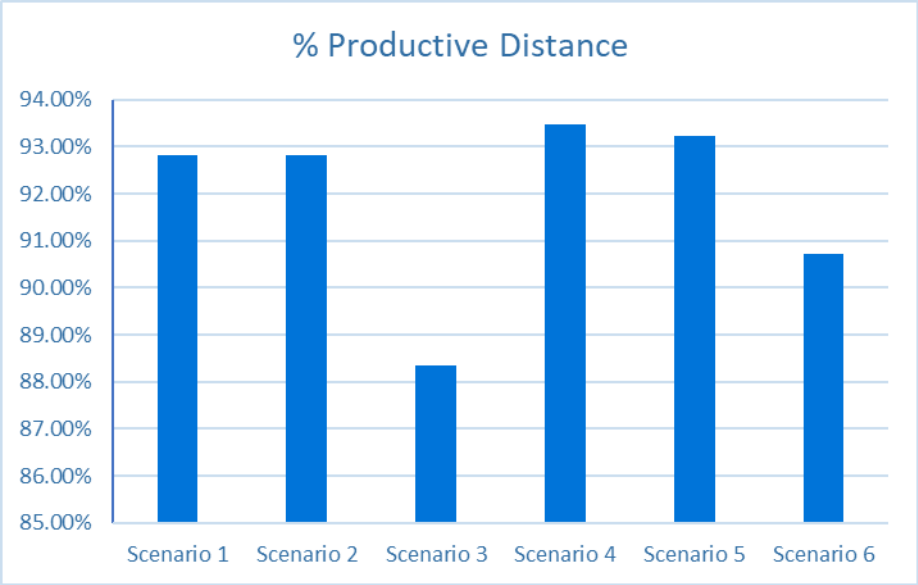
Impact to Total Single Trip Time Taken



The total time taken to complete each route represents the service level citizens can expect. A lower total time means citizens can expect plowed and sanded routes in their communities sooner after the beginning of a storm event. That is, total time is inversely related to service level, and as such a lesser increase in total time is more desirable.

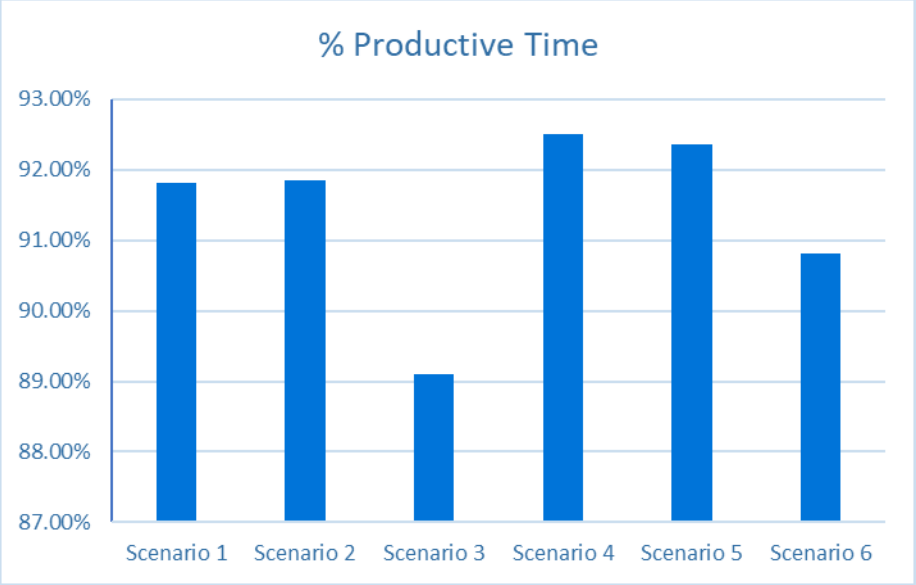
Note that the numbers above are comparing the aggregate time taken to complete all 15 (or 14 in the case of the combined routes in Scenarios 4-6) routes independently. Each scenario is compared to the simulated Status Quo, which had a total time taken of 1 19:37:26.

Percent Productive Distance



Percent productive distance is a good surrogate for fuel use efficiency.

Percent Productive Time



Percent productive time represents efficiency from a staff time perspective.

The clear pattern from the three (3) charts above indicates that combining Route 11 and Route 16 creates a more efficient total output regardless of the depot configuration. This comes at the cost of a slightly decreased service level.

Route Level Results

In this section, we evaluate the impact on the service levels and efficiency for each individual route under each scenario.

All percentage values in the tables below are in comparison to the values from the Status Quo scenario. A positive value indicates an increase from the Status Quo (i.e., in non-productive distance; non-productive time; and total time).

Scenario 2 Compared to Status Quo

Remove Almonte Depot and run the trucks out of Mississippi Mills Township Yard

Route	# Trips	Prod Dist	Non-Prod Dist	Prod Time	Non-Prod time	Single Trip Time
Route 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 11	0.00%	0.00%	-47.27%	0.00%	-35.91%	-6.94%
Route 12	0.00%	0.00%	248.40%	0.00%	32.75%	1.43%
Route 13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 16	-16.67%	-16.67%	42073.81%	-16.67%	32.96%	16.70%
TOTAL	-1.61%	-1.14%	-1.26%	-1.14%	-1.66%	0.25%

Under this scenario, only routes based out of Almonte Depot are affected. Route 11 becomes far more efficient with a closer home depot. Route 12 and 16 see an increase in non-productive time/distance as a result of the depot being further from any of their segments. Only route 16 will see a drop in service levels.

Note that the deceivingly large percentage growth in non-productive distance is due to the routes being extremely efficient in scenario 1. For example, Route 16 is 99.99% efficient with regards to distance in scenario 1. Even a reasonably small increase in non-productive distance will translate to a massive percentage increase. This insight is relevant in all scenario comparisons below as well.

Scenario 3 Compared to Status Quo

Remove Almonte Depot and run the trucks out of Union Hall

Route	# Trips	Prod Dist	Non-Prod Dist	Prod Time	Non-Prod time	Single Trip Time
Route 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 11	0.00%	0.00%	67.34%	0.00%	51.15%	9.88%
Route 12	-25.00%	-25.00%	2706.62%	-25.00%	327.69%	25.69%
Route 13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 16	-33.33%	-33.33%	263023.81%	-33.33%	291.01%	67.62%
TOTAL	-4.84%	-4.18%	63.55%	-4.18%	31.48%	4.86%

Under this scenario, both Route 12 and Route 16 see a decrease in service level. All three routes originally based out of Almonte Depot see considerable negative effects to their efficiencies.

Scenario 4 Compared to Status Quo

Combine Route 11 and Route 16 and run the combined route out of Almonte Depot – status quo depot configuration

Route	# Trips	Prod Dist	Non-Prod Dist	Prod Time	Non-Prod time	Single Trip Time
Route 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 11	N/A	N/A	N/A	N/A	N/A	N/A
Route 12	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 16	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	-11.29%	-4.81%	-14.20%	-4.81%	-13.54%	1.25%

Combining Route 11 and 16 result in a negative impact on total service level, as seen by the decreased number of trips completed, and an increase in the average single trip time. There is an increase in time/distance efficiencies to compensate.

Scenario 5 Compared to Status Quo

Combine Route 11 and Route 16 and run the combined route out of Mississippi Mills Township Yard – scenario 2 depot configuration

Route	# Trips	Prod Dist	Non-Prod Dist	Prod Time	Non-Prod time	Single Trip Time
Route 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 11	N/A	N/A	N/A	N/A	N/A	N/A
Route 12	0.00%	0.00%	248.40%	0.00%	32.75%	1.43%
Route 13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 16	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	-11.29%	-4.81%	-10.61%	-4.81%	-11.60%	1.47%

Once again, we see that combining Route 11 and Route 16 results in greater efficiencies at the cost of a reduced service level.

The reduction in non-productive distance is less than the reduction in the number of trips taken, which means that per trip non-productive distance has increased in total. This scenario performs worse overall than Scenario 4. However, the benefits of the route reduction help to minimize the negative efficiency impacts associated with scenario 2's depot configuration, at the cost of a further worsened service level.

Scenario 6 Compared to Status Quo

Combine Route 11 and Route 16 and run the combined route out of Union Hall – scenario 3 depot configuration

Route	# Trips	Prod Dist	Non-Prod Dist	Prod Time	Non-Prod time	Single Trip Time
Route 1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 7	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 8	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 10	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 11	N/A	N/A	N/A	N/A	N/A	N/A
Route 12	-25.00%	-25.00%	2706.62%	-25.00%	327.69%	25.69%
Route 13	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 14	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 15	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Route 16	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	-12.90%	-6.72%	23.52%	-6.72%	5.91%	4.28%

Once again, we see that combining Route 11 and Route 16 results in greater efficiencies at the cost of a reduced service level.

Compared to the status quo, this scenario sees significant negative impacts to both time/distance efficiencies and service level.

Compared to scenario 3, the route reduction considerably decreases the negative impacts to total time/distance efficiencies. As usual, it does so at the cost of a worse service level.

Conclusions

The simulation offers some significant insight on how the five (5) considered changes to the status quo can affect the service levels and efficiency of the winter maintenance operation. The charts and route level comparisons seen above unanimously confirm the following conclusions.

When looking at service level and efficiencies in isolation there are very few benefits or drawbacks to operating out of Mississippi Mills Township Yard instead of Almonte Depot. The two depots perform nearly equivalently in aggregate. Almonte offers a slightly greater service level and Mississippi Mills Township Yard offers slightly better efficiencies, though both effects are extremely small.

When looking at service level and efficiencies in isolation there are no benefits to operating out of Union Hall instead of Almonte Depot. There are considerable negative impacts to both service levels and time/distance efficiencies associated with this change.

If improving efficiencies is of high value, then combining Route 11 and Route 16 into a single route yields favorable increases in efficiency. This comes at the cost of a reduced service level. These effects apply when combining the route reduction with other depot configurations as well.

Appendix D

Trail Condition Assessment - Summary Memorandum

Memo

To: Terry McCann – Director, Lanark County

From: Bill Harvey – Project Manager, Dillon Consulting Limited

Date: January 25, 2023

Subject: Trail Condition Assessment – Summary Memorandum

Our File: 22-4587

Ancillary to the Public Works Departmental Review, Dillon Consulting Limited (Dillon) completed Condition Assessments of Lanark County (County) owned and maintained segments of the Tay-Havelock Trail and Ottawa Valley Recreational Trail (OVRT), 23 km and 62 km in length, respectively. Data collected through these assessments and inspections was used to identify current condition of major components and develop a 10-Year Capital Plan for trail operations and maintenance.

1.0 Introduction

Lanark County owns and maintains several trails for recreational usage, including 23 km of the Tay-Havelock Trail and 62 km of the Ottawa Valley Recreation Trail. In addition to the review of the Public Works Department, Dillon completed condition assessments of these two segments of networks throughout the late summer / fall of 2022. Condition assessments were completed along the OVRT and Tay-Havelock Trail in order to develop a 10-year forecast of capital and personnel requirements for the County's trail systems, with associated strategies to ensure cost minimization.

The condition assessments were completed to determine the current state ("as is") of the trails. The current state assessment provided a platform to evaluate opportunities for extending the useful life of the assets while identifying operations and maintenance activities to maintain level of service expectations and performance.

1.1 Tay-Havelock Trail

The County's portion of the Tay-Havelock Trail starts just east of Perth with a Trail Head parking lot located on the south side of Highway 7 (500 m west of the Highway 7 traffic signals at Glen Tay Road). The trail continues west following an abandoned rail bed for approximately 23 km.

The trail is comprised of a stone dust surface which hosts many multi-use activities. These multi-use trail activities include the following:

- Walking/Hiking;
- Cycling/Alternative Biking;
- Birdwatching;
- ATV/Side-by-Sides;
- Snowmobiling;
- Cross-country skiing; and
- Snowshoeing.

The trail continues in Frontenac County to Sharbot Lake where it intersects the K&P Trail. Users on the trail can either travel north towards Calabogie, south to Kingston or continue west to Havelock.

Trail parking is available at two locations:

- Tay Havelock Trail Lot: 18471 Highway 7, Perth, Ontario; and
- Tay Havelock Trail Parking Area: 460 Armstrong Line, Maberly, Ontario.

1.2 Ottawa Valley Recreational Trail

The County's section of the OVRT commences north of Smiths Falls on Sturgess Road approximately 250 m west of Highway 15, and extends north for approximately 62 km terminating in Arnprior at a Highway 417 overpass approximately 510 m south of Decosta Street.

The majority of the trail surface is comprised of granular material with small sections surfaced with stone dust which hosts many multi-use activities. These multi-use trail activities include the following:

- Walking/Hiking;
- Cycling/Alternative Biking;
- Bird watching;
- ATV/Side-by-Sides;
- Snowmobiling;
- Cross-country skiing;
- Snowshoeing;
- Equestrians; and
- Emergency Response Route.

2.0 Methodology

The intents is for the results of the assessments and the reported findings to be used to ensure that the following items are properly addressed with respect to the County's trail assets:

- Ensure that the County's trail components remain at an acceptable level of safety;
- Ensure that the useful life of the components are optimized;
- Ensure that maintenance, repair, and rehabilitation needs are identified; and
- Ensure that the County has adequate economic and technical information to effectively plan for studies, repairs and/or replacement of the structures.

Field assessments were completed during 5 individual site visits. The work was carried out in accordance with the Occupational Health and Safety Act, and in accordance with the Ontario Traffic Control Manual Book 7 – Temporary Conditions.

The assessment process included a visual examination of each individual component (ie. trail tread, gates, signs, and non-structural culverts) of the trail assets. The visual inspections of the components were conducted from within an arm's-length, where accessible. As a means of checking concrete soundness, the inspections included physically tapping concrete surfaces with a hammer, where accessible.

Binoculars, digital camera, tape measures, chest waders, flotation vest, chipping hammer, paint markers, and chalk were used to complete the inspections.

During the visual assessments, a variety of maintenance needs were noted. Examples of these needs include addressing roadway and embankment erosion, vegetation overgrowth, addressing minor collision damage, culvert cleanouts, repainting, replacing reflective tape, and repairing/installing slope protection. Areas of deterioration or maintenance needs for each component were noted and documented/supported with photographs.

Dillon's trail condition assessments consisted of a review of existing documents provided by the County in addition to visual assessment of the trails components. Detailed, non-destructive visual assessment for the trail assets was completed by vehicle and documented within Survey123 with GPS referencing. Performance, condition rating, and general information was documented while surveying the trail systems at regular intervals or at the following points of interest:

- Change in trail surface material;
- Change in trail width;
- Areas of excessive rutting, potholes, or erosion;
- Gates;
- Signage;
- Structures and culverts;
- Trail and roadway / entrance intersections; and
- Unique attributes (e.g. maintenance hole within trail right-of-way).

Assets documented as part of the trail assessments were provided condition ratings ranging from Excellent, Good, Fair, and Poor based on the condition of the asset. The ratings were used to identify a timeline for maintenance and repairs within the 10-Year Plan. Each component was assigned a prioritized maintenance and repair timeline depending on the rating a component received and its estimated remaining useful life. The suggested timeline for the prioritized maintenance and repair is categorized as follows:

- Short Term (1 to 3 years);
- Mid Term (3 to 5 years);
- Long Term (5 to 10 years); and
- No Action Required (greater than 10 years, outside of the Capital Plan window).

2.1 Assumptions and Limitations

It should be noted that there are some limitations which have the potential to affect the overall accuracy of the 10-Year Capital Plan. Limitations to the overall accuracy of the 10-Year Capital Plan as it relates to operations and maintenance recommendations include:

- Both trail systems feature structural culverts (>3.0 m span) and bridges that require maintenance and rehabilitation in order to keep the trails operational. The condition of the structural culverts and bridges can affect the experience of trail users significantly. However, these assets are not included in this memorandum and will be completed under a separate assignment;
- Inspections are non-invasive and non-destructive;
- No confined space entry was completed as part of the inspections for assets such as non-structural culverts. Visual inspection was completed from the most accessible point when possible; and
- Trail components with ratings of Excellent or Good may fall outside the timing and scope of the 10-Year Plan based on their estimated remaining useful life.

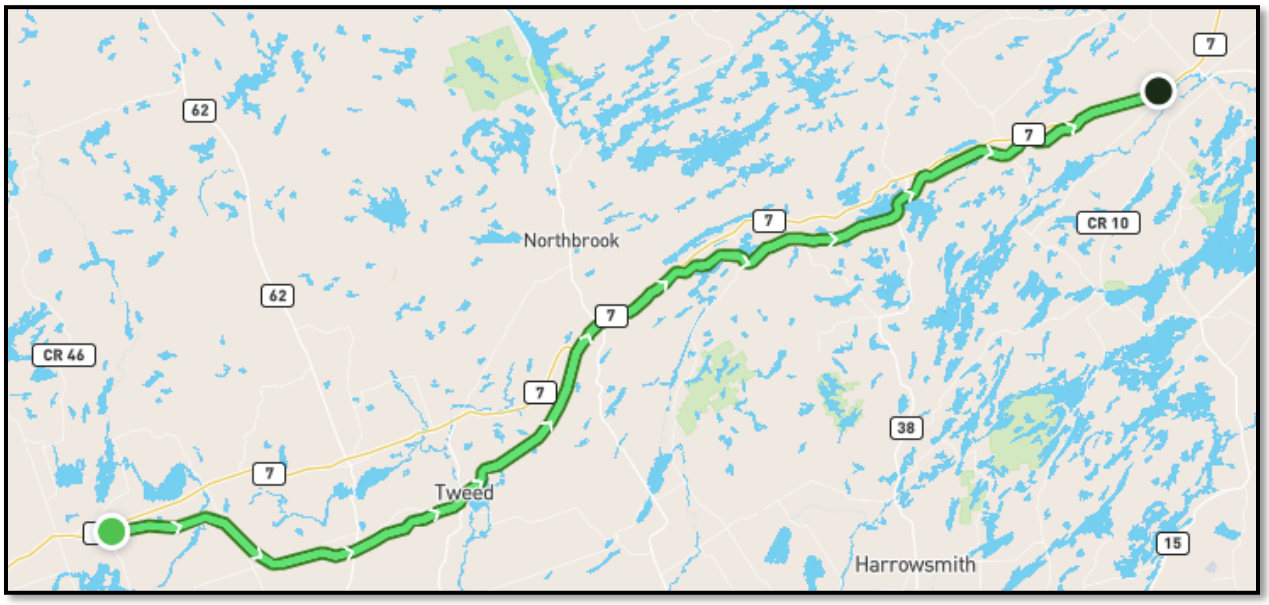
Asset management considers lifecycle activities required to continue or extend the useful life of an existing component. The base assumption is that a like-for-like replacement will occur and the required investment improves the current condition of the existing asset, making the asset fit for purpose.

3.0 Inventory and Condition

3.1 Tay-Havelock Trail

The Tay-Havelock Trail is a 23 km multi-use trail in the east-west direction within Lanark County that utilizes an abandoned rail bed. The County's portion of the Tay-Havelock Trail starts just east of Perth with a Trail Head parking lot located on the south side of Highway 7 (500 m west of the Highway 7 traffic signals at Glen Tay Road). The trail continues west following an abandoned rail bed for approximately 23 km. The trail features a stone dust surface with varying widths ranging from 2.2 m to 4.5 m. In general, the trail system was found to be in generally good condition.

Figure 1: Tay-Havelock Trail



See **Table 1** for an inventory and condition ratings of the Tay-Havelock Trail assets.

Table 1: Tay-Havelock Trail Inventory

Item	Quantity	Unit	Excellent	Good	Fair	Poor
Trail Length	23	km	0	9	9	5
Gates	3	each	0	0	3	0
Signage	113	each	3	104	6	0
Non-Structural Culverts	6	each	0	2	1	3

3.1.1 Component Condition and Representative Photographs

The condition of the Tay-Havelock Trail components were captured via photograph with GPS referencing. A few representative and worst-case photographs are included below as reference for the condition of the trail. A map book of the Tay-Havelock Trail including all components, ratings, photograph references and selects photographs of poor components can be found in **Appendix A.** In addition to this, a digitized web map with all component locations, photographs, observations, condition ratings have been provided to the County to incorporate into their GIS data.

3.1.1.1 Trail Cross Section

Typical cross section of the Tay-Havelock Trail featuring a stone dust surface with maintained grassed shoulders. The multi-use trail section is generally in Good condition exhibiting light rutting, localized medium to severe rutting, light potholes, and erosion.

Photograph Coordinates: 44.8341235, -76.49430957

3.1.1.2 Gates

Trail gates allowing trail users to pass through but blocking passage of vehicles. The gate reflective tape and paint that has faded due to exposure and slight rusting was evidenced. All gates were given a condition rating of Fair.

Photograph Coordinates: 44.82132208, -76.55102233

3.1.1.3 Signage

Stop Ahead warning sign, typically found in advance of each trail crossing. This sign exhibits slight discolouration due to exposure. A rating of Good was assigned. All signs were found to be generally in Good condition.

Photograph Coordinates: 44.82076117, -76.53181686

3.1.1.4 Rutting and Potholes

Trail platform exhibits moderate rutting and significant potholes. This deterioration was localized to a small area. A rating of Poor was assigned.

Photograph Coordinates: 44.83763264, -76.50151038

3.1.1.5 Embankment Erosion

Embankment exhibiting significant erosion which appears to be accelerated due to turtle nesting activity when compared to adjacent stretches of trail. A rating of Poor was assigned.

Photograph Coordinates: 44.82259129, -76.55760872

3.1.1.6 Raised Maintenance Hole

Bell Canada maintenance hole locate within the trail. The maintenance hole protuded approximately 80 mm above grade creating a hazard to trail users. The trail was given rating of Poor in this localized area.

Photograph Coordinates: 44.86738788, -76.39271935

3.1.1.7 Asphalt Apron

Brooke Valley Road trail crossing featuring an asphalt apron. The asphalt apron exhibited significant deterioration and ravelling of material. A rating of Poor was assigned.

Photograph Coordinates: 44.85599782, -76.42930237

3.1.1.8 Non-Structural Culverts

Culvert C14 concrete barrel wall. The barrel exhibited medium to severe scaling, disintegrations and ice damage. This non-structural culvert was rated in Poor condition

Photograph Coordinates: 44.82148906, -76.53060954

1.1 Tay-Havelock Trail Cost Estimates

The 10-Year Capital Plan for the operations and maintenance of the Tay-Havelock Trail is based on the rating system and suggested timeline noted in the previous section, and is supplemented with a cost estimate for the recommended work. The 10-Year Capital Plan and list of all components and recommendations for the Tay-Havelock Trail are included in **Appendix B** of this report.

A summary of the 10-Year Capital Plan can be found below in **Table 2.**

Table 2: Tay-Havelock Trail 10-Year Capital Plan

Tay-Havelock 10-Year Capital Plan						
Year	**Trail**	**Signs**	**Gates**	**Non-Structural Culverts**	**ANNUAL TOTAL**	**CUMULATIVE TOTAL**
2023	$40,000	$400	$300	$39,000	**$79,700**	**$79,700**
2024	$30,000	$300	$350	$38,000	**$68,650**	**$148,350**
2025	$23,000	$400	$500	-	**$23,900**	**$172,250**
2026	$23,000	-	-	-	**$23,000**	**$195,250**
2027	$23,000	$1,900	$300	$27,000	**$52,200**	**$247,450**
2028	$23,000	-	-	-	**$23,000**	**$270,450**
2029	$23,000	$400	$300	-	**$23,700**	**$294,150**
2030	$23,000	-	$300	-	**$23,300**	**$317,450**
2031	$23,000	$400	$300	-	**$23,700**	**$341,150**
2032	$23,000	-	-	$21,000	**$44,000**	**$385,150**

The cost estimates represent Class "D" (Indicative) Estimates prepared with an expected accuracy of 25% +/-. The estimates were prepared using previous completed tenders of similar work, experience with similar projects, previous quotes from contractors, and factoring in the recent high levels of inflation. The scope of any particular recommendation is made without the benefit of coordinated asset upgrades; consequently, the scope of specific recommendations should be verified as part of any detailed project planning.

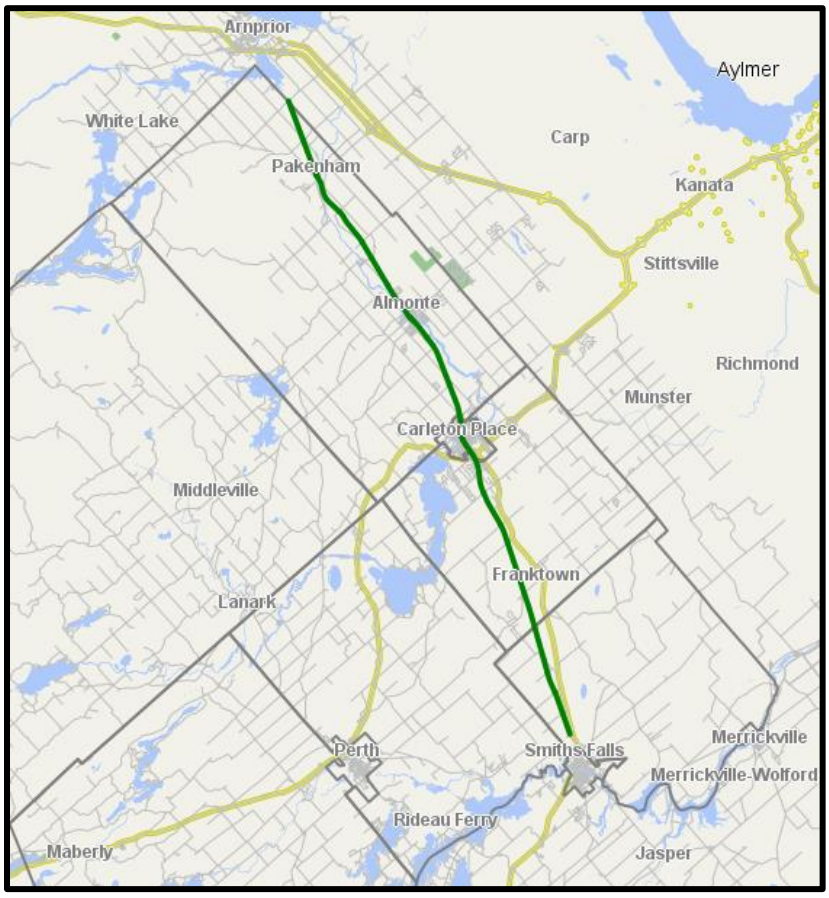
All cost estimates are an opinion of probable costs in current dollars (i.e. year 2023) and are provided for budgeting purposes only. Accurate figures can only be obtained after further investigation, preparing detailed specifications, tendering, and receiving competitive quotes from qualified contractors. Life expectancy projections are based on visual review during the site visits. The costs were developed with the following assumptions:

- Contingency of 10% was included for materials and anticipated line items;
- Contingency of 15% was included for engineering services associated with works; and
- Internal management costs, contractor indirect costs and economic factors are excluded.

1.2 Ottawa Valley Recreational Trail

The OVRT is a 62 km multi-use trail in the north-south direction within the Lanark County that makes use of a section of the former Canadian Pacific Railway year-round. The County's section of the OVRT commences north of Smiths Falls on Sturgess Road approximately 250 m west of Highway 15, and extends north for approximately 62 km terminating in Arnprior at a Highway 417 overpass approximately 510 m south of Decosta Street. The trail features a stone dust surface with varying widths ranging from 2.7 m to 6.3 m. In general, the trail system was found to be in Good to Fair condition.

Figure 2 – OVRT



See **Table 3** for an inventory and condition ratings of the OVRT assets.

Table 3: OVRT Trail Inventory

Item	Quantity	Unit	Good	Fair	Poor
Trail Length	62	km	33	16	13
Gates	30	each	0	30	0
Signage	393	each	328	27	38
Non-Structural Culverts	34	each	14	9	11

3.1.2 Component Conditions and Representative Photographs

The condition of the OVRT components were captured via photograph with GPS referencing. A few representative and worst-case photographs are included below as reference for the condition of the trail. A map book of the OVRT including all components, ratings, photo references and selects photographs of poor components can be found in **Appendix C.** In addition to this a digitized web map

with all component locations, photos, observations, condition ratings have been provided to the County to incorporate into their GIS data.

3.1.2.1 Trail Cross Section

Typical cross section of the Tay-Havelock Trail featuring a stone dust and granular surface. The multi-use trail section is generally in Fair to Poor condition exhibiting light to medium rutting.

Photograph Coordinates: 45.26342895, -76.23003565

3.1.2.2 Gates

Trail gates allowing trail users to pass through but blocking passage of vehicles. The gate reflective tape has faded due to exposure, paint has stated to peel, and light corrosion was evidenced. All gates were given a condition rating of Fair.

Photograph Coordinates: 44.82132208, -76.55102233

3.1.2.3 Signage

Trail rules sign exhibited severe damage. A rating of Poor was assigned. All signs were found to range in condition from Poor to Good. Several Stop Ahead and Stop signs were missing and should be replaced. These are highlighted in the condition comments and recommendations.

Photograph Coordinates: 44.92308448, -76.03055002

3.1.2.4 Rutting and Potholes

Trail platform exhibited severe rutting and significant potholes. This deterioration was localized to a small area. A rating of Poor was assigned.

Photograph Coordinates: 45.18398348, -76.15835351

3.1.2.5 Embankment Erosion

Embankment exhibiting significant erosion which appears to be accelerated due trail width and standing water on either side of the trail. A rating of Poor was assigned.

Photograph Coordinates: 45.04029955, -76.08436785

3.1.2.6 Non-Structural Culverts

The culvert shown exhibits severe delaminations, displaced wingwalls, severe spalling and efflorence throughout. This non-structural culvert was rated in poor condition.

Photograph Coordinates: 45.26355262, -76.23010134

3.2 Ottawa Valley Recreational Trail – Cost Estimates

The 10-Year Capital Plan for the operations and maintenance of the OVRT is based on the rating system and suggested timeline noted in the previous section, and is supplemented with a cost estimates for the recommended work. The 10-Year Capital Plan and list of all components and recommendations for the OVRT trail are included in **Appendix D** of this report.

A summary of the 10-Year Capital Plan can be found below in **Table 4.**

Table 4: Ottawa Valley Recreational Trail 10-Year Capital Plan

Ottawa Valley Recreational Trail 10-Year Capital Plan						
Year	Trail	Signs	Gates	Non-Structural Culverts	ANNUAL TOTAL	CUMULATIVE TOTAL
2023	$ 100,000	$ 5,400	$ 1,000	$ 89,500	$195,900	$195,900
2024	$ 100,000	$ 1,500	$ 750	$ 101,500	$203,750	$399,650
2025	$ 61,000	$ 2,300	$ 1,500	$ 133,000	$197,800	$597,450
2026	$ 61,000	$ 1,500	$ 3,000	$ 55,000	$120,500	$717,950
2027	$ 61,000	$ 2,300	$ 3,000	$ 31,000	$97,300	$815,250
2028	$ 61,000	$ 2,340	$ 1,000	$ 4,000	$68,340	$883,590
2029	$ 61,000	$ 3,140	-	$ 20,000	$84,140	$967,730
2030	$ 61,000	$ 2,340	-	-	$63,340	$1,031,070
2031	$ 61,000	$ 3,140	-	-	$64,140	$1,095,210
2032	$ 61,000	$ 2,340	$ 1,000	-	$64,340	$1,159,550

The costing is prepared at a Class D level with an expected accuracy of +/- 25%. The estimates were prepared based on previous completed tenders of similar work, experience with similar projects, and previous quotes from manufacturers. The scope of any particular recommendation is made without the benefit of coordinated asset upgrades; consequently, the scope of specific recommendations should be verified as part of any detailed project planning.

All cost estimates are an opinion of probable costs in current dollars and are provided for budgeting purposes only. Accurate figures can only be obtained after further investigation, preparing detailed specifications, tendering, and receiving competitive quotes from qualified contractors. Life expectancy projections are based on visual review during the site visits. The costs were developed with the following assumptions:

- Contingency of 10% was included for materials and anticipated line items;
- Contingency of 15% was included for engineering services associated with works; and
- Internal management costs, contractor indirect costs and economic factors are excluded.

4.0 General Maintenance

Recommendations have been provided for the majority of the trail assets on both the Tay Havelock Trail and OVRT. The majority of maintenance issues requiring attention are relatively minor and it has been assumed can be completed by Lanark County staff. These maintenance issues include the following:

- Repainting gates and replacing reflective material;
- Replacing signs and straightening signs;
- Repair of trail surfaces including eroded areas, rutting, depression, and potholes;
- Embankment repairs;
- Waterway debris and overgrowth removal;
- Culvert cleanouts; and
- Minor concrete repairs not requiring engineering direction.

The Ottawa Valley Recreation Trail Management Plan is a document to provide direction in managing the goals and objectives of the trail, including maintenance. The document suggests that the County is responsible for upholding the guidelines identified in this Plan and endeavour to oversee the management and maintenance of the trail in conjunction with this Plan.

4.1 Trail Maintenance Objectives

Trail maintenance objectives are to preserve the trail in an operational state for the permitted users to access the trail safely, enjoyably and sustainably, providing:

- User Safety - anytime user safety is in question, the trail may be closed until the required maintenance can be completed;
- Positive User Experience - trails that have a quality maintenance program help facilitate a positive user experience; and
- Trail Sustainability - it is recommended that any trail maintenance shall be done in accordance with sustainable trail building practices resulting in lower overall costs and a reduced impact on the surrounding eco-system.

4.2 Trail Maintenance

4.2.1 Trail Corridor

It is recommended that a trail bed width of 3 m be maintained and brush cut to an additional 0.6 m on each side and approximately 4.2 m overhead of the trail for the safety of all identified recreational users and maintenance for both trail systems.

4.2.2 Trail Surfacing

Grading is recommended to be completed as required. The most critical time for grading is following spring thaw to prepare the surface for summer use. The current tread surface is unsatisfactory and changes to accommodate all trail users must be made. The recommended trail surface is Granular 'A' material, Granular 'M' material, or stone dust. When grading or shaping is completed, it is recommended a crown 2-3% be utilized to promote proper drainage. The surface material upgrade should occur as part of any capital improvements on the trail.

4.2.3 Gates, Barriers and Bollards

Gates, barriers and bollards should be kept in good working order, painted and reflectivity tape installed to ensure visibility to trail users.

4.2.4 Ditches and Culverts

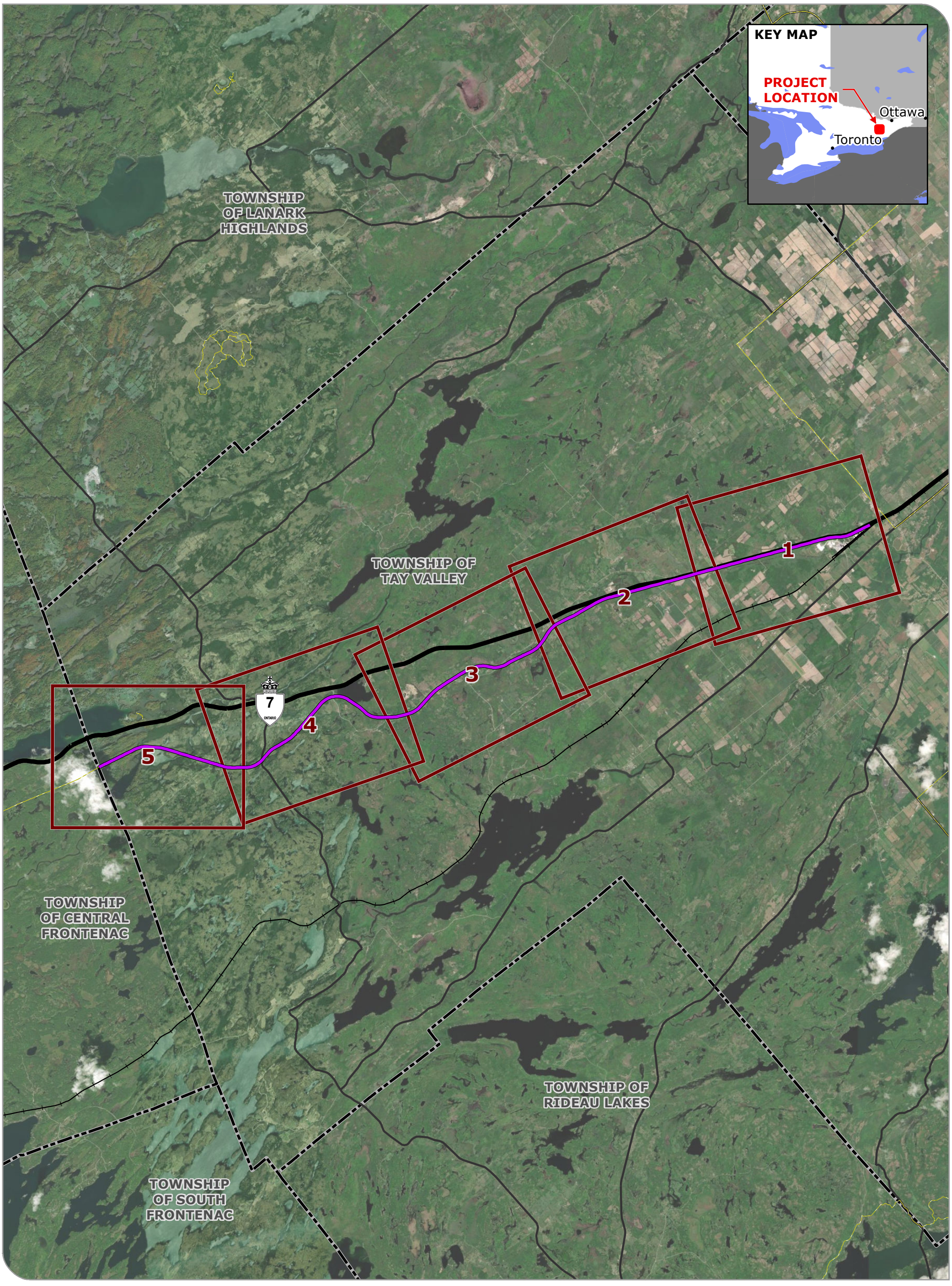
When trail maintenance is being completed, it is recommended that ditches and culverts be cleared of debris. Culverts should be installed to accommodate the heaviest permitted use on the trail (e.g. emergency or maintenance equipment) when replacement is warranted. To prevent culvert deformation due to loads, culverts should be installed as deep as grading and drainage permits in order to provide sufficient cover. When flooding or washouts occur at culverts and ditches, action should be taken immediately. In areas where the trail is covered by water, or may potentially be covered by water, grading should be completed to prevent deterioration. Ditches should free of trees and other vegetation that may inhibit storm water conveyance.

4.2.5 Insufficient Trail Building Practices

Insufficient trail building practices are identifiable in cases where a maintenance log shows reoccurring issues in the same area. In locations where repeated temporary fixes are applied without success, the County should seek a long-term sustainable solution and remediation approaches.

Appendix A

Tay-Havelock Trail Map Book



LANARK COUNTY TRAILS

Trail Memo

TAY HAVELOCK TRAIL OVERVIEW

FIGURE 1

- Tay Havelock Trail
- Page
- Highway
- Major Road
- Provincal Trail
- Railway
- Municipal Boundary

SCALE 1:100,000

0 0.5 1 2 km

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_TNT01_Trail_Overview.mxd

LANARK COUNTY TRAILS

Trail Memo

TAY HAVELOCK TRAIL

FIGURE 1 - 1

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Tay Havelock Trail
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Railway
- Municipal Boundary
- Water Body
- Watercourse

SCALE 1:15,000

0 125 250 500 m

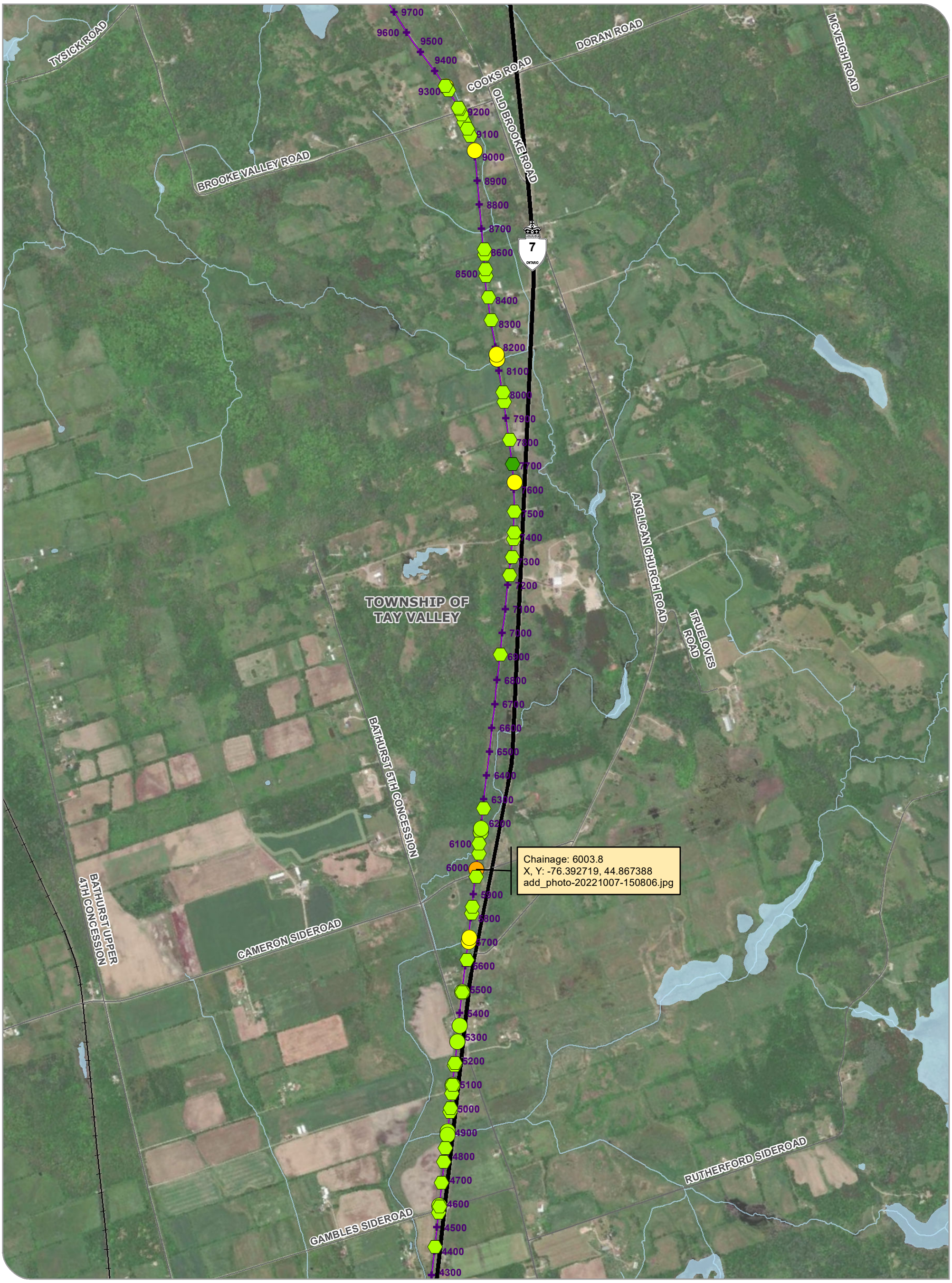
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-25

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_TNT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

TAY HAVELOCK TRAIL

FIGURE 1 - 2

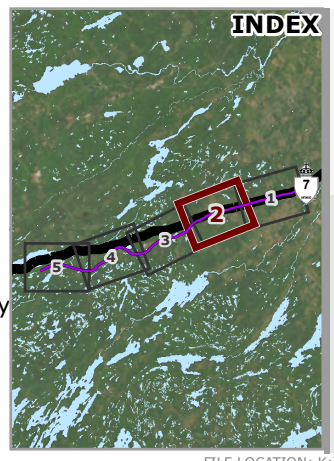
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Tay Havelock Trail
- Chainage Station
- Highway
- Minor Road
- Provincal Trail
- Railway
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

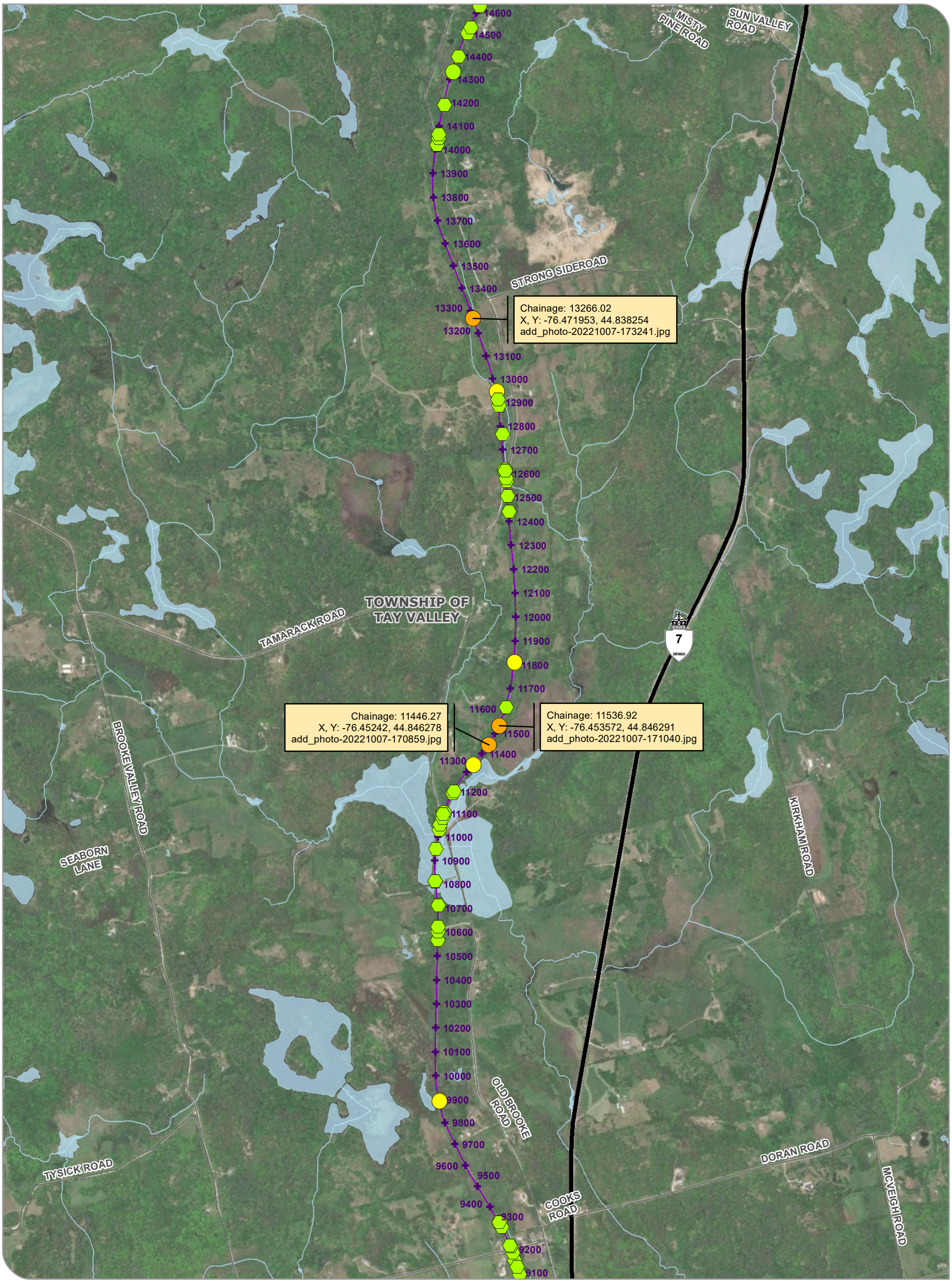
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-25

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_TNT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

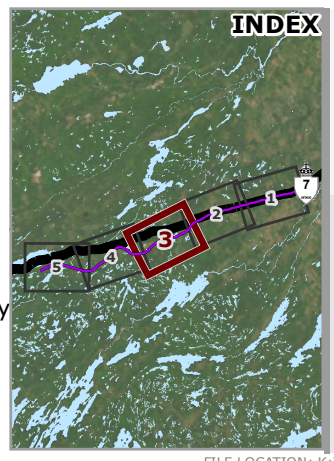
TAY HAVELOCK TRAIL

FIGURE 1 - 3

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor
- No Status

- Tay Havelock Trail
- Chainage Station
- Highway
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-25

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_TNT01a_Trail_DD.mxd

LANARK COUNTY TRAILS

Trail Memo

TAY HAVELOCK TRAIL

FIGURE 1 - 4

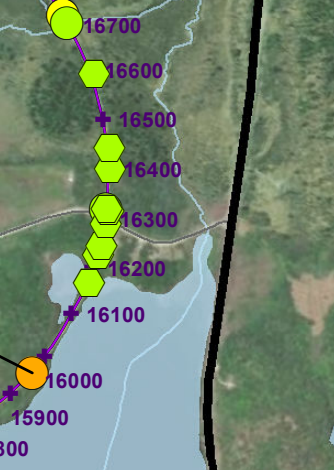
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Tay Havelock Trail
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

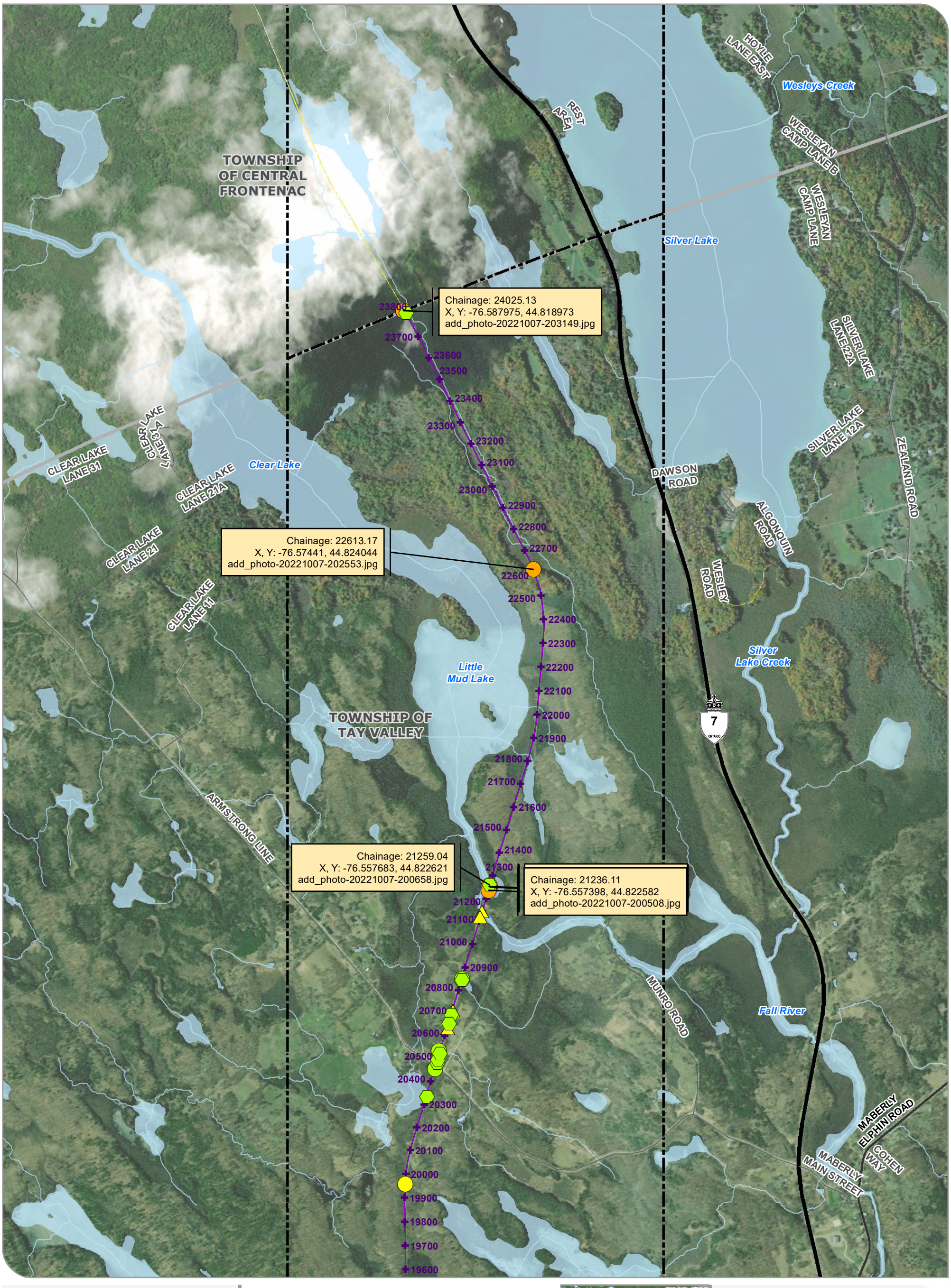
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-25

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_TNT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

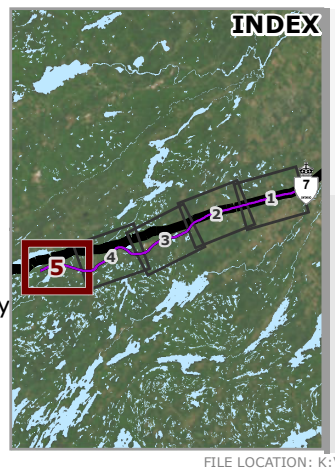
TAY HAVELOCK TRAIL

FIGURE 1 - 5

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Tay Havelock Trail
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-25

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_TNT01a_Trail_DD.mxd

Appendix B

Tay-Havelock 10-Year Capital Plan and Component Sheets

DILLON CONSULTING

Appendix B
Tay-Havelock 10-Year Capital Plan

Tay-Havelock 10-Year Capital Plan										
Component	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Trail	$40,000	$30,000	$23,000	$23,000	$23,000	$23,000	$23,000	$23,000	$23,000	$23,000
Signs	$400	$300	$400	-	$1,900	-	$400	-	$400	-
Gates	$300	$350	$500	-	$300	-	$300	$300	$300	-
Non-Structural Culverts	$39,000	$38,000	-	-	$27,000	-	-	-	-	$21,000
ANNUAL TOTAL	**$79,700**	**$68,650**	**$23,900**	**$23,000**	**$52,200**	**$23,000**	**$23,700**	**$23,300**	**$23,700**	**$44,000**
CUMULATIVE TOTAL	**$79,700**	**$148,350**	**$172,250**	**$195,250**	**$247,450**	**$270,450**	**$294,150**	**$317,450**	**$341,150**	**$385,150**

Appendix B
Ottawa Valley Recreational Trail - Trail Data Points and Observations

Tay-Valley Recreational Trail Components - Trail Data Points						
No.	**Trail Latitude**	**Trail Longitude**	**Width (m)**	**Observations**	**Condition Raiting**	**Recommendation**
18	44.86738788	-76.39271935	2.7	Generally good condition with sandy granular and localized rutting. Bell manhole should be adjusted to grade, 80 mm too high	Poor	Add additional material and grade at intersection around Bell manhole.
28	44.84629102	-76.45357157	4.5	Large pothole centre of the trail.	Poor	Typical annual maintenance and repair potholes.
29	44.84627754	-76.45241998	3.2	Light to medium potholes in trail.	Poor	Typical annual maintenance and repair potholes.
35	44.83825355	-76.47195347	2.4	C9, severe rutting localized at culvert and approaches.	Poor	Typical annual maintenance and add additional material.
37	44.83763264	-76.50151038	2.6	Generally in fair to poor condition with medium rutting and severe pothole.	Poor	Typical annual maintenance and repair potholes.
45	44.82404416	-76.57440966	2.5	Medium to severe rutting.	Poor	Typical annual maintenance and add additional material.
47	44.82262437	-76.55756822	N/A	Embankment erosion north side.	Poor	Typical annual maintenance and repair north embankment.
48	44.82262145	-76.55768325	2.6	Medium to severe rutting and embankment erosion and evidence of turtle nesting holes,	Poor	Typical annual maintenance and repair embankment.
49	44.82259129	-76.55760872	N/A	Embankment erosion south side and evidence of turtle nesting holes	Poor	Typical annual maintenance and repair embankment.
50	44.82258172	-76.55739821	N/A	Embankment erosion south side.	Poor	Typical annual maintenance and repair north embankment.
57	44.818973	-76.58797491	3.0	Potholes throughout and medium to severe rutting.	Poor	Typical annual maintenance and add additional material.
22	44.86313368	-76.41240688	2.8	Medium rutting and potholes	Fair	Typical annual maintenance.
9	44.87426806	-76.35936178	2.7	Medium rutting, 70mm rut.	Fair	Typical annual maintenance.
17	44.86811743	-76.38925649	2.3	Fair condition exhibiting light to medium rutting.	Fair	Typical annual maintenance.
23	44.86074931	-76.41806607	2.2	C5, no railing with large drop is quite dangerous, light to medium rutting,	Fair	Typical annual maintenance.
24	44.86066864	-76.41829253	2.5	Light to medium rutting.	Fair	Typical annual maintenance.
25	44.85696478	-76.42780135	2.2	Light to medium rutting and narrows at bend.	Fair	Typical annual maintenance.
26	44.85504033	-76.43035716	2.7	Light to medium rutting.	Fair	Typical annual maintenance.
27	44.85089974	-76.43456507	2.6	Light to medium rutting.	Fair	Typical annual maintenance.
30	44.8461145	-76.45111487	2.8	Localized pothole	Fair	Typical annual maintenance.
32	44.84568937	-76.45691913	2.9	Generally fair condition with light potholes and light to medium rutting.	Fair	Typical annual maintenance.
34	44.84033322	-76.46912955	2.4	Light to medium rutting.	Fair	Typical annual maintenance.
39	44.83595479	-76.5102058	2.7	Light to medium rutting.	Fair	Typical annual maintenance.
42	44.83035815	-76.51663629	2.9	Medium rutting.	Fair	Typical annual maintenance.
43	44.82827736	-76.51917692	N/A	C12, generally in good to fair condition with light to medium rutting.	Fair	Typical annual maintenance.
44	44.82718173	-76.52080189	2.8	C13, generally in good to fair condition with light to medium rutting and beaver dam upstream.	Fair	Typical annual maintenance.
52	44.82148906	-76.53060954	3.8	C14, generally in good to fair condition with light to medium rutting.	Fair	Typical annual maintenance.
54	44.8207491	-76.53181639	3.2	Medium rutting.	Fair	Typical annual maintenance.
56	44.81964648	-76.54178945	2.8	Medium rutting.	Fair	Typical annual maintenance.
1	44.88201299	-76.32017518	N/A	Traial head parking lot, gravel good condition	Good	Typical annual maintenance.
2	44.88199095	-76.32071125	2.4	Trail head, good conditon, 2.4m width, entrance 4.0m	Good	Typical annual maintenance.
3	44.88198085	-76.32115794	N/A	Good condition	Good	Typical annual maintenance.
4	44.88183076	-76.32156373	2.7	Trail start	Good	Typical annual maintenance.
5	44.88008568	-76.32903764	2.7	Trail west of Omya	Good	Typical annual maintenance.
6	44.87949723	-76.33410059	2.7	Good condition	Good	Typical annual maintenance.
7	44.87765206	-76.34293748	3.1	Light rutting	Good	Typical annual maintenance.
8	44.87657844	-76.34824894	N/A	windrow on edge, good conditon	Good	Typical annual maintenance.
10	44.87263243	-76.36732307	N/A	Good condition	Good	Typical annual maintenance.
11	44.87093799	-76.37556223	2.8	Good condition	Good	Typical annual maintenance.
12	44.87015769	-76.37935081	2.3	Trail west of B1 and good condition.	Good	Typical annual maintenance.

13	44.86966321	-76.38171501	2.7	Good condition	Good	Typical annual maintenance.
14	44.86920438	-76.38393718	2.7	Good condition	Good	Typical annual maintenance.
15	44.86904907	-76.3847649	N/A	Good condition - Bathhurst 5th concession crossing	Good	Typical annual maintenance.
16	44.8686581	-76.38645338	N/A	Generally good condition, light rutting, and maintained grass shoulder	Good	Typical annual maintenance.
19	44.86695327	-76.39482496	2.3	Light rutting and in good condition	Good	Typical annual maintenance.
31	44.84598864	-76.44811192	4.2	Good condition with light rutting.	Good	Typical annual maintenance.
33	44.84198608	-76.46566263	2.7	Light rutting.	Good	Typical annual maintenance.
36	44.83786022	-76.50599985	3.5	material change to fine granular A mix,	Good	Typical annual maintenance.
38	44.83606281	-76.51005951	N/A	C11, generally in good condition.	Good	Typical annual maintenance.
40	44.8341235	-76.49430957	2.4	Light rutting and in good condition	Good	Typical annual maintenance.
41	44.83326457	-76.48298239	2.6	C10, generally in good condition with light rutting.	Good	Typical annual maintenance.
46	44.82276931	-76.52911174	3.0	Medium rutting.	Good	Typical annual maintenance.
51	44.82164061	-76.55268675	2.4	Light to medium rutting.	Good	Typical annual maintenance and repair north embankment.
53	44.82082373	-76.54886073	N/A	Ambassador line parking lot.	Good	Typical annual maintenance.
55	44.82068847	-76.54790116	N/A	Armstrong line crossing.	Good	Typical annual maintenance.

Appendix B
Ottawa Valley Recreational Trail - Non-Structural Culvert Components

Tay-Valley Recreational Trail Components - Non-Structural Culverts									
No.	Trail Latitude	Trail Longitude	Material	Span (m)	Observations	Condition Raiting	Recommendation Timing	Recommendation	Costs
C14	44.82148906	-76.53060954	Concrete	1.25 x 0.9	C14, Medium to severe scaling and light disintegration throughout barrel walls.	Poor	1 to 3 years	Reface barrel walls or confirm installing a liner based on hydraulic requirements.	$ 30,000.00
C3	44.869577°	-76.382150°	Concrete	1.85 x 1.2	C3, Medium to severe spalling, delamination and scaling.	Fair - Poor	1 to 3 years	Miscellanous partial depth concrete repairs and repair embankments.	$ 38,000.00
C9	44.83825355	-76.47195347	Concrete	0.5 x 0.3	C9, Limited inspection due material throughout invert. Light scaling observed.	Good	1 to 3 years	Culvert cleanout.	$ 4,000.00
C10	44.83326457	-76.48298239	Stacked Stone	0.7 x 0.8	C10, Generally good condition with build up of sediment.	Good	1 to 3 years	Culvert cleanout.	$ 5,000.00
C6	44.858404°	-76.423957°	Concrete	1.2 x 1.0	C6, Limited inspection due to accessibility. Medium to severe scaling and spalling noted from ends.	Fair	3 to 5 years	Miscellanous partial depth concrete repairs and repair embankments.	$ 27,000.00
C8	44.842240°	-76.465148°	Concrete	1.2 x 0.5	C8, Medium to severe delaminations throughuot soffit and scaling throughout base of both walls. Dry at the time of inspection.	Fair	5 to 10 years	Miscellanous partial depth concrete repairs.	$ 21,000.00

Appendix B
Ottawa Valley Recreational Trail - Sign Components

Tay-Valley Recreational Trail Components - Signs						
No.	**Trail Latitude**	**Trail Longitude**	**Observations**	**Condition Raiting**	**Recommendation Timing**	**Recommendation**
8	44.87472225	-76.35722584	Generally in fair with reflectivity worn.	Fair	1 to 3 years	Replace
9	44.87428591	-76.35936079	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace
58	44.84612916	-76.44722624	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace
61	44.84593575	-76.44927625	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace
72	44.83402493	-76.47916192	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace
10	44.87137966	-76.37345027	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace
26	44.86747437	-76.39237071	Generally in good condition.	Good	No action	Routine maintenance
1	44.88020261	-76.32723648	Generally in good condition.	Good	No action	Routine maintenance
3	44.87998604	-76.33048865	Generally in good condition.	Good	No action	Routine maintenance
4	44.8786043	-76.33831233	Generally in good condition.	Good	No action	Routine maintenance
5	44.87800451	-76.34111572	Generally in good condition.	Good	No action	Routine maintenance
7	44.87493674	-76.35621819	Generally in good condition.	Good	No action	Routine maintenance
11	44.87101772	-76.37519901	Generally in good condition.	Good	No action	Routine maintenance
12	44.87095824	-76.3755255	Generally in good condition.	Good	No action	Routine maintenance
13	44.87068153	-76.3767134	Generally in good condition.	Good	No action	Routine maintenance
14	44.87045712	-76.37780311	Generally in good condition.	Good	No action	Routine maintenance
15	44.87032039	-76.37849622	Generally in good condition.	Good	No action	Routine maintenance
16	44.86995893	-76.38034142	Generally in good condition.	Good	No action	Routine maintenance
17	44.86991871	-76.38055955	Generally in good condition.	Good	No action	Routine maintenance
18	44.86975572	-76.38130063	Generally in good condition.	Good	No action	Routine maintenance
19	44.86965751	-76.38172242	Generally in good condition.	Good	No action	Routine maintenance
20	44.86944831	-76.38271614	Generally in good condition.	Good	No action	Routine maintenance
21	44.86943334	-76.38283195	Generally in good condition.	Good	No action	Routine maintenance
22	44.86865595	-76.38645056	Generally in good condition.	Good	No action	Routine maintenance
23	44.86835299	-76.38813299	Generally in good condition.	Good	No action	Routine maintenance
24	44.86785292	-76.3904876	Generally in good condition.	Good	No action	Routine maintenance
25	44.86778519	-76.3908186	Generally in good condition.	Good	No action	Routine maintenance

Appendix B

Ottawa Valley Recreational Trail - Sign Components

27	44.86724691	-76.39355933	Generally in good condition.	Good	No action	Routine maintenance
28	44.86709812	-76.39405194	Generally in good condition.	Good	No action	Routine maintenance
29	44.86675298	-76.39586076	Generally in good condition.	Good	No action	Routine maintenance
30	44.86430086	-76.4077811	Generally in good condition.	Good	No action	Routine maintenance
31	44.8641367	-76.40870486	Generally in good condition.	Good	No action	Routine maintenance
32	44.86391045	-76.40962244	Generally in good condition.	Good	No action	Routine maintenance
33	44.86354364	-76.4109932	Generally in good condition.	Good	No action	Routine maintenance
35	44.86234777	-76.414378	Generally in good condition.	Good	No action	Routine maintenance
36	44.86161535	-76.41612211	Generally in good condition.	Good	No action	Routine maintenance
37	44.8614268	-76.41657468	Generally in good condition.	Good	No action	Routine maintenance
38	44.85998734	-76.41984726	Generally in good condition.	Good	No action	Routine maintenance
39	44.85956241	-76.42091344	Generally in good condition.	Good	No action	Routine maintenance
40	44.8591614	-76.4219131	Generally in good condition.	Good	No action	Routine maintenance
41	44.85905321	-76.42220872	Generally in good condition.	Good	No action	Routine maintenance
42	44.85881028	-76.4229174	Generally in good condition.	Good	No action	Routine maintenance
43	44.85872477	-76.42316528	Generally in good condition.	Good	No action	Routine maintenance
44	44.85660603	-76.42843178	Generally in good condition.	Good	No action	Routine maintenance
45	44.85618795	-76.42898266	Generally in good condition.	Good	No action	Routine maintenance
46	44.85639579	-76.42873136	Generally in good condition.	Good	No action	Routine maintenance
47	44.85582902	-76.42952189	Generally in good condition.	Good	No action	Routine maintenance
48	44.85577644	-76.42955921	Generally in good condition.	Good	No action	Routine maintenance
49	44.85517602	-76.43022212	Generally in good condition.	Good	No action	Routine maintenance
50	44.84801041	-76.44205607	Generally in good condition.	Good	No action	Routine maintenance
51	44.84786632	-76.44244764	Generally in good condition.	Good	No action	Routine maintenance
52	44.84779093	-76.4426637	Generally in good condition.	Good	No action	Routine maintenance
53	44.84741655	-76.44368424	Generally in good condition.	Good	No action	Routine maintenance
54	44.84741506	-76.44368269	Generally in good condition.	Good	No action	Routine maintenance
55	44.84689344	-76.44471481	Generally in good condition.	Good	No action	Routine maintenance
56	44.84689572	-76.44472125	Generally in good condition.	Good	No action	Routine maintenance
57	44.84634938	-76.44626338	Generally in good condition.	Good	No action	Routine maintenance
59	44.84602555	-76.44787774	Generally in good condition.	Good	No action	Routine maintenance

Appendix B

Ottawa Valley Recreational Trail - Sign Components

60	44.84598163	-76.44804643	Generally in good condition.	Good	No action	Routine maintenance
62	44.84593894	-76.44940874	Generally in good condition.	Good	No action	Routine maintenance
63	44.84619774	-76.45462055	Generally in good condition.	Good	No action	Routine maintenance
64	44.8428521	-76.46382252	Generally in good condition.	Good	No action	Routine maintenance
65	44.84252541	-76.46451375	Generally in good condition.	Good	No action	Routine maintenance
66	44.84223827	-76.46517747	Generally in good condition.	Good	No action	Routine maintenance
67	44.84200586	-76.46563737	Generally in good condition.	Good	No action	Routine maintenance
68	44.84200442	-76.46563704	Generally in good condition.	Good	No action	Routine maintenance
69	44.84127686	-76.46727542	Generally in good condition.	Good	No action	Routine maintenance
70	44.84065131	-76.46852363	Generally in good condition.	Good	No action	Routine maintenance
71	44.84050847	-76.46879101	Generally in good condition.	Good	No action	Routine maintenance
73	44.83400308	-76.47917275	Generally in good condition.	Good	No action	Routine maintenance
74	44.83394012	-76.47951575	Generally in good condition.	Good	No action	Routine maintenance
75	44.83388518	-76.47970303	Generally in good condition.	Good	No action	Routine maintenance
76	44.83355612	-76.48121897	Generally in good condition.	Good	No action	Routine maintenance
77	44.83316808	-76.4838393	Generally in good condition.	Good	No action	Routine maintenance
78	44.83306893	-76.48513255	Generally in good condition.	Good	No action	Routine maintenance
79	44.83306791	-76.48549556	Generally in good condition.	Good	No action	Routine maintenance
80	44.83298871	-76.4866975	Generally in good condition.	Good	No action	Routine maintenance
81	44.83803576	-76.50412877	Generally in good condition.	Good	No action	Routine maintenance
82	44.83801488	-76.50486088	Generally in good condition.	Good	No action	Routine maintenance
83	44.83801084	-76.50509387	Generally in good condition.	Good	No action	Routine maintenance
84	44.83794977	-76.50565776	Generally in good condition.	Good	No action	Routine maintenance
85	44.83791675	-76.50598777	Generally in good condition.	Good	No action	Routine maintenance
86	44.83788356	-76.50601755	Generally in good condition.	Good	No action	Routine maintenance
87	44.83768953	-76.50699712	Generally in good condition.	Good	No action	Routine maintenance
88	44.83755229	-76.50748167	Generally in good condition.	Good	No action	Routine maintenance
89	44.83683664	-76.50908964	Generally in good condition.	Good	No action	Routine maintenance
90	44.83371695	-76.51282344	Generally in good condition.	Good	No action	Routine maintenance
91	44.83272433	-76.51394968	Generally in good condition.	Good	No action	Routine maintenance
92	44.83217273	-76.51458703	Generally in good condition.	Good	No action	Routine maintenance

Appendix B

Ottawa Valley Recreational Trail - Sign Components

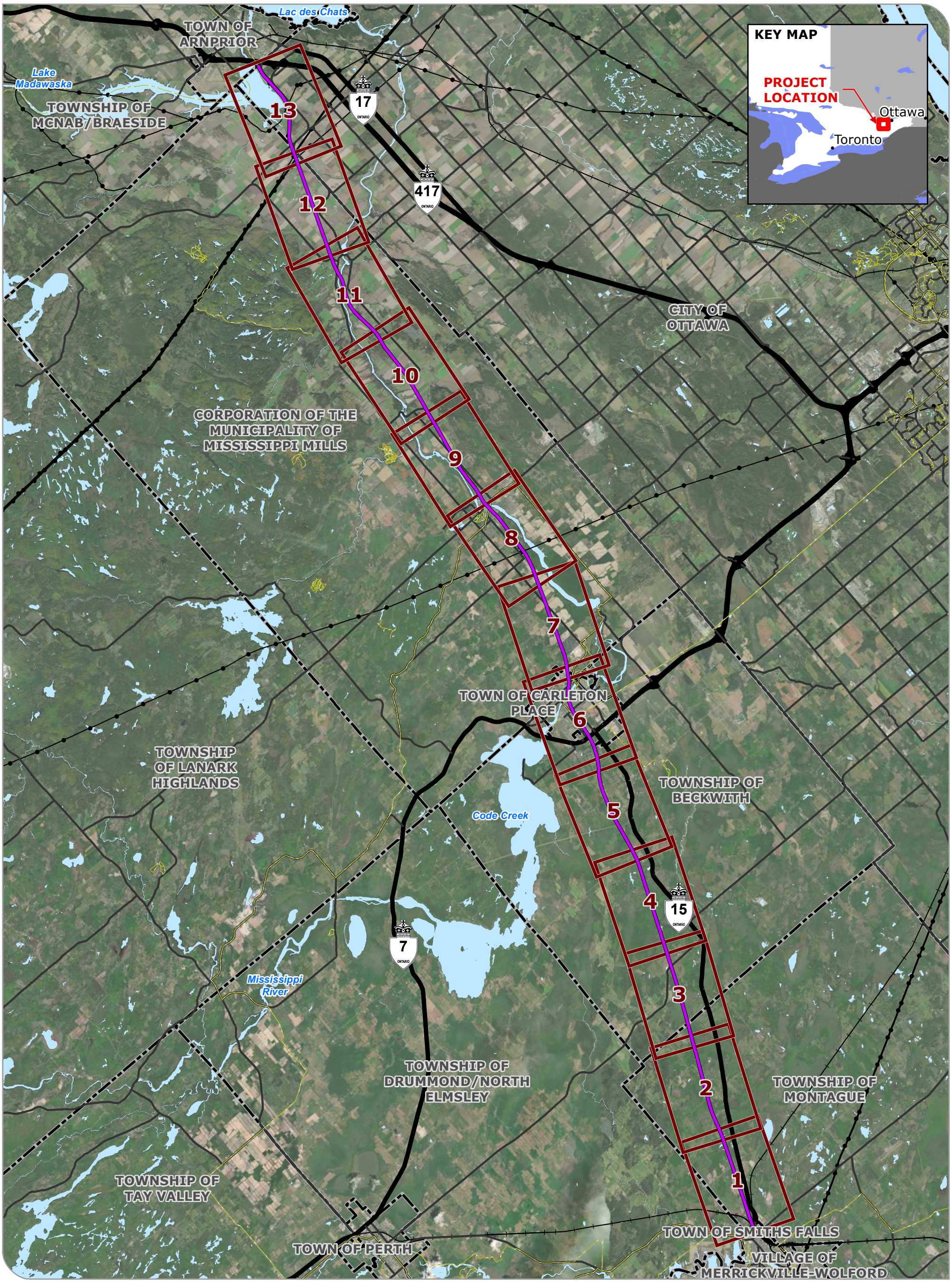
93	44.83073327	-76.51620387	Generally in good condition.	Good	No action	Routine maintenance
94	44.83036087	-76.51662564	Generally in good condition.	Good	No action	Routine maintenance
95	44.82825523	-76.51913591	Generally in good condition.	Good	No action	Routine maintenance
96	44.82510695	-76.52542565	Generally in good condition.	Good	No action	Routine maintenance
97	44.82277424	-76.52909969	Generally in good condition.	Good	No action	Routine maintenance
98	44.82176753	-76.53027065	Generally in good condition.	Good	No action	Routine maintenance
99	44.82146341	-76.53063312	Generally in good condition.	Good	No action	Routine maintenance
100	44.82130917	-76.53091817	Generally in good condition.	Good	No action	Routine maintenance
101	44.82126501	-76.55078474	Generally in good condition.	Good	No action	Routine maintenance
102	44.82076117	-76.53181686	Generally in good condition.	Good	No action	Routine maintenance
103	44.8204048	-76.54643099	Generally in good condition.	Good	No action	Routine maintenance
104	44.82041326	-76.54643004	Generally in good condition.	Good	No action	Routine maintenance
105	44.82077327	-76.54823121	Generally in good condition.	Good	No action	Routine maintenance
106	44.82079088	-76.54838274	Generally in good condition.	Good	No action	Routine maintenance
107	44.82086421	-76.54873177	Generally in good condition.	Good	No action	Routine maintenance
108	44.82117962	-76.55031172	Generally in good condition.	Good	No action	Routine maintenance
109	44.82164038	-76.55264068	Generally in good condition.	Good	No action	Routine maintenance
110	44.82261317	-76.55769463	Generally in good condition.	Good	No action	Routine maintenance
111	44.81908242	-76.58784844	Generally in good condition.	Good	No action	Routine maintenance
112	44.81908242	-76.58784844	Generally in good condition.	Good	No action	Routine maintenance
113	44.85501617	-76.43036335	Generally in good condition.	Good	No action	Routine maintenance
2	44.8800794	-76.3285537	Generally in good condition.	Excellent	No action	Routine maintenance
6	44.87595188	-76.35130065	Generally in good condition.	Excellent	No action	Routine maintenance
34	44.86279624	-76.41327238	Generally in good condition.	Excellent	No action	Routine maintenance

Appendix B
Ottawa Valley Recreational Trail - Gate Components

Tay-Valley Recreational Trail Components - Gates							
No.	Trail Latitude	Trail Longitude	Material	Observations	Condition Raiting	Recommendation Timing	Recommendation
3	44.8222787	-76.55600389	Steel	Bridge gate, one side open locked in position, replace reflective sticker	Fair	1 to 3 years	Fix lock, remove existing paint, repaint and replace reflective tape.
1	44.82113766	-76.55007062	Steel	Weathering paint and poor reflectivity.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
2	44.82132208	-76.55102233	Steel	Weathering paint and poor reflectivity.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.

Appendix C

OVRT Map Book



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL (OVRT) OVERVIEW

FIGURE 1

- Ottawa Valley Recreational Trail (OVRT)
- Page
- Highway
- Major Road
- Provincal Trail
- Railway
- Utility Line
- Municipal Boundary
- Water Body

SCALE 1:175,000

0 1 2 4 km

N W E S

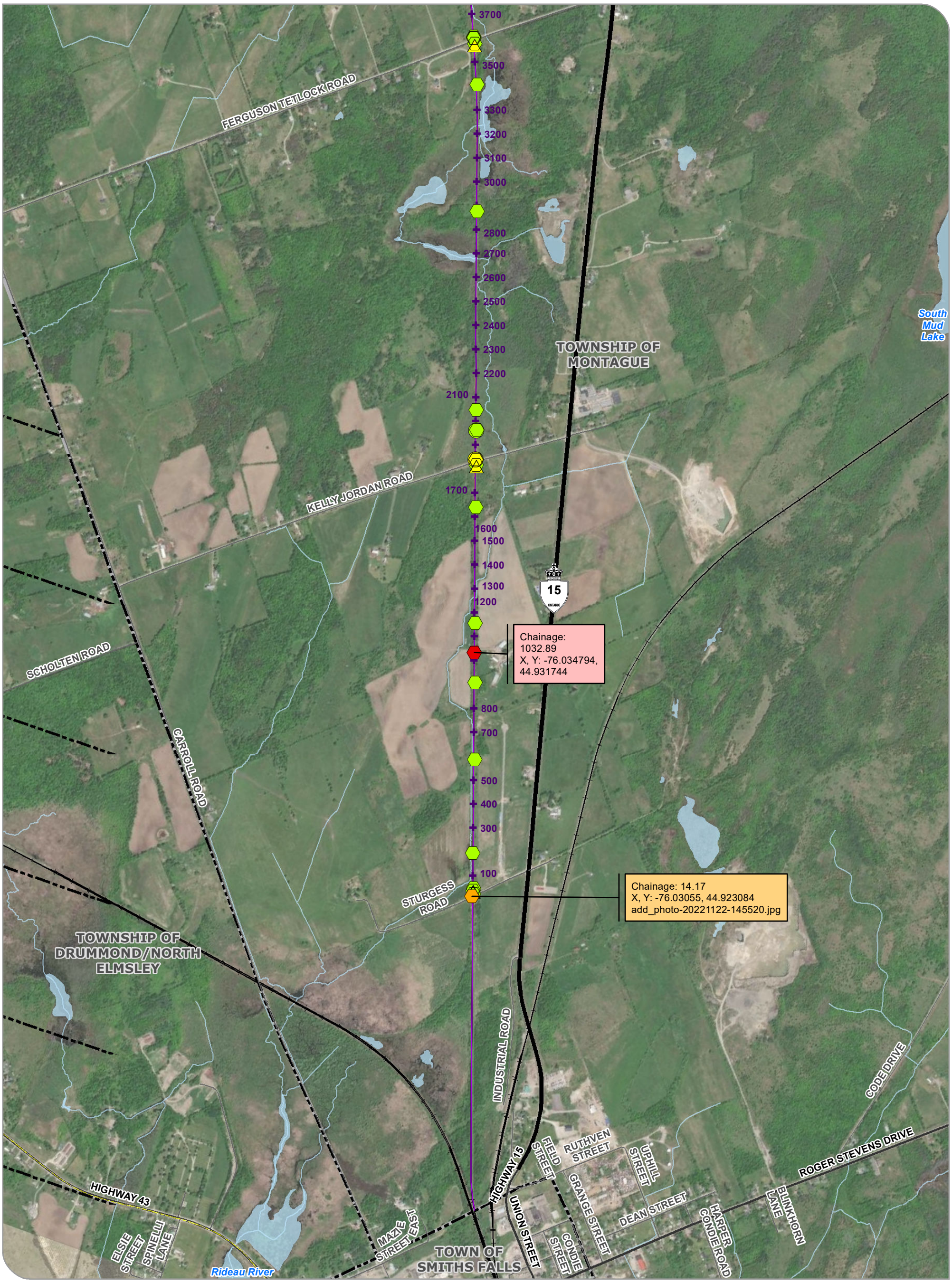
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01_Trail_Overview.mxd



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 1

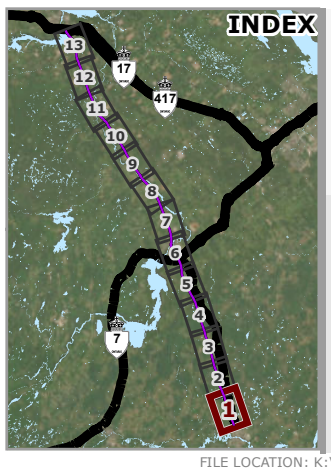
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor
- No Status

- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Railway
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

N W E S

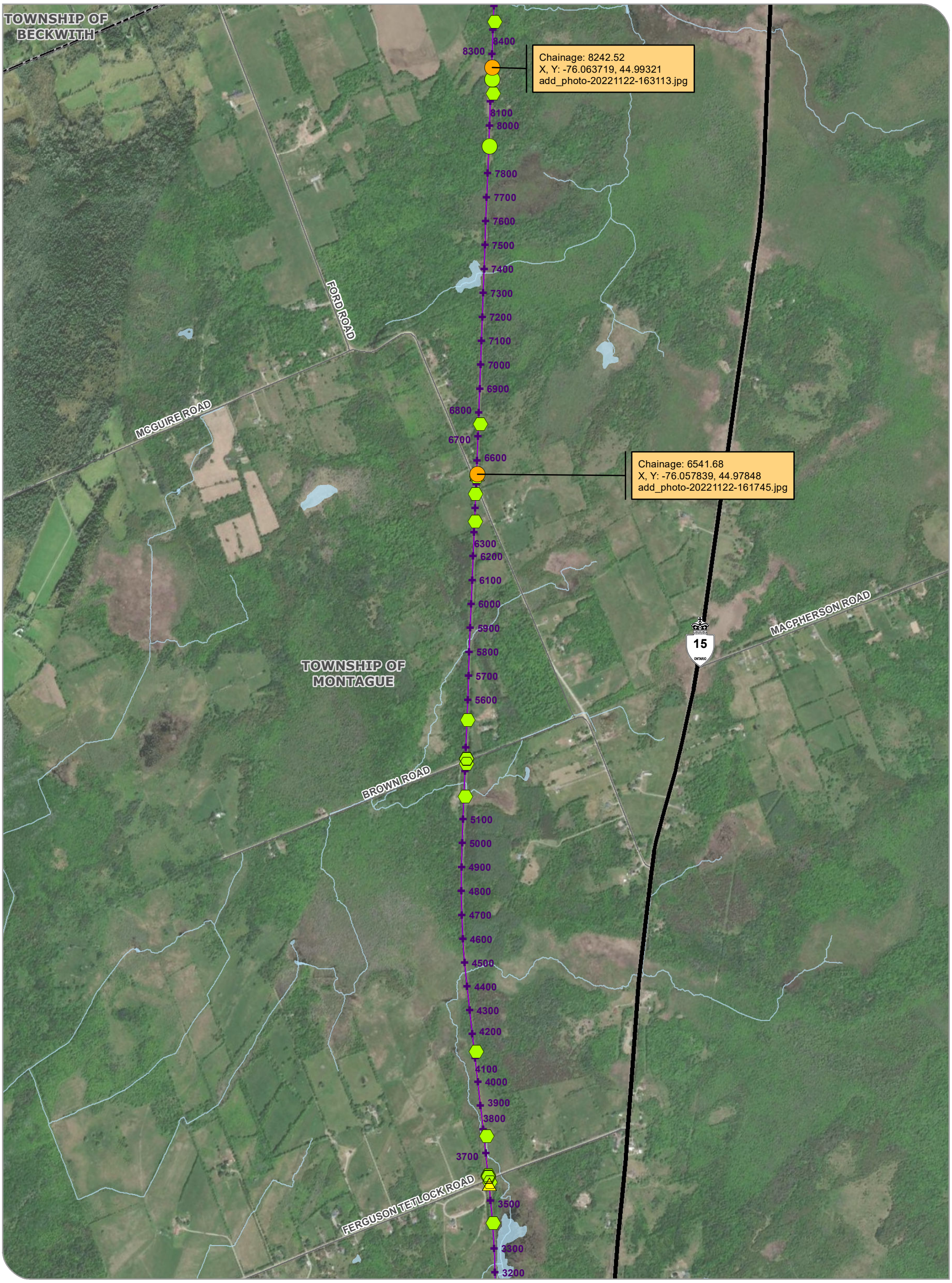
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 2

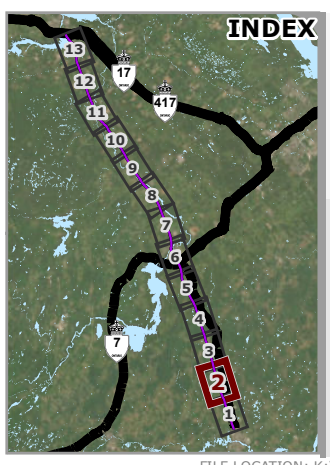
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Highway
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

DILLON CONSULTING

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd

Chainage: 12008.12
X, Y: -76.077514, 45.025656
add_photo-20221122-165634.jpg

Chainage: 11847.93
X, Y: -76.076851, 45.024292
add_photo-20221122-165327.jpg

Chainage: 8242.52
X, Y: -76.063719, 44.99321
add_photo-20221122-163113.jpg

LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 3

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse

INDEX

SCALE 1:15,000

0 125 250 500 m

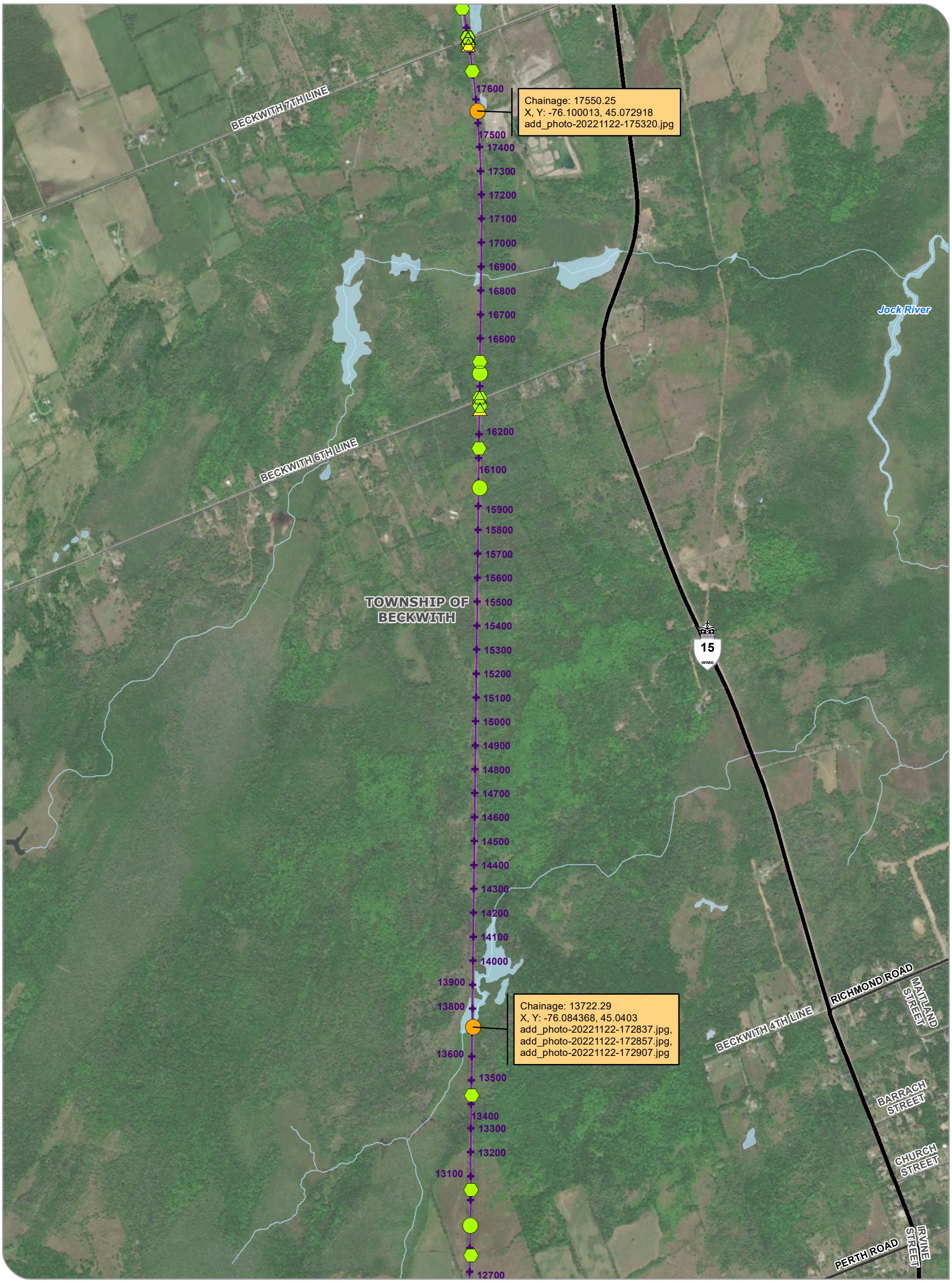
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

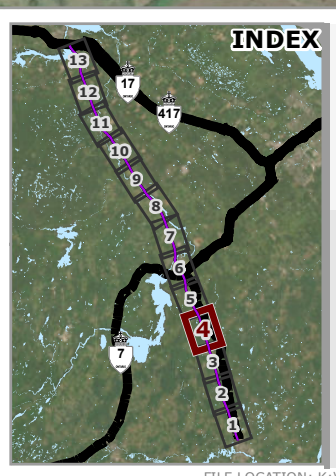
OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 4

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

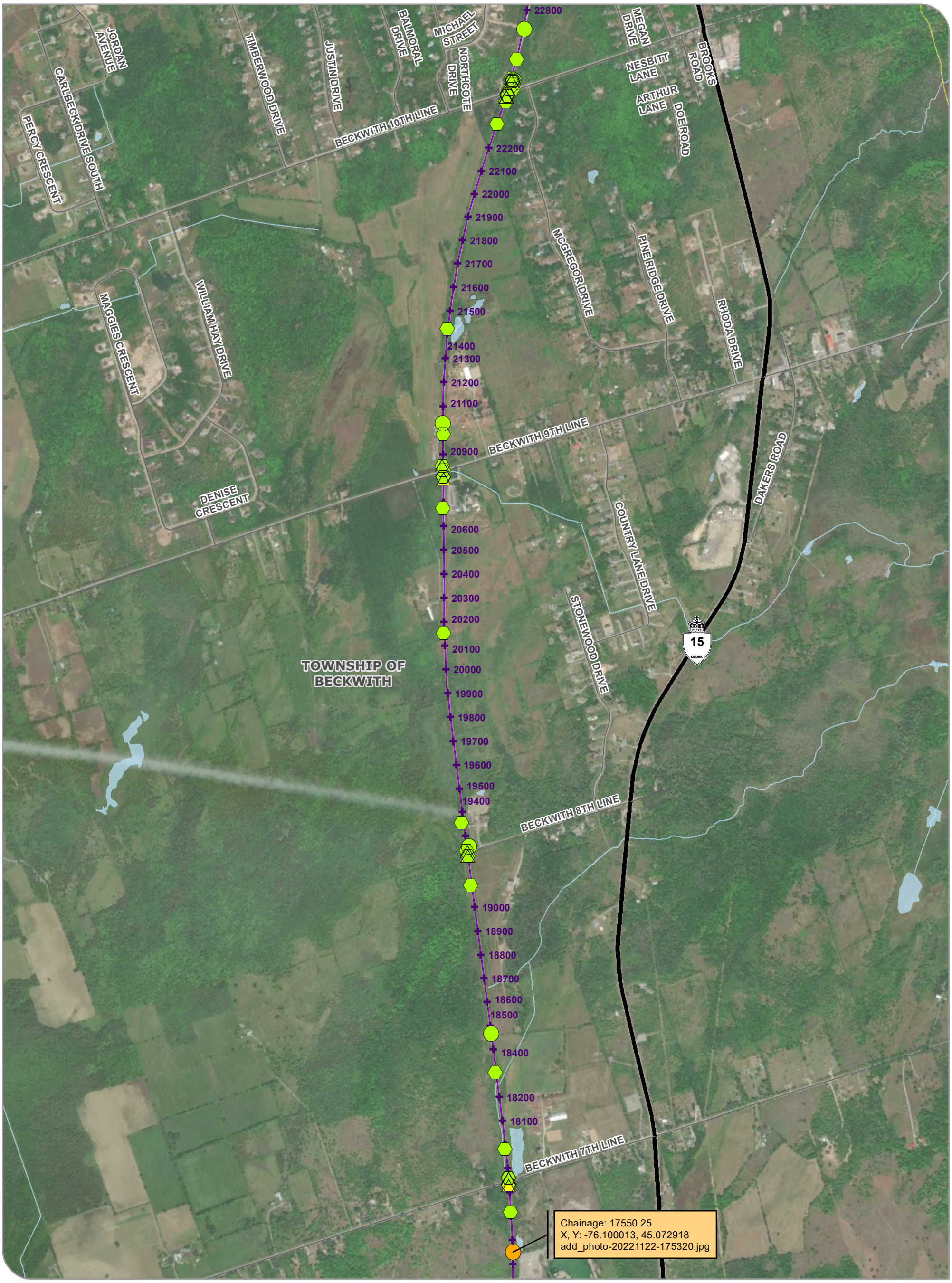
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 5

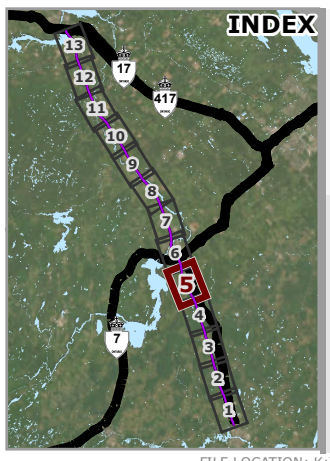
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Highway
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd

CORPORATION OF THE MUNICIPALITY OF MISSISSIPPI MILLS

TOWN OF CARLETON PLACE

TOWNSHIP OF BECKWITH

Mississippi Lake

Chainage: 23965.33
X, Y: -76.130115, 45.125942
add_photo-20221122-194219.jpg,
add_photo-20221122-194228.jpg,
add_photo-20221122-194526.jpg

Chainage: 23965.33
X, Y: -76.130115, 45.125942
add_photo-20221122-194219.jpg,
add_photo-20221122-194228.jpg,
add_photo-20221122-194526.jpg

LANARK COUNTY TRAILS

Trail Memo

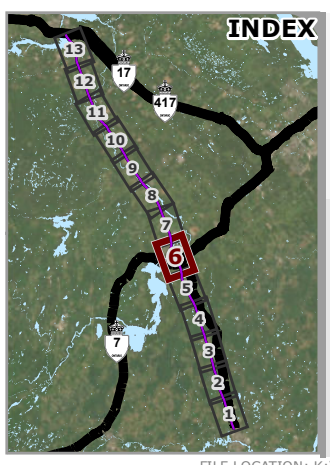
OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 6

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor
- No Status

- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Utility Line
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

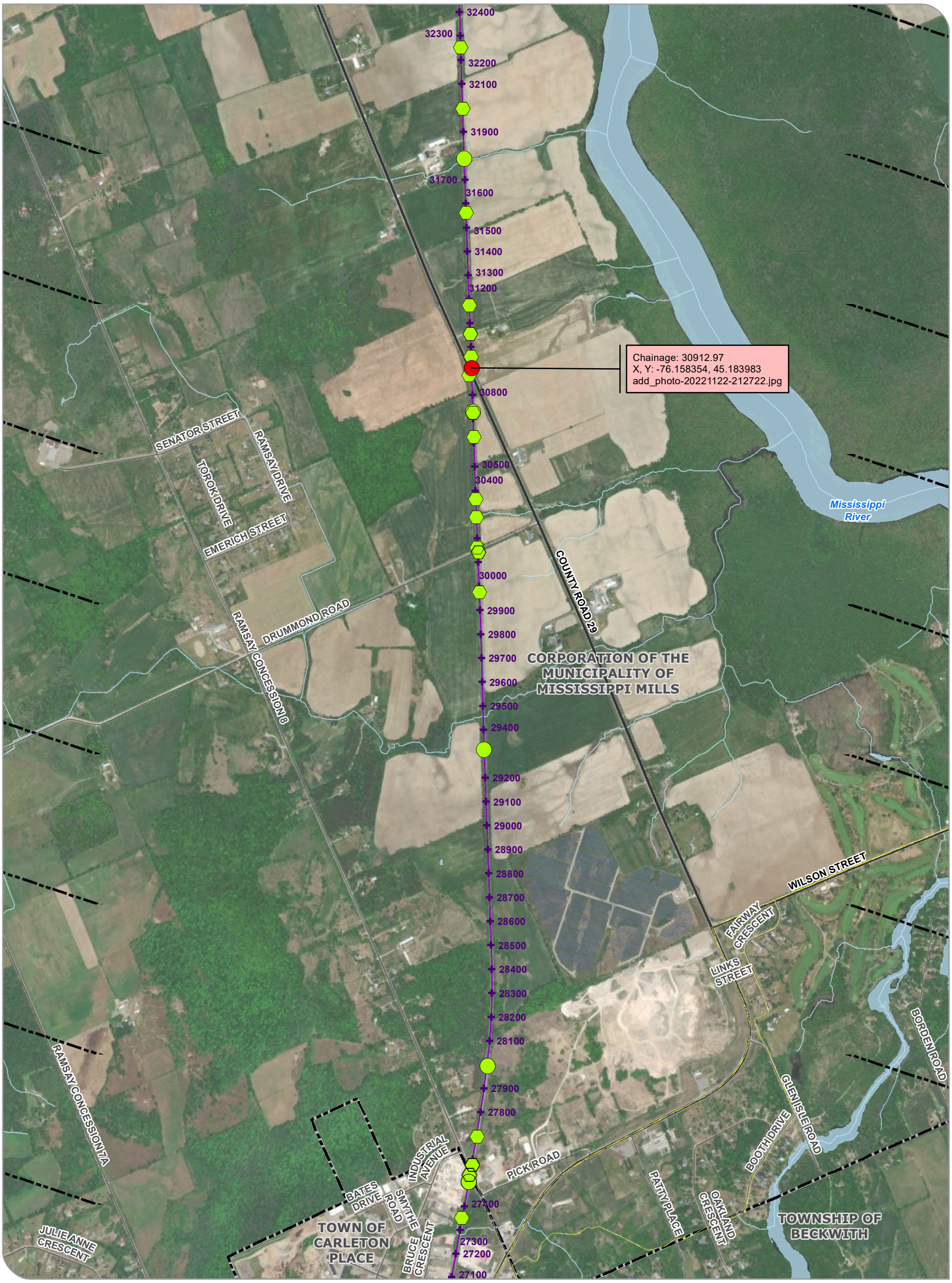
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

DILLON CONSULTING

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 7

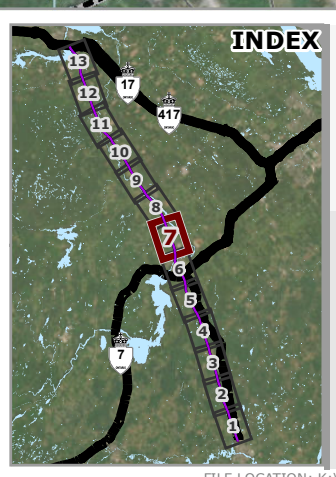
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Major Road
- Minor Road
- Provincal Trail
- Utility Line
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

DILLON CONSULTING

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd

Chainage: 36095.1
X, Y: -76.191541, 45.223743
add_photo-20221128-144936.jpg

Chainage: 35938.26
X, Y: -76.19016, 45.222722
add_photo-20221128-144640.jpg

Chainage: 35459.8
X, Y: -76.186115, 45.219504
add_photo-20221128-144214.jpg

Chainage: 35128.88
X, Y: -76.183582, 45.217125
add_photo-20221128-144013.jpg

Chainage: 34017.38
X, Y: -76.175025, 45.209156
add_photo-20221122-214307.jpg

LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 8

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Major Road
- Minor Road
- Provincal Trail
- Utility Line
- Municipal Boundary
- Water Body
- Watercourse

INDEX

SCALE 1:15,000

0 125 250 500 m

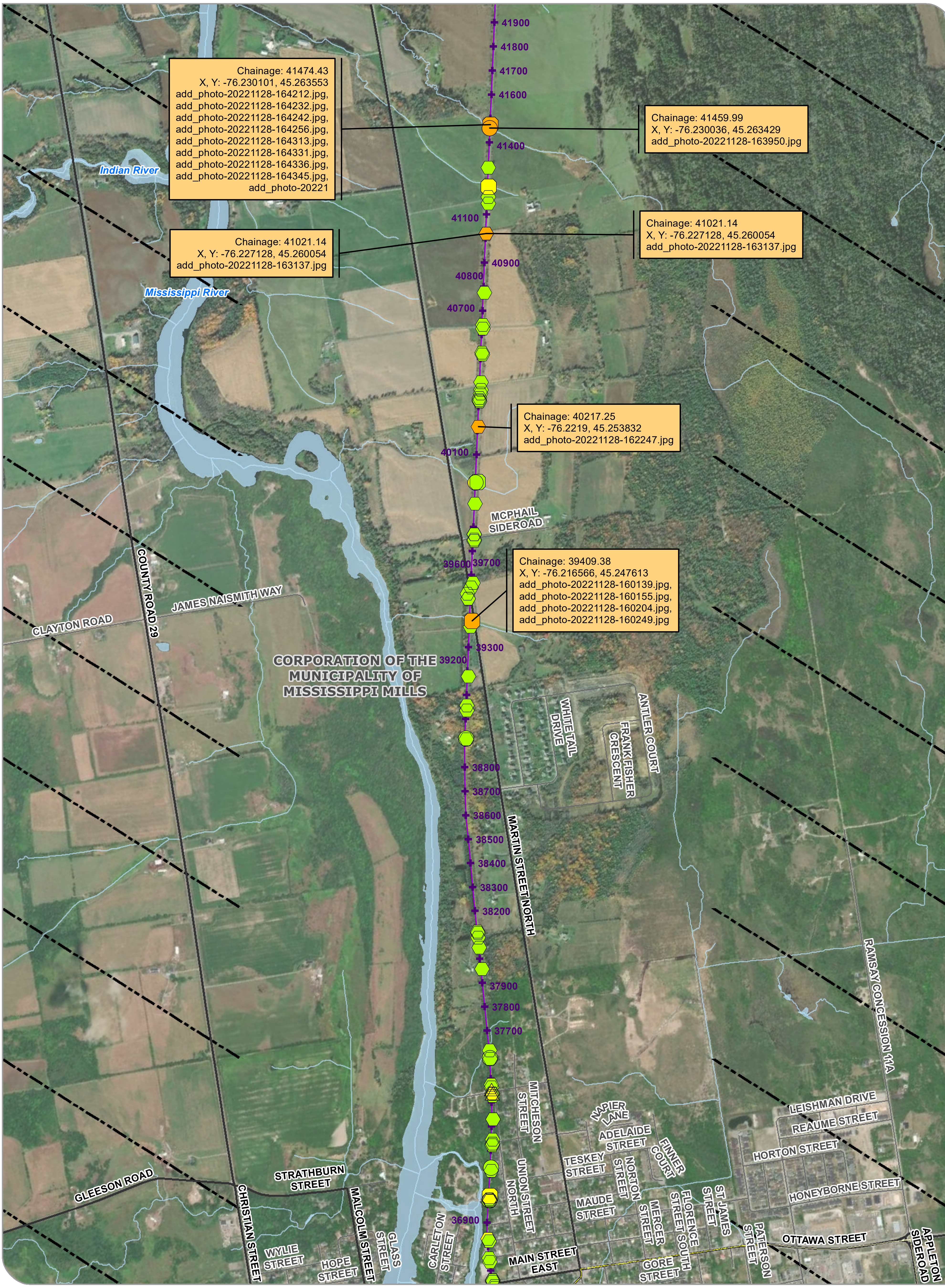
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 9

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Major Road
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse

SCALE 1:15,000

0 125 250 500 m

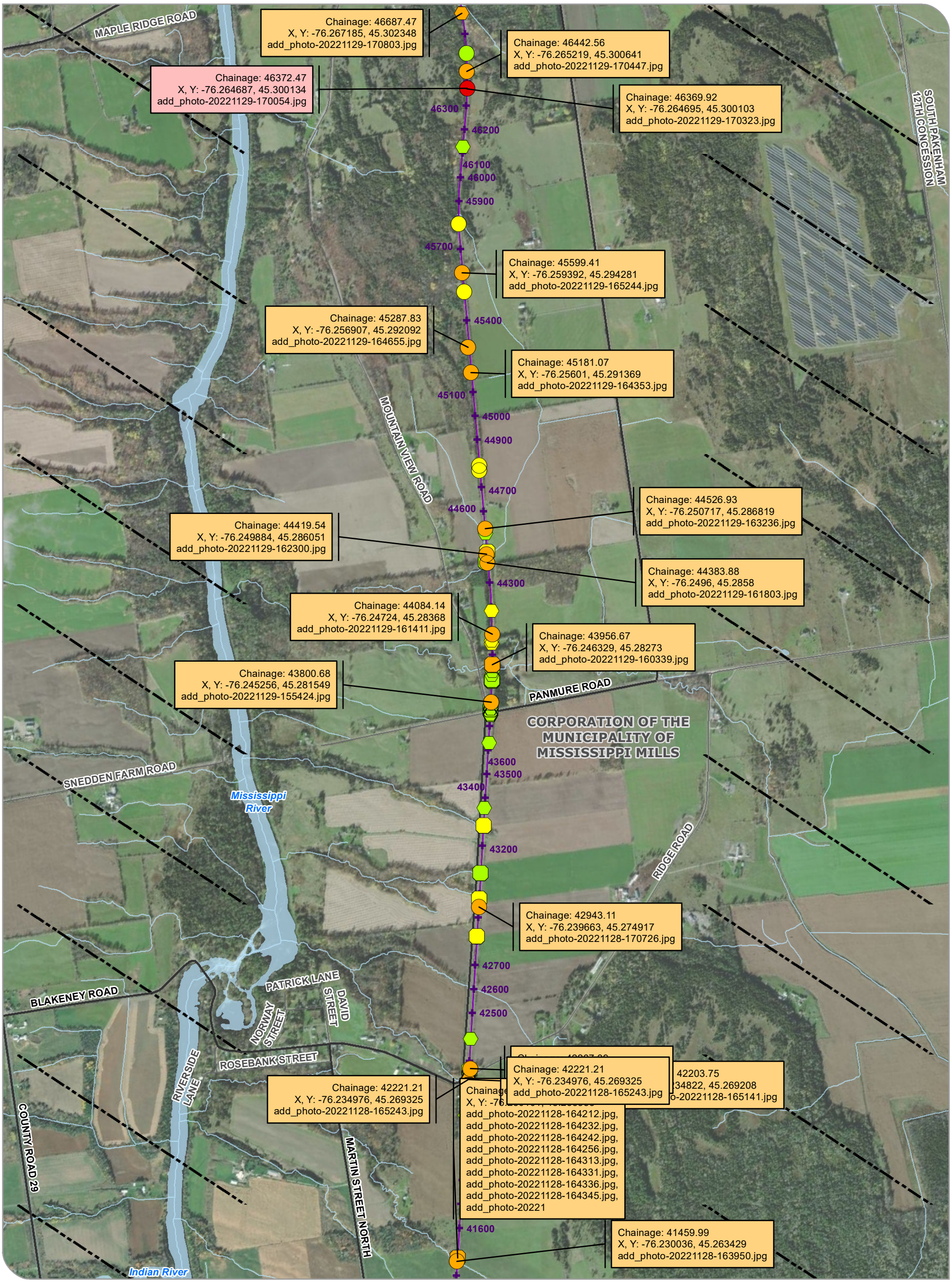
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 10

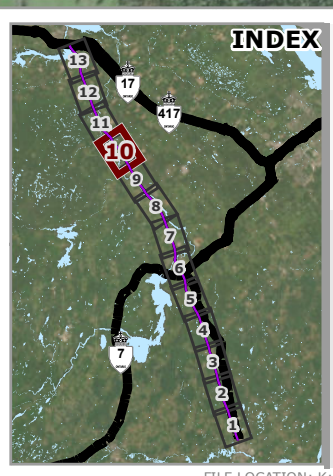
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Major Road
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd

CORPORATION OF THE MUNICIPALITY OF MISSISSIPPI MILLS

Mississippi River

WABA ROAD

DARKS SIDEROAD

KINBURN SIDEROAD

5 ARCHES DRIVE

JESSIE STREET

MACFARLANE STREET

MARGARET STREET

SKI HILL ROAD

MUIRFIELD COURT

LION HEAD DRIVE

TROON COURT

GLEN ABBEY COURT

McWATTY ROAD

LYNX HOLLOW ROAD

RIVERBEND PARKL

BLAKENEY ROAD

SOUTH PAKENHAM 12TH CONCESSION

COMBA LANE

COUNTY ROAD 29

INDIAN HILL ROAD

MAPLE RIDGE ROAD

NEEDHAM SIDEROAD

51500
51400
51300
51200
50700
50600
49300
49200
48800
48700
48300
48100
47300
47100
46300
46200

Chainage: 50905.02
X, Y: -76.294604, 45.334023
add_photo-20221129-200500.jpg

Chainage: 50947.61
X, Y: -76.294712, 45.334404
add_photo-20221129-200809.jpg

Chainage: 50794.78
X, Y: -76.294056, 45.33311
add_photo-20221129-200113.jpg

Chainage: 50206.65
X, Y: -76.290955, 45.328298
add_photo-20221129-191950.jpg

Chainage: 50117.24
X, Y: -76.290328, 45.327624
add_photo-20221129-191423.jpg

Chainage: 49989.02
X, Y: -76.289499, 45.326629
add_photo-20221129-190854.jpg

Chainage: 49989.02
X, Y: -76.289499, 45.326629
add_photo-20221129-190854.jpg

Chainage: 49644.87
X, Y: -76.287571, 45.323862
add_photo-20221129-184051.jpg

Chainage: 49702.09
X, Y: -76.287788, 45.324352
add_photo-20221129-184237.jpg

Chainage: 49571.14
X, Y: -76.287322, 45.323223
add_photo-20221129-183821.jpg

Chainage: 49381.33
X, Y: -76.286636, 45.321584
add_photo-20221129-183216.jpg

Chainage: 49165.77
X, Y: -76.285982, 45.319699
add_photo-20221129-182712.jpg

add_photo-20221129-181947.jpg

Chainage: 48967.73
X, Y: -76.285287, 45.317986
add_photo-20221129-181737.jpg

Chainage: 48475.18
X, Y: -76.282989, 45.31387
add_photo-20221129-180702.jpg

Chainage: 48442.85
X, Y: -76.282744, 45.313634
add_photo-20221129-180441.jpg

Chainage: 48324.38
X, Y: -76.281981, 45.312711
add_photo-20221129-180234.jpg

Chainage: 48174.32
X, Y: -76.280863, 45.311611
add_photo-20221129-180105.jpg

Chainage: 47769.33
X, Y: -76.277262, 45.308997
add_photo-20221129-174116.jpg

Chainage: 46986.98
X, Y: -76.269958, 45.3042
add_photo-20221129-172940.jpg

Chainage: 46856.41
X, Y: -76.268742, 45.303396
add_photo-20221129-171653.jpg

Chainage: 46849.7
X, Y: -76.268599, 45.303415
add_photo-20221129-171856.jpg

Chainage: 46687.47
X, Y: -76.267185, 45.302348
add_photo-20221129-170803.jpg

Chainage: 46442.56
X, Y: -76.265219, 45.300641
add_photo-20221129-170447.jpg

Chainage: 46369.92
X, Y: -76.264695, 45.300103
add_photo-20221129-170323.jpg

Chainage: 46372.47
X, Y: -76.264687, 45.300134
add_photo-20221129-170054.jpg

LANARK COUNTY TRAILS

Trail Memo

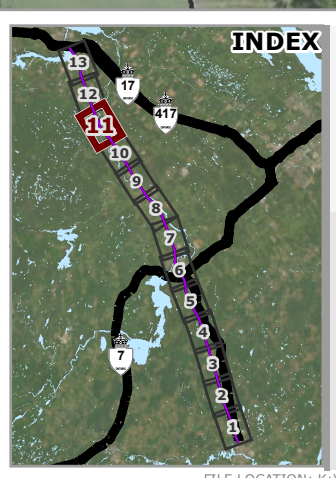
OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 11

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Major Road
- Minor Road
- Provincal Trail
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

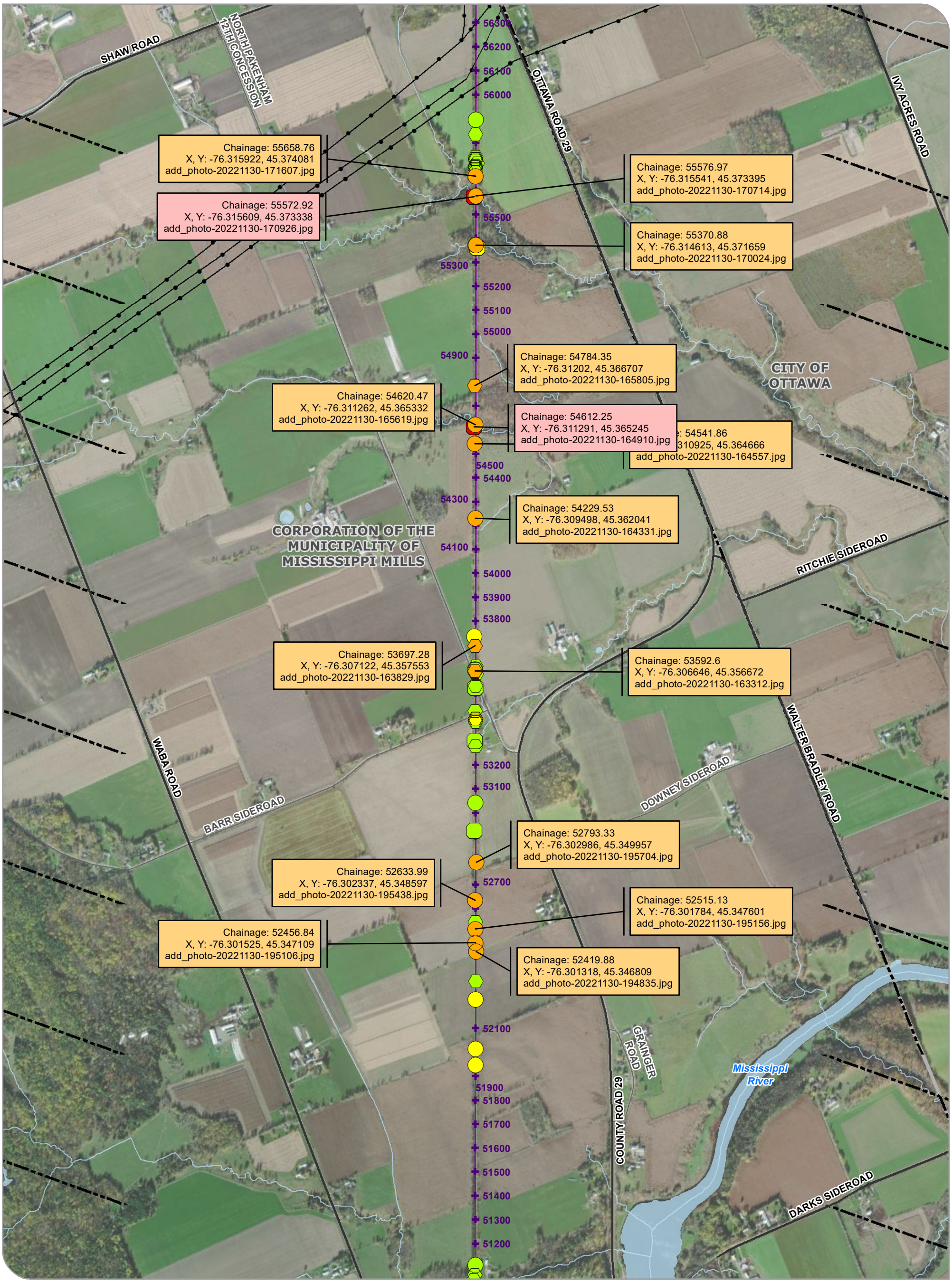
MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

DILLON CONSULTING

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd



LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 12

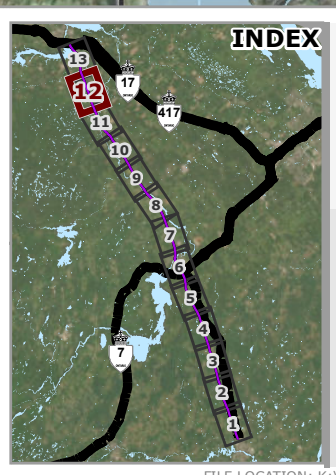
Survey Type

- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result

- Excellent
- Good
- Fair
- Poor
- VeryPoor

- No Status
- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Major Road
- Minor Road
- Provincal Trail
- Utility Line
- Municipal Boundary
- Water Body
- Watercourse



SCALE 1:15,000

0 125 250 500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

DILLON CONSULTING

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd

Chainage: 61240.09
X, Y: -76.342778, 45.418764
add_photo-20221130-190746.jpg

Chainage: 61079.24
X, Y: -76.341817, 45.417485
add_photo-20221130-190346.jpg

Chainage: 60910.62
X, Y: -76.340848, 45.416128
add_photo-20221130-190122.jpg

Chainage: 60873.76
X, Y: -76.3406, 45.415846
add_photo-20221130-185907.jpg

Chainage: 60724.17
X, Y: -76.339576, 45.414709
add_photo-20221130-185646.jpg

Chainage: 60472.4
X, Y: -76.337534, 45.412961
add_photo-20221130-185420.jpg

Chainage: 60116.6
X, Y: -76.334449, 45.410608
add_photo-20221130-184918.jpg

Chainage: 59848.55
X, Y: -76.332112, 45.408844
add_photo-20221130-184508.jpg

Chainage: 59604.07
X, Y: -76.330017, 45.407212
add_photo-20221130-184235.jpg

Chainage: 58945.17
X, Y: -76.324889, 45.402542
add_photo-20221130-182422.jpg

Chainage: 58733.18
X, Y: -76.32371, 45.400828
add_photo-20221130-182200.jpg

Chainage: 58663.7
X, Y: -76.323427, 45.400235
add_photo-20221130-182011.jpg

Chainage: 56785.98
X, Y: -76.32102, 45.383568
add_photo-20221130-174735.jpg

Chainage: 56742.4
X, Y: -76.320801, 45.383207
add_photo-20221130-173912.jpg

Chainage: 56785.98
X, Y: -76.32102, 45.383568
add_photo-20221130-174735.jpg
add_photo-20221130-174949.jpg
X, Y: -76.320752, 45.383093
add_photo-20221130-173753.jpg

LANARK COUNTY TRAILS

Trail Memo

OTTAWA VALLEY RECREATIONAL TRAIL

FIGURE 1 - 13

Survey Type
- Trail
- Gates
- Non-Structural Culverts
- Sign

Inspection Result
- Excellent
- Good
- Fair
- Poor
- VeryPoor
- No Status

- Ottawa Valley Recreational Trail (OVRT)
- Chainage Station
- Highway
- Major Road
- Minor Road
- Provincal Trail
- Utility Line
- Municipal Boundary
- Water Body
- Watercourse

INDEX

SCALE 1:15,000

0 125 250 500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, ESRI
Imagery Basemap

MAP CREATED BY: LMM
MAP CHECKED BY: -
MAP PROJECTION: NAD 1983 UTM Zone 18N

PROJECT: 22-4587 STATUS: DRAFT DATE: 2023-01-24

FILE LOCATION: K:\2022\224587\Product\Client\TrailMemo\224587_OVT01a_Trail_DD.mxd

Appendix D

OVRT 10-Year Capital Plan

DILLON CONSULTING

Appendix D

Ottawa Valley Recreational Trail 10-Year Capital Plan

Ottawa Valley Recreational Trail 10-Year Capital Plan										
Component	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Trail	$ 100,000	$ 100,000	$ 61,000	$ 61,000	$ 61,000	$ 61,000	$ 61,000	$ 61,000	$ 61,000	$ 61,000
Signs	$ 5,400	$ 1,500	$ 2,300	$ 1,500	$ 2,300	$ 2,340	$ 3,140	$ 2,340	$ 3,140	$ 2,340
Gates	$ 1,000	$ 750	$ 1,500	$ 3,000	$ 3,000	$ 1,000	-	-	-	$ 1,000
Non-Structural Culverts	$ 89,500	$ 101,500	$ 133,000	$ 55,000	$ 31,000	$ 4,000	$ 20,000	-	-	-
ANNUAL TOTAL	**$195,900**	**$203,750**	**$197,800**	**$120,500**	**$97,300**	**$68,340**	**$84,140**	**$63,340**	**$64,140**	**$64,340**
CUMULATIVE TOTAL	**$195,900**	**$399,650**	**$597,450**	**$717,950**	**$815,250**	**$883,590**	**$967,730**	**$1,031,070**	**$1,095,210**	**$1,159,550**

Appendix D

Ottawa Valley Recreational Trail - Trail Data Points and Observations

Ottawa Valley Recreational Trail Components - Trail Data Points					
No.	**Trail Latitude**	**Trail Longitude**	**Width (m)**	**Observations**	**Condition Raiting**
23	45.30013361	-76.26468734	4.8	Severe rutting on west continues for 200m some areas of erosion. Trail appears "super-elevated" on east side	Poor
57	45.38356838	-76.32101968	N/A	Deep rutting depressions at 4x4 entrance of gate	Poor
70	45.41584621	-76.34059989	N/A	Edge of trail has deep depression / erroded away due to ATVs using the location as an entry point to the trail	Poor
74	45.41876428	-76.34277818	N/A	Deep depression at entry point due to ATV erosion. This location may be outside limits of project.	Poor
116	45.18398348	-76.15835351	4	Severe rutting	Poor
2	44.93174445	-76.03479446	3.4	Generally in good condition with light rutting.	Poor
11	45.28154905	-76.24525608	5.0	Poor conidtion with severe rutting for 50m.	Poor
13	45.2836804	-76.24724016	4.4	Medium severe erosion at top of both embankments	Poor
14	45.28580018	-76.2496005	N/A	Poor condition with washed out area, rutting and overturned stones for next 300m (aligned with culverts)	Poor
15	45.28605097	-76.24988439	N/A	Poor condition with severe rutting and washed-out	Poor
16	45.28681867	-76.25071722	5	Poor condition severeally washed out section.	Poor
18	45.29136887	-76.25601031	4.6	Generally fair to poor condition with severe rutting sections and upturned stone for 300m.	Poor
19	45.29209235	-76.25690734	4.7	Two severe areas of rutting	Poor
21	45.29428099	-76.25939165	4.9	Deep rutting and up-turned stone.	Poor
24	45.30064051	-76.26521917	N/A	Distinct run-off divots ans severe rutting	Poor
30	45.31161133	-76.28086349	5.1	Build-up of stones on east side and deep rutting for 50m	Poor
32	45.31387021	-76.28298881	N/A	Trail "rises" at intersection (not level)	Poor
34	45.31798606	-76.28528679	3.6	Severe rutting and light potholes	Poor
38	45.32435166	-76.2877877	4.7	Light to medium rutting	Poor
41	45.32662931	-76.28949861	3.5	Trail has sudden rise at north approach to bridge and "bump" at expansion joint	Poor
42	45.32762429	-76.2903275	5.6	Run-off depression created by pedestrian access at gabion retaining wall (wall is 6.0m in length and 1m wide) Area used as pedestrian access. Wall is in good condition.	Poor
43	45.32829794	-76.29095539	N/A	Gabion wall structure (6m x 1m) with run-off damage at trail. Wall in good condition.	Poor
49	45.3620408	-76.30949758	4.3	Localized area of over-turned ballast stone sections have deep rutting	Poor
50	45.36466555	-76.31092527	4.5	Wash-out depreassion	Poor
51	45.36533204	-76.31126214	4.3	Severe rutting at culvert location.	Poor
52	45.37165941	-76.31461297	4.5	Wash-out depression (culvert location)	Poor
54	45.37339509	-76.31554118	N/A	Uneven ground, wash-out depression and rutting for 50 segment	Poor
55	45.37408069	-76.31592164	4.3	Generally fair to poor condition with medium to severe rutitng.	Poor
59	45.40023521	-76.32342746	6	1m long wash-out 100mm deep	Poor
60	45.40082802	-76.32370993	N/A	100mm deep eroded area	Poor

Appendix D

Ottawa Valley Recreational Trail - Trail Data Points and Observations

61	45.40254165	-76.32488902	6	100m segment of uneven trail / medium rutting and several wash-out depressions at edge of trail	Poor
63	45.40721213	-76.33001698	N/A	Washed out area approximately 100mm in depth.	Poor
64	45.40884413	-76.33211246	N/A	Depression with medium rutting	Poor
66	45.41060789	-76.33444942	N/A	Erosion causing depression	Poor
68	45.41296057	-76.33753354	N/A	Depression at edge of rutting	Poor
69	45.41470933	-76.33957596	4.6	Over-turned stones and deep rutting segment for 20m	Poor
71	45.41612843	-76.34084816	N/A	Wash-out depression	Poor
72	45.41748453	-76.34181719	N/A	East entry point is graded nicely, west entry point is erroded / depression. Not official intersection? (No signage)	Poor
73	45.41804612	-76.34221408	N/A	Washout depression 150mm deep	Poor
80	45.34680875	-76.30131785	N/A	Deep rutting, upturned stone and uneven trail for about 50m either side of intersection.	Poor
81	45.34710924	-76.30152497	N/A	Deep rutting depression	Poor
82	45.34760104	-76.30178397	4.4	Severe potholes and medium rutting and upturned stone for 20m segment	Poor
83	45.34859736	-76.30233675	4.6	Upturned stone, uneven trail and rutting for various segments over next km	Poor
84	45.34995737	-76.30298593	N/A	Deep depressions / potholes over 30m segment. Upturned stone, rutting, and uneven trail typ. over next km	Poor
86	44.97848032	-76.05783878	6.3	Medium to severe rutting at entrsnce next to gate	Poor
89	44.99321011	-76.06371899	N/A	Localized light potholes.	Poor
96	45.04029955	-76.08436785	2.5	Light to medium rutting and severe erosion both sides.	Poor
99	45.07291779	-76.10001276	3.5	Medim to severe rutting and depression	Poor
105	45.12594244	-76.13011544	6.0	Severe rutting and depression	Poor
126	45.24822616	-76.21737582	4.5	Light to medium potholes	Poor
129	45.26342895	-76.23003565	4.7	Trail uneven for 500m and light to medium rutting	Poor
130	45.26970849	-76.23521571	5	Washed out at culvert ends 20m x5m	Poor
131	45.27491695	-76.23966326	4.7	Light to medium rutting and uneven surface 1km	Poor
4	44.93859395	-76.0381892	4.3	Geneerally in good to fair condition exhibiting light to medium ruttin	Fair
17	45.28865468	-76.25287489	4.9	Generally good condition with light rutting	Fair
20	45.29373378	-76.25872864	5	Washed out areas and light to medium rutting	Fair
22	45.295734	-76.2610128	N/A	Generally good to fair condition with light to medium rutting.	Fair
26	45.30303283	-76.26817304	N/A	Depression in trail right before gate.	Fair
31	45.31349596	-76.28268496	4.7	Light to medium rutting	Fair
35	45.31851731	-76.28548611	N/A	Depressions / uneven trail at farm yard entrance	Fair
36	45.31969953	-76.28592038	4.4	Medium rutting for next 600m	Fair
37	45.32176735	-76.28675521	4.4	Un-even graded area (about 150m long)	Fair
40	45.32492448	-76.288186	N/A	Generally fair condition with light to medium rutting.	Fair
48	45.3578799	-76.30733798	4.3	Up-turned ballast stone and light rutting (various 10m segments over the next km)	Fair
65	45.4087231	-76.33199746	N/A	Light to medium erosion	Fair
75	45.41876613	-76.34279092	4.8	Last 500m of trail has medium rutting	Fair
77	45.34281397	-76.29921894	4.2	Deep depression and medium to severe rutting	Fair
78	45.34337786	-76.29951532	N/A	30m segment of overturned stones and medium rutting	Fair
79	45.34510856	-76.30045066	4.2	200m segment of over-turned stone, medium rutting and un-even ground in general	Fair
108	45.13499578	-76.13905365	N/A	Significant bump at path way	Fair
118	45.21187439	-76.17797184	4.7	Medium rutting at gate	Fair
127	45.25202828	-76.22041065	N/A	Ligh to medium rutting 500m	Fair
1	44.92796529	-76.03285706	3.4	Generally in good condition with light rutting.	Good
5	44.93963102	-76.03869406	3.6	Generally in good condition with light rutting.	Good
25	45.30120021	-76.26577087	N/A	End of "super-elevated" area.	Good
27	45.30373976	-76.26922354	4.8	Good condition.	Good

Appendix D

Ottawa Valley Recreational Trail - Trail Data Points and Observations

29	45.30674673	-76.27382806	4.7	Generally good condition with light rutting.	Good
33	45.31496137	-76.28375969	3.1	Narrow section of trail. Light rutting (typ. For 400m)	Good
39	45.32484523	-76.28807251	3.1	Trail more clay/muddy then gravel for 300m section	Good
44	45.32932904	-76.2916707	6.2	Gabion wall (6x1m) in good condition	Good
45	45.32983024	-76.29206741	5.5	Trail is flattened little gravel overlay, but flat (typ. For next few 100m's)	Good
46	45.33377095	-76.29438258	N/A	Parking area, uneven surface but generally in good to fair location.	Good
47	45.35673351	-76.30668755	4.3	Good condition.	Good
53	45.37165673	-76.31464189	4.6	Generally good condition with light rutting.	Good
56	45.37606515	-76.31696418	4.4	Light rutting for 1 km.	Good
58	45.3905267	-76.32224595	5.5	Wide trail for long strectch (5.5m gravel + 1m ballast on each side). Typ. Light rutting in middle, but good condition.	Good
62	45.40707681	-76.32979578	5	Localized light rutting for next km.	Good
67	45.41063162	-76.33448915	4.6	Light rutting typical for next km	Good
76	45.33576421	-76.2954729	4.0	Light rutting	Good
85	45.35203495	-76.30415395	4.4	Trail now in good condition. Light rutting typ.	Good
87	44.99036159	-76.06257406	3.4	Light rutting	Good
88	44.99279149	-76.06353017	3.5	Good Condition	Good
90	45.00814256	-76.06966061	N/A	Light to medium rutting	Good
91	45.02564233	-76.07750762	N/A	Light to medium rutting	Good
92	45.02621401	-76.07774265	N/A	Parking lot	Good
93	45.02712509	-76.07818275	4.5	Light to medium rutting at side entrance	Good
94	45.02817752	-76.07871779	3.8	Good condition	Good
95	45.0332147	-76.08108127	3.5	Light rutting	Good
97	45.05955374	-76.0933782	3.5	Light to medium rutting	Good
98	45.06361977	-76.09535315	3.4	Light rutting	Good
100	45.08017078	-76.10559374	3.5	Light rutting	Good
101	45.08631547	-76.11052491	3.7	Light rutting	Good
102	45.10059712	-76.12053006	N/A	Light rutting	Good
103	45.11352499	-76.12416301	N/A	Parking lot	Good
104	45.11544711	-76.12466736	N/A	Good condition	Good
106	45.12913994	-76.133226	4.5	barrels across but in good conditon	Good
107	45.13345873	-76.1377313	3.5	light rutting	Good
109	45.13688328	-76.14038805	4.7	Light rutting	Good
110	45.14416653	-76.14389863	3.0	Light rutting	Good
111	45.14891506	-76.14318029	4.5	Good condition	Good
112	45.15502988	-76.14435987	4.5	Good condition	Good
113	45.15937562	-76.14542115	4.4	Good condition	Good
114	45.17056685	-76.15109785	3.5	Light rutting	Good
115	45.18243127	-76.15752877	4.1	Light rutting	Good
117	45.19133274	-76.16237901	4.1	Light rutting	Good
119	45.21624239	-76.18267273	3.7	Hump in the road at intersection	Good
120	45.22097263	-76.18782341	4.4	Traffic cones on trail - purpose unknown	Good
121	45.22382957	-76.19169512	4	8 benches nearby and north on trail in good condition	Good
122	45.22978299	-76.19905672	N/A	Cones to signify stairs	Good
123	45.23083831	-76.19992514	N/A	TC-54s to deter speed	Good
124	45.23426103	-76.20313895	3.4	Good condition	Good
125	45.24380358	-76.2134339	4.6	Good condition	Good
128	45.2600544	-76.22712838	4.2	Good condition	Good

Ottawa Valley Recreational Trail Components - Non-Structural Culverts

No.	Trail Latitude	Trail Longitude	Material	Size (m)	Observations	Condition Raiting	Recommendation Timing	Recommendation	Cost
15	45.3733381	-76.31560883	Concrete	3.0 x 3.0	Concrete arch culvert with scaling, ice damage and light disintegration thoghout. Wingwall on southwest collapsed into waterway. Cannot access east side due to slope and foliage.	Poor	1 to 3 years	Install liner or full replacement.	$ 79,000.00
13	45.36524524	-76.31129114	Concrete	2.2 x 2.0	Disintegrated and scaled concrete throughout. Collapse / cave-in on the west side. Very poor condition.	Poor	1 to 3 years	Install liner or full replacement.	$ 58,000.00
5	45.30341496	-76.26859926	Concrete	0.25	Severe overgrowth on west aide, and gravel in-fill / blockage on east.	Poor	1 to 3 years	Remove obstruction from culvert and repair embankments	$ 2,500.00
8	45.31825097	-76.28531202	CSP	0.3	South end damaged and north end invert 10m below south end. No light at inlet, cannot access outlet (slope / foliage).	Poor	1 to 3 years	Repair embankments and re-assess the culvert for potential full replacement.	$ 2,500.00
9	45.31969886	-76.28598182	CSP	0.6	CSP inside old stone culvert. Steel in good condition. Culvert filled with debris, severe overgrowth, and stone blockage at outlet.	Poor	1 to 3 years	Remove obstruction from culvert and repair embankments	$ 2,500.00
11	45.32970585	-76.29202827	CSP	0.3	Unable to see daylight through culvert believed to be blocked. Assumed to be overflow for other 1.0m nearby	Poor	1 to 3 years	Remove obstructions from culvert.	$ 1,500.00
12	45.32970585	-76.29202827	CSP	0.3	Unable to see daylight through culvert believed to be blocked. Assumed to be overflow for other 1.0m nearby	Poor	1 to 3 years	Remove obstructions from culvert.	$ 1,500.00
17	45.3832124	-76.32089965	CSP	0.7	Each retaining wall at inlet and outlet have wide crack in the middle (west is broken in half)	Poor	1 to 3 years	Replace retaining walls.	$ 16,000.00
25	45.24761303	-76.21656642	Concrete	1.1	Severe delamination, displacement, spalling and scour.	Poor	1 to 3 years	Miscellanous concrete repairs throughout.	$ 16,000.00
28	45.26355262	-76.23010134	Concrete/Stone	1.00	Severe delamination, displacement, spalling and scour. Appears that interior is beginning to collapse.	Poor	1 to 3 years	Full replacement.	$ 72,000.00
24	45.2299269	-76.19916183	CSP	0.9	Generally in good condition with debris observed at inlet. Stacked stone retaining wall in fair poor condition. Difficult to see barrel appears to be in good condition.	Fair	1 to 3 years	Remove vegetation, clean out culvert and reassess.	$ 3,500.00
30	45.27395604	-76.2388739	Concrete	0.55	Limited inspeciton. Medium spalling, light to medium erosion and light to medium scaling.	Fair	1 to 3 years	Generally in good to fari condition. Complete hydrualic asessment and consider abandoning or lining.	$ 10,000.00
31	45.27517371	-76.23989993	Concrete	0.55	Limited inspeciton. Medium spalling, light to medium erosion and light to medium scaling.	Fair	1 to 3 years	Repair grout of masonry walls, culvert is geneerally in good to fair condiition. Complete hydrualic asessment and consider abandoning or lining.	$ 10,000.00
27	45.26157028	-76.22838822	Concrete	0.9 x 0.8	Northeast and southwest wingwalls displaced. Culvert generally in good condition with light to medoum scaling throughout.	Fair	1 to 3 years	Repair/replace wingwalls and complete miscellanous concrete patch repairs in culvert.	$ 27,000.00
16	45.38220837	-76.32031325	Concrete	1.5 x 0.6	Concrete box culvert installed in 1927. Concrete in generally good to fair condition with light to medium scaling and ice damage. Standing water in culvert. East side stream has debris and overgrowth.	Fair	1 to 3 years	Remove vegetation and debris from inlet and outlet.	$ 2,500.00
7	45.31732062	-76.2849982	CSP	0.6	Generally goood condition but perched on north end. Stones block were observed on south end slightly obstructing flows.	Good	1 to 3 years	Repair embankments to address perch ends.	$ 4,000.00
1	45.28226968	-76.24589696	Concrete	0.6	Overgrowth and bloackage on west. Exposed concrete generally in good condition.	Good	1 to 3 years	Remove obstruction and overgrowth from culvert.	$ 2,000.00
3	45.2857993	-76.24969069	CSP	0.6	CSP in good condition, surrounding embankments erroded	Good	1 to 3 years	Repair embankments.	$ 3,000.00
6	45.31050563	-76.27998683	SCSP	1.8	Approximately 30m of cover. Steel is generally in good condition with the exception of deformation at centre. Approx. 50m long embankment erroded / washed-out on west side and very steep slope to trail.	Good	1 to 3 years	Repair embankments.	$ 5,000.00
19	45.40257824	-76.32486077	Concrete	1.0 x 1.5	Concrete box culvert generally in good condition. Potential blockage due to water level appering high at inlet (end of wingwall underwater at east side)	Good	1 to 3 years	Clean culvert and remove any obstructions.	$ 3,500.00
22	45.35608688	-76.30631564	CSP	0.8	Generally in good condition. Lots of overgrowth at both sides creating blockage. Standing water inside culvert	Good	1 to 3 years	Remove vegetation and debris from inlet and outlet.	$ 2,000.00
2	45.28273019	-76.24632938	Concrete	3.1 x 2.75	Concrete generally in fair to poor condition with spalling and scaling throughout. Requires further assessment as it was found to be greater than 3m.	Poor	3 to 5 years	Install liner or partial depth concrete repair and/or refacing throughout.	$ 52,000.00
14	45.37159307	-76.31450174	Concrete	0.6	Concrete pipe culvert in fair condition but erosion noted on both ends.	Fair	3 to 5 years	Repair embankments.	$ 4,000.00
4	45.28612578	-76.2499206	CSP	0.9	Old, collapsed culvert with new replacement 0.9 CSP nearby. Light to medium deformation observed in obvert and severe rutting on trail at location.	Fair	3 to 5 years	Consider abandoning collapsed culvert and monitor deformation in obvert of CSP.	$ 3,000.00
20	45.35103566	-76.30368582	Concrete	1.25 x 0.3	Concrete box culvert stamped 1907. Concrete generally in good to fair condition. Lots of overgrowth at both inlet and outlet. West side has debris blocking waterway. No flowing water in culvert.	Fair	5 to 10 years	Clean culvert and remove any obstructions and reasses.	$ 4,000.00
33	45.27754891	-76.24189383	Concrete	1.0	Constructed in 1912. Medium to severe scaling at base of arch, light spalling and ice damage throughout.	Fair	5 to 10 years	Culvert clean out and miscellanous partial depth concrete repairs.	$ 20,000.00
18	45.39492682	-76.32217177	CSP	0.25 x 0.5	Culvert has 0.15m Dia. PVC pipe feeded through directly from farmer's field. Culvert appears generally in good condition.	Good	No Action	Routine maintenance	-
10	45.32970585	-76.29202827	SCSP	1.0	SCSP inside old rock culvert with water flowing and appears to be in good condition. Two 0.3 CSP noted near the culvert. No light in 0.3 culverts at inlet. Outlet is old, unused rock culvert	Good	No Action	Routine maintenance	-
21	45.35419547	-76.3053384	CSP	1.2	CSP inside concrete culvert stamped 1929. CSP and concrete generally in good to fair condition.	Good	No Action	Routine maintenance	-
23	45.12007341	-76.12626945	CSP	1.0	Light corrosion observed at the ends.	Good	No Action	Routine maintenance	-
26	45.25208758	-76.22033509	CSP	0.8	CSP liner in good condition	Good	No Action	Routine maintenance	-
29	45.26964276	-76.23520666	CSP	0.45	Generally in good condition.	Good	No Action	Routine maintenance	-
32	45.27600606	-76.24061126	Concrete	0.6	Medium to severe scaling on the exterior appears to be in good to fair condition.	Good	No Action	Routine maintenance	-
34	45.28130959	-76.24507053	CSP	0.6	Coated CSP and in excellent condition	Good	No Action	Routine maintenance	-

Appendix D
Ottawa Valley Recreational Trail - Gate Components

Ottawa Valley Recreational Trail Components - Gates

No.	Trail Latitude	Trail Longitude	Material	Observations	Condition Raiting	Recommendation Timing	Recommendation
1	44.9232589	-76.03057471	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
2	44.9383608	-76.0380276	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
3	44.9532325	-76.04566785	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
4	45.2814766	-76.24523696	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
5	45.3030921	-76.26827597	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
7	45.3033031	-76.26854964	Steel	Paint and reflective tape in good condition. Damage / scuffs to 4x4 entry posts	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
8	45.3102828	-76.27910782	Steel	Reflective stakes / sticks (to signify steep drop-off) spaced every 20m for next 100m are tilted. Recommend re-assesing to make more prominent and noticable.	Fair	3 to 5 years	Confirm safety requirements and re-assess.
14	45.334477	-76.2947725	Steel	Paint ans reflective tape faded. Damage and scuff marks to both posts.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
16	44.9784812	-76.05785235	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
17	45.0005783	-76.06664307	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
18	45.0009718	-76.06661571	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
19	45.025675	-76.07752398	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
20	45.0423599	-76.08784683	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
21	45.0623499	-76.09474683	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
22	45.0627999	-76.09498158	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
23	45.0751567	-76.10162214	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
24	45.0753931	-76.10176251	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
25	45.0859745	-76.11038815	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
26	45.0861141	-76.11051435	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
27	45.0986896	-76.11936104	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
28	45.0991287	-76.11970375	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
29	45.1128423	-76.12415437	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
30	45.1134728	-76.12425031	Steel	Faded/peeling paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
32	45.1395389	-76.14220434	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
33	45.1439894	-76.14386502	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
34	45.2118083	-76.17789847	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
35	45.2258244	-76.19447725	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
36	45.2331895	-76.20200626	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
37	45.2333032	-76.20216865	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.
38	45.2693255	-76.23497631	Steel	Faded paint and reflective tape.	Fair	3 to 5 years	Remove existing paint, repaint and replace reflective tape.

Appendix D
Ottawa Valley Recreational Trail - Sign Components

Ottawa Valley Recreational Trail Components - Signs						
No.	**Trail Latitude**	**Trail Longitude**	**Observations**	**Condition Raiting**	**Recommendation Timing**	**Recommendation**
8	44.93174445	-76.03479446	Missing stop sign.	Poor	1 to 3 years	Install new sign.
290	45.22374257	-76.19154148	Missing stop sign.	Poor	1 to 3 years	Install new sign.
310	45.22734598	-76.19660704	Missing stop ahead sign.	Poor	1 to 3 years	Install new sign.
517	45.23793803	-76.2072929	Missing stop ahead sign.	Poor	1 to 3 years	Install new sign.
518	45.24881577	-76.21762572	Missing stop ahead sign.	Poor	1 to 3 years	Install new sign.
519	45.25020737	-76.21881964	Missing stop ahead sign.	Poor	1 to 3 years	Install new sign.
1	44.92308448	-76.03055002	Severe damage	Poor	1 to 3 years	Replace.
76	45.33311041	-76.29405644	Light weathering, bent and not aligned with trail.	Poor	1 to 3 years	Replace
80	45.33402303	-76.29460352	Generally in good to fair condition with light weathering.	Poor	1 to 3 years	Replace
85	45.33440395	-76.29471232	Generally in good to fair condition with light weathering.	Poor	1 to 3 years	Replace
88	45.35667236	-76.30664581	Generally in fair to poor condition with light weathering and damage.	Poor	1 to 3 years	Replace
93	45.35755275	-76.30712173	Generally in fair to poor condition with light weathering and bent.	Poor	1 to 3 years	Replace.
95	45.36670692	-76.31201986	Generally in good condition with light weathering and slightly bent.	Poor	1 to 3 years	Replace
109	45.38301283	-76.32069455	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
110	45.38309329	-76.32075188	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
111	45.38320733	-76.32080066	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
116	45.38343871	-76.32092698	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
150	45.02429246	-76.07685088	Generally in fair to poor condition with light damage.	Poor	1 to 3 years	Replace
151	45.02565565	-76.07751416	Generally in fair to poor condition with light damage.	Poor	1 to 3 years	Replace
174	45.0753931	-76.10176251	Generally in fair to poor condition with light damage.	Poor	1 to 3 years	Replace.
276	45.20915606	-76.1750254	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
283	45.21712498	-76.18358214	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
284	45.21950431	-76.18611483	Generally in fair to poor condition with light weathering and damage.	Poor	1 to 3 years	Replace.
286	45.22272217	-76.19015985	Generally in fair to poor condition with light weathering and damage.	Poor	1 to 3 years	Replace.
354	45.25383245	-76.22189958	Generally in fair to poor condition with light weathering and damage.	Poor	1 to 3 years	Replace
367	45.2600544	-76.22712838	Generally in good to fair condition with light weathering and graffiti.	Poor	1 to 3 years	Replace
372	45.26920755	-76.23482165	Generally in fair to poor condition with light to medium weathering.	Poor	1 to 3 years	Replace
373	45.26932545	-76.23497631	Generally in fair to poor condition with light to medium weathering.	Poor	1 to 3 years	Replace
32	45.3001026	-76.26469488	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
33	45.30234828	-76.26718464	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
44	45.30339648	-76.26874217	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
45	45.30419976	-76.26995771	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace

Appendix D

Ottawa Valley Recreational Trail - Sign Components

49	45.30899664	-76.2772617	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
51	45.31271146	-76.28198113	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
52	45.31363397	-76.28274363	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
56	45.32158425	-76.2866356	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
62	45.32322299	-76.28732217	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
64	45.3238619	-76.28757086	Generally in fair to poor condition with light weathering and damage	Poor	1 to 3 years	Replace
68	45.32530447	-76.28841072	Generally good condition but not square to road (not clearly visible).	Fair	1 to 3 years	Reposition sign and remove and vegetation to increase visibility.
69	45.32560316	-76.28872328	Generally in good to fair condition with light weathering and graffiti.	Fair	1 to 3 years	Replace.
279	45.21277259	-76.17892007	Generally in good to fair condition with graffiti obseved.	Fair	1 to 3 years	Replace.
338	45.24378369	-76.2134101	Generally in good condition with graffiti obseved.	Fair	1 to 3 years	Replace.
295	45.22470859	-76.1929193	Generally in good condition but tree limiting visibility.	Good	1 to 3 years	Remove vegetation to increase visibility.
297	45.2254561	-76.19393115	Generally in good condition but tree limiting visibility.	Good	1 to 3 years	Remove vegetation to increase visibility.
147	45.00066844	-76.0666541	Generally in good condition. Straighten and raise if possible to increase visibility.	Good	1 to 3 years	Straighten and raise to increase visibility.
101	45.37476189	-76.31628449	Generally good condition and needs foliage to be cleared.	Good	1 to 3 years	Remove vegetation to increase visibility.
54	45.3145634	-76.28350144	Generally in fair condition with light weathering and damage.	Fair	3 to 5 years	Replace.
57	45.32286219	-76.28720549	Generally in fair condition with light weathering and damage.	Fair	3 to 5 years	Replace.
83	45.33435546	-76.29468273	Good condition but slightly bent.	Fair	3 to 5 years	Replace.
97	45.37423525	-76.31601267	Generally in good to fair condition with light weathering.	Fair	3 to 5 years	Replace.
114	45.38349705	-76.32090627	Generally in good to fair condition with light weathering.	Fair	3 to 5 years	Replace.
126	45.40701814	-76.32970576	Generally in good to fair condition with light weathering	Fair	3 to 5 years	Replace.
136	45.35500692	-76.30573452	Generally in fair condition with light weathering and damage.	Fair	3 to 5 years	Replace.
216	45.13490928	-76.13892837	Generally in fair condition with light weathering and damage.	Fair	3 to 5 years	Replace.
278	45.21180833	-76.17789847	Generally in fair condition with light weathering and damage.	Fair	3 to 5 years	Replace.
314	45.22855166	-76.19799835	Generally in fair condition with light weathering and fading paint.	Fair	3 to 5 years	Replace.
25	45.28240635	-76.24604716	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
27	45.28339257	-76.24698979	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
28	45.28346079	-76.24707973	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
29	45.28440359	-76.2479838	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
37	45.30324426	-76.26852374	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
38	45.30324506	-76.26854352	Generally in good condition with light weathering.	Fair	5 to 10 years	Replace.
40	45.30337946	-76.26868098	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
46	45.30754519	-76.27499901	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.

Appendix D

Ottawa Valley Recreational Trail - Sign Components

66	45.32481354	-76.28807218	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
70	45.32662227	-76.28951881	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
73	45.32924028	-76.29163826	Generally in good to fair condition with light weathering.	Fair	5 to 10 years	Replace.
77	45.33369643	-76.29439557	Generally in good to fair condition with light weathering	Fair	5 to 10 years	Replace.
122	45.39727878	-76.32239817	Generally in good condition but difficult to see.	Fair	5 to 10 years	Replace.
357	45.25468836	-76.22263994	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.

Appendix D

Ottawa Valley Recreational Trail - Sign Components

362	45.25617786	-76.22381855	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
368	45.2610359	-76.22790882	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
369	45.26124801	-76.22809568	Generally in fair to poor condition with light weathering and damage.	Good	5 to 10 years	Replace.
379	45.26960032	-76.23517713	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
382	45.27063957	-76.23609055	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
388	45.2811559	-76.24493955	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
391	45.2813285	-76.24507933	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
11	44.93840791	-76.03806896	Generally in good condition but sign difficult to see behind gate.	Good	5 to 10 years	Replace.
31	45.29822317	-76.26314364	Generally in good to fair condition with light weathering	Good	5 to 10 years	Replace.
36	45.30323894	-76.2684799	Generally in good condition with light weathering	Good	5 to 10 years	Replace.
86	45.3344213	-76.29475742	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
87	45.33451983	-76.29477913	Generally in good condition.	Good	5 to 10 years	Replace.
89	45.3565763	-76.30654145	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
98	45.37440205	-76.3160985	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
102	45.37469299	-76.3162435	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
103	45.37444572	-76.3161285	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
106	45.37456391	-76.31608207	Generally in good condition. Signs (on 5 posts) just off trail at intersection.	Good	5 to 10 years	Replace.
107	45.37555951	-76.31670057	Generally in good to fair condition with light weathering.	Good	5 to 10 years	Replace.
118	45.38461276	-76.32159744	Generally good condition but slightly leaning.	Good	5 to 10 years	Replace.
119	45.39442135	-76.3221913	Generally in good condition.	Good	5 to 10 years	Replace.
120	45.39555395	-76.32214478	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
121	45.39576862	-76.32219776	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
371	45.26815304	-76.23402583	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
374	45.26928682	-76.23491576	Generally in good condition.	Good	5 to 10 years	Replace.
375	45.26936657	-76.23500739	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
370	45.26216288	-76.22894898	Generally in good condition with light weathering.	Good	5 to 10 years	Replace.
294	45.22541879	-76.19392115	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
298	45.22546891	-76.19396437	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
303	45.22602085	-76.19471394	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
305	45.22694839	-76.19603824	Info plaque in generally good condition with light weathering.	Good	No Action	Routine Maintenance
308	45.22730343	-76.19655367	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
313	45.22796046	-76.19740221	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
2	44.92318365	-76.03052103	Generally in good condition.	Good	No Action	Routine Maintenance
3	44.92329997	-76.03060326	Generally in good condition.	Good	No Action	Routine Maintenance
4	44.92338914	-76.0306209	Generally in good condition.	Good	No Action	Routine Maintenance
5	44.9246199	-76.03128415	Generally in good condition.	Good	No Action	Routine Maintenance
6	44.92796529	-76.03285706	Generally in good condition.	Good	No Action	Routine Maintenance
7	44.93069803	-76.03422376	Generally in good condition.	Good	No Action	Routine Maintenance

Appendix D

Ottawa Valley Recreational Trail - Sign Components

9	44.9328008	-76.03528574	Generally in good condition.	Good	No Action	Routine Maintenance
10	44.93691052	-76.03733359	Generally in good condition.	Good	No Action	Routine Maintenance
12	44.93857275	-76.03817067	Generally in good condition.	Good	No Action	Routine Maintenance
13	44.9386034	-76.0381748	Generally in good condition.	Good	No Action	Routine Maintenance
14	44.93964957	-76.03866052	Generally in good condition.	Good	No Action	Routine Maintenance
15	44.95187461	-76.04483165	Generally in good condition.	Good	No Action	Routine Maintenance
16	44.9533017	-76.04567704	Generally in good condition.	Good	No Action	Routine Maintenance
17	44.95347639	-76.04581874	Generally in good condition.	Good	No Action	Routine Maintenance
18	44.95354376	-76.04586753	Generally in good condition.	Good	No Action	Routine Maintenance
19	44.95489828	-76.04657928	Generally in good condition.	Good	No Action	Routine Maintenance
20	44.96682214	-76.05319681	Generally in good condition.	Good	No Action	Routine Maintenance
21	44.96800305	-76.05365468	Generally in good condition.	Good	No Action	Routine Maintenance
22	44.96818344	-76.05375776	Generally in good condition.	Good	No Action	Routine Maintenance
23	44.96816781	-76.05372844	Generally in good condition.	Good	No Action	Routine Maintenance
24	44.96957434	-76.05430762	Generally in good condition.	Good	No Action	Routine Maintenance
26	45.28254117	-76.2461371	Generally in good condition.	Good	No Action	Routine Maintenance
30	45.28668032	-76.25056006	Generally in good condition.	Good	No Action	Routine Maintenance
34	45.30315135	-76.26837353	Generally in good condition	Good	No Action	Routine Maintenance
35	45.30326354	-76.26846615	Generally in good condition	Good	No Action	Routine Maintenance
39	45.30323831	-76.26852709	Generally in good condition	Good	No Action	Routine Maintenance
41	45.3034303	-76.26874929	Generally in good condition	Good	No Action	Routine Maintenance
42	45.3034795	-76.26876966	Generally in good condition	Good	No Action	Routine Maintenance
43	45.30337909	-76.26871375	Generally in good condition	Good	No Action	Routine Maintenance
47	45.30821486	-76.27605823	Generally in good condition	Good	No Action	Routine Maintenance
48	45.30838057	-76.27627876	Generally in good condition	Good	No Action	Routine Maintenance
50	45.30978634	-76.27839569	Generally in good condition	Good	No Action	Routine Maintenance
53	45.3137615	-76.28294564	Generally in good condition	Good	No Action	Routine Maintenance
55	45.31970959	-76.28594502	Generally in good condition	Good	No Action	Routine Maintenance
58	45.32298461	-76.28724237	Generally in good condition	Good	No Action	Routine Maintenance
59	45.32305196	-76.28727891	Generally in good condition	Good	No Action	Routine Maintenance
60	45.3230598	-76.28725955	Generally in good condition	Good	No Action	Routine Maintenance
61	45.32310745	-76.28723617	Generally in good condition	Good	No Action	Routine Maintenance
63	45.32378521	-76.28754169	Generally in good condition	Good	No Action	Routine Maintenance
65	45.32407518	-76.28763925	Generally in good condition	Good	No Action	Routine Maintenance
67	45.32505741	-76.28827217	Generally in good condition	Good	No Action	Routine Maintenance
71	45.32834727	-76.29093342	Generally in good condition.	Good	No Action	Routine Maintenance
72	45.32888048	-76.29134171	Generally in good condition.	Good	No Action	Routine Maintenance
74	45.33020696	-76.29229523	Generally in good condition.	Good	No Action	Routine Maintenance
75	45.33020256	-76.29235609	Generally in good condition.	Good	No Action	Routine Maintenance
78	45.3336904	-76.29438719	Generally in good condition	Good	No Action	Routine Maintenance
79	45.33399789	-76.2945705	Generally in good condition	Good	No Action	Routine Maintenance
81	45.33405266	-76.29449992	Generally in good condition.	Good	No Action	Routine Maintenance
82	45.33430781	-76.29464937	Generally in good condition.	Good	No Action	Routine Maintenance
84	45.33438459	-76.29475247	Generally in good condition.	Good	No Action	Routine Maintenance
90	45.35662831	-76.30664069	Generally in good condition.	Good	No Action	Routine Maintenance
91	45.35674369	-76.30666777	Generally in good condition.	Good	No Action	Routine Maintenance
92	45.35683279	-76.30669693	Generally in good condition.	Good	No Action	Routine Maintenance
94	45.36467913	-76.31089459	Generally in good condition.	Good	No Action	Routine Maintenance
96	45.37342594	-76.3155173	Generally in good condition.	Good	No Action	Routine Maintenance
99	45.37463197	-76.31621383	Generally in good condition.	Good	No Action	Routine Maintenance
100	45.3746997	-76.31624744	Generally in good condition.	Good	No Action	Routine Maintenance
104	45.37438722	-76.31610721	Generally in good condition.	Good	No Action	Routine Maintenance
105	45.37433726	-76.31607394	Generally in good condition.	Good	No Action	Routine Maintenance

Appendix D

Ottawa Valley Recreational Trail - Sign Components

108	45.3820624	-76.32018853	Generally in good condition.	Good	No Action	Routine Maintenance
112	45.38320779	-76.32081055	Generally in good condition.	Good	No Action	Routine Maintenance
113	45.38341419	-76.3209341	Generally in good condition.	Good	No Action	Routine Maintenance
115	45.38354365	-76.32096285	Generally in good condition.	Good	No Action	Routine Maintenance
117	45.38343837	-76.3209372	Generally in good condition.	Good	No Action	Routine Maintenance
123	45.40507433	-76.32722966	Generally in good condition.	Good	No Action	Routine Maintenance
124	45.40512735	-76.32732958	Generally in good condition.	Good	No Action	Routine Maintenance
125	45.40594873	-76.32835837	Generally in good condition.	Good	No Action	Routine Maintenance
127	45.40705841	-76.32977835	Generally in good condition.	Good	No Action	Routine Maintenance
128	45.33521469	-76.29526461	Generally in good condition.	Good	No Action	Routine Maintenance
129	45.33542608	-76.29531867	Generally in good condition.	Good	No Action	Routine Maintenance
130	45.34576884	-76.30078861	Generally in good condition.	Good	No Action	Routine Maintenance
131	45.34783813	-76.30192076	Generally in good condition.	Good	No Action	Routine Maintenance
132	45.35403663	-76.30520579	Generally in good condition.	Good	No Action	Routine Maintenance
133	45.35488391	-76.3056678	Generally in good condition.	Good	No Action	Routine Maintenance
134	45.35493391	-76.30569312	Generally in good condition.	Good	No Action	Routine Maintenance
135	45.35500692	-76.30573452	Generally in good condition.	Good	No Action	Routine Maintenance
137	45.355266	-76.30589194	Generally in good condition.	Good	No Action	Routine Maintenance
138	45.35615126	-76.30634766	Generally in good condition.	Good	No Action	Routine Maintenance
139	44.97676231	-76.05717415	Generally in good condition.	Good	No Action	Routine Maintenance
140	44.97776159	-76.05760942	Generally in good condition.	Good	No Action	Routine Maintenance
141	44.97839757	-76.05782027	Generally in good condition.	Good	No Action	Routine Maintenance
142	44.97846921	-76.0578441	Generally in good condition.	Good	No Action	Routine Maintenance
143	44.98032412	-76.05849531	Generally in good condition.	Good	No Action	Routine Maintenance
144	44.99229702	-76.06324359	Generally in good condition.	Good	No Action	Routine Maintenance
145	44.99488275	-76.06433294	Generally in good condition.	Good	No Action	Routine Maintenance
146	44.99935796	-76.06612167	Generally in good condition.	Good	No Action	Routine Maintenance
148	45.00101695	-76.06660534	Generally in good condition.	Good	No Action	Routine Maintenance
149	45.00223055	-76.06726453	Generally in good condition.	Good	No Action	Routine Maintenance
152	45.02567538	-76.07752884	Generally in good condition.	Good	No Action	Routine Maintenance
153	45.02561504	-76.07749441	Generally in good condition.	Good	No Action	Routine Maintenance
154	45.02572764	-76.07749805	Generally in good condition.	Good	No Action	Routine Maintenance
155	45.02602367	-76.07767082	Generally in good condition.	Good	No Action	Routine Maintenance
156	45.02608719	-76.07766257	Generally in good condition.	Good	No Action	Routine Maintenance
157	45.02612623	-76.07770242	Generally in good condition.	Good	No Action	Routine Maintenance
158	45.02619934	-76.07773217	Generally in good condition.	Good	No Action	Routine Maintenance
159	45.02658796	-76.07806535	Generally in good condition.	Good	No Action	Routine Maintenance
160	45.02708661	-76.07815264	Generally in good condition.	Good	No Action	Routine Maintenance
161	45.02709438	-76.07822275	Generally in good condition.	Good	No Action	Routine Maintenance
162	45.02774073	-76.07847541	Generally in good condition.	Good	No Action	Routine Maintenance
163	45.03003804	-76.07955009	Generally in good condition.	Good	No Action	Routine Maintenance
164	45.03217108	-76.08054314	Generally in good condition.	Good	No Action	Routine Maintenance
165	45.03450226	-76.0816595	Generally in good condition.	Good	No Action	Routine Maintenance
166	45.03787168	-76.08326699	Generally in good condition.	Good	No Action	Routine Maintenance
167	45.06094549	-76.09409675	Generally in good condition.	Good	No Action	Routine Maintenance
168	45.06246311	-76.09479351	Generally in good condition.	Good	No Action	Routine Maintenance
169	45.06273741	-76.09493764	Generally in good condition.	Good	No Action	Routine Maintenance
170	45.06402826	-76.09555765	Generally in good condition.	Good	No Action	Routine Maintenance
171	45.07426814	-76.10096597	Generally in good condition.	Good	No Action	Routine Maintenance
172	45.07518102	-76.10164	Generally in good condition.	Good	No Action	Routine Maintenance
173	45.07518102	-76.10164	Generally in good condition.	Good	No Action	Routine Maintenance
175	45.07541012	-76.1017635	Generally in good condition.	Good	No Action	Routine Maintenance
176	45.07540597	-76.10179084	Generally in good condition.	Good	No Action	Routine Maintenance

177	45.07636436	-76.10255249	Generally in good condition.	Good	No Action	Routine Maintenance
178	45.07888362	-76.10460025	Generally in good condition.	Good	No Action	Routine Maintenance
179	45.08499504	-76.10965315	Generally in good condition.	Good	No Action	Routine Maintenance
180	45.08598052	-76.11038875	Generally in good condition.	Good	No Action	Routine Maintenance
181	45.08613907	-76.11057444	Generally in good condition.	Good	No Action	Routine Maintenance
182	45.08704069	-76.11139211	Generally in good condition.	Good	No Action	Routine Maintenance
183	45.09334153	-76.11617143	Generally in good condition.	Good	No Action	Routine Maintenance
184	45.09765641	-76.11879017	Generally in good condition.	Good	No Action	Routine Maintenance
185	45.09875224	-76.11942018	Generally in good condition.	Good	No Action	Routine Maintenance
186	45.09875976	-76.11941819	Generally in good condition.	Good	No Action	Routine Maintenance
187	45.09875976	-76.11941819	Generally in good condition.	Good	No Action	Routine Maintenance
188	45.09911904	-76.11969017	Generally in good condition.	Good	No Action	Routine Maintenance
189	45.09898288	-76.1195492	Generally in good condition.	Good	No Action	Routine Maintenance
190	45.10023985	-76.12029456	Generally in good condition.	Good	No Action	Routine Maintenance
191	45.10394955	-76.12227112	Generally in good condition.	Good	No Action	Routine Maintenance
192	45.1117732	-76.12406312	Generally in good condition.	Good	No Action	Routine Maintenance
193	45.11266672	-76.12407912	Generally in good condition.	Good	No Action	Routine Maintenance
194	45.11284228	-76.12415437	Generally in good condition.	Good	No Action	Routine Maintenance
195	45.11290029	-76.12414457	Generally in good condition.	Good	No Action	Routine Maintenance
196	45.11289715	-76.12413426	Generally in good condition.	Good	No Action	Routine Maintenance
197	45.11292921	-76.12416289	Generally in good condition.	Good	No Action	Routine Maintenance
198	45.11293915	-76.12417233	Generally in good condition.	Good	No Action	Routine Maintenance
199	45.11336132	-76.12409404	Generally in good condition.	Good	No Action	Routine Maintenance
200	45.11321033	-76.12401143	Generally in good condition.	Good	No Action	Routine Maintenance
201	45.11315038	-76.12418295	Generally in good condition.	Good	No Action	Routine Maintenance
202	45.11345368	-76.12418377	Generally in good condition.	Good	No Action	Routine Maintenance
203	45.11349467	-76.12420366	Generally in good condition.	Good	No Action	Routine Maintenance
204	45.11351856	-76.12416456	Generally in good condition.	Good	No Action	Routine Maintenance
205	45.11356187	-76.12426921	Generally in good condition.	Good	No Action	Routine Maintenance
206	45.11429404	-76.12444343	Generally in good condition.	Good	No Action	Routine Maintenance
207	45.12007341	-76.12626945	Generally in good condition.	Good	No Action	Routine Maintenance
208	45.13235427	-76.13641962	Generally in good condition.	Good	No Action	Routine Maintenance
209	45.13275109	-76.13685102	Generally in good condition.	Good	No Action	Routine Maintenance
210	45.1329755	-76.13706783	Generally in good condition.	Good	No Action	Routine Maintenance
211	45.13312112	-76.13725142	Generally in good condition.	Good	No Action	Routine Maintenance
212	45.13320778	-76.13731552	Generally in good condition.	Good	No Action	Routine Maintenance
213	45.13331663	-76.13745296	Generally in good condition.	Good	No Action	Routine Maintenance
214	45.13338341	-76.13756269	Generally in good condition.	Good	No Action	Routine Maintenance
215	45.13501179	-76.13905499	Generally in good condition.	Good	No Action	Routine Maintenance
217	45.13587695	-76.13962845	Generally in good condition.	Good	No Action	Routine Maintenance
218	45.13629106	-76.13998957	Generally in good condition.	Good	No Action	Routine Maintenance
219	45.13668866	-76.14010726	Generally in good condition.	Good	No Action	Routine Maintenance
220	45.13662691	-76.14004337	Generally in good condition.	Good	No Action	Routine Maintenance
221	45.137455	-76.14086021	Generally in good condition.	Good	No Action	Routine Maintenance
222	45.13753239	-76.14094845	Generally in good condition.	Good	No Action	Routine Maintenance
223	45.13779805	-76.14110052	Generally in good condition.	Good	No Action	Routine Maintenance
224	45.13923444	-76.14194952	Generally in good condition.	Good	No Action	Routine Maintenance
225	45.13933937	-76.14200766	Generally in good condition.	Good	No Action	Routine Maintenance
226	45.13947639	-76.14216387	Generally in good condition.	Good	No Action	Routine Maintenance
227	45.13953497	-76.14214432	Generally in good condition.	Good	No Action	Routine Maintenance
228	45.14078859	-76.14278845	Generally in good condition.	Good	No Action	Routine Maintenance
229	45.14087754	-76.14282542	Generally in good condition.	Good	No Action	Routine Maintenance
230	45.14117927	-76.14296944	Generally in good condition.	Good	No Action	Routine Maintenance

Appendix D

Ottawa Valley Recreational Trail - Sign Components

231	45.14371855	-76.14379065	Generally in good condition.	Good	No Action	Routine Maintenance
232	45.14393111	-76.1438816	Generally in good condition.	Good	No Action	Routine Maintenance
233	45.14406757	-76.14386598	Generally in good condition.	Good	No Action	Routine Maintenance
234	45.14417403	-76.14389821	Generally in good condition.	Good	No Action	Routine Maintenance
235	45.14486218	-76.14386912	Generally in good condition.	Good	No Action	Routine Maintenance
236	45.14488883	-76.14386897	Generally in good condition.	Good	No Action	Routine Maintenance
237	45.14515191	-76.14394036	Generally in good condition.	Good	No Action	Routine Maintenance
238	45.14528485	-76.14386044	Generally in good condition.	Good	No Action	Routine Maintenance
239	45.14820247	-76.14332066	Generally in good condition.	Good	No Action	Routine Maintenance
240	45.14832957	-76.14323055	Generally in good condition.	Good	No Action	Routine Maintenance
241	45.14872653	-76.14318158	Generally in good condition.	Good	No Action	Routine Maintenance
242	45.14876735	-76.14318069	Generally in good condition.	Good	No Action	Routine Maintenance
243	45.14981343	-76.14325069	Generally in good condition.	Good	No Action	Routine Maintenance
244	45.14916381	-76.14319106	Generally in good condition.	Good	No Action	Routine Maintenance
245	45.15366716	-76.14409108	Generally in good condition.	Good	No Action	Routine Maintenance
246	45.15502988	-76.14435987	Generally in good condition.	Good	No Action	Routine Maintenance
247	45.15526757	-76.14445176	Generally in good condition.	Good	No Action	Routine Maintenance
248	45.15528884	-76.1444272	Generally in good condition.	Good	No Action	Routine Maintenance
249	45.15566771	-76.14445708	Generally in good condition.	Good	No Action	Routine Maintenance
250	45.15566771	-76.14445708	Generally in good condition.	Good	No Action	Routine Maintenance
251	45.1556765	-76.14447042	Generally in good condition.	Good	No Action	Routine Maintenance
252	45.1567373	-76.14471863	Generally in good condition.	Good	No Action	Routine Maintenance
253	45.17610376	-76.15405957	Generally in good condition.	Good	No Action	Routine Maintenance
254	45.17751316	-76.15482788	Generally in good condition.	Good	No Action	Routine Maintenance
255	45.17751668	-76.15479744	Generally in good condition.	Good	No Action	Routine Maintenance
256	45.17766909	-76.15496665	Generally in good condition.	Good	No Action	Routine Maintenance
257	45.17874179	-76.15553313	Generally in good condition.	Good	No Action	Routine Maintenance
258	45.17936781	-76.15585892	Generally in good condition.	Good	No Action	Routine Maintenance
259	45.18155241	-76.1570371	Generally in good condition.	Good	No Action	Routine Maintenance
260	45.18241597	-76.15751466	Generally in good condition.	Good	No Action	Routine Maintenance
261	45.18369647	-76.15835827	Generally in good condition.	Good	No Action	Routine Maintenance
262	45.18398007	-76.15832208	Generally in good condition but wooden base lightly weathered.	Good	5 to 10 years	Replace
263	45.18437464	-76.15857443	Generally in good condition.	Good	No Action	Routine Maintenance
264	45.18517699	-76.15901167	Generally in good condition.	Good	No Action	Routine Maintenance
265	45.18517717	-76.15901197	Generally in good condition.	Good	No Action	Routine Maintenance
266	45.18616886	-76.15955798	Generally in good condition.	Good	No Action	Routine Maintenance
267	45.18942569	-76.16133056	Generally in good condition.	Good	No Action	Routine Maintenance
268	45.19308606	-76.16331336	Generally in good condition.	Good	No Action	Routine Maintenance
269	45.19523646	-76.1644781	Generally in good condition.	Good	No Action	Routine Maintenance
270	45.19704144	-76.16548623	Generally in good condition.	Good	No Action	Routine Maintenance
271	45.20431732	-76.17014912	Generally in good condition.	Good	No Action	Routine Maintenance
272	45.20599694	-76.17168803	Generally in good condition.	Good	No Action	Routine Maintenance
273	45.20744001	-76.17316928	Generally in good condition.	Good	No Action	Routine Maintenance
274	45.20820488	-76.17397879	Generally in good condition.	Good	No Action	Routine Maintenance
275	45.20834909	-76.17416013	Generally in good condition.	Good	No Action	Routine Maintenance
277	45.2105757	-76.17653381	Generally in good condition.	Good	No Action	Routine Maintenance
280	45.21515845	-76.18147549	Generally in good condition.	Good	No Action	Routine Maintenance
281	45.21608949	-76.18248749	Generally in good condition.	Good	No Action	Routine Maintenance
282	45.21623936	-76.18267237	Generally in good condition.	Good	No Action	Routine Maintenance
285	45.22067154	-76.1874456	Generally in good condition.	Good	No Action	Routine Maintenance
287	45.22282585	-76.19030993	Generally in good condition.	Good	No Action	Routine Maintenance
288	45.22361063	-76.19135858	Generally in good condition.	Good	No Action	Routine Maintenance

Appendix D

Ottawa Valley Recreational Trail - Sign Components

289	45.2236409	-76.1914319	Generally in good condition.	Good	No Action	Routine Maintenance
291	45.22382957	-76.19169512	Generally in good condition.	Good	No Action	Routine Maintenance
292	45.22471958	-76.19292709	Generally in good condition.	Good	No Action	Routine Maintenance
293	45.22547577	-76.19399435	Generally in good condition.	Good	No Action	Routine Maintenance
296	45.22472473	-76.19294071	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
299	45.22546903	-76.19396516	Generally in good condition.	Good	No Action	Routine Maintenance
300	45.22568843	-76.19421814	Generally in good condition.	Good	No Action	Routine Maintenance
301	45.22573951	-76.19438329	Generally in good condition.	Good	No Action	Routine Maintenance
302	45.22598693	-76.19465493	Generally in good condition.	Good	No Action	Routine Maintenance
304	45.22617656	-76.19494518	Generally in good condition.	Good	No Action	Routine Maintenance
306	45.22715009	-76.19628588	Generally in good condition.	Good	No Action	Routine Maintenance
307	45.2272053	-76.19635587	Generally in good condition.	Good	No Action	Routine Maintenance
309	45.22734598	-76.19660704	Generally in good condition.	Good	No Action	Routine Maintenance
311	45.22734914	-76.19660592	Generally in good condition.	Good	No Action	Routine Maintenance
312	45.22786448	-76.19725683	Generally in good condition.	Good	No Action	Routine Maintenance
315	45.22849656	-76.1978964	Generally in good condition.	Good	No Action	Routine Maintenance
316	45.22976978	-76.19903025	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
317	45.22978792	-76.19903106	Info plaque in generally good condition.	Good	No Action	Routine Maintenance
318	45.22981447	-76.19908968	Generally in good condition.	Good	No Action	Routine Maintenance
319	45.23074437	-76.19983119	Generally in good condition.	Good	No Action	Routine Maintenance
320	45.23157787	-76.2005181	Generally in good condition.	Good	No Action	Routine Maintenance
321	45.23162669	-76.20055165	Generally in good condition.	Good	No Action	Routine Maintenance
322	45.23162669	-76.20055165	Generally in good condition.	Good	No Action	Routine Maintenance
323	45.23174989	-76.20067033	Generally in good condition.	Good	No Action	Routine Maintenance
324	45.23240602	-76.20123723	Generally in good condition.	Good	No Action	Routine Maintenance
325	45.23240602	-76.20123723	Generally in good condition.	Good	No Action	Routine Maintenance
326	45.2331283	-76.20193158	Generally in good condition.	Good	No Action	Routine Maintenance
327	45.23319067	-76.20199414	Generally in good condition.	Good	No Action	Routine Maintenance
328	45.23319553	-76.20203646	Generally in good condition.	Good	No Action	Routine Maintenance
329	45.23337511	-76.20222814	Generally in good condition.	Good	No Action	Routine Maintenance
330	45.23345121	-76.20232169	Generally in good condition.	Good	No Action	Routine Maintenance
331	45.23424364	-76.20310984	Generally in good condition.	Good	No Action	Routine Maintenance
332	45.23449036	-76.2033747	Generally in good condition.	Good	No Action	Routine Maintenance
333	45.23689679	-76.20606737	Generally in good condition.	Good	No Action	Routine Maintenance
334	45.23750492	-76.20681588	Generally in good condition.	Good	No Action	Routine Maintenance
335	45.2377943	-76.20714599	Generally in good condition.	Good	No Action	Routine Maintenance
336	45.23793803	-76.2072929	Generally in good condition.	Good	No Action	Routine Maintenance
337	45.23797187	-76.20734052	Generally in good condition.	Good	No Action	Routine Maintenance
339	45.24469577	-76.21420425	Generally in good condition.	Good	No Action	Routine Maintenance
340	45.24485626	-76.21435611	Generally in good condition.	Good	No Action	Routine Maintenance
341	45.24579706	-76.21511772	Generally in good condition.	Good	No Action	Routine Maintenance
342	45.24740055	-76.21646312	Generally in good condition.	Good	No Action	Routine Maintenance
343	45.24822616	-76.21737582	Signs and road markers 35 total are generally in good condition.	Good	No Action	Routine Maintenance
344	45.24836704	-76.21755354	Generally in good condition.	Good	No Action	Routine Maintenance
345	45.24864318	-76.2175835	Generally in good condition.	Good	No Action	Routine Maintenance
346	45.24881577	-76.21762572	Generally in good condition.	Good	No Action	Routine Maintenance
347	45.25017069	-76.21878762	Generally in good condition.	Good	No Action	Routine Maintenance
348	45.25020737	-76.21881964	Generally in good condition.	Good	No Action	Routine Maintenance
349	45.25037383	-76.2189721	Generally in good condition.	Good	No Action	Routine Maintenance
350	45.25037383	-76.2189721	Generally in good condition.	Good	No Action	Routine Maintenance
351	45.25037383	-76.2189721	Generally in good condition.	Good	No Action	Routine Maintenance
352	45.25037383	-76.2189721	Generally in good condition.	Good	No Action	Routine Maintenance

Appendix D

Ottawa Valley Recreational Trail - Sign Components

353	45.25135252	-76.21982442	Generally in good condition.	Good	No Action	Routine Maintenance
355	45.25464813	-76.2225883	Generally in good condition.	Good	No Action	Routine Maintenance
356	45.25464813	-76.2225883	Generally in good condition.	Good	No Action	Routine Maintenance
358	45.25475788	-76.22267902	Generally in good condition.	Good	No Action	Routine Maintenance
360	45.25504149	-76.22285504	Generally in good condition.	Good	No Action	Routine Maintenance
361	45.25528055	-76.2230646	Generally in good condition.	Good	No Action	Routine Maintenance
363	45.25622823	-76.2238737	Generally in good condition.	Good	No Action	Routine Maintenance
364	45.25700327	-76.22454311	Generally in good condition.	Good	No Action	Routine Maintenance
365	45.25711597	-76.22464101	Generally in good condition.	Good	No Action	Routine Maintenance
376	45.26934537	-76.23499687	Generally in good condition.	Good	No Action	Routine Maintenance
377	45.26953324	-76.23511961	Generally in good condition.	Good	No Action	Routine Maintenance
378	45.26953342	-76.23511991	Generally in good condition.	Good	No Action	Routine Maintenance
380	45.26960055	-76.23517389	Generally in good condition.	Good	No Action	Routine Maintenance
381	45.26960055	-76.23517389	Generally in good condition.	Good	No Action	Routine Maintenance
383	45.27811089	-76.24239768	Generally in good condition.	Good	No Action	Routine Maintenance
384	45.2802354	-76.24412253	Generally in good condition.	Good	No Action	Routine Maintenance
385	45.28113352	-76.24488703	Generally in good condition.	Good	No Action	Routine Maintenance
386	45.28112721	-76.24489767	Generally in good condition.	Good	No Action	Routine Maintenance
387	45.28112721	-76.24489767	Generally in good condition.	Good	No Action	Routine Maintenance
389	45.281153	-76.24493479	Generally in good condition.	Good	No Action	Routine Maintenance
390	45.28132832	-76.24507903	Generally in good condition.	Good	No Action	Routine Maintenance
392	45.2813285	-76.24507933	Generally in good condition.	Good	No Action	Routine Maintenance