THE REGIONAL MUNICIPALITY OF NIAGARA
COMMITTEE OF THE WHOLE AGENDA

COTW 1-2025
Thursday, February 6, 2025
6:30 p.m.
Council Chamber - In Person and Electronic Meeting
Niagara Region Headquarters, Campbell West
1815 Sir Isaac Brock Way, Thorold, ON

To view live stream meeting proceedings, please visit: niagararegion.ca/government/council

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Pages

1. CALL TO ORDER

2. LAND ACKNOWLEDGEMENT

3. DISCLOSURES OF PECUNIARY INTEREST

4. REPORTS

   4.1 CSD 5-2025 — 2 - 43
   Procurement By-law Review and Proposed Amendments

   A presentation will precede the discussion of this item.

   4.2 PHD 1-2025 — 44 - 182
   Niagara Emergency Medical Services (NEMS) 10 Year Master Plan

   A presentation will precede the consideration of this item.

5. OTHER BUSINESS

6. NEXT MEETING
   The next meeting is scheduled for Thursday, March 6, 2025, at 6:30 p.m. in the Council Chamber, Regional Headquarters.

7. ADJOURNMENT

If you require any accommodations for a disability in order to attend or participate in meetings or events, please contact the Accessibility Advisor at 905-980-6000 ext. 3252 (office), 289-929-8376 (cellphone) or accessibility@niagararegion.ca (email).

Procurement By-law Review and Proposed Amendments

Committee of the Whole
CSD 5-2025
February 6, 2025

Bart Menage, Director, Procurement and Strategic Acquisitions

Procurement By-law Review and Proposed Amendments

Committee of the Whole
February 6, 2025

Agenda

A. The Review Process and Resulting Opportunities

B. Proposed Substantive Amendments

C. What these proposed modernizations mean operationally

D. Next Steps – Timing

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Review Process – Why is this Important?

Section 270(1) of the Municipal Act

To be reviewed for "effectiveness" at least every 5 years (s.40) – Last reviewed in 2019

Alignment with Council Strategic Priorities

Keeping Pace

Review Process - Work Effort

Corporate Leadership Team commissioned a working group of senior management from across organization

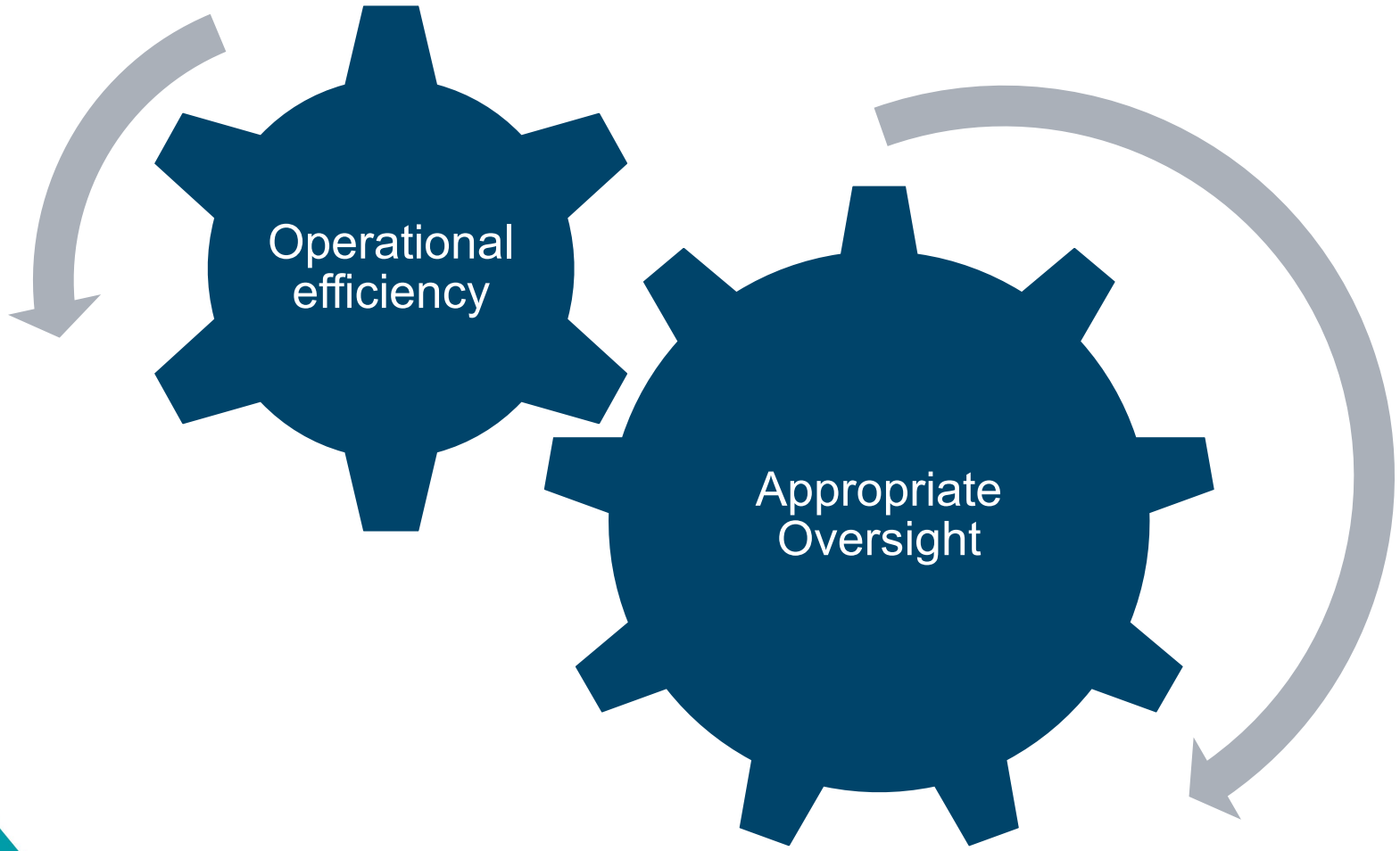
Understand the challenges and opportunities through principles-based discussion

“Why” is a change necessary and “how” it will positively impact service delivery

Identify whether a challenge or possible improvement requires a ‘by-law’ vs. other process change

Benchmarking – considered change in the context of peer group

Review Process - Opportunities



1. By-law Structure
2. Re-aligning values for procurement methods
3. Approval Authorities
4. Contract Amendments and Extensions
5. Schedule “A” Exemptions
6. Social Procurement

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1. “New” By-law Structure

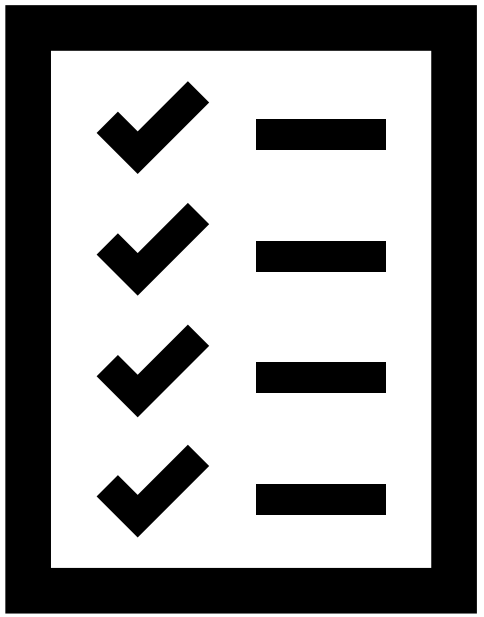
- Vision = Separating Policy vs. Procedure
- Introduction of suite of procedures to accompany by-law
- Delegated authority to Director of Procurement to develop procedures to be approved by CAO

Procedural Document List…

Supplier Code of Conduct	Supplier Performance Evaluation	Supplier Suspension	Contract Management	Bidder Debriefing	Procurement Protest
Informal Procurement	Document Drafting	Procurement Planning	Qualified Supplier Roster	Surplus Disposal	Format Selection
	Formal Procurement	Enhanced Consensus Scoring	Informal Procurement	Negotiation	

Vendor Performance

- Supplier Code of Conduct
  - Sets expectations re: legal/unethical practices, conflict of interest etc.
- Supplier Performance Evaluation
  - Establishes clear expectations, monitoring/evaluation requirements re: supplier performance
- Contract Management
  - Provides guidance to staff and sets out roles and responsibilities for the management of contracts
- Supplier Suspension
  - Sets out criteria and process of suspension



2. Methods of Purchasing

Low Value:

Niagara Region:

Current	Proposed
10k	25k

Jurisdictional:

Burl	Miss	Peel	Ham	Wat	York	Hal	Dur	Tor
10k	25k	10k	10k	25k	25k	15k	10k	50k

Informal:

Niagara Region:

Current	Proposed
10k – 25k	25k-100k

Jurisdictional:

Burl	Miss	Peel	Ham	Wat	York	Hal	Dur	Tor
10k-50k	25k-100k*	10k-100k	10k-100k	25k-150k	25k-100k*	15k-100k*	10k-100k*	50k-100k

*process is run by the department and not procurement; note: in the case of Halton, between 15-35k department solicits the quotes

Methods of Purchasing

Method	Current Threshold	Revised Threshold
Low Value	Up to $10,000	Up to $25,000
Informal Quote	$10,000 - $25,000	$25,000 - $100,000
Formal Quote (RFQ) (goods/services)	$25,000 - $100,000	$100,000 – $133,800*
Formal Quote (construction)	N/A	$100,000 – $334,400*
Request for Tender (RFT)	>$100,000	> $133,800*
Request for Proposal (RFP)	> $10,000	> $25,000

*Current Open Threshold which is a concept tied to CFTA and is adjusted every 2 years.

3. Purchasing and Document Execution Authorities

- Introduction of Associate Director and Deputy CAO Roles
- Proposed changes to the purchasing methods approval authorities to, generally, be shifted down one rung in Schedule “B”

Previous Purchasing Authority	Proposed Purchasing Authority
Director	▸ Manager
Commissioner	▸ Director

Previous Execution Authority	Proposed Execution Authority
Director	▸ Manager
Commissioner	▸ Director

Going to Council Post Award?

Current State:

Competitive processes (RFx) - $5M+ Council is the purchasing authority “approval” required (current process is to go to Council at the conclusion of the Bid Solicitation Process for approval to award)

*Safeguards: regular reporting of awards above dollar threshold; where portions of by-law being waived; not awarding in accordance with process set out in Rfx (e.g., bypass low bid);

Municipality	Requirement to go to Council after Award
York	NO*
Durham	NO*
Peel	NO*
Waterloo	>$1M
Halton	NO*
Hamilton	NO*
Toronto	NO*

Best Practice

“Best practices in municipal procurement include the clear separation of political and administrative functions in relation to the municipality’s procurement operations. In accordance with best practices, elected officials should not be involved in the award of contracts in a competitive procurement process.

Best Practice continued

Subject to accountability controls (e.g. the contract value is within budget and the process was conducted in accordance with governing rules), the authority to award the contract to the top-ranked proponent should be delegated to staff and neither Council nor any committee of Council should be involved in the award process." – Paul Emanuelli

Lifecycle of a $5M+ Contract Award

Current:

- RFT Closes February 3, 2025
- Procurement completes administrative review to confirm compliant Bids (1 week) – February 10, 2025
- Report deadline for March cycle is January 31, 2025
- Report Goes to April 8, 2025 PW Committee and then Council on April 24, 2025
- Contract Award Notice Circulated to Successful Bidder in April 25, 2025
- Successful Bidder to satisfy preconditions of Award and Contract Execution (3 weeks) – May 16, 2025
- Commencement of Work in May

Lifecycle of a $5M+ Contract Award

Proposed:

- RFT Closes February 3, 2025
- Procurement completes administrative review to confirm compliant Bid (1 week) – February 10, 2025
- Contract Award Notice Circulated to Successful Bidder on February 11, 2025
- Successful Bidder to satisfy preconditions of Award and Contract Execution (3 weeks) – March 4, 2025
- Council Informed in weekly correspondence in March
- Commencement of Work in March

4. Contract Amendment Regime

Table of Authority if Total Cumulative Value of Increase is Less than 20% of Original Procurement Value

Total Cumulative Increase	Authority
< Open Competition Threshold	Department Manager
> Open Competition Threshold	Associate Director (or Director where there is no AD)

Table of Authority if Total Cumulative Value of Increase is Equal to or More than 20% of Original Procurement Value

Total Cumulative Increase	Authority
< Open Competition Threshold	Director
> Open Competition Threshold	Commissioner

Additional Safeguards:

1. Must be sufficient budget;
2. Nexus of Additional Work to Project/Initial Scope; (3) Report to Council where total value of increase(s) exceed $1M

Current Impacts & Proposed Benefits

Current:

- Montrose Road EA and Design: PW-32-2024
- Casablanca Road Engineering and Contract Administration Services: PW-18-2024

Proposed:

- Allows Project Work to Continue uninterrupted
- Approval Authority appropriately tied to Risk Level
- Continued oversight - Regular Reporting to Council

7. Schedule “A” – Exemptions

Additions include things like indigenous consultation; certain specialized community services

By-law still applies to these categories, but purchasing methods set out in the by-law are not applicable.

Signing authority for these is the same as “Single Source”

8. Social Procurement

“Community Benefit(s)” means additional physical, social, economic and/or environmental benefits for local communities that can be leveraged through funds already being spent on Deliverables and land development projects.

“Social Procurement” means using Bid Solicitations to generate positive social outcomes which may include job creation, training, or apprenticeships for a historically disadvantaged community, or reducing carbon emissions, in addition to the efficient delivery of goods and services and may include other benefits as defined by the local community or the Region.

Social/Sustainable Procurement:

“Niagara Region is committed to responsible and sustainable procurement. Encouragement is given to the adoption of sustainable products and services, with consideration for their impact on social, environmental, and economic factors.

Staff must ensure that Bid Solicitation documents reflect sustainability attributes, integrating provisions aimed at environmental responsibility. This includes consideration of practical and appropriate implementation tools, such as full lifecycle assessments, energy efficiency, and the promotion of reusable and recyclable products, without compromising usability.

Social/Sustainable Procurement continued

To the extent practicable, the Region shall endeavour to promote and incorporate Social Procurement opportunities and Community Benefit approaches into its Procurements, having regard to the requirements of all applicable legislation and trade treaties, and in accordance with any applicable procedures.

Council may approve or provide direction on complementary by-laws/policies to guide the Region's procurement practices. This may include but is not limited to policies on topics such as social procurement, living wage employment and ethical/sustainable purchasing."

Next Steps

Proposed Changes	February 6, 2025
By-law to be updated	By-law draft to be prepared & circulated to working group and CLT
By-law to Committee	By-law to be presented to Corporate Services Committee through regular committee cycle
Peoplesoft Process changes/Training/Roll out	Target effective date 90 days from Council approval

Summary

- By-law Structure – separation of policy (by-law) from procedure; clear nexus between by-law and procedures with role clarity; ensuring standardization of a number of current practices
- Re-aligning Values for Procurement Methods – increase to low value; change in responsibility for informal quotes
- Purchasing and Document Execution Authorities – alignment of authorities to revised methods of purchasing and to better reflect increased cost of goods/services in the market; reporting obligation to Council for >$5M contract awards
- Clarity around contract amendments and extensions with approval authority appropriate to level of risk
- Schedule “A” Updates
- Introduction of Social Procurement

Thank you

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Subject: Procurement By-law Review and Proposed Amendments

Report to: Committee of the Whole

Report date: Thursday, February 6, 2025

Recommendations

1. That Report CSD 5-2025 **BE RECEIVED** for information.

Key Facts

- To ensure the Procurement By-law remains effective, responsive, and aligned with industry standards, staff undertook a comprehensive review of the existing procurement policy.
- An external firm, The Procurement Office (TPO), led by Paul Emanuelli, a recognized expert in Canadian public procurement law, was engaged to conduct the initial review of our current procurement by-law and they were consulted to consider whether the recommendations contained herein were compliant with legislative requirements, such as the trade treaty.
- The review process was informed by expert review of the procurement landscape at the Region in comparison to industry standards and best practices, as well as a thorough jurisdictional scan.
- A number of substantive changes are proposed in order to make the process for the acquisition of goods and services more responsive to business needs and better aligned to Council's strategic priorities.
- Subject to Council direction as part of the Committee of the Whole presentation, staff will finalize the draft by-law and will report back to seek Council approval early in Q2.

Financial Considerations

This report does not have an immediate direct financial impact; however, the Procurement By-law plays a critical role in ensuring efficient, transparent, and competitive procurement processes. Over time, this leads to long-term cost savings, reduced risks, and improved financial management.

Procurement By-law Review – Purpose and Approach

Section 270(1) of the Municipal Act (Ontario) requires that all municipalities adopt and maintain a policy with respect its procurement of goods and services. The Region's current Procurement By-law was last updated in 2019 and, in accordance with its terms, is to be reviewed for effectiveness at least every 5 years. To ensure the Procurement By-law remains effective, responsive, and aligned with industry standards, Niagara Region undertook a comprehensive review of the existing procurement policy. The review was guided by expert consultation and a thorough evaluation of emerging trends, best practices, and municipal comparators. The review sought to align the By-law with industry standards, focusing on openness, fairness, and transparency at every stage of the process.

Niagara Region engaged The Procurement Office (TPO), led by Paul Emanuelli, a recognized expert in Canadian public procurement law, to assist in the initial review of the by-law. Subsequent processes included in-depth consultations with municipal counterparts, a jurisdictional scan of comparable municipalities, and an evaluation of best practices.

An internal working group comprised of senior management from across the organization was established to ensure that any proposed changes would reflect operational needs, mitigate business risks and maximize efficiencies to support successful implementation.

The insights gathered from this review culminated in a series of recommendations aimed at modernizing the Procurement By-law to make service delivery more efficient and effective.

Niagara Region's Procurement Landscape

Procurement plays an important role as an integral partner in the daily operations of Niagara Region, the NRPS and the NTC. Procurement provides professional services, strategic planning, a client based focused approach to customer service which is value add.

Procurement is responsible for the management of all formal procurement processes to support operational needs; ensuring compliance with trade agreements; the Municipal Act and Procurement By-law. These currently include all formal quotations between $25,000 and $100,000, any Request for Tenders more than $100,000 and any Request

for Proposals in excess of $10,000. Supplier Administration and Purchasing Card Administration are also supported by Procurement.

Appendix 1 provides historical comparators including number of published projects, awarded value and average number of projects per FTE. In 2023, there were 211 published projects with a total award value of $219 million or an average of 28 projects per FTE. In 2024, there were 234 projects but as 46 of those projects are currently in award stage the total award value of those projects cannot be reported until those agreements are executed.

Review Process

Significant outreach was conducted to engage municipal counterparts and gather insights on industry standards and emerging trends. As part of this, a comprehensive jurisdictional scan was performed, comparing procurement practices among upper and lower-tier municipalities across Ontario. This scan offered valuable insights into how other municipalities are adapting to changing regulations, market conditions, and operational needs.

In addition to the jurisdictional scan, the review process included internal consultations and was informed by expert review of the procurement landscape at the Region in comparison to industry standards and best practices. The Niagara Region working group was engaged throughout the process to ensure that the proposed amendments addressed service delivery needs, mitigated business risks, maximized efficiency and effectiveness, and TPO was then consulted to consider whether the recommendations complied with applicable legislative requirements, such as trade treaties.

Key Findings

A key goal of the review exercise was to assess whether the Region's current procurement practices could be more responsive to business needs and better aligned to Council's strategic priorities, while still preserving the overarching principles of competition, best value, fairness, objectivity, accountability and transparency. With this objective in mind, the following observations emerged from the review process:

1. The Region's purchasing value thresholds have not been updated since 2006;
2. There is an opportunity to better leverage and align procurement methodologies to trade agreements;
3. The Region would benefit from a more robust and standardized approach to vendor performance management;

4. The Procurement By-law contains both policy and procedural content and could be structured in a way that better aligns with the corporate policy framework;
5. Best practices in accountability controls suggest an opportunity to better separate political from administrative functions;
6. The current approval framework should be re-aligned to promote operational efficiency and to better reflect the current corporate structure (e.g., Associate Director and Deputy CAO do not currently appear as approval authorities); and
7. The By-law could better support the Region's commitment to social procurement and community benefits.

These observations, in turn, became the areas of focus for modernization. By leveraging the inter-jurisdictional benchmarking work and the recommendations of TPO staff are proposing a number of substantive changes to the current By-law, together with several housekeeping items.

Proposed Changes and Next Steps

A summary of the proposed substantive changes relative to the current By-law can be found in Appendix 2. Each substantive change is further discussed below and effectively balances controls to manage risks while enabling faster and more effective service delivery.

A. By-law Structure

Currently, the Procurement By-law includes both policy and procedural content. This proposed change would see procedural content being moved into a new suite of comprehensive procedural documents. This proposed change flows from a recommended best practice to separate policy from procedure and is in alignment with the Region's corporate policy framework. York Region underwent a similar exercise with their By-law in 2020 when it moved content that was procedural in nature to a series of administrative protocols which work to support but do not form part of their procurement bylaw. Delegation to the CAO for approval of procedural content will allow for the more efficient and agile updating of procedural elements from time to time. While the Procurement and Strategic Acquisitions Division has developed a number of resources (process/guidance) documents over the years, this structural change allocates clear responsibility for the development and approval of procedural content and codifies this content as integral to the operationalization of the By-law. The procedural documents will help ensure a standardized (and consistent) approach to things like, supplier performance evaluation, bidder debriefings, procurement planning, supplier suspension, etc.

B. Improving Vendor Performance Management

Vendor management is an area where there is opportunity for improvement by creating better alignment/standardization across the organization. By introducing more robust procedures to manage vendor performance the organization will create clear expectations of the vendor community and will enable better tracking of vendor performance over time (with more transparent and defensible consequences for poor vendor performance). These documents reflect a formalization of many of the more informal approaches/strategies currently in use and is responsive to the program opportunities identified by KPMG in its 'Vendor Performance Management Final Advisory Internal Audit Report' presented to Audit Committee on December 9, 2024. Collectively, these documents, set a standard expectation for supplier conduct; standardize the approach to performance monitoring/evaluation and suspension; and provide role clarity and expectations of staff regarding contract management.

C. Re-Aligning Values for Procurement Methods

Low Value Threshold. The Region has not updated its purchasing thresholds since 2006. Over the course of the last 19 years the relative value/utility of a ‘low value’ acquisition threshold of less than $10k has largely been eroded. Moving from a $10k to a $25k threshold is consistent with a number of other municipalities who have recently increased their low value threshold to $25k, including, Mississauga, Waterloo and York. Notably, the City of Toronto has a low value threshold of $50k. While departments are only required to obtain one quote in the case of low value procurements, where practical, departments are encouraged to obtain multiple quotes to ensure they are obtaining best value. Quotes may be obtained through advertisements or supplier catalogues or by contacting the potential supplier(s) by telephone or email. If a department anticipates making multiple low-value procurements of the same deliverables and the total value of those purchases may exceed the applicable low-value procurement threshold, the department must contact Procurement Services to discuss the possibility of setting up a standing offer or qualified supplier roster.

Informal Quotes. A second proposed change seeks to expand the informal quote range to $100k. The informal quote process is completed at the department level and not through procurement services. This is a simpler and more efficient process than the formal quote process (which is completed by a procurement agent). By increasing the informal quotation band, it decentralizes a number of low risks, low value procurements allowing the Procurement and Strategic Acquisitions Division to focus their efforts on larger and more complicated Bid Solicitations. Training materials are available to departments to assist with conducting informal quotes and the Procurement and

Strategic Acquisitions Division is always available to answer questions and assist, as necessary. Operationally, this change will mean that individual departments can more quickly obtain quotes for low dollar value works that are well below trade treaty open competition thresholds. Over the last three years, the number of quotes that would have been subject to the informal quote process would have ranged from 55 to 64. A number of other municipalities follow a similar decentralized approach for lower value procurements (i.e., those below trade treaty open procurement thresholds) as shown, below:

Mississauga	York Region	Halton	Durham
$25k-100k	$25k-100k	$15k-100k	$10k-100k

Formal Quotes. Owing to the change to the Informal Quote methodology, above, the Region's Formal Quote procurement methodology would now be conducted for the procurement of goods and services between $100k and the Open Competition Threshold (a concept tied to the Canadian Free Trade Agreement (CFTA) and is currently set at $133,800 for goods and services and $334,400 for construction and is adjusted 'up' every 2 years). Open Competitions (e.g., tenders/RFPs) will be required for bid solicitations above the Open Competition Threshold set by the CFTA. These changes align the Region's requirement for open competition with its trade treaty obligations.

D. Approval Authorities

General Realignment. A key theme that emerged from the working group was that approval authorities were, in some cases, sitting too high in the organization and that they should be re-aligned to better reflect an approval process closer to the project. Additionally, the associate director and the Deputy CAO roles are not currently contemplated in the Bylaw. By introducing these roles as purchasing and document execution authorities there is, generally, a downward shift in approval authority. This change will allow for more timely and effective approvals at value appropriate levels (by staff closer to the work), while still ensuring appropriate safeguards for larger value acquisitions.

Council Approval for Competitive Awards. Best practices in municipal procurement include the clear separation of political and administrative functions in relation to the municipality's procurement operations. In accordance with best practices, elected

officials should not be involved in the award of contracts in a competitive procurement process. Subject to accountability controls (e.g., the contract value is within budget and the process was conducted in accordance with governing rules), the authority to award the contract to the top-ranked proponent should be delegated to staff and neither Council nor any committee of Council should be involved in the award process. This ensures that the integrity of the bidding process is maintained and avoids potential risk exposure. From an operational perspective, the current need to go to Council before a contract is awarded is also inefficient. From the time a bid solicitation closes to the time it is approved at Council can take as much as two months.

This approach is consistent with a number of other municipalities, including York Region, Durham Region, Peel Region, Halton Region, Hamilton and Toronto who all provide delegated authority to senior staff to authorize and execute all contracts (i.e., there is no report to Council post-bid seeking approval to award). Recognizing the importance of keeping Council informed, the current requirement for Council approval will be replaced with a regular reporting requirement for all competitive contract awards in excess of $5 million dollars. Importantly, this change would just apply to competitive procurement awards. Staff would still be required to seek Council approval for single source awards above $1 million dollars.

E. Contract Amendments and Extensions

Approval authority for contract amendments and/or extensions is not expressly addressed in the current iteration of the Procurement By-law. Accordingly, in all cases, the extension to, or addition of, any work to a contract over and above what was initially awarded is processed in accordance with the single source approval authorities in Schedule "B" with any increase to a contract value above $ 1 million requiring Council approval. Operationally, this proves cumbersome (and not practical) in situations where for example,

(i) It would be costly to demobilize a construction site or stop work on a project in order to prepare a report and wait for it to go through the committee cycle for approval; and
(ii) The additional work is such that it is a natural extension of, or necessary to complete, the initial scope owing to an circumstances that were unforeseen at the time of initial award (e.g., the need for additional bore holes; an unknown site condition, like contaminated soil, presents itself; the need to extend the term of a consultancy contract owing to construction delays, etc.).

In order to address this, a number of municipalities, including York Region, Peel Region, Halton Region, and, most recently the City of Orillia in 2022, have introduced specific language in their procurement bylaws providing for delegated authority to staff to approve contract amendments/extensions.

The single source approval authorities that are currently in Schedule “B” of the By-law were developed for the scenario of a non-competitive process to acquire goods and/or services from a specific supplier even though there may be more than one supplier capable of providing that good or service. Owing to a different risk profile, these approval authorities do not map well onto the above-referenced contract amendment or extension scenarios where it is not practical (or in some cases even feasible) to award the additional work to a different supplier.

The two primary risk elements when adding new value/scope to a contract are: (i) the increase(s) in contract value relative to the initial contract award value; and (ii) the increase(s) in value relative to the Open Procurement Threshold. Staff propose the introduction of the approval authority regime in the tables below to address these risk elements by tying approval authority to the level of relative risk. That is, as the value of the contract amendment relative to the original value of the contract increases and where the value of the increase exceeds the Open Competition Threshold so too does the approval authority. The introduction of this stand-alone contract amendment regime adds clarity and better supports operational reality by more appropriately attaching approval authority to risk level in contract amendment situations (as opposed to the single source approval authority table which is more appropriately designed to address an initial direct award).

Table of Authority if the Total Cumulative Value of the Increase is Less than 20% of the Original Procurement Value

Total Cumulative Increase	**Authority**
< Open Competition Threshold	Department Manager
> Open Competition Threshold	Associate Director (or Director where there is no AD)

Table of Authority if the Total Cumulative Value of the Increase is Equal to or Greater than 20% of the Original Procurement Value

Total Cumulative Increase	**Authority**
< Open Competition Threshold	Director
> Open Competition Threshold	Commissioner

There are a number of additional safeguards attached to the delegated authority being proposed above:

(i) It is only applicable to competitively awarded contracts (e.g., it is not available in cases where the initial contract was a single source);
(ii) It cannot be used in cases where the proposed additional scope is not a natural extension of (or logically flows from or is necessary to complete) the initial contract scope of work (e.g., it cannot be used to surreptitiously circumvent the need for a competitive process or appropriate single source approvals where there is no nexus between the proposed additional scope and original contract scope);
(iii) The cumulative value of all amendment(s) is within the approved budget envelope); and
(iv) There is a rolled-up reporting requirement to Council in the event that the total cumulative value of all contract amendments exceed $1 million dollars.

F. Schedule “A” Exemptions

In order to avoid confusion and provide for clear delegation of authority to execute certain agreements, additions are being made to Schedule “A” for things like Indigenous engagement activities and instances where the Region is acting as service manager in accordance with a legislative mandate. These activities should properly be exempt from procurement by-law methodologies and by adding these items to Schedule “A” staff are able to follow the approval authorities for document execution set out in Schedule “B”.

G. Social Procurement

Staff propose to introduce a new section supporting social and community benefits in procurements. Subject to complying with applicable trade agreements, where practical, procurements are to consider the requirements of this section. It is anticipated that a procedural document will be established to provide guidelines and parameters

pertaining to social procurement and community benefits once a Council approved policy position is adopted.

Housekeeping Items

In addition to the substantive amendments being proposed, a number of other housekeeping items are also being made, including:

1. The integration of the Niagara Transit Commission (NTC) flowing from By-law 2022-38 which requires that NTC comply with the Region's Procurement By-law;
2. The expansion of the use of rostering methodology
3. A modernization of the co-operative purchasing language which would see the By-law continue to support co-operative purchasing opportunities with local municipalities and other public agencies.
4. The establishment of a procurement review committee consisting of the director of procurement and strategic acquisitions together with two or more persons designated by the Corporate Leadership Team who are responsible for making determinations under the Procurement Protest Procedure, the Supplier Suspension Procedure and any other matters referred to it by the Director of Procurement and Strategic Acquisitions.
5. Refreshing some of the naming conventions (e.g. changing "single source" to "direct award").

Relationship to Council Strategic Priorities

This report reflects the importance of Procurement and how its related activities are critical in maintaining taxpayer affordability. Effective Region, Objective 1.1 Implement continuous improvement and modernized processes to ensure value-for-money in regional services and programs.

Other Pertinent Reports

PAC-C 6-2019 - Nov 18, 2019 Procurement Work Plan Update 19/20 (https://pub-niagararegion.escribemeetings.com/Meeting.aspx?Id=c58101e4-a3e8-4feb-a16b-83b04b165b37&Agenda=Agenda&lang=English)

CSD 12-2019 - January 9, 2019 Procurement By-Law Review and Proposed Amendments (https://pub-niagararegion.escribemeetings.com/Meeting.aspx?Id=f437d899-38ba-4d24-b975-080215968efa&Agenda=Merged&lang=English)

PAC-C 3-2015 - Sept 14, 2015 By-Law Review and Recommended Changes
(Should you require a copy of this report, kindly contact the Regional Clerks Office)

Prepared by:
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Prepared by:
Brain Wilson
Legal Counsel, Legal Services
Corporate Services

Recommended by:
Dan Carnegie
Acting Commissioner/Treasurer
Corporate Services

Submitted by:
Ron Tripp, P.Eng.
Chief Administrative Officer

This report was prepared in consultation with Donna Gibbs, Director, Legal Services

Appendices

Appendix 1	Internal Performance Measures
Appendix 2	Procurement Review Recommendations

Internal Performance Measures

	2019	2020	2021	2022	2023	2024
Approved/Budgeted FTEs	6.5	6.5	6.5	6.5	7.5	7.5
Total Published Projects	216	210	269	229	211	234
* Total Awarded Value	$185.9M	$126.2M	$329.7M	$229.5M	$219.6M	*$125.4M
* Average Value/Project	$860K	$601K	$1.2M	$1.0M	$1.04M	*$535.9K
Average # Projects/FTE	33.2	32.3	41.4	35.2	28.13	31.2

0.5 FTE is Junior Buyer Role (0.5 Admin support & 0.5 = Procurement)
* As of December 31, 2024, Source: MBN Canada Report. Total Published Projects – 234 - (includes 46 projects in the award stage), and the total awarded value does not include these 46 projects.

	ISSUE	CURRENT STATE	PROPOSED CHANGE
1	**BYLAW STRUCTURE**		
1A	**By-law Structure: Separating Policy from Procedure**	All policy and procedure is contained within the bylaw	This structural change would see Bylaw continuing to set policy framework and introduces a series of procedural documents to complement the policy statements contained in the Bylaw. Any procedural content that is currently in the Bylaw will be moved to a procedural document. There are currently 18 procedural documents in development. Following the structure of the corporate policy framework, the policy content contained in the Bylaw will be approved by Council and the CAO will have delegated authority to approve the procedural documents and updates to same from time to time.
	ISSUE	**CURRENT STATE**	**PROPOSED CHANGE**
1B	**Vendor Performance Management**	Current bylaw addressed supplier performance in s.29; however, its not addressed in a substantive way. Approach to vendor performance management has been more informal and department specific.	A more standardization approach to vendor performance management is proposed through a suite of more developed procedural documents, namely (i) Supplier Code of Conduct; (ii) Supplier Performance Evaluation; (iii) Contract Management; and (iv) Supplier Suspension, which introduce more concrete tools/procedures aimed at better managing vendor performance.

	ISSUE	CURRENT STATE	PROPOSED CHANGE
2	**RE-ALIGNING VALUE FOR PROCUREMENT METHODS**	Low value <$10k Informal Quote > $10K - $25K (Staff) Formal Quote > $25K to $100K (Procurement) Request for Tender >$100k	Increase low value procurement to $25k and expand the use of informal quote methodology for Staff from $25k to $100k. Formal quotes would be conducted by Procurement between $100k to the Open Competition Threshold (a concept tied to the Canadian Free Trade Agreement (CFTA) is currently set at $133,800 for goods and services and $334,400 for construction is adjusted 'up' every 2 years). Open Competitions (e.g., tenders) will be conducted for bid solicitations above the Open Competition Threshold set by the CFTA. Departments will continue to be responsible for completing informal quotes and the procurement department will continue to manage all formal quote processes as well as Bid Solicitations above the open competition threshold.
	ISSUE	**CURRENT STATE**	**PROPOSED CHANGE**
3	**APPROVAL AND DOCUMENT EXECUTION THRESHOLDS**		
3A	**General Re-alignment**	Attached as Schedule "B" to the current Procurement By-law	As a result of the updates to the procurement methodologies (see item 2, above) Schedule "B", which is tied to the procurement methodologies and their respective limits, requires a general re-alignment. Additionally, the current bylaw does not consider the associate director or deputy CAO roles. Accordingly, a number of approval authorities in Schedule "B" to have been updated to account for the introduction of theses authorities with the effective of pushing down (by one level) some of the current approval requirements.

	ISSUE	CURRENT STATE	PROPOSED CHANGE
3B	**Council Approval for competitive awards >$5M**	Competitive awards over $5M go to Council for approval post-bid solicitation	Remove the requirement for Council approval post-bid solicitation for competitive awards >$ 5M for 'routine' procurements and replace with a reporting requirement. Notably, there a requirement to still go to Council where portions of the bylaw are being waived and/or staff seeks to award other than in accordance with process set out in the RFx (e.g., bypass low bid) or if there isn't budget. Essentially, this change permits staff to proceed to award a contract (of any value) provided that the procurement has been completed in accordance with the Bylaw.
	ISSUE	**CURRENT STATE**	**PROPOSED CHANGE**
4	**CONTRACT VALUE/SCOPE INCREASES**	The current by-law does not address this matter	We propose to introduce new language that expressly addresses the addition of scope and/or contract increases to a contract. Specifically, provided that (i) there is project budget availability; and (ii) the requisite approval authority is satisfied that the proposed 'new' or 'additional' scope is necessary and logically flows from and/or is in furtherance of the initial scope of the Contract, a more streamlined contract amendment approval regime would apply. The effect of this change is to attach appropriate approval authority having regard to the level of risk associated with the change, as shown in Appendix 2. In the case of contract amendments meeting the requisite criteria, rather than seeking approval for any increase in excess of $1 million dollars, staff would be required to report back to Council on a rolled basis for all contract increase(s) where the cumulative value of the increase(s) exceed $1 million dollars at regular reporting intervals. Importantly, any additions not meeting the criteria above will continue to follow the current single source approval mechanism.

	ISSUE	CURRENT STATE	PROPOSED CHANGE
5	**SCHEDULE "A" EXEMPTIONS**	Schedule “A” of current Procurement By-law. Deliverables set out in Schedule “A” can be procured under the authority of the bylaw without adhering to the procurement methods and reporting requirements. Authorities for execution follow the single source authorities.	Additional items have been added to Schedule “A” – including (i) insurance; (ii) indigenous consultation; (iii) a number of specialized community services where the Region is acting a service manager (childcare centre funding, homelessness services…etc.).
6	**SOCIAL PROCURE-MENT**	Not expressly addressed in the current by-law.	To include general enabling statement, but substantively this will be addressed in a stand-alone separate policy once Council direction is provided.

Emergency Services Division 10 Year Master Plan

Committee of the Whole
PHD 1-2025
February 6, 2025

Richard Ferron, Chief Niagara Emergency Medical Services
Melaine Steele, Associate Director of Reporting & Analysis
Hannah Mayes-Frenett, Senior Consultant, Operational Research in Health (ORH)

Emergency Services Division
10 Year Master Plan

Feb 6, 2025

Niagara Region | Growing Better Together

Critical Mission Statement

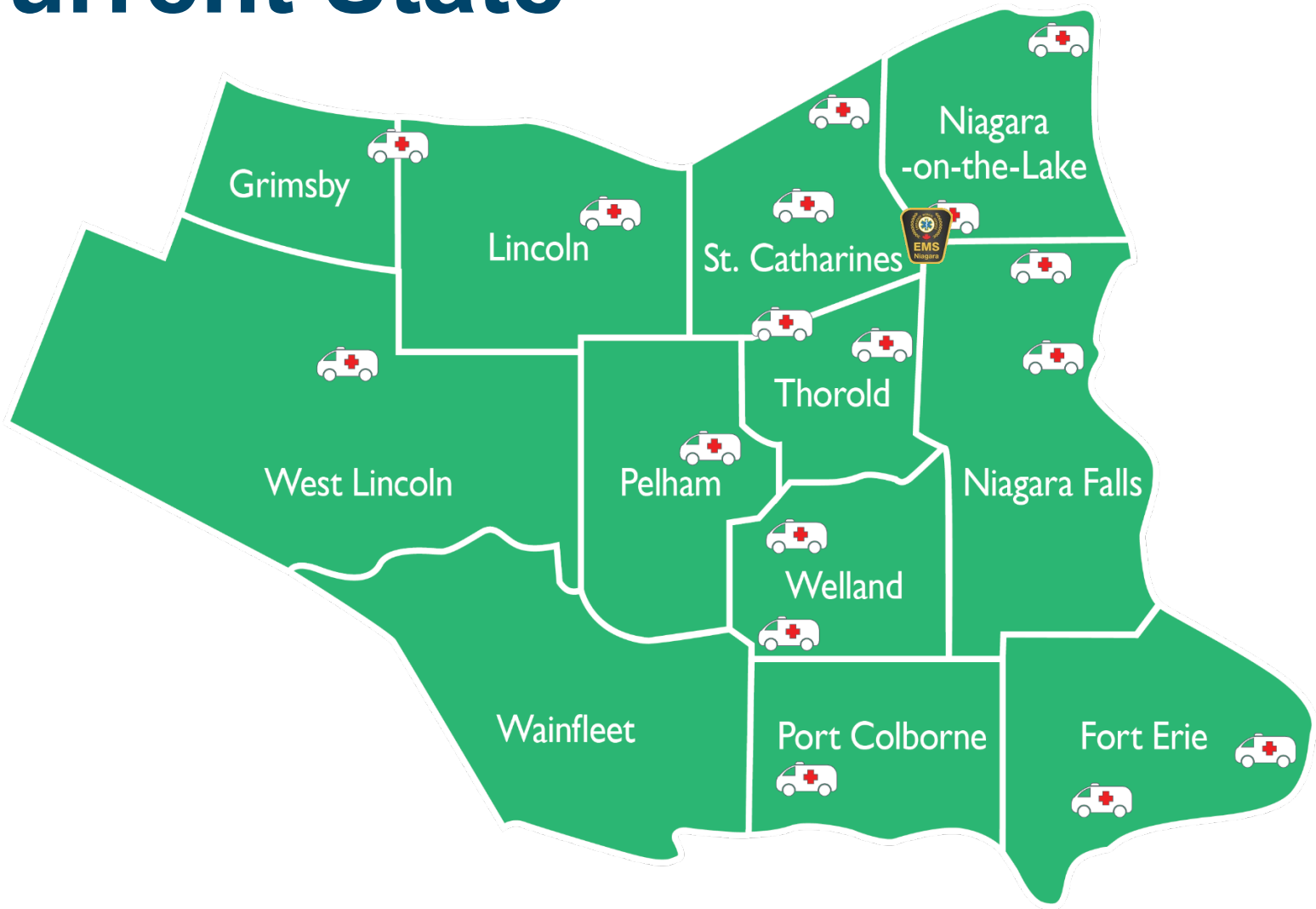
To develop a comprehensive, forward-thinking plan that ensures our paramedic services can effectively meet evolving needs of the communities we serve over the next decade considering:

1. Excellence in Emergency Care
2. Adaptability and Future Readiness
3. Operational Efficiency
4. Workforce Support and Safety
5. Community Centered Approach

Agenda

- Recap previous discussions
- Previous decisions
- Updated Plan
- Recommendations/Risks

Current State



Niagara Region | Growing Better Together

Municipality	Owned	Leased
Fort Erie	Gilmore Road Gorham Road	
Grimsby	Iroquois Trail	
Lincoln		Tallman Drive
Niagara Falls		North Street St. Paul Avenue
Niagara-on-the-Lake		Queen's Parade 101 Lampman Court (x4) 2 Westwood Court (x2)
Pelham	Highway 20	
Port Colborne	Dolphin Street	
St. Catharines	Ontario Street Linwell Road	
Thorold	Merrittville Highway	Allanburg Road
Wainfleet		Park Street*
Welland		King Street Abbey Road Fitch Street*
West Lincoln	West Street	

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Timeline

- **2012:** Kasian Report
- **2013-2016:** Various Consultants
- **2018:** A49 & Clarico Feasibility Studies
- **2019:** A49 Site Selection Matrix& Clarico Update
- **September 2020:** EOI Issued
- **December 1, 2021:** PHD 03-2021
- ***February, 2025:*** *ORH 10 Year Facilities Plan*

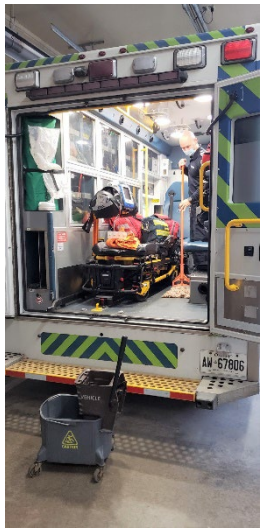
Decentralized Model

People Challenges

- Limited staff interactions
- Disparity in station assignments and workload
- Limited wellness opportunities

Requires all amenities

- Staff parking
- Lockers
- Equipment storage
- Medical supplies inventory
- Controlled medication security
- Extra garage bays



Operational Inefficiencies

- Paramedics time required to
  - maintain station
  - disinfect ambulances
  - manage inventory control

Niagara Region | Growing Better Together

Future Planning

Replace existing and expand new facilities with large footprint building (3500 square feet) and parking, inventory, all amenities, high energy consumption, high maintenance (traditional)

Or a small footprint building (2400 square feet) and parking, limited inventory, basic amenities, reduced energy, low maintenance (hub)

What is the Hub?

Hosting the Emergency Services Division (ESD), the Hub will consist of:

- Administration
- Logistics
- Fleet Storage for 28 transport vehicles with capacity for future growth up 60
- EMS Dispatch with option to expand as Public Safety Communications Centre
- Training Facility (including community)
- Regional Emergency Operations Centre
- Post Station (option)
- Community Engagement

What is the Hub?

- Geographically located to provide optimal service levels for the Region
- Will house 60-65% of the Niagara EMS fleet within the Niagara Region
- Be future ready
- A place of wellness and civic pride for ESD staff who spend the majority of their lives working to ensure the residents of the Region of Niagara are safe and cared for

Analysis

Hannah Mayes-Frenett
Senior Consultant,
Operational Research in Health (ORH)

Ten Year Facilities Master Plan

Committee of the Whole

Hannah Mayes-Frenett
February 6, 2025

PLAN. PREPARE. PERFORM.

Agenda

- Objective and Introduction
- Key Findings of Service and Facilities Analysis
- Predictive Modelling Capabilities
- Demand Projections
- Facility and Ambulance Requirements
- Summary

Objective

Develop a **Master Facility Plan** encompassing a ten-year period from 2023 to 2033

Identify Optimal and Efficient Facilities

Meet Response Time Targets

Eliminate Risk in Facility Portfolio

Recommend a Prioritization Plan

ORH Introduction

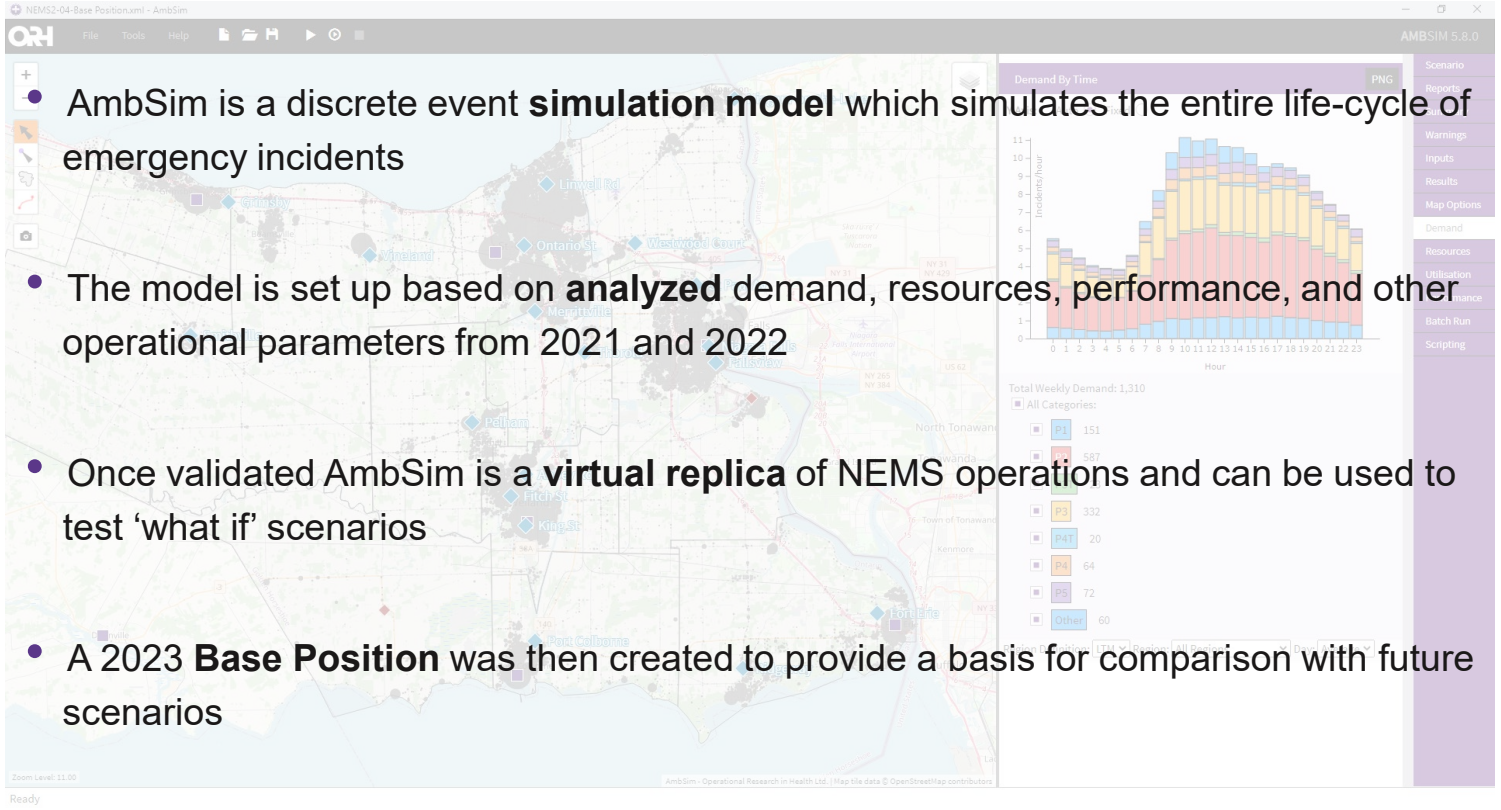
ORH helps emergency services around the world to optimize resource use and respond in the most effective and efficient way.

Key Analysis Findings

- Demand has been increasing year-on-year, except for 2020, across the sample period, at a rate equivalent to an average of **2.5% per year**
- Time on task[1] has also increased from **86 to 98 minutes** per incident
- Internal response time targets were **close to being met** for each priority, with variation across the Region
- However, due to increasing demand and time on task, there has been a **slow decline** from above target to below target levels in recent years
- There are **condition, lease, and coverage** risks at many of the Region's existing EMS facilities
- Almost all facilities have **no spare capacity** for deploying additional resources in the future

Footnote 1: Time on task is measured as the time from vehicle mobilizing to clearing at the scene or hospital, for P1 to P5 incidents

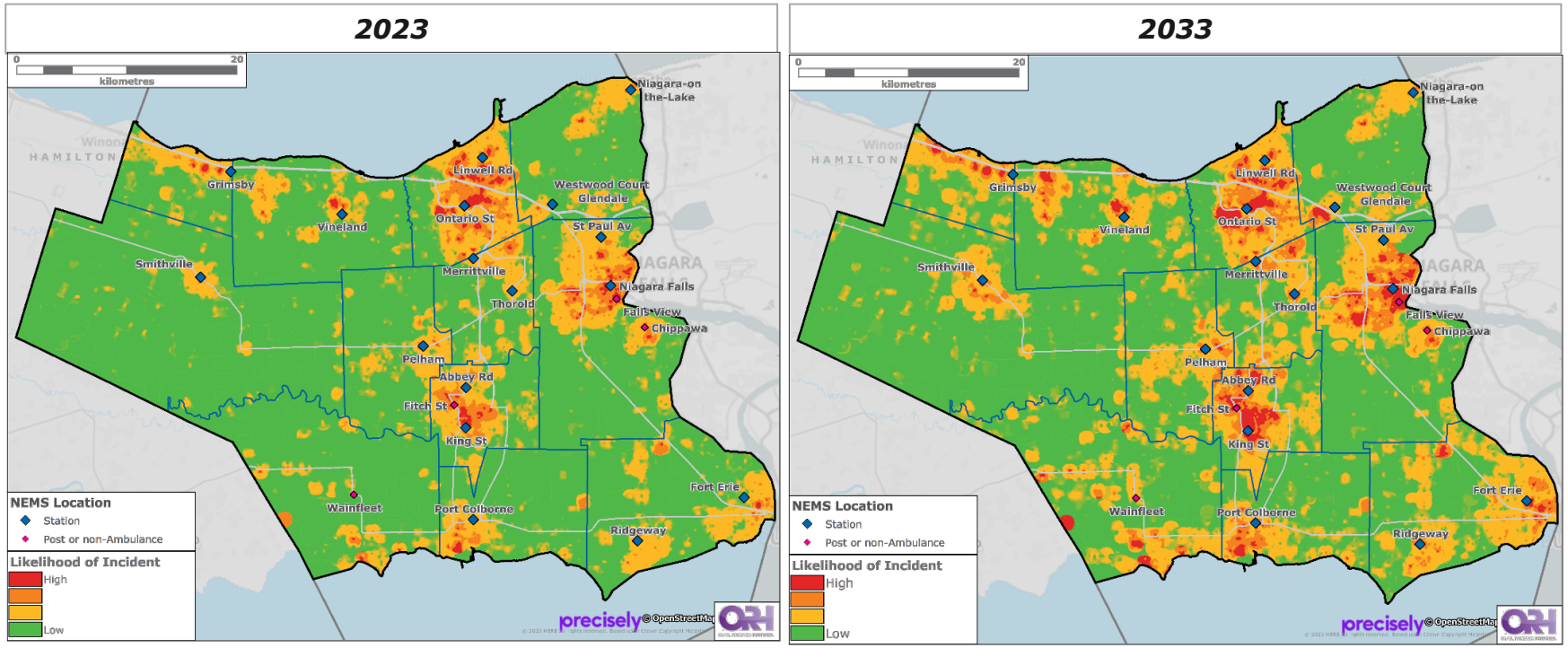
Predictive Modelling Capabilities



- AmbSim is a discrete event **simulation model** which simulates the entire life-cycle of emergency incidents
- The model is set up based on **analyzed** demand, resources, performance, and other operational parameters from 2021 and 2022
- Once validated AmbSim is a **virtual replica** of NEMS operations and can be used to test ‘what if’ scenarios
- A 2023 **Base Position** was then created to provide a basis for comparison with future scenarios

Demand Projections

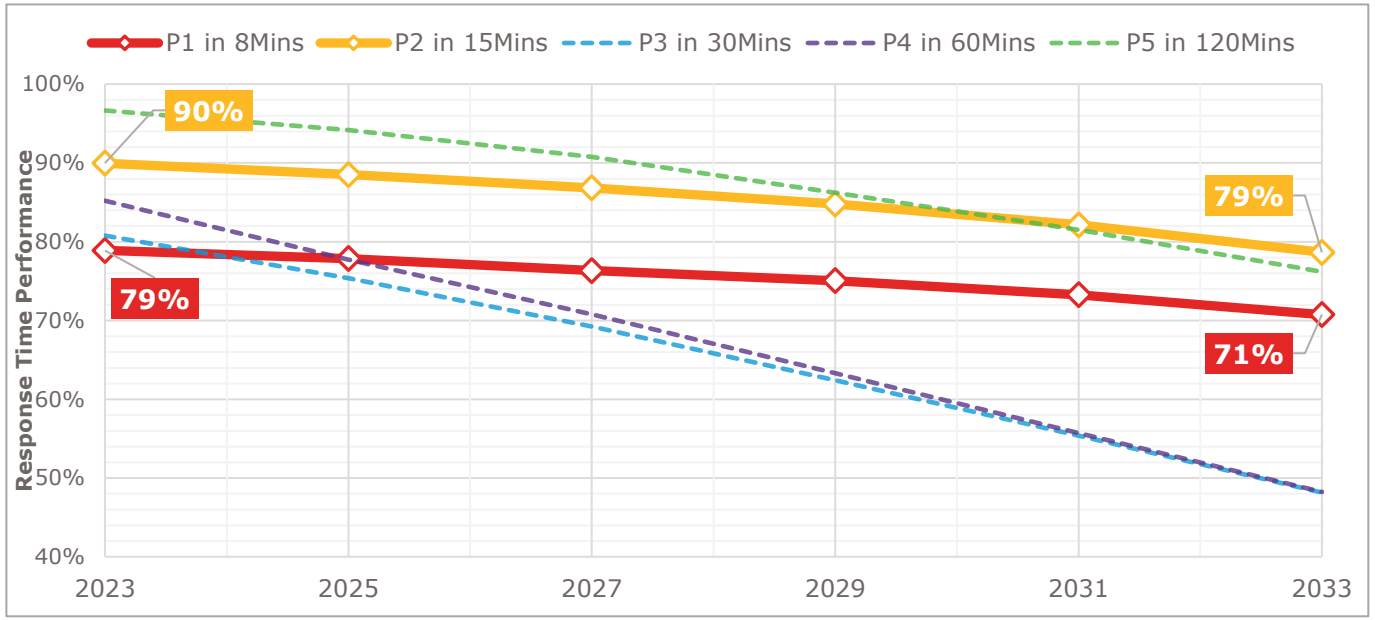
= 40% Increase over Ten Years



ORH Final Report, Figure 4-3

PLAN. PREPARE. PERFORM.

The ‘Do Nothing’ Scenario

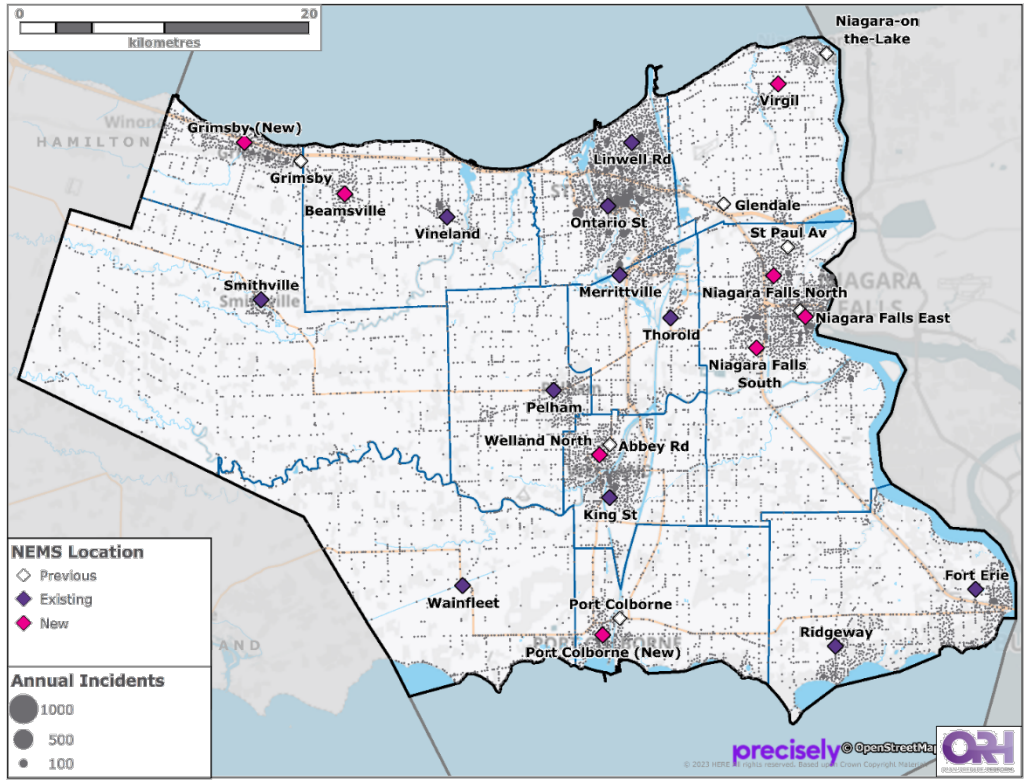


Category	Annual Calls **Missed** Target		
	2023	2033	Difference
P1	1,672	3,128	1,456
P2	3,085	8,849	5,764
P3	3,585	13,096	9,511
P4	656	3,087	2,431
P5	128	1,220	1,092
Total	9,125	29,379	20,254

Note: Priority 1 to 2 response time performance measured from time first vehicle assigned, Priority 3 to 5 measured from time of call

ORH Final Report, Figure 4-4

Identifying Optimal Facility Locations



- Recommended facility configuration resolves majority of the condition, lease, coverage and condition risks
- **Ten** facilities to be retained[2]
- **Five** facilities to be closed (white diamonds)
- **Eight** new facilities required (pink diamonds):
  - Abbey Rd and Port Colborne re-located
  - Consolidate NOTL resources to a single facility near Virgil
  - Grimsby resources divided between two new facilities
  - Niagara Falls/St Paul Av resources divided between three new facilities

Footnote 2: In addition, NEMS are in the process of finalizing the lease for Wainfleet (taking over the vacated fire hall)

ORH Final Report, Figure 5-2

Identifying Ambulance Requirements in 2033

- Recommended ambulance requirements ae equivalent to a **38% increase** in ambulance hours by 2033
- Majority of the recommended resource investment would be required to offset the demand increases, even if the only criteria for response performance was to ensure no degradation
- Response performance is **improved in every municipality**, better equity between municipalities
- Only two municipalities achieve lower than 70% P1 response performance (target of 80%)

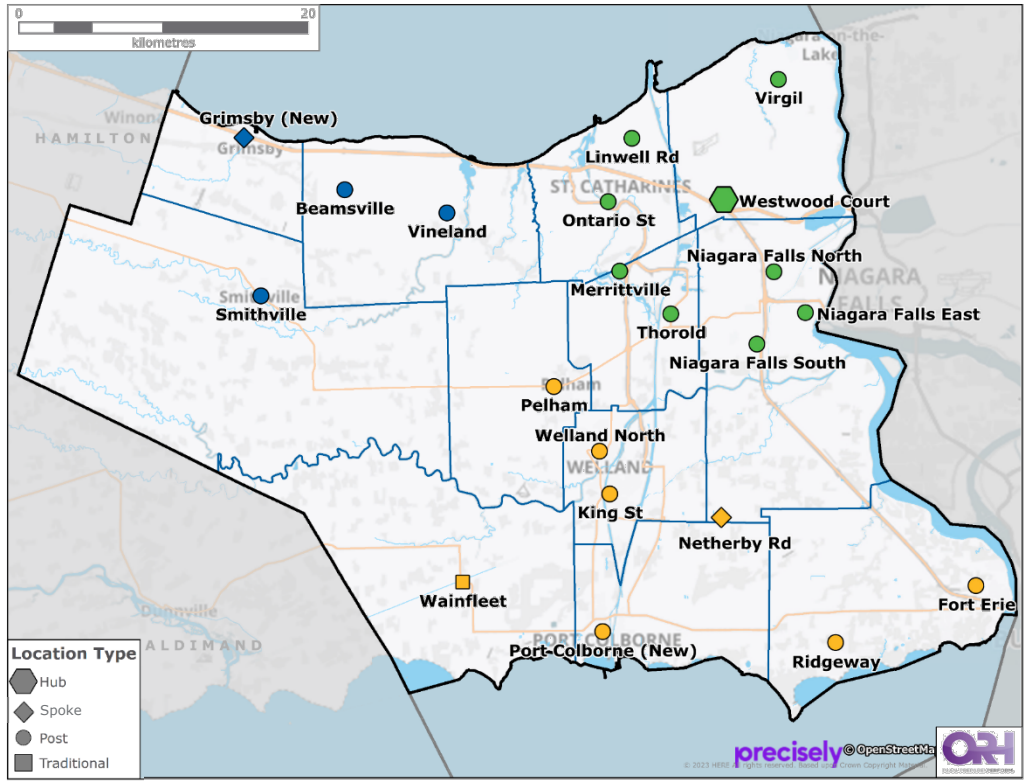
Weekly Ambulance Hours and Response Performance by Municipality

Municipality	Weekly Ambulance Hours		P1 Response Performance	
	2033	Difference to Base	2033	Difference to Base
Fort Erie	756	168	79.3%	5.9%
Grimsby	504	252	83.1%	24.8%
Lincoln	420	252	70.1%	24.1%
Niagara Falls	924	168	86.4%	4.9%
Niagara-on-the-Lake	420	84	80.5%	28.7%
Pelham	420	84	77.4%	5.3%
Port Colborne	504	168	86.7%	4.5%
St Catharines	924	252	90.1%	3.6%
Thorold	756	84	71.1%	2.5%
Wainfleet	0	0	37.4%	8.6%
Welland	588	168	94.0%	0.2%
West Lincoln	252	84	67.0%	17.9%
Overall	**6,468**	**1,764**	**84.7%**	**5.8%**

80% Target

ORH Final Report, excerpt from Figure 6-1 and Figure 6-2

Identifying Hub Requirements



- Under a hub, spoke and post model the recommended facilities would operate as posts, reducing the footprint of future builds and alleviating the remaining capacity pressures at facilities to be retained
- A **three-hub** solution (one primary hub plus two spokes) was found to best meet the geographical coverage needs of the Region
- The hub facilities would need to accommodate (plus 30% spares):
  - Primary Hub = **22** peak ambulances
  - North West Spoke = **9** peak ambulances
  - South Spoke = **18** peak ambulances

ORH Final Report, Figure 7-1

Comparison of Facility Models

Hub, Spoke & Post Facilities Model

- Same shift requirements as Traditional Facilities Model
- Additional 18 ambulances required (including 30% spares required at hub level)
- Retain 10 existing facilities and use as posts, all requiring same or smaller footprint than existing facility
- Spare capacity only needs addressing at hubs rather than post facilities
- Develop 7 new post facilities[4]: 2 x 1-bay, 5 x 2-bay (noting that 2-bay post will have smaller footprint than 2-bay traditional facility)
- Develop 3 new hub facilities: Primary Hub, North West Spoke and South Spoke
- Easier to build new posts if required beyond the 10-year horizon

Traditional Facilities Model

- Additional 5 x 24/7 shifts and 11 x 12/7 ambulance shifts required (38% increase)
- Additional 21 ambulances required (including 30% spares required at municipality level)
- Retain 10 existing facilities, but at least 4 would require expansion including 2 that have low potential for expansion
- No spare capacity at existing facilities
- Develop 8 new traditional facilities: 2 x 2-bay, 4 x 4-bay, 2 x 6-bay, plus address the 2 retained facilities that can't be expanded
- No hub requirement, though headquarters (admin, dispatch, training) is at capacity
- No resilience for beyond 10 years without new traditional facilities or further expansions

Footnote 4: Only 7 posts are required as one of the original post facilities, Grimsby (New), is co-located with the North West Spoke

ORH Final Report, Figure 7-3

Recommended Trajectory

Recommended Trajectory of Facility and Ambulance Changes by Year

Year	Facilities Opened			Facilities Closed	Ambulance Requirements			*With Potential Operational Efficiency Savings* Ambulance Requirements	
	1-bay Post	2-bay Post	Hub		Shifts		Peak Ambulances	Shifts	Peak Ambulances
2025	*None*	*None*	*None*	*None*	Ontario St	24/7	1	24/7	1
					Smithville	12/7	1	12/7	1
					Fort Erie	12/7	1	12/7	1
2026	*None*	*None*	*None*	*None*	Abbey Rd	12/7	1	12/7	1
					Niagara-on-the-Lake	12/7	1	12/7	1
2027	Niagara Falls North[5]	Niagara Falls East[5]	*None*	Niagara Falls	Niagara Falls East[5]	12/7	1	12/7	1
		Virgil[5]		St Paul Av	Linwell Rd[5]	12/7	1	12/7	1
				NOTL					
2028	*None*	Welland North[5]	North West Spoke	Abbey Rd	North West Spoke	12/7 + 12/7 (Night)	1	12/7 + 12/7 (Night)	1
					Welland North[5]	12/7 (Night)	0	12/7 (Night)	0
2029	Niagara Falls South[5]	*None*	*None*	*None*	Merrittville[5]	12/7	1	-	-
					North West Spoke	24/7	1	24/7	1
2030	*None*	*None*	Primary Hub	Glendale	Primary Hub	12/7 (Night)	0	-	-
2031	*None*	Beamsville	*None*	Grimsby	North West Spoke	12/7	1	12/7	1
2032	*None*	Port Colborne (New)	South Spoke	Port Colborne	South Spoke	24/7	1	24/7	1
2033	*None*	*None*	*None*	*None*	North West Spoke	12/7	1	-	-
					South Spoke	2 x 12/7	2	12/7	1

Footnote 5: Shifts associated with posts that are opened or at currently at full capacity before their hub/spoke is fully operational will temporarily forward deploy from other appropriate locations

ORH Final Report, Figure 8-1

Summary

- Detailed review of service profile and facility risks undertaken
- Demand projections made, equivalent to a 40% increase over 10 years
- Facility recommendations made to address lease, condition, capacity and coverage risks:
  - Retain 10 existing facilities and use as posts, all requiring same or smaller footprint than existing facility
  - Develop 7 new posts facilities: 2 x 1-bay, 5 x 2-bay (noting that 2-bay post will have smaller footprint than 2-bay traditional facility)
  - Develop 3 new hub facilities: Primary Hub, North West Spoke and South Spoke
- Ambulance requirements identified to allow improved coverage in all municipalities by 2033:
  - Additional 5 x 24/7 shifts and 11 x 12/7 ambulance shifts required by 2033 (38% increase)
  - Additional 18 ambulances required (including spares)
  - Spare capacity only needs addressing at hubs rather than post facilities

Financial Impacts

Melanie Steele

Three Scenarios Evaluated

Traditional Facilities Model (Current model)

- Continue to grow/build/own separate facilities to address services needs

Hub Model – Regional Build

- Region will acquire land and build/own all required facilities

Hub Model – 3rd Party Lease

- Region to look for partner who owns HUB site to enter into long term lease for this facility
- Posts and Spoke would continue to be built and owned

Scenario Comparison

Benefit	Traditional Facilities Model	Hub Model Regional Build	Hub Model 3rd Party Lease
Stability of business functions	Yes	Yes	Yes
Improved paramedic availability	No	Yes	Yes
Ease of growth	No	Yes	Yes
Human connectivity	No	Yes	Yes
Cost avoidance through inventory management and human resource efficiencies	No	Yes	Yes
Efficiency of changing/upgrading facility	Yes	Yes	No
Readily available adequate debt/reserve funding	No	No	Yes
Long-term financial stability – Future cost certainty & no negotiation for lump sum payments	Yes	Yes	No
Opportunities for Provincial Partnerships	Yes	Yes	No

Master Plan Investment Req'd ($millions)

	Traditional Facilities Model	Hub Model Regional Build	Hub Model 3rd Party Lease
10 year			
Operating	$136.5	$124.5	$63.7
Capital	$157.9	$143.3	$78.3
Funding	($58.7)	($53.4)	($50.2)
Total	**$235.6**	**$214.5**	**$129.3**
30 year			
Operating	$640.2	$556.7	$607.1
Capital	$157.9	$143.3	$53.7
Funding	($307.9)	($267.2)	($292.0)
Total	**$490.2**	**$432.8**	**$368.7**

Efficiencies with the hub model mitigate future operating costs

Lease model has higher annual operating cost but does not require additional contribution to reserves for asset management

Lease model has unknown costs expected to be negotiated upfront and at end of lease that we expect would bring in line with a build model over the long term.

2026 Investment ($millions)

	Traditional Facilities Model	Hub Model Regional Build	Hub Model 3rd Party Lease
Operating Expenses	$4.4	$4.6	$1.7
Operating Funding	($1.5)	($1.5)	($1.5)
Net Operating Investment	$2.8	$3.1	$0.2
One-time reserve transfer for funding lag and smoothing	($2.5)	($3.0)	$0.0
Net Operating Impact	$0.3	$0.0	$0.3
% levy increase for operating	**0.06%**	**0.01%**	**0.05%**
Capital Expenditures	$186.4	$199.9	$24.8
Capital Funding	($84.3)	($104.5)	($6.6)
Net Capital Investment	$102.1	$93.3	$18.8
% of annual capital budget needing to be dedicated to EMS	**66.8%**	**62.4%**	**11.9%**

The operating impact has been smoothed over 10 years using the reserve to mitigate fluctuations to the tax levy

2025 levy capital budget was $152.8 million. Assuming available funding continues at this level the initial capital investment to build a HUB would represent the majority of the capital funding available.

Current approved budget

- 2 capital projects were previously approved for preliminary land search, consulting, and design with a total combined budget of $4,995,250
- $1,100,000 of this has been initiated and $630,000 has been spent to date
- Remaining $4,365,250 in funding is adequate to move to next steps of conceptual design/site selection

Recommendations/Next Steps

- Endorse 10 year facilities plan in principle, with the hub/spoke approach
- Initiate existing funding remaining in previously approved capital projects
- RFP for conceptual design with performance specifications
- Proceed with land search (own and build scenario) or an EOI for the lease scenario
- Incorporate anticipated costs into 2026 and 2027 budget proposals
- Reach out to province to formalize provinces intention to partner/fund additional space for ambulance dispatch and incorporate into design
- Explore opportunities to share sites with NRPS for future posts builds

Subject: Niagara Emergency Medical Services (NEMS) 10 Year Master Plan

Report to: Committee of the Whole

Report date: Thursday, February 6, 2025

Recommendations

1. That Report PHD 1-2025 **BE RECEIVED** as a summary of planning and information concerning the 10-year plan for EMS facilities, including the proposed construction of a new facility known as the EMS Primary Hub;
2. That the 10-year master facilities plan **BE ENDORSED IN PRINCIPLE** so that staff may proceed to 'Request for Proposals' for conceptual design of an EMS Hub with performance specifications and continue to explore partnership opportunities as detailed within this report;
3. That staff **BE DIRECTED** to proceed with expression of interest (EOI) for the lease-based scenario for an EMS Hub; and
4. That financing in the amount of $3,895,250 gross and $3,036,890 net **BE INITIATED** from the 2017 capital budget for EMS Central Hub (#20000117) and that the project **BE FUNDED** as follows:
    - Development Charges $858,360
    - Debt $3,036,890.

Key Facts

- The purpose of this report is to seek Council's endorsement for the 10-year Niagara Emergency Medical Services (EMS) master facilities plan and approval to proceed with planning for an EMS Hub.
- Approval of the 10-year facilities plan for EMS allows for progress toward the development of an EMS Hub and provides a framework for ongoing decision-making regarding EMS facilities and resources.
- In December 2021, Council considered three models and approved the exploration of a land acquisition process for an EMS Hub facility (PHD 03-2021); however, staff changes, Region priorities and capital challenges delayed initiation of this project.
- As planning for the EMS Hub continued, the need for a comprehensive facilities plan was clear.
- To address this gap, Operational Research in Health (ORH), a firm with extensive experience in developing facilities plans for Ontario EMS, was engaged to assist in creating a complete and strategic EMS facilities plan.

- The assessment led to the recommendation of a 10-year EMS Facilities Plan using a Hub and Spoke model, which incorporates future demographic and development impacts, as well as potential effects on EMS volume and response times.
- The recommendations from this assessment are outlined in Appendix 1 of the report.

Financial Considerations

PHD 03-2021 Niagara EMS Primary Hub – Background and Site Opportunities, from December 2021, outlined the financial implications of transitioning to a primary hub model, including a build versus lease model cost comparison for the primary hub. The financial considerations identified in that report, which included access to funding and debt, and overall operating and capital costs over the short and long term, remain relevant. Staff have built off these financial considerations and updated them for the scope of the proposed updated master plan now including all facilities required over the next 10 years.

Staff have taken the updated master plan provided from ORH (Appendix 1) and updated the costing and assumptions under three scenarios to ensure we have a complete view of the financial impacts:

1. Traditional Facilities Model – Where we continue to grow to address ongoing service needs by building new stations including a new headquarters. (Appendix 2a)
2. Hub Model Regional Build – Where the Region will acquire land and build and own all required facilities including a new hub. (Appendix 2b)
3. Hub Model 3rd Party Lease – Where the Region would look for a partner who owns and builds the Hub and enter into a long-term lease for this facility. Posts and spokes would be built and owned by the Region. (Appendix 2c)

Regional staff have worked with ORH to provide estimated costs associated with each model or scenario. The 10-year and 30-year capital and operating costs are summarized in the following table.

Table 1: Traditional vs Hub Cost Comparison – 10 years

$Millions	Traditional Facilities Model	Hub Model Regional Build	Hub Model 3rd Party Model
Operating	$136.5	$124.5	$63.7
Capital	$157.9	$143.3	$78.3
Funding	($58.7)	($53.4)	($50.2)
Total	**$235.6**	**$214.5**	**$129.3**

Table 2: Traditional vs Hub Cost Comparison – 30 years

$Millions	Traditional Facilities Model	Hub Model Regional Build	Hub Model 3rd Party Model
Operating	$640.2	$556.7	$607.1
Capital	$157.9	$143.3	$53.7
Funding	($307.9)	($267.2)	($292.0)
Total	**$490.2**	**$432.8**	**$368.7**

The 10-year plan is inclusive of all facility construction costs, as well as necessary ambulance purchases and staffing to support growth. The Hub and Spoke model offers a lower cost option than the Traditional model due to more efficient use of facilities and operational efficiencies leading to cost avoidance.

Relative to the Regional Build model, the 3rd party lease model offers initial savings by avoiding upfront capital for the construction and eliminating the need for an asset renewal provision in the operating budget for the future lifecycle costs. However, there are risks and uncertainties with a lease model that would need to be negotiated with the developer, likely including ballon payments upfront or throughout the life of the lease. These extra payments have not been incorporated into the financial model as they are unknown until details are received through an expression of interest process. Staff anticipate that once a lease is negotiated, additional costs will likely bring the overall 30-year cost closer to that of a Regionally built and owned facility.

Despite the unknown costs and uncertainties, staff recommend that Council endorse proceeding with the 3rd Party Lease Hub and Spoke scenario due to the current

constraints on available capital funding and limited debt access. Building an EMS hub would require a significant portion of the Regions capital budget in year one of the plan as outlined in the table below and would not be feasible given other infrastructure needs across the Region.

Table 3: Year 1 Capital Investment Comparison

$Millions	Traditional Facilities Model	Hub Model Regional Build	Hub Model 3rd Party Lease
Capital Expenditures	$186.4	$199.9	$24.8
Capital Funding	($84.3)	($104.5)	($6.6)
Net Capital Investment	$102.1	$93.3	$18.8
% of annual capital budget needing to be dedicated to EMS	**66.8%**	**62.4%**	**11.9%**

Operating Budget

Each scenario will require a small levy operating budget increase over the next 10 years as shown in the table below. When developing the model, staff plan to use the taxpayer relief reserve to minimize the impact of Ministry funding lagging the year costs are actually being incurred. This approach ensures that the tax levy is not increased in one year and then decrease in the next year once Ministry funding begins. While the lease model has higher annual operating increases as outlined in the table below, it remains relatively small compared to the upfront capital investment need of the build model discussed above.

Table 4: Annual Operating Budget Impact

$Millions	Traditional Facilities Model	Hub Model Regional Build	Hub Model 3rd Party Lease
Operating Expenses	$4.4	$4.6	$1.7
Operating Funding	($1.5)	($1.5)	($1.5)
Net Operating Investment	$2.8	$3.1	$0.2
One-time reserve transfer for funding lag and smoothing	($2.5)	($3.0)	$0.0
Net Operating Impact	$0.3	$0.0	$0.3
% levy increase for operating	**0.06%**	**0.01%**	**0.05%**

Financial Reporting and Debt Impacts

From a financial reporting perspective, the 3rd Party Lease Model will be deemed a capital lease and therefore would be included in the capital budget with a corresponding long-term liability reported. While the lease payments will impact the operating budget, it will help to preserve debt capacity limits and capital reserves for future and other Regional capital needs.

Future capital lease payments are included in the Province of Ontario's Annual Repayment Limit (ARL) calculation; however Standard & Poor's does not factor in capital leases when assessing credit ratings, as these are considered direct debt and not tax supported debt.

Project Initiation and Future Budgets

Regional Council has already approved $4,995,250 in capital funding for the EMS primary hub through projects 10GD1128 ($1,100,000) and 20000117 ($3,895,250). Of this, $1,100,000 has been initiated and $630,000 spent to date. Staff are recommending the remaining funds be initiated and be used to proceed with next steps.

Of note, the costs outlined in this master plan are based on several assumptions and are intended to help assess the impact of decisions. Staff anticipate more refined cost information to become available as the process progresses, and updates will be built into future Regional capital and operating budgets, which will be brought back to Council for approval as part of the annual budget process.

Analysis

Background

As outlined in PHD 03-2021, following provincial downloading and amalgamation of services, Niagara Region inherited ten facilities used by the previous six ambulance services operating within the region. Over the past 21 years, nine of these stations have remained operational, with the Region replacing one and adding eight more. Today, the Region operates 19 ambulance stations, a fleet center, and an EMS headquarters and dispatch center. These operate under varying models, including standalone owned facilities, shared spaces with other emergency services, and leased units in strip malls. Of these, 9 are Region-owned, and 11 are leased.

The recommendation for a Hub and Spoke facility model was first identified in 2011 following a corporate facilities review that included a long-term EMS facility plan, and a series of reports, consultant reviews and updated modeling have since reaffirmed a Hub as the preferred model for long-term EMS delivery.

Council has previously supported the exploration of land assessment and development opportunities for the EMS Primary Hub project; however, the project has not been initiated. When Council approved the exploration of a Hub in December 2021, it was without a comprehensive master facilities plan. Continuing to build new EMS stations without a strategic plan would result in facilities that are larger, more expensive, and less operationally efficient than necessary. Recognizing this gap, in early 2022, the decision was made to develop a thorough plan, presented to Council for alignment with the overall direction. Operational Research in Health (ORH) was engaged to provide this plan, based on detailed analysis of EMS historical data and predictions for future Regional growth. It is important to note that capital needs required for the project will still require approval through the annual capital budget process.

Options Considered

In addressing future needs, as outlined above, three options are possible; carry on with the legacy Traditional decentralized full station approach, to move forward with a wholly Region owned Hub and Spoke model, or to move forward with a Hub and Spoke model involving a 3rd party lease-build partnership. Each has different financial implications.

Current State (Traditional) and Risks

In addition to 19 ambulance bases, the Emergency Services Division maintains five separate leases for support and administrative services, all in Niagara on the Lake. Four of these leases are held at the Niagara Corporate Business Centre (NCBC) at 101 Lampman Court and the other space at 2 Westwood Court.

1. Niagara Ambulance Communications Services (NACS - dispatch centre) - NCBC
2. Dispatch Training - relocated to NCBC due to COVID-19
3. ESD Administration (Headquarters) – NCBC
4. ESD Administration (Dispatch Training) –NCBC
5. Fleet and Logistics / Mobile Integrated Health Station – 2 Westwood Court

The current Traditional facility model consists of stand-alone stations and requires each site to be completely self-sustaining. Each station must contain all necessary amenities, such as multi-bay garages, inventory rooms, secure medication storage, cleaning equipment, change rooms, lockers, administrative resources, and staff break areas. As an example, the last stand-alone station constructed, Merrittville Station (built 2014 at Regional Headquarters), occupies a large physical footprint to accommodate these requirements.

In 2019, Niagara College purchased the NCBC, current site of EMS Headquarters and Communications Center, and assumed the leases at this facility. Niagara College has committed to maintain current leases at the NCBC, though this approach may change in the future.

The current leases at 101 Lampman Court expired in August 2024 with a termination notice between 90 days and 6 months dependant on the space. It is currently in the process of being extended to August 31, 2026. The lease for 2 Westwood Court expires July 2025 with no termination notice required. If these leases were not to be renewed, Niagara EMS would be forced to find new space within imposed timelines. The preference is to mitigate against this risk in the development of a Primary Hub for long term facility confidence.

Future State - Hub and Spoke

A Hub and Spoke model is a multi-function station model, where Emergency Services operations including administration, training, fleet, communications (dispatch) and emergency operations are centralized at a Hub where the majority of EMS staff report to and deploy from. Satellite spokes in the West and South would accommodate the

remaining daily operations and staff reporting. Together, all daily operations including supply, readiness and staffing would originate at the Hub and Spokes, with ambulances assigned to small footprint posts strategically located throughout the region. Currently, these functions are distributed across various sites, leading to inefficiency as described above.

As noted in PHD 03-2021, this model leads to a number of advantages, including standardization and operational efficiencies across the fleet leading to significant cost savings and operational advantages such as:

- Stability of business functions
- Enhanced staff connectivity
- Improved Paramedic staff availability
- Improved staff flexibility and decreased overtime
- Enhanced vehicle/equipment maintenance capacity
- Space for growth
- Enhanced partnership opportunities for co-location of EMS ‘posts’

For these reasons, Council previously endorsed the concept of an EMS 'Hub' (PHD 01-2021). This report and its recommendations further informs this decision through endorsement of an all-inclusive 10 year Facilities Plan.

Region Owned Hub vs 3rd Party Capital Lease

EMS infrastructure is critical and staff feel that the best long-term option is for the Region to acquire land, build and own the facilities. This approach allows for legal authority, full operational decision making and generally is cost effective over the longer term. However, staff recognize that the upfront capital required to achieve this is significant, and due to cost, a lease arrangement with a 3rd party owner avoids much of the upfront capital requirement. This comes with added risk for operational stability and potential future cost increases and is therefore not a common model for emergency services. While staff have recommended the less expensive option in the short-term to ensure that the project proceeds and operational efficiencies are achieved, an owned facility model is preferable should capital become available.

Summary of Findings and Recommendations from ORH Evaluation

ORH was engaged to provide a fulsome 10-year Facilities Plan, using robust statistical modelling to predict future response needs. This modelling is based on Niagara’s historical EMS data, as well as information regarding future regional predicted growth

and development plans. ORH has performed this work for several Ontario municipalities. The plan evaluated utilized three comparative approaches:

A) Maintain current resources (with resultant degradation of response times) or
B) Maintain current performance, or
C) Improve performance to meet Council approved response time targets, resulting in improved response times in all municipalities.

Based on approach 'C', recommendations from that 10-year plan include:

- A detailed review of service profile and facility risks was undertaken.
- Projections of future EMS demand: the anticipated increase is approximately 40% over the next decade. Demand projections predict a 40% increase by 2033.
- Facility recommendations to address lease, condition, capacity, and coverage risks:
  - The retention of 10 existing facilities for continued use as 'posts'
  - The development of 7 new 'post' facilities: 2 x 1-bay, 5 x 2-bay (noting that a 2-bay post will have smaller footprint than a current 2-bay Traditional facility)
  - The development of 3 new Hub facilities was found to best meet the geographical coverage needs of Niagara Region: a Primary Hub, (which incorporates EMS Communications Center, Training, and Headquarters), along with a smaller Northwest Spoke and a South Spoke. These facilities, once constructed, will be the primary reporting and deployment stations for all staff.

- Additional ambulance requirements identified to allow improved coverage in all municipalities by 2033: Additional 5 x 24/7 shifts and 11 x 12/7 ambulance shifts are required by 2033 (38% increase)
- Additional 18 ambulances (vehicles) required, including spares.

Alternatives Reviewed

Alternative options are to continue with the Traditional EMS facilities model, or to move forward with the Hub and Spoke model as a region-owned capital project rather than a lease-build model.

The disadvantages of continuing with the Traditional model include increased operating costs, potentially greater capital costs over time, and failure to realize the numerous operational advantages that can be achieved with a Hub and Spoke model.

The primary disadvantage of a region-owned capital Hub project is increased capital costs that may exceed capital funding available.

Relationship to Council Strategic Priorities

The recommendations support Council's strategic priority of 'Effective Region' by ensuring that EMS response meets current and forecast urgent health care needs of the communities we serve as the Region continues to grow and prosper. The delivery of prompt, quality paramedic services will help maintain the health and safety of Niagara's citizens. With a smaller footprint for Paramedic 'posts', enhanced opportunity exists for co-location of ambulance stations.

The recommendations in the 10-year Facility Plan also support Council's strategic priority of 'Equitable Region', as implementation is anticipated to improve EMS response times in every municipality, supporting health, growth, and future development for all areas.

Other Pertinent Reports

- PHD 23-2012 Niagara EMS Strategic Accommodations Study
  (Report available upon request)
- PHD 17-2014 EMS System Performance Sustainability
  (Report available upon request)
- PHD 17-2015 EMS System Performance Sustainability
  (Report available upon request)
- PHD 05-2016 Niagara EMS Master Plan
  (Report available upon request)
- PHD 08-2016 Master Plan Award of RFP
  (Report available upon request)
- PHD 19-2016 Niagara EMS Mobile Integrated Health Community Paramedic Update
  (Report available upon request)
- PHD 21-2016 2016 Update to EMS System Performance Sustainability
  (Report available upon request)
- PHD 05-2017 Niagara Emergency Medical Services Pomax Master Plan Review
  (Report available upon request)
- PHD 19-2017 Niagara EMS 2018 Resource Requirements
  (Report available upon request)
- PHD 17-2017 Niagara EMS System Design Changes
  (Report available upon request)

- PHD 03-2021 - Niagara EMS Primary Hub-Land Procurement Phase (https://pub-niagararegion.escribemeetings.com/Meeting.aspx?Id=3b2e29a1-bbc5-4aba-8a1bbfdb43176cd4&Agenda=Merged&lang=English&Item=21&Tab=attachments)

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Appendices

Appendix 1	ORH Report – 10 Year Master Facilities Plan – March 14, 2024
Appendix 2	Master Plan Cost Comparison – Traditional vs Hub

Emergency Service Planning
Emergency Medical Services

Niagara EMS

Ten Year Facilities Master Plan

Final Report

ORH/NEMS/2
March 14, 2024

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Accreditations

Other than data provided by Niagara EMS, this report also contains data from the following sources:

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EXECUTIVE SUMMARY

i. The Regional Municipality of Niagara (Niagara Region) engaged Operational Research in Health Limited (ORH) to develop a Ten Year Facilities Master Plan for the delivery of Niagara Emergency Medical Services (NEMS) across the period 2023 to 2033. This is the Final Report for the review.

ii. A five-year sample of workload and resourcing data (January 2018 to December 2022) was collected by ORH to examine and analyze trends in demand and performance. ORH was also provided with a range of qualitative and quantitative information relating to Niagara Region's EMS facilities.

iii. Daily demand (incidents responded to by a NEMS vehicle) increased across the sample period, from 164 incidents per day in 2018 to 181 in 2022, which is equivalent to an average of 2.5% per year. Average occupied time per Priority 1 to Priority 5 (P1 to P5) incident, measured from vehicle mobilized to clear, has also increased across the sample period, from 86 minutes in 2018 to 98 minutes in 2022. Time at hospital accounts for a significant percentage of occupied time.

iv. Across the sample, response performance targets were close to being met for each priority. However, due to increasing demand and increasing time on task, P1 and P2 performance slowly declined from above target levels to below target levels over the course of 2021 and 2022. As of 2023, NEMS planned to deploy 4,704 ambulance (transport unit) hours per week, along with a range of Mobile Integrated Healthcare teams. Average ambulance utilization for 2021 and 2022 was 42%.

v. ORH conducted a review of the Region's EMS facilities and evaluated a range of different metrics. The facilities that have concerns in multiple areas, and are therefore deemed to be the highest risk, are Abbey Rd, Niagara Falls, St Paul Av, Niagara-on-the-Lake, Grimsby, and Vineland.

vi. However, almost all the facilities in the Region have no spare capacity. This means that, under a traditional facilities model, it will not be possible to deploy additional resources when required without new or expanded facilities in the future.

vii. ORH uses sophisticated predictive modelling tools that have been developed in-house to assist with the development of master plans for paramedic services. ORH validated its EMS simulation model, AmbSim, against analyzed NEMS performance, utilization and hospital flows, which showed that the model replicated historical operations accurately and therefore was appropriate to use for different 'what if' modelling scenarios. A 2023 Base Position was then created to provide a basis for comparison with future scenarios.

viii. To understand facility and resource requirements for the next ten years, a demand projection was required. Demand projections were created using a population-based projection method with the underlying hypothesis that demand is strongly related to the population age profile.

ix. Total population for Niagara Region is expected to reach 589,000 by 2033, an increase of 15% from 2023. The population is projected to continue to age during this period. For example, the percentage of the population aged 65 and over is 23% in 2023 compared to 26% in 2033.

x. The predicted increasing and ageing population, coupled with increasing demand rates, suggests that demand on NEMS will continue to increase significantly to 2033. P1 to P5 demand in Niagara Region is expected to increase by 40% between 2023 and 2033, from 179 incidents per day to 242 incidents per day. This equates to a 3% increase year-on-year Region-wide.

xi. To highlight the impact on performance if no investment is made to NEMS frontline operations, the demand projections were applied to the Base Position in AmbSim. No other operational changes were made (a 'Do Nothing' scenario). In this scenario, P1 8-minute response performance for Niagara Region falls significantly from 79% in 2023 to 71% in 2033, well below target levels.

xii. The main aims of the facility optimization were to identify facility locations that would best improve equity of coverage across Niagara Region and/or resolve existing facility issues (for example, lack of spare capacity for the future, condition risks, or lease risks). Following a highly iterative process, supported with input from the Steering Committee, the location optimization outcomes were as follows (see map in Figure **I**):

- Ten facilities were identified as being already optimally located, or not worth moving to a slightly more optimal location
- Two facilities were recommended to be moved to a new optimal location: Abbey Rd and Port Colborne
- Glendale and Niagara-on-the-Lake resources are recommended to be consolidated to a single facility near Virgil
- Grimsby resources are recommended to be divided between two new facilities, one in Beamsville and one more centrally located within Grimsby
- Niagara Falls/St Paul Av resources are recommended to be divided between three new facilities in the municipality

xiii. An increase of 1,764 weekly ambulance hours, from 4,704 in the 2023 Base Position to 6,468 in 2033, is recommended to improve performance in every municipality in 2033. This is equivalent to a 38% increase in resource hours, compared to the 40% increase projected in demand.

xiv. Crucially, these resources and facilities would allow the P1 8-minute response performance target of 80% to be to be exceeded in overall Niagara Region terms and in six municipalities. Furthermore, the remaining municipalities would either have maintained the same performance as recorded in the Base Position or have substantially improved.

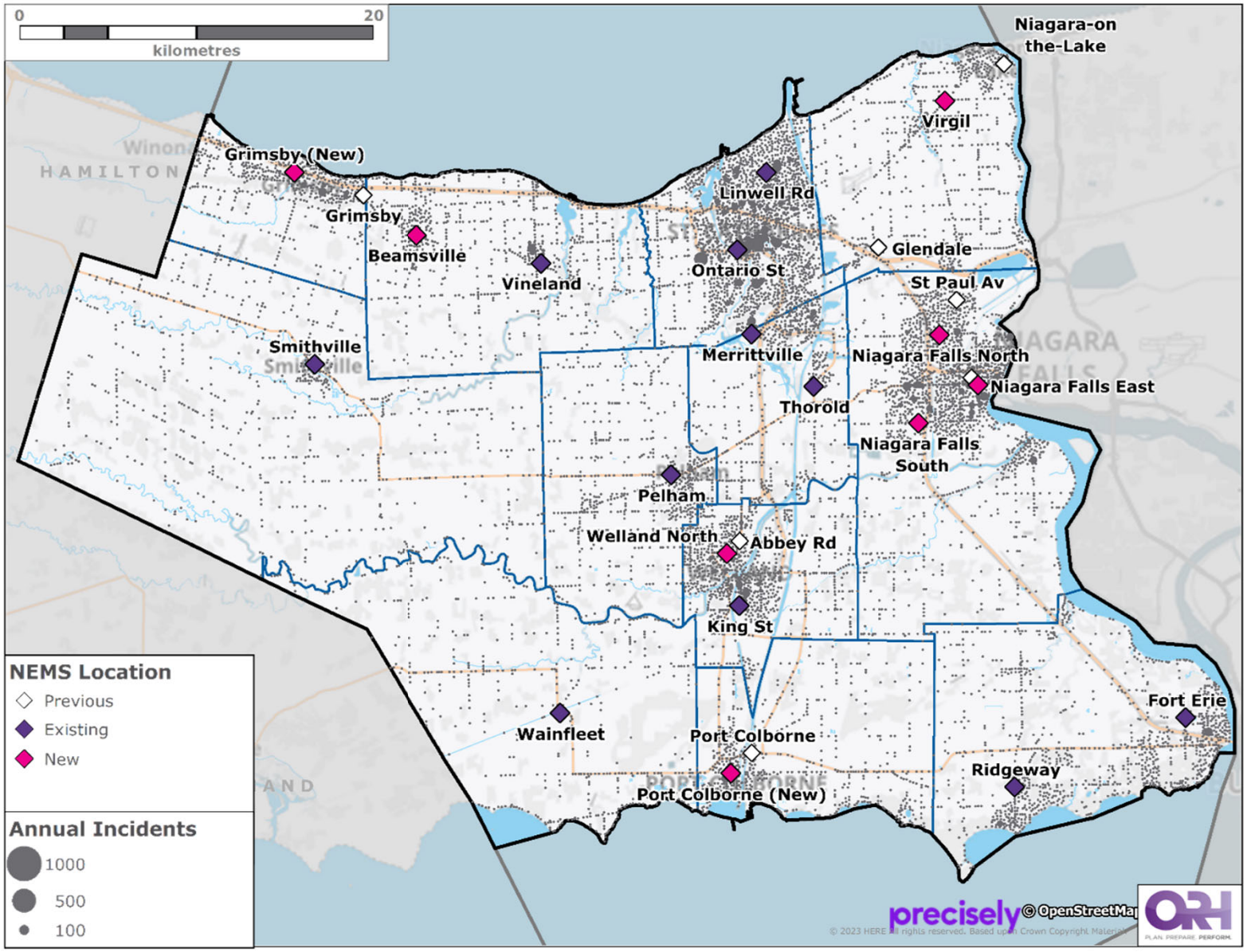


Figure I: Recommended Facility Configuration (excluding Hubs)

xv. The majority of the recommended resource investment would be required to offset the demand increases, even if the only criteria for response performance was to ensure no degradation from the Base Position.

xvi. Under a hub, spoke and post model, the recommended facilities would operate as posts, reducing the footprint of future builds and alleviating the remaining capacity pressures at facilities to be retained. Ambulances associated with these facilities would book on and off at a primary location or locations.

xvii. A three-hub solution (one primary hub plus two spokes) was found to best meet the geographical coverage needs of Niagara Region. Potentially suitable land near to each of the optimal sites has already been identified. Based on the recommended vehicle requirements outlined, this means that hub facilities would need to accommodate 22 peak ambulances plus spares at the Primary Hub (at Westwood Court), 9 peak ambulances plus spares at the North West Spoke (at the optimal new Grimsby facility), and 18 peak ambulances plus spares at South Spoke (at approximately Morris Rd and Netherby Rd).

xviii. There is a small response performance improvement of moving to the hub, spoke and post facilities model when compared with the traditional facilities model. There are also many other potential benefits of a hub, spoke and post model that are not captured within response time metrics, for example:

- Minimized footprint for the post facilities, which are often in high-population areas where land prices are expensive; this also reduces energy requirements
- Centralized supplies, cleaning, and maintenance, reducing the logistics mileage impact, supplies wastage and vehicle downtime
- Focus for frontline staff on patient care rather than stocking and cleaning
- Increased equity in workload by shift, with opportunities for improved skills retention and reduced WSIB incidents
- Opportunity to consolidate administration, dispatch, dispatch training, and quality assurance functions alongside the primary hub

xix. The recommended facility and ambulance requirements are suggested to be introduced over the next ten years according to the trajectory outlined in Figure **II**. The process for determining an appropriate trajectory aimed to address high risk facilities as quickly as possible. However, the trajectory also needed to reflect budget cycles, follow a sensible construction schedule, stagger ambulance increases so that the financial impacts are as evenly spread across the ten years as possible, and balance this with the need to improve performance.

xx. Sensitivity modelling was also undertaken to test assumptions about parameters incorporated into the core modelling scenarios, including: building optimal sites at potential alternative locations, opening the new South Niagara Site hospital, variations to time at hospital, and variations to demand projections.

Figure II: Recommended Trajectory Implementation

Year	Facilities Opened			Facilities Closed	Ambulance Requirements			Notes
	1-bay Post	2-bay Post	Hub		Shifts		Peak Ambulances	
2025	*None*	*None*	*None*	*None*	Ontario St Smithville Fort Erie	24/7 12/7 12/7	1 1 1	No space for any spare vehicles at Smithville, Fort Erie or Ontario St
2026	*None*	*None*	*None*	*None*	Abbey Rd Niagara-on-the-Lake	12/7 12/7	1 1	No space for any spare vehicles at Abbey Rd or NOTL
2027	Niagara Falls North*	Niagara Falls East* Virgil*	*None*	Niagara Falls St Paul Av Niagara-on–the-Lake	Niagara Falls East* Linwell Rd*	12/7 12/7	1 1	*Shifts associated with the opened posts and the additional Linwell Rd shift will now forward deploy from Westwood Court as a temporary hub. Glendale technically won't close, but shifts will forward deploy to Virgil
2028	*None*	Welland North*	North West Spoke	Abbey Rd	North West Spoke Welland North*	12/7 + 12/7 (Night) 12/7 (Night)	1 0	North West Spoke will open as a fully operational spoke, with Grimsby, Smithville and Vineland used as posts. *Shifts associated with the Welland North post will forward deploy from King St temporarily, supervisors will need to be temporarily relocated (Fitch St?)
2029	Niagara Falls South*	*None*	*None*	*None*	Merrittville* North West Spoke	12/7 24/7	1 1	*Shifts associated with the Niagara Falls South post and the additional Merrittville shift will forward deploy from Westwood Court as a temporary hub
2030	*None*	*None*	Primary Hub	Glendale	Primary Hub	12/7 (Night)	0	Primary Hub will open as a fully operational hub, with Niagara Falls, NOTL, St Catharines and Thorold facilities all used as posts
2031	*None*	Beamsville	*None*	Grimsby	South Spoke	12/7	1	
2032	*None*	Port Colborne (New)	South Spoke	Port Colborne	South Spoke	24/7	1	South Spoke will open as a fully operational spoke, with Fort Erie, Pelham, Port Colborne and Welland facilities all used as posts
2033	*None*	*None*	*None*	*None*	North West Spoke South Spoke	12/7 2 x 12/7	1 2	

Contents

1 INTRODUCTION

1.1 The Regional Municipality of Niagara (Niagara Region) engaged Operational Research in Health Limited (ORH) to develop a Ten Year Facilities Master Plan for the delivery of Niagara Emergency Medical Services (NEMS) across the period 2023 to 2033.

1.2 The Master Plan was required to:

(a) Review current service operations and the facilities portfolio.

(b) Through predictive modelling, determine locations and vehicles required for the future under a traditional model.

(c) Through predictive modelling, determine locations and vehicles required for the future under a hub, spoke and post model.

(d) Determine the feasibility of the current facilities portfolio to suit the needs of either model.

(e) Develop a series of prioritized recommendations based on the recommended option.

1.3 A Steering Committee was formed to support ORH during the course of the review, in particular to compile data, check analysis outputs, agree demand projection and modelling scenario assumptions, facilitate stakeholder consultation, and provide feedback on emerging results.

1.4 ORH collected and analyzed detailed NEMS workload, resourcing and facility data to enable a review of the current service and facilities profile (Section 2).

1.5 Location optimization and simulation models reflecting NEMS frontline operations were built and validated, and used to create a Base Position for modelling (Section 3).

1.6 Using historical demand population data, a demand projection was made to 2033. The simulation model was used to understand the impacts of the future projections as a 'do nothing' scenario (Section 4).

1.7 ORH's location optimization model was used to identify optimal facility locations (Section 5). Vehicle requirements for the future were identified using ORH's simulation model under a traditional facilities model (Section 6), as well as for a hub, spoke and post facilities model (Section 7).

1.8 Finally, a trajectory of prioritized recommendations has been provided (Section 8) along with a series of sensitivity modelling scenarios (Section 9).

1.9 **This is the Final Report for the review**.

2 CURRENT SERVICE AND FACILITIES PROFILE

A five-year sample of workload and resourcing data (January 2018 to December 2022) was collected by ORH to examine and analyze trends in demand and performance. ORH was also provided with a range of qualitative and quantitative information relating to Niagara Region's EMS facilities.

Daily demand (incidents responded to by a NEMS vehicle) increased across the sample period, from 164 incidents per day in 2018 to 181 in 2022, which is equivalent to an average of 2.5% per year. Average occupied time per Priority 1 to Priority 5 (P1 to P5) incident, measured from vehicle mobilized to clear, has also increased across the sample period, from 86 minutes in 2018 to 98 minutes in 2022. Time at hospital accounts for a significant percentage of occupied time.

Across the sample, response performance targets were close to being met for each priority. However, due to increasing demand and increasing time on task, P1 and P2 performance slowly declined from above target levels to below target levels over the course of 2021 and 2022.

As of 2023, NEMS planned to deploy 4,704 ambulance (transport unit) hours per week, along with a range of Mobile Integrated Healthcare teams. Average ambulance utilization for 2021 and 2022 was 42%.

ORH conducted a review of the Region's EMS facilities and evaluated a range of different metrics, the key findings of which are presented in Figure **3-6**. The facilities that have concerns in multiple areas, and are therefore deemed to be the highest risk, are Abbey Rd, Niagara Falls, St Paul Av, Niagara-on-the-Lake, Grimsby, and Vineland.

However, almost all the facilities in the Region have no spare capacity. This means that, under a traditional facilities model, it will not be possible to deploy additional resources when required without new or expanded facilities in the future.

Data Collection

2.1 A five-year sample of workload and resourcing data (January 2018 to December 2022) was collected by ORH to examine and analyze trends in demand and performance. For example:

- Medical Priority Dispatch System (MPDS) workload data
- Resource data (planned and actual deployments)

- Geographical data (station and hospital locations)
- Operational policies and procedures (deployment protocols, meal break policies)
- Vehicle unavailability data

2.2 To create a facilities profile, ORH was provided with a range of qualitative and quantitative information relating to building conditions, leasehold details (if applicable), site costs, and station capabilities or limitations of the Region's EMS facilities.

Service Profile Overview

Demand

2.3 Unless otherwise specified, demand is defined in this report as NEMS-responded incidents, where a vehicle(s) arrives on scene; if two vehicles mobilize to or attend the scene of the same incident, this unique incident is only counted once. This includes out of area incidents. Demand is grouped into the five priority categories (Priority 1 through Priority 5) plus an 'Other' category which includes mostly mobile integrated healthcare (MIH) incidents as well as miscellaneous incidents such as courtesy calls.

2.4 NEMS responded to an average of 169 incidents per day during the five-year sample. Daily demand increased across the sample period, from 164 incidents per day in 2018 to 181 in 2022, which is equivalent to an average of 2.5% per year (see Figure **2-1**). Demand fell to its lowest levels between March and June 2020, strongly influenced by the COVID-19 pandemic.

2.5 Over half (57%) of P1 to P5 demand is in St Catharines and Niagara Falls municipalities, with 57 and 37 incidents per day respectively (see Figure **2-2**). Municipalities in the west of the Region generally have the lowest demand, for example, Wainfleet and West Lincoln with 1 and 2 incidents per day respectively.

2.6 Across the week hourly demand peaked between 10:00 and 13:00, with around 10.5 incidents per hour occurring during this time (see Appendix **A1**). Demand gradually decreases through the evening and night time hours, except for the weekend at 18:00 when demand peaks again.

2.7 The majority of patients transported to hospital by NEMS ambulances (a total of 117 per day) were taken to hospitals within the Region, all of which are operated by Niagara Health with the exception of West Lincoln Memorial Hospital. St Catharines Site was the most frequent destination for patients, at 49 per day (see Appendix **A2**). Fort Erie and Port Colborne Urgent Care Centres are now closed as a destination for EMS patients.

Figure 2-1: Demand by Month and Category

Average Daily Responded Demand (P1 to P5 & Other)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall
2018	164.7	163.0	163.5	158.2	162.4	168.1	171.9	168.2	165.5	158.5	162.4	163.1	**164.1**
2019	163.9	158.2	164.3	162.9	162.1	172.2	175.6	167.2	166.9	157.8	154.1	157.4	**163.6**
2020	158.5	159.0	139.5	132.1	146.3	157.6	170.0	166.8	168.4	158.4	160.1	163.5	**156.7**
2021	160.7	160.8	169.3	171.7	174.3	181.5	195.2	198.5	190.9	181.5	177.6	173.8	**178.1**
2022	168.7	165.3	165.5	173.8	181.7	187.9	188.1	186.8	185.0	187.6	188.3	191.2	**180.9**

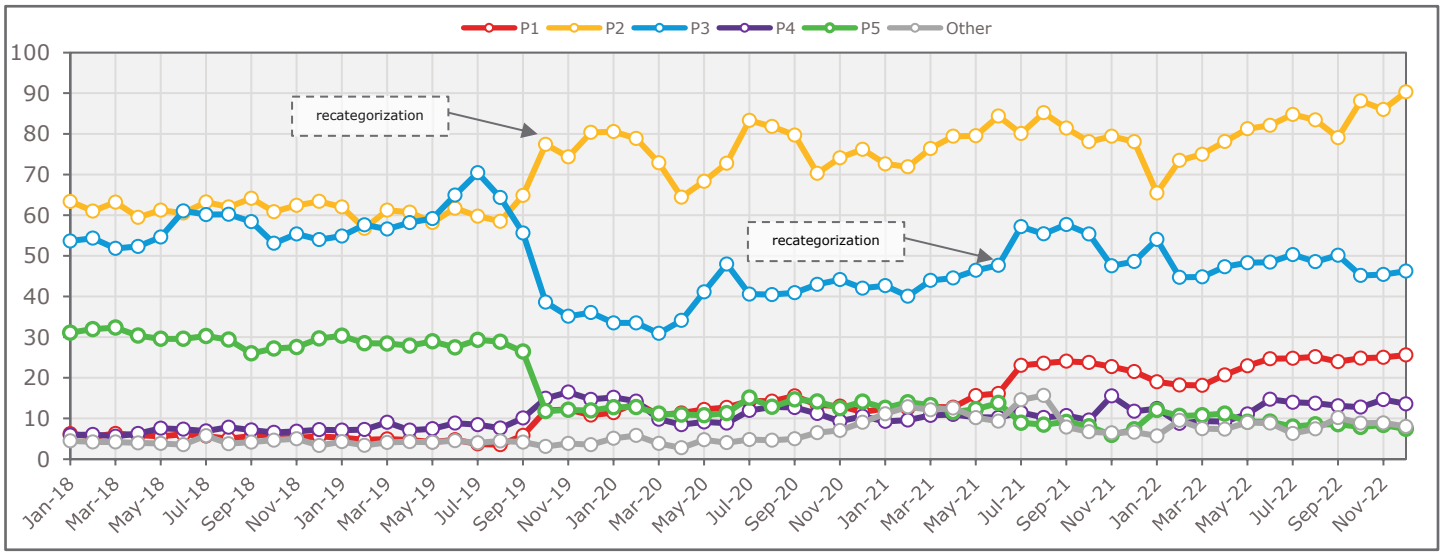
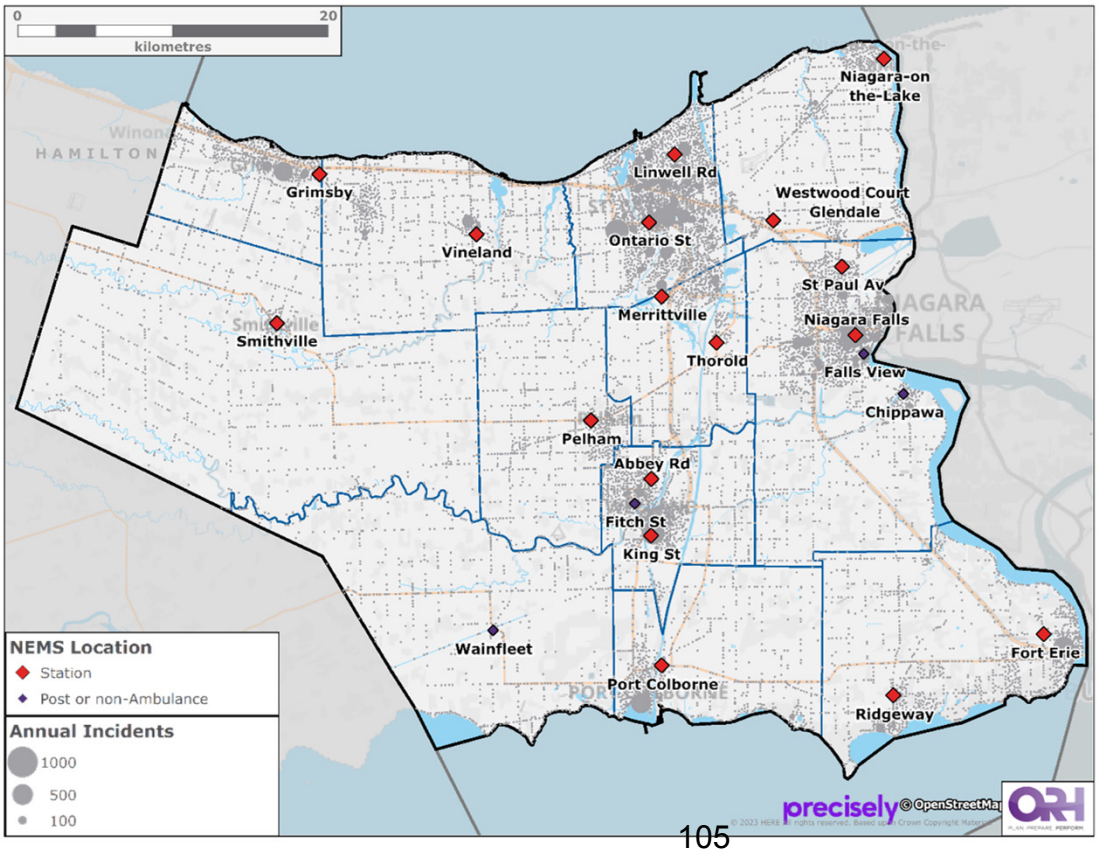


Figure 2-2: Priority 1 to 5 Demand by Municipality



Municipality	Daily Demand	% of Demand
Fort Erie	10.4	6.4%
Grimsby	6.7	4.2%
Lincoln	5.7	3.5%
Niagara Falls	36.5	22.5%
Niagara-On-The-Lake	5.4	3.3%
Pelham	3.5	2.2%
Port Colborne	6.9	4.3%
St Catharines	57.4	35.4%
Thorold	6.0	3.7%
Wainfleet	1.1	0.7%
Welland	19.9	12.3%
West Lincoln	2.3	1.4%
Out-of-Area	0.4	0.2%
Total	162.3	100.0%

2.8 This is equivalent to an 70% average conveyance rate for Priority 1 to 5, which varies by category and has reduced during the sample period (see Appendix **A3**). As is expected, the conveyance rate for Other patients is very low.

Call Components and Performance

2.9 ORH calculates each component of the incident cycle separately and analyzes these to understand how they may vary (see Figure **2-3**). Average occupied time for P1 to P5 incidents, measured from vehicle mobilized to clear, was around 87 minutes, with time at hospital accounting for 69 minutes of this on average.

2.10 Occupied time has generally increased across the sample period, from 86 minutes in 2018 to 98 minutes in 2022. Assignment times, time to scene and time at scene have all increased by more than 15 seconds year-on-year.

2.11 Time at hospital varies considerably across the five-year sample period (see Figure **2-4**), with most of this variation being attributed to the arrival to handover component. Across 2018 and 2019 time at hospital was relatively stable with an average of 64 minutes, however, in April 2020 this rapidly declined along with the number of patient journeys due to the initial stages of the COVID-19 pandemic. By the second half of 2021, patient journeys and time at hospital had increased back to pre-pandemic levels, with time at hospital continuing to increase and reaching an average of 96 minutes for 2022.

2.12 For P1 and P2 incidents, response times are measured from the time the vehicle is notified to the time the vehicle arrives at scene for the first vehicle arriving at scene. For P3 to P5 incidents, response times are measured from the time the call was answered. Across the sample, P1 and P2 response performance targets were close to being met[1] (see Figure **2-5**).

2.13 However, due to increasing demand and increasing time on task, P1 and P2 performance slowly declined from above target levels to below target levels over the course of 2021 and 2022 (see Appendix **A4**).

2.14 ORH also evaluated performance at station catchment level; station catchments are geographical boundaries which divide up Niagara Region into the areas which are closest to each station based on drive times (see Appendix **A5**). Niagara-on-the-Lake station catchment had the lowest P1 response performance (30%), and Ontario St station catchment had the highest (88%). The lower performance in Niagara-on-the-Lake is most likely a product of the vehicle (there is only one vehicle deployed here) being unavailable either on a call or having been moved elsewhere for coverage, and the area being isolated such that it cannot then be easily covered by other vehicles. Similar comments can be made about the Vineland station catchment.

[1] The P1 response target is 80% within 8 minutes. The P2 to P5 response targets are 90% within 15, 30, 60, and 120 minutes respectively.

Figure 2-3: Call Component Averages

Calculated for First Responding Vehicle to Priority 1 to 5 Incidents

Call Answered to Vehicle Assigned (Priority 1)	01:28			02:22		02:20
Vehicle Assigned to Mobilized	00:53	00:55	01:04	00:57	01:01	00:58
Time to Scene	08:58					09:50
Time at Scene	20:05					22:32
Time to Hospital	12:58	13:13	13:05	13:00		13:06
Arrival to Handover	52:00					55:30
Handover to Clear	13:45	13:39				12:57
Time at Hospital	65:20					68:32
Occupied Time (Mobilized to Clear)	85:31					87:07

Increase from previous year by 15seconds

Decrease from previous year by 15seconds

Figure 2-4: Time at Hospital Variation

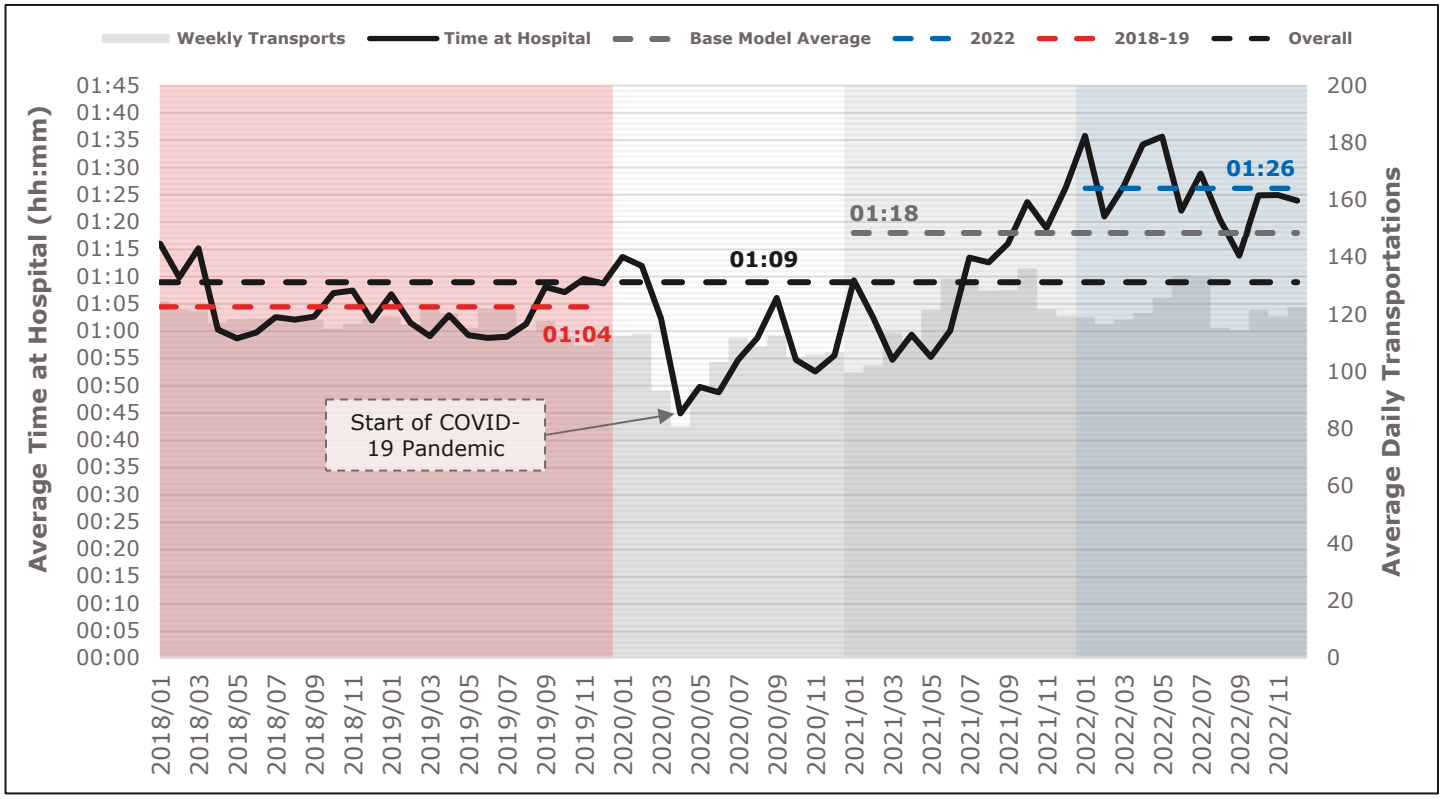
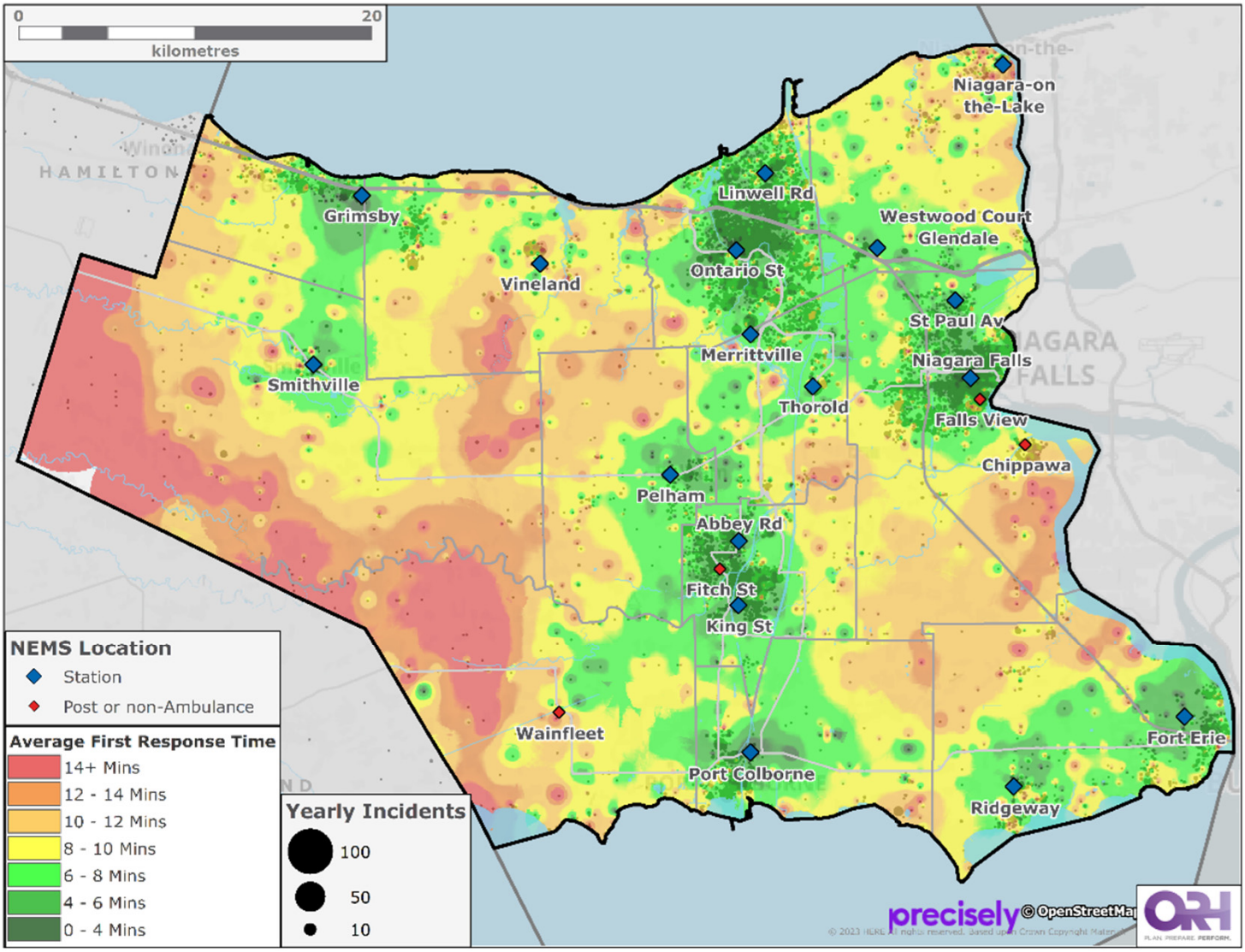


Figure 2-5: Performance Summary



Municipality	% within X Mins				
	P1 in 8	P2 in 15	P3 in 30	P4 in 60	P5 in 120
Fort Erie	71.7%	87.4%	82.9%	75.5%	96.6%
Grimsby	57.0%	89.6%	84.1%	79.0%	97.1%
Lincoln	50.4%	82.5%	82.4%	87.9%	97.6%
Niagara Falls	80.3%	91.8%	85.0%	84.7%	98.4%
Niagara-on-the-Lake	52.2%	77.4%	80.4%	83.2%	98.1%
Pelham	61.1%	86.1%	83.9%	88.8%	99.2%
Port Colborne	79.0%	90.9%	84.3%	71.2%	96.6%
St Catharines	86.3%	91.4%	84.9%	86.2%	98.3%
Thorold	66.1%	87.4%	85.7%	90.1%	98.8%
Wainfleet	26.6%	72.0%	82.8%	95.3%	98.9%
Welland	88.7%	92.9%	85.2%	81.7%	97.9%
West Lincoln	34.7%	75.8%	83.2%	89.4%	99.0%
Overall	**77.7%**	**89.8%**	**84.5%**	**82.7%**	**98.1%**
Target	**80%**	**90%**	**90%**	**90%**	**90%**

Resourcing and Resource Use

2.15 As of 2023, NEMS planned to deploy 4,704 ambulance (transport unit) hours per week, with a mix of Advanced Care Paramedic (ACP) and Primary Care Paramedic (PCP) led crews. MIH teams are also deployed, including a Community Paramedic (CP) for Wainfleet, the Falls Intervention Team (FIT), the Mental Health and Addictions Response Team (MHART), the Street Outreach team, the Palliative Care team, and the Community Assessment and Referral Team (CARE).

2.16 In 2021 and 2022 an average of 194 responses were undertaken by NEMS vehicles per day, which is equivalent to 1.1 responses per incident (see Appendix **A6**). As expected, for P1 to P5 incidents, the majority of responses are made by ambulances, and for the Other incidents by MIH teams.

2.17 Broadly the hourly profile of resource deployment aligns well with demand. There are, however, limitations as to how well NEMS can match demand levels since the collective agreement means the service only deploys 12-hour shifts, and a certain level of coverage must always be maintained, even in rural areas.

2.18 In evaluating the current use of resources, it is of interest to measure how well frontline resources are utilized. Utilization here is defined as the proportion of a vehicle's planned shift time that is spent responding and dealing with patient care (measured from time of mobilization to posting clear). This therefore excludes time spent on rest breaks, returning to base, and other duties such as completing paperwork.

2.19 Average ambulance utilization for 2021 and 2022 was 42%. Ambulance utilization reaches its highest level of just under 50% from around 11:00 and stays at approximately this level until around 15:00 (see Appendix **A7**); this is slightly later than the peak in demand. After this, utilization starts to reduce until a secondary peak of approximately 45% between 20:00 and 22:00.

2.20 The most common reason for ambulance unavailability for 2021 and 2022 was meal breaks, which are equivalent to an average unavailability of 30 minutes per vehicle per shift, or approximately 30 hours per day in total (see Appendix **A8**). NEMS plans to put out 630 ambulance vehicle hours per day, so this is equivalent to approximately 5% of the potentially available hours in the day.

2.21 There is also an average of 20 hours per day unavailability due to end of shift unavailability (23 minutes per occurrence), 18 hours of vehicle service[2] unavailability (10 minutes per occurrence), 13 hours of out of service unavailability (47 minutes per occurrence), and 13 hours of shift start unavailability (15 minutes per occurrence). The remaining reasons each only account for under 10 hours per day of unavailability.

[2] Vehicle service unavailability is applied after completion of transfer of care unless the crew indicates they are immediately ready to respond, followed by a further 10 minutes of stretcher clear time.

Facility Analysis

2.22 ORH conducted a review of the Region's EMS facilities and evaluated metrics such as:

- Age and condition: construction year, last major refurbishment year, condition rating
- Value and costs: land value, building value, net rental, expected remedial costs
- Size: land size, building size, number of floors, number of bays and their current usage, ability for expansion
- Location: local area response times, demand coverage, population coverage
- Tenure: freehold/leasehold, lease end date (if applicable), owner
- Access/egress: access to highways and service roads
- Resources: number of staff and number of vehicles allocated to the station
- Utilization: staff, bay, and vehicle utilization rates
- Amenities and support spaces: types and sizes of amenities (toilets, kitchen, offices, etc)
- Inventory: current requirements, wastage

2.23 The key findings are summarized in Figure **2-6** and discussed in more detail below. The facilities that have concerns in multiple areas, and are therefore deemed to be the highest risk, are Abbey Rd, Niagara Falls, St Paul Av, Niagara-on-the-Lake, Grimsby and Vineland.

2.24 Response performance by municipality and station catchment has already been discussed in an earlier sub-section. However, poorer response performance is not necessarily always directly related to the facility location, as it may instead be related to insufficient resource availability even if a facility is well located. ORH has therefore also calculated the station 'coverage' by station catchment. Coverage is calculated as the percentage of incidents within a station's catchment that are within a certain drive time of the station, under the assumption that a vehicle would always be available at the nearest station.

2.25 The majority of facilities can provide 5-minute drive time coverage for more than 60% of the incidents within their catchment; the higher the percentage, the more well located a facility is within its local area. The lowest performing stations in catchment terms are Grimsby, Merrittville, Niagara-on-the-Lake, Smithville, and Glendale. For example, the Grimsby facility can only reach 41% of incidents in its catchment within 5 minutes.

Figure 2-6: Facility Analysis Summary

Risk Type	Measure	Abbey Rd	Fitch St	Glendale	King St	Niagara Falls	Niagara-on-the-Lake	St Paul Av	Thorold	Vineland	Westwood Court	Fort Erie	Grimsby	Linwell Rd	Merrittville	Ontario St	Pelham	Port Colborne	Ridgeway	Smithville
Location & Coverage	P1 to P5 5-minute Coverage in Catchment	82%	Not included in Catchment Analysis	55%	85%	64%	52%	73%	79%	75%	Not included in Catchment Analysis	81%	41%	82%	51%	80%	67%	62%	74%	52%
	P1 8-minute Performance in Catchment	82%		74%	84%	78%	30%	74%	54%	36%		73%	56%	78%	70%	88%	60%	75%	53%	34%
	Co-Location			Fleet	Hospital Site	Hospital Site			Firehall	Firehall	Glendale	Police			Region HQ	Training Space	Water Tower			
	Other Access Issues	Bay Doors	Within Plaza				Parks Land										Firehall			
	Region's Location Rating																			
Call Components	Time to Scene	09:31	Not included in Catchment Analysis	09:37	09:03	09:19	13:17	09:33	10:40	12:36	Not included in Catchment Analysis	10:15	10:26	10:27	10:13	08:52	10:36	10:08	10:56	11:39
	Time to Hospital	10:04		14:40	11:05	09:46	24:54:00	10:21	14:53	15:34		23:36	12:14	13:18	13:01	11:04	16:20	16:45	25:44	20:07
	Time at Hospital	67:47		69:40	62:05	61:40	69:31	65:18	67:12	70:00		57:13	48:39	86:59	80:03	77:31	70:10	61:25	57:14	45:19
Condition & Capacity	Region's Condition Rating																			
	Capacity (Ambulance Bays)	2	7	2	4	4	2	1	2	1	16	4	2	2	3	4	2	3	2	2
	Peak Vehicles	1	0	1	2	4	1	1	2	1	-	3	2	2	3	3	2	3	2	1
	Potential for Expansion																			
	Inventory	Janitorial	Bi-weekly	Bi-weekly	Weekly	Weekly	Bi-weekly	Janitorial	Bi-weekly	Janitorial		Weekly	Weekly + Hosp Stock	Bi-weekly	Bi-weekly	Weekly	Bi-weekly	Bi-weekly	Bi-weekly	Bi-weekly
Lease Details	Lease Expiry	Jun-24	Jul-26	Jul-25	Dec-24	Dec-24	Dec-21	Jun-25	Dec-23	Apr-24	Feb-25	-	-	-	-	-	-	-	-	-
	Region's Termination Clause Rating																			
	Region's Landlord & Option to Negotiate Rating																			
Cost	2022 Operating Costs / sqf	$20.52	$9.88	$15.58	$5.60	$5.63	$8.04	$18.70	$3.61	$13.24	$15.58	$8.51	$11.28	$13.43	$8.91	$5.49	$6.38	$3.56	$6.40	$6.46
	Current Annual Rent / sqf	$14.40	$16.13	$7.96	$0.00	$0.00	$0.00	$12.31	$0.00	$16.98	$7.96	-	-	-	-	-	-	-	-	-
	Region's Operational Costs Rating																			
	Region's Capital Costs Rating																			
	Region's Lease Cost Rating																			

Notes:

Fitch St and Westwood Court excluded from Catchment and Call Component calculations (as no ambulances deployed here)

Coverage calculated based on drive times assuming vehicle available at station

Region's Location Rating 1: in the perfect location for call volume and regional coverage, 2: meets regional and call volume with minor issues (i.e. egress), 3: location does meet regional coverage meets call volume, 4: location does not meet call volume meets regional coverage, 5: location does not meet call volume and regional coverage

Call Component calculations are averages for incidents occurring within the station catchment (the station is not necessarily the one responding)

Region's Condition Rating 1: No issues or new, 2: "Good": FCI <5%, 3: "Fair": FCI ≥5%-<10,: "Poor": ≥10%-<30%, 5: "Critical": FCI ≥30%

Lease Expiry/Term End varied slightly between data sources

Region's Termination Clause Rating 1: Tenant has option to terminate; Landlord does not have option to terminate, 2: If EMS exercises, provide less than 6 months notice. Tenant and Landlord both have an option to terminate., 3: Tenant and Landlord have an option to terminate upon 6 months notice., 4: If Landlord exercises, provide less than 6 months notice. Tenant and Landlord both have an option to terminate., 5: Only Landlord has option to terminate; or, Tenant does not have an option to terminate.

Region's Landlord & Option to Negotiate Rating 1: Auto renewal, 2: Good landlord; favourable terms with previous negotiations, 3: Adequate landlord; mostly favourable terms with previous negotiations, 4: Difficult landlord; unfavourable terms with previous negotiations, 5: None

Square footage varied depending on data source (used the source that had calculated Operating Costs / sqf)

Region's Operational Costs Rating 1: $0 to $5/SF, **2**: $5.01 to $10/SF, **3**: $10.01 to $15/SF, 4: $15.01 to $20/SF, 5: $20.01 and up

Region's Capital Costs Rating 1: The Landlord is responsible for all capital repairs and replacement costs, 2: The Niagara Region is responsible for roof, HVAC and electrical repair costs, but not replacement., 3: The Niagara Region is responsible for some or part of capital replacement costs through Common Area Maint., 4: The Niagara Region is responsible for HVAC & Electrical replacement and repair costs., 5: The Niagara Region is responsible for all capital replacements costs.

Region's Lease Cost Rating 1: Nominal Rent or no cost; Decrease of rental rate, 2: Insignificant increase being less than CPI (2021 CPI=2.4%), 3: CPI increase 2.4% and ≤5% increase, 4: >5% increase and ≤20% increase, 5: >20% increase

2.26 In addition, several of the facilities have other access issues. For example, at Abbey Rd the bay doors are only just wide enough for ambulances to fit through (side mirrors have to be folded inwards), there is a firehall between the facility at Pelham and the main access road, and the Niagara-on-the-Lake facility has access via Parks Canada land.

2.27 Generally, the nine owned facilities are in a better condition than the ten leased facilities, except for Fitch St and Glendale leased facilities. Abbey Rd and Niagara-on-the-Lake are in a particularly poor condition, with King St, Niagara Falls, St Paul Av, and Smithville also in a relatively poor condition.

2.28 Almost all the facilities in the Region have no spare capacity when comparing the number of ambulance bays and the number of peak ambulances from the planned deployments. Even when there appear to be spare bays (for example, where the capacity is greater than the peak ambulances), these are often being used to store spare ambulances (to help manage incidences of vehicle unavailability) or for other vehicles (for example, admin or supervisor vehicles).

2.29 This means that, under a traditional facilities model, it will not be possible to deploy additional resources when required without new or expanded facilities in the future. There is a particular concern for the Niagara Falls, Grimsby, and Lincoln municipalities as there is currently no spare capacity at any of the stations in these areas (Niagara Falls, St Paul Av, Grimsby, and Vineland). Pelham and Port Colborne municipalities also have no spare capacity.

2.30 Even if spare bays exist to deploy ambulances from in the future, there are several facilities that are already fully utilizing the existing crew quarter space: Abbey Rd, St Paul Av, Ontario St, Thorold, and Vineland. In addition, Abbey Rd, St Paul Av, and Vineland only have inventory storage space for janitorial items.

2.31 With inventory supplies needing to be delivered to 17 distinct facilities (excluding Glendale and Westwood Court) and three hospitals (excluding West Lincoln Memorial Hospital), significant logistics travel is generated. Maintaining the required supplies at every facility also leads to waste as a result of products expiring.

2.32 Of the nine owned facilities, only two (Fort Erie and Merrittville) have a high potential for expansion. The remaining facilities, including Grimsby and Port Colborne, have medium or low potential for expansion. While coverage analysis indicates that Ontario St and Linwell Rd in St Catharines are well located, there is limited scope to add ambulances in this area in the future under a traditional facilities model.

2.33 Ten out of 19 of the Region's EMS response facilities are leased, which leaves the Region open to inherent risk. The facility that houses administration, dispatch, dispatch training and quality assurance (QA) is also leased and due to expire in 2024.

2.34 With the exception of Fitch St, all leases are due to expire by 2025. If leases are renewed or renegotiated and have similar conditions to the existing leases, then six of the ten leases have no option for the Region to terminate (Abbey Rd, Glendale, King St, Niagara Falls, Vineland, and Westwood Court). In general, this gives the Region limited flexibility in the future to terminate if a better alternative location was found, while the landlord has the option to terminate the lease at their discretion.

2.35 For the Niagara-on-the-Lake facility, the municipality has already indicated that they would like EMS to vacate. Similarly, Niagara Falls will need to be vacated due to the future closure of the Niagara Health hospital site.

2.36 The facilities with the highest operating costs per square foot (based on 2022 data) are Abbey Rd and St Paul Av. The facilities with the highest annual rental costs per square foot (based on current rent) are Abbey Rd, Fitch St, and Vineland.

2.37 In addition, at Abbey Rd, St Paul Av and Vineland, the Region is responsible for all capital replacement costs.

3 PREDICTIVE MODELLING INTRODUCTION

ORH uses sophisticated predictive modelling tools that have been developed in-house to assist with the development of master plans for paramedic services.

ORH validated its EMS simulation model, AmbSim, against analyzed NEMS performance, utilization and hospital flows, which showed that the model replicated historical operations accurately and therefore was appropriate to use for different 'what if' modelling scenarios. A 2023 Base Position was then created to provide a basis for comparison with future scenarios.

Predictive Modelling Capabilities

Simulation

3.1 ORH has developed a sophisticated simulation model, AmbSim, for modelling the operations of emergency medical services. AmbSim is a discrete event simulation model that replicates the key characteristics of an emergency medical service and can be used to predict future behaviour under a variety of different scenarios when run by ORH's experienced modelling consultants.

3.2 AmbSim can be described as 'off-the-shelf', as it has been developed by ORH and is used both by ORH and our clients. It does, however, require customization to reflect the geography, demand and operations of the service in which it is to be used.

3.3 Once customized and validated, AmbSim can provide evidence-based answers to a wide range of 'what if' questions. The model can assess the impact of changes to several factors, such as station locations and resource deployments, dispatch protocols and resource use, or demand increases or decreases. AmbSim reports operational performance in terms of response times, resource workload and utilization. It can simulate multiple vehicle types and incident types with specified response rules.

Location Optimization

3.4 ORH can also utilize 'Auto Add' functionality within the Demand Coverage Model (DCM), a powerful model that evaluates response time coverage and optimizes the locations of emergency service resources. Auto Add uses a substitution algorithm to assess millions of options in minutes, quickly identifying optimum solutions. The optimization criteria are carefully agreed with the client to ensure that solutions meet an individual client's needs.

3.5 DCM is a flexible model, ideally suited to identifying the scope for operational efficiencies, improving service delivery, and optimizing the use of resources. Only travel time to incidents is accounted for in the optimization process; the exact impact of changing resource deployments within a changed station configuration is therefore fully evaluated in AmbSim to check that optimal locations deliver service improvements.

Predictive Model Setup and Base Position

3.6 A virtual replica of NEMS operations was created within AmbSim by populating inputs using parameters derived from the analysis referenced in Section 2. In addition to this data, ORH developed a detailed travel time model of the Region using commercially available data calibrated against information on journey times from activity data.

3.7 The model was validated by comparing a wide range of outputs from the model, such as response performance, vehicle workload (utilization) and hospital workload, to the corresponding analyzed figures for these factors based on actual data (see an examples in Figure **3-1** and Appendix **B**). The comparison of outputs, including others not listed here, showed that the model replicated historical operations accurately and therefore was appropriate to use for different 'what if' modelling scenarios.

3.8 The model was initially set up to reflect NEMS operations during the 2021 to 2022 sample period to provide a robust sample for model validation; however, it was then possible to switch to a more up-to-date Base Position for 2023.

3.9 In line with projections, demand was uplifted slightly in the model and the vehicle shift pattern was updated to reflect the latest 2023 position. In addition, the Fort Erie and Port Colborne Urgent Care Centres (UCCs) were permanently closed as EMS destinations. All other model parameters were assumed to remain at analyzed levels, although variations to this assumption have been tested through sensitivity modelling in Section 9.

3.10 In the Base Position, P1 8-minute response performance, when measured from time assigned, was 78.9%, just shy of the 80% target (see Figure **3-2**). P1 performance varies by municipality, with:

- Niagara Falls, Port Colborne, St Catharines, and Welland achieving over 80% in 8 minutes
- Fort Erie and Pelham achieving over 70% in 8 minutes
- Thorold achieving over 60% in 8 minutes
- Grimsby and Niagara-on-the-Lake achieving over 50% in 8 minutes
- Lincoln, Wainfleet and West Lincoln achieving under 50% in 8 minutes

Figure 3-1: Model Validation Example, Response Performance

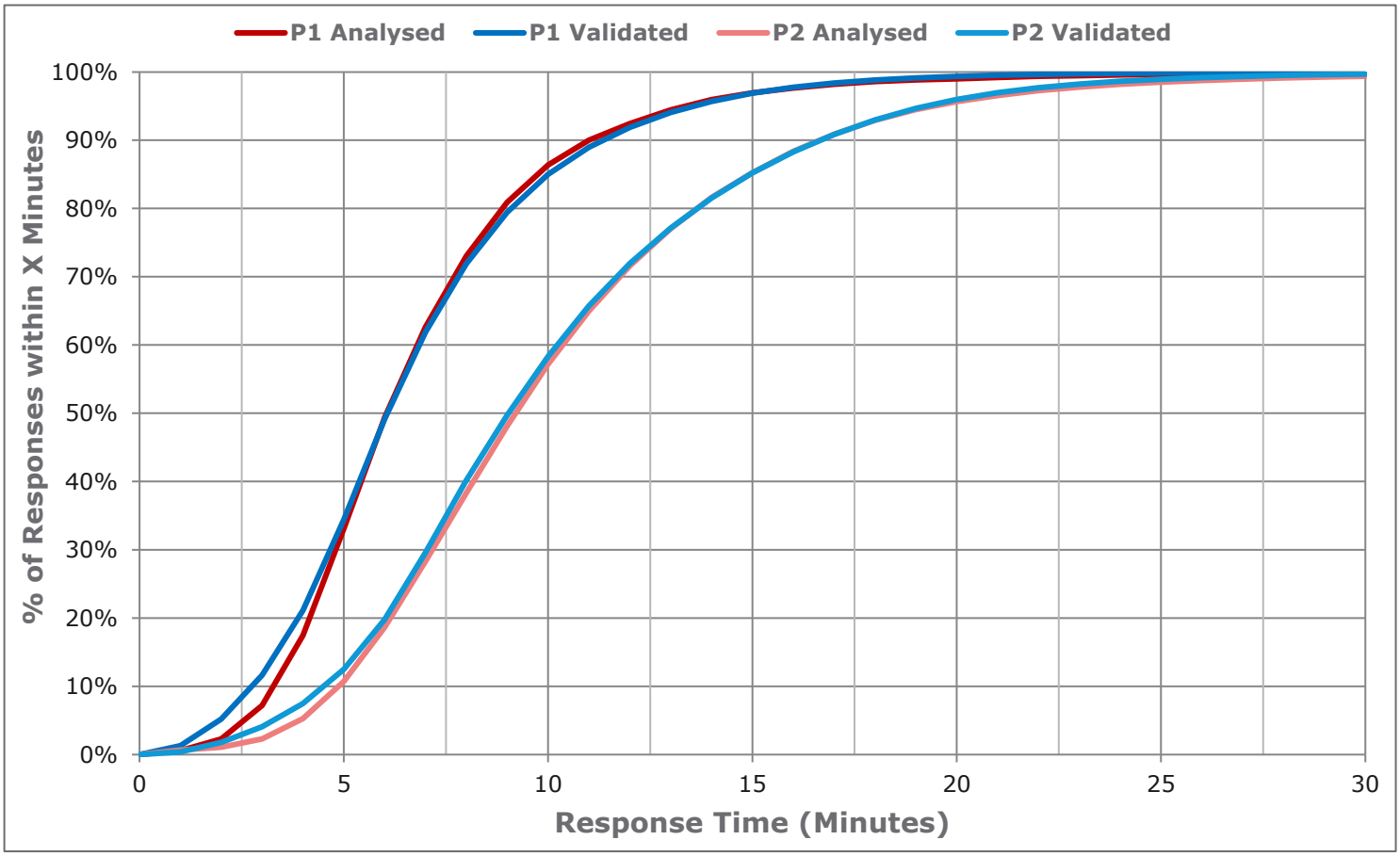


Figure 3-2: 2023 Base Position Response Performance

Municipality	P1 8-minute	P2 15-minute	P3 30-minute	P4 60-minute	P5 120-minute	P1 Mean	P2 Mean
Fort Erie	73.4%	86.8%	80.1%	81.1%	96.0%	07:04	09:49
Grimsby	58.4%	91.2%	80.0%	82.4%	94.2%	07:41	09:06
Lincoln	46.0%	76.7%	76.0%	88.7%	95.7%	08:55	11:25
Niagara Falls	81.5%	91.9%	80.2%	86.6%	97.1%	05:58	09:07
Niagara-on-the-Lake	51.8%	73.6%	76.5%	82.4%	95.6%	08:17	11:57
Pelham	72.1%	87.8%	83.6%	90.7%	98.5%	06:31	09:27
Port Colborne	82.1%	90.1%	81.7%	78.5%	97.4%	06:06	09:04
St Catharines	86.6%	92.3%	80.7%	85.8%	96.3%	05:36	09:02
Thorold	68.6%	88.3%	78.7%	89.7%	97.4%	07:01	10:05
Wainfleet	28.7%	70.8%	78.1%	98.5%	97.8%	10:43	12:31
Welland	93.7%	94.0%	86.2%	86.4%	97.3%	05:00	08:02
West Lincoln	49.1%	79.9%	81.9%	90.8%	99.5%	08:31	09:49
Overall	**78.9%**	**90.0%**	**80.8%**	**85.2%**	**96.6%**	**06:14**	**09:18**
Target	**80%**	**90%**	**90%**	**90%**	**90%**	**-**	**-**

4 THE 'DO NOTHING' SCENARIO

To understand facility and resource requirements for the next ten years, a demand projection was required. Demand projections were created using a population-based projection method with the underlying hypothesis that demand is strongly related to the population age profile.

Total population for Niagara Region is expected to reach 589,000 by 2033, an increase of 15% from 2023. The population is projected to continue to age during this period. For example, the percentage of the population aged 65 and over is 23% in 2023 compared to 26% in 2033.

The predicted increasing and ageing population, coupled with increasing demand rates, suggests that demand on NEMS will continue to increase significantly to 2033. P1 to P5 demand in Niagara Region is expected to increase by 40% between 2023 and 2033, from 179 incidents per day to 242 incidents per day. This equates to a 3% increase year-on-year Region-wide.

To highlight the impact on performance if no investment is made to NEMS frontline operations, the demand projections were applied to the Base Position in AmbSim. No other operational changes were made (a 'Do Nothing' scenario).

In this scenario, P1 8-minute response performance for Niagara Region falls significantly from 79% in 2023 to 71% in 2033, well below target levels.

Demand Projections

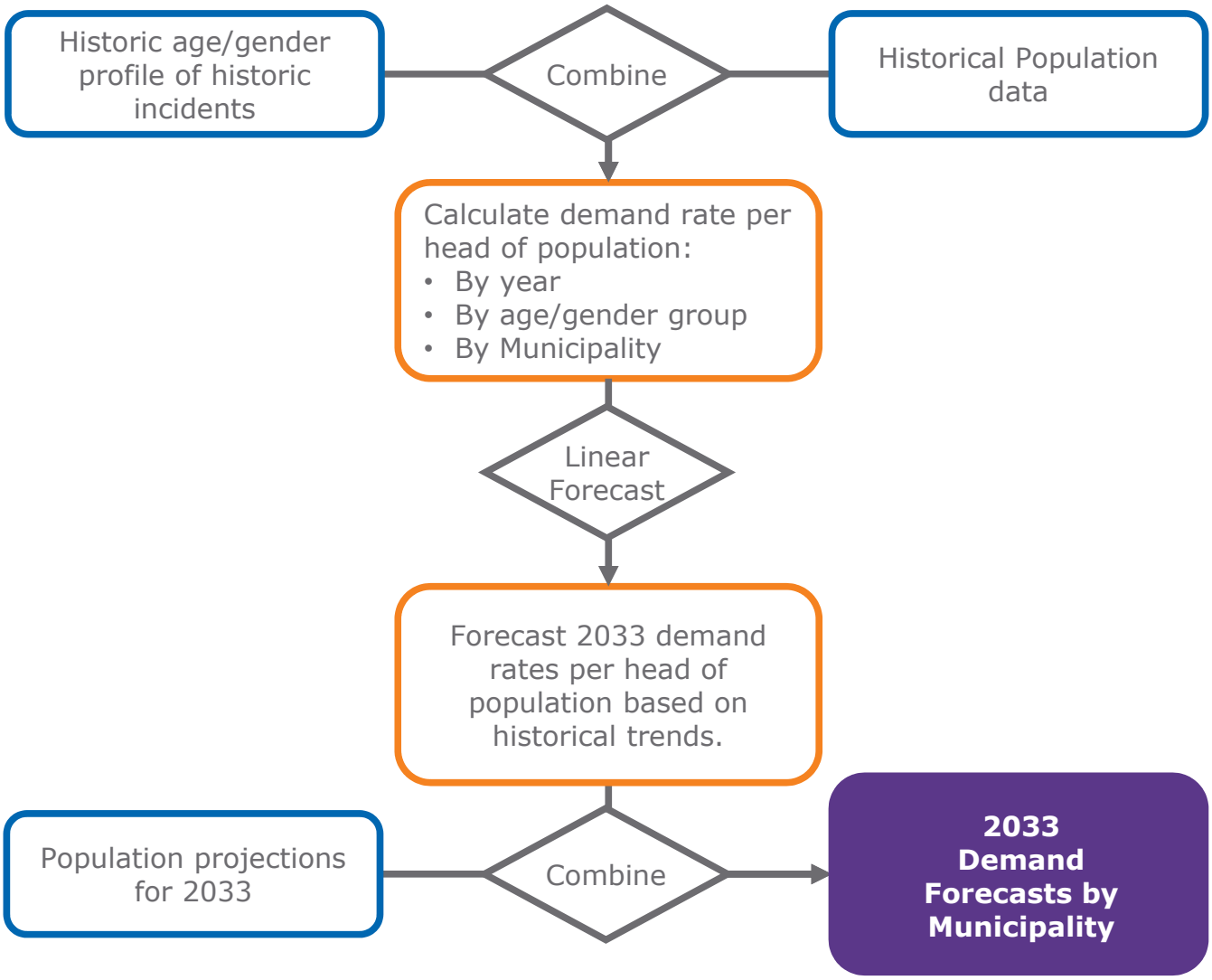
Methodology

4.1 To understand facility and resource requirements for the next ten years, a demand projection was required.

4.2 Demand projections were created using a population-based projection method (see Figure **4-1**). This method is based on the hypothesis that demand is strongly related to the population age profile and that there is an underlying trend for increased demand at all age groups due to unquantifiable factors such as the overall level of health provision and public expectation, which, it is assumed, will continue into the foreseeable future.

4.3 Historical population is compared with historical demand to calculate demand rates per head of population for different age and area combinations. These are then investigated to understand how they have changed over time and combined with future population projections to calculate expected future demand levels. This method captures three factors that impact demand:

Figure 4-1: Population-based Projection Method



- Changes to the population size
- Changes to the age profile of the population
- Changes to the base demand rates per head of population

Population

4.4 Population figures by year, age, and municipality for each year from 2013 to 2033 were required to feed into the demand projection calculation. ORH was provided with several datasets regarding the historical and projected population of Niagara Region (see Appendix **C1**); no single dataset contained every element required.

4.5 In agreement with the Steering Committee, the Ministry of Health (MoH) historical data was used for 2013 to 2021, and Ministry of Finance (MoF) projection data was used for 2022 to 2033. Given that the MoF data was only given for Niagara Region as a whole, the MoH data was used to generate assumptions for breaking down the data by municipality; it was assumed that each age group could be broken down by municipality according to the proportions observed from 2021. This was agreed to be a sensible approach given that the proportions had not changed significantly between 2013 and 2021.

4.6 Population in 2013 was around 447,000 across Niagara Region, increasing to 510,000 by 2023 (a 14% increase over 10 years), and to 589,000 by 2033 (a further 15% increase over 10 years). The population is projected to continue to age between 2023 and 2033 (see Figure **4-2**). For example, the percentage of the population aged 65 and over is 23% in 2023 compared to 26% in 2033.

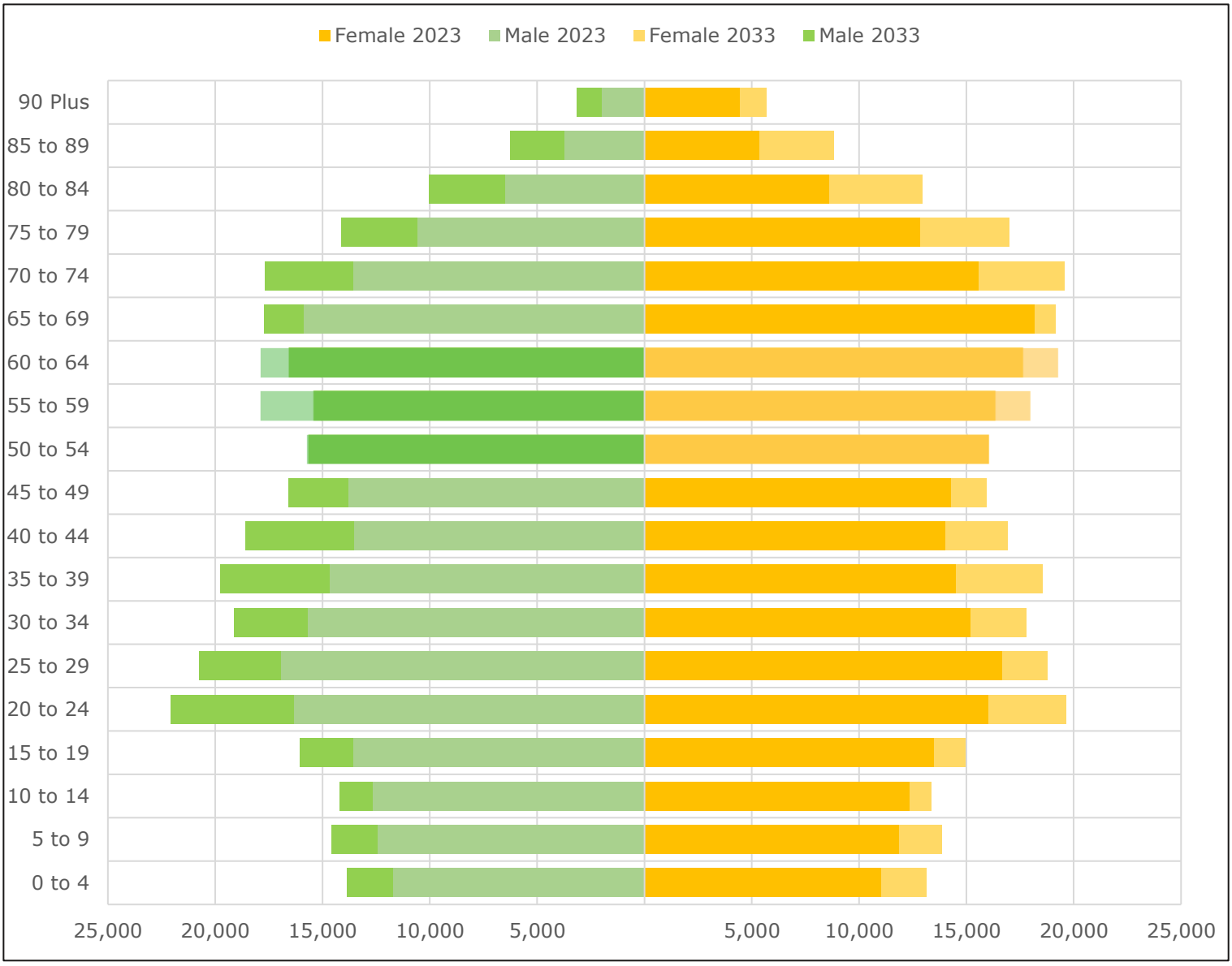
4.7 Traffic zone population projections were also supplied directly by Niagara Region for 2021 and 2031. The traffic zones sub-divide the municipalities, and this data gave further insight into which areas within each municipality were likely to grow the most over the next ten years (see Appendix **C2**).

Demand

4.8 Historical demand figures by year, age, and municipality for each year from 2013 to 2022 were also required to feed into the demand projection calculation. However, this could only be collected as far back as 2018.

4.9 There is a clear correlation between age and demand, with the older age groups generating the most incidents. As a result, when comparing historical population and historical demand, demand rates per 1,000 population are substantially higher for the '80+' age group than for other age groups (see Appendix **C3**). Demand rates in each age group have generally followed an upward trend and are therefore predicted to increase again between 2023 and 2033.

Figure 4-2: Population Pyramid, 2023 vs 2033



Year	Male	Female	Overall
2023	244,991	257,729	502,720
2033	292,263	296,255	588,518

4.10 The predicted increasing and ageing in population, coupled with increasing demand rates, suggests that demand on NEMS will continue to increase significantly to 2033. Although there was a slight dip in the number of incidents NEMS responded to in 2020 due to COVID-19, this is not expected to impact the onward projections.

4.11 P1 to P5 demand in Niagara Region is expected to increase by 40% between 2023 and 2033, from 179 incidents per day to 242 incidents per day (see Appendix **C4**). This equates to a 3% increase year-on-year Region-wide, with some variation by municipality.

4.12 The projected increases were first applied to each municipality as a whole, and then redistributed to align with the additional traffic zone projection profiles (see Figure **4-3**).

Response Performance Impacts

4.13 To provide meaningful context for future resource recommendations, it was important to model a 'do nothing' scenario through to 2033. This helps to highlight the impact on performance if no investment is made to NEMS frontline operations. The demand projections were therefore applied to the Base Position in AmbSim, and no other operational changes were made.

4.14 In this 'do nothing' scenario, P1 8-minute response performance for Niagara Region falls significantly from 79% in 2023 to 71% in 2033, well below the target of 80% (see Figure **4-4** and Appendix **C5**). Similarly, P2 15-minute response performance falls from 90% in 2023 to 79% in 2033. The lower priority categories fall even further.

4.15 Clearly there will be frontline resource investments required by 2033 to offset the demand increases and, at a minimum, maintain current response performance levels.

Figure 4-3: Demand Projection Distribution

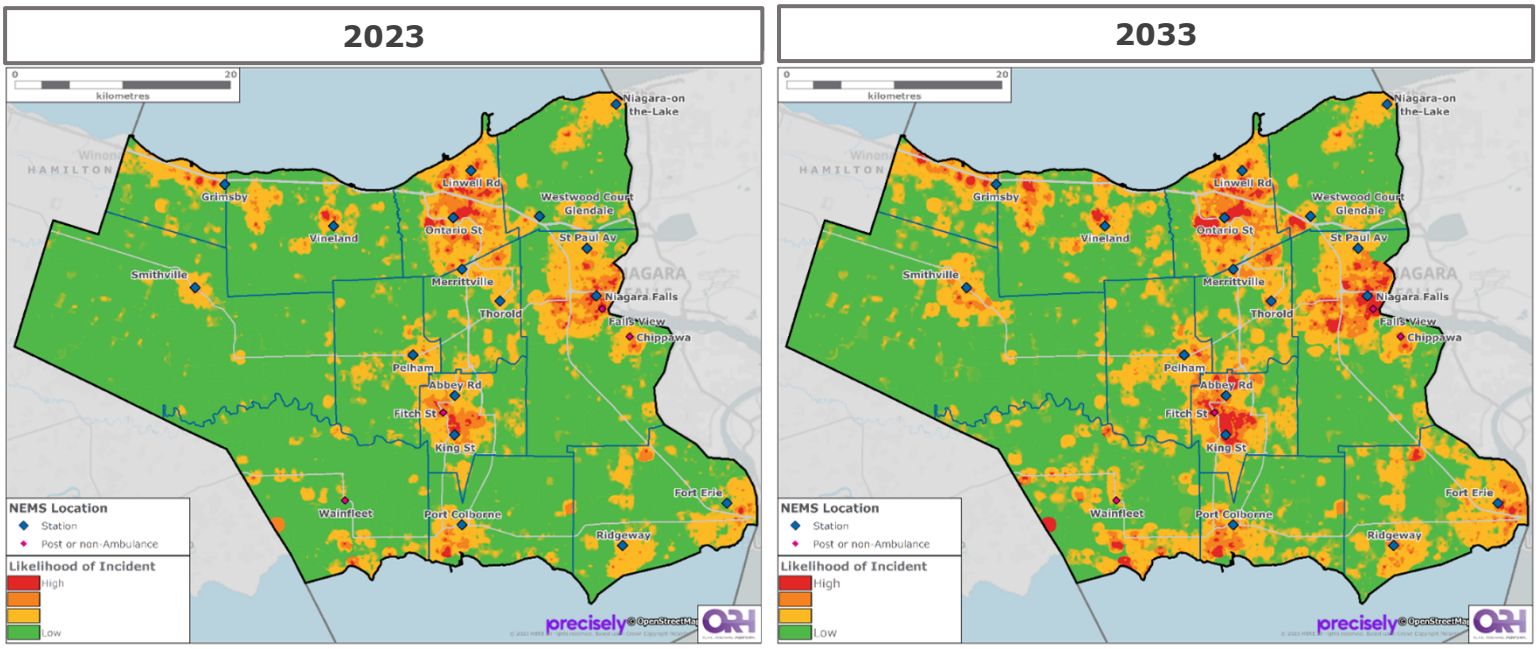
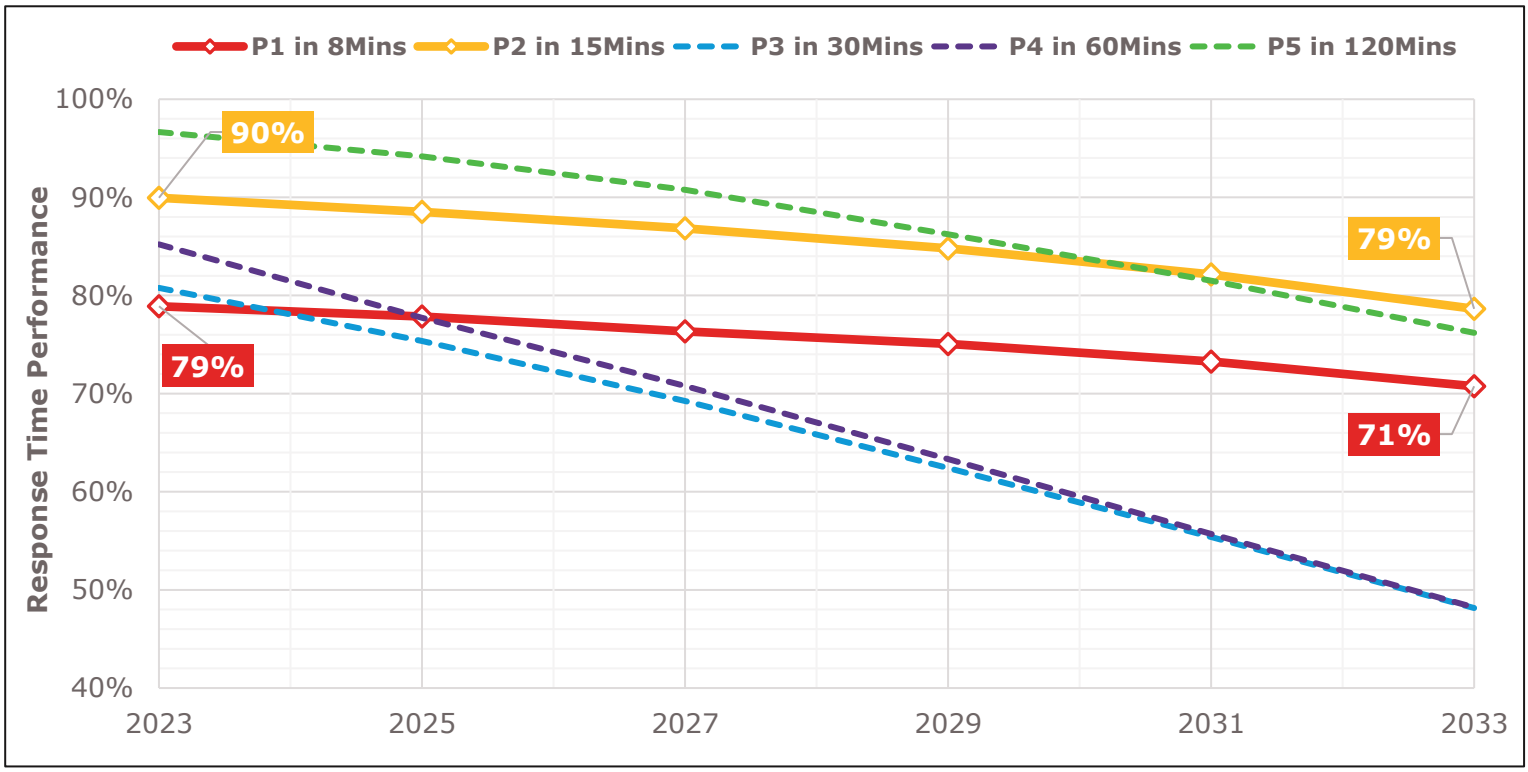


Figure 4-4: Performance under 'Do Nothing' Scenario



Measure	2023	2025	2027	2029	2031	2033
P1 in 8Mins	78.9%	77.9%	76.3%	75.1%	73.3%	70.8%
P2 in 15Mins	90.0%	88.5%	86.8%	84.8%	82.1%	78.6%
P3 in 30Mins	80.8%	75.4%	69.2%	62.4%	55.4%	48.2%
P4 in 60Mins	85.2%	77.7%	70.8%	63.3%	55.7%	48.2%
P5 in 120Mins	96.6%	94.2%	90.8%	86.2%	81.5%	76.2%

Note: Priority 1 to 2 response time performance measured from time first vehicle assigned, Priority 3 to 5 measured from time of call

5 IDENTIFYING OPTIMAL FACILITY LOCATIONS

The main aims of the facility optimization were to identify facility locations that would best improve equity of coverage across Niagara Region and/or resolve existing facility issues (for example, lack of spare capacity for the future, condition risks, or lease risks).

It is important to note that, whether facilities are to be utilized as traditional stations or as posts under a hub, spoke and post model, this does not meaningfully impact the location optimization process.

Following a highly iterative process, supported with input from the Steering Committee, the location optimization outcomes were as follows (see map in Figure **5-2**):

- Ten facilities were identified as being already optimally located, or not worth moving to a slightly more optimal location
- Two facilities were recommended to be moved to a new optimal location: Abbey Rd and Port Colborne
- Glendale and Niagara-on-the-Lake resources are recommended to be consolidated to a single facility near Virgil
- Grimsby resources are recommended to be divided between two new facilities, one in Beamsville and one more centrally located within Grimsby
- Niagara Falls/St Paul Av resources are recommended to be divided between three new facilities in the municipality

Approach

5.1 ORH's location optimization model was used to assess the configuration of existing station locations and identify how this could be improved currently and in the future. The main aims of the facility optimization were to identify facility locations that would best improve equity of coverage across Niagara Region and/or resolve existing facility issues (for example, lack of spare capacity for the future, condition risks, or lease risks).

5.2 Exploratory runs were undertaking using a 'blank canvas' optimization methodology, which involves identifying ideal locations taking no account of where current stations are located or other constraints. These runs were undertaken against a range of criteria, for example:

- Demand = P1, P2, or both P1 and P2
- Time Criteria = minimizing average travel time, or maximizing the percentage of incidents within X minutes travel time
- Number of Stations = initially keeping the same number of facilities, then testing areas that are identified with more or fewer facilities

5.3 The results of the exploratory scenarios were reviewed with the Steering Committee and used to identify targeted iterations of scenarios to test; initially, in the Base Position in AmbSim to understand the full response performance impacts (see examples of options considered in Figure **5-1**).

5.4 It is important to note that, whether facilities are to be utilized as traditional stations or as posts under a hub, spoke and post model, this does not meaningfully impact the location optimization process. The optimization process identifies suitable locations for crews to respond from, regardless of the type of location. The vehicle and capacity requirements, and response performance outcomes, of the differing facility models will be explored further in Sections 6 and 7.

Outcomes

5.5 Following this iterative process, the location optimization outcomes were as follows (see map in Figure **5-2**):

- Ten facilities were identified as being already optimally located, or not worth moving to a slightly more optimal location: Fort Erie, King St, Linwell Rd, Merrittville, Ontario St, Pelham, Ridgeway, Smithville, Thorold and Vineland
- Two facilities are recommended to be moved to a new optimal location: Abbey Rd and Port Colborne
- Glendale and Niagara-on-the-Lake resources are recommended to be consolidated to a single facility near Virgil (with MIH teams remaining at Westwood Court)
- Grimsby resources are recommended to be divided between two new facilities, one in Beamsville and one more centrally located within Grimsby
- Niagara Falls/St Paul Av resources are recommended to be divided between three new facilities in the municipality

5.6 Each of these outcomes are discussed in more detail below.

Figure 5-1: Examples of Exploratory Optimization Results

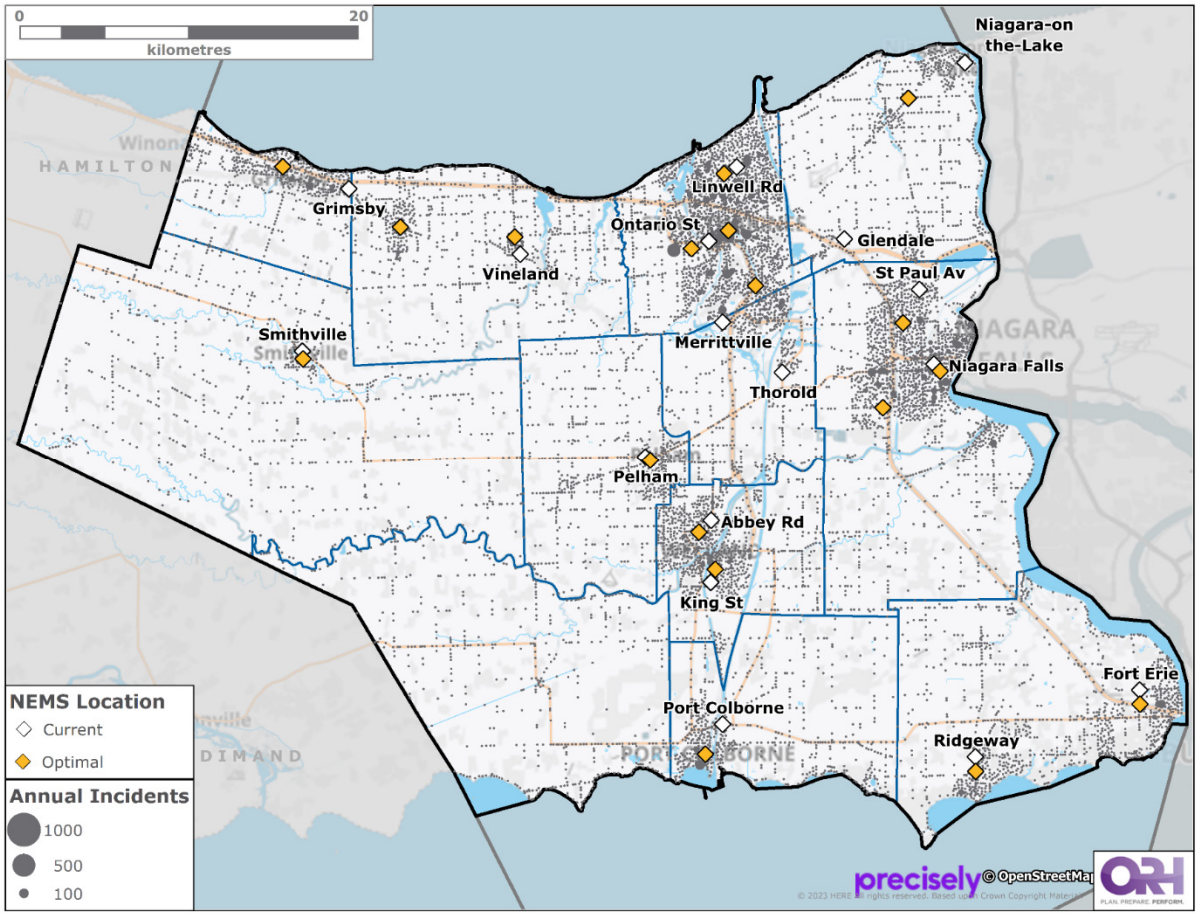
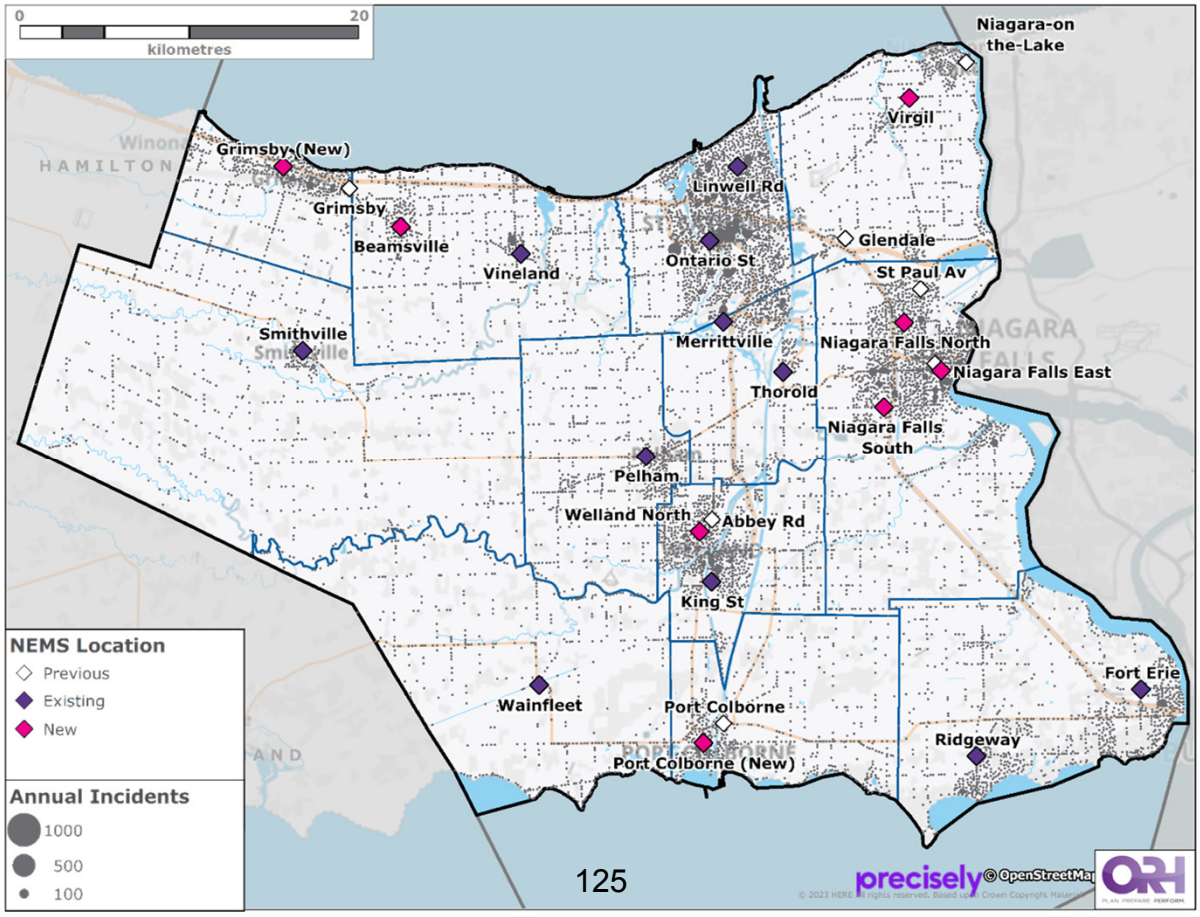


Figure 5-2: Recommended Facility Configuration



Niagara-on-the-Lake

5.7 A single optimal site was consistently found for Niagara-on-the-Lake, at approximately East & West Ln and Niagara Stone Rd. Modelling in AmbSim showed that there would be benefits to consolidating resources from both Niagara-on-the-Lake and Glendale at this site. The optimal location gives better coverage to Virgil while still providing good access to the old town.

5.8 In addition, the existing Niagara-on-the-Lake facility is leased and in poor condition, and the municipality would ideally like NEMS to vacate this site. If the Glendale resource was also consolidated at the optimal site, this would free up some additional space (possibly to be utilized by supervisors) at Westwood Court.

5.9 There may be land available to Niagara Region at Anderson Ln (approximately 3km northeast of the optimal site) that could be utilized for a new facility; this site has been tested as part of the sensitivity modelling scenarios covered in Section 9.

5.10 Some other potential sites, for example south of Virgil, were tested as an alternative to the optimal site, but were rejected as they led to poor performance outcomes.

Grimsby, Lincoln and West Lincoln

5.11 Optimal sites were found close to the existing Smithville and Vineland facilities, and testing within AmbSim found that the response performance improvements were not significant enough to warrant relocating either facility. While there are potential condition and capacity concerns at both sites, these are not as pressing as for some other facilities. The Vineland location is shared with Lincoln Fire Rescue, who may vacate the facility, giving EMS the potential opportunity to alleviate capacity issue here in the future.

5.12 The optimization results consistently proposed dividing the existing Grimsby into two facilities, one in Grimsby (at approximately Clarke St and Christie St) and another in Beamsville (at approximately King St and Ontario St). AmbSim modelling confirmed that there would be significant response performance improvements if a two-site configuration was utilized. There is already no spare bay capacity and the predictive modelling confirmed that it would be difficult to meaningfully improve response performance in Grimsby from the existing site alone, even if capacity issues were negated.

5.13 There may be land available to Niagara Region on Clarke St (approximately 1km east of the optimal site) that could be utilized for a new facility; the difference between this site and the optimal site has been tested as part of the sensitivity modelling scenarios covered in Section 9.

Niagara Falls

5.14 There is currently no spare bay capacity at either of the existing facilities in Niagara Falls. The Niagara Falls facility is leased and will need to be vacated when the hospital closes and moves to a new South Niagara Site. St Paul Av is leased and in poor condition with only a single bay and janitorial inventory space. It is therefore recommended that both these sites be closed by 2033.

5.15 Testing of alternative optimal two-, three-, and four-site configurations in this municipality indicated that the three-site configuration would be most favourable (the four-site configuration gave limited additional benefits). The three optimal sites were identified at approximately Thorold Stone Rd and Dorchester Rd ('Niagara Falls North'), Stanley Av and Ferry St ('Niagara Falls East'), and McLeod Rd and Montrose Rd ('Niagara Falls North').

5.16 There may be land available to Niagara Region at Kitchener St (approximately 1km northwest of the optimal Niagara Falls East site) that could be utilized for a new facility; this site has been tested as part of the sensitivity modelling scenarios covered in Section 9.

Pelham and Welland

5.17 Optimal sites were found close to the existing Pelham and King St facilities, and testing within AmbSim found that the response performance improvements were not significant enough to warrant relocating either facility. Pelham is in good condition and has medium potential for expansion if necessary, and King St currently has some potential spare capacity if the Superintendents could be deployed elsewhere (for example, at Fitch St or Wainfleet).

5.18 An optimal site (at approximately Thorold Rd and First Av) was also found close to Abbey Rd indicating that this facility is well located. However, there are other significant risks associated with this facility. For example, it is in poor condition, there are issues with the width of bay doors, and there is limited inventory space. It is therefore recommended that Abbey Rd facility be closed and relocated to this new site ('Welland North').

5.19 There may be land available to Niagara Region at Prince Charles Dr (approximately 1km west of the optimal site) that could be utilized for a new facility; this site has been tested as part of the sensitivity modelling scenarios covered in Section 9.

5.20 A further alternative one-site scenario was investigated for Welland, where King St and Abbey Rd resources could be consolidated a single central location. While this gave similar performance results as a two-site configuration, it was deemed infeasible due to the lack of available land near to the optimal single site.

Fort Erie and Port Colborne

5.21 Optimal sites were found fairly close to each of the existing Fort Erie, Port Colborne and Ridgeway facilities, and each were tested in AmbSim to understand the response performance improvements.

5.22 The most significant response performance improvement was found for the move to the Port Colborne optimal facility (at approximately Killaly St W and Fielden Av), which also provided some performance benefits for southeast Wainfleet. The existing facility has no spare bay capacity and no option for expansion and, although the site is owned, there are potential issues with other tenants. It is therefore recommended that this facility be relocated to the optimal site.

5.23 There were smaller response performance improvements for the Fort Erie and Ridgeway optimal locations. Given that both existing facilities are in good condition, it is not recommended that these are relocated. Additionally, Fort Erie has high potential for expansion if required. Ridgeway has limited potential for expansion, so could pose a capacity issue under a traditional facilities model in the future.

St Catharines and Thorold

5.24 The blank canvas configuration for St Catherines and Thorold initially indicated that a four-site configuration could be optimal, with a north, south, east and west facility all within St Catharines. However, there is understandably unlikely to be the appetite for a future facilities configuration that does not include a station in the Thorold municipality.

5.25 The existing Ontario St, Linwell Rd and Merrittville facilities are all owned and in good or fair condition. Additionally, Merrittville has high potential for expansion and Ontario St has medium potential for expansion. Linwell Rd has limited scope for expansion and Thorold has no spare bay capacity, so each could pose a capacity issue under a traditional facilities model in the future.

5.26 AmbSim was used to understand the response time impact of moving to the optimal sites identified versus retaining the existing facilities. There were only slight improvements in overall response performance from utilising the optimal sites (coupled with a reduction in Thorold); it was agreed that this didn't warrant relocating each of the facilities.

Wainfleet

5.27 There is currently no permanent NEMS facility in Wainfleet, and the optimization process did not identify a significant need to develop an ambulance facility here. However, Wainfleet Fire and Emergency Services are planning to vacate their Station 2 and pass responsibility for this facility to NEMS. The Wainfleet CP vehicle will therefore be able to permanently deploy from this location in future, rather than booking on at Fitch St.

6 IDENTIFYING AMBULANCE REQUIREMENTS

To identify future vehicle requirements, resources were added at the most appropriate facilities and times to improve performance in every municipality as much as possible against targets. This was initially carried out under a traditional facilities model, utilizing the recommended facilities identified in Section 5.

An increase of 1,764 weekly ambulance hours, from 4,704 in the 2023 Base Position to 6,468 in 2033, is recommended to improve performance in every municipality in 2033. This is equivalent to a 38% increase in resource hours, compared to the 40% increase projected in demand.

Crucially, these resources and facilities would allow the P1 8-minute response performance target of 80% to be to be exceeded in overall Niagara Region terms and in six municipalities. Furthermore, the remaining municipalities would either have maintained the same performance as recorded in the Base Position or have substantially improved.

The majority of the recommended resource investment would be required to offset the demand increases, even if the only criteria for response performance was to ensure no degradation from the Base Position.

If the 80% P1 performance target must be met in every municipality, then this is not possible without a further five new facilities and a particularly significant 70% increase in resource hours. In this scenario there would be cost inefficiencies in rural municipalities due to the low utilization of certain facilities and resources.

Improving Coverage in Every Municipality (Recommended)

6.1 The predictive model was used to determine the frontline shifts and ambulances that would be required by 2033 to offset the negative response performance impacts outlined under the 'do nothing' scenario.

6.2 This was initially carried out under a traditional facilities model, utilizing the recommended facilities identified in Section 5. This modelling exercise found that it would not be possible to achieve performance targets in 2033 utilizing only existing facilities as part of a traditional facilities model, due to the various capacity, condition and lease issues also outlined in the previous section.

6.3 To identify future vehicle requirements, resources were therefore added at the most appropriate facilities and times to improve performance in every municipality as much as possible against targets. However, it was recognized that in order for every municipality to achieve target performance levels a significant investment would be required, and certain resources would run inefficiently (that is, with very low utilization). Therefore, the requirement to meet targets in every municipality was relaxed for some municipalities where appropriate (this is explored more in the Meeting Targets in Every Municipality sub-section).

6.4 An increase of 1,764 weekly ambulance hours, from 4,704 in the 2023 Base Position to 6,468 in 2033, is recommended to improve performance in every municipality in 2033 (see Figure **6-1**). This is equivalent to a 38% increase in resource hours, compared to the 40% increase projected in demand.

6.5 An increase of 15 peak ambulances would be required, increasing from 34 peak ambulances in the Base Position to 49 peak ambulances (plus spares) by 2033.

6.6 Peak ambulances are a measure of the absolute minimum number of physical ambulances required to deploy the recommended shifts. For example, a day shift of 07:00 to 19:00 followed by a night shift of 19:00 to 07:00 technically only requires one physical ambulance under the optimistic assumption that neither shift overruns. Alternatively, a day shift of 07:00 to 19:00 along with a day shift of 08:00 to 20:00 would require a minimum of two physical ambulances for at least the 08:00 to 19:00 period.

6.7 Crucially, these resources and facilities would allow the P1 8-minute response performance target of 80%[3] to be exceeded in overall Niagara Region terms and in six municipalities (see Figure **6-2** and Appendix **D1**). Furthermore, the remaining municipalities would either have maintained the same performance as recorded in the Base Position or have substantially improved. Only two municipalities achieve lower than 70% P1 response performance, and both are higher than in the Base Position.

6.8 The majority of the recommended resource investment would be required to offset the demand increases, even if the only criteria for response performance was to ensure no degradation from the Base Position (this is explored more in the Minimum Requirements to Offset Demand sub-section).

6.9 Under a traditional model there will likely still be some capacity issues at the existing facilities that are recommended to be retained. Rather than expand or relocate these facilities, the capacity issues could be resolved by a hub, spoke and post model, and this will be explored in the next section.

[3] For succinctness, only the P1 response performance outcomes are discussed within the body of this report. However, all category targets were reported during the modelling process and reviewed by ORH consultants.

Figure 6-1: Resourcing Summary, Improving Coverage in Every Municipality

Weekly Ambulance Hours

Municipality	Base Position (2023)	Improving Coverage in Every Municipality (2033)	Difference to Base	Peak Ambulances
Fort Erie	588	756	168	7
Grimsby	252	504	252	4
Lincoln	168	420	252	3
Niagara Falls	756	924	168	6
Niagara-on-the-Lake	336	420	84	3
Pelham	336	420	84	3
Port Colborne	336	504	168	4
St Catharines	672	924	252	7
Thorold	672	756	84	6
Wainfleet	0	0	0	0
Welland	420	588	168	4
West Lincoln	168	252	84	2
Overall	**4,704**	**6,468**	**1,764**	**49**

See definition of peak ambulances given in paragraph 6.6.

Figure 6-2: Performance Summary, Improving Coverage in Every Municipality

P1 within 8 minutes

Municipality	Base Position (2023)	Do Nothing (2033)	Improving Coverage in Every Municipality (2033)	Difference to Base
Fort Erie	73.4%	58.6%	79.3%	5.9%
Grimsby	58.4%	44.8%	83.1%	24.8%
Lincoln	46.0%	44.5%	70.1%	24.1%
Niagara Falls	81.5%	74.5%	86.4%	4.9%
Niagara-on-the-Lake	51.8%	49.5%	80.5%	28.7%
Pelham	72.1%	56.6%	77.4%	5.3%
Port Colborne	82.1%	63.5%	86.7%	4.5%
St Catharines	86.6%	81.7%	90.1%	3.6%
Thorold	68.6%	55.7%	71.1%	2.5%
Wainfleet	28.7%	23.5%	37.4%	8.6%
Welland	93.7%	88.8%	94.0%	0.2%
West Lincoln	49.1%	39.0%	67.0%	17.9%
Overall	**78.9%**	**70.8%**	**84.7%**	**5.8%**

Below 80% | Below 70% | Below 70% **and** Degradation from Base Position

Alternative Scenarios

Minimum Requirements to Offset Demand

6.10 The predictive model was also used to understand the minimum level of frontline shifts and ambulances that would be required by 2033 to simply offset the demand increases and ensure that no municipality sees a degradation in response performance from current levels.

6.11 This was tested under a traditional facilities model, utilizing only existing facility locations to highlight the absolute minimum investment for comparison to the recommended resource position described above.

6.12 An increase of 1,092 weekly ambulance hours, from 4,704 in the 2023 Base Position to 5,796 in 2033, would be required to maintain Base Position performance in every municipality in 2033 (see Figure **6-3**). This is equivalent to a 23% increase in resource hours.

6.13 An increase of 8 peak ambulances would be required, increasing from 34 peak ambulances in the Base Position to 42 peak ambulances (plus spares) by 2033.

6.14 Using only existing facilities, it is not possible to maintain Base Position performance in Grimsby and Wainfleet due to the location of (or lack of) facilities in these municipalities. While Base Position performance can be maintained in every municipality, there is substantial disparity in performance across Niagara Region (see Appendix **D2**). For example, only four municipalities achieve the 80% P1 target while six achieve lower than 70% P1 response performance, including five achieving 60% or under.

6.15 Additionally, none of the existing facility condition or lease risks have been addressed. There would also be capacity issues at almost all stations, as there are very few spare bays to accommodate the additional ambulances.

Meeting Targets in Every Municipality

6.16 At the opposite end of the scale, the predictive model was used to understand the frontline shifts and vehicle requirements by 2033 to ensure that every single municipality could achieve the 80% P1 response performance target.

6.17 If the 80% P1 performance target must be met in every municipality, then this is not possible without a further five new facilities in addition to those recommended in Section 5 (13 new facilities in total). Of the five, one would be required in each of West Lincoln (at approximately Sixteen Rd and Caistor Centre Rd), Lincoln (at approximately Dustan St and Victoria Av N), and Thorold (at Maitland St and Queen St S), along with two in Wainfleet (at approximately Forks Rd and Victoria Av, and Lakeshore Rd and Bellview Rd).

Figure 6-3: Resourcing Summary, Minimum Requirement to Offset Demand

Weekly Ambulance Hours

Municipality	Base Position (2023)	Minimum Req. to Offset Demand (2033)	Difference to Base	Peak Ambulances
Fort Erie	588	588	0	5
Grimsby	252	504	252	4
Lincoln	168	168	0	1
Niagara Falls	756	924	168	6
Niagara-on-the-Lake	336	336	0	2
Pelham	336	420	84	3
Port Colborne	336	504	168	4
St Catharines	672	840	168	6
Thorold	672	756	84	6
Wainfleet	0	0	0	0
Welland	420	588	168	4
West Lincoln	168	168	0	1
Overall	**4,704**	**5,796**	**1,092**	**42**

See definition of peak ambulances given in paragraph 6.6.

Figure 6-4: Resourcing Summary, Meeting Targets in Every Municipality

Weekly Ambulance Hours

Municipality	Base Position (2023)	Meeting Targets in Every Municipality (2033)	Difference to Base	Peak Ambulances
Fort Erie	588	840	252	7
Grimsby	252	504	252	4
Lincoln	168	588	420	4
Niagara Falls	756	924	168	6
Niagara-on-the-Lake	336	420	84	3
Pelham	336	504	168	4
Port Colborne	336	504	168	4
St Catharines	672	924	252	7
Thorold	672	1176	504	9
Wainfleet	0	420	420	3
Welland	420	588	168	4
West Lincoln	168	588	420	4
Overall	**4,704**	**7,980**	**3,276**	**59**

See definition of peak ambulances given in paragraph 6.6.

6.18 Alongside these additional sites, a particularly significant increase of 3,276 weekly ambulance hours, from 4,704 in the 2023 Base Position to 7,980 in 2033, would be required in 2033 (see Figure **6-4**). This is equivalent to an 70% increase in resource hours and would also lead to cost inefficiencies in rural municipalities due to the low utilization of certain facilities and resources.

6.19 An increase of 25 peak ambulances would be required, increasing from 34 peak ambulances in the Base Position to 59 peak ambulances (plus spares) by 2033.

6.20 With the P1 8-minute response performance target of 80% met in every municipality, the overall Niagara Region P1 response performance would reach 89% in 8 minutes (see Appendix **D3**).

6.21 Furthermore, under a traditional model, there will still be capacity issues at some existing facilities unless they could be expanded.

7 HUB, SPOKE AND POST FACILITIES MODEL

Under a hub, spoke and post model, the recommended facilities within the configuration identified in Section 5 would operate as posts, reducing the footprint of future builds and alleviating the remaining capacity pressures at facilities to be retained. Ambulances associated with these facilities would book on and off at a primary location or locations.

A three-hub solution (one primary hub plus two spokes) was found to best meet the geographical coverage needs of Niagara Region (see Figure **7-1**). Potentially suitable land near to each of the optimal sites has already been identified. Based on the recommended vehicle requirements outlined in Section 6, this means that hub facilities would need to accommodate 22 peak ambulances plus spares at the Primary Hub, 9 peak ambulances plus spares at the North West Spoke, and 18 peak ambulances plus spares at South Spoke.

There is a small response performance improvement of moving to the hub, spoke and post facilities model when compared with the traditional facilities model. There are also many other potential benefits of a hub, spoke and post model that are not captured within response time metrics, for example:

- Minimized footprint for the post facilities, which are often in high-population areas where land prices are expensive; this also reduces energy requirements
- Centralized supplies, cleaning, and maintenance, reducing the logistics mileage impact, supplies wastage and vehicle downtime
- Focus for frontline staff on patient care rather than stocking and cleaning
- Increased equity in workload by shift, with opportunities for improved skills retention and reduced WSIB incidents
- Opportunity to consolidate administration, dispatch, dispatch training, and quality assurance functions alongside the primary hub

Identifying Hub Requirements

7.1 Although the modelling discussed in the report so far has focused on the requirements under a traditional facilities model, a key part of this review was to understand the facility requirements under an alternative hub, spoke and post model.

7.2 Under a hub, spoke and post model, the recommended facilities within the configuration identified in Section 5 would operate as posts, reducing the footprint of future builds and alleviating the remaining capacity pressures at facilities to be retained. Ambulances associated with these facilities would book on and off at a primary location or locations.

7.3 The process for identifying optimal hub locations to service the post facilities is very similar to the optimization process described in Section 5. However, this time the recommended vehicle requirements at each facility are used as 'demand'. Scenarios were tested to identify the best locations for minimizing the average travel time from potential hubs to post facilities, or maximizing the number that could be reached within 20 minutes; both criteria yielded similar results.

7.4 A three-hub solution (one primary hub plus two spokes) was found to best meet the geographical coverage needs of Niagara Region. For example, with only one or two hubs, many facilities would still need to operate as traditional facilities or accept a drive of over 20 minutes from hub to post. With four hubs, the fourth hub would only need to be a booking on location for one or two posts in the more isolated areas of the Region (for example, one hub to service the Fort Erie and Ridgeway facilities).

7.5 Several three-hub configurations were tested, with the optimal configuration comprising of one Primary Hub (at Westwood Court), one North West Spoke (at the optimal new Grimsby facility), and one South Spoke (at approximately Morris Rd and Netherby Rd). Each of the recommended facilities described in Section 5 can be associated with one of these three hubs (see Figure **7-1**).

7.6 Potentially suitable land has been identified near to each of the optimal sites:

- There is unused land adjacent to the existing Westwood Court facility that could be pursued to accommodate the Primary Hub
- The Region owns land at Clarke St (approximately 1km east of the optimal North West Spoke site) next to Niagara Regional Police
- The Region owns land at Montrose Rd and Netherby Rd (approximately 2.5km east of the optimal South Spoke site)

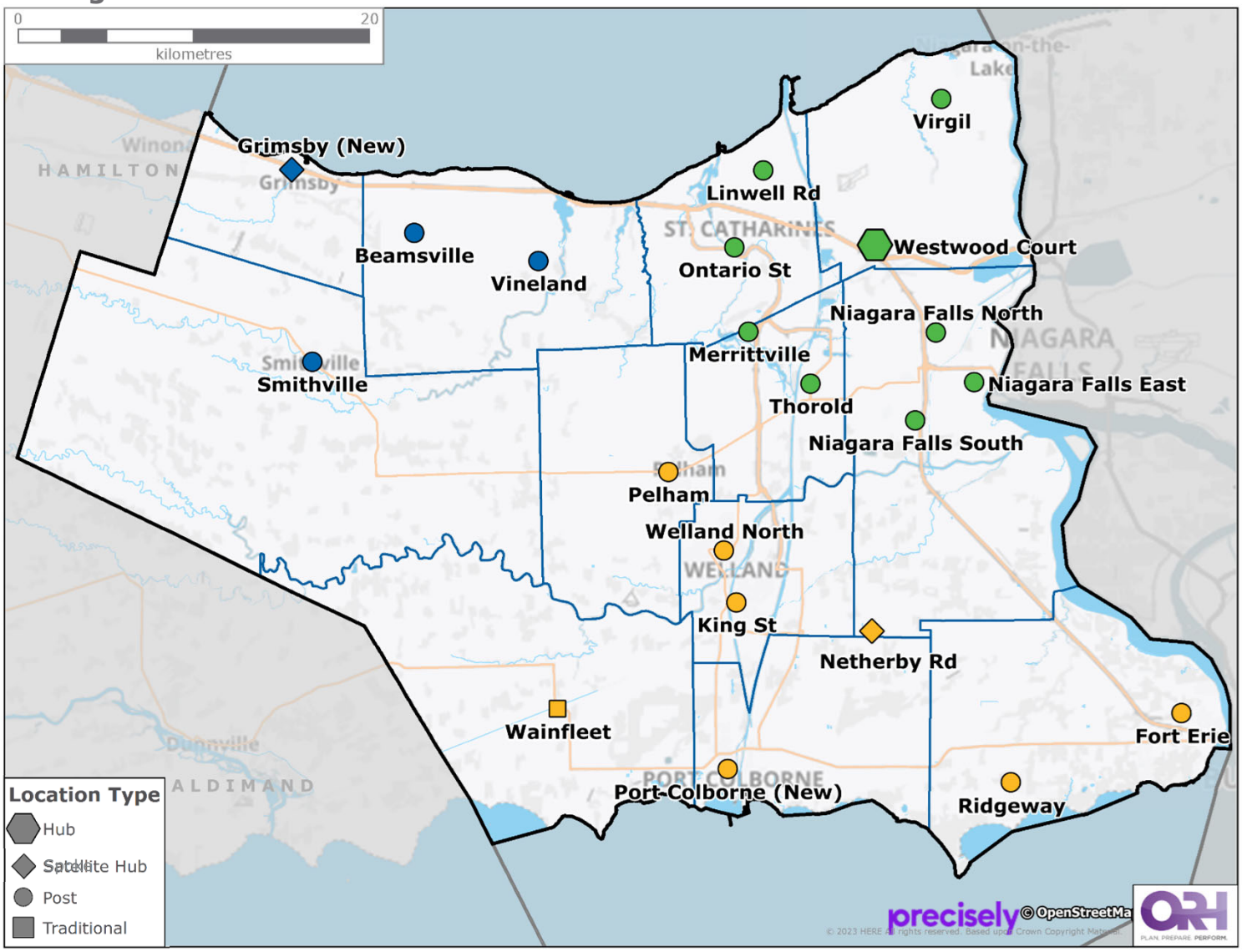
7.7 Based on the recommended vehicle requirements outlined in Section 6, this means that hub facilities would need to accommodate:

- Primary Hub = 22 peak ambulance[4]s plus spares
- North West Spoke = 9 peak ambulances plus spares
- South Spoke = 18 peak ambulances plus spares

[4] See definition of peak ambulances in paragraph 6.6.

Figure 7-1: Hub Requirements

Configuration



Drive Times

North East Hub	
Post	Drive Time
Linwell Rd	13
Merrittville	15
Niagara Falls East	15
Niagara Falls North	10
Niagara Falls South	15
Ontario St	14
Thorold	14
Virgil	13

South Spoke	
Post	Drive Time
Pelham	21
King St	14
Welland North	11
Fort Erie	18
Ridgeway	15
Port Colborne (New)	13

North West Spoke	
Post	Drive Time
Beamsville	11
Grimsby (New)	0
Smithville	14
Vineland	13

Impacts of Hub Model

7.8 The recommended facilities and ambulances from Sections 5 and 6, together with the hub and spoke reporting facilities from the previous sub-section, were then tested within the predictive model. The following assumptions were made when setting up the hub, spoke and post system:

- A dynamic system is implemented whereby ambulances will move to cover the highest priority vacancies at a post, within the vehicle's hub or spoke grouping, whenever a vehicle becomes unavailable
- Crews are usually unavailable for 15 minutes at the start of their shift for vehicle checks; it is assumed that this can be conservatively reduced to 10 minutes due to centralized cleaning and stocking
- Crews can take meal breaks at any hub, spoke or post
- MIH teams continue to operate as usual from Westwood Court or Fitch St

7.9 There is a small response performance improvement of moving to the hub, spoke and post facilities model when compared with the traditional facilities model (see Figure **7-2**). However, it should be cautioned that, in reality, performance benefits are often only seen when a hub is operating extremely efficiently.

7.10 There are also many other potential benefits of a hub, spoke and post model that are not captured within response time metrics. A comparison of the vehicle and facility requirements for a traditional or a hub, spoke and post model is in Figure **7-3**. Only seven new posts are required, compared with eight new traditional facilities, as one of the original post facilities is co-located with the North West Spoke.

7.11 Under a traditional facilities model, even with the recommended facilities configuration, there would be capacity issues at the remaining retained facilities given the need to accommodate frontline ambulances and spare ambulances.

7.12 Under a hub, spoke and post model, the footprint of posts is anticipated to be much smaller than a traditional station, even if the intention is to deploy a similar number of vehicles to each area. This is because they will not necessarily need space for supplies and staff facilities, except for a small lounge and washroom. The reduced footprint also reduces energy requirements.

7.13 Many of the existing and recommended facilities are in high-demand, high-population areas where land prices are expensive; minimizing the footprint of sites in these areas is an important consideration for the overall cost envelope comparison. Putting posts in these locations as opposed to traditional stations should create reductions in capital and operating expenditure, as well as having shorter construction timescales.

Figure 7-2: Hub, Spoke and Post P1 Response Performance

P1 within 8 minutes

Municipality	Base Position (2023)	Traditional Facilities Model (2033)	Hub, Spoke & Post Facilities Model (2033)	Difference to Traditional
Fort Erie	73.4%	79.3%	75.5%	-3.8%
Grimsby	58.4%	83.1%	78.3%	-4.9%
Lincoln	46.0%	70.1%	75.9%	5.8%
Niagara Falls	81.5%	86.4%	91.9%	5.4%
Niagara-on-the-Lake	51.8%	80.5%	80.9%	0.5%
Pelham	72.1%	77.4%	80.8%	3.5%
Port Colborne	82.1%	86.7%	88.9%	2.2%
St Catharines	86.6%	90.1%	93.8%	3.6%
Thorold	68.6%	71.1%	77.3%	6.2%
Wainfleet	28.7%	37.4%	39.0%	1.7%
Welland	93.7%	94.0%	96.9%	2.9%
West Lincoln	49.1%	67.0%	68.7%	1.7%
Overall	**78.9%**	**84.7%**	**88.1%**	**3.3%**

Below 80% | Below 70% | Below 70% **and** Degradation from Base Position

Figure 7-3: Comparison of Facility Models

Traditional Facilities Model

- Additional 5 x 24/7 shifts and 11 x 12/7 ambulance shifts required (38% increase)
- Additional 21 ambulances required (including 30% spares required at municipality level)
- Retain 10 existing facilities, but at least 4 would require expansion including 2 that have low potential for expansion
- No spare capacity at existing facilities
- Develop 8 new traditional facilities: at minimum 1 x 1-bay, 3 x 2-bay, 2 x 3-bay and 2 x 4-bay (need to be larger than this to accommodate spares)
- No hub requirements
- No resilience for beyond 10 years without new traditional facilities or further expansions

Hub, Spoke & Post Facilities Model

- Same shift requirements as Traditional Facilities Model
- Additional 18 ambulances required (including 30% spares required at hub level)
- Retain 10 existing facilities and use as posts, all requiring same or smaller footprint than existing facility
- Spare capacity only needs addressing at hubs rather than post facilities
- Develop 7 new posts facilities: 2 x 1-bay, 5 x 2-bay (noting that 2-bay post will have smaller footprint than 2-bay traditional facility)
- Develop 3 new hub facilities: Primary Hub, North West Spoke and South Spoke
- Easier to build new posts if required beyond the 10-year horizon

7.14 It is anticipated that spokes would operate like large traditional facilities. They should have adequate bays for vehicles and spares to be housed indoors, along with storage for supplies, and crew rest and work areas.

7.15 As well as providing adequate vehicle housing to supply its associated posts, the primary hub would act as a central logistics and supplies department for the Region. It is anticipated that vehicle maintenance and deep cleaning will take place at the primary hub.

7.16 With the complementary spokes, logistics travel relating to delivery of supplies would be significantly reduced; deliveries will only be required to the two spokes and the hospitals, instead of to each of the 18 distinct facilities recommended by 2033. This increases the life cycle of logistics vehicles, saves logistics staff time which can be redeployed to other appropriate tasks, and will lead to environmental impact efficiencies.

7.17 The current administration, dispatch, dispatch training, and quality assurance facility at Lampman Court is already fully utilized and is currently leased, posing a risk to the Region should alternative accommodation or expansion in the future be required at short notice. It would therefore be advantageous to consolidate these functions, and alongside the primary hub, enabling NEMS to deliver a highly cohesive service across frontline, support, logistics, QA, and dispatch staff.

7.18 Ownership of land and infrastructure has clear benefits over leasing as this will provide more flexibility in terms of construction and expansion options and, in total cost terms, should be cheaper long term without a landlord requiring profit. However, there are potential disadvantages that need considering, such as the possible difficulty in procuring sites, and economic climates affecting the life-cycle cost of land and buildings.

7.19 It is anticipated that larger hub locations will have greater operating costs but, given the centralization of services, this could be offset by lower costs at posts compared to traditional stations. Post configurations and layouts can be standardized more easily than for traditional stations, given the lack of ancillary function requirements, potentially allowing for greater economies of scale in procurement and construction.

7.20 An inherent advantage of a hub, spoke and post model is that logistics operations, maintenance, restocking and storage can be centralized within larger hub locations, ensuring greater efficiency given a larger quantum of resourcing. The benefits of scale can also be particularly realized with a central pool of spares. Inventory and supply chain management should be improved in a hub, spoke and post model, leading to decreased wastage.

7.21 Within a traditional model, minor and major vehicle cleans will need to be undertaken within a vehicle's daily cycle, often impacting productivity at shift start and end times. It is possible within hub, spoke and post models to introduce 'ambulance vehicle preparation', meaning that dedicated staff prepare ambulances at hub locations and thus crews have ready-prepared ambulances at their shift start. Frontline staff can therefore focus on patient care rather than on stocking and cleaning.

7.22 The advantages of dynamically deploying ambulances to posts includes an increased balance of coverage which should result in improvements to response performance. With ambulances flowing between sites as necessary, there should also be increased equity in workload by shift in the system, in contrast to wider variation within the traditional model. This could potentially provide a better balance of staff working time, leading to better opportunities for skill retention and reduced WSIB incidents, and improve wellbeing and morale.

7.23 Assuming supervisors are based at each hub and spoke, frontline staff will have much greater visibility of, and access to, their support staff. There will also be better and more equal access to crew quarters amenities, the quality of which currently vary wildly across the existing facilities.

7.24 A potential downside of a hub, spoke and post system is that staff may feel that an increased amount of their time is spent travelling, either to start their shift or within the shift itself. However, it should be noted that this is also reported in a traditional model where standby moves between stations occur. Travel between hubs and posts within the shift would be reduced if there are facilities to take rest breaks at every post.

8 RECOMMENDED TRAJECTORY

8.1 The recommended facility and ambulance requirements are suggested to be introduced over the next ten years according to the trajectory outlined in Figure **8-1**. This includes:

- Seven new posts
- A Primary Hub and two complementary Spokes
- A 38% increase in weekly ambulance hours
- An additional 18 physical ambulances (including 3 spares)

8.2 The process for determining an appropriate trajectory aimed to address high risk facilities as quickly as possible. However, the trajectory also needed to reflect budget cycles, follow a sensible construction schedule, stagger ambulance increases so that the financial impacts are as evenly spread across the ten years as possible, and balance this with the need to improve performance.

8.3 Until the Primary Hub and complementary Spokes are fully operational, there are some restrictions on where ambulances can be added. This is because, in the interim, there is limited spare capacity at retained facilities and any new facilities will be built as posts (that is, with a smaller footprint than a traditional facility and without the full capabilities of book-on location).

8.4 There will therefore need to be some temporary arrangements made to accommodate new shifts. For example, in 2027, both the shifts associated with the new Niagara Falls and Niagara-on-the-Lake posts, and the additional shifts recommended in Niagara Falls and St Catharines will need to temporarily forward deploy from Westwood Court.

8.5 In particular, this means that, until the South Spoke is fully operational in 2032, there is very limited capacity for adding ambulances to Pelham, Welland, Port Colborne and Fort Erie.

8.6 A summary of weekly ambulance hours added in each year, for each hub or spoke area, is given in Appendix **E1**. The P1 8-minute response performance in each year, along with the alternative Do Nothing performance, is given in Appendix **E2**.

Figure 8-1: Recommended Trajectory Implementation

Year	Facilities Opened			Facilities Closed	Ambulance Requirements			Notes
	1-bay Post	2-bay Post	Hub		Shifts		Peak Ambulances	
2025	*None*	*None*	*None*	*None*	Ontario St Smithville Fort Erie	24/7 12/7 12/7	1 1 1	No space for any spare vehicles at Smithville, Fort Erie or Ontario St
2026	*None*	*None*	*None*	*None*	Abbey Rd Niagara-on-the-Lake	12/7 12/7	1 1	No space for any spare vehicles at Abbey Rd or NOTL
2027	Niagara Falls North* Virgil*	Niagara Falls East*	*None*	Niagara Falls St Paul Av Niagara-on–the-Lake	Niagara Falls East* Linwell Rd*	12/7 12/7	1 1	*Shifts associated with the opened posts and the additional Linwell Rd shift will now forward deploy from Westwood Court as a temporary hub. Glendale technically won't close, but shifts will forward deploy to Virgil
2028	*None*	Welland North*	North West Spoke	Abbey Rd	North West Spoke Welland North*	12/7 + 12/7 (Night) 12/7 (Night)	1 0	North West Spoke will open as a fully operational spoke, with Grimsby, Smithville and Vineland used as posts. *Shifts associated with the Welland North post will forward deploy from King St temporarily, supervisors will need to be temporarily relocated (Fitch St?)
2029	Niagara Falls South*	*None*	*None*	*None*	Merrittville* North West Spoke	12/7 24/7	1 1	*Shifts associated with the Niagara Falls South post and the additional Merrittville shift will forward deploy from Westwood Court as a temporary hub
2030	*None*	*None*	Primary Hub	Glendale	Primary Hub	12/7 (Night)	0	Primary Hub will open as a fully operational hub, with Niagara Falls, NOTL, St Catharines and Thorold facilities all used as posts
2031	*None*	Beamsville	*None*	Grimsby	South Spoke	12/7	1	
2032	*None*	Port Colborne (New)	South Spoke	Port Colborne	South Spoke	24/7	1	South Spoke will open as a fully operational spoke, with Fort Erie, Pelham, Port Colborne and Welland facilities all used as posts
2033	*None*	*None*	*None*	*None*	North West Spoke South Spoke	12/7 2 x 12/7	1 2	

9 SENSITIVITY MODELLING

Sensitivity modelling was also undertaken to test assumptions about parameters incorporated into the core modelling scenarios, including:

- Building optimal sites at potential alternative locations
- Opening the new South Niagara Site hospital
- Variations to time at hospital
- Variations to demand projections

These scenarios were tested in the 2033 position with the recommended facilities and ambulances, under a hub, spoke and post model. The response performance impacts, and resulting resourcing changes to offset any of these impacts, are given in Figure **9-1**.

The response performance impacts were generally negligible when moving each of the optimal sites to potential alternative locations, meaning that the alternative locations would be appropriate options for the future.

Testing Locations at Available Land

9.1 In order to determine facility requirements for the future, ORH's models were used to identify the mathematically optimal facility locations. However, it is accepted that land may not be available at the exact optimal site in each case.

9.2 Through the Steering Committee (including Real Estate representatives), alternative options for some of the recommended facilities were put forward for testing, including:

- Anderson Ln instead of the optimal Virgil site (approximately 3km northeast of the optimal site)
- Prince Charles Dr instead of the optimal Welland North site (approximately 1km west of the optimal site)
- Kitchener St instead of the optimal Niagara Falls East site (approximately 1km northwest of the optimal site)
- Clarke St next to the Niagara Regional Police building instead of the optimal Grimsby (New) site / North West Spoke (approximately 1km east of the optimal site)
- Montrose Rd and Netherby Rd instead of the optimal South Spoke (approximately 2.5km east of the optimal site)

Figure 9-1: Sensitivity Modelling Summary

Response Performance Impacts under Changes

P1 within 8 minutes **Differences compared to Core Scenario**

Municipality	2033 Recommended Hub, Spoke and Post Scenario	New South Niagara Site opens and Niagara General closes		Changes to Time at Hospital		Differing Demand Projection	
		Welland Site stays open	Welland Site Closes	2018-19 Average	2022 Average	Subtract 10% from Uplift	Add to 10% Uplift
Fort Erie	75.5%	-0.7%	-4.9%	3.6%	-3.4%	2.6%	-3.4%
Grimsby	78.3%	0.0%	0.0%	0.2%	0.0%	0.1%	0.0%
Lincoln	75.9%	-0.4%	-0.4%	1.3%	-0.9%	0.5%	-0.6%
Niagara Falls	91.9%	-1.7%	-1.8%	2.0%	-1.5%	1.2%	-1.4%
Niagara-on-the-Lake	80.9%	-3.2%	-4.2%	4.7%	-3.6%	3.4%	-4.0%
Pelham	80.8%	-0.3%	-5.4%	3.1%	-2.8%	1.6%	-2.6%
Port Colborne	88.9%	-0.3%	-5.0%	2.3%	-1.9%	1.6%	-1.8%
St Catharines	93.8%	-0.7%	-0.9%	1.1%	-0.7%	0.5%	-0.5%
Thorold	77.3%	-1.3%	-1.5%	3.5%	-2.6%	2.0%	-2.0%
Wainfleet	39.0%	-0.1%	-1.6%	0.8%	-1.1%	0.8%	-1.1%
Welland	96.9%	0.0%	-1.4%	0.6%	-0.5%	0.4%	-0.4%
West Lincoln	68.7%	-0.2%	0.1%	1.0%	-0.7%	0.6%	-1.1%
Overall	**88.1%**	**-0.9%**	**-1.7%**	**1.6%**	**-1.3%**	**0.9%**	**-1.1%**

Resourcing Changes to Offset Impact

Weekly Ambulance Hours **Differences compared to Core Scenario**

Base	2033 Recommended Hub, Spoke and Post Scenario	New South Niagara Site opens and Niagara General closes		Changes to Time at Hospital		Differing Demand Projection	
		Welland Site stays open	Welland Site Closes	2018-19 Average	2022 Average	Subtract 10% from Uplift	Add to 10% Uplift
Primary Hub	3,024	168	168	-252	168	-168	168
South Spoke	2,268	0	336	-168	168	-84	84
North West Spoke	1,176	0	0	-84	0	0	0
Total	**6,468**	**168**	**504**	**-504**	**336**	**-252**	**252**

9.3 Sensitivity modelling scenarios were undertaken which involved moving each optimal site to its corresponding alternative location and reviewing the response performance impacts (see Appendix **F**). However, as the final two alternative locations were already built into the 2033 recommended hub, spoke and post scenario, the sensitivity modelling instead tested moving the alternative locations back to their optimal sites.

9.4 In each case, the response performance impacts were generally negligible, meaning that the alternative locations would be appropriate options for the future.

9.5 The largest impact was seen in moving the alternative Grimsby (New) / North West Spoke back to the optimal location at approximately Clarke St and Christie St, where the optimal site gives a 6.7 percentage point increase in P1 8-minute response performance over the alternative. However, even with the alternative site, P1 8-mintue response performance is still close to the 80% target and significantly improved over the Base Position.

South Niagara Site

9.6 It is anticipated that a new South Niagara Site hospital facility will open towards the end of the ten-year horizon of this review. At this point the Niagara Falls Site hospital facility will close. It is not yet known if the Welland Site hospital facility will close, or, if it remains open, what functions it will retain.

9.7 Sensitivity modelling was therefore completed to understand the potential response performance impacts of this hospital reconfiguration. Several assumptions were agreed with the Steering Committee:

- The new South Niagara Site would have similar offload delays to the St Catharines Site (the most pessimistic option)
- There would be no significant changes to hospital destination policies, except where these are based on the patient's proximity to destination hospital
- South Niagara Site will send and receive the same number of inter-facility transfers to and from each other facility as the Niagara Falls Site

9.8 Given the uncertainty regarding the Welland Site, two scenarios were tested either with Welland Site remaining open or with it closing entirely. In the scenarios where the Welland Site is closed, it is assumed that inter-facility transfers between it and other hospitals would instead go to and from the South Niagara Site.

9.9 In both scenarios, P1 8-minute response performance gets slightly worse across Niagara Region; 0.9 percentage points worse when the Welland Site remains open or 1.7 percentage points worse when the Welland Site closes. When Welland Site remains open, the most affected municipalities are Niagara Falls, Niagara-on-the-Lake, and Thorold as the ambulances transporting patients in some parts of these areas will typically now have to travel further to their destination hospital and spend longer at hospital with the patient. When Welland Site closes, Fort Erie, Pelham and Port Colborne municipalities are also impacted more severely.

9.10 To offset the worsened response performance, it is recommended that an additional 168 weekly ambulance hours be added to the Primary Hub by 2033. If Welland Site closes, then a further 336 weekly ambulance hours should be added to the South Spoke by 2033.

Variations to Time at Hospital

9.11 The core modelling scenarios for 2033 assumed there would be no changes to the call components incorporated into the Base Position. The call component inputs in the Base Position were based on 2021 and 2022 data.

9.12 As discussed in Section 2, the time at hospital call component varied significantly over the full five-year sample period. For example, the average time at hospital was:

- 64 minutes for 2018 and 2019
- 78 minutes for 2021 and 2022 (used in the Base Position)
- 86 minutes for 2022 only

9.13 Sensitivity modelling was therefore undertaken to understand the response performance impacts of a more optimistic position (reducing the average to 64 minutes) and a more pessimistic position (increasing the average to 86 minutes).

9.14 In the optimistic scenario, P1 8-minute response performance increases by 1.6 percentage points. Comparatively, in the pessimistic scenario, P1 8-minute response performance reduces by 1.3 percentage points.

9.15 This therefore means that a saving of 504 weekly ambulance hours by 2033 could be made under the optimistic scenario, with the remaining hours equivalent to a 27% total increase above the Base Position. Under the pessimistic scenario, a further increase of 336 weekly ambulance hours by 2033 would be required, equivalent to a 45% total increase above the Base Position.

Variations to Demand Projections

9.16 ORH has a tried and tested approach to projecting ambulance demand. However the change in demand over a ten-year horizon is difficult to predict with absolute certainty, as this can vary depending on a wide range of factors.

9.17 Sensitivity modelling was therefore undertaken to understand the impact of a 10% increase and a 10% decrease in the projected demand figures for 2033. A 10% decrease in demand results in an increase of 0.9 percentage points to P1 8-minute response performance. Conversely, a 10% increase in demand results in a decrease of 1.1 percentage points to P1 8-minute response performance.

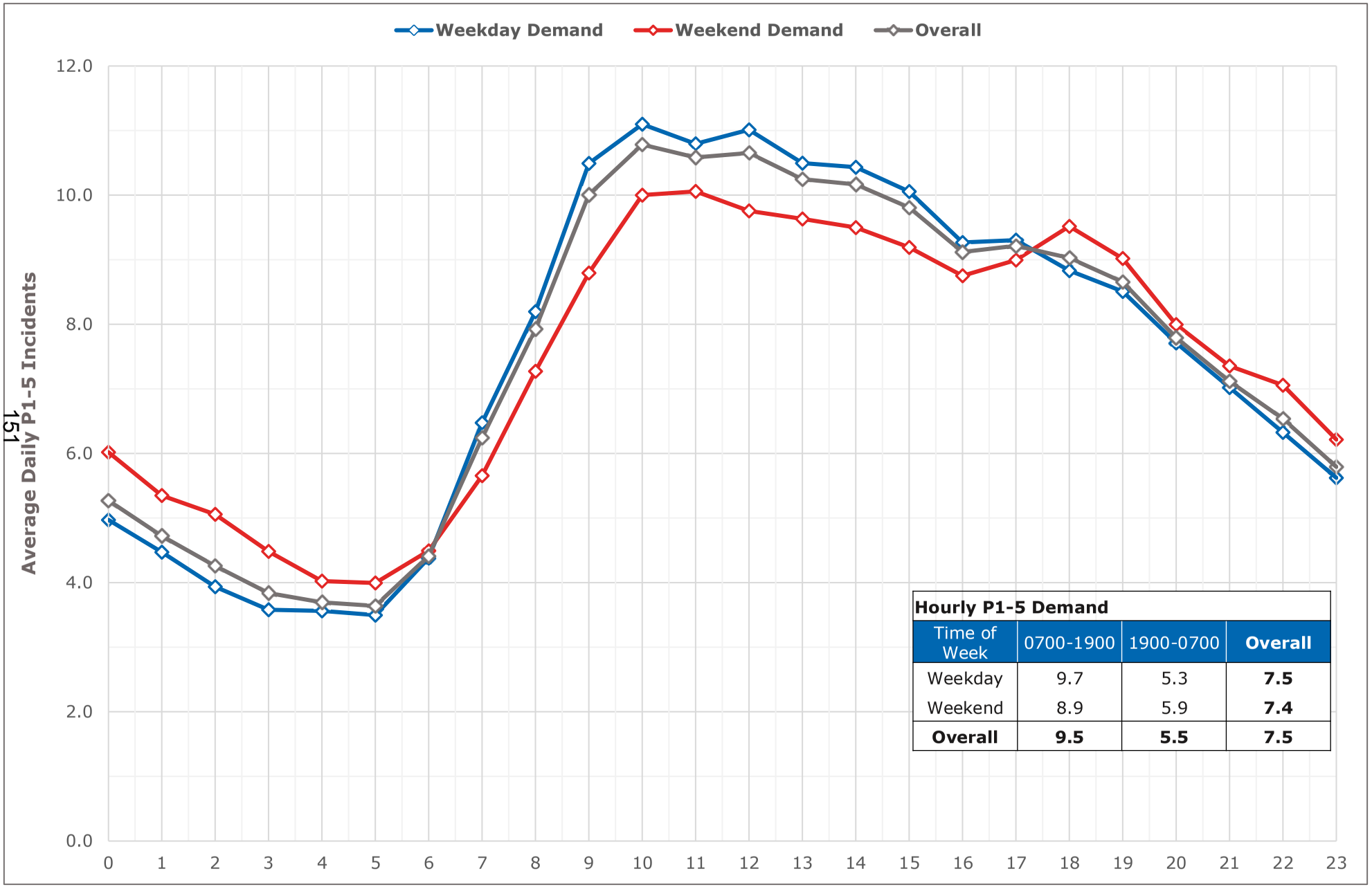
9.18 Either a saving, or an increase, of 252 weekly ambulance hours would be required to address the demand variation impacts.

Appendices

A	Current Service Profile
B	Predictive Model Setup
C	The 'Do Nothing' Scenario
D	Identifying Vehicle Requirements
E	Recommended Trajectory

A Current Service Profile

Demand by Hour (2021 & 2022)



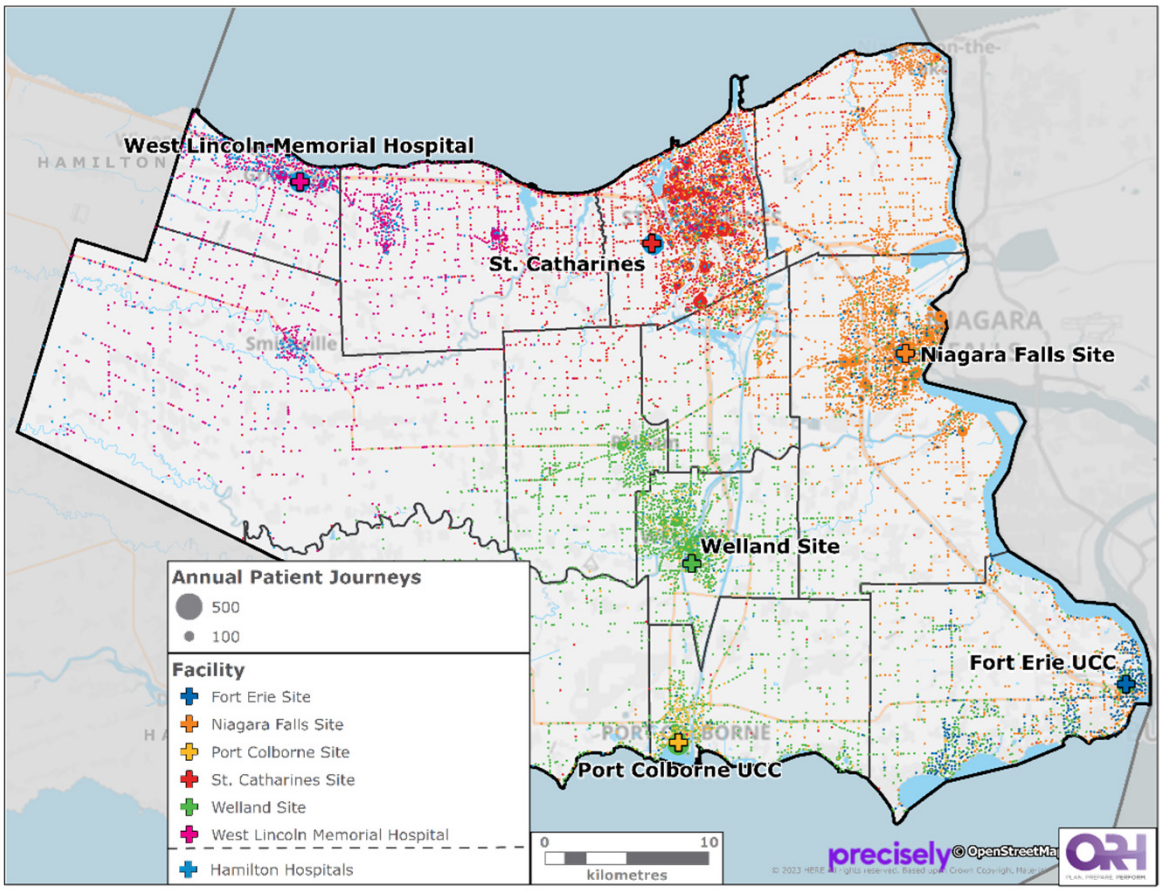
Hourly P1-5 Demand

Time of Week	0700-1900	1900-0700	Overall
Weekday	9.7	5.3	**7.5**
Weekend	8.9	5.9	**7.4**
Overall	**9.5**	**5.5**	**7.5**

Note: Uses typical Monday to Friday definition of weekday and Saturday to Sunday for weekend.

Transported Patients by Hospital

Patient Journeys by Destination Facility



Patient Journeys per day by Priority

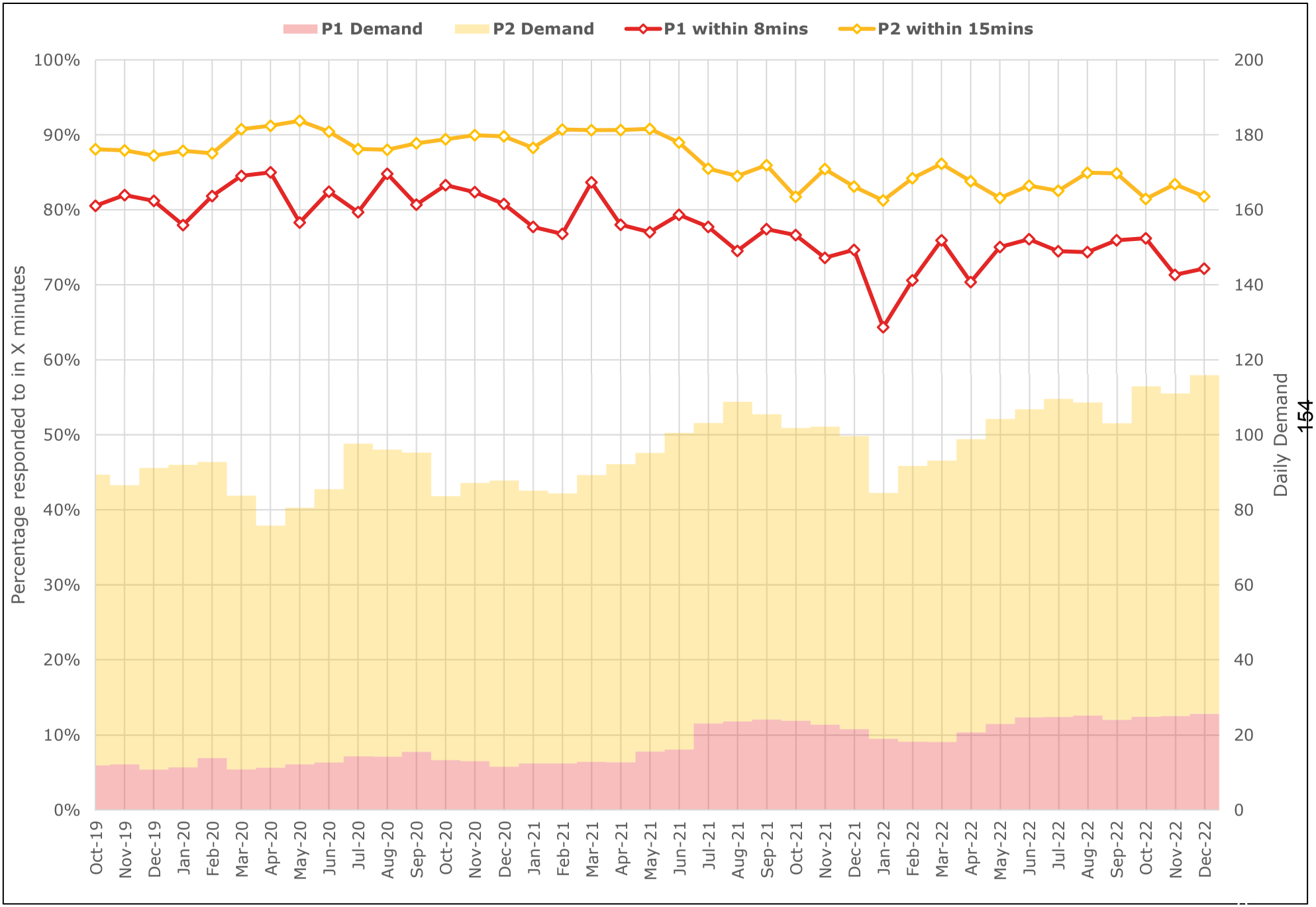
Hospital	Priority					Total
	P1	P2	P3	P4	P5	
St. Catharines Site	3.7	23.3	13.3	3.3	5.1	**48.7**
Niagara Falls Site	2.8	16.6	8.3	1.4	2.9	**31.9**
Welland Site	1.8	10.7	5.7	1.9	2.1	**22.2**
West Lincoln Memorial Hospital	0.6	4.1	1.9	0.3	0.9	**7.9**
Hamilton General Hospital	0.1	1.2	1.0	0.2	0.0	**2.5**
McMaster University Medical Centre	0.0	0.1	0.5	0.2	0.0	**0.8**
FE Urgent Care Centre	0.0	0.2	0.2	0.1	0.2	**0.8**
PC Urgent Care Centre	0.0	0.1	0.1	0.1	0.1	**0.4**
Haldimand War Memorial Hospital	0.0	0.2	0.1	0.0	0.0	**0.3**
Juravinski Hospital	0.0	0.0	0.2	0.1	0.0	**0.3**
St. Joseph's Healthcare Hamilton	0.0	0.0	0.1	0.1	0.0	**0.2**
Niagara Falls Site Helepad	0.0	0.0	0.0	0.1	0.0	**0.1**
Other	*0.0*	*0.1*	*0.1*	*0.1*	*0.1*	***0.4***
Total	**9.1**	**56.5**	**31.5**	**8.0**	**11.5**	**116.6**
Conveyance Rates	63.7%	76.2%	62.0%	75.6%	65.8%	69.5%

Conveyance Rates by Category

Category	Year					Overall
	2018	2019	2020	2021	2022	
P1	70.9%	65.4%	58.7%	62.4%	65.9%	**63.7%**
P2	79.6%	80.4%	74.5%	73.4%	74.7%	**76.2%**
P3	67.7%	64.2%	57.2%	60.6%	58.8%	**62.0%**
P4	80.5%	71.3%	74.4%	78.3%	75.4%	**75.6%**
P5	71.5%	67.1%	66.8%	60.1%	51.8%	**65.8%**
Other	*0.4%*	*2.0%*	*1.3%*	*0.6%*	*1.1%*	***1.0%***
Overall	**72.2%**	**70.1%**	**65.6%**	**64.6%**	**65.5%**	**67.4%**

A4

Priority 1 and 2 Performance by Month



Station Catchment Performance

Station Catchment	Percentage within X minutes	
	P1 in 8	P2 in 15
Abbey Rd	82%	91%
Glendale	74%	85%
King St	84%	87%
Niagara Falls	78%	88%
Niagara-on-the-Lake	30%	60%
St Paul Av	74%	89%
Thorold	54%	75%
Vineland	36%	62%
Fort Erie	73%	86%
Grimsby	56%	87%
Linwell Rd	78%	83%
Merrittville	70%	85%
Ontario St	88%	90%
Pelham	60%	79%
Port Colborne	75%	87%
Ridgeway	53%	74%
Smithville	34%	67%

Responses by Category and Vehicle Type

% of Responses by Vehicle Type

Vehicle Type	Category						Overall	Average Daily Responses
	P1	P2	P3	P4	P5	Other		
TU (PCP)	13%	43%	29%	9%	6%	0%	100%	85.7
TU (ACP)	15%	54%	25%	4%	2%	0%	100%	80.2
MIH (CARE)	10%	4%	27%	5%	24%	30%	100%	9.6
Supervisor	70%	20%	7%	1%	2%	0%	100%	4.5
MIH (Not Specified)	2%	2%	3%	0%	4%	89%	100%	3.5
Other	16%	40%	20%	5%	3%	16%	100%	2.9
MIH (FIT)	4%	2%	45%	3%	6%	40%	100%	2.5
MIH (MHART)	9%	14%	38%	8%	23%	9%	100%	2.2
MIH (CP)	8%	15%	9%	1%	3%	64%	100%	2.0
MIH (STREET)	9%	8%	45%	1%	5%	32%	100%	1.2
Overall	15%	43%	26%	6%	6%	5%	100%	194.2

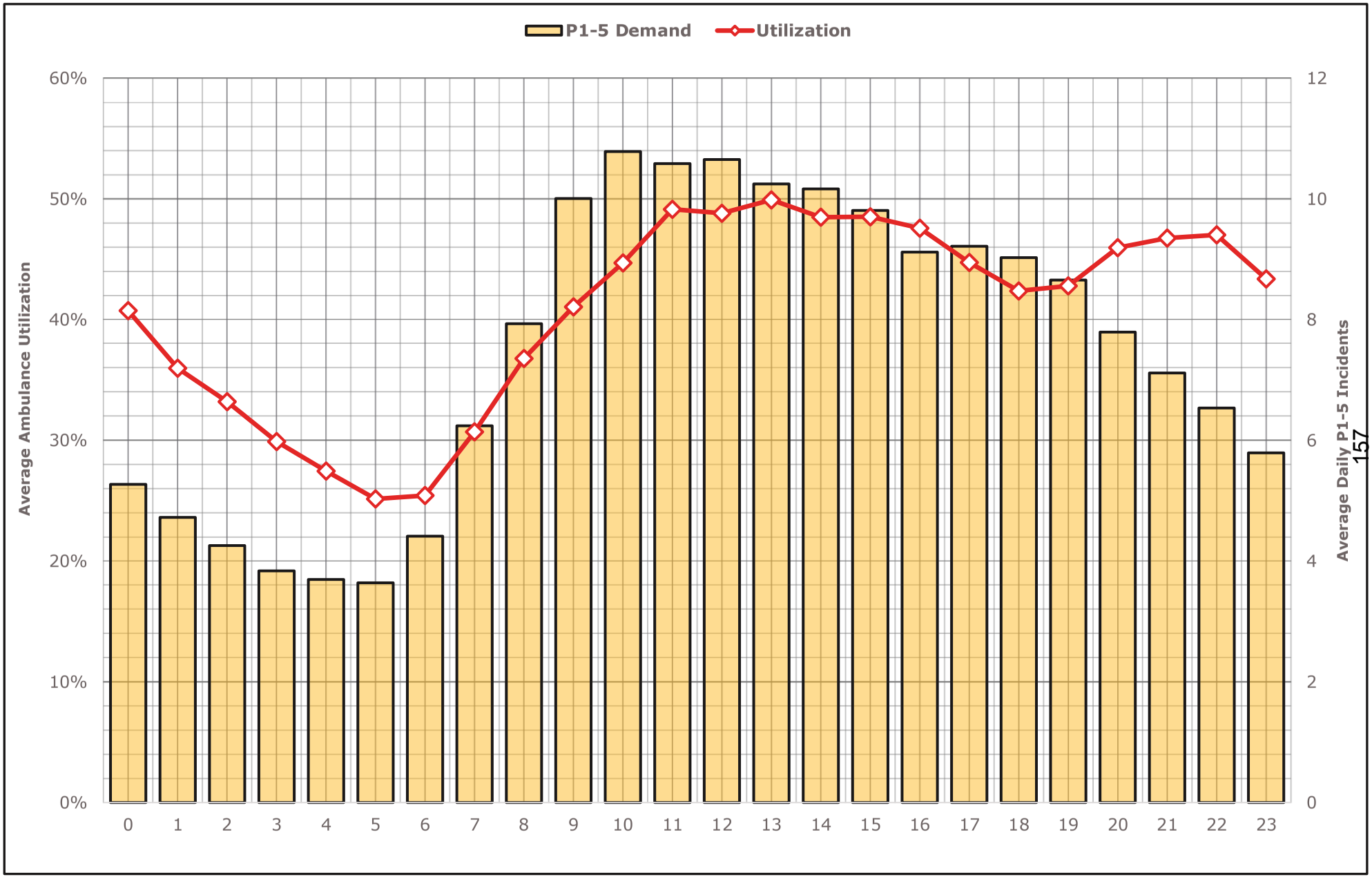
% of Responses by Category

Vehicle Type	Category						Overall	Average Daily Responses
	P1	P2	P3	P4	P5	Other		
TU (PCP)	39%	44%	49%	64%	51%	2%	44%	85.7
TU (ACP)	42%	52%	39%	27%	18%	2%	41%	80.2
MIH (CARE)	3%	0%	5%	4%	22%	30%	5%	9.6
Supervisor	11%	1%	1%	0%	1%	0%	2%	4.5
MIH (Not Specified)	0%	0%	0%	0%	1%	32%	2%	3.5
Other	2%	1%	1%	1%	1%	5%	1%	2.9
MIH (FIT)	0%	0%	2%	1%	1%	11%	1%	2.5
MIH (MHART)	1%	0%	2%	2%	5%	2%	1%	2.2
MIH (CP)	1%	0%	0%	0%	1%	13%	1%	2.0
MIH (STREET)	0%	0%	1%	0%	1%	4%	1%	1.2
Overall	100%	100%	100%	100%	100%	100%	100%	194.2

TU (PCP) = PCP-led Transport Unit

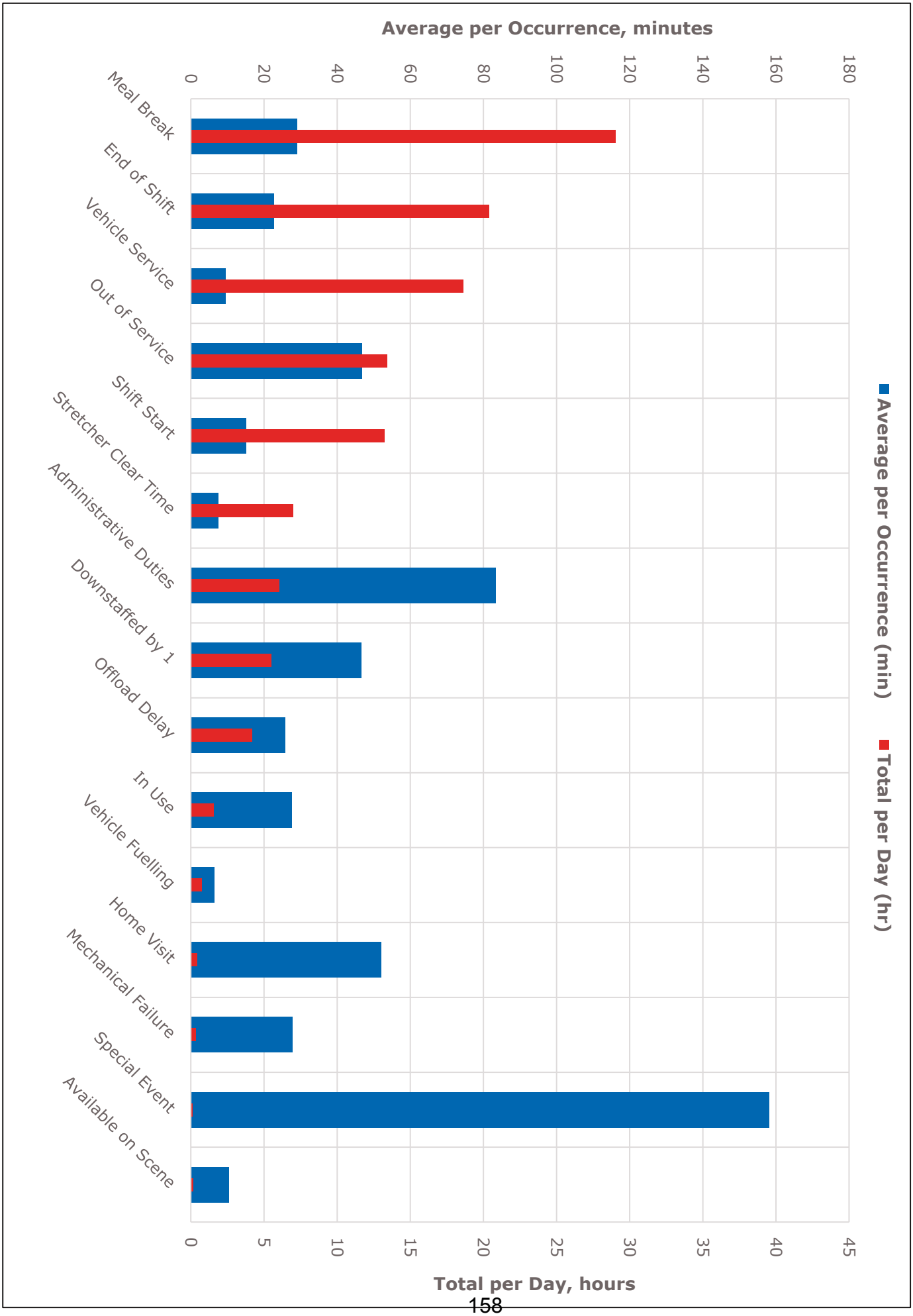
TU (PCP) = ACP-led Transport Unit

Ambulance Utilization by Hour



Utilization is defined as the sum of occupied time (from vehicle mobilization to clear) divided by actual rostered vehicle time; time spent on meal breaks and returning to base are thus excluded from the calculation. Standby moves are also excluded. CAV descriptions 'VS' and 'STR' are included.

Ambulance Unavailability



B Predictive Model Setup

B1 Model Validation Example, Hospital Flows

B2 Model Validation Example, Responses by Category and Vehicle Type

Model Validation Examples, Hospital Flows

Model Validation Examples, Responses by Category and Vehicle Type

	Analysed			Validated			Examples		
Category	ACP Transport Units	PCP Transport Units	MIH	ACP Transport Units	PCP Transport Units	MIH	ACP Transport Units	PCP Transport Units	MIH
P1	12.0	11.2	1.6	12.5	10.3	1.8	0.5	-0.9	0.2
P2	43.1	36.5	1.2	45.0	33.6	0.9	2.0	-3.0	-0.3
P3	19.8	24.7	5.4	17.4	25.9	6.1	-2.3	1.2	0.8
P4	3.3	7.7	0.8	3.7	7.3	1.1	0.4	-0.4	0.3
P5	1.9	5.4	3.2	1.9	5.4	3.8	0.0	0.0	0.5
Other	0.2	0.2	8.7	0.4	0.5	7.9	0.2	0.3	-0.9
Overall	**80.1**	**85.7**	**20.9**	**81.0**	**83.0**	**21.5**	**0.9**	**-2.7**	**0.5**

PCP Transport Unit = PCP-led Transport Unit

ACP Transport Unit = ACP-led Transport Unit

C The 'Do Nothing' Scenario

C1 Population Data Summary

C2 Traffic Zone Population Changes

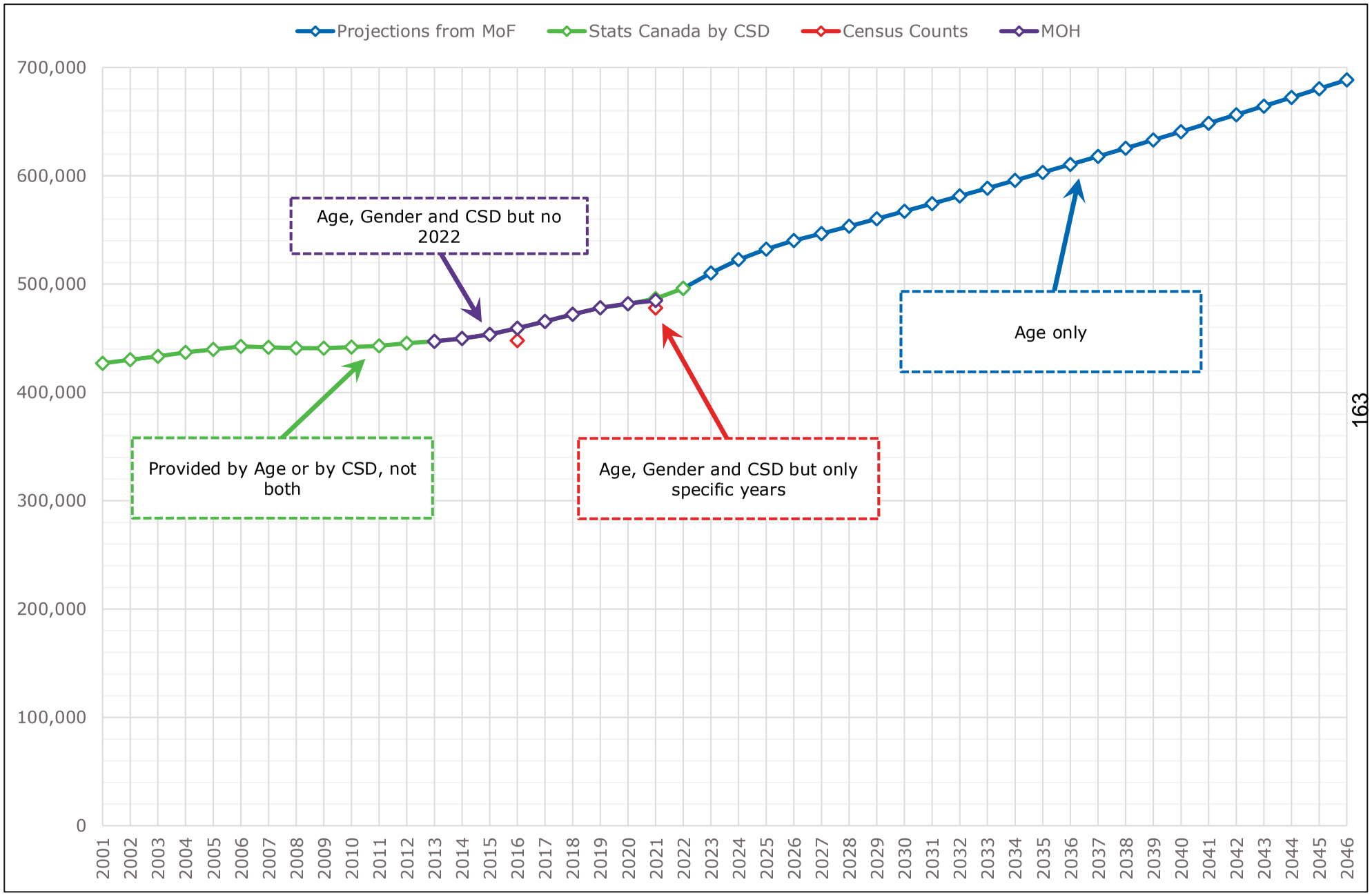
C3 Demand Rates

C4 Demand Projection by Municipality

C5 'Do Nothing' Response Performance by Municipality

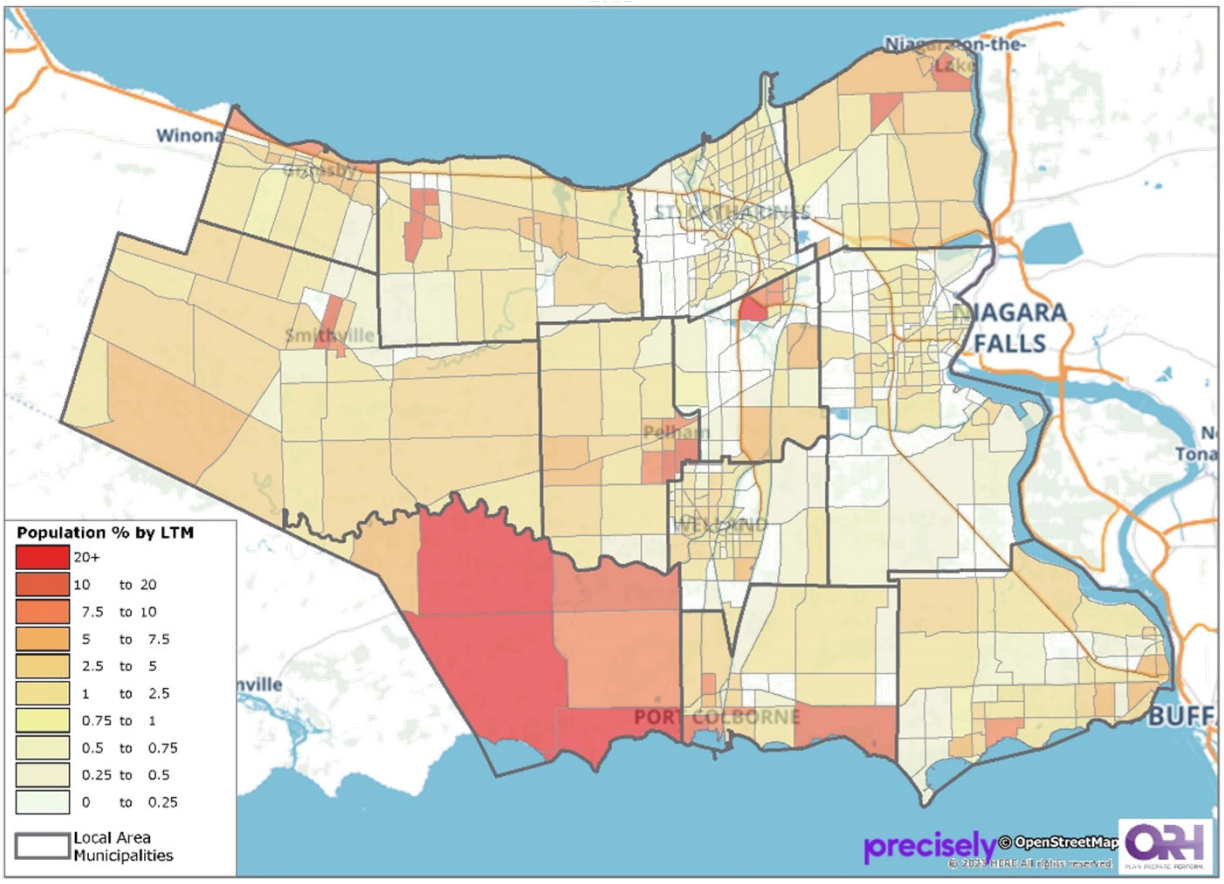
C1

Population Data Summary

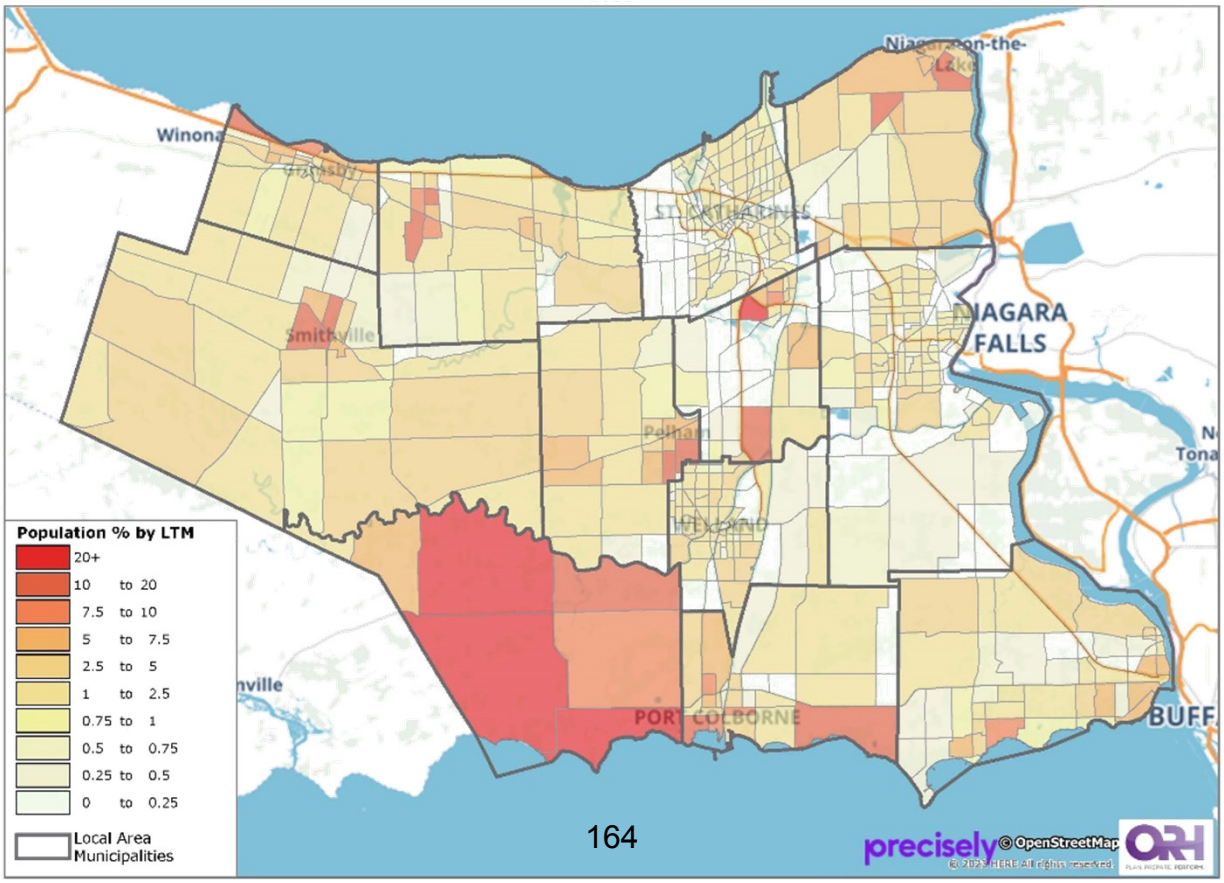


Traffic Zone Population Changes– Percentage by Municipality

2021

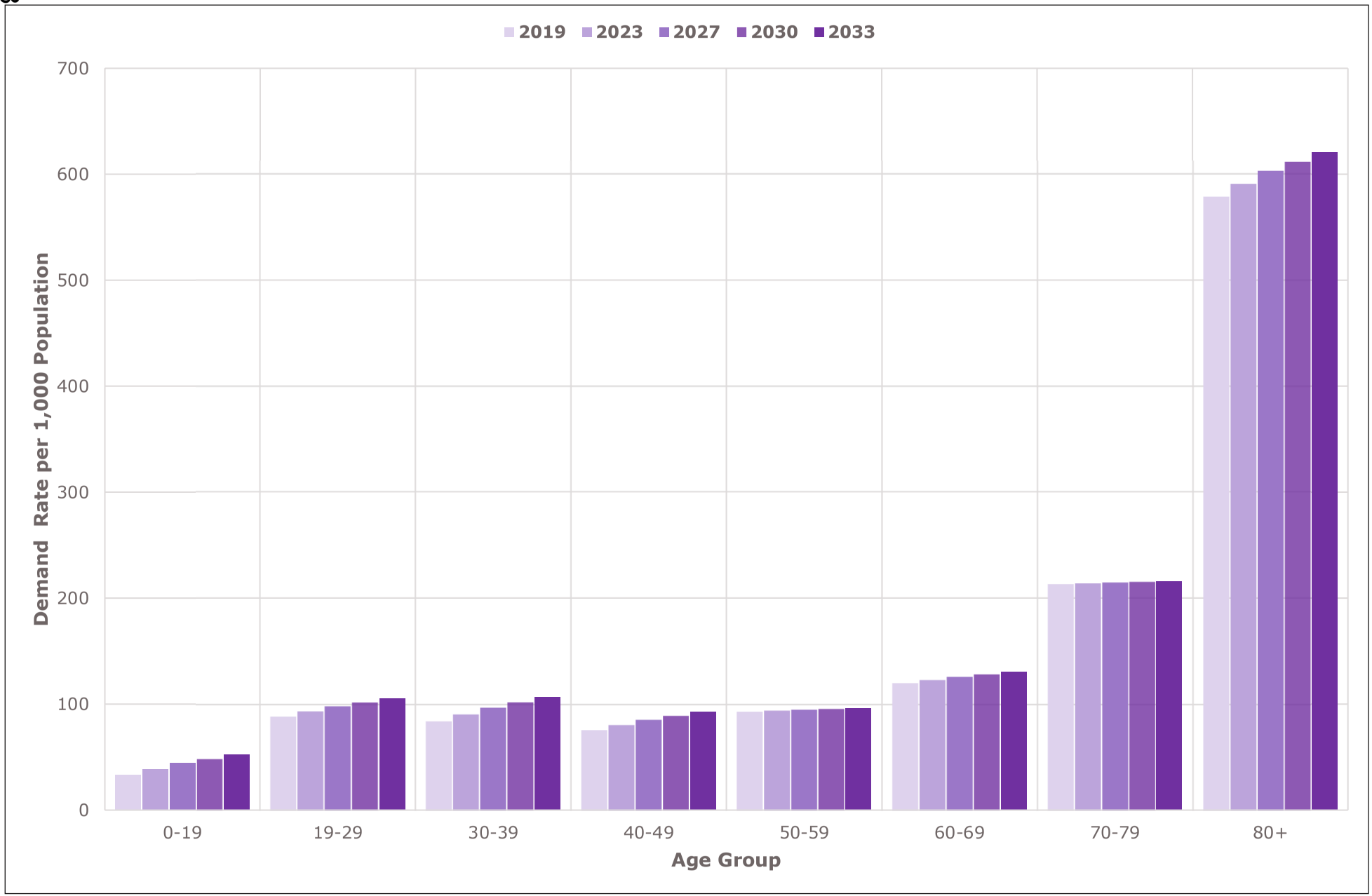


2033



Demand Rates

C3



165

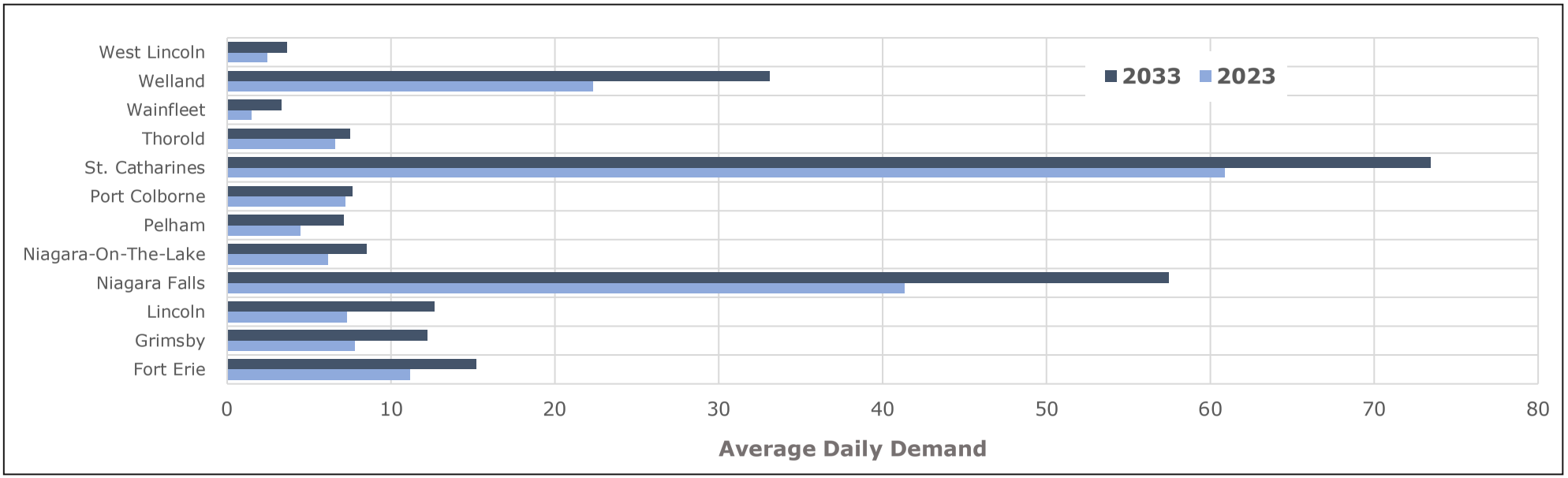
Note:

- Excludes 2020 when projecting demand rates

Demand Projections by Municipality

Average Daily Demand

Municipality	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	d
Fort Erie	10.8	11.1	11.5	11.9	12.2	12.6	13.0	13.4	13.8	14.3	14.7	15.2	141%
Grimsby	7.4	7.8	8.1	8.4	8.8	9.3	9.7	10.2	10.6	11.1	11.6	12.2	164%
Lincoln	6.8	7.3	7.7	8.2	8.7	9.2	9.8	10.3	10.9	11.4	12.0	12.6	185%
Niagara Falls	39.5	41.3	43.1	44.7	46.2	47.8	49.4	51.0	52.6	54.1	55.8	57.4	145%
Niagara-On-The-Lake	5.9	6.1	6.3	6.5	6.8	7.0	7.2	7.5	7.7	8.0	8.2	8.5	144%
Pelham	4.2	4.5	4.7	5.0	5.2	5.5	5.8	6.0	6.3	6.6	6.8	7.1	169%
Port Colborne	7.1	7.2	7.3	7.4	7.5	7.6	7.6	7.7	7.7	7.7	7.7	7.6	108%
St. Catharines	59.2	60.9	62.5	63.8	64.9	66.3	67.6	68.7	69.9	71.1	72.2	73.4	124%
Thorold	6.4	6.6	6.7	6.9	7.0	7.1	7.2	7.2	7.3	7.4	7.4	7.5	118%
Wainfleet	1.3	1.5	1.6	1.8	1.9	2.1	2.3	2.5	2.7	2.9	3.1	3.3	251%
Welland	21.2	22.3	23.4	24.4	25.3	26.4	27.5	28.5	29.6	30.7	31.9	33.1	156%
West Lincoln	2.3	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.4	3.5	3.6	154%
Overall	**172.2**	**179.0**	**185.6**	**191.6**	**197.3**	**203.7**	**210.1**	**216.2**	**222.4**	**228.6**	**235.0**	**241.6**	**140%**



'Do Nothing' Response Performance by Municipality

'Do Nothing' 2033

Municipality	P1 Mean	P2 Mean	P1 8-minute	P2 15-minute	P3 30-minute	P4 60-minute	P5 120-minute
Fort Erie	09:11	12:54	58.6%	71.3%	40.7%	38.7%	62.5%
Grimsby	09:26	10:48	44.8%	81.2%	43.6%	41.8%	69.1%
Lincoln	09:42	13:01	44.5%	66.4%	42.0%	52.2%	70.7%
Niagara Falls	06:37	10:46	74.5%	82.1%	47.5%	50.0%	77.5%
Niagara-on-the-Lake	08:45	13:13	49.5%	67.1%	48.0%	48.4%	74.8%
Pelham	07:57	12:19	56.6%	70.7%	51.6%	57.3%	82.3%
Port Colborne	08:02	12:00	63.5%	75.3%	48.5%	37.0%	79.1%
St Catharines	06:06	10:44	81.7%	81.4%	49.2%	50.4%	76.3%
Thorold	08:10	12:08	55.7%	75.4%	48.8%	56.0%	78.3%
Wainfleet	12:12	14:50	23.5%	58.0%	49.7%	68.1%	80.8%
Welland	05:27	09:50	88.8%	84.7%	53.4%	49.5%	80.5%
West Lincoln	10:18	12:29	39.0%	64.6%	45.7%	52.8%	76.4%
Overall	**07:09**	**11:13**	**70.8%**	**78.6%**	**48.2%**	**48.2%**	**76.2%**

Difference from 2023 Base Position

Municipality	P1 Mean	P2 Mean	P1 8-minute	P2 15-minute	P3 30-minute	P4 60-minute	P5 120-minute
Fort Erie	02:06	03:05	-14.8%	-15.5%	-39.4%	-42.4%	-33.6%
Grimsby	01:45	01:42	-13.6%	-10.0%	-36.4%	-40.6%	-25.1%
Lincoln	00:47	01:36	-1.5%	-10.3%	-34.1%	-36.5%	-25.0%
Niagara Falls	00:39	01:39	-7.0%	-9.9%	-32.6%	-36.7%	-19.6%
Niagara-on-the-Lake	00:28	01:16	-2.3%	-6.5%	-28.5%	-34.0%	-20.8%
Pelham	01:27	02:52	-15.5%	-17.2%	-32.0%	-33.3%	-16.2%
Port Colborne	01:56	02:56	-18.7%	-14.7%	-33.2%	-41.5%	-18.3%
St Catharines	00:29	01:41	-4.9%	-10.9%	-31.4%	-35.3%	-20.1%
Thorold	01:09	02:03	-12.9%	-13.0%	-29.9%	-33.7%	-19.1%
Wainfleet	01:29	02:19	-5.2%	-12.9%	-28.4%	-30.4%	-17.0%
Welland	00:27	01:48	-4.9%	-9.3%	-32.8%	-36.9%	-16.7%
West Lincoln	01:48	02:40	-10.1%	-15.3%	-36.2%	-38.1%	-23.1%
Overall	**00:54**	**01:55**	**-8.1%**	**-11.3%**	**-32.6%**	**-37.0%**	**-20.5%**

Note: Priority 1 & 2 measured from time first vehicle assigned. Priority 3-5 measured from time of call.

D Identifying Vehicle Requirements

D1 Improving Coverage in Every Municipality - Response Performance

D2 Minimum Requirements to Offset Demand - Response Performance

D3 Meeting Targets in Every Municipality - Response Performance

Improving Coverage in Every Municipality - Response Performance

Performance under Scenario

Municipality	P1 8-minute	P2 15-minute	P3 30-minute	P4 60-minute	P5 120-minute	P1 Mean	P2 Mean
Fort Erie	79.3%	90.7%	83.5%	83.2%	96.3%	06:32	09:05
Grimsby	83.1%	97.6%	86.4%	85.7%	94.8%	05:39	06:37
Lincoln	70.1%	89.6%	83.2%	91.5%	96.3%	07:07	09:14
Niagara Falls	86.4%	92.8%	79.9%	86.4%	97.0%	05:29	08:32
Niagara-on-the-Lake	80.5%	93.4%	84.1%	86.5%	96.4%	06:12	09:02
Pelham	77.4%	90.6%	85.1%	91.6%	98.6%	06:07	08:56
Port Colborne	86.7%	92.8%	84.6%	79.4%	97.5%	05:11	07:37
St Catharines	90.1%	93.2%	82.1%	86.9%	96.3%	05:10	08:31
Thorold	71.1%	90.9%	80.2%	90.1%	97.0%	06:42	09:38
Wainfleet	37.4%	77.3%	80.7%	98.7%	97.7%	09:44	11:33
Welland	94.0%	94.9%	87.4%	87.0%	97.2%	04:51	07:39
West Lincoln	67.0%	89.1%	88.9%	93.9%	99.6%	06:39	08:08
Overall	**84.7%**	**92.6%**	**83.0%**	**86.5%**	**96.7%**	**05:40**	**08:30**

Difference from 2023 Base Position

Fort Erie	5.9%	3.9%	3.3%	2.1%	0.2%	-00:32	-00:44
Grimsby	24.8%	6.4%	6.4%	3.3%	0.6%	-02:02	-02:29
Lincoln	24.1%	12.9%	7.2%	2.7%	0.6%	-01:48	-02:11
Niagara Falls	4.9%	0.9%	-0.2%	-0.2%	-0.1%	-00:30	-00:36
Niagara-on-the-Lake	28.7%	19.8%	7.6%	4.1%	0.8%	-02:06	-02:55
Pelham	5.3%	2.8%	1.5%	0.9%	0.1%	-00:24	-00:31
Port Colborne	4.5%	2.8%	2.9%	1.0%	0.1%	-00:55	-01:27
St Catharines	3.6%	0.9%	1.4%	1.1%	0.0%	-00:26	-00:31
Thorold	2.5%	2.5%	1.5%	0.4%	-0.3%	-00:19	-00:28
Wainfleet	8.6%	6.5%	2.6%	0.2%	-0.1%	-00:59	-00:57
Welland	0.2%	0.9%	1.2%	0.6%	-0.1%	-00:09	-00:22
West Lincoln	17.9%	9.2%	7.0%	3.1%	0.1%	-01:51	-01:41
Overall	**5.8%**	**2.6%**	**2.2%**	**1.2%**	**0.0%**	**-00:35**	**-00:48**

Response Performance Summary
Minimum Requirement to Offset Demand

P1 within 8 minutes

Municipality	Base Position (2023)	Do Nothing (2033)	Min. Req. to Offset Demand (2033)	Diff. to Base
Fort Erie	73.6%	58.6%	74.7%	1.3%
Grimsby	55.2%	44.8%	52.5%	-5.8%
Lincoln	49.3%	44.5%	56.4%	10.4%
Niagara Falls	81.6%	74.5%	84.0%	2.5%
Niagara-on-the-Lake	50.9%	49.5%	59.3%	7.5%
Pelham	72.5%	56.6%	76.2%	4.1%
Port Colborne	83.1%	63.5%	82.6%	0.4%
St Catharines	86.6%	81.7%	89.0%	2.5%
Thorold	68.4%	55.7%	69.5%	0.9%
Wainfleet	30.5%	23.5%	27.1%	-1.6%
Welland	93.8%	88.8%	93.7%	-0.1%
West Lincoln	39.7%	39.0%	59.7%	10.6%
Overall	**78.9%**	**70.8%**	**80.4%**	**1.5%**

Below 80% | Below 70% | Below 70% **and** Degradation from Base Position

Cannot raise Grimsby or Wainfleet performance without significant additional resource or new facilities

Response Performance Summary
Meeting Targets in Every Municipality

P1 within 8 minutes

Municipality	Base Position (2023)	Do Nothing (2033)	Meeting Targets in Every Municipality (2033)	Difference to Base
Fort Erie	73.4%	58.6%	82.7%	9.3%
Grimsby	58.4%	44.8%	85.8%	27.4%
Lincoln	46.0%	44.5%	84.3%	38.3%
Niagara Falls	81.5%	74.5%	88.1%	6.6%
Niagara-on-the-Lake	51.8%	49.5%	83.3%	31.6%
Pelham	72.1%	56.6%	85.6%	13.5%
Port Colborne	82.1%	63.5%	90.2%	8.0%
St Catharines	86.6%	81.7%	93.0%	6.4%
Thorold	68.6%	55.7%	80.3%	11.7%
Wainfleet	28.7%	23.5%	80.2%	51.4%
Welland	93.7%	88.8%	94.8%	1.1%
West Lincoln	49.1%	39.0%	82.0%	32.9%
Overall	**78.9%**	**70.8%**	**89.0%**	**10.1%**

Below 80%

Below 70%

Below 70% **and** Degradation from Base Position

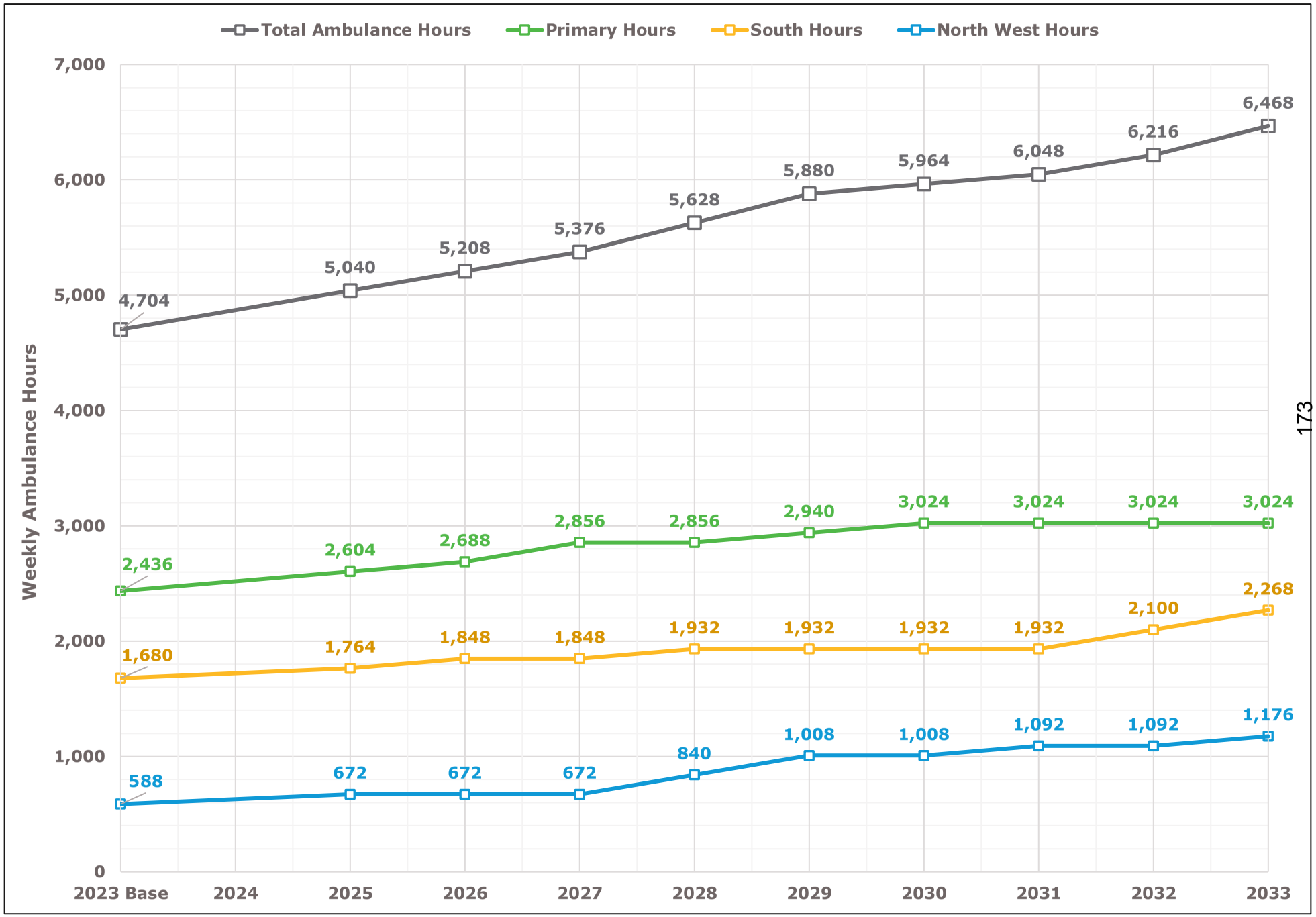
E Recommended Trajectory

E1 Trajectory Resource Summary

E2 Trajectory Response Performance Summary

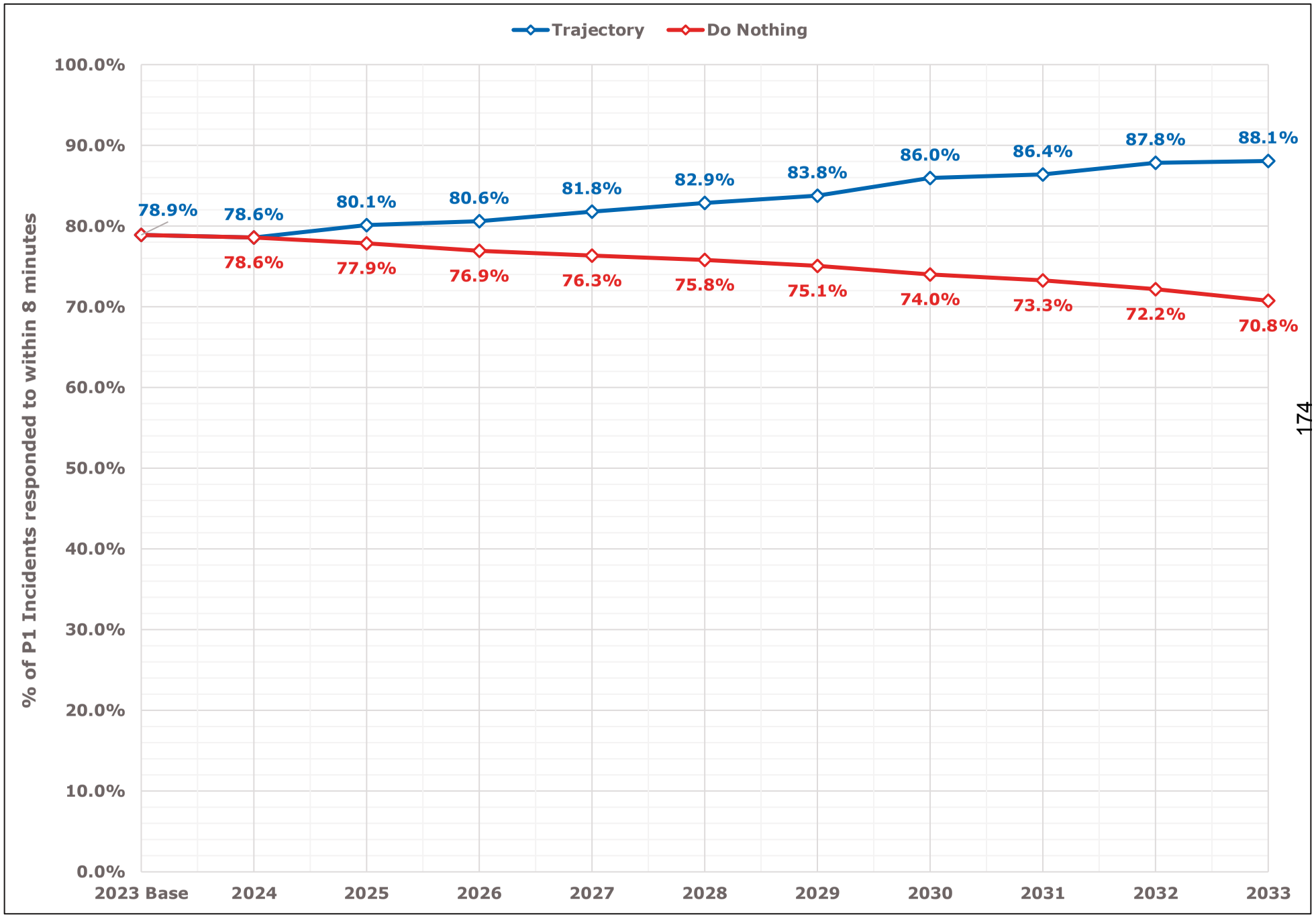
E1

Trajectory Resource Summary



E2

Trajectory Response Performance Summary



F Sensitivity Modelling

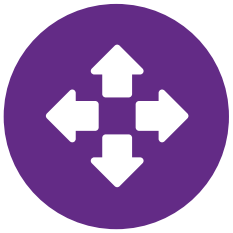
F1 Response Performance using Alternate Locations

F1

Response Performance Impacts of Alternative Sites

			Moving from Optimal to Alternative			Moving from Alternative to Optimal		Moving from Optimal to Alternative			Moving from Alternative to Optimal	
P1 within 8minutes			**Response Performance with Site Changes**					**Difference to Core Scenario**				
Municipality	Base Position (2023)	2033 Recommended Hub, Spoke and Post Scenario	Anderson Ln instead of **Virgil**	Thorold Stone Rd/Prince Charles Dr instead of **Welland North**	Kitchener St instead of **Niagara Falls East**	Grimsby (New) instead of **Clarke St**	Netherby Rd /Morris Rd instead of **Netherby Rd /Montrose Rd**	Anderson Ln instead of **Virgil**	Thorold Stone Rd/Prince Charles Dr instead of **Welland North**	Kitchener St instead of **Niagara Falls East**	Grimsby (New) instead of **Clarke St**	Netherby Rd /Morris Rd instead of **Netherby Rd /Montrose Rd**
Fort Erie	73.4%	75.5%	75.4%	75.3%	75.3%	75.3%	75.5%	-0.2%	-0.3%	-0.2%	-0.2%	-0.1%
Grimsby	58.4%	78.3%	78.3%	78.3%	78.3%	84.9%	78.3%	0.0%	0.0%	0.0%	6.7%	0.1%
Lincoln	46.0%	75.9%	76.1%	75.9%	75.9%	75.5%	75.8%	0.2%	0.0%	0.0%	-0.4%	-0.1%
Niagara Falls	81.5%	91.9%	91.9%	91.9%	92.2%	92.0%	91.9%	0.0%	0.0%	0.3%	0.1%	0.0%
Niagara-on-the-Lake	51.8%	80.9%	80.0%	81.0%	81.3%	80.8%	80.9%	-1.0%	0.0%	0.4%	-0.1%	0.0%
Pelham	72.1%	80.8%	80.8%	81.7%	80.9%	80.9%	81.2%	0.0%	0.9%	0.1%	0.1%	0.4%
Port Colborne	82.1%	88.9%	89.0%	89.2%	89.1%	89.2%	88.8%	0.1%	0.3%	0.2%	0.3%	0.0%
St Catharines	86.6%	93.8%	93.7%	93.8%	93.8%	93.8%	93.8%	0.0%	0.1%	0.1%	0.0%	0.1%
Thorold	68.6%	77.3%	77.5%	76.9%	77.3%	77.5%	77.3%	0.2%	-0.4%	0.0%	0.2%	0.1%
Wainfleet	28.7%	39.0%	38.6%	39.3%	39.0%	39.1%	38.4%	-0.5%	0.3%	-0.1%	0.1%	-0.6%
Welland	93.7%	96.9%	96.8%	96.5%	96.9%	96.9%	96.9%	-0.1%	-0.4%	0.0%	0.0%	0.0%
West Lincoln	49.1%	68.7%	68.9%	68.9%	69.0%	69.8%	68.8%	0.3%	0.2%	0.3%	1.2%	0.1%
Overall	**78.9%**	**88.1%**	**88.0%**	**88.0%**	**88.2%**	**88.4%**	**88.1%**	**0.0%**	**0.0%**	**0.1%**	**0.4%**	**0.0%**

Emergency Service Planning



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Niagara EMS 10-Year Facility Plan
Traditional Summary

Traditional Model - Purchase of HQ	2025	2026	2027	2028	2029	2030
Capital Required	6,227,424	186,378,265	33,328,648	12,224,511	5,633,306	18,877,781
Capital Funding (Proceeds & DCs)	(1,637,424)	(84,284,060)	(7,161,361)	(7,443,749)	(2,036,614)	(7,599,693)
Operating Impact of Facilities (Opened & Closed)	-	-	57,517	136,250	192,670	(496,175)
Operating Impact of New Ambulances & Staff	2,752,451	4,236,818	5,727,300	8,005,937	10,373,428	11,340,629
Efficiencies	-	-	-	-	-	-
Operating Contribution to Capital for New Facilities	-	2,868,106	3,449,754	3,676,867	3,716,605	4,004,038
Net Funding Impact	-	(1,539,968)	(2,407,414)	(4,658,056)	(6,214,447)	(7,628,580)
Total Levy Funded Cost	**7,342,451**	**107,659,160**	**32,994,443**	**11,941,761**	**11,664,948**	**18,498,000**
2025 Approved gross EMS budget		32,488,488	32,792,941	33,097,393	33,401,846	33,706,298
Increase (decrease) from master plan		2,812,505	1,262,201	333,842	907,258	(848,344)
1-Time reserve transfers for operating expense funding lag	-	(1,406,252)	(631,100)	(166,921)	(453,629)	-
1-Time reserve transfers for amortization funding lag	-	(1,101,800)	(326,648)	137,531	(149,176)	1,152,797
Estimated gross budget		32,792,941	33,097,393	33,401,846	33,706,298	34,010,751
% annual operating increase due to MSP		**0.94%**	**0.93%**	**0.92%**	**0.91%**	**0.90%**
General Levy	537,000,000	579,960,000	626,356,800	676,465,344	730,582,572	789,029,177
% of levy increase due to MSP		**0.06%**	**0.05%**	**0.05%**	**0.05%**	**0.04%**

Niagara EMS 10-Year Facility Plan
Traditional Summary (Continued)

Traditional Model - Purchase of HQ	2031	2032	2033	2034	10-Year Total	30-Year Total
Capital Required	20,497,525	4,621,597	1,918,503	-	289,707,561	289,707,561
Capital Funding (Proceeds & DCs)	(13,809,270)	(5,964,606)	(1,918,503)	-	(131,855,281)	(131,855,281)
Operating Impact of Facilities (Opened & Closed)	(531,015)	(498,214)	(492,884)	(502,741)	(2,134,592)	(15,354,859)
Operating Impact of New Ambulances & Staff	12,342,368	14,198,860	16,930,907	17,269,526	103,178,222	531,174,351
Efficiencies	-	-	-	-	-	-
Operating Contribution to Capital for New Facilities	4,381,795	4,446,014	4,446,014	4,446,014	35,435,206	124,355,477
Net Funding Impact	(7,669,081)	(8,217,084)	(9,449,085)	(10,954,852)	(58,738,566)	(307,863,546)
Total Levy Funded Cost	**15,212,322**	**8,586,566**	**11,434,952**	**10,257,946**	**235,592,549**	**490,163,702**
2025 Approved gross EMS budget	34,010,751	34,315,203	34,619,656	34,924,108		
Increase (decrease) from master plan	1,304,155	1,405,508	1,505,377	(1,177,006)	7,505,495	
1-Time reserve transfers for operating expense funding lag	(652,077)	(702,754)	(752,688)	-	(4,765,423)	
1-Time reserve transfers for amortization funding lag	(347,625)	(398,302)	(448,236)	1,481,459		
Estimated gross budget	34,315,203	34,619,656	34,924,108	35,228,561		
% annual operating increase due to MSP	**0.90%**	**0.89%**	**0.88%**	**0.87%**		
General Levy	852,151,511	920,323,632	993,949,523	1,073,465,485		
% of levy increase due to MSP	**0.04%**	**0.04%**	**0.03%**	**0.03%**		

Niagara EMS 10-Year Facility Plan
Owned Hub Model

Hub & Spoke - Purchase of HQ	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Capital Required	3,371,424	199,863,941	46,938,617	434,412	2,737,003	12,815,278
Capital Funding (Proceeds & DCs)	(1,637,424)	(104,534,876)	(30,537,639)	(434,412)	(1,329,300)	-
Operating Impact of Facilities (Opened & Closed)	-	-	(17,763)	86,874	88,611	(559,540)
Operating Impact of New Ambulances & Staff	2,752,451	4,236,818	5,753,379	8,005,937	10,400,561	11,340,629
Efficiencies	-	-	-	-	-	(3,277,351)
Operating Contribution to Capital for New Facilities	-	3,133,040	4,033,552	4,033,552	4,033,552	4,142,893
Net Funding Impact	-	(1,539,968)	(2,407,414)	(4,808,512)	(6,480,806)	(7,811,917)
Total Levy Funded Cost	**4,486,451**	**101,158,954**	**23,762,732**	**7,317,850**	**9,449,621**	**16,649,992**
2025 Approved gross budget		32,488,488	32,534,307	32,580,125	32,625,944	32,671,763
Increase from master plan	-	3,077,439	1,531,864	(43,903)	724,067	(4,207,204)
1-Time reserve transfers for expense funding lag	-	(1,538,719)	(765,932)	-	(362,034)	-
1-time reserve transfers for amortization funding lag	-	(1,492,901)	(720,113)	89,722	(316,215)	4,253,022
Estimated gross budget	-	32,534,307	32,580,125	32,625,944	32,671,763	32,717,581
% annual operating increase due to MSP		**0.14%**	**0.14%**	**0.14%**	**0.14%**	**0.14%**
General Levy	537,000,000	579,960,000	626,356,800	676,465,344	730,582,572	789,029,177
% of levy increase due to MSP		**0.01%**	**0.01%**	**0.01%**	**0.01%**	**0.01%**

Niagara EMS 10-Year Facility Plan
Owned Hub Model (Continued)

Hub & Spoke - Purchase of HQ	2031	2032	2033	2034	10-Year Total	30-Year Total
Capital Required	62,157,239	-	1,918,503	-	330,236,417	330,236,417
Capital Funding (Proceeds & DCs)	(41,137,960)	(5,389,633)	(1,918,503)	-	(186,919,747)	(186,919,747)
Operating Impact of Facilities (Opened & Closed)	(578,846)	(419,343)	(427,730)	(436,285)	(2,264,023)	(15,484,291)
Operating Impact of New Ambulances & Staff	12,342,368	14,112,478	16,842,799	17,179,655	102,967,074	528,735,902
Efficiencies	(3,342,898)	(3,409,756)	(3,477,951)	(3,547,510)	(17,055,465)	(104,974,528)
Operating Contribution to Capital for New Facilities	5,376,818	5,376,818	5,376,818	5,376,818	40,883,861	148,420,224
Net Funding Impact	(6,155,458)	(6,589,409)	(8,052,570)	(9,527,848)	(53,373,903)	(267,182,367)
Total Levy Funded Cost	**28,661,263**	**3,681,156**	**10,261,366**	**9,044,830**	**214,474,214**	**432,831,610**
2025 Approved gross budget	32,717,581	32,763,400	32,809,219	32,855,037		
Increase from master plan	3,807,270	1,428,805	1,190,577	(1,216,536)	6,292,379	
1-Time reserve transfers for expense funding lag	(1,903,635)	(714,402)	(595,288)	-	(5,880,011)	
1-time reserve transfers for amortization funding lag	(1,857,816)	(668,584)	(549,470)	1,262,355		
Estimated gross budget	32,763,400	32,809,219	32,855,037	32,900,856		
% annual operating increase due to MSP	**0.14%**	**0.14%**	**0.14%**	**0.14%**		
General Levy	852,151,511	920,323,632	993,949,523	1,073,465,485		
% of levy increase due to MSP	**0.01%**	**0.01%**	**0.00%**	**0.00%**		

Niagara EMS 10-Year Facility Plan
Leased Hub Model

Hub & Spoke - Lease of HQ	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Capital Required	3,371,424	24,801,667	46,938,617	434,412	2,737,003	12,815,278
Capital Funding (Proceeds & DCs)	(1,637,424)	(6,623,589)	(30,537,639)	(434,412)	(1,329,300)	(500,000)
Operating Impact of Facilities (Opened & Closed)	-	-	(17,763)	86,874	88,611	2,870,420
Operating Impact of New Ambulances & Staff	2,752,451	4,236,818	5,753,379	8,005,937	10,400,561	11,340,629
Efficiencies	-	-	-	-	-	(3,277,351)
Operating Contribution to Capital for New Facilities	-	263,941	1,164,454	1,164,454	1,164,454	1,273,795
Net Funding Impact	-	(1,539,968)	(2,407,414)	(3,373,963)	(5,046,257)	(6,377,368)
Total Levy Funded Cost	**4,486,451**	**21,138,869**	**20,893,633**	**5,883,301**	**8,015,072**	**18,145,403**
2025 Approved gross budget		32,488,488	32,742,879	32,997,269	33,251,660	33,506,050
Increase from master plan		208,340	1,531,864	1,390,646	724,067	(777,244)
1-Time reserve transfers for expense funding lag		(104,170)	(765,932)	(695,323)	(362,034)	-
1-Time reserve transfers for amortization funding lag		150,220	(511,541)	(440,933)	(107,643)	1,031,634
Estimated gross budget		32,742,879	32,997,269	33,251,660	33,506,050	33,760,441
% annual operating increase due to MSP		**0.78%**	**0.78%**	**0.77%**	**0.77%**	**0.76%**
General Levy	537,000,000	579,960,000	626,356,800	676,465,344	730,582,572	789,029,177
% of levy increase due to MSP		**0.05%**	**0.04%**	**0.04%**	**0.04%**	**0.03%**

Niagara EMS 10-Year Facility Plan
Leased Hub Model (Continued)

Hub & Spoke - Lease of HQ	2031	2032	2033	2034	10-Year Total	30-Year Total
Capital Required	62,157,239	-	1,918,503	-	155,174,143	155,174,143
Capital Funding (Proceeds & DCs)	(41,637,960)	(5,889,633)	(2,418,503)	(500,000)	(91,508,460)	(101,508,460)
Operating Impact of Facilities (Opened & Closed)	2,851,114	3,010,617	3,002,230	2,993,675	14,885,777	118,073,480
Operating Impact of New Ambulances & Staff	12,342,368	14,112,478	16,842,799	17,179,655	102,967,074	528,735,902
Efficiencies	(3,342,898)	(3,409,756)	(3,477,951)	(3,547,510)	(17,055,465)	(104,974,528)
Operating Contribution to Capital for New Facilities	2,507,720	2,507,720	2,507,720	2,507,720	15,061,976	65,216,369
Net Funding Impact	(6,435,889)	(6,869,840)	(8,333,001)	(9,808,279)	(50,191,978)	(291,980,849)
Total Levy Funded Cost	**28,441,694**	3,461,586	10,041,796	8,825,260	129,333,066	368,736,058
2025 Approved gross budget	33,760,441	34,014,831	34,269,222	34,523,612		
Increase from master plan	2,092,290	1,428,805	1,190,577	(1,216,536)	6,572,810	
1-Time reserve transfers for expense funding lag	(1,046,145)	(714,402)	(595,288)	-	(4,283,295)	
1-Time reserve transfers for amortization funding lag	(791,754)	(460,012)	(340,898)	1,470,926		
Estimated gross budget	34,014,831	34,269,222	34,523,612	34,778,003		
% annual operating increase due to MSP	**0.75%**	0	0	0		
General Levy	852,151,511	920,323,632	993,949,523	1,073,465,485		
% of levy increase due to MSP	**0.03%**	0	0	0		