

Re: Item No. 15.1.5

**HALIFAX**

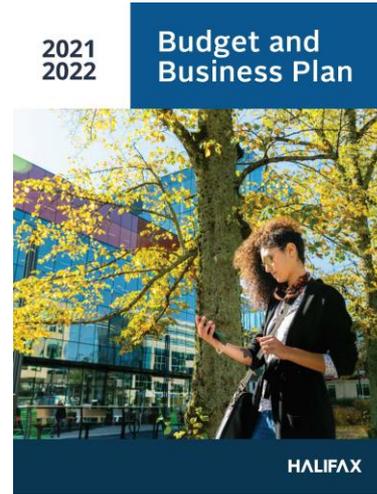
# **Recommendation on Level of Service (LOS) for the HRM Street Network**

Halifax Regional Council

January 25, 2022

# Origin

Strategic  
Priorities Plan  
2021-25

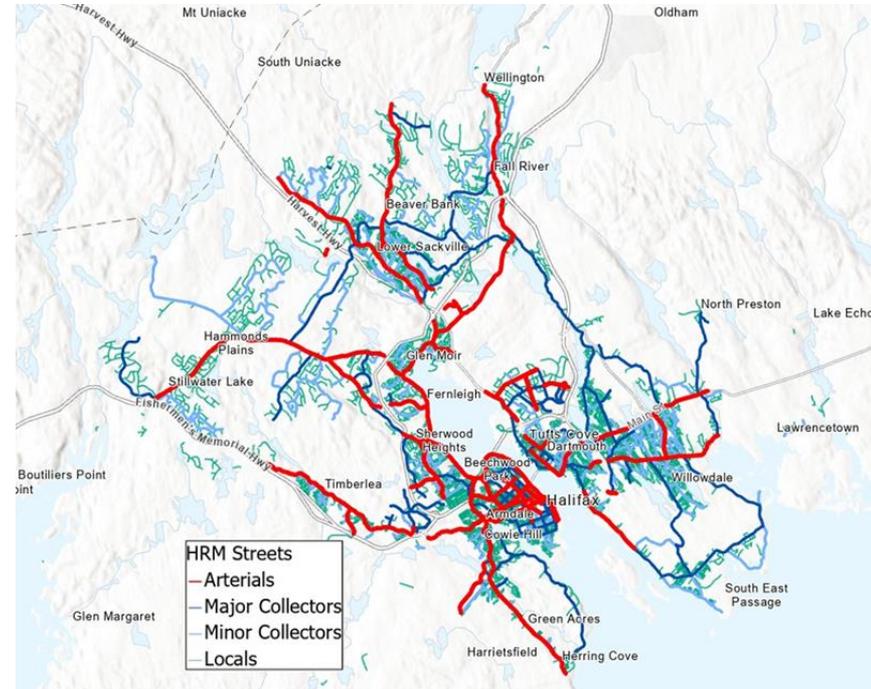


Transportation and  
Public Works  
2021/22 Budget  
and Business Plan.

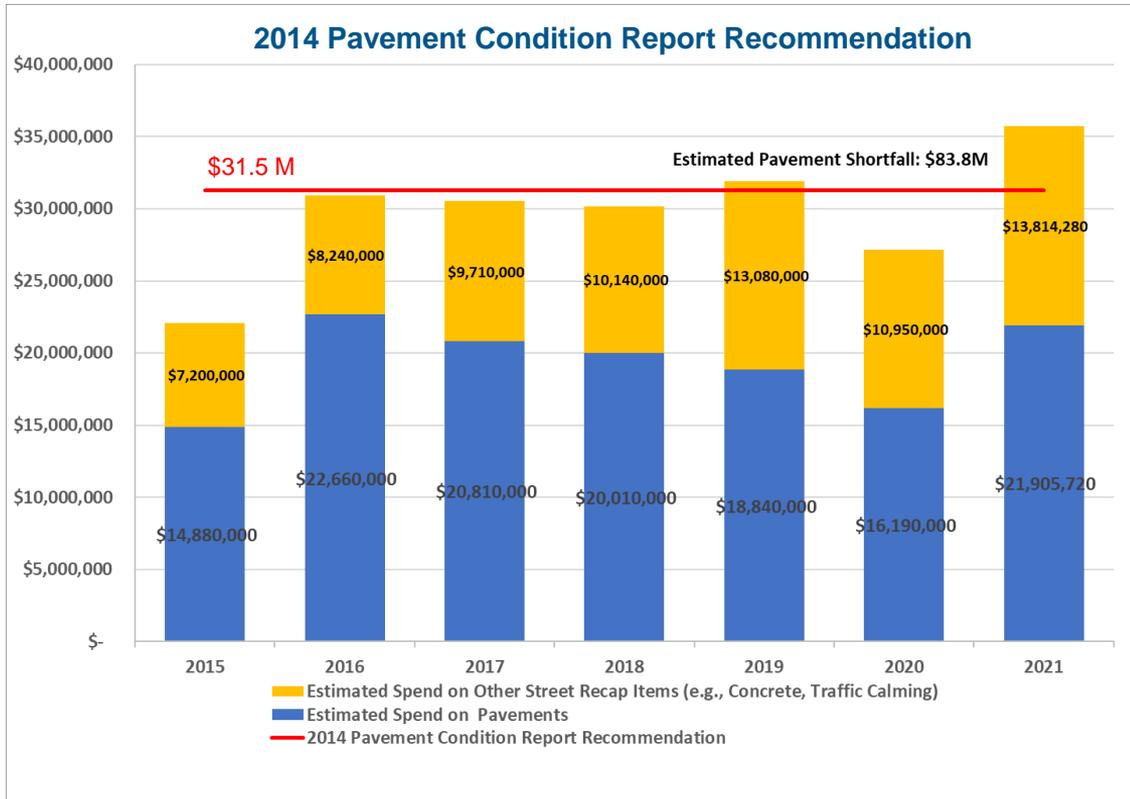
“Municipal staff will work with Regional Council to articulate what a "Well-Maintained Transportation Network" means for the municipality. This includes defining levels of service for transportation related assets (e.g., streets, sidewalks, walkways, etc.) and will help identify funding requirements to maintain assets at an acceptable level.”

# Background

- Currently own approximately **3900** lane-kilometers of arterial, collector and local roads.
- Historically, condition data was collected via windshield surveys.
- Pavement management system (PMS), Road Analytics, computed the Surface Distress Index (SDI) (0-10 Scale).
- In 2014 HRM engaged a third-party consultant to analyze the condition of the pavement network.



# Background



\$31.5M / year required to maintain the network average (~ 7.4 SDI)

# Background

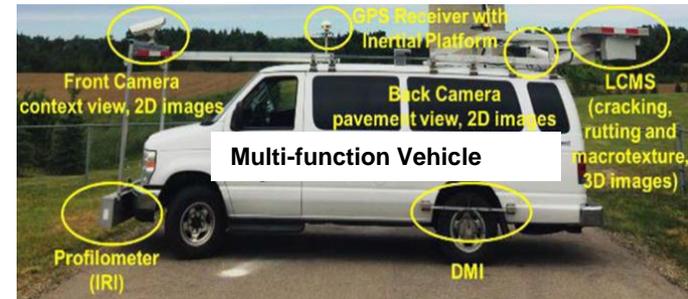
Between 2015 and 2020, HRM:

- Procured and implemented a new PMS.
- Introduced a new data collection methodology.
- Collected condition data (2016, 2018, 2020).
- Conducted analyses.



In 2021, HRM, with assistance from Stantec Consulting Ltd. (Stantec):

- Updated core data and parameters.
- Transitioned to the Pavement Quality Index (PQI) (0-100 Scale).
- Conducted jurisdictional scans.
- Developed new PQI triggers / Condition Categories.
- Recommended a Level of Service (LOS) for the HRM roadway network.



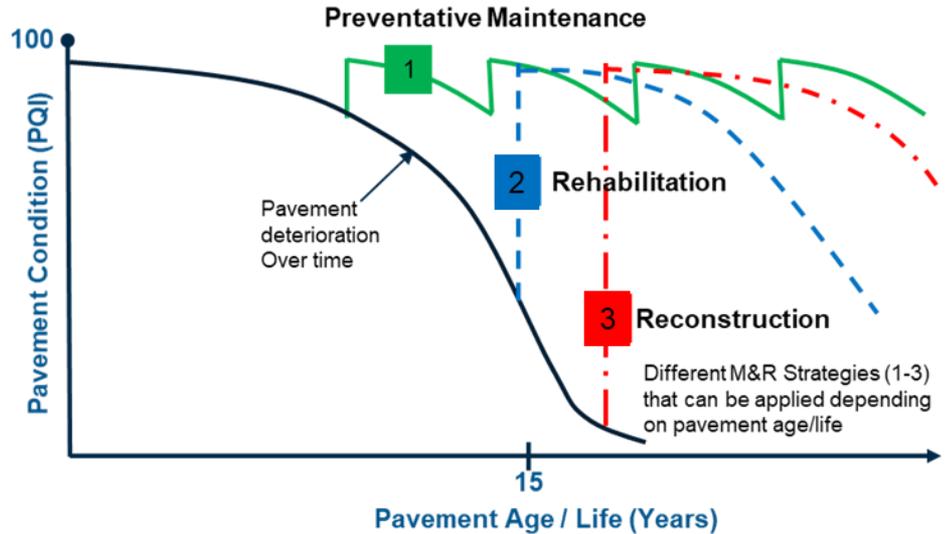
# Pavement Management System

## Highway Pavement Management Application (HPMA)

- Forecasts maintenance/rehabilitation (M&R) needs.
- Develops program budgets and priorities.
- Uses cost-effectiveness and marginal cost-effectiveness approaches to optimize program.

### Performing the right fix at the right time

- Does not currently assess intangible factors (e.g., disruption / congestion, integration opportunities / conflicts, etc.).



# PQI Rehabilitation Triggers

- Used in rehabilitation needs analysis.
- Generally, differ by road functional class (i.e., Arterial, Collector, Local).
- Typically represent level of poor condition.
- Jurisdictional scans completed for comparison with other agencies.

Functional Class	PQI Trigger Scan Ranges	Initial PQI Triggers	Initial PQI Minus 5	Initial PQI Plus 5	Initial PQI Minus 5 (Minor and Local Only)
Arterial	50 to 70	60	55	65	60
Major Collector	40 to 65	55	50	60	55
Minor Collector	40 to 65	55	50	60	50
Local	40 to 55	50	45	55	45

Budget Scenario	Average Annual Needs (\$M)	Year-1 Needs (\$M)
Initial PQI Triggers	\$53 M	\$192 M
Initial PQI Minus 5	\$52 M	\$152 M
Initial PQI Plus 5	\$60 M	\$235 M
Initial PQI Minus 5 (Minor and Local Only)	\$50 M	\$163 M

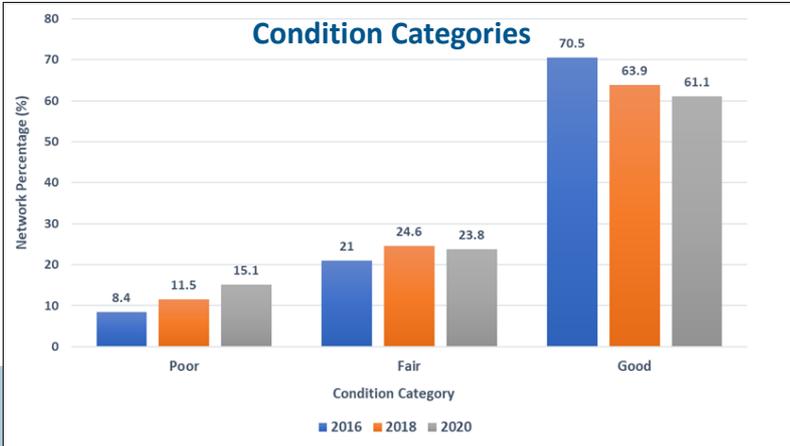
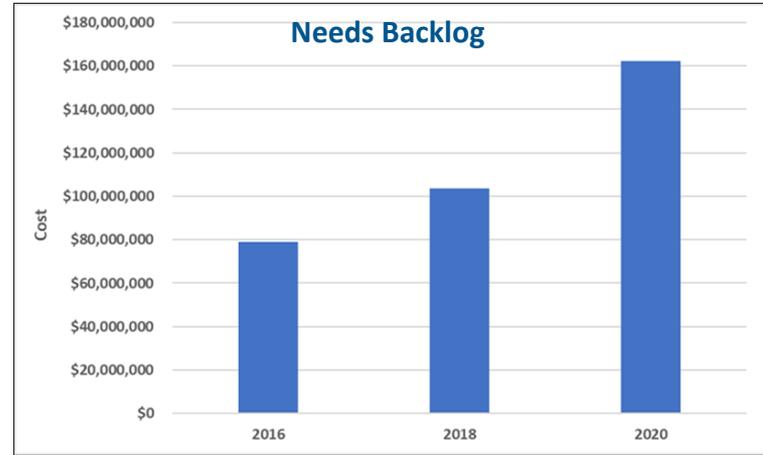
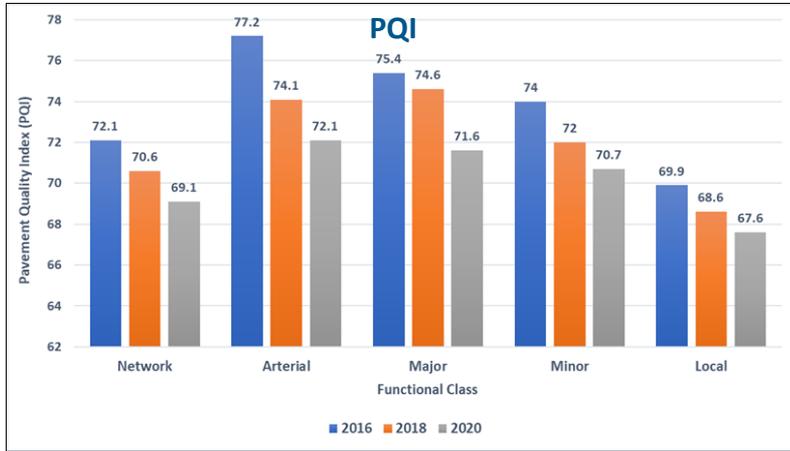
# Condition Categories

- PQI can be classified as Good, Fair, or Poor
- Differ by functional class (higher thresholds for higher volume streets)
- Three to five condition states typical throughout the industry

Condition Categories Established in HPMA (Table 4 in Report)

Functional Class	Good	Fair	Poor
Arterial	$\geq 75$	60-75	$\leq 60$
Major Collector	$\geq 70$	55-70	$\leq 55$
Minor Collector	$\geq 65$	50-65	$\leq 50$
Local	$\geq 60$	45-60	$\leq 45$

# Network Condition



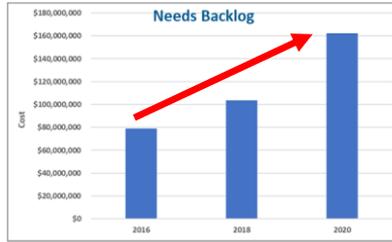
- Need is defined as the level where a street segment falls below the “trigger” or “poor” threshold.
- Needs backlog relates to the cost required to bring all streets above the trigger values.
- Needs backlog can also be defined as a percentage of the network’s lane-kms below the triggers.

# Pavement Management Objectives

- To maximize the value and service level of the road network through timely intervention and cost-effective management of available funds.
- To manage the road network to the level of service (LOS) that meets the expectations of customers (i.e., public drivers), and to provide a safe and functional road network.
- To minimize the depreciation of the road network.

# Pavement Management Objectives

Delaying state of  
good repair work =



= ↑ RISKS

- Increased reactive maintenance requirements
- Lower customer satisfaction
- Increased vehicle maintenance costs (private as well as transit and commercial vehicles)
- Reduced network safety (friction and drainage issues) and reduced accessibility
- Potential for increased claims and greater liability
- Potential for health and safety impacts
- Missed minor M&R results in more major M&R along with higher cost repairs
- More intrusive rehabilitation requirements increase road disruption

It is important to establish an approved Level of Service (LOS) that stabilizes network condition. Establishing LOS was recommended as part of the 2019 Road and Sidewalk Asset Management Audit.

# Level of Service / Funding Investment

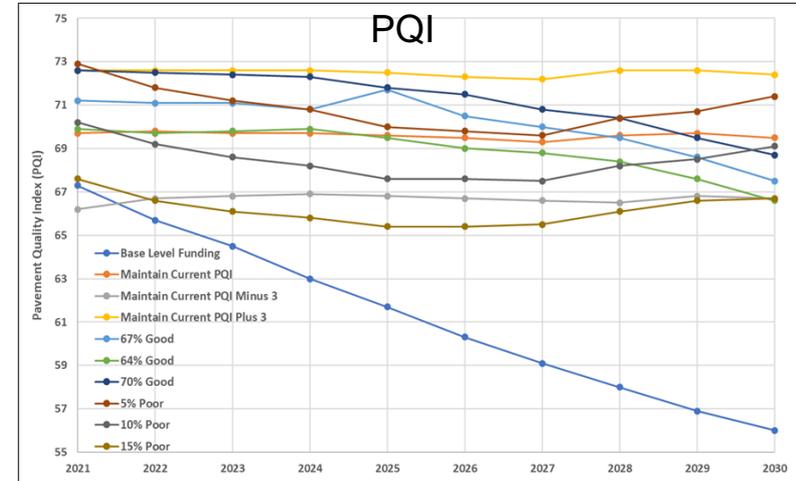
Budget Scenario	Average Annual Budget Needs (\$M)*	Year-1 Needs (\$M)*	Needs Backlog at Year 10 (% Lane-Kms)	PQI at Year 10	Average % Good	% Good at Year 10
Base Level Funding**	20	22	40	56.0	-	-
Maintain Current PQI	42	61	16	69.1	-	-
Maintain Current PQI Minus 3	36	-**	22	66.1	-	-
Maintain Current PQI Plus 3	48	103	11	72.1	-	-
67% Good	38	69	15	67.5	67	65.4
64% Good	36	51	18	66.6	64	62.7
70% Good	41	90	13	68.7	70	67.4
5% Poor	45	114	5	71.4	65	66.9
10% Poor	39	57	10	69.1	60	62.9
15% Poor	34	20	15	66.7	55	58.4

\*Funds are for Pavement M&R only

\*\*Base level funding aligns with proposed Four-Year Draft Budget

## 2020 Condition

- Network average PQI = 69.1.
- Needs backlog = 15.1% of network lane-kms
- 61% of network “Good” (70% in 2016)



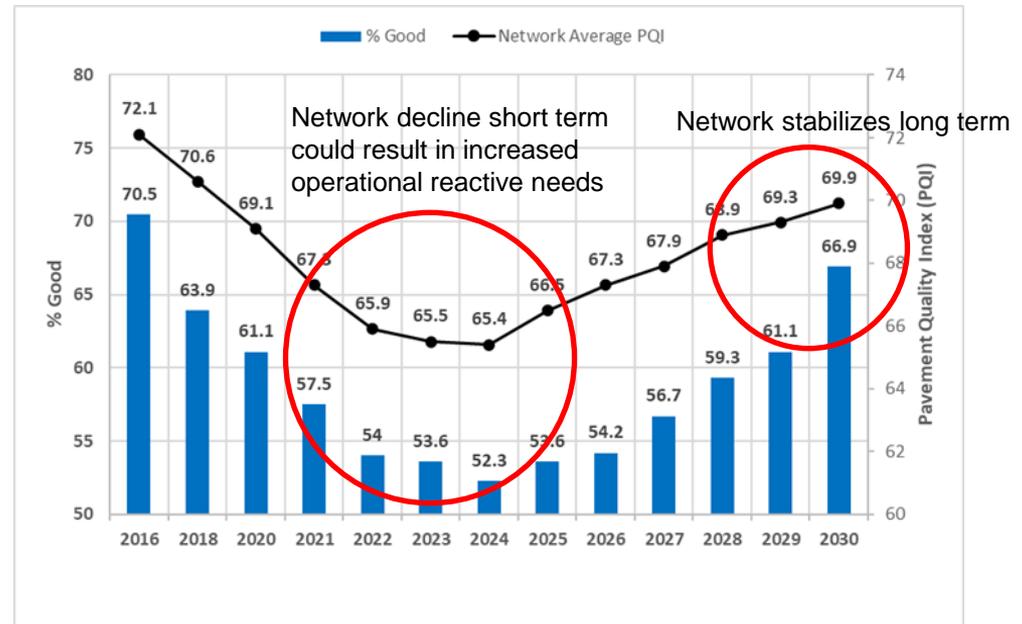
# Level of Service / Funding Investment

## Proposed Funding Scenario

Year	Funds Attributed to Pavement M&R
2021	\$21,905,720
2022	\$22,770,000
2023	\$35,000,000
2024	\$40,000,000
2025	\$45,000,000
2026	\$45,000,000
2027	\$45,000,000
2028	\$50,000,000
2029	\$50,000,000
2030	\$55,000,000



Budget Scenario	Average Annual Budget Needs (\$M)*	Year-1 Needs (\$M)*	Needs Backlog at Year 10 (% Lane-Kms)	PQI at Year 10	Average % Good	% Good at Year 10
Recommended Funding	41	22 (Current)	15.4	69.9	56.9	66.9



A gradual increase in funding should be considered to allow for planning, staff resourcing, and construction industry to prepare.

# Funding Impacts to Street Recapitalization

The Street Recapitalization Account is the account that funds HRM Capital street rehabilitation projects



<https://dynatest.com/equipment/>

But also, funds:

- Concrete curb and gutter
- Integrated traffic calming
- Sidewalk spot repairs
- Pedestrian ramp upgrades and tactile plates
- Landscaping elements
- Preventative maintenance initiatives such as crack sealing and street planer patching
- Staff resources tied to Capital
- Studies, designs, investigations, QA testing, surveys
- Pavement condition data collection

# Funding Impacts to Street Recapitalization

Table 9 in Report

Year	Funds Attributed to Pavement (59%)	Street Recap Funding Proposed
2021	\$21,905,720*	
2022	\$22,770,000**	
2023	\$35,000,000	\$59,322,034
2024	\$40,000,000	\$67,796,610
2025	\$45,000,000	\$76,271,186
2026	\$45,000,000	\$76,271,186
2027	\$45,000,000	\$76,271,186
2028	\$50,000,000	\$84,745,763
2029	\$50,000,000	\$84,745,763
2030	\$55,000,000	\$93,220,339

\*Estimated funds spent on Pavement in 2021

\*\*Estimated funds to be spent on Pavement in 2022 based on current workplan

Table 10 in Report

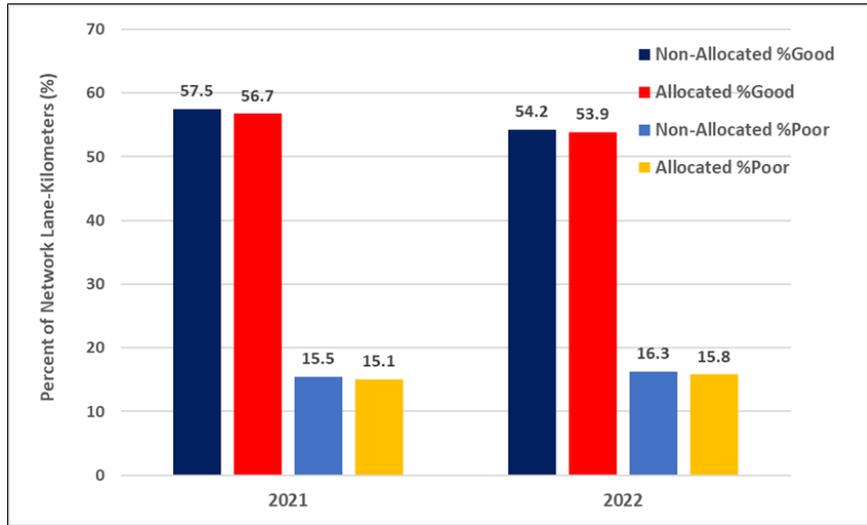
Year	Funds Attributed to Pavement (70%)	Street Recap Funding Proposed
2021	\$21,905,720*	
2022	\$22,770,000**	
2023	\$35,000,000	\$50,000,000
2024	\$40,000,000	\$57,142,857
2025	\$45,000,000	\$64,285,714
2026	\$45,000,000	\$64,285,714
2027	\$45,000,000	\$64,285,714
2028	\$50,000,000	\$71,428,571
2029	\$50,000,000	\$71,428,571
2030	\$55,000,000	\$78,571,429

Funding Impacts  
Pre IMP ~ **32%** of Budget  
Post IMP ~ **41%** of Budget

Recognize that every street selected as part of the Capital Program will not be “complete”

# Program Selection

Full Network vs Individual District Optimization



## Moving Forward

- Street condition rating (PQI)
- Street classification (e.g., arterial, collector, local)
- Type of existing street surface material
- Synergies / conflicts and integration opportunities
- District allocation
- Budget levels
- HPMa optimization (starting point)
- LOS

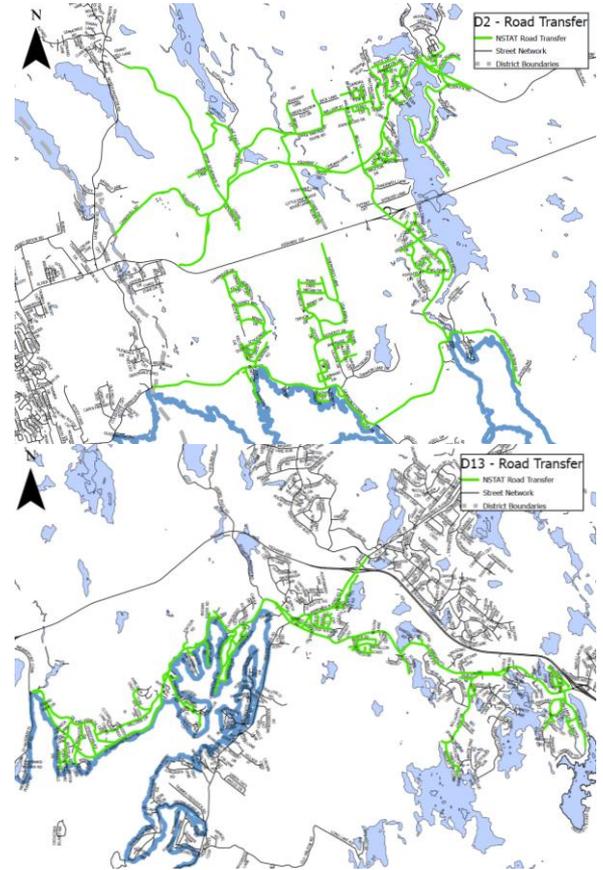
# Recommendation

It is recommended that Halifax Regional Council:

- 1) Approve the Pavement Quality Index (PQI) Condition Categories as described in Table 4 of this report;
- 2) Approve a target Level of Service (LOS) for the HRM road pavement network as outlined in the Discussion section of this report to maintain a minimum of 67% of the network in “Good” condition with PQI for each functional class of road greater or equal to the number shown in Table 4 for the “Good” category”;
- 3) Approve the proposed Budget Based Funding Scenario described in Table 10 of this report as the target funding level for the Street Recapitalization Account in future capital plans; and refer to the 2022/23 Budget Adjustment List process for the initial 22/23 funding level;
- 4) Approve the continued use of District allocation for Capital program selection as described in the Discussion section of this report; and
- 5) Approve a biennial reporting period, whereby staff will conduct similar analyses and report back to Council every two years with pavement condition, as described in the Discussion section of this report.

# Financial Implications

- Recommended funding scenario not currently funded. Possible funding options for the first four years include:
  - Higher capital from operating.
  - Increased federal funding from the Canada Community-Building Fund (previously Gas Tax) or other cost sharing.
  - Reprioritizing projects within the capital plan.
  - Additional debt funding or additional tax increases in 2023/24 and future years.
- Analysis conducted in present-day dollars.
- Analysis does not include proposed Provincial Road Transfer streets. Data will be collected on Road Transfer streets in 2022 and will be part of the next analysis.



# Next Steps

HRM is continuously improving its pavement management processes.

Some next steps:

- Continue to work with other Business Units as we develop future capital programs.
- Assess staff resourcing if funding is increased.
- Work with industry partners to determine capacity to construct larger capital programs.
- Revisit the analysis once the 2022 Road Transfer is complete.
- Increase efforts with Capital integration planning.
- Continue to collect pavement condition data.
- Conduct further refinement of the core data and parameters utilized in HPMA.
- Conduct further budget and performance analyses (biennially).