Grey County Paramedic Services

Comprehensive Deployment Review for Paramedic Services

Final Report

ORH/GCPS/1
April 3, 2023

PLAN. PREPARE. **PERFORM.**

This document has been produced by ORH for *Grey County Paramedic Services* on April 3, 2023. This document can be reproduced by *Grey County Paramedic Services,* subject to it being used accurately and not in a misleading context. When the document is reproduced in whole or in part within another publication or service, the full title, date and accreditation to ORH must be included.

ORH is the trading name of Operational Research in Health Limited, a company registered in England with company number 2676859.

ORH's quality management system is ISO 9001:2015 certified: recognition of ORH's dedication to maintaining high quality services for its clients.

ORH's environmental management policy is ISO 14001:2015 certified: verification of ORH's desire to deliver its services and products in a sustainable way and to reduce ORH's impact on the environment.

ORH's information security management system is ISO 27001:2017 certified: evidence of ORH's commitment to implementing international best practice with regard to data security.

Disclaimer

The information in this report is presented in good faith using the information available to ORH at the time of preparation. It is provided on the basis that the authors of the report are not liable to any person or organization for any damage or loss which may occur in relation to taking, or not taking, action in respect of any information or advice within the document.

Accreditations

Other than data provided by *Grey County Paramedic Services*, this report also contains data from the following sources:

© 2023 HERE All rights reserved. © Her Majesty the Queen in Right of Canada, © Queen's Printer for Ontario

EXECUTIVE SUMMARY

Current Service Profile

i. ORH collected data from the Ambulance Dispatch Recording System (ADRS) in order to understand the demand placed on Grey County Paramedic Services, the usage of resources deployed, and the response performance achieved within Grey County.

ii. Analysis of January 2018 to May 2022 data showed that Grey County Paramedic Services responded to an average of 33.4 calls per day excluding standby moves. Priority 4 (P4) Emergency calls accounted for 59% of all calls. P3 Urgent and P4 Emergency demand is generally increasing year-on-year at 4.2% per annum.

iii. There were on average 27.8 incidents per day in the off-peak period, and 32.6 incidents per day in the peak (December to February). The difference between off-peak and peak is mostly due to added demand in the Blue Mountains (3.2 incidents per day off-peak and 6.9 incidents per day peak).

iv. Grey County Paramedic Services met all CTAS reporting targets at County-wide level, although these are not met in some of the more rural lower tier municipalities (especially in Chatsworth and the Grey Highlands). Paramedic Services are required to report figures to the Ministry of Health at County level, but it is important to understand the variation across the service. By year, Grey County Paramedic Services have not consistently achieved the 90% in 15-minutes CTAS2 target but have been close to this measure.

v. Time at hospital is the longest call component for both P4 Emergency and P3 Urgent incidents and has increased from the end of 2019. There is a wide variation in time at hospital by facility but at the most common destinations (those within Grey) it is generally shorter than those located outside Grey.

vi. All of Grey County Paramedic Services' eight stations were crewed 24/7, with one additional 09:00 to 21:00 shift at Owen Sound. Markdale station also deployed a 12 hour first response unit during the daytime. Ambulances from Owen Sound make up 30.8% of P1 Non-Urgent to P4 Emergency responses whereas vehicles from Dundalk, Durham and Markdale make up less than 9% each.

vii. ORH benchmarked Grey County Paramedic Services against its database of Ontario ambulance service data. Generally, Grey County Paramedic Services benchmarked well and was not a particular outlier in any measure although did have a quicker time to scene and time to hospital when compared to the other rural services. This, as well as a shorter time at hospital, contributed to Grey County Paramedic Services having the shortest total occupied time out of the benchmarked services.

Demand Projections

viii. The age and gender of historical patients was combined with historical population data to produce demand rates per 1,000 by year, age and gender group, and area. This was

forecasted to 2033 and combined with population projections to produce 2033 demand forecasts by LTM. Demand is often strongly related to the population age profile, hence using this method.

ix. Historical analysis projected a 5.8% increase in incidents per year across the County between 2022 and 2033; this number varied by LTM. The historical analysis and future demand projections focused on P3 Urgent and P4 Emergency calls only as P1 and P2 Non-Urgent demand has been at low levels historically; P1 and P2 Non-Urgent demand was kept constant for the future projection. The demand levels were then supplemented with growth data to refine the geographical spread of demand.

Model Validation

x. A key reason for undertaking detailed analysis of the current service profile (described in Section 2) was so that this information could be used to populate ORH's simulation model, AmbSim. AmbSim is a discrete event simulation model that replicates the key characteristics of an emergency ambulance service and can be used to predict future behaviour under a variety of different scenarios.

xi. The model was validated by comparing a 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. It was concluded that the model replicated current behaviour accurately and therefore could be used with confidence when examining options for change.

Station Location Optimization

xii. ORH's location optimization model OGRE was used to assess the configuration of existing station locations and identify how this could be improved currently and in the future.

xiii. The modelling initially focused on 'blank canvas optimization' (assuming no sites are fixed) and the criteria was to minimize the mean response time to P3 Urgent and P4 Emergency non-transfer incidents.

xiv. Three demand scenarios were modelled: Grey County Paramedic Services-responded demand, all demand in Grey County, and Grey County Paramedic Services-responded demand plus forecasted housing development demand.

xv. The results from these were very similar with the optimal eight locations in close proximity to existing station locations; current bases are in good locations to respond to the demand within Grey County.

Current Demand Modelling

xvi. ORH simulated current service operations, with specific changes to resourcing in order to find potential efficiencies.

xvii. The modelling focuses on 8-minute performance as this aligns with CTAS reporting to the Ministry of Health, but there is also a focus on 15-minute performance as this is important to consider in a service with relatively rural geography. Grey County's 90th percentile for P4 Emergency calls has been at or around the 15-minute mark historically.

xviii. ORH tested moving the currently deployed FRU to each base station and standby post. The largest improvements to P4 Emergency 8-minute response performance can be achieved through redeploying it to Owen Sound or Thornbury; both increase performance by 0.5% across Grey County Paramedic Services. The largest improvement 0.5% in 15-minute response performance would be achieved by redeploying to Chatsworth, at 0.5%. Permanently deploying the FRU at Dundalk, Kimberley or Markdale produces a reduction in performance at both 8-minute and 15-minute measures.

xix. To help identify optimal areas for additional resourcing and demonstrate the geographical challenges in reducing the P4 Emergency 90th percentile, 1, 2 and 3 vehicles were added to each station. The biggest overall improvement is obtained through adding vehicles to Owen Sound; adding one 24/7 ambulance here reduces the 90th percentile by 1m09s. Adding a 24/7 ambulance at Markdale makes the smallest improvement for its LTM, since improving performance in the Grey Highlands is an issue of coverage rather than workload.

xx. The minimal resource requirement to achieve Grey County Paramedic Services's 15-minute P4 Emergency 90th percentile target was found. A 17% increase in vehicle hours, or 252 extra weekly ambulance hours, is required. This requirement is without any additional demand – it is the investment required to meet a 15-minute 90th percentile in 2022.

Future Demand Modelling

xxi. A 2033 'Do Nothing' position was modelled to quantify the impact of demand increases (average 5.8% per annum or 68% over 10 years) with no other operational changes. P4 Emergency 8-minute response performance is projected to degrade from 61.6% in 2020 to 47.5% in 2033. 15-minute response performance degrades from 87.5% to 74.5%.

xxii. A core scenario was proposed with the aim of maintaining 2022 performance in each LTM. An additional 672 weekly ambulance hours are required which includes upstaffing the 12-hour FRU to an ambulance. Maintaining performance in each LTM leads to a 4.0 percentage point improvement in Grey County Paramedic Services-wide P4 Emergency 8-minute response performance.

xxiii. A scenario was also created to identify future improved performance with targets based on the relative rurality of LTMs.

Organizational Structure and Support Services Recommendations

xxiv.   ORH subcontracted the Association of Ambulance Chief Executives (AACE) to review the organizational structure and supplemental functions required to deliver paramedic services across Grey County.

xxv.   This review has necessarily taken a high-level view of current operations and support services arrangements, based on interviews with key individuals and a limited review of pertinent documentation.

xxvi.   The key recommendations from this element are that Grey County Paramedic Services should:

- Maintain its current supervisor to frontline staff ratio of 28:1 as this is in-line with other Ontario services, requiring two additional supervisors by 2033. As Paramedic Services grows, the organization should consider at an appropriate juncture in the future whether it may be possible to introduce a clinical supervision framework as deployed overseas.

- Examine how different models of care and increased integration with Community Paramedicine could be deployed with the associated clinical and wider health system benefits realised, if the wider Ontario paramedic system changes in future to introduce different dispatch systems and deployment models that enable greater use of treat and release and treat and refer.

- Develop a business case for an additional scheduler within operations to extend the operating hours further into the evenings and across the full seven days of the week.

- Create an additional logistics depot within a different part of the Grey County geography to mitigate the capacity and business continuity risks of the current arrangements. This should also consider spare vehicle capacity in-line with increased frontline resource requirements in future.

Glossary

Term	Definition	
Activation Time	Time from T1 Call Received to T2 Unit Notified	
ALS	Advanced Life Support	
AVL	Automatic Vehicle Location	
BLS	Basic Life Support	
CACC	Central Ambulance Communications Centre	
CTAS	Canadian Triage and Acuity Scale	
	1	(Resuscitation): Conditions that are threats to life or limb (or imminent risk of deterioration) requiring immediate aggressive interventions
	2	(Emergent): Conditions that are a potential threat to life, limb or function requiring rapid medical intervention or delegated acts
	3	(Urgent): Conditions that could potentially progress to a serious problem requiring emergency intervention
	4	(Less Urgent): Conditions that are related to patient age, distress, or potential for deterioration or complications which would benefit from intervention or reassurance
	5	(Non Urgent): Conditions that may be acute but non-urgent as well as conditions which may be part of a chronic problem with or without evidence of deterioration
FRU	First Response Unit	
FT	Full Time	
GCPS	Grey County Paramedic Services	
Incident	A P1 to P4 call resulting in at least one unit response	
LTM	Lower Tier Municipality	
Mobilization	A unit being mobilized to an incident (may be more than one unit mobilization for an incident and may not reach scene)	
Mobilization Time	Time from T2 Unit Notified to T3 Unit Mobile	
MOHLTC	Ministry of Health Long-Term Care	
Occupied Time	Time from T2 Unit Notified to Unit Clear	
Optimization	Using a sophisticated, geographically based genetic algorithm to evaluate multiple configurations of locations and identify best options.	
ORH	Operational Research in Health Ltd	
P4NonT	Priority 4 incidents excluding inter-facility transfers	
P4T	Priority 4 inter-facility Transfer incidents	
PCP	Primary Care Paramedic	

Glossary

Term		Definition
Priority 1 to 4	P1	(Deferrable): A routine call that may be delayed without detriment to the patient (eg, a non-scheduled transfer; a minor injury)
	P2	(Scheduled): A call which must be done at a specific time, for example because of special treatment or diagnostic facility requirement (eg, inter-hospital transfers or a scheduled meet with an air ambulance)
	P3	(Prompt): A call that should be performed without delay (eg, serious injury or illness)
	P4	(Urgent): A call that must be performed immediately where the patients 'life or limb' may be at risk (eg, Vital Signs Absent patient or unconscious head injury)
PT		Part Time
Response		A unit arriving at the scene of an incident (there may be more than one unit response at an incident)
Response Time	1	Time from T2 Unit Notified of the first notified unit to T4 Arrive Scene of the first arrived unit. BCPS uses this measurement of response
	2	Time from T0 Call Answer to T4 Arrive Scene of the first arrived unit. ORH also monitors this measurement of response time for modelling
Simulation		Using a discrete event simulation model, which replicates the key characteristics of an emergency service, to predict future behaviour under a variety of difference scenarios.
Standby (Priority 8)		Moving a crew from one station to another station to maintain coverage
Time Events	T0	Time Call Answered
	T1	Time Available for Dispatch
	T2	First Unit Notified
	T3	First Unit Mobilized
	T4	First Unit Arrived at Scene
Utilization		The combined occupied time of all units divided by the combined total deployed unit hours (shift start to shift end)

Contents

1   INTRODUCTION

Report Overview

1.1   Operational Research in Health Limited (ORH) has carried out a Comprehensive Deployment Review of Paramedic Services for the County of Grey (Grey County or the County) in order to develop a plan for the delivery of Paramedic Services. The key objectives for the review included:

- Projecting ambulance call volumes, taking into consideration opportunities for alternative response options.

- Recommending response time standards that balance efficiency, service quality, geography, affordability and patient outcomes.

- Recommending the resources required to achieve response time performance plans, including frontline and support services.

- Recommending a station facility model.

- Identifying broader considerations for overall service efficiencies.

- Supplying a modelling tool for use in-house.

1.2   This is the Final Report for the review and encompasses a ten-year time period from 2023 to 2033. This report is for review ahead of recommendations regarding support services.

1.3   A quantitative description of Grey County Paramedic Services (GCPS) operations embracing demand, performance, resources and resource use is provided in Section 2. Using historical demand and population data, a demand projection was produced through to 2033 (Section 3).

1.4   A simulation model of Paramedic Services operations was built and validated, and used to create a Base Position (Section 4). The model was then used to assess options for changing the station configuration (Section 5), testing changes to the current model (Section 6) and for maintaining response performance in 2033 (Section 7).

1.5   The final phasing of recommendations is provided in Section 8.

1.6   An overview of the review of organizational structures and support services is included in Section 9.

1.7   ORH engaged with staff and Council after the creation of the Draft Report; feedback from this is included in Section 10.

1.8   A glossary of terms is provided in Appendix **A**.

Background

Grey County Paramedic Services

1.8   The County of Grey assumed the responsibility of delivering Paramedic Services as of September 4, 2004. GCPS provides emergency and non-emergency out-of-hospital primary care as well as community paramedic care to approximately 100,000 permanent residents and several thousand seasonal residents over a 4,500 square kilometer area in Ontario. Grey County is located in south-western Ontario and is bordered by the County of Simcoe, the County of Dufferin, the County of Wellington, the County of Huron and the County of Bruce.

1.9   The current fleet consists of 23 vehicles inclusive of ambulances and response units. GCPS provides nine transport ambulances at peak, and eight transport ambulances off peak.

1.10   GCPS employs nine management, three administrative staff, and 145 full-time and part-time paramedics. The operations include not only emergency responses but a complement of community programmes.

1.11   GCPS operates from within eight response stations, all of which are currently staffed 24/7, and these staff are dispatched by the London Central Ambulance Communications Centre (CACC), operated by the Ministry of Health (MoH).

ORH

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

1.13   We have set the benchmark for emergency service planning, with a proven approach combining rigorous scientific analysis with experienced, insightful consultancy. Our expert team uses sophisticated modeling techniques to identify opportunities for improvement and uncover hidden capacity. Simulating future scenarios ensures that solutions are objective, evidence-based and quantified.

1.14   ORH has been continuously active in undertaking paramedic services reviews across the world over more than 35 years. The process of applying our modelling and analysis techniques to varied jurisdictions has given ORH unrivalled international Paramedic Services consultancy experience. It has also ensured that our approach is flexible and can encompass the wide range of factors encountered in working with clients and their stakeholders.

1.15   ORH's approach to strategic planning is centred on consultancy, extensive data analysis and using a suite of modelling packages developed in-house:

- **Analysis** of demand, performance and resource use to allow the model of the service area to be populated and validated, and to inform an appraisal of potential options for change.

- Identifying and **modelling** options that aim to improve the effectiveness, efficiency and equity of service provision.

- Delivering sustainable solutions in a timely manner through a tried and tested **consultancy** process with suitably qualified personnel.

2 CURRENT SERVICE PROFILE

ORH collected data from ADRS to understand the demand placed on GCPS, the usage of resources deployed, and the response performance achieved within Grey County.

Analysis of January 2018 to May 2022 data showed that GCPS responded to an average of 33.4 incidents per day excluding standby moves. Priority 4 (P4) incidents accounted for 59% of all incidents. P3 and P4 demand is generally increasing year-on-year at 4.2% per annum. Demand levels ranged from 32.6 incidents per day in the peak (December to February) to 27.8 incidents per day in the off-peak period, mainly driven by changes in the Blue Mountains.

GCPS met all CTAS reporting targets at County-wide level, although these are not met in some of the rural LTMs including Chatsworth and Grey Highlands. Historically, GCPS have met the majority of targets according to Interdev reporting.

On average, GCPS spend around 50 to 55 minutes 'occupied' on each P3 or P4 incident (measured from time mobile to time clear). Time at hospital is the longest call component for both P4 and P3 incidents and has been increasing since 2020, peaking at 24m36s in December 2021.

All of GCPS' eight stations were crewed 24/7, with one additional 12/7 day shift at Owen Sound. A 12-hour FRU was also deployed at Markdale during the daytime. Owen Sound vehicles account for 31% of P1 to P4 responses whereas Dundalk, Durham and Markdale account for less than 9% each. Recent deployments produce an average of 1,428 ambulance and 48 FRU hours per week (including peak resources, averaged out across the year).

ORH benchmarked GCPS against its database of Ontario ambulance service data. Generally, GCPS benchmarked well and was not a particular outlier in any measure although did have a quicker time to scene and time to hospital when compared to the other rural services.

Introduction

2.1 ORH collected data from ADRS to understand the demand placed on GCPS's services, the usage of resources deployed, and the response performance achieved within Grey County.

2.2 A four and a half year sample of data, from January 1, 2018 to June 1, 2022, was collected in order to examine and analyze trends in demand and performance.

2.3   ORH also collected historical Demand and Performance reports. This was compared to demand and performance analyzed from the ADRS data to see that all data was present without duplication and to test that ORH's interpretation of the data aligned with that of GCPS.

Demand

2.4   Demand analysis focused on the main sample, from January 1, 2018 to June 1, 2022. For this report, demand is generally defined as GCPS-responded incidents including out-of-area demand; if two vehicles mobilize to or attend the scene of the same incident, this unique incident is only counted once.

2.5   GCPS responded to an average of 33.4 incidents per day, including 3.9 per day outside Grey County, but excluding standby moves. A further 1.7 incidents per day occurred within Grey County but received only a response from another service (see Figure **2-1**).

2.6   Priority 4 (P4 or Code 4) incidents, which are the highest priority, accounted for 19.8 per day or 59% of all incidents and P3 accounted 12.8 per day or 38% of all incidents (see Appendix **B1**). P1 and P2 demand has remained stable at a low level throughout the sample period.

2.7   The largest proportion of P1 to P4 demand is in Owen Sound Lower Tier Municipality (LTM) at 10.8 per day (or 32.3% of all incidents), followed by the Blue Mountains at 4.2 (or 12.4%). The lowest demand level is in Southgate at 1.1 incidents per day (or 3.3%).

2.8   P3 and P4 demand, occurring within Grey County, increased from 28.1 incidents per day in 2018 to 33.2 in 2022, a total increase of 18.1% or an average annual increase of 4.2% (see Appendix **B2**). P3 and P4 demand is generally on an upward trend, with a reduction in 2020 owing to the influence of the COVID-19 pandemic.

2.9   Examining the change in demand by LTM, the largest increase was in Owen Sound with 3.2 more incidents per day in 2022 than in 2018. This is followed by West Grey with 0.9 more per day. This equates to an average annual change of 7.0% for Owen Sound and 8.1% for West Grey. Southgate and Georgian Bluffs experienced the highest percentage changes at around 9% per annum however the actual increase in volumes in these areas is relatively small. Blue Mountains experienced a decrease in 2021 potentially owing to changes in recreation during the COVID-19 pandemic.

2.10   The detailed geographical spread of P4 non-transfer incidents for the full sample is mapped in Figure **2-2**. Demand is more clustered in urban LTMs such as Hanover and Owen Sound whereas it is sparse for more rural LTMs such as Dundalk and the Grey Highlands.

2.11   Bruce County Paramedic Services commonly responds to the west of Grey County, along with responses in the Blue Mountains by County of Simcoe

Figure 2-1: Demand by Service and Within/Outside Grey

Demand by LTM

Average Daily Incidents

Service	Category				Overall
	P1	P2	P3	P4	
GCPS within Grey	0.4	0.1	11.3	17.7	29.5
GCPS outside Grey	0.3	0.0	1.5	2.0	3.9
Other Service within Grey	0.4	0.0	0.3	1.0	1.7

Overall	**1.2**	**0.1**	**13.1**	**20.8**	**35.2**

Figure 2-2: P4 Non-transfer Incident Distribution

01 January 2018 to 01 June 2022
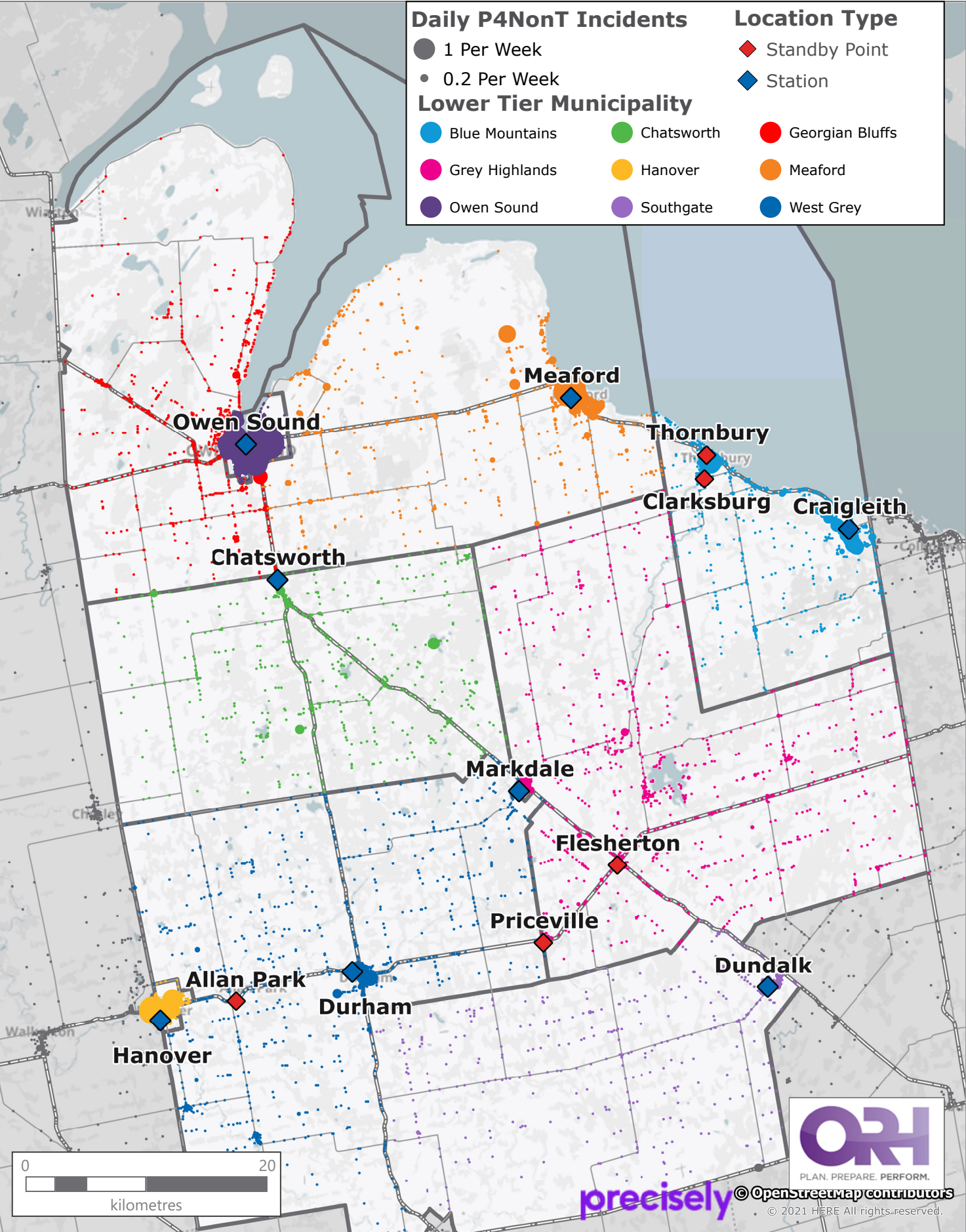
Paramedic Services and in Southgate by Guelph-Wellington Paramedic Services (see Appendix **B3**).

2.12 Demand levels ranged from 32.6 incidents per day in the peak period of the year (December to February) to 27.8 incidents per day in the off-peak period (see Appendix **B4**). The difference was greatest in the Blue Mountains, with an average daily demand of 3.7 incidents higher in peak than in off-peak. There were relatively small fluctuations in other areas indicating no clear differences by season.

2.13 Across the week hourly demand peaked between 12:00 and 13:00 with around 2.0 incidents per hour occurring during this time (see Appendix **B5a**). Demand gradually decreases through the evening and night hours except for 19:00 where demand peaks again, particularly for weekends. There is as a peak in P3 Transfer (P3T) incidents scheduled at this time (see Appendix **B5b**).

2.14 The majority of patients from Grey County were taken to hospitals operated by Grey Bruce Health Services (GBHS). GBHS Owen Sound was the most frequent destination for patients at 85.4 per week, or 46.4% of patient journeys (see Appendix **B6**). The remaining four hospitals in Grey County all received a smaller number of patients per week, between 10.6 at South Bruce Grey Health Centre (SBGHC) Durham and 21.1 at Hanover and District Hospital. Due to their proximity to the Grey County border, Collingwood General and Marine Hospital and SBGHC Walkerton together received 10.1% of patients despite being out of area.

Response Performance

2.15 Response performance statistics are submitted by GCPS to the MoH by Canadian Triage Acuity Scale (CTAS) with CTAS1 being the highest acuity. GCPS has set a response performance target by CTAS for P4 incidents:

- CTAS 1: 60% in 8 minutes

- CTAS 2: 90% in 15 minutes

- CTAS3-5: 90% in 20 minutes

2.16 Mandated reporting of response performance to the MoH calculates performance from the time the first vehicle is notified until arrival on scene. ORH replicates this calculation but also presents performance measured from the time the call is answered, to include the processes undertaken in the London CACC. Targets are set by CTAS code but not by Priority code, though only P4 incidents are included in performance calculations.

2.17 When measured from the time the call was answered, P4 8-minute response performance (the percentage of incidents receiving a response within 8 minutes) varied from 13.7% in Georgian Bluffs to 70.9% in Owen Sound (see Appendix **B7**); Grey County overall P4 8-minute response performance was

46.4%. Measured at the 15-minute mark, this performance was 81.5% across Grey County.

2.18   When measured from the time the first vehicle was notified, P4 8-minute response performance varied from 19.7% in Chatsworth to 91.1% in Owen Sound; Grey County overall P4 8-minute response performance was 63.3%. The 15-minute response performance measured from time first notified was 88.9%.

2.19   Across the sample period, when just considering P4 incidents, GCPS met or exceeded all CTAS targets at County-wide level (see Figure **2-3**). CTAS1 8-minute performance was 64% compared with a target of 60%. While the targets were met County-wide, there was significant variation by LTM; Chatsworth and Grey Highlands achieved below 30% for this measure while Hanover and Owen Sound achieved above 85%.

2.20   CTAS1 is the highest acuity and relatively few calls are coded in this category; CTAS2 volumes are larger and are measured at 15-minutes with a standard of 90%. Historically GCPS have met or been close to meeting this standard; during the sample for this review performance was at 90% within 15-minutes.

2.21   Options for improving performance and reducing the disparity between LTMs are explored in the modelling described in Section 7.

2.22   Mean response time is generally lowest in areas in close proximity to stations (see Appendix **B8**). Areas of the County that have longer average response times (for example, Grey Highlands) tend to have lower demand volumes. The simulation modelling described in Sections 6 and 7 includes testing deploying vehicles in such areas to improve longer response times.

Call Components

2.23   ORH calculates each component of the call cycle separately and analyzes these to understand how they may vary by day (see definitions and outcomes in Appendix **B9**). On average, GCPS spend around 50 to 55 minutes 'occupied' on each incident (measured from time mobile to time clear).

2.24   Average total occupied time for P4 NonTs is almost half that of P4Ts at 48m30s compared to 92m08s. Nearly all call components are longer for P4Ts than NonTs; travel time to hospital is particularly different owing to the fact that they are often transfers to larger hospitals out-of-County. The time spent at hospital is also 7m10s longer on average.

2.25   P4 occupied time is 3m36s shorter than P3 occupied time; the main difference can be seen in the shorter assignment times for P4 incidents, as assignments to P3 incidents are permitted to be delayed in certain circumstances. Travel time to scene is shorter for P4 incidents as vehicles will more often travel under lights-and-sirens.

Figure 2-3: P4 CTAS Performance by Lower Tier Municipality

01 January 2018 to 01 June 2022

Average Daily Incidents

CTAS	Lower Tier Municipality										Service-wide
	Blue Mountains	Chatsworth	Georgian Bluffs	Grey Highlands	Hanover	Meaford	Owen Sound	Southgate	West Grey	Out of Area	
CTAS1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	**0.3**
CTAS2	0.7	0.2	0.3	0.4	0.4	0.4	1.6	0.2	0.5	0.4	**5.2**
CTAS3	1.3	0.4	0.5	0.6	0.9	0.6	3.0	0.4	0.7	0.6	**9.0**
CTAS4	0.2	0.1	0.1	0.1	0.1	0.1	0.6	0.0	0.1	0.1	**1.4**
CTAS5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	**0.4**

Response Performance (Time First Notify to Arrive Scene)

CTAS	Target	Lower Tier Municipality										Service-wide
		Blue Mountains	Chatsworth	Georgian Bluffs	Grey Highlands	Hanover	Meaford	Owen Sound	Southgate	West Grey	Out of Area	
CTAS1	**8**	57%	29%	48%	28%	87%	52%	93%	37%	46%	32%	**64%**
CTAS2	**15**	92%	64%	89%	63%	99%	90%	99%	81%	87%	74%	**90%**
CTAS3	**20**	98%	92%	97%	85%	100%	97%	100%	94%	98%	91%	**97%**
CTAS4	**20**	98%	88%	100%	89%	100%	97%	99%	93%	99%	96%	**98%**
CTAS5	**20**	100%	83%	98%	92%	100%	96%	100%	85%	95%	91%	**97%**

Note: all CTAS levels have a 90% target except CTAS1 at 60%

2.26   Time at hospital is the longest call component for both P4 and P3 incidents. Although, there is a wide variation by facility (see Appendix **B10a**), the time spent at hospitals within Grey County is generally lower than that at facilities outside the County.

2.27   This should however be considered in the context of patient volumes; hospitals within Grey County receive 84% of all patients, thus giving an overall average time at hospital of 20m42s.

2.28   Time at hospital has gradually increased from 16m37s at the end of 2019, peaking at 24m36s in December 2021 (see Appendix **B10b**). There was a smaller peak in average time at hospital from April to October 2020 owing to the impact of the COVID-19 pandemic. The rise from 2021 onwards is then correlated to a rise in patient volumes; this can be seen as arrival to handover times are also increasing during the same timeframe, due to an increased strain on facilities. The future impact on performance when faced with different times at hospital is tested in section 7.

Resources

2.29   GCPS currently deploys at least one double-staffed 24/7 ambulance to each of its eight stations. Two 12-hour day shifts are deployed in addition, one at Owen Sound from 09:00 to 21:00 and another first response unit (FRU) is deployed at Markdale. During the peak season the following resources are added:

- For two weeks in the Christmas break, a 12-hour day shift is added at Craigleith

- After the Christmas break until the March break, a 12-hour day shift is added at Craigleith on weekends

- For the March break a 12-hour day shift is added at Craigleith

2.30   These recent deployments produce an average of 1,428 ambulance and 48 FRU hours per week (including peak resources, averaged out across the year).

2.31   As GCPS's collective agreement mandates 12-hour shifts and GCPS must also maintain a base level of coverage in a relatively rural area, it is difficult for the ambulance deployments to perfectly match the pattern of demand. Broadly the peak in resources matches the peaks in demand in both the early afternoon and at 19:00 (see Appendix **B11**).

Resource Use

2.32   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.

2.33   Ambulance utilization for 2022 is at its highest level from 12:00 through to 15:00 at 26% utilized which coincides with the peak in demand. Excluding standby moves (P8s), average ambulance utilization was 17.9% (see Figure **2-4**).

2.34   Utilization increases to 20.6% when standby moves are included in the calculation. The difference between utilization when standby moves are or are not included is greater during the day than nighttime, as this is when most moves occur. The difference is also large between 19:00-21:00 since that is when shifts are finishing, thus vehicles must move to provide coverage or return the vehicle to its base station.

2.35   More rural stations such as Dundalk, Durham and Markdale do not undertake as much workload as the more urban stations in terms of average daily responses, however each of these stations has one vehicle deployed 24/7 to provide cover in the more sparsely populated areas of Grey County (see Appendix **B12**).

2.36   Vehicles from four of the eight stations (Owen Sound, Hanover, Meaford and Craigleith) all make more than four non-standby move responses per day; these stations spend most of their occupied time on P4 incidents. Vehicles from the remaining four spend around 20% of their occupied time on standby moves with over 50% of Durham's, Chatsworth's and Dundalk's responses being to P8s (see Appendix **B13**).

2.37   On average, 34.4 standby moves are completed per day, which represents 82% of the moves initially assigned; 18% are stood down before reaching their assigned destination (see Appendix **B14**). The average travel time for incomplete moves is longer than complete moves; this could potentially be due to the proximity of stations with longer journeys having a greater chance of being cancelled due to change in vehicle availability.

Figure 2-4: Ambulance Utilization by Hour - 2022

Utilization is defined as the sum of occupied time (from vehicle mobilization to clear) divided by **planned** rostered vehicle time; time spent on meal breaks and returning to base are thus excluded from the calculation.

Legend: - - - Including P8s — P1 to P4

Responses	Utilization
P1 to P4	17.9%
Include P8s	20.6%
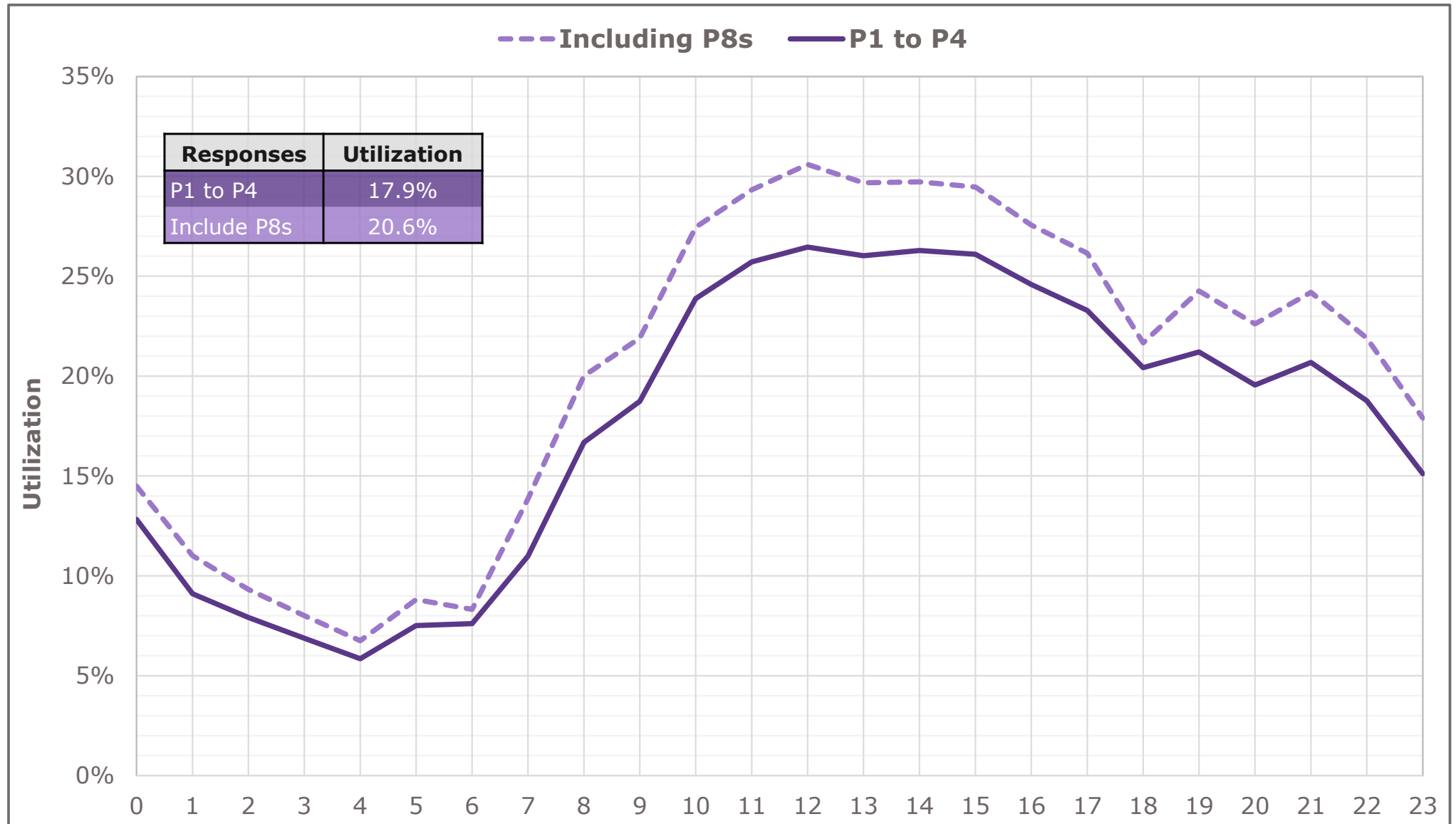
2.38   Durham and Craigleith have the most standby moves completed per day at 3.5 and 2.9 respectively. Durham will often make moves into Allen Park to provide coverage across Hanover and West Grey LTMs, while Craigleith will often be moved to Thornbury as a mid-point between Meaford and the Blue Mountains resort.

2.39   GCPS's level of standby moves is similar to that of other nearby services. It should also be noted that the level of standby moves would be expected to decrease when more stations have more than one vehicle deployed, as required in the future demand modelling (see Section 7).

Benchmarking

2.40   ORH has compiled an anonymized database of key operational parameters across recent similarly-sized Ontario paramedic service clients (see Figure **2-5**). The results of benchmarking can help to identify potential efficiencies for GCPS to target over the next ten years. This benchmarking uses GCPS data from 2018 through mid-2022, with the exception of vehicle utilization which uses 2022.

2.41   Generally, GCPS benchmarked well and was not a particular outlier in any measure.

2.42   The main points of interest from the benchmarking are that:

- Time at hospital is the third shortest out of the benchmarked services at 20m14s (see Appendix **C1**). This is 4m40s longer than the minimum but 24m11s shorter than the maximum. Most hospitals post COVID-19 have seen a large increase in arrival to handover times thus time at hospital, however hospitals within Grey County have been relatively unaffected.

- GCPS also has both the third shortest arrival to handover and handover to clear times. There is a large correlation between both of these components for the benchmarked services.

- GCPS's time at scene ranked in the middle of the other benchmarked trusts at 24m36s.

- Occupied time is the shortest at 51m18s on average (see Appendix **C2**). This is mainly due to the shorter time at hospital however a shorter time to scene and time to hospital also contributed.

- Ambulance utilization is the third-lowest of benchmarked services, though it should be noted that utilization does not necessarily correlate with response performance as the 'ideal' utilization for a service depends the balance between its geography, demand patterns and response time targets.

2.43   On consultation with the GCPS management team it was decided that the benchmarking did not offer obvious potential efficiencies for testing, though the impact of changes to offload delays should be investigated.

Figure 2-5: Benchmarking Summary

Benchmark	GCPS Value	Rank	Minimum	Median	Maximum
P4 Control Activation Time	02:44	5 of 7	00:59	02:42	03:59
P4 Mobilization Time	00:50	4 of 8	00:25	00:51	01:11
P4 Time to Scene	07:05	2 of 8	07:02	07:27	09:12
Time at Scene	24:36	5 of 8	15:59	23:13	27:05
Time to Hospital	11:52	1 of 8	11:52	16:08	22:12
Time at Hospital	20:14	3 of 8	15:34	31:56	44:25
P4 Conveyance Rate	80.3%	3 of 8	78.7%	84.3%	89.0%
P4 Multiple Attendance Ratio	1.09	5 of 8	1.06	1.09	1.16
Occupied Time	51:18	1 of 8	51:18	61:59	70:39

3   DEMAND PROJECTIONS

In order to understand the vehicle requirements in 2033, ORH estimated demand in yearly intervals between 2022 and 2033. The underlying hypothesis of the projection method is that demand is strongly related to the population age profile, which often varies by area.

The age and gender of historical patients was combined with historical population data to produce demand rates per 1,000 by year, age and gender group, and area. This was forecasted to 2033 and combined with population projections to produce 2033 demand forecasts by LTM.

This process resulted in a projected 5.8% increase in incidents per year across the County between 2022 and 2033; this increase varied by LTM. The historical analysis and future demand projections focused on P3 and P4 incidents only as P1 and P2 demand has been at low levels historically; P1 and P2 demand was therefore kept constant for the future projection. The demand levels were then supplemented with housing data to refine the geographical spread of demand.

Methodology Overview

3.1   ORH estimated demand in yearly intervals from 2022 to 2033 in order to inform the demand levels for the ten-year plan. The approach used in this review is based on the methodology presented in the La Trobe report '*Factors in Ambulance Demand: Options for Funding and Forecasting*' (Livingstone 2007).

3.2   Several forecasting models were investigated as part of the La Trobe study. Their 'Method 4', which uses age and gender distribution trends to forecast future growth, was considered by the authors to produce the best results. The underlying hypothesis is that demand is strongly related to the population age profile. There is an underlying trend for increased demand in all age groups due to unquantifiable factors such as the overall level of health provision, public expectation, etc, which, it is assumed, will continue into the foreseeable future.

3.3   As well as a slight overall population increase, the population across the County is expected to age by 2033. This in itself is expected to lead to an increase in demand, an effect which is well-known from observations of Paramedic Services demand around the world.

3.4   An overview of the approach taken is provided in Figure **3-1**. This method relies on the availability of accurate historical and future population and demand data.

Figure 3-1: Population-based Projection Method
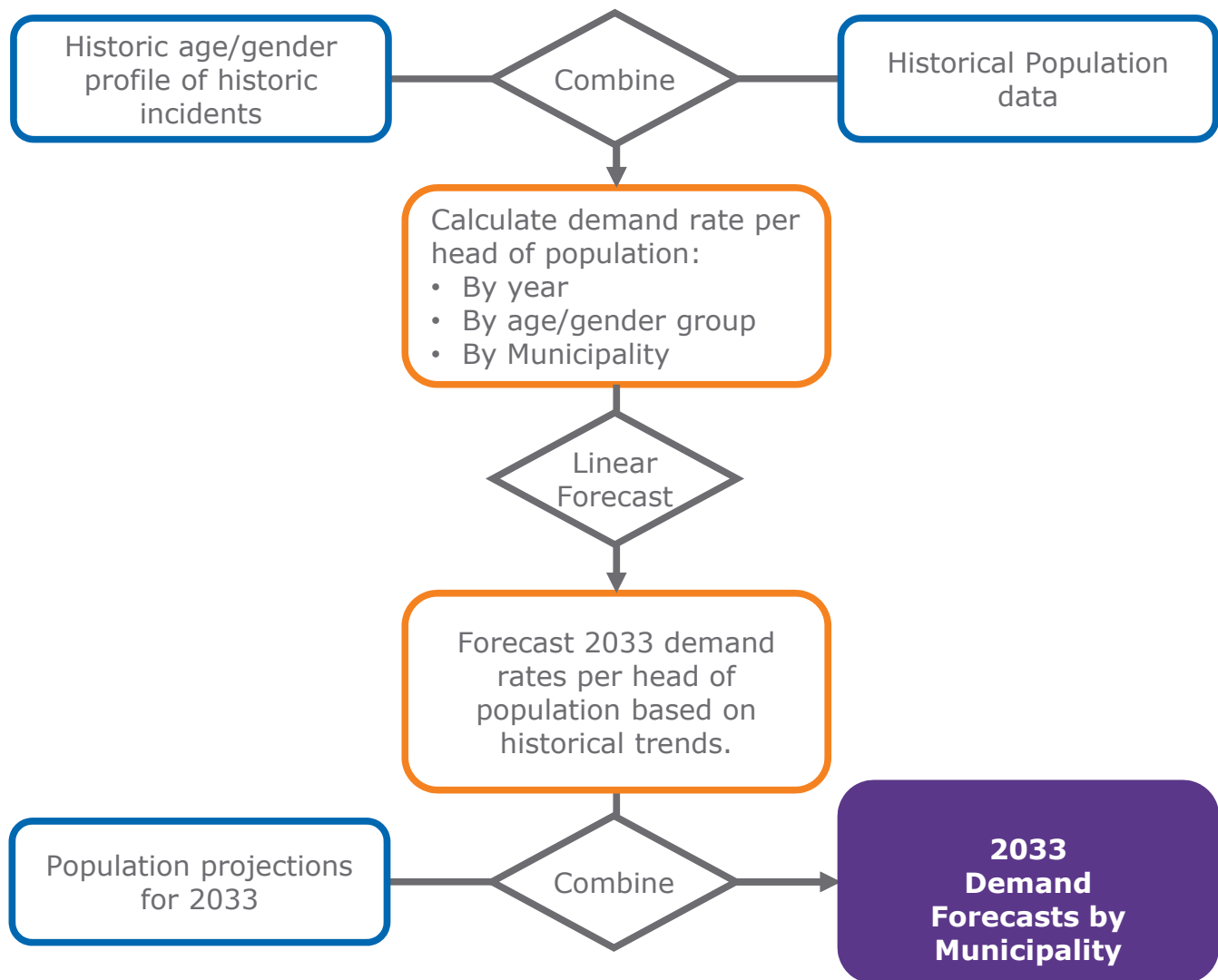
Population and Demand Profiles

3.5   To calculate demand projections according to the method described in Figure **3-1**, historical population estimates and future population projections are required by age, LTM and year through to 2033.

3.6   No single data source provided the required detail and therefore an amalgamation process was required, which involved:

- Combining Hemson Consulting estimates alongside Ministry of Finance future projections to produce LTM age profiles for future years (2021 to 2033).

- Linearly projecting the Statistics Canada historical population estimates by Age, Gender and LTM was used to do the same for historical years (2012 to 2020).

3.7   Using this methodology showed a typical ageing profile in the County from 2021 to 2033 and was also seen in the majority of LTMs. The 75+ age group is projected to increase by 64.7% across Grey County (see Appendix **D1**) and would make up 16.3% of the total population by 2033 rather than 11.0% in 2021.

3.8   Historical age and gender demand data was also analyzed. This covered the period from 2012 to 2020 to ensure changes driven by the COVID-19 pandemic were understood but did not skew the overall projection.

3.9   Demand data showed that P1 and P2 incidents were reducing slightly in volume from 2012 through to 2033. Following consultation with GCPS it was decided to focus on P3 and P4 incidents within the demand projection.

3.10   Historical population and demand were then combined to calculate annual demand rates per 1,000 population by age group and year for 2012 to 2020. These were compared to understand the underlying trend for requests for ambulance assistance so that demand rates could be projected through to 2033.

3.11   In each age band, demand rates per 1,000 are projected to increase from 2022 to 2033 (see Appendix **D2**). The increase projected is largest in the 75+ age group going from 365 incidents per 1,000 people in 2022 to 704 incidents per 1,000 people in 2033.

3.12   There are multiple potential reasons for this large change in demand rates; potentially as people live longer they may more commonly have multiple co-morbidities, and also the increased demand rates could be related to changes in access to primary care and other health services.

Demand Projection Results

3.13   The projected 2033 demand rates were combined with the future population estimates to give a final demand projection by LTM. This resulted in an average annual demand increase of 5.8% across Grey County, varying from 3.9% in Chatsworth to 8.7% in the Blue Mountains (see Figure **3-2**).

3.14   GCPS agreed that the demand increases should be applied to P3 and P4 incidents only, due to the historical trend of diminishing P1 and P2 incidents. P1 and P2 demand was kept constant.

3.15   This projection was taken forward for use in the modelling phases of the study, with alternate demand levels equal to a 3.8% and 7.8% annual increase treated as sensitivity modelling. This certifies that future recommendations are robust and future-proof options.

Incorporating Future Housing Developments

3.16   The demand projection estimates the future number of incidents per day in each LTM as a whole. Supplementary development information gives a more granular geographic distribution of these incidents within each LTM. The County provided expected housing unit numbers and locations, which were scaled to align with 2033 projected LTM population numbers.

3.17   A future demand level was created for these developments, by combining the projected demand rate per head of population with the expected units and persons per unit. It is assumed that the population housed within these developments are a subset of the population projections, and therefore the projected demand was split between demand in new developments and demand in existing areas.

3.18   There are developments of varying footprints in each LTM (see Appendix **D3**). The size of developments on the map does not necessarily represent the number of units in each area.

3.19   The Blue Mountains contains the largest number of new development units which aligns with it being the fastest-growing LTM. All development areas over 1,000 total units are located close to a station, except for that at Cobble Beach in Georgian Bluffs. The optimization modelling sought to identify whether this would affect the optimal deployment of stations (see Section 5).

Figure 3-2: Demand Projections

Legend: —◆— Historical —◆— Projected

Y-axis: Average Daily Incidents (P3 + P4)

Data labels on chart: -2.7%, 4.1%, 15.6%, 6.1%, 10.8%, 18.3%, 0.8%, -5.0%, 11.4%, 8.7%, 10.6%, 5.7%, 5.4%, 5.5%, 5.6%, 5.4%, 5.3%, 5.0%, 5.0%, 5.3%, 5.2%

Note: mobilizations around 13% higher than incidents on average
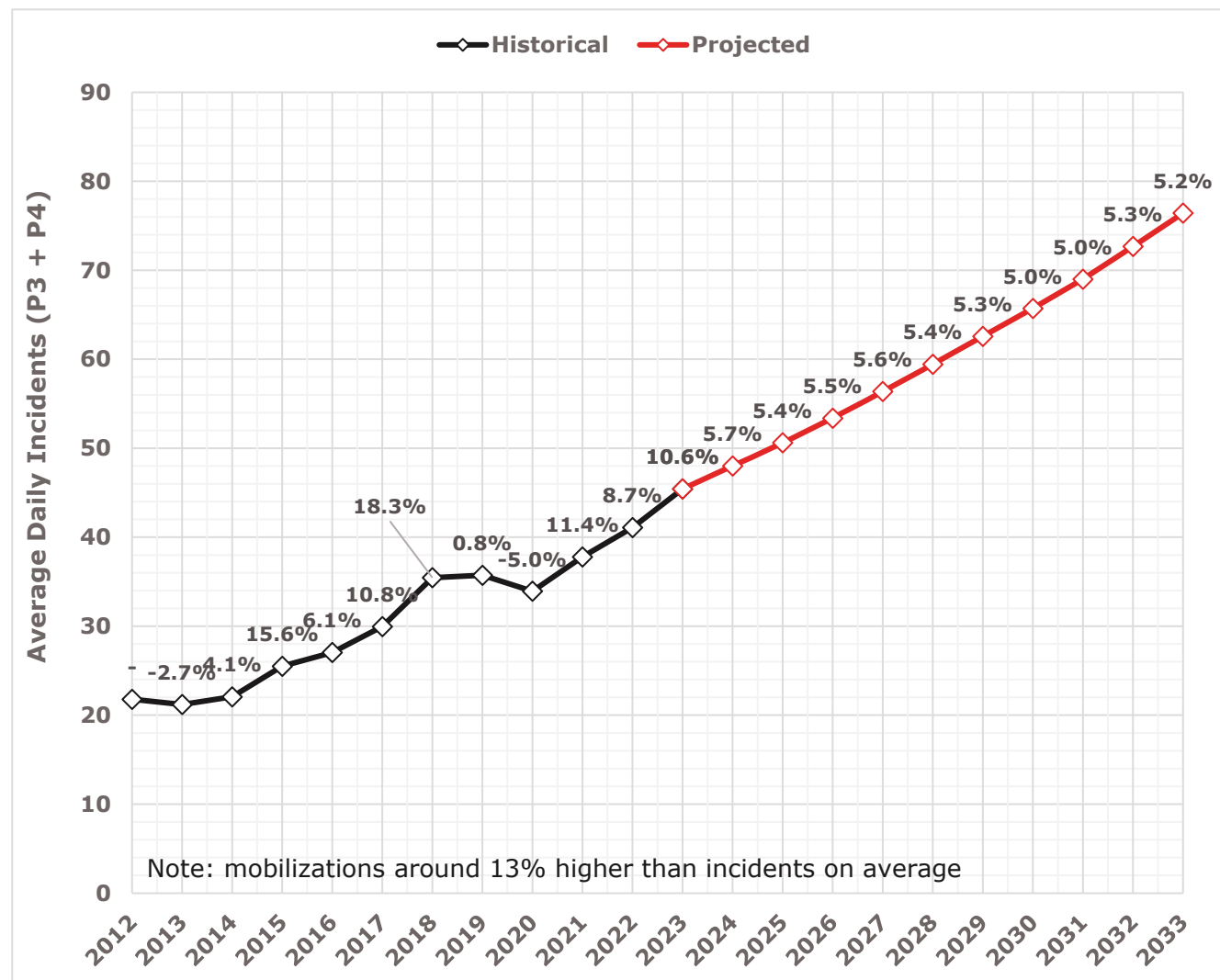
Annual % Increase (P3 and P4)

LTM	2012-22	2022-33
Blue Mountains	18.6%	8.7%
Chatsworth	5.4%	3.9%
Georgian Bluffs	5.4%	5.0%
Grey Highlands	4.8%	4.7%
Hanover	6.0%	6.1%
Meaford	3.1%	6.4%
Owen Sound	5.9%	5.1%
Southgate	9.1%	5.2%
West Grey	4.8%	4.9%
Overall	**6.5%**	**5.8%**

4   MODEL VALIDATION AND BASE POSITION

A key reason for undertaking detailed analysis of the current service profile (described in Section 2) was so that this information could be used to populate ORH's simulation model, AmbSim. AmbSim is a discrete event simulation model that replicates the key characteristics of an emergency ambulance service and can be used to predict future behaviour under a variety of different scenarios.

The model was validated by comparing a 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. It was concluded that the model replicated current behaviour accurately and therefore could be used with confidence when examining options for change.

The model was validated and configured using analysis of the last year of ADRS data (June 2021 to May 2022). Upon matching this, a final validated position, or Base Position, was established and was used to compare most other modelling scenarios to.

Model Validation

AmbSim

4.1   ORH has developed a sophisticated simulation model, AmbSim (see Appendix **E1**), for modelling the operations of ambulance services. AmbSim is a discrete event simulation model that replicates the key characteristics of an emergency ambulance service and can be used to predict future behaviour under a variety of different scenarios.

4.2   AmbSim takes account of the actual geographical and temporal distributions of demand and resources and incorporates travel times between locations. It reports operational performance in terms of response times, vehicle workload and utilization, and patient flows.

4.3   A virtual replica of GCPS operations was created within AmbSim. Once validated, and thereby shown to accurately reflect the historical sample service profile analyzed, a final validated position, or Base Position, was created.

Model Validation

4.4   ORH's simulation model was populated using parameters derived from analysis of the last year of provided ADRS data (June 2021 to May 2022). Analysis of GCPS activity data provided information on demand, call locations, job cycle times and hospital transports. Service data was also used to provide

ambulance numbers and deployed hours, deployment locations, and dispatch times for inputting to the model.

4.5   In addition to this data, ORH developed a detailed travel time model of the GCPS area using commercially available data calibrated against information on journey times from activity data. To achieve this, the area was 'noded' with key points in relation to the road network and incident distribution (including some locations outside the region). Stations and hospitals were also included as noded points.

4.6   Travel times between nodes are a key model input and were assigned initially based on road classifications that differentiate achievable speeds in 'average' traffic conditions. A careful calibration process was undertaken that gives ambulance travel times for different periods of the day, reflecting lights and sirens conditions as well as normal speeds.

4.7   The model was then validated by comparing a 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.

4.8   The modelled P4NonT response time distribution, measured from the time of call, showed a close match to actual analyzed values (see Appendix **E2**).

4.9   Modelled ambulance utilization in AmbSim also closely followed the temporal profile analyzed from the ADRS data and similarly, hospital flows aligned with those analyzed.

4.10   The comparison of outputs showed that the model was an accurate replica of GCPS operations and therefore was appropriate to use for different modelling scenarios. This final validated position was therefore used as a Base Position, the outputs of which would be compared to most other modelling scenarios (see Figure **4-1**).

4.11   GCPS are required to report performance to MoH by CTAS, however this can change at scene and priority is the categorization system used at point of dispatch. The CTAS performance can be somewhat inferred using the priority system in terms of high to low acuity.

Peak and Off-Peak Modelling

4.12   Analysis showed that demand in the peak period (December to February) was 4.5 incidents per day higher than the rest of the year across Grey County, and the difference was mainly driven by demand in the Blue Mountains (see Section 2).

4.13   To reflect these localized seasonal differences, peak and off-peak versions of the Base Position were created in order to assess whether resourcing profiles should be flexible across the year in certain locations to better match the profile

of demand. The models were updated with daily demand for the peak and off-peak periods by LTM as well as slight differences in resourcing levels.

4.14 County-wide P4 8-minute response performance in the peak 2022 Base Position model is 59.9% and the equivalent figure is 62.2% in the off-peak model.

Figure 4-1: Base Position

P4 Performance

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	46.8%	56.5%	89.9%	10:01	15:01
Chatsworth	25.0%	38.3%	69.3%	12:26	18:48
Georgian Bluffs	33.4%	51.1%	87.3%	10:42	15:41
Grey Highlands	30.0%	39.4%	64.6%	12:54	21:13
Hanover	84.9%	93.2%	98.1%	06:17	09:01
Meaford	53.9%	66.7%	88.1%	08:53	16:10
Owen Sound	89.3%	94.3%	97.8%	06:02	08:13
Southgate	44.4%	48.6%	72.6%	11:06	19:19
West Grey	46.9%	61.4%	83.5%	09:57	16:59
Overall	**61.6%**	**70.6%**	**87.5%**	**00:08**	**00:16**

5   LOCATION OPTIMIZATION

ORH's location optimization model OGRE was used to assess the configuration of existing station locations and identify how this could be improved currently and in the future. The model uses a genetic algorithm which evaluates large numbers of potential configurations, resulting in an optimal solution.

The modelling initially focused on 'blank canvas optimization' (assuming no sites are fixed) and the criteria was to minimize the mean response time to P3 and P4 NonT (non-transfer) incidents.

Three demand scenarios were modelled: GCPS-responded demand, all demand in Grey County, and GCPS-responded demand plus forecasted housing development demand. The results from these were very similar with the optimal eight locations in close proximity to existing station locations. The optimization results suggested a site in Thornbury instead of Chatsworth; this was tested in the simulation model, the results of which are discussed in Section 6.

Individual station optimization scenarios were created for Craigleith and Durham in case of potential changes to locations required in these areas.

Overview

5.1   ORH's location optimization model OGRE (Optimizing by Genetic Resource Evolution) can be used to assess the configuration of existing station locations and identify how this could be improved currently and in the future. The model uses a genetic algorithm which evaluates large numbers of potential configurations, resulting in an optimal solution.

5.2   The location optimization criteria used in all cases was to minimize the mean response time to P3 and P4 non-transfer incidents. 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 fully evaluated with simulation modelling.

Blank Canvas Optimization

5.3   In the first instance, the optimization model was used to find eight optimal sites given that there are eight stations currently, taking account of the potential coverage provided to GCPS-responded demand. This therefore excludes any demand which was met by other services within Grey County.

5.4 Mapping the location optimization results shows that the current station configuration was well aligned to the optimal deployment of eight stations (see Appendix **F1a**), with the exception of Chatsworth which OGRE instead placed in Thornbury. There was also a small change to the location of Markdale which was placed slightly northeast of its current position.

5.5 Completing the same blank canvas optimization but instead using nine locations produces a configuration with sites near to all current locations, plus a location at Thornbury (see Appendix **F1b**). A simulation scenario with Thornbury station utilized is tested in Section 6.

5.6 The optimization results are identical when all demand is modelled (including that met by other services), as well as when 2033 demand with future developments are modelled.

Individual Station Optimization

5.7 The Steering Group requested specific optimization runs to potentially relocate Durham and Craigleith stations independently, with all other stations as their existing locations. In each case, OGRE was used to test locations within each area and create a 'score' of best to worst location.

5.8 The scope of the review includes the supply of AmbSim which will enable GCPS to test individual locations and produce performance outcomes should opportunities to relocate arise.

Durham

5.9 The optimal potential area for Durham station is along Highway 6, between the intersections with Elizabeth St and Chester St, along with Lambton St west of Highway 6 (see Appendix **F2a**).

Craigleith

5.10 The optimal area for a station in Craigleith encompasses the existing station location, though a site inside the Blue Mountains resort itself would provide the best coverage (see Appendix **F2b**). Demand in the resort is relatively high in comparison to the surrounding areas.

6   MODELLING SCENARIOS FOR CURRENT SERVICE OPERATIONS

ORH simulated current service operations, with specific changes to resourcing in order to find potential efficiencies.

Adding a 24/7 shift at Thornbury improved response performance, but replacing Chatsworth station with Thornbury lead to a 2.2% decrease in overall P4 8-minute response performance, and a 1.0% decrease in P4 15-minute performance.

ORH tested moving the currently deployed FRU to each base station and standby post. The largest improvements to P4 8-minute response performance can be achieved through redeploying it to Owen Sound or Thornbury; both increase 8-minute performance by 0.5% across GCPS. Both of these moves would also improve 15-minute performance.

To help identify optimal areas for additional resourcing and to demonstrate the geographical challenges in reducing the P4 90th percentile, one, two and three vehicles were added to each station independently. The biggest overall improvement is obtained through adding vehicles to Owen Sound; adding one 24/7 ambulance here reduces the 90th percentile by 1m09s. Even with three additional 24/7 ambulances at Markdale, there is not material reduction in the 90th percentile for Grey Highlands; it is not possible to improve geographical coverage of this LTM using existing response locations only.

The minimal resource requirement to achieve GCPS's 15-minute P4 90th percentile target involved a 17% increase in vehicle hours, or 252 extra weekly ambulance hours.

6.1   A number of scenarios were tested within the Base Position simulation model before demand projections were incorporated, to answer initial questions on potential station and vehicle locations.

Adding a Station to Thornbury

6.2   In Section 5, Thornbury was identified as an optimal location when searching for both an 8-site and 9-site station configuration. The response performance impact upon using Thornbury station was therefore tested using AmbSim.

6.3   The first scenario tested involved replacing the station at Chatsworth with one at Thornbury. Implementing this produces reductions in P4 8-minute and 15-minute response performance of 2.2% and 1.0% across GCPS respectively (see Appendix **G1a**).

6.4   Around 50% of Chatsworth's responses are standby moves (P8s) into Owen Sound; moving the station would therefore reduce coverage in both Chatsworth and in Owen Sound. This can be seen as P4 8-minute response performance in Chatsworth and Owen Sound falls by 15.0% and 3.1% respectively, compared to the Base Position. Due to the volume of calls in Owen Sound, overall response performance is heavily influenced by performance in Owen Sound.

6.5   The P4 15-minute response performance also degrades, by 9.6% in Chatsworth and 0.7% in Owen Sound. This is not outweighed by the 2.7% improvement in 15-minute performance in Meaford.

6.6   If instead GCPS maintained the station at Chatsworth and added a 24/7 ambulance to Thornbury, there would be a 2.4% improvement to P4 8-minute response performance across GCPS and a 36s improvement to the 90th percentile (see Appendix **G1b**). The improvements are especially prevalent in the Blue Mountains and Meaford with decreases in 90th percentile response performance of 1m59s and 2m14s respectively.

Relocating the First Response Unit

6.7   GCPS currently deploys a day-shift FRU at Markdale which provides coverage in the south of the County. ORH tested moving the vehicle to each base station and standby post, assuming it operates on a permanent basis at each location and doesn't provide standby cover.

6.8   The largest improvements to P4 8-minute response performance can be achieved through redeploying it to Owen Sound or Thornbury with both increasing overall performance by 0.5% (see Appendix **G2**). There are also small improvements in the 15-minute performance measure.

6.9   Permanently deploying the vehicle at Dundalk, Flesherton, Kimberley or Markdale gives a reduction in performance. The areas surrounding these stations are particularly rural, thus having resources respond quicker in these areas does not offset the generally larger performance degradations for both 8-minute and 15-minute measures in Chatsworth (at between 2.1% to 5.0%) nor in West Grey (at between 1.6% to 2.7%).

Additional Vehicles

6.10   To help identify optimal areas for additional resourcing and to demonstrate the geographical challenges in reducing the P4 90th percentile for response performance, modelling runs were undertaken to add one, two or three vehicles independently at each station.

6.11   The biggest overall improvement is obtained through adding vehicles to Owen Sound; adding one 24/7 ambulance here reduces the 90th percentile by 1m09s (see Appendix **G3**). Adding a 24/7 ambulance to Chatsworth also gives a similar improvement of 1m02s.

6.12   Adding a 24/7 ambulance at Markdale makes the smallest improvement for Grey Highlands LTM (reducing the 90th percentile by 42s), and one of the smallest improvements across GCPS. Adding three 24/7 ambulances at Markdale produces only a 22s improvement across Grey County. Coverage presents a challenge within the rural Grey Highlands LTM, and adding extra vehicles at existing stations will not materially improve geographical coverage. Instead, new response locations would be required.

6.13   In many of the other LTMs, there are diminishing returns when adding the second or third ambulance; that is, there is a much bigger improvement in the 90th percentile response performance between the Base Position and adding one 24/7 ambulance than between adding one and two 24/7 ambulances.

Achieving P4 15-minute 90th Percentile

6.14   GCPS has a target of achieving a 15-minute P4 90th percentile. ORH modelled the addition of shifts at locations and times of day which would minimize the additional resourcing requirement while achieving this target. This is an iterative process, testing different combinations of deployments within AmbSim to identify the option with the lowest total resourcing requirement.

6.15   A 17% increase in vehicle hours is required to reduce the 90th percentile to 15 minutes (see Appendix **G4**). This is the most 'efficient' way to achieve this, which involves adding two 12/7 ambulances (168 weekly vehicle hours) to Owen Sound and a 12/7 ambulance (84 weekly vehicle hours) to Craigleith, totalling 252 additional weekly ambulance hours.

6.16   While the overall 90th percentile achievement is 15 minutes (or equivalently, 90% response performance is achieved in 15 minutes) there are several LTMs below this: Chatsworth (80.8% in 15 minutes), Grey Highlands (64.8%), Southgate (73.3%) and West Grey (84.0%).

6.17   From this scenario, moving the FRU to Kimberley would improve the 90th percentile in the Grey Highlands to under 20 minutes.

7   FUTURE DEMAND MODELLING

A 2033 'Do Nothing' position was modelled to quantify the impact of demand increases (average 5.8% per annum or 68% over 10 years) with no other operational changes. P4 8-minute response performance is projected to degrade from 61.6% in the Base Position to 47.5% in 2033, and P4 15-minute performance degrades by 12.9%.

A core scenario was proposed with the aim of maintaining 2022 performance in each LTM. An additional 672 weekly ambulance hours are required which includes upstaffing the 12-hour FRU to an ambulance. At peak, an additional six vehicles would be required. Maintaining performance in each LTM leads to a 4.0 percentage point improvement in GCPS-wide P4 8-minute response performance when compared to the Base Position. P4 15-minute response performance improves by 2.3 percentage points.

A scenario was also created to identify future improved performance with P4 90th percentile targets based on the relative rurality of LTMs with a view to improving equity of performance. Under this scenario, an additional 1,428 weekly ambulance hours are required.

Sensitivity modelling was also undertaken to test parameters included in the core modelling scenarios, including: alternate demand projections, reintroducing FRUs at new stations, reintroducing FRUs at current stations but with an emphasis on 'Treat and Release', and changes to offload delays.

Do Nothing Scenario

7.1   To provide meaningful context for future resource recommendations, it was important to create a 'Do Nothing' position through to 2033. This involved using the core demand projection of 5.8% average growth per year, or 68% over ten years, with no other operational changes made.

7.2   County-wide P4 8-minute response performance degrades from 61.6% in the Base Position to 47.5% in 2033, with the P4 90th percentile increasing by 7m25s, from 16m10s to 23m34s (see Appendix **H1a**). Several LTMs see an increase of 10 minutes or more to the 90th percentile. Average ambulance utilization increases from 17.1% to 35.9% (excluding run-backs to station).

7.3   The more urban areas had the biggest degradation in P4 8-minute response performance, including Owen Sound responding to 20% fewer incidents within 8-minutes by 2033. For rural areas 8-minute performance did not degrade as much, however it was from a lower baseline than urban areas; for example, Chatsworth's 8-minute performance reduced by 7.2 percentage points but was originally 17.8% in the Base Position. Despite being a more rural area,

Georgian Bluffs experiences a degradation in-line with the more urban LTMs (an 11.9 percentage point reduction). This is partly due to new developments in Cobble Beach with no station nearby.

7.4   Reductions in 15-minute response performance were larger in rural LTMs such as Georgian Bluffs (18.6 percentage points) and Southgate (17.0 percentage points) than Owen Sound (13.5 percentage points). This reflects not only changes in development locations but also the increased likelihood of concurrent incidents in relatively rural areas, reducing the coverage provided by one vehicle.

7.5   Modelling the 'Do Nothing' scenario at two-year intervals shows similar reductions in performance year-on-year, although the 90th percentile increases became larger over time; for example, a 42s increase in the overall P4 90th percentile from 2023 to 2025 but a 2m10s increase from 2031 to 2033 (see Appendix **H1b**).

Maintaining Performance in 2033

7.6   To offset the performance degradation from increasing demand, ORH modelled the addition of shifts required to maintain Base Position response performance across all LTMs in 2033. These were modelled at locations and times of day which would minimize the additional resourcing requirement as far as possible, using 12-hour shift lengths.

7.7   Following this process, all P4 performance metrics were much improved across Grey County when compared with the Base Position, since the target was to maintain performance in each LTM rather than across Grey County as a whole. P4 8-minute response performance has improved by 4 percentage points compared to the Base Position (see Appendix **H2**). The overall 90th percentile is very close to the previously discussed 15-minute target (89.9% in 15 minutes.

7.8   Performance in Georgian Bluffs cannot be maintained with the current station configuration due to the volume and proximity of new developments. The degradation in P4 response performance is relatively small however at 2.3% in 8-minutes and 1.7% in 15-minutes.

7.9   There are some local areas which perform much better than in 2022 due to the addition of resources, for example Meaford, where P4 8-minute response performance improves by 7.8%. The added resource is required here to maintain performance however due to GCPS shift constraints, only a 7 day per week 12-hour day shift can be added causing performance to be above current levels.

7.10   To achieve this level of response performance, 672 additional weekly ambulance hours are required by 2033 which includes upstaffing the 12-hour

FRU to an ambulance (see Figure **7-1**). This represents a 43% increase in staff hours, compared to a 68% increase in responded demand.

7.11   Additional 12-hour shifts are required at all stations except Chatsworth and Dundalk and a further additional 24/7 shift is required at Owen Sound (as well as the 12-hour shift). At peak hours of the day, an additional 6 resources are therefore required. There are potential capacity constraints at some stations (for example, Markdale) where Community Paramedicine or spare vehicles are based.

7.12   This scenario forms the 'core scenario' for other scenarios to be compared to in the Sensitivity Modelling sub-section.

7.13   Adding a further 12-hour shift at Feversham (84 weekly ambulance hours) would reduce the Grey Highlands 90th percentile to 19 minutes and reduce the overall 90th percentile to under 15 minutes.

Alternative Performance Standards

7.14   GCPS requested that ORH suggest alternative response time standards to provide more equitable options for future service delivery.

7.15   ORH calculated 'The Weighted Geometric Mean' (TWGM) for population by LTM and Census dissemination area, taking into account not only population density but also 'clustering' of population.

7.16   For example, two areas could have the same population density, but one may be made up of one or two clustered population centres whereas the other may have its population spread across many small localities. It is typically much harder to obtain a high level of response performance in the latter than the former, but this would not be reflected in a measure of population density. However, this is accounted for through the TWGM measure with the latter having a lower TWGM score than the former.

7.17   Based on these calculations, ORH has a proposed an achievable P4 90th percentile standard for each LTM (see Appendix **H3**). Owen Sound and Hanover both have a shorter suggested 90th percentile standard (8m30s) since they are by far the most urban LTMs with other LTMs assigned to either 15- or 18-minute 90th percentiles based on their TWGM scores.

7.18   Most LTMs are currently performing quite close to their proposed standard. Only two LTMs have a current 90th percentile with more than a 2-minute difference to their suggested figure, Southgate and Grey Highlands. Both LTMs have stations located very close to one of the LTM's borders, thus vehicles will take longer to respond to incidents at the other side of the municipality.

7.19   ORH therefore investigated the minimum number of resources required to meet these standards in 2033. This was done in the same iterative manner as in the 'Maintaining Performance in 2033' sub-section. Many LTMs can be improved to

Figure 7-1: Maintaining Performance in 2033

Average Weekly Vehicle Hours

Station	Validated Position	Adding Resources	Difference
Owen Sound	252	504	252
Meaford	168	252	84
Markdale	168	252	84
Hanover	168	252	84
Durham	168	252	84
Dundalk	168	168	
Craigleith	178	262	84
Chatsworth	168	168	
Total	**1,438**	**2,110**	**672**

be better than the suggested standards (see Appendix **H4**), however removing vehicles from these LTMs would take either the LTM or a neighbouring LTM to below target.

7.20   In this scenario, overall P4 8-minute response performance has increased by 9.7 percentage points when compared to the Base Position, and the overall 90th percentile is 13m13s.

7.21   A total of 1,428 ambulance hours are required compared to current levels, more than those required to maintain performance from the previous sub-section.

7.22   A 24/7 ambulance is added at Dundalk, and the additional 12/7 ambulances at Hanover and Meaford are increased to 24/7. Resources are not added at Markdale with shifts instead deployed at four new stations at Cobble Beach (Georgian Bluffs), Holstein (Southgate), Holland Centre (Chatsworth) and Feversham (Grey Highlands).

7.23   These suggested locations are required to improve coverage in more rural areas where the existing stations do not provide coverage within the target time. Both Feversham and Holstein have low ambulance utilization of 7.3% and 3.9% respectively however these would be required to reduce the response time to incidents a long drive time away from existing stations.

7.24   At peak hours of the day, a total of 24 vehicles is required.

Sensitivity Modelling

7.25   The modelling described up to this point has included a number of assumptions that had to be made and agreed in order to devise recommended scenarios. However, it is important to stress-test these scenarios against changes to variables to ensure that any recommendations are robust (see Figure **7-2** for a summary of a selection of the results discussed below).

Alternate Future Demand

7.26   A demand increase of 5.8% per annum on average was used for all core 2033 scenarios. The 'Do Nothing' scenario was re-run in 2033 with two alternative demand projection methods to quantify the impact of demand on performance outcomes. These were agreed with GCPS management to ensure the impact of potential demand changes was understood.

7.27   One alternative was a higher demand projection of 7.8% per annum, or a 106.7% increase over the ten years. The other was a 3.8% increase per annum, or a 36.4% increase overall.

7.28   Using the higher demand projection resulted in a P4 8-minute response performance degradation of 21.8% (see Appendix **H5**), compared to 14.1%

Figure 7-2: Sensitivity Modelling Summary

Modelling Results

Current Position against 2033 Scenarios

Performance	Current Position	Do Nothing			Maintain Performance			Offload Delays	
		+3.8%	+5.8%	+7.8%	+3.8%	+5.8%	+7.8%	PreCovid-19	Increase
8-Minute Performance	61.6%	53.5%	47.5%	39.8%	64.5%	65.6%	66.5%	64.8%	66.2%
15-Minute Performance	87.5%	80.5%	74.5%	66.3%	88.8%	89.8%	90.0%	89.1%	89.9%
90th Percentile	16:10	19:35	23:34	29:39	15:38	15:07	14:59	15:29	15:05

Difference

Performance	Current Position	Do Nothing			Maintain Performance			Offload Delays	
		+3.8%	+5.8%	+7.8%	+3.8%	+5.8%	+7.8%	PreCovid-19	Increase
8-Minute Performance	61.6%	-8.2%	-14.1%	-21.8%	2.9%	4.0%	4.9%	3.2%	4.5%
15-Minute Performance	87.5%	-6.9%	-12.9%	-21.2%	1.3%	2.3%	2.6%	1.6%	2.4%
90th Percentile	16:10	03:25	07:25	13:29	-00:32	-01:02	-01:11	-00:41	-01:05

Additional Ambulance Hours

Station	Current Position	Do Nothing			Maintain Performance			Offload Delays	
		+3.8%	+5.8%	+7.8%	+3.8%	+5.8%	+7.8%	PreCovid-19	Increase
Total	1,438				504	672	1,008	588	840

using the core projection. There is an 8.2% degradation when the lower demand projection is tested.

7.29   The reduction in P4 response performance within 15-minute varies from 6.9% in the lower demand scenario and 21.2% in the upper demand scenario.

7.30   ORH also re-tested the 'Maintain Performance in 2033' scenario using these alternate demand levels.

7.31   When applying the higher demand projection, an extra day shift is required at each of Craigleith, Hanover, Markdale and Owen Sound to maintain performance, on top of the resources already added with the core demand projection. This equates to 1,008 weekly ambulance hours added compared to the 672 when applying the 'standard' projection.

7.32   When applying the lower demand projection, an additional day shift at Craigleith and an additional night shift at Owen Sound can be removed from the core resourcing. This means an addition of 504 ambulance hours compared to current levels, or 168 fewer hours than in the core scenario when applying the 'standard' projection.

FRU reintroduced with 'Treat and Release'

7.33   The Ontario Ambulance Act does not currently permit general use of 'treat and release', which removes the mandated requirement for transport to hospital unless the patient declines transport. This would provide paramedic staff with more flexibility on scene with the patient, potentially treating and releasing on scene to avoid transport to hospital if transport is not the most appropriate clinical outcome for the patient.

7.34   ORH investigated how treat and release could be used by GCPS by modelling a scenario with the following resources and assumptions:

- An Owen Sound night shift is replaced by a 24/7 FRU

- Where the FRU attends P3 and P4 incidents, 30% of these do not require transport so can be treated on scene without an ambulance response

7.35   In this scenario, the FRU role would be similar to the role of Emergency Care Practitioner (ECP) solo responders in UK ambulance services who treat patients on scene where appropriate, thus potentially reducing the job cycle time and benefitting the wider healthcare system.

7.36   The scenario gives a slight improvement in overall performance due to performance improvements in Owen Sound and Georgian Bluffs, near where the FRU is based (see Appendix **H6**). However, performance falls in other LTMs. Offload delays do not present a significant challenge in GCPS and therefore the saving on job cycle time is small; however there would be a benefit to a reduction in the number of patients presented at hospital.

Figure 7-3: Time at Hospital by Month and Facility
01 January 2018 to 01 June 2022
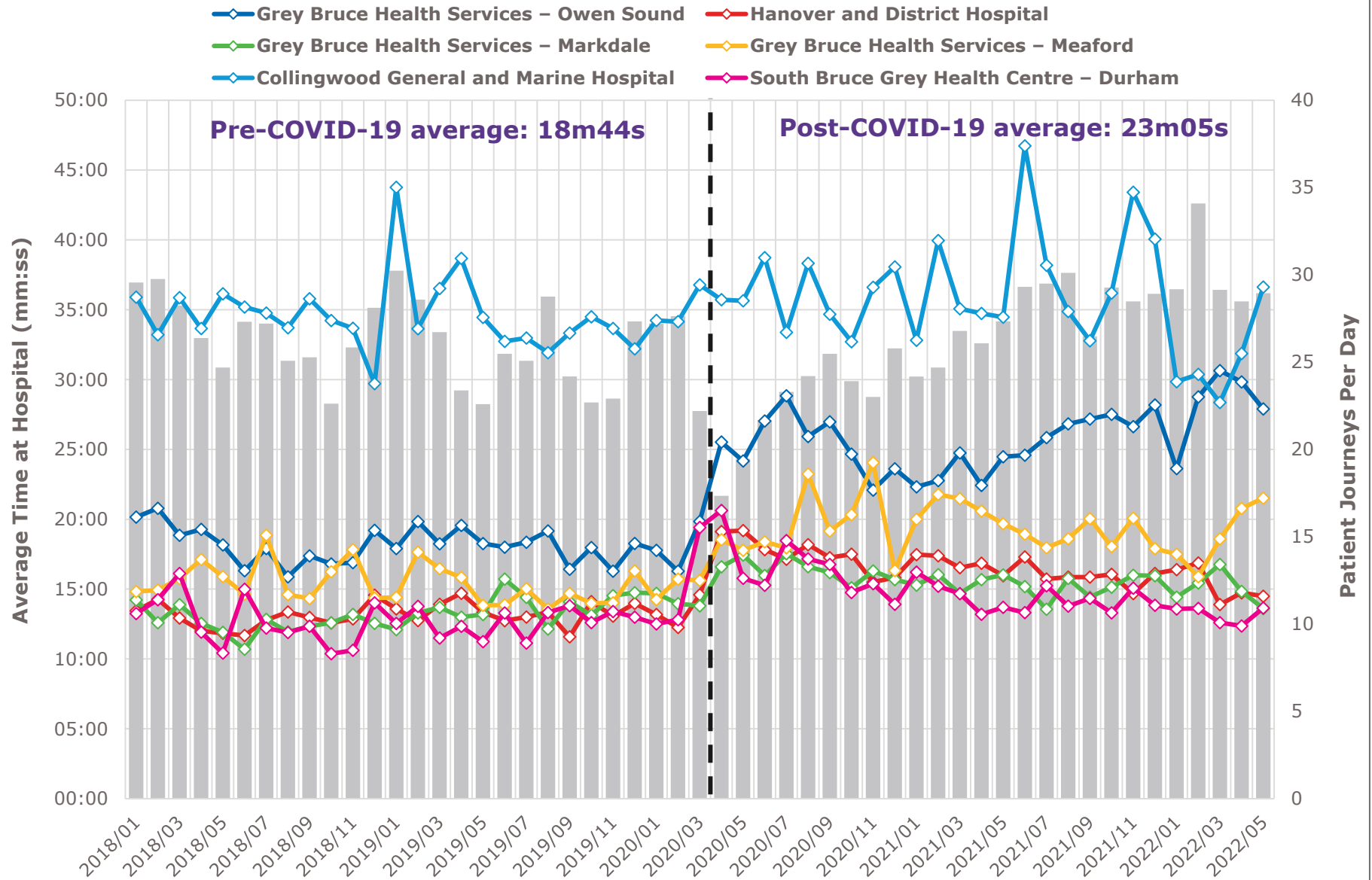
Testing FRUs at Cobble Beach and Feversham

7.37   GCPS requested that ORH test the deployment of FRUs at Cobble Beach and Feversham. This has been undertaken using the core 2033 'maintaining performance' scenario for comparison.

7.38   P4 90th percentile response performance reduces in Georgian Bluffs by 1m04s and in Grey Highlands by 2m07s as a result of deploying these in addition to the 672 weekly vehicle hours deployed in the core scenario (see Appendix **H7**). It was not possible to remove ambulance shifts and still maintain performance, as this would extend waits for transport and cause vehicle availability to fall.

Changes to Offload Delays

7.39   While offload delays have not historically presented a significant challenge to GCPS, these delays increased during the analyzed sample period. Before the COVID-19 pandemic the average time at hospital was 18m44s, with this increasing to 23m05s between April 2021 and May 2022 (see Figure **7-3**).

7.40   ORH tested the impact of returning time at hospital to pre-COVID levels, and also produced a future position with the historical change projected through to an average time at hospital of 28m59s in 2033.

7.41   Compared to the 2033 'maintain performance' scenario, GCPS P4 8-minute performance improves by 0.9 percentage points when using the pre-COVID levels and increases by 0.8 percentage points when using increased time at hospital levels (see Appendix **H8**). P4 15-minute response performance improves by 0.6 percentage points with reduced time at hospital and degrades by 0.5 percentage points with increased time at hospital.

7.42   To maintain performance in 2033 if pre-COVID time at hospital could be achieved would require 84 fewer ambulance hours per week than the core scenario. Alternatively, an additional 168 ambulance hours per week would be required if the projected increase occurred.

8   PHASING

8.1   The recommended resource additions resulting from the core 'Maintaining Performance by LTM' scenario for 2033 presented in Section 7 are suggested for introduction in a phased manner to make the most efficient staggering of resource and estate changes over the next ten years.

8.2   In addition to this scenario it was decided to also include the day shift ambulance at Feversham to improve response times in rural areas.

8.3   The following phasing schedule is suggested to ensure that performance is maintained at Base Position levels in each year as far as possible:

- 2024: Add a 12-hour day shift at each of Owen Sound and Hanover

- 2025: Open a new location at Feversham with a 12-hour day shift, plus add a 12-hour day shift at Meaford

- 2027: Add a 12-hour late shift at Owen Sound

- 2029: Add a 12-hour day shift at Durham

- 2031: Add a 12-hour night shift at Owen Sound

- 2033: Add a 12-hour day shift at Craigleith

8.4   It is noted that GCPS have already made budget submissions for 2023 and therefore cannot add resources within this year; these should be added in 2024 instead.

8.5   Incorporated within this modelling is the upstaffing of the FRU to an ambulance; this could occur within 2025 to move the (now dual-crewed) resource to Feversham keeping it within Grey Highlands.

8.6   GCPS should monitor performance achieved over the next ten years, and may wish to make alterations to this phasing plan should demand increases or performance diverge significantly from the projected levels. For example, if the Blue Mountains developments are built more quickly than assumed, then the additional shifts at Meaford or Craigleith may need to be introduced earlier.

8.7   The modelling was undertaken to maintain performance within each LTM in each year wherever possible, and therefore results and deployments differ from the 'Achieving P4 15 minute 90th percentile' modelling which was concerned with maintaining performance across Grey County.

8.8   The resulting year-on-year P4 8-minute and 15-minute response times are given in Figure **8-1**.

8.9   A total of eight additional shifts are added, which will require procurement of three further spare vehicles to maintain the current ratio. GCPS currently

operates five spares, though with current stations at capacity this will result in vehicles being displaced. When building new locations in Durham, Feversham and potentially Craigleith, there should be consideration of space for spare vehicle capacity.

Figure 8-1: Phasing Summary
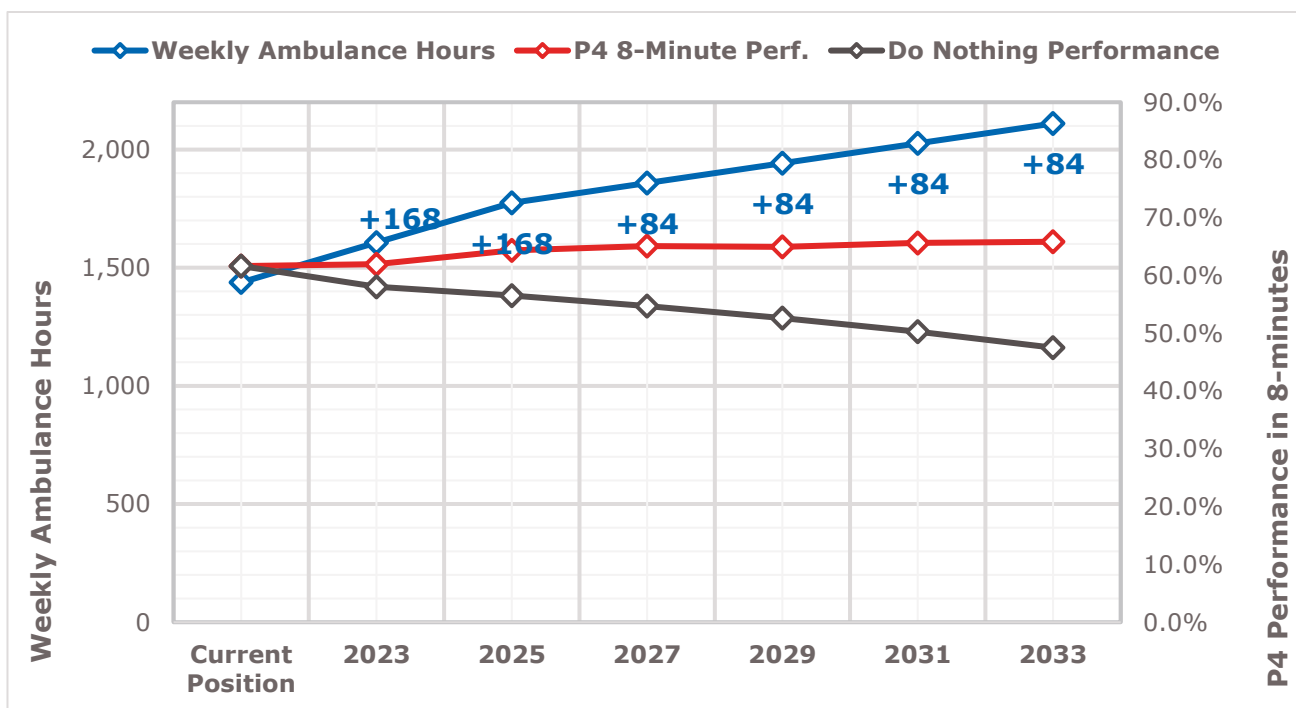
Difference in P4 8-Minutes Perf. from Base Performance

LTM	Current	2023	2025	2027	2029	2031	2033
Blue Mountains	46.8%	-1.0%	3.4%	2.5%	1.3%	0.8%	5.4%
Chatsworth	25.0%	2.9%	3.2%	7.3%	6.6%	10.4%	9.1%
Georgian Bluffs	33.4%	2.9%	0.6%	0.4%	-1.4%	-0.8%	-2.3%
Grey Highlands	30.0%	-2.0%	5.7%	5.5%	6.2%	6.2%	6.2%
Hanover	84.9%	6.6%	5.8%	5.0%	4.0%	3.0%	1.7%
Meaford	53.9%	-2.6%	8.7%	7.4%	5.8%	4.4%	7.8%
Owen Sound	89.3%	2.2%	1.3%	3.1%	2.0%	3.7%	2.5%
Southgate	44.4%	-3.5%	8.6%	10.5%	11.6%	12.7%	13.1%
West Grey	46.9%	1.5%	2.0%	1.4%	7.3%	7.1%	6.5%
Overall	**61.6%**	**0.3%**	**2.7%**	**3.5%**	**3.3%**	**4.0%**	**4.2%**

Difference in P4 15-Minutes Perf. From Base Performance

LTM	Current	2023	2025	2027	2029	2031	2033
Blue Mountains	89.9%	-1.6%	2.3%	2.1%	1.6%	1.3%	4.0%
Chatsworth	69.3%	2.9%	3.8%	7.6%	6.9%	11.3%	9.9%
Georgian Bluffs	87.3%	1.8%	0.2%	0.5%	-1.2%	-0.2%	-1.8%
Grey Highlands	64.6%	-1.7%	7.6%	7.1%	7.0%	7.1%	6.8%
Hanover	98.1%	0.8%	0.7%	0.5%	0.6%	0.5%	0.3%
Meaford	88.1%	-1.1%	3.1%	2.2%	0.9%	0.2%	0.4%
Owen Sound	97.8%	0.6%	0.4%	0.9%	0.6%	1.3%	1.0%
Southgate	72.6%	-3.7%	4.8%	5.3%	5.4%	5.6%	5.2%
West Grey	83.5%	-0.8%	-0.8%	-0.9%	2.9%	2.6%	2.1%
Overall	**87.5%**	**0.0%**	**1.8%**	**2.2%**	**2.1%**	**2.7%**	**2.8%**

9 ORGANIZATIONAL STRUCTURE AND SUPPORT SERVICES

9.1 ORH subcontracted the Association of Ambulance Chief Executives (AACE) to review the organizational structure and supplemental functions required to deliver paramedic services across Grey County.

9.2 This review has necessarily taken a high-level view of current operations and support services arrangements, based on interviews with key individuals and a limited review of pertinent documentation.

Leadership and Strategic Direction

9.3 Grey County Paramedic Services is led by a Director of Paramedic Services who has overall accountability for the organization and reports to the CAO of Grey County. The Director is supported by a senior management team working hard to prioritize patient care in Grey County (see Figure **9-1**).

9.4 The organizational leadership structure within GCPS, which includes the senior management team and the additional business partnering arrangements that have been put in place for other support functions is wholly reasonable, given the overall size of the organization.

9.5 The nature of Grey County Paramedic Services as a relatively small organization leads to management sometimes 'wearing more than one hat'; it is clear that all members of the management team are working hard to deliver their relevant portfolios. GCPS must be congratulated on introducing and appointing to a "Wellness and Support Manager" role. This clearly signals how important the organisation views the physical and psychological welfare of all staff and we feel sure that this will provide tangible benefits to staff and the organisation alike as this role gets fully embedded.

Operational Structure and Clinical Response Model

9.6 Scheduling of crews to roster patterns is currently allocated to one full-time scheduler working Monday to Friday in office hours. The responsibility for scheduling outside of these hours falls to the on-duty supervisor. It is recommended that Paramedic Services makes a case for an additional scheduler post to enhance the hours of operation for this function, with cover extending in to the evenings and weekends with the ability to fill shifts for the next day. This would increase the resilience of the function to effectively cover absences such as annual leave as well as supporting the workload of the operational supervisors. This additional resource could potentially be shared with the County to support other scheduling requirements.

Figure 9-1: Organizational Structure
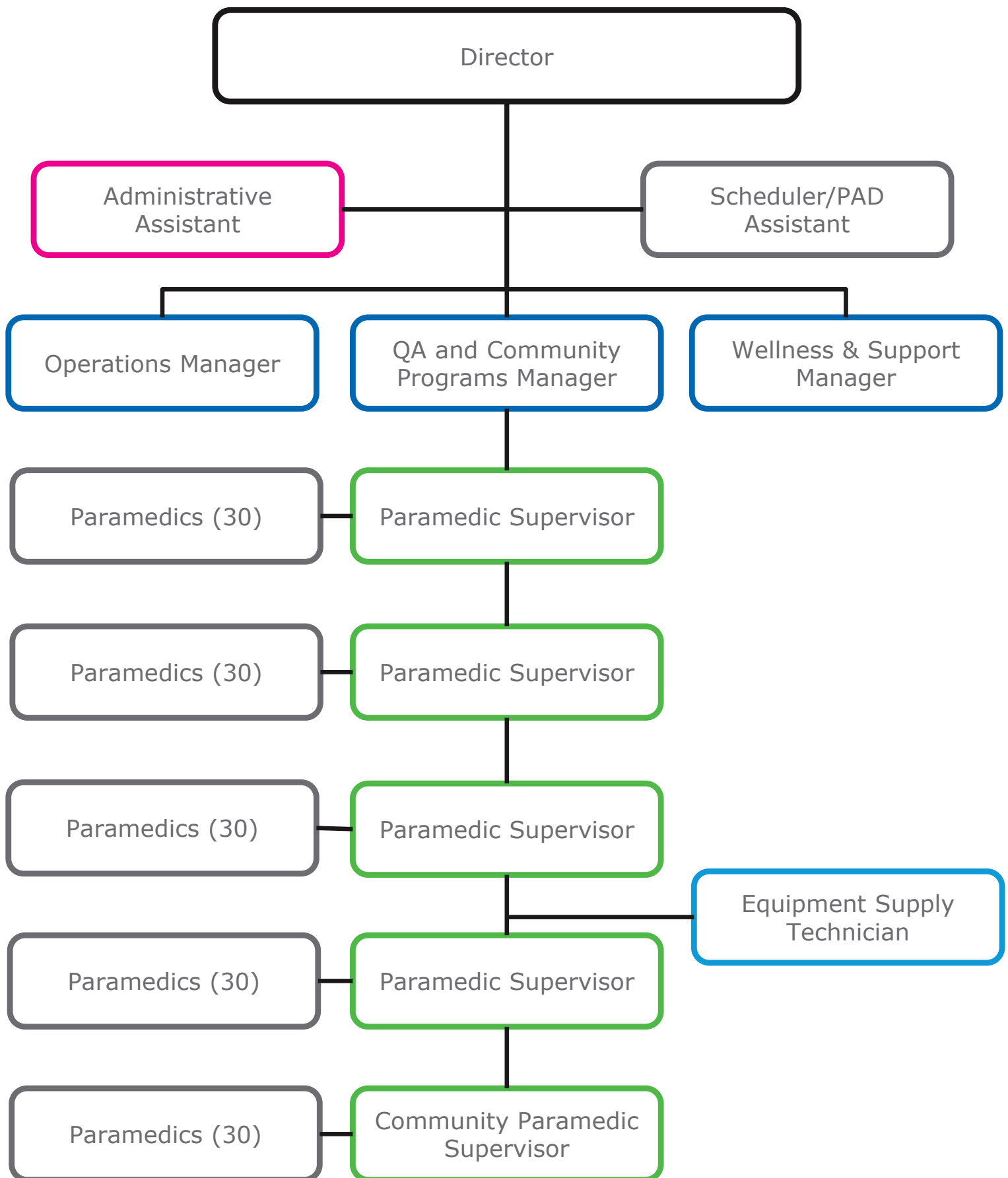
9.7   Subject to the introduction of changes to dispatch priority systems and ability to 'treat and release' and 'treat and refer' within Ontario, solo responder vehicles may provide a greater pre-hospital care role within Grey County in future. This would also provide greater integration with Community Paramedicine programmes with the aim of providing the best care for the patient and reducing pressure on the wider healthcare system.

Frontline and Clinical Supervision

9.8   GCPS currently has in place a provision for operational supervision and first line management of frontline staff, delivered through the Operations Supervisor role.

9.9   This role attracts a 15% pay uplift and there is currently an establishment of five operational supervisors. Four are on on-duty 24/7 shift patterns and one is shared with the Community Paramedicine Programme.

9.10   The principal responsibilities of the Operations Supervisor are to deliver first line management of operational staff. Their primary responsibilities when they are on duty will include for example, responding to calls in support of frontline clinicians, providing staff welfare and debriefing, information sharing, scheduling, and identification and resolution of daily work issues.

9.11   An additional layer of 'clinical supervision' does not generally exist within Ontario in the same terms as it exists in the UK and Australasia for example.

9.12   Clinical supervision is a term used to describe a formal process of professional support and learning which enables individual practitioners to develop knowledge and competence, assume responsibility for their own practice and enhance consumer protection and safety of care in complex situations.

9.13   Effective clinical supervision creates an environment that encourages shared learning and allows participants to reflect, evaluate, evolve, and refine their own clinical practice. It encourages staff to support one another, promoting teamwork, creating a positive and just culture by celebrating good practice and demonstrating that the organisation values its people. It also provides a safe environment for staff to explore and discuss personal and emotional responses to their work, with a strong focus on supporting staff wellbeing.   .

9.14   The base hospital system currently provides a level of clinical reflection, 'just culture' and support to paramedics; it is acknowledged that introducing a separate and additional clinical supervision layer within the paramedic service would be challenging financially.

9.15   The out-of-hospital clinical environment presents unique challenges in providing clinical supervision opportunities. The supervision model would therefore need to be suitably flexible to provide appropriate access, whilst being able to align to different organisational structures. To overcome logistical and geographical barriers, ambulance services must embrace digital technology enablers

wherever possible. Clinical supervision is an additional means of support and development to that of line management. It is acknowledged that the ambulance service setting may lend itself to a combined role and that a locally determined, flexible approach may be required.

9.16   The frontline supervisor to frontline staff ratio in Grey County is currently 28:1, similar to that used within other Ontario paramedic services. To maintain this ratio would require an additional supervisor in 2025 and another in 2031.

Support Services

9.17   Some transactional processes and advisory services for support functions such as HR are currently provided for GCPS through strong relationships with the County. Due to the limited scope of this review, we were not required to examine these services.

9.18   The current fleet support and logistics function is well-organised and is delivered internally through an Equipment Support Technician-led team. The hours of operation are Monday to Friday within office hours. Outside of these hours it is down to the operational supervisors to undertake these responsibilities, in a similar way to the scheduling responsibilities out of hours.

9.19   The logistics function is predominantly delivered from one of the operational stations in Owen Sound. This building is now at full capacity and there is no ability to expand this current site. This could present issues, in relation to business continuity for example.

9.20   It is worth considering whether the organisation should as part of a wider logistics review seek to create an additional logistics depot in a different part of the operational geography to address these issues.

9.21   The redevelopment of the station in Durham was proposed as a potential site to accommodate this expansion. If a new base is built in this location, it is important to future-proof with enough logistics capacity and bays for operational and spare vehicles.

10   FEEDBACK FROM CONSULTATIONS

10.1   ORH presented draft results to Council and at a staff engagement meeting to gain feedback on the review.

10.2   This section contains ORH's response to the question and queries raised at both of these meetings.

Demand Projection Queries

10.3   Prior to and during the Grey County council meeting on 9 February 2023, Councillors had questions regarding ORH's demand projections for future Grey County Paramedic Services call volumes.

10.4   These questions focused on future call volumes for the Blue Mountains Lower Tier Municipality (LTM), given the large increases in call volumes in this area that have been observed historically.

10.5   During the Council presentation, the average annual percentage increase in Code 3 and 4 responded incidents was presented, focusing on a historical timeframe (2012 to 2022) and a future projection (2022 to 2033). This is shown below in Table **1**.

Table 1: Annual % Increase

LTM	2012 to 2022	2022 to 2033
Blue Mountains	18.6%	8.7%
Chatsworth	5.4%	3.9%
Georgian Bluffs	5.4%	5.0%
Grey Highlands	4.8%	4.7%
Hanover	6.0%	6.1%
Meaford	3.1%	6.4%
Owen Sound	5.9%	5.1%
Southgate	9.1%	5.2%
West Grey	4.8%	4.9%
Overall	**6.5%**	**5.8%**

10.6   Blue Mountains LTM has the highest projected demand increase of 8.7% per year when compared to other LTMs, though this is lower than the historical annual average of 18.6%.

10.7   If we examine the figures in terms of daily incidents for every historical and projected year, this helps to show the compounded effect of an 8.7% increase being applied in every projected year. This leads to incident volumes in Blue Mountains in 2033 reaching more than double that of 2022 levels (see Figure **10-1**).

Figure 10-1: Demand Projections

Average Historical and Projected P3+P4 Daily Demand by Municipality
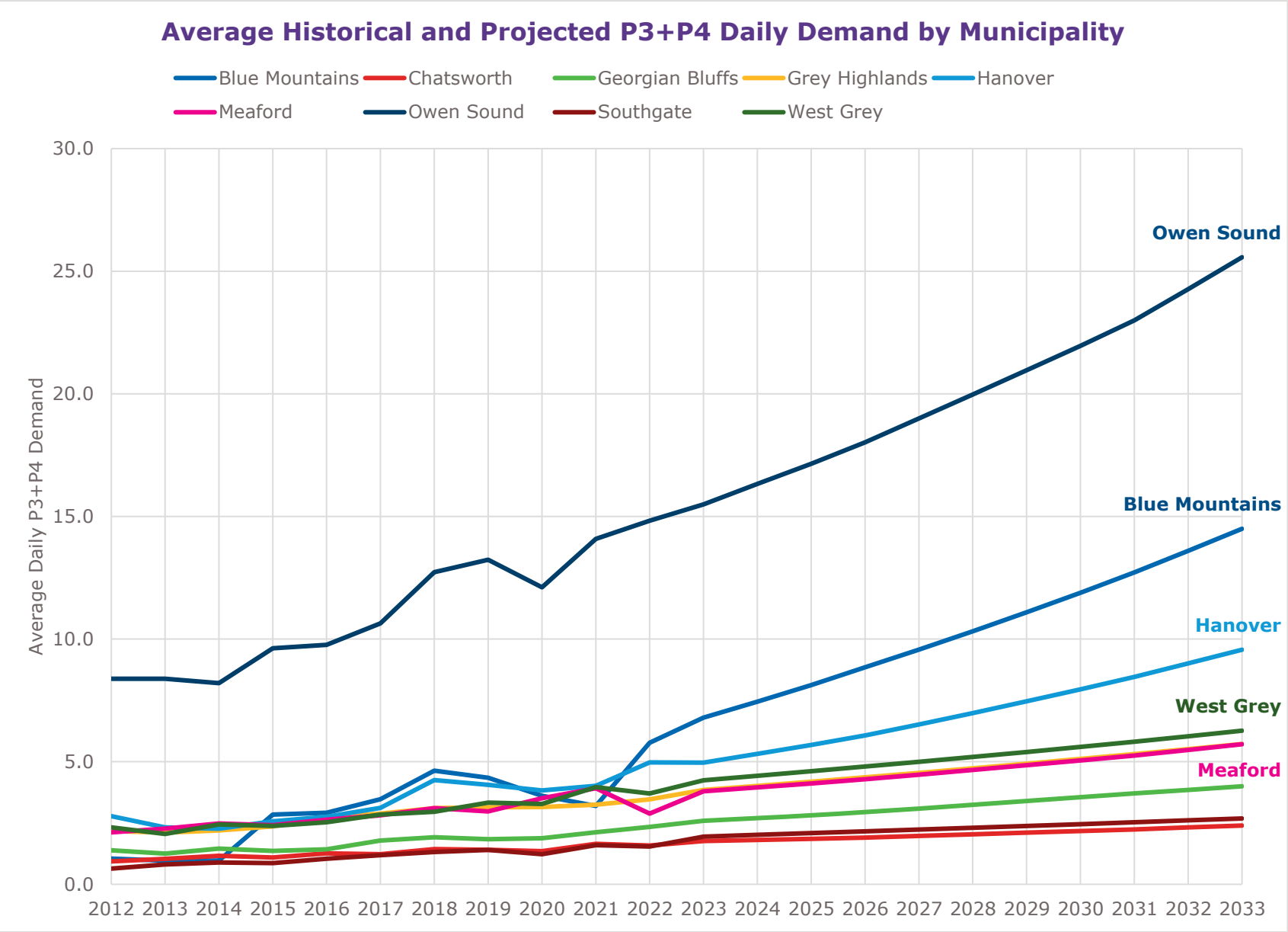
10.8   While the historical average annual increase for Blue Mountains is 18.6%, it has been skewed by three years with particularly large increases (2015, 2018 and 2022). In fact, the projected 8.7% annual increase is higher than the historical increase observed in six of the last ten years. Despite the large changes in percentage terms in some years, historically there have been fewer than five incidents per day in Blue Mountains but by 2033 this is projected to be approximately 15 per day.

Offload Delay Crew Handover

10.9   GCPS (and other Paramedic Services) can experience long offload delays at hospital, and subsequently sometimes have to use a second crew to remain with a patient at hospital to free up the original crew to end their shift.

10.10   This behaviour was discussed during the frontline staff engagement meeting; it is understood that the ADRS and ACR data potentially does not accurately capture this.

10.11   This behaviour cannot directly be modelled within AmbSim, however if it is thought that this crew handover is causing the total offload delay to be under-reported, then the time at hospital in AmbSim could be increased.

10.12   If the data captured is not accurate, an alternative method to ascertain the extent of the difference could be to ask staff to keep records of the number of occasions and amount of time spent as the second crew for a patient. This would need to be undertaken over a reasonable period of time to gain a meaningful sample.

Station Capacities

10.13   When spares are included, GCPS stations are currently all at capacity (excluding Craigleith). By 2033, 7 additional vehicles are required (plus the upstaffing of FRU to ambulance).

10.14   Clearly this will require either expansion of existing station sites, or the building of new locations with greater capacity than currently exists. It also may be possible to repurpose existing County land to house spares, though it should be ensured that this is in close proximity to existing stations. Relocating these spares may free up space, however it should also be noted that more spares may be required in future to maintain the current ratio of frontline resources to spares.

Vehicle Utilization

10.15   ORH's utilization calculation for Ontario paramedic services is undertaken separately including and excluding standby moves (see Section 2 – Resource

Use). This however only includes standby moves which are completed (where the resource arrives at its destination station.

10.16   Undertaking this analysis including all time spent on standby moves regardless of completion increases utilization to 24% (see Figure **10-2**). This calculation excludes any time spent on meal break or returning to base, so whilst higher than including only completed standby moves, it may not necessarily represent staff experience.

10.17   ORH's AmbSim model replicates the standby move behaviour including the fact that not all moves are completed and vehicles may be diverted; it also includes the time spent returning to base when necessary, though this is not reported as time busy on incident response.

Figure 10-2: Ambulance Utilization by Hour - 2022

Utilization is defined as the sum of occupied time (from vehicle mobilization to clear) divided by <u>planned</u> rostered vehicle time; time spent on meal breaks and returning to base are thus excluded from the calculation.

Utilization: Including and Excluding P8s
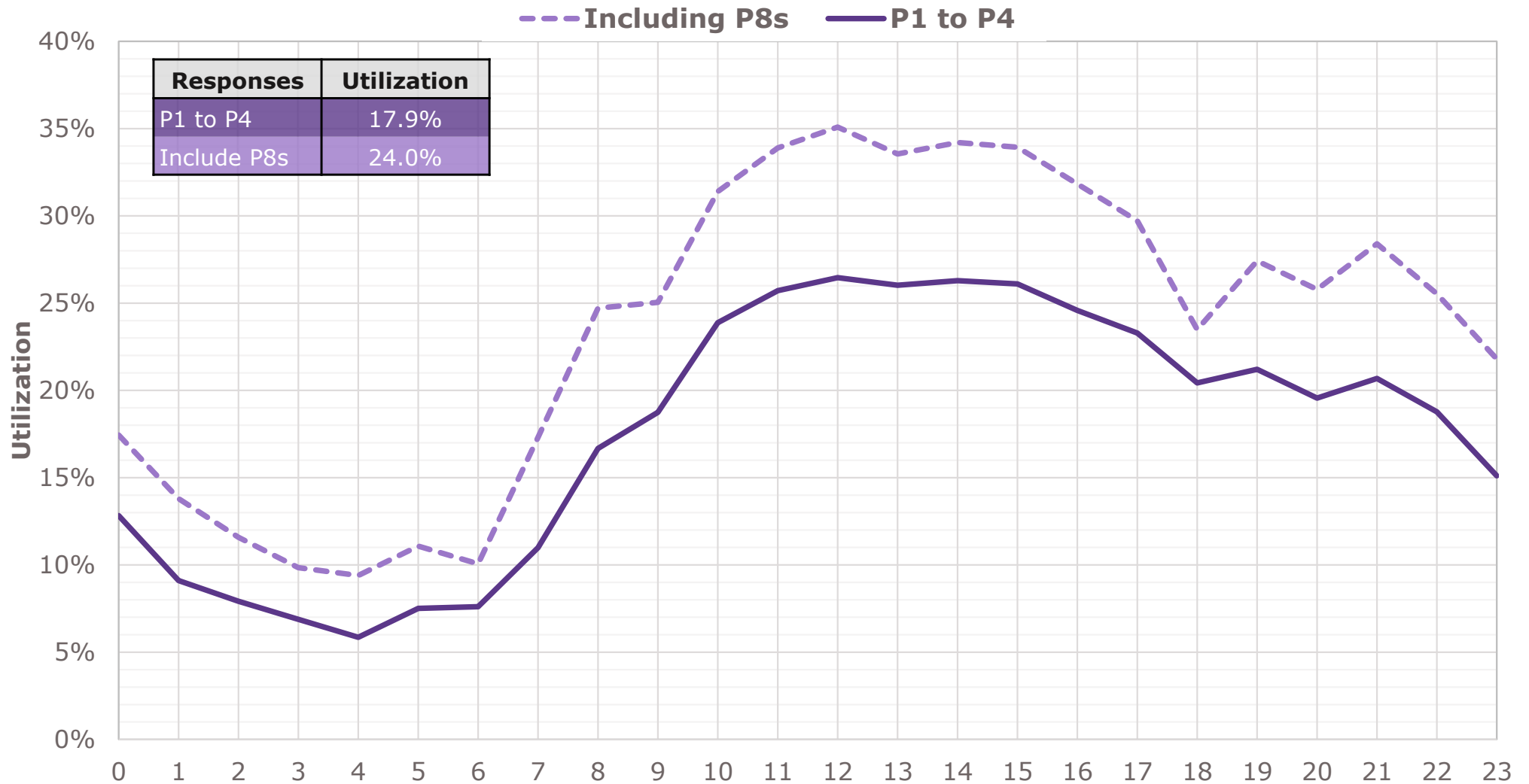
- - - Including P8s ——— P1 to P4

Responses	Utilization
P1 to P4	17.9%
Include P8s	24.0%

Appendices

Grey County Paramedic Services

Comprehensive Deployment Review for Paramedic Services

Draft Final Report

ORH/GCPS/1

ORH

PLAN. PREPARE. **PERFORM.**

A   Glossary of Terms

Glossary

Term	Definition	
Activation Time	Time from T1 Call Received to T2 Unit Notified	
ALS	Advanced Life Support	
AVL	Automatic Vehicle Location	
BLS	Basic Life Support	
CACC	Central Ambulance Communications Centre	
CTAS	Canadian Triage and Acuity Scale	
	1	(Resuscitation): Conditions that are threats to life or limb (or imminent risk of deterioration) requiring immediate aggressive interventions
	2	(Emergent): Conditions that are a potential threat to life, limb or function requiring rapid medical intervention or delegated acts
	3	(Urgent): Conditions that could potentially progress to a serious problem requiring emergency intervention
	4	(Less Urgent): Conditions that are related to patient age, distress, or potential for deterioration or complications which would benefit from intervention or reassurance
	5	(Non Urgent): Conditions that may be acute but non-urgent as well as conditions which may be part of a chronic problem with or without evidence of deterioration
FRU	First Response Unit	
FT	Full Time	
GCPS	Grey County Paramedic Services	
Incident	A P1 to P4 call resulting in at least one unit response	
LTM	Lower Tier Municipality	
Mobilization	A unit being mobilized to an incident (may be more than one unit mobilization for an incident and may not reach scene)	
Mobilization Time	Time from T2 Unit Notified to T3 Unit Mobile	
MOHLTC	Ministry of Health Long-Term Care	
Occupied Time	Time from T2 Unit Notified to Unit Clear	
Optimization	Using a sophisticated, geographically based genetic algorithm to evaluate multiple configurations of locations and identify best options.	
ORH	Operational Research in Health Ltd	
P4NonT	Priority 4 incidents excluding inter-facility transfers	
P4T	Priority 4 inter-facility Transfer incidents	
PCP	Primary Care Paramedic	

Glossary

Term	Definition	
Priority 1 to 4	P1	(Deferrable): A routine call that may be delayed without detriment to the patient (eg, a non-scheduled transfer; a minor injury)
	P2	(Scheduled): A call which must be done at a specific time, for example because of special treatment or diagnostic facility requirement (eg, inter-hospital transfers or a scheduled meet with an air ambulance)
	P3	(Prompt): A call that should be performed without delay (eg, serious injury or illness)
	P4	(Urgent): A call that must be performed immediately where the patients 'life or limb' may be at risk (eg, Vital Signs Absent patient or unconscious head injury)
PT	Part Time	
Response	A unit arriving at the scene of an incident (there may be more than one unit response at an incident)	
Response Time	1	Time from T2 Unit Notified of the first notified unit to T4 Arrive Scene of the first arrived unit. BCPS uses this measurement of response
	2	Time from T0 Call Answer to T4 Arrive Scene of the first arrived unit. ORH also monitors this measurement of response time for modelling
Simulation	Using a discrete event simulation model, which replicates the key characteristics of an emergency service, to predict future behaviour under a variety of difference scenarios.	
Standby (Priority 8)	Moving a crew from one station to another station to maintain coverage	
Time Events	T0	Time Call Answered
	T1	Time Available for Dispatch
	T2	First Unit Notified
	T3	First Unit Mobilized
	T4	First Unit Arrived at Scene
Utilization	The combined occupied time of all units divided by the combined total deployed unit hours (shift start to shift end)	

B   Current Service Profile

B1   **Demand by Priority and LTM**

B2   **Demand by Year and LTM**

B3   **Demand by Responding Service Map**

B4   **Demand by Season**

B5   **Demand by Hour**

B5a   By Hour and Weekday/Weekend
B5b   By Hour and Category

B6   **Hospital Profile**

B7   **Response Performance by LTM**

B8   **P4 Non-Transfer Response Time Map**

B9   **Call Components by Category**

B10   **Time at Hospital**

B10a By Facility
B10b By Month

B11   **Demand/Resource Matching**

B12   **Responses by Vehicle Type and Station**

B13   **Responses by Station and Priority**

B14   **Standby Moves**

Grey County Paramedic Service

Demand by Priority and Lower Tier Municipality

01 January 2018 to 01 June 2022

Average Daily P1-4 Incidents

LTM	Average Daily Demand		Total (P1-P4)	% of Incidents
	P3	**P4**		
Blue Mountains	1.7	2.5	**4.2**	12.4%
Chatsworth	0.3	0.8	**1.1**	3.4%
Georgian Bluffs	0.5	1.0	**1.5**	4.5%
Grey Highlands	1.2	1.5	**2.7**	8.1%
Hanover	1.0	1.7	**2.7**	8.0%
Meaford	1.2	1.6	**2.8**	8.3%
Owen Sound	4.1	6.3	**10.8**	32.3%
Southgate	0.3	0.8	**1.1**	3.3%
West Grey	1.1	1.6	**2.7**	8.1%
Grey County	**11.3**	**17.7**	**29.5**	**88.3%**
Out of Area	1.5	2.0	**3.9**	11.7%
Total	**12.8**	**19.8**	**33.4**	**100.0%**

Grey County Paramedic Service

Demand by Year and Lower Tier Municipality

01 January 2018 to 01 June 2022

Average Daily P1-4 Incidents

LTM	Average Daily Demand by Year					Average Annual Change	% of 2022 Demand
	2018	2019	2020	2021	2022		
Blue Mountains	5.0	4.9	4.0	2.7	4.2	-4.3%	11.1%
Chatsworth	1.0	1.0	1.0	1.3	1.4	8.2%	3.6%
Georgian Bluffs	1.3	1.3	1.4	1.7	1.9	8.6%	5.0%
Grey Highlands	2.8	2.8	2.5	2.6	2.9	1.0%	7.7%
Hanover	2.6	2.7	2.4	2.6	3.4	7.0%	9.1%
Meaford	2.6	2.6	2.9	3.2	2.4	-1.2%	6.5%
Owen Sound	10.1	10.3	9.7	12.1	13.2	7.0%	35.2%
Southgate	0.9	1.0	1.0	1.4	1.3	9.4%	3.5%
West Grey	2.3	2.5	2.5	3.2	3.2	8.1%	8.5%
Out Of Area	5.0	3.8	3.2	3.8	3.7	-7.5%	9.8%
Grey County	**28.6**	**29.2**	**27.6**	**30.9**	**33.9**	**4.3%**	**90.2%**

P3-4 in Grey	28.1	28.8	27.2	30.3	33.2	4.2%	

P4 Non-Transfer Demand by Responding Service
01 January 2018 to 01 June 2022

P4NonT Incidents

- 1 Per 10 Days
- 1 Per 20 Days
- 1 Per 50 Days

Location Type

- ◆ Standby Point
- ◆ Station

Responding Service

- ● Bruce County Ambulance Service
- ● County of Simcoe PS
- ● Dufferin Caledon Health Care
- ● GCPS
- ● Guelph Wellington EMS
- ● Middlesex London EMS
- ● Other Service

BRUCE

Meaford

Thornbury

ven Sound

Clarksburg

Craigleith

SIMCOE

Chatsworth

Markdale

Flesherton

Priceville

Dundalk

Allan Park

Durham

Hanover

DUFFERIN

0   20

kilometres

ORH
PLAN. PREPARE. PERFORM.

precisely

Grey County Paramedic Service

Demand by Season

01 Janurary 2018 to 01 June 2022

Average Daily Incidents

LTM	Average Daily Demand				Overall	Difference from 'Winter Peak'			
	Dec-Feb	Mar-May	Jun-Aug	Sep-Nov		Dec-Feb	Mar-May	Jun-Aug	Sep-Nov
Blue Mountains	6.9	3.3	3.5	2.7	4.2	-	-3.7	-3.5	-4.2
Chatsworth	1.2	1.0	1.3	1.1	1.1	-	-0.2	0.1	-0.1
Georgian Bluffs	1.5	1.5	1.5	1.6	1.5	-	0.0	0.1	0.1
Grey Highlands	2.9	2.6	2.7	2.6	2.7	-	-0.3	-0.2	-0.3
Hanover	2.7	2.6	2.7	2.6	2.7	-	-0.1	0.0	-0.1
Meaford	2.8	2.8	2.9	2.7	2.8	-	0.0	0.1	0.0
Owen Sound	10.7	10.8	11.0	10.6	10.8	-	0.1	0.3	-0.1
Southgate	1.1	1.1	1.1	1.1	1.1	-	0.0	-0.1	0.0
West Grey	2.9	2.5	2.8	2.7	2.7	-	-0.4	-0.1	-0.1
Out of Area	4.2	3.6	4.1	3.8	3.9	-	-0.6	-0.1	-0.4
Grey County	**32.6**	**28.1**	**29.4**	**27.8**	**29.5**	-	**-4.5**	**-3.2**	**-4.8**

Demand by Day and Hour - Weekday vs Weekend
01 January 2018 to 01 June 2022

■ Weekday ■ Weekend

Weekend defined as 6pm
Friday to 6pm Sunday

Average Daily Responded Demand
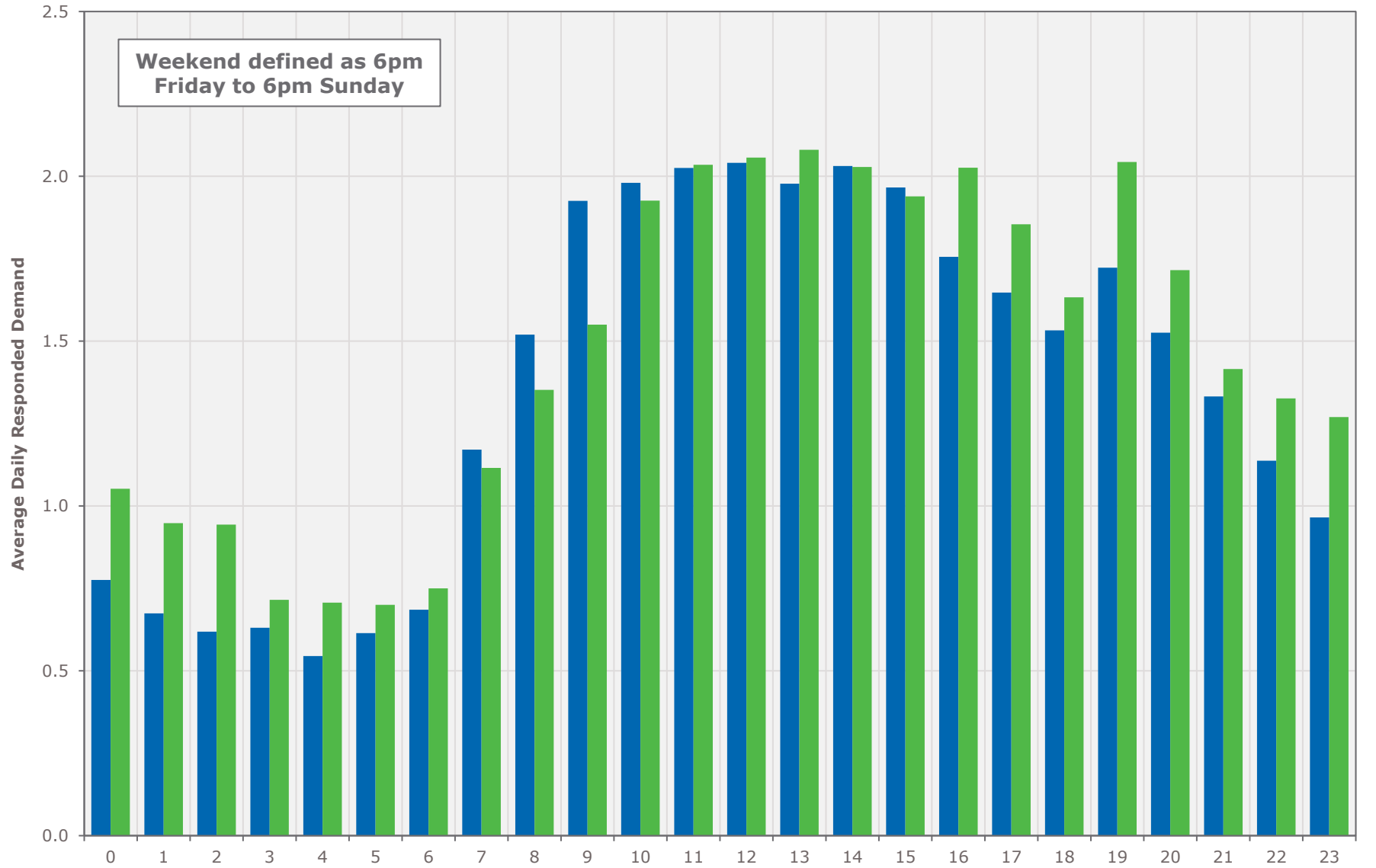
Demand by Hour and Category
01 January 2018 to 01 June 2022

P3T · P3NonT · P4T · P4NonT

Weekend defined as 6pm
Friday to 6pm Sunday

Average Daily Responded Demand
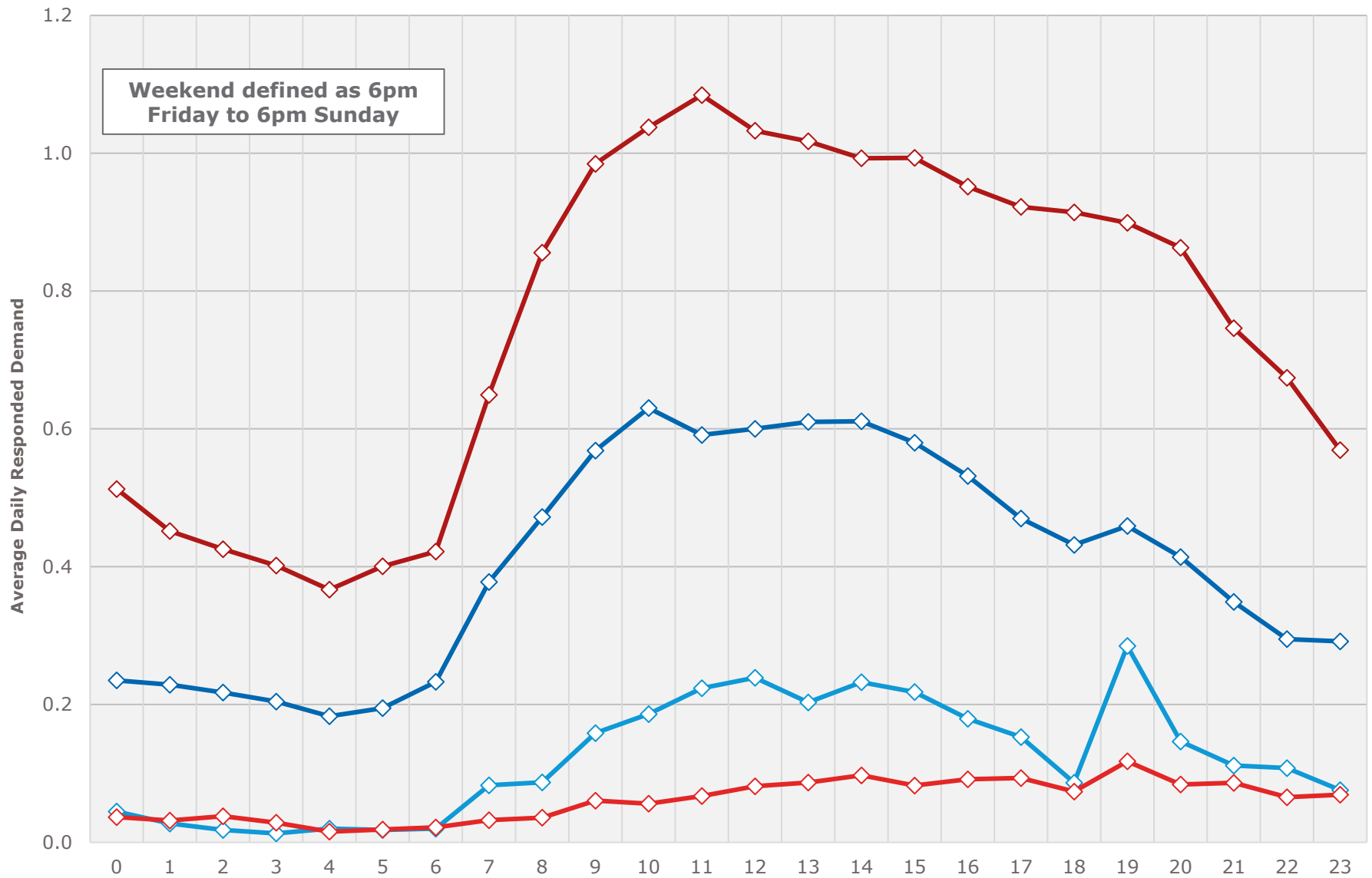
Grey County Paramedic Service

Hospital Profile

01 January 2018 to 01 June 2022

Patient Journeys Per Week

Hospital	Year				Total
	P1	P2	P3	P4	
Grey Bruce Health Services – Owen Sound	0.1	0.1	32.2	53.0	85.4
Hanover and District Hospital	0.7	0.0	6.8	13.5	21.1
Grey Bruce Health Services – Markdale	0.9	0.1	5.5	12.5	19.0
Grey Bruce Health Services – Meaford	1.2	0.0	5.8	10.8	17.8
Collingwood General and Marine Hospital	0.0	0.0	5.6	8.4	14.0
South Bruce Grey Health Centre – Durham	1.2	0.0	3.0	6.3	10.6
South Bruce Grey Health Centre – Walkerton	0.0	0.0	3.0	1.5	4.5
St. Mary's General Hospital	0.0	0.0	0.7	0.8	1.6
London Health Sciences Centre – Victoria Hospital	0.0	0.0	0.7	0.7	1.4
London Health Sciences Centre – University Hospital	0.0	0.0	0.5	0.6	1.2
South Bruce Grey Health Centre – Chesley	0.0	0.0	0.2	0.8	1.0
Other / Unknown	0.6	0.1	2.2	3.1	6.0
Total	**5**	**1**	**66**	**112**	**184**

Within Grey County

Grey County Paramedic Service

P4 Performance by Lower Tier Municipality

01 January 2018 to 01 June 2022

First Vehicle Notified to Arrival at Scene

LTM	P4 Performance		
	8-minute	10-minute	15-minute
Blue Mountains	52.1%	61.9%	91.5%
Chatsworth	19.7%	30.9%	66.4%
Georgian Bluffs	36.6%	56.3%	88.9%
Grey Highlands	31.7%	40.1%	65.9%
Hanover	89.6%	96.3%	99.2%
Meaford	57.6%	68.6%	89.6%
Owen Sound	91.1%	95.4%	98.4%
Southgate	47.7%	53.6%	76.7%
West Grey	49.2%	64.8%	88.9%
Out of Area	*44.1%*	*55.5%*	*77.7%*
Overall	**63.3%**	**72.1%**	**88.9%**

Call Answer to Arrival at Scene

LTM	P4 Performance		
	8-minute	10-minute	15-minute
Blue Mountains	33.8%	49.0%	79.7%
Chatsworth	14.2%	20.4%	51.4%
Georgian Bluffs	13.7%	33.9%	78.9%
Grey Highlands	25.7%	32.7%	55.1%
Hanover	65.9%	86.7%	97.0%
Meaford	46.0%	57.8%	82.6%
Owen Sound	70.9%	88.1%	96.2%
Southgate	32.7%	42.4%	61.0%
West Grey	33.1%	47.7%	78.4%
Out of Area	*10.4%*	*21.2%*	*52.1%*
Overall	**46.4%**	**61.2%**	**81.5%**

P4 Non-Transfer Response Times

01 January 2018 to 01 June 2022

Daily P4NonT Incidents
- 1 Per Week
- 0.2 Per Week

Location Type
- Standby Point
- Station

P4NonT Response Time
- +15 Mins
- 13 - 15 Mins
- 11 - 13 Mins
- 9 - 11 Mins
- 7 - 9 Mins
- 5 - 7 Mins
- 0 - 5 Mins

Meaford

Owen Sound

Thornbury

Clarksburg

Craigleith

Chatsworth

Markdale

Flesherton

Priceville

Dundalk

Allan Park

Durham

Hanover

0   20
kilometres

ORH
PLAN. PREPARE. PERFORM.

precisely

© OpenStreetMap contributors
© 2021 HERE All rights reserved.

Grey County Paramedic Service

Call Components - Transfers Vs Non-Transfer

01 January 2018 to 01 June 2022

Component		P3			P4		
		IFT	Non-IFT	**Overall**	IFT	Non-IFT	**Overall**
T0-T1	T0_TimeZero to T1_CallReceived	23:20	03:21	**07:58**	09:23	02:08	**02:40**
T1-VA	T1_CallReceived to Vehicle Assign	00:36	00:24	**00:27**	00:14	00:10	**00:10**
CC-VA	*T0_TimeZero to Vehicle Assign*	*24:24*	*03:44*	***08:31***	*09:41*	*02:18*	***02:51***
VA-VM	Vehicle Assign to Vehicle Mobile	01:04	00:52	**00:54**	00:55	00:50	**00:50**
TTS	Time to Scene	05:28	08:53	**08:06**	04:39	07:12	**07:00**
TAS	Time at Scene	15:25	16:50	**16:31**	20:46	17:37	**17:51**
TTH	Time to Hospital	33:12	10:00	**15:22**	42:44	09:45	**12:13**
TAH	Time at Hospital	22:31	20:36	**21:02**	27:28	20:18	**20:50**
OCC	Occupied Time	80:50	47:43	**55:22**	92:08	48:30	**51:46**

Grey County Paramedic Service
Time at Hospital by Facility
01 Janurary 2018 to 01 July 2022
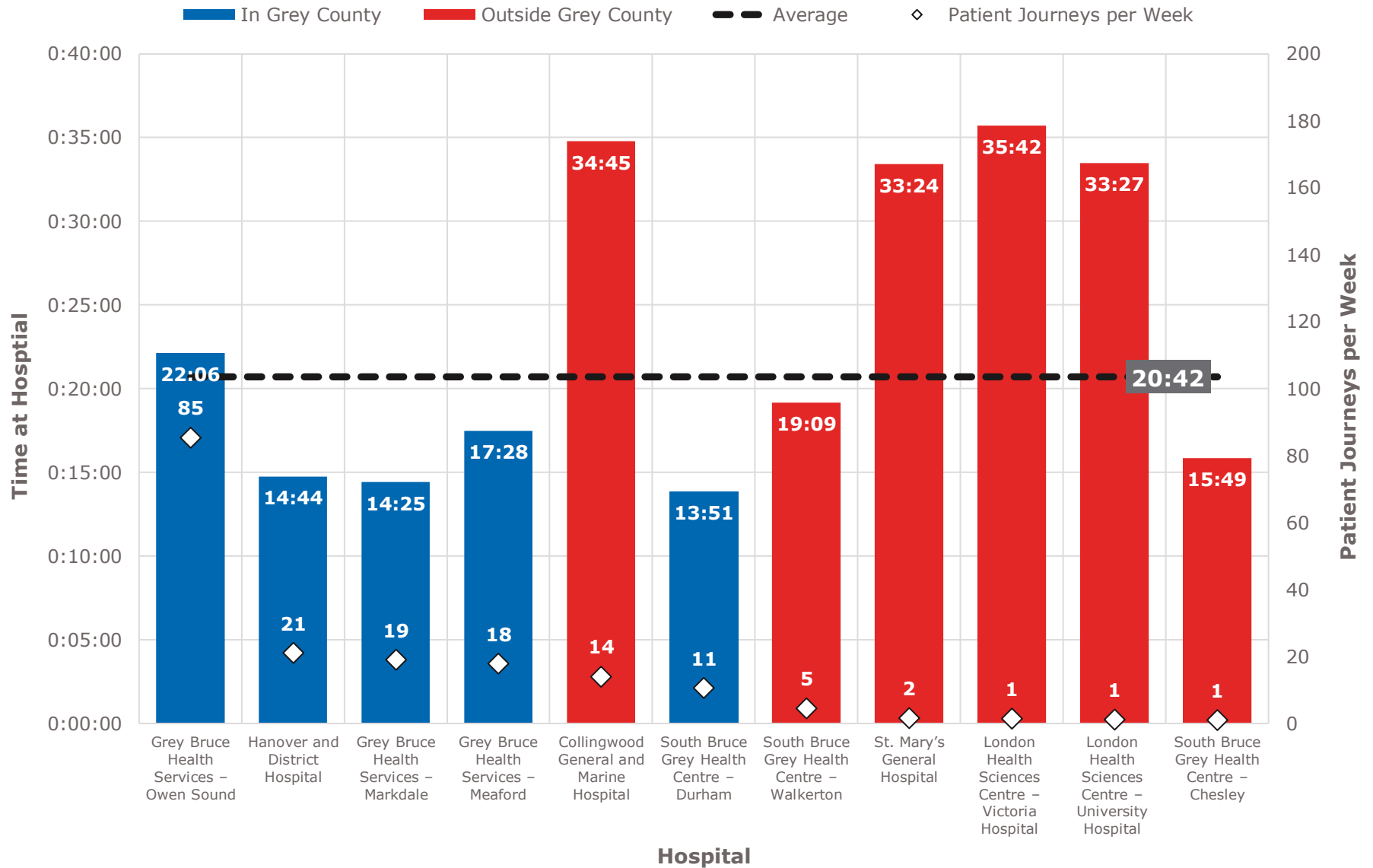
Time at Hospital by Month
01 January 2018 to 01 June 2022
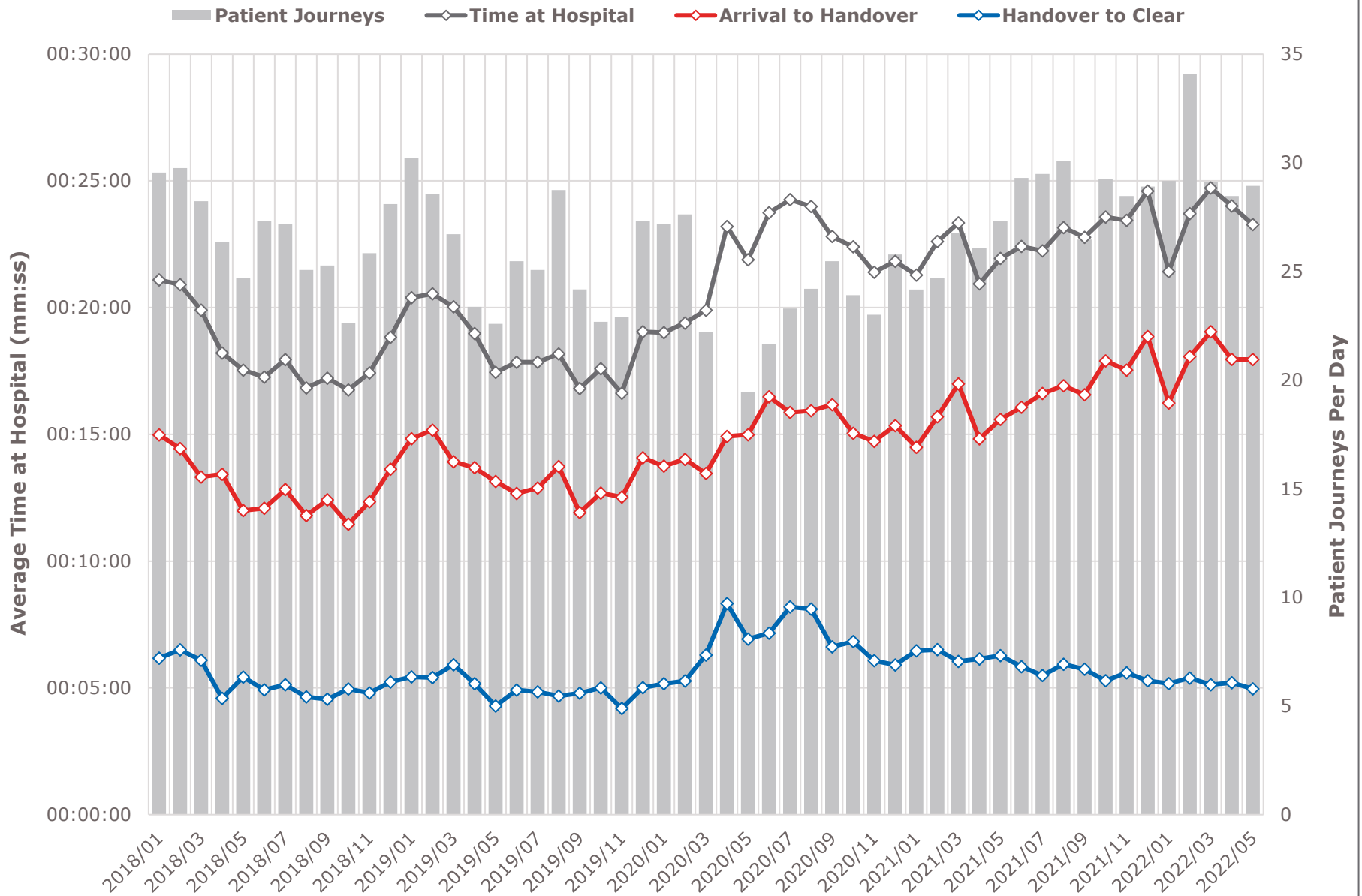
Demand-Resource Matching
2022

Legend: Ambulance, FRV, Weekend, Weekday

Weekend defined as 6pm Friday to 6pm Sunday

Y-axis (left): Average Daily Incidents — 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0

Y-axis (right): Vehicles Deployed — 0, 2, 4, 6, 8, 10

X-axis: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
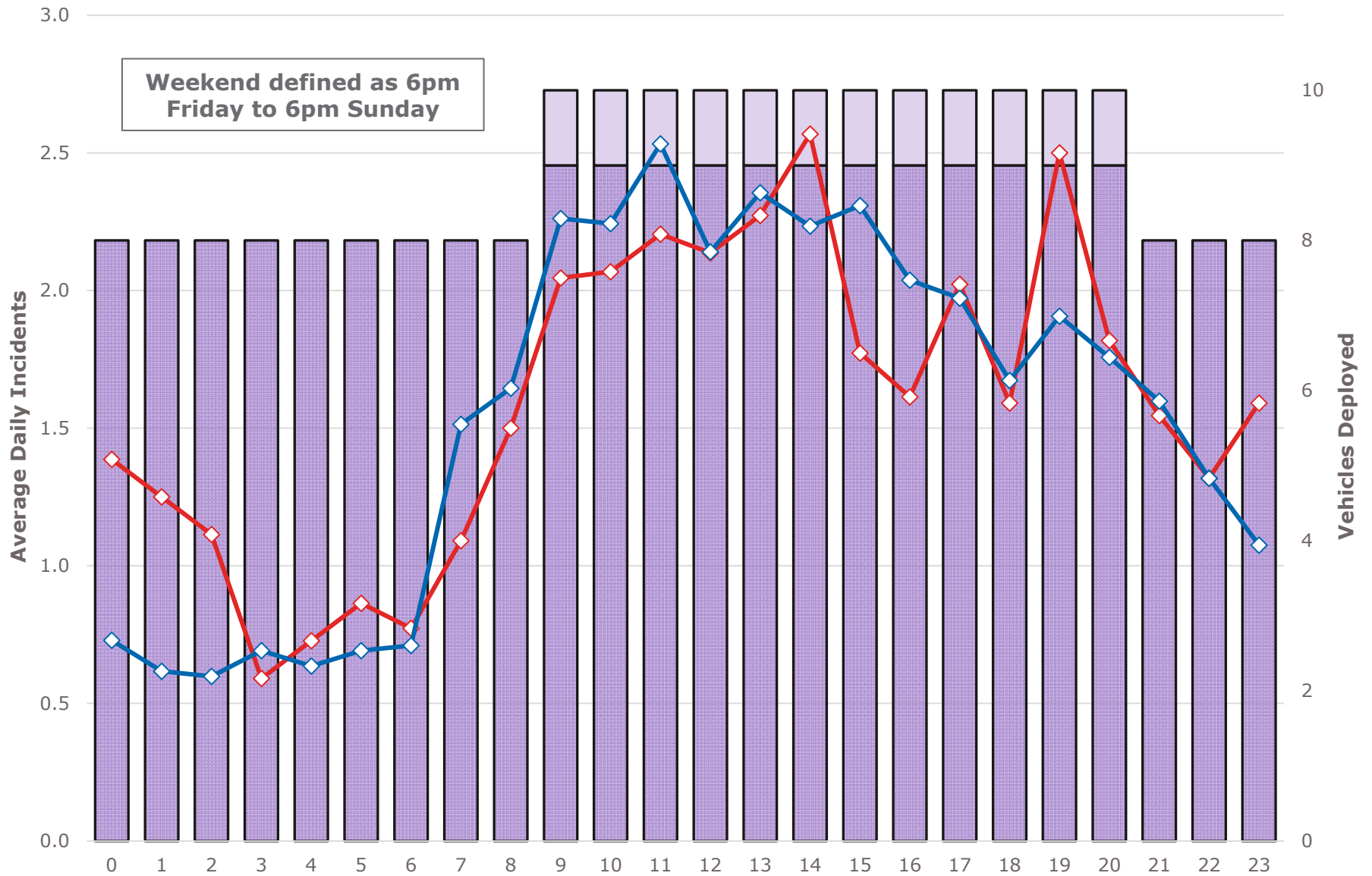
Responses by Vehicle Type and Station

Weekly Vehicle Hours

Station	Ambulance	FRVs
Owen Sound	252	
Meaford	168	
Markdale	168	84
Dundalk	168	
Durham	168	
Hanover	168	
Craiglieth	168	
Chatsworth	168	
Total	**1,428**	**84**

% of Weekly Hours

Station	Ambulance	FRVs
Owen Sound	16.7%	
Meaford	11.1%	
Markdale	11.1%	5.6%
Dundalk	11.1%	
Durham	11.1%	
Hanover	11.1%	
Craiglieth	11.1%	
Chatsworth	11.1%	
Total	**94.4%**	**5.6%**

% of P1-P4 Responses

Station	Ambulance	FRVs
Owen Sound	30.8%	2.8%
Meaford	9.6%	
Markdale	8.8%	1.4%
Dundalk	6.8%	
Durham	7.8%	
Hanover	12.4%	0.1%
Craiglieth	9.2%	
Chatsworth	10.4%	0.1%
Total	**95.7%**	**4.3%**

Average Daily Responses

Category	Daily Responses		% of Responses	
	Ambulances	FRV	Ambulances	FRV
P4	21.0	1.3	94.4%	5.6%
P3	15.7	0.4	97.5%	2.5%
P2	0.2	0.0	100.0%	0.0%
P1	0.8	0.0	97.7%	2.3%
Total	**37.6**	**1.7**	**95.7%**	**4.3%**

Grey County Paramedic Service
Responses by Station
01 January 2018 to 01 June 2022

Responses by Station   *% of Occupied Time*

Station Name	Daily Responses (P1 - 4)	Overall Priority Code				
		1	2	3	4	8
Owen Sound	12.8	0.8%	0.6%	40.4%	52.7%	5.4%
Hanover	4.3	1.3%	0.7%	41.2%	47.5%	9.2%
Meaford	4	2.4%	0.0%	35.1%	47.7%	14.8%
Craigleith	4	0.2%	0.0%	33.5%	51.5%	14.8%
Markdale	3.2	2.3%	0.2%	33.4%	37.8%	26.4%
Durham	3.1	4.5%	0.3%	33.0%	42.4%	19.8%
Chatsworth	2.1	0.8%	0.3%	32.6%	48.0%	18.3%
Dundalk	2	0.5%	0.0%	26.9%	49.1%	23.6%
Other Services	*0.3*	*0.0%*	*0.0%*	*0.4%*	*97.1%*	*2.5%*
Total	**35.8**	**1.4%**	**0.3%**	**35.6%**	**48.4%**	**14.3%**

Responses by Station   *% of Responses*

Station Name	Daily Responses (P1 - 4)	Overall Priority Code				
		1	2	3	4	8
Owen Sound	12.8	0.7%	0.2%	26.8%	47.8%	24.5%
Hanover	4.3	2.0%	0.2%	27.4%	43.3%	27.1%
Meaford	4	2.4%	0.1%	25.5%	35.4%	36.6%
Craigleith	4	0.3%	0.0%	21.2%	34.5%	44.0%
Markdale	3.2	2.3%	0.3%	22.8%	29.4%	45.2%
Durham	3.1	2.6%	0.1%	18.3%	25.4%	53.5%
Chatsworth	2.1	0.8%	0.2%	18.2%	30.2%	50.6%
Dundalk	2	0.3%	0.1%	12.5%	28.6%	58.6%
Other Services	*0.3*	*0.9%*	*0.0%*	*8.7%*	*88.3%*	*2.1%*
Total	**35.8**	**1.3%**	**0.2%**	**22.8%**	**37.0%**	**38.7%**

Grey County Paramedic Service

Standby Moves

01 January 2018 to 01 June 2022

Average Daily Moves

Average Travel Times

Initial Location	Assigned	Complete	% Complete	Assigned	Incomplete	Complete
Durham	4.4	3.5	79.6%	15:49	19:28	13:51
Craigleith	3.9	2.9	74.5%	19:21	26:36	14:53
Meaford	4.0	2.7	66.3%	20:26	21:40	18:39
Owen Sound	3.5	2.6	74.1%	22:03	19:28	24:31
Markdale	3.8	2.5	65.3%	21:45	21:40	21:51
Chatsworth	3.3	2.4	73.3%	20:55	21:12	20:34
Dundalk	3.2	2.6	79.4%	15:46	20:48	13:25
Hanover	2.0	1.7	82.1%	14:10	18:26	12:23
Hospitals	1.4	1.3	93.1%	58:25	45:56	58:31
Standby Points	1.2	1.1	94.5%	30:02	46:26	13:35
Unknown / Non-Key Location	*11.1*	*11.1*	*100.0%*	*20:31*	*23:36*	*17:26*
Overall	**41.9**	**34.4**	**82.0%**	**19:19**	**21:53**	**17:23**

C Benchmarking

Benchmarking – Time at Scene

Time at Scene (mm:ss)

28:00
26:00
24:00
22:00
20:00
18:00
16:00
14:00
12:00
10:00
08:00
06:00
04:00
02:00
00:00

Area6 Area4 Area5 GCPS Area3 Area2 Area1 Area7
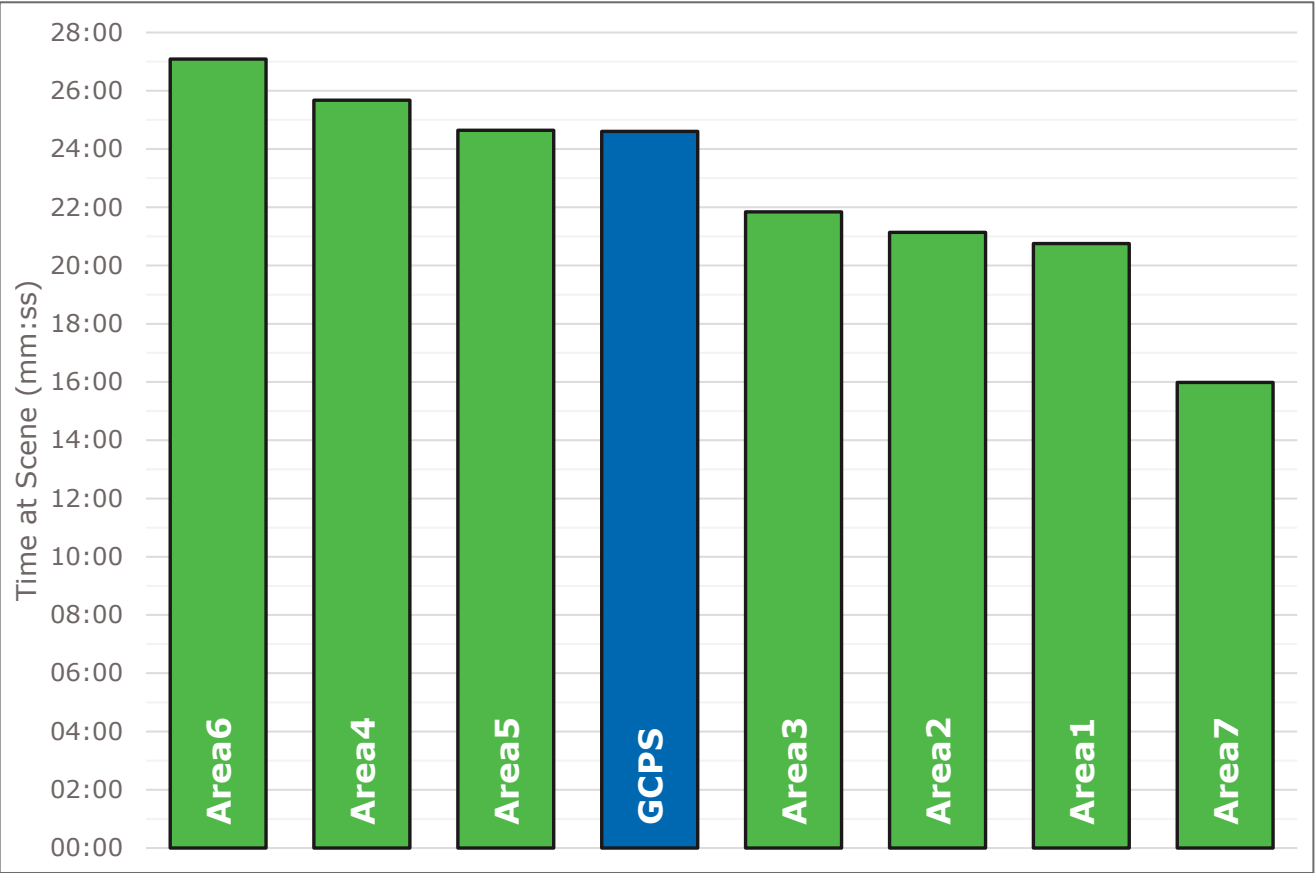
Benchmarking – Time at Hospital

48:00
46:00
44:00
42:00
40:00
38:00
36:00
34:00
32:00
30:00
28:00
26:00
24:00
22:00
20:00
18:00
16:00
14:00
12:00
10:00
08:00
06:00
04:00
02:00
00:00

Handover to Clear

Arrival to Handover

Area1 Area2 Area4 Area5 GCPS Area6 Area7

1
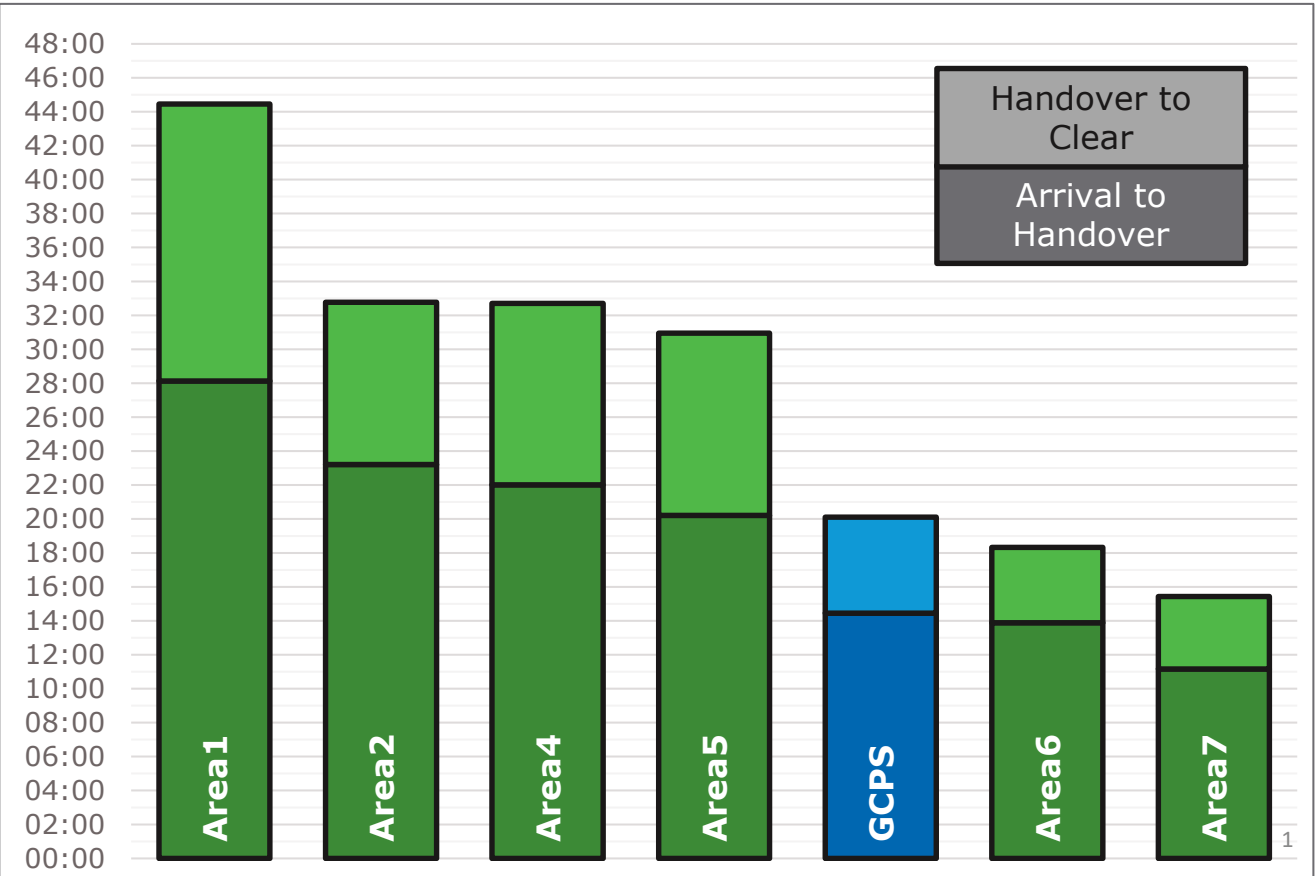
Benchmarking – Occupied Time

Occupied Time (mm:ss)

80:00	
70:00	
60:00	
50:00	
40:00	
30:00	
20:00	
10:00	
00:00	

Area1 · Area5 · Area4 · Area6 · Area2 · Area3 · Area7 · GCPS
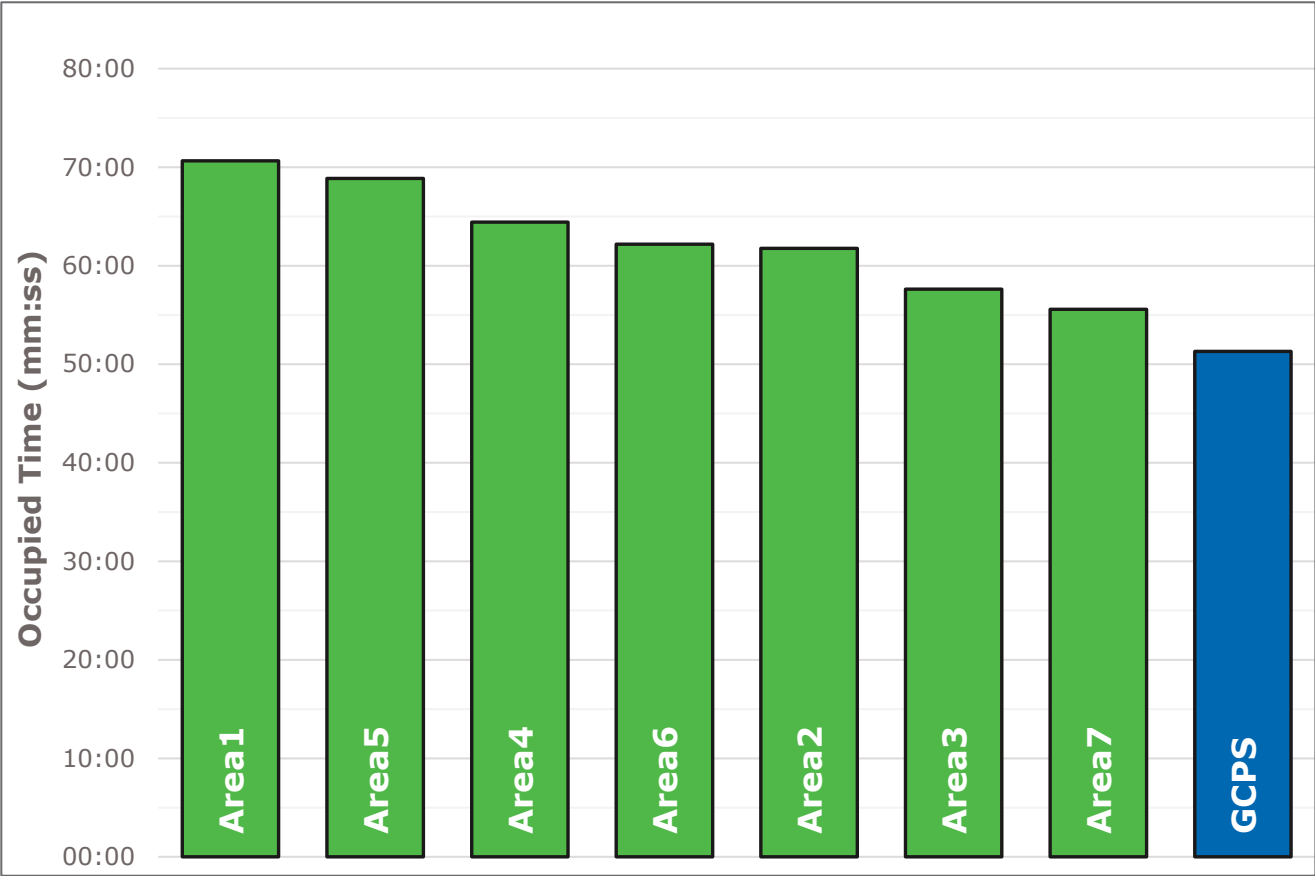
Benchmarking – Utilization
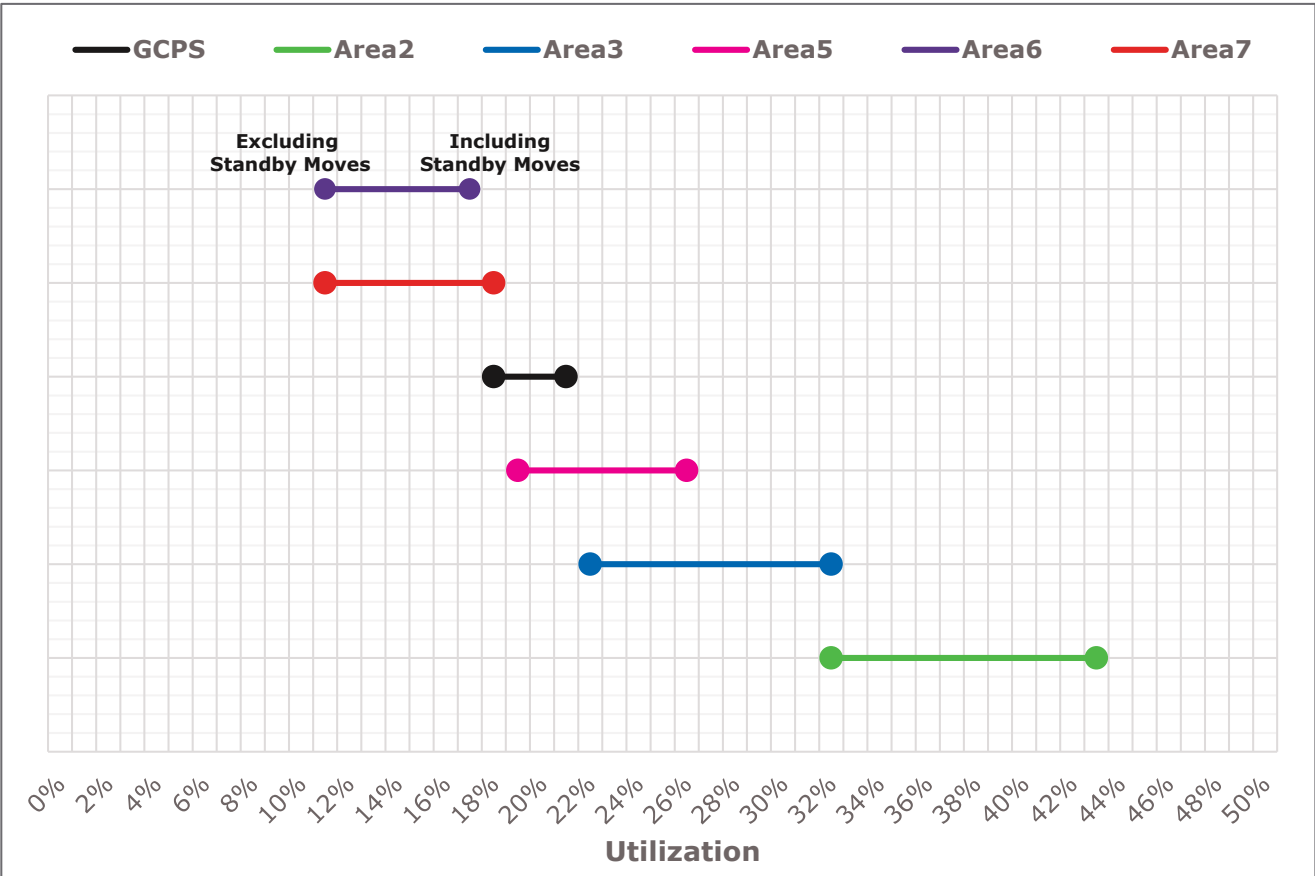
GCPS   Area2   Area3   Area5   Area6   Area7

Excluding Standby Moves   **Including Standby Moves**

Utilization

0% 2% 4% 6% 8% 10% 12% 14% 16% 18% 20% 22% 24% 26% 28% 30% 32% 34% 36% 38% 40% 42% 44% 46% 48% 50%

D   Demand Projections

Population Pyramid – 2021 compared with 2033 estimate

Legend: 2021 Male, 2021 Female, 2033 Male, 2033 Female

Age Group (vertical axis):
85+, 80 - 84, 75 - 79, 70 - 74, 65 - 69, 60 - 64, 55 - 59, 50 - 54, 45 - 49, 40 - 44, 35 - 39, 30 - 34, 25 - 29, 20 - 24, 15 - 19, 10 - 14, 5 - 9, 0 - 4

Population (horizontal axis): 5,000, 4,000, 3,000, 2,000, 1,000, 1,000, 2,000, 3,000, 4,000, 5,000, 6,000

Source: Hemson Consulting and MoF
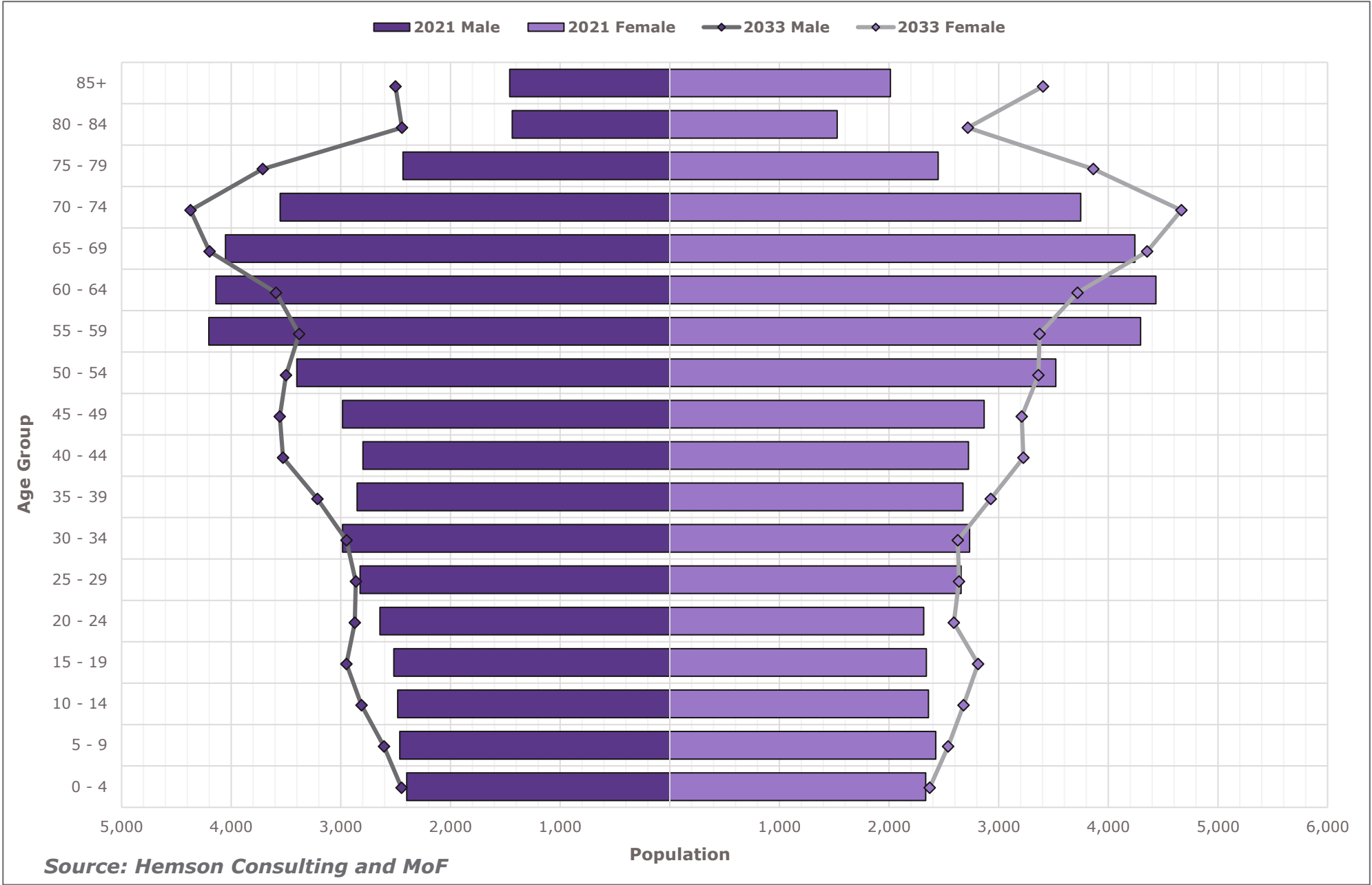
Demand Rates per 1,000 Population
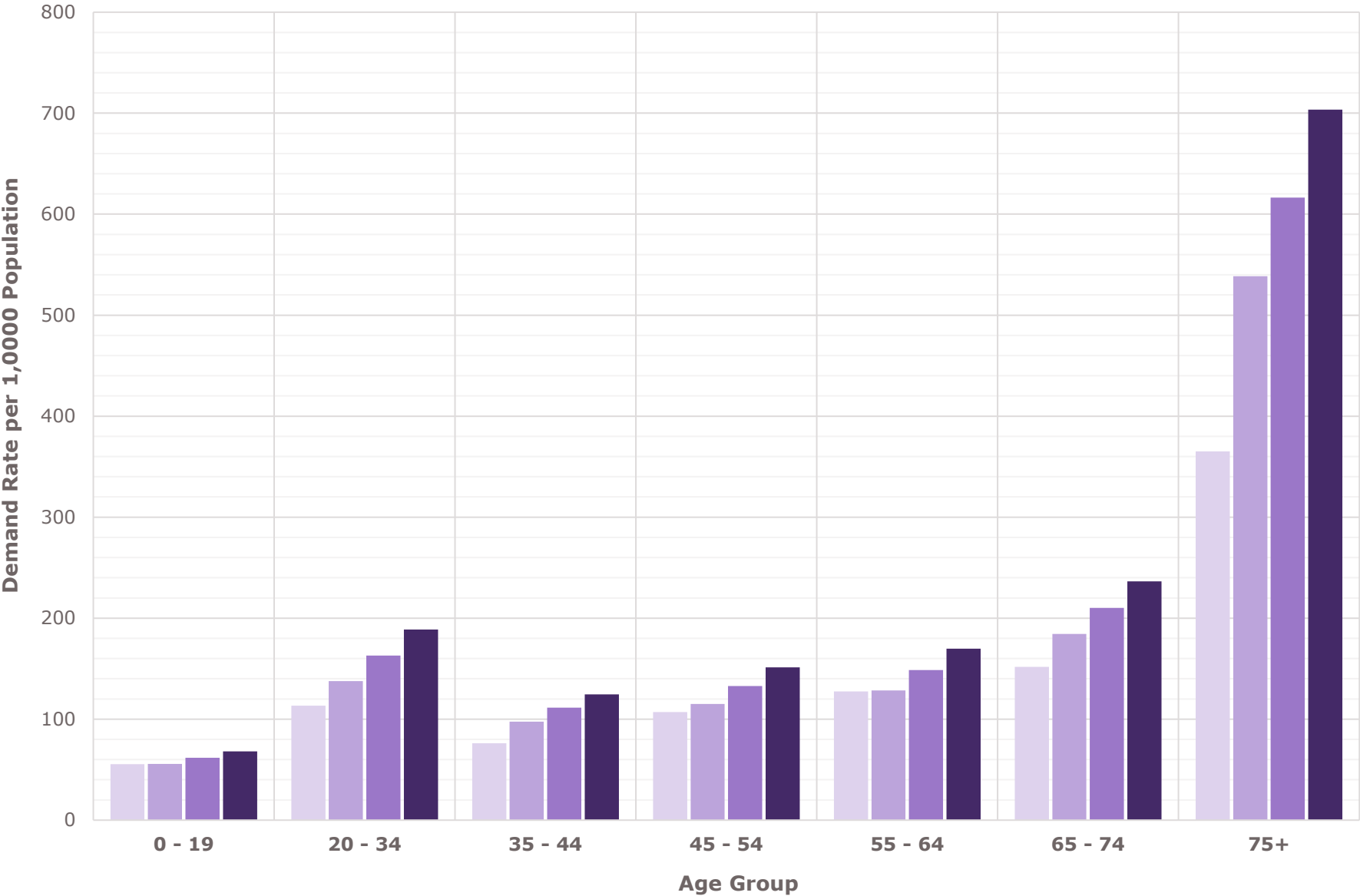
New Development Areas - 2033

Top 10 Sites by Total Units

Filename	Total Units	Status	LTM
Georgian Gate (Windfall)	900	Final Approved	Blue Mountains
Cobble Beach	861	Draft Approved	Georgian Bluffs
Flato East Resubmission Phase 2 and 2b	501	Final Approved	Southgate
Loon Call GH	469	Active	Grey Highlands
Meaford Haven	400	Draft Approved	Meaford
Centre Point South	393	Draft Approved	Grey Highlands
Home Farm Development	277	Pending LPAT Decision	Blue Mountains
Flato North Lands	267	Final Approved	Southgate
Sunvale Homes	247	Final Approved	West Grey
Trailhead (Eden Oak)	217	Pending LPAT Decision	Blue Mountains

Also includes Talisman Trail Edge and Fox Ridge in Grey Highlands
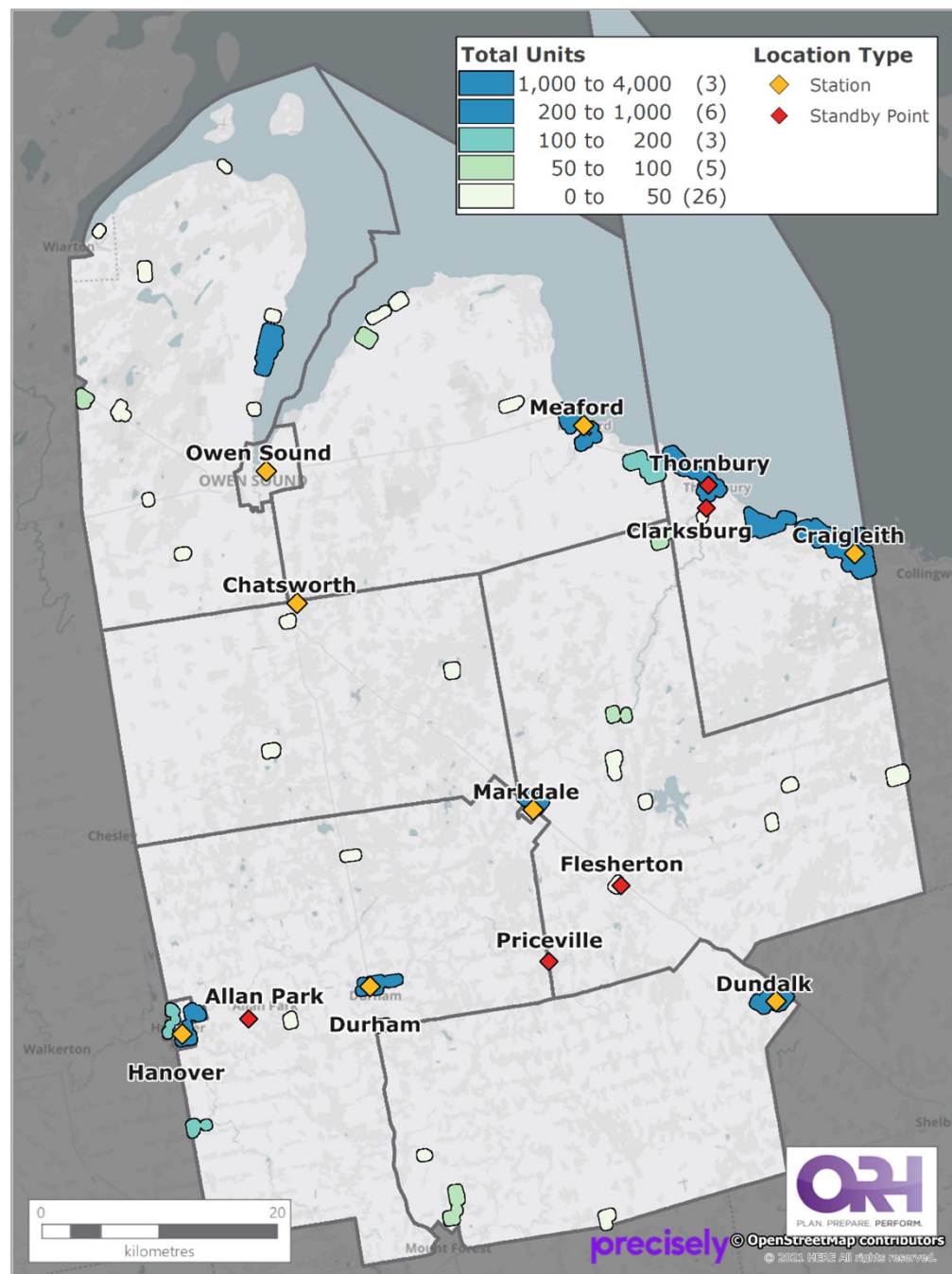
E   Model Validation

AmbSim
ORH Ambulance Simulation Model
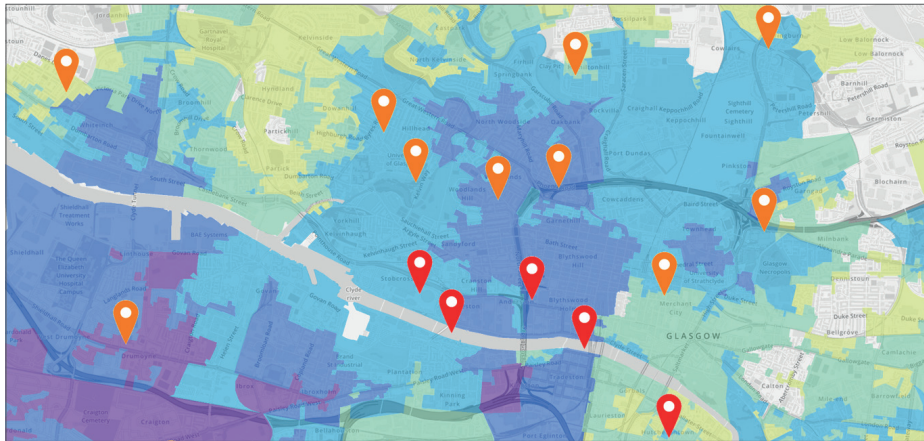
Simulating potential changes and understanding their impacts

KEY FACTS

- Used in numerous studies worldwide
- Built on historical analysis
- Validated against known operations
- Risk-free environment for testing
- Evidence base for change

ABOUT AMBSIM

AmbSim is a simulation model that replicates the key characteristics of an ambulance service to predict future behaviour and performance under a variety of different scenarios. AmbSim is used by ORH consultants for ambulance service reviews, and in-house by services worldwide.

AMBSIM'S APPROACH

Demand is generated in AmbSim in accordance with historical data. Vehicles within the model respond to this demand according to their proximity and the desired dispatch protocols; dispatch rules can be based on any combination of categorization systems, resource types and staff skills.

ORH analyzes Automatic Vehicle Location data to understand variation in road speeds by time, location, road classification and vehicle type. These are fed into the model to ensure that travel times accurately replicate reality.

Resources within AmbSim can reflect both actual and planned rosters. This allows the user to identify required changes in resource levels/balance in specific detail.

Time components of the job cycle are based on historical analysis and differ by location, day, hour, category, and vehicle type. Along with demand and resourcing, the user can vary these parameters to assess different scenarios.

APPLICATION

AmbSim can be used to devise optimal operational models and resourcing by location, time, vehicle type and staff skill. Different demand levels and combinations of operational parameters can be incorporated to provide an evidence base for informed decision making. Inputs and parameters are flexible and can be updated to reflect changes that are within the control of the service and those that are external, such as hospital configuration.

Model Validation Examples

P4 Non-Transfer Performance Distribution

Legend: Analysed Position, Validated Position

X-axis: Response Time (Minutes) — 0, 10, 20, 30, 40, 50, 60
Y-axis: % of Incidents — 0% to 100%

Ambulance Utilization

Legend: Analysed Position, Validated Position

X-axis: 0–23
Y-axis: 0% to 50%
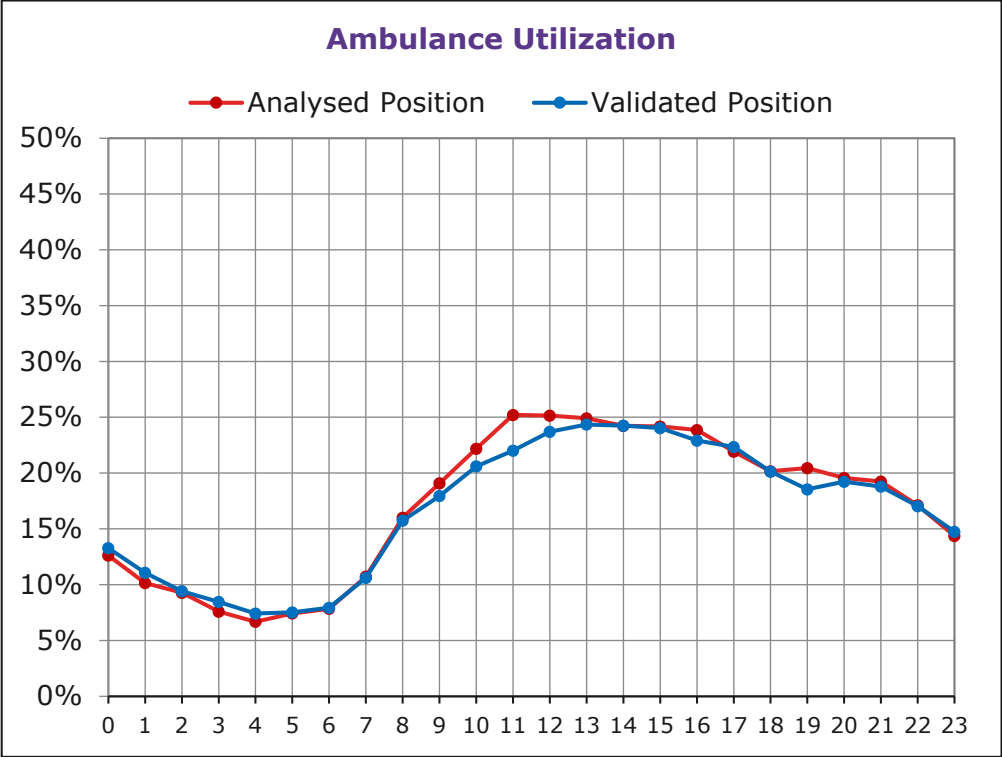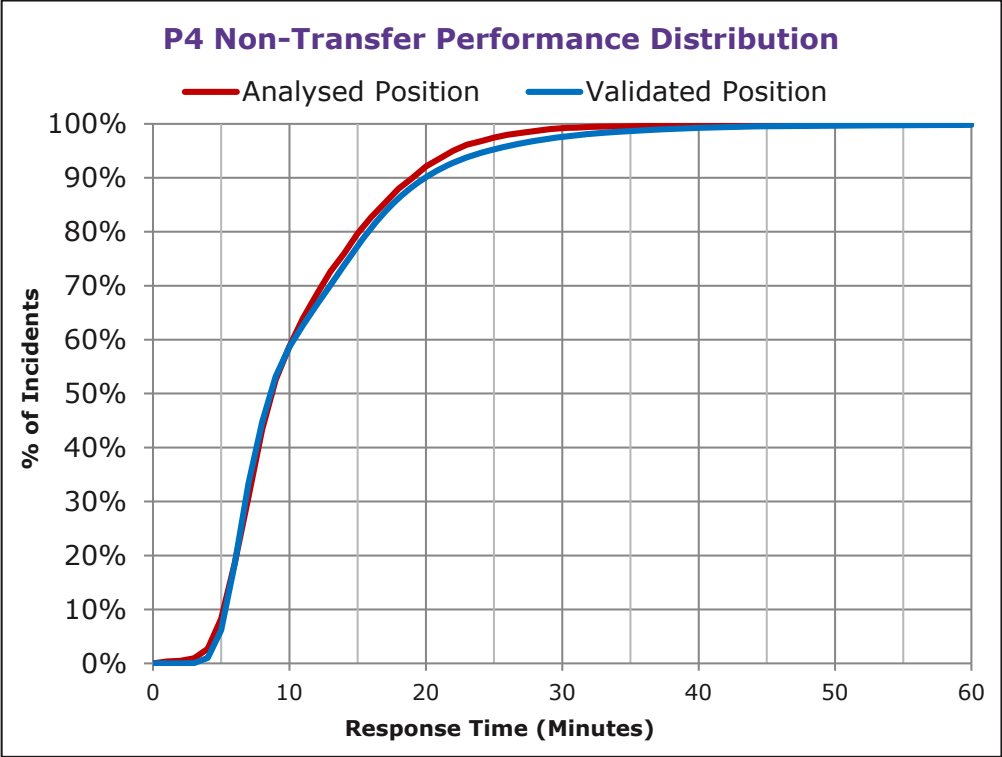
Annual Demand

Category	Validated	Analysed	Difference
P1	300	302	-0.5%
P2	45	47	-3.5%
P3	5,275	5,274	0.0%
P4	7,769	7,772	0.0%
Total	26,435	26,441	0.0%

Difference in Weekly Patient Journeys

Facility	P1	P2	P3	P4	Weekly	% Difference
Grey Bruce Health Services Markdale	0	0	1	2	3	14.1%
Grey Bruce Health Services Meaford	0	0	0	-1	0	-0.2%
Grey Bruce Health Services Owen Sound	0	0	-1	-3	-4	-4.1%
Hanover and District Hospital	0	0	0	1	1	5.1%
Outside Grey County	0	0	2	6	9	25.0%
Weekly Overall	1.1	0.1	3.1	4.6	8.9	4.6%

F   Optimization Modelling

F1   Blank Canvas Optimization

F1a   8 Sites
F1b   9 Sites

F2   Site Search Maps

F2a   Durham
F2b   Craigleith

Blank Canvas Optimization Locations : 8 Sites
Modelling Results

Location Type

◆ Current Location

◆ Optimal Location

Meaford

Owen Sound

Craigleith

Chatsworth

Markdale

Dundalk

Durham

Hanover

0   20

kilometres

precisely

ORH
PLAN. PREPARE. **PERFORM.**
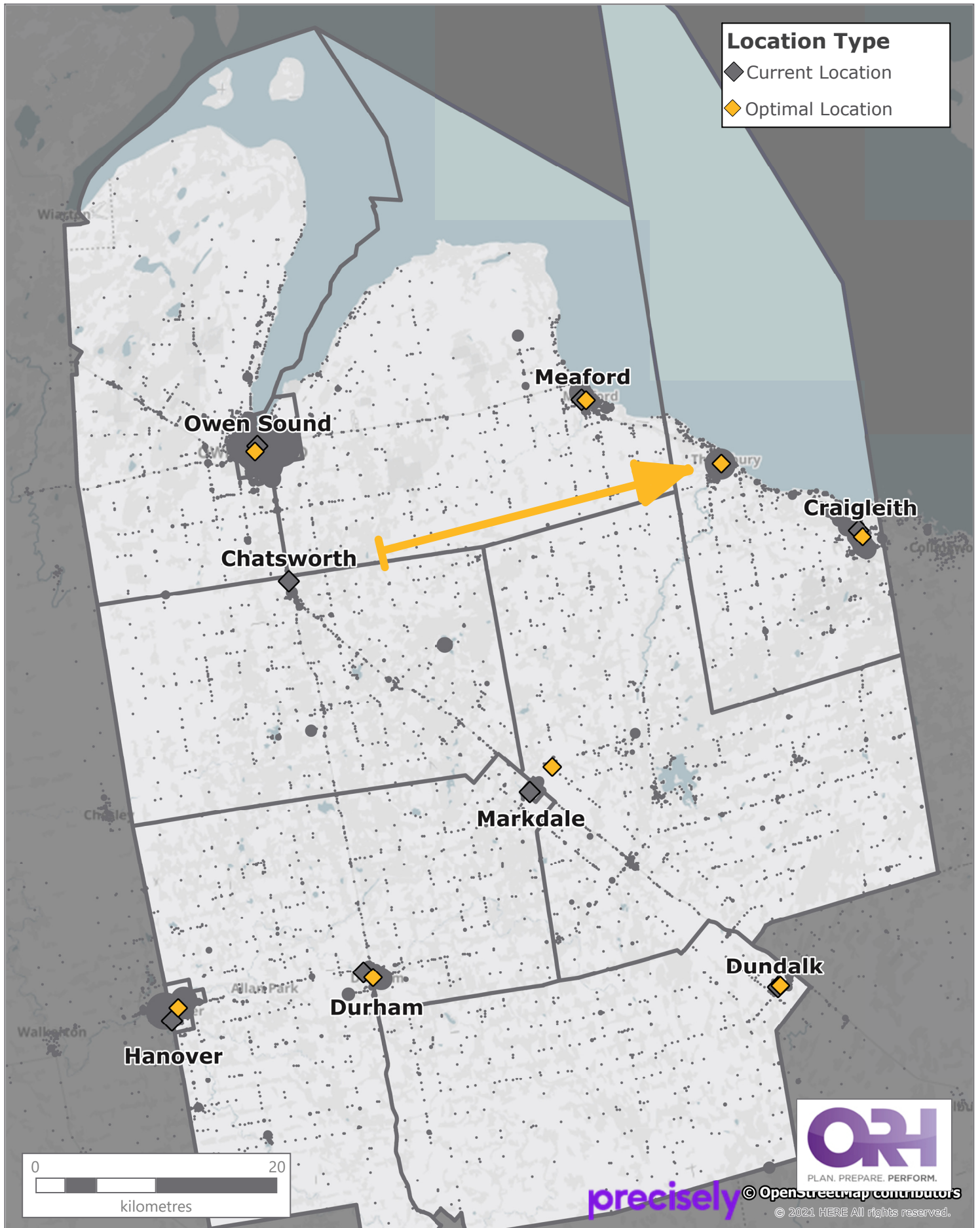
Blank Canvas Optimization Locations : 9 Sites
Modelling Results

Location Type
- ◆ Current Location
- ◆ Optimal Location

Meaford

Owen Sound

Craigleith

Chatsworth

Markdale

Dundalk

Durham

Hanover

0   20
kilometres

PLAN. PREPARE. **PERFORM.**

precisely

Site Search Map - Durham

DURHAM RD E

DURHAM RD W

Existing

CHESTER ST W

DJAY CRES

MACDONALD CRES

COLLEGE ST N

GARAFRAXA ST N

LAMBTON ST W

LAMBTON ST E

Optimal

QUEEN ST S

GARAFRAXA ST S

ALBERT ST S

PARK ST W

precisely © OpenStreetMap contributors

Site Search Location Score

- Best in local area
-
-
-
- Worst in local area

Location Type

- Existing
- Optimal

0   0.2

kilometres

ORH

PLAN. PREPARE. PERFORM.

Site Search Map - Craigleith

N
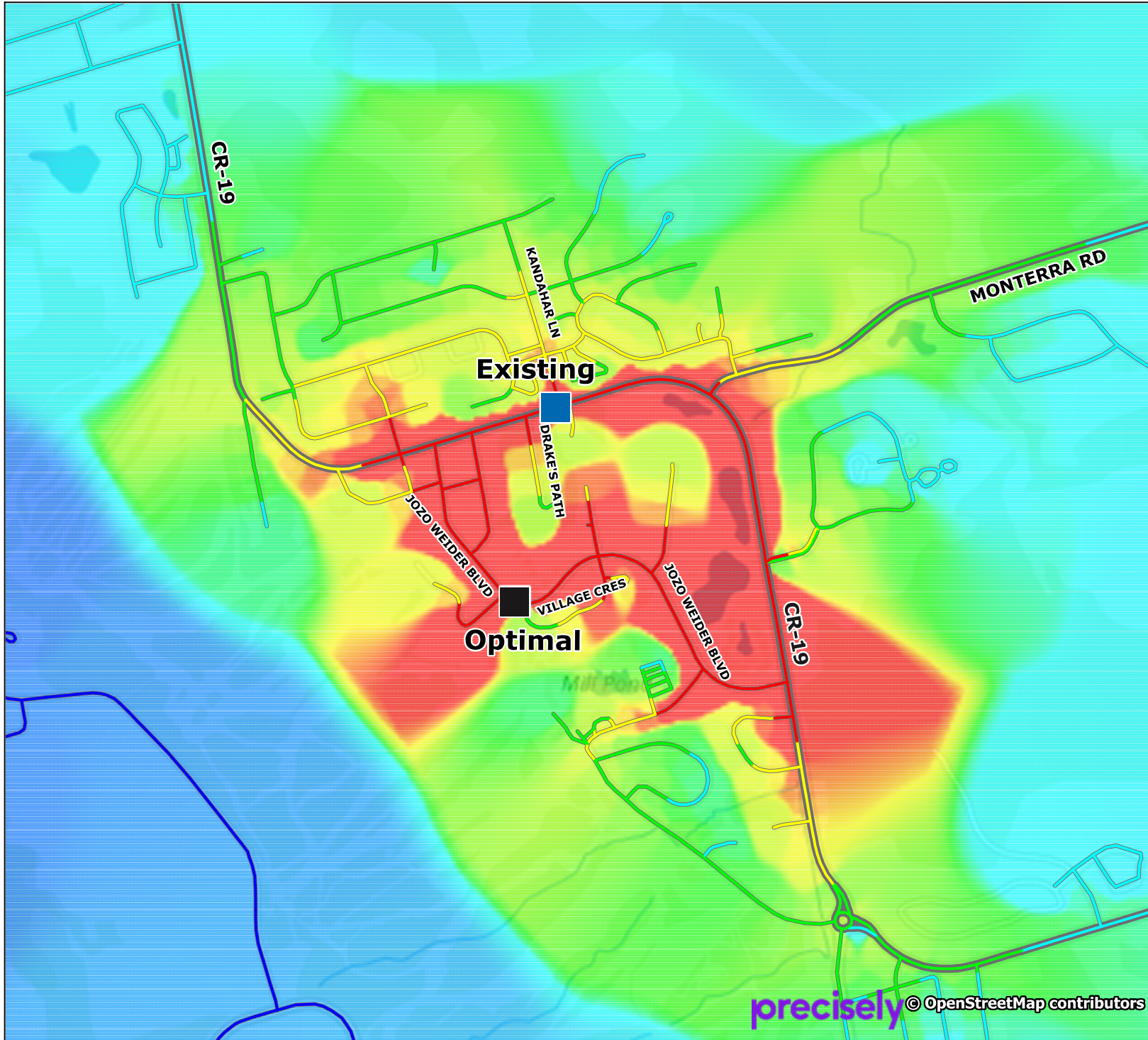
Scale: 1:14,880
Date: 10/10/2022

Site Search Location Score

🟥	Best in local area
🟨	
🟩	
⬜	
🟦	Worst in local area

Location Type

🟦	Existing
⬛	Optimal

0   0.5

kilometres
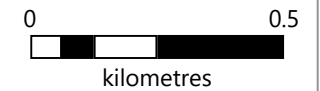
Copyright Notice, OS license or other legal
reference goes here

ORH
PLAN. PREPARE. PERFORM.

Client:

**Grey County Paramedic
Service**

Project:

GCPS1

Drawing Title:

**Site Search map for
Craigleith**

precisely   © OpenStreetMap contributors

G   Current Demand Modelling

Grey County Paramedic Service

Moving Chatsworth Resources to Thornbury

Modelling Results

P4 8-Minute Performance

LTM	Base Position	Chatsworth moved	Difference
Blue Mountains	46.8%	46.0%	-0.8%
Chatsworth	25.0%	10.0%	-15.0%
Georgian Bluffs	33.4%	28.9%	-4.5%
Grey Highlands	30.0%	30.1%	0.1%
Hanover	84.9%	85.0%	0.0%
Meaford	53.9%	52.5%	-1.4%
Owen Sound	89.3%	86.3%	-3.1%
Southgate	44.4%	44.3%	-0.1%
West Grey	46.9%	46.8%	-0.1%
Overall	61.6%	59.5%	-2.2%

P4 15-Minute Performance

LTM	Base Position	Chatsworth moved	Difference
Blue Mountains	89.9%	85.3%	-4.6%
Chatsworth	69.3%	59.7%	-9.6%
Georgian Bluffs	87.3%	86.7%	-0.6%
Grey Highlands	64.6%	65.1%	0.5%
Hanover	98.1%	98.0%	0.0%
Meaford	88.1%	90.8%	2.7%
Owen Sound	97.8%	97.1%	-0.7%
Southgate	72.6%	72.5%	-0.1%
West Grey	83.5%	83.6%	0.0%
Overall	87.5%	86.4%	-1.0%

Grey County Paramedic Service

P4 Performance: Adding Thornbury Base

Modelling Results

Modelled Scenario

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	69.8%	77.8%	95.7%	07:25	13:03
Chatsworth	25.1%	38.5%	69.6%	12:23	18:45
Georgian Bluffs	33.5%	51.1%	87.4%	10:42	15:40
Grey Highlands	30.2%	39.9%	65.7%	12:44	20:57
Hanover	85.0%	93.2%	98.1%	06:16	09:00
Meaford	56.6%	68.7%	93.6%	08:12	13:56
Owen Sound	89.5%	94.4%	97.9%	06:00	08:10
Southgate	44.8%	49.0%	73.0%	11:03	19:15
West Grey	47.0%	61.6%	83.6%	09:56	16:58
Overall	**64.0%**	**72.9%**	**88.8%**	**08:29**	**15:34**

Difference to Base Position

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	23.0%	21.4%	5.7%	-02:35	-01:59
Chatsworth	0.1%	0.2%	0.3%	-00:03	-00:03
Georgian Bluffs	0.1%	0.0%	0.1%	-00:01	-00:01
Grey Highlands	0.2%	0.5%	1.1%	-00:10	-00:16
Hanover	0.1%	0.1%	0.0%	-00:01	-00:01
Meaford	2.7%	2.1%	5.5%	-00:41	-02:14
Owen Sound	0.2%	0.1%	0.1%	-00:01	-00:03
Southgate	0.4%	0.4%	0.4%	-00:04	-00:04
West Grey	0.1%	0.2%	0.1%	-00:01	-00:01
Overall	**2.4%**	**2.2%**	**1.4%**	**-00:19**	**-00:36**

Grey County Paramedic Service

Relocating Fast Response Unit

Modelling Results

P4 8-Minute Performance Difference

LTM	Validated Position	FRV Location											
		Allen Park	Chatsworth	Craigleith	Dundalk	Durham	Flesherton	Hanover	Kimberley	Markdale	Meaford	Owen Sound	Thornbury
Blue Mountains	46.8%	-0.1%	-0.1%	10.5%	0.0%	0.0%	-0.1%	-0.1%	0.2%	0.0%	0.1%	-0.1%	14.3%
Chatsworth	25.0%	-4.7%	12.1%	-4.8%	-4.8%	-4.8%	-5.0%	-4.7%	-4.9%	-2.1%	-4.8%	-4.4%	-4.8%
Georgian Bluffs	33.4%	-0.9%	4.4%	-0.8%	-0.9%	-0.8%	-0.9%	-0.8%	-0.8%	-0.8%	-0.8%	4.0%	-0.8%
Grey Highlands	30.0%	-1.3%	-1.3%	-1.4%	-1.2%	-1.4%	6.6%	-1.4%	1.5%	2.7%	-1.4%	-1.4%	-1.2%
Hanover	84.9%	4.3%	-0.8%	-0.7%	-0.8%	-0.7%	-0.8%	5.8%	-0.8%	-0.9%	-0.9%	-0.8%	-0.8%
Meaford	53.9%	-0.1%	0.6%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	11.1%	0.5%	0.0%
Owen Sound	89.3%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%
Southgate	44.4%	-1.7%	-1.8%	-1.8%	9.8%	-1.5%	-1.6%	-1.8%	-2.8%	-1.8%	-1.9%	-1.8%	-1.7%
West Grey	46.9%	0.7%	-2.7%	-2.8%	-2.7%	6.4%	-2.7%	-1.7%	-2.9%	-1.6%	-2.8%	-2.7%	-2.8%
Overall	**61.6%**	**0.1%**	**0.4%**	**0.3%**	**-0.1%**	**0.1%**	**-0.2%**	**0.2%**	**-0.6%**	**-0.3%**	**0.0%**	**0.5%**	**0.5%**

P4 15-Minute Performance

LTM	Validated Position	FRV Location											
		Allen Park	Chatsworth	Craigleith	Dundalk	Durham	Flesherton	Hanover	Kimberley	Markdale	Meaford	Owen Sound	Thornbury
Blue Mountains	89.9%	0.0%	0.0%	4.4%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	1.3%	0.0%	4.0%
Chatsworth	69.3%	-3.7%	9.9%	-4.2%	-4.3%	-3.2%	-3.8%	-4.1%	-2.8%	0.5%	-4.1%	-2.7%	-4.2%
Georgian Bluffs	87.3%	-0.6%	1.9%	-0.5%	-0.5%	-0.5%	-0.6%	-0.6%	-0.6%	-0.5%	-0.4%	2.5%	-0.5%
Grey Highlands	64.6%	-1.6%	-1.6%	-1.6%	0.0%	-1.6%	7.6%	-1.6%	5.2%	2.6%	-1.2%	-1.6%	-0.8%
Hanover	98.1%	0.6%	-0.8%	-0.8%	-0.8%	0.6%	-0.9%	0.7%	-0.9%	-0.9%	-0.9%	-0.9%	-0.8%
Meaford	88.1%	-0.2%	0.3%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.6%	-0.1%	4.6%	0.4%	3.2%
Owen Sound	97.8%	-0.2%	0.5%	-0.2%	-0.3%	-0.3%	-0.2%	-0.3%	-0.3%	-0.3%	-0.2%	0.6%	-0.2%
Southgate	72.6%	-1.8%	-2.2%	-2.2%	8.0%	-0.3%	2.3%	-2.1%	-7.2%	-2.0%	-2.3%	-2.2%	-2.1%
West Grey	83.5%	4.6%	-1.7%	-1.8%	-1.8%	3.8%	-1.1%	0.4%	-2.1%	-0.7%	-1.8%	-1.7%	-1.7%
Overall	**87.5%**	**0.0%**	**0.5%**	**0.0%**	**-0.1%**	**0.0%**	**0.1%**	**-0.2%**	**-0.4%**	**-0.2%**	**-0.3%**	**0.1%**	**0.1%**

Grey County Paramedic Service

P4 90th Percentile : Additional Ambulance

Modelling Results

		Additional 24/7 Ambulance at:							
LTM	Base Position	Chatsworth	Craigleith	Dundalk	Durham	Hanover	Markdale	Meaford	Owen Sound
Blue Mountains	15:01	14:55	**13:49**	15:00	15:00	15:00	14:59	14:20	14:54
Chatsworth	18:48	**15:33**	18:46	18:39	18:41	18:44	18:21	18:45	16:46
Georgian Bluffs	15:41	14:35	15:41	15:41	15:40	15:40	15:40	15:38	14:21
Grey Highlands	21:13	21:06	21:08	21:16	21:00	21:04	**20:31**	21:06	21:08
Hanover	09:01	08:58	09:00	08:59	10:51	**06:06**	08:57	09:00	08:58
Meaford	16:10	15:19	16:20	16:10	16:09	16:11	16:08	**12:05**	15:19
Owen Sound	08:13	07:53	08:14	08:12	08:13	08:13	08:11	08:08	**07:03**
Southgate	19:19	19:07	19:14	**17:00**	18:38	18:51	18:19	19:12	19:09
West Grey	16:59	16:54	16:58	16:56	**15:21**	16:19	16:45	16:56	16:55
Overall	**16:10**	**15:08**	**15:48**	**15:55**	**15:48**	**15:47**	**15:49**	**15:42**	**15:01**

		Additional 2x 24/7 Ambulance at:							
LTM	Base Position	Chatsworth	Craigleith	Dundalk	Durham	Hanover	Markdale	Meaford	Owen Sound
Blue Mountains	15:01	14:53	**13:39**	15:00	15:00	15:01	14:59	14:20	14:53
Chatsworth	18:48	**13:42**	18:46	18:39	18:40	18:43	18:14	18:44	14:56
Georgian Bluffs	15:41	14:38	15:41	15:42	15:42	15:41	15:40	15:39	13:57
Grey Highlands	21:13	21:04	21:08	21:25	20:58	21:00	**20:18**	21:02	21:06
Hanover	09:01	08:58	09:04	08:59	11:01	**05:39**	08:57	09:01	08:57
Meaford	16:10	15:15	16:45	16:11	16:11	16:13	16:07	**11:15**	15:08
Owen Sound	08:13	08:51	08:14	08:12	08:12	08:13	08:11	08:08	**06:51**
Southgate	19:19	19:02	19:10	**16:38**	18:33	18:48	18:20	19:07	19:04
West Grey	16:59	16:54	16:58	16:58	**14:54**	16:14	16:43	16:56	16:54
Overall	**16:10**	**15:08**	**15:46**	**15:55**	**15:45**	**15:44**	**15:46**	**15:37**	**14:41**

Grey County Paramedic Service
P4 90th Percentile : Additional Ambulance
Modelling Results

LTM	Base Position	Additional 3x 24/7 Ambulance at:							
		Chatsworth	Craigleith	Dundalk	Durham	Hanover	Markdale	Meaford	Owen Sound
Blue Mountains	15:01	14:54	**13:37**	15:00	15:00	15:01	14:59	14:25	14:53
Chatsworth	18:48	**13:24**	18:46	18:38	18:40	18:44	18:13	18:43	14:24
Georgian Bluffs	15:41	14:32	15:42	15:41	15:40	15:41	15:41	15:39	13:52
Grey Highlands	21:13	21:04	21:08	21:25	20:58	21:01	**20:21**	21:03	21:05
Hanover	09:01	08:57	09:03	08:59	10:51	**05:34**	08:57	09:01	08:58
Meaford	16:10	15:13	16:46	16:11	16:11	16:11	16:08	**11:08**	15:06
Owen Sound	08:13	08:39	08:14	08:13	08:12	08:13	08:11	08:08	**06:48**
Southgate	19:19	19:02	19:15	**16:36**	18:32	18:47	18:36	19:09	19:03
West Grey	16:59	16:53	16:57	16:59	**14:47**	16:11	16:45	16:57	16:55
Overall	**16:10**	**15:03**	**15:46**	**15:55**	**15:44**	**15:43**	**15:48**	**15:38**	**14:36**

Grey County Paramedic Service

Resource Requirement: Achieving P4 15-minute 90th Percentile

Modelling Results

P4 8-Minute Performance

LTM	Base Position	Adding Resources	Difference
Blue Mountains	46.8%	54.1%	7.3%
Chatsworth	25.0%	35.8%	10.8%
Georgian Bluffs	33.4%	39.0%	5.6%
Grey Highlands	30.0%	30.3%	0.3%
Hanover	84.9%	85.3%	0.4%
Meaford	53.9%	62.6%	8.8%
Owen Sound	89.3%	95.0%	5.7%
Southgate	44.4%	45.2%	0.8%
West Grey	46.9%	47.3%	0.5%
Overall	**61.6%**	**66.2%**	**4.6%**

P4 15-Minute Performance

LTM	Base Position	Adding Resources	Difference
Blue Mountains	89.9%	93.7%	3.8%
Chatsworth	69.3%	80.8%	11.6%
Georgian Bluffs	87.3%	91.4%	4.1%
Grey Highlands	64.6%	64.8%	0.2%
Hanover	98.1%	98.1%	0.1%
Meaford	88.1%	89.8%	1.7%
Owen Sound	97.8%	99.3%	1.5%
Southgate	72.6%	73.3%	0.8%
West Grey	83.5%	84.0%	0.4%
Overall	**87.5%**	**90.2%**	**2.8%**

Average Weekly Vehicle Hours

Station	Base Position	Adding Resources	Difference
Owen Sound	252	420	168
Meaford	168	168	
Markdale	252	252	
Hanover	168	168	
Durham	168	168	
Dundalk	168	168	
Craigleith	178	262	84
Chatsworth	168	168	
Total	**1,522**	**1,774**	**252**

H   Future Demand Modelling

H1   'Do Nothing' Scenario

     H1a   2033 Results

     H1b   'Do Nothing' Trajectory

H2   Maintaining Current Performance in 2033

H3   Potential Performance Standards

H4   Meeting Potential Performance Standards

H5   'Do Nothing' with Alternative Demand Levels

H6   Modelling the FRU with Treat and Release

H7   Additional FRUs

H8   Changes to Offload Delays

Grey County Paramedic Service

P4 Performance: 'Do Nothing' Scenario in 2033

Modelling Results

Modelled Scenario

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	35.6%	47.6%	75.2%	13:33	26:31
Chatsworth	17.8%	28.8%	57.8%	14:31	21:46
Georgian Bluffs	21.5%	33.4%	68.7%	14:18	24:31
Grey Highlands	26.0%	34.9%	58.0%	15:09	26:32
Hanover	69.7%	80.1%	88.3%	09:13	17:12
Meaford	36.0%	46.6%	70.7%	12:29	22:30
Owen Sound	69.3%	75.8%	84.3%	09:54	20:54
Southgate	36.0%	38.2%	55.6%	15:24	29:35
West Grey	37.3%	50.7%	74.2%	12:12	21:01
Overall	**47.5%**	**56.6%**	**74.5%**	**12:10**	**23:34**

Difference to Validated Position

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	-11.2%	-8.8%	-14.7%	03:32	11:29
Chatsworth	-7.2%	-9.5%	-11.5%	02:05	02:58
Georgian Bluffs	-11.9%	-17.6%	-18.6%	03:36	08:50
Grey Highlands	-4.1%	-4.5%	-6.6%	02:15	05:19
Hanover	-15.2%	-13.1%	-9.8%	02:56	08:11
Meaford	-17.9%	-20.0%	-17.4%	03:36	06:20
Owen Sound	-20.0%	-18.5%	-13.5%	03:52	12:41
Southgate	-8.4%	-10.4%	-17.0%	04:17	10:16
West Grey	-9.5%	-10.7%	-9.3%	02:15	04:02
Overall	**-14.1%**	**-14.1%**	**-12.9%**	**03:21**	**07:25**

'Do Nothing' Scenario Trajectory
90th Percentile Performance by Lower Tier Municipality

Legend: Blue Mountains, Chatsworth, Georgian Bluffs, Grey Highlands, Hanover, Meaford, Owen Sound, Southgate, West Grey, Overall

Y-axis: 90th Percentile (mm:ss)

X-axis years: 2023, 2025, 2027, 2029, 2031, 2033
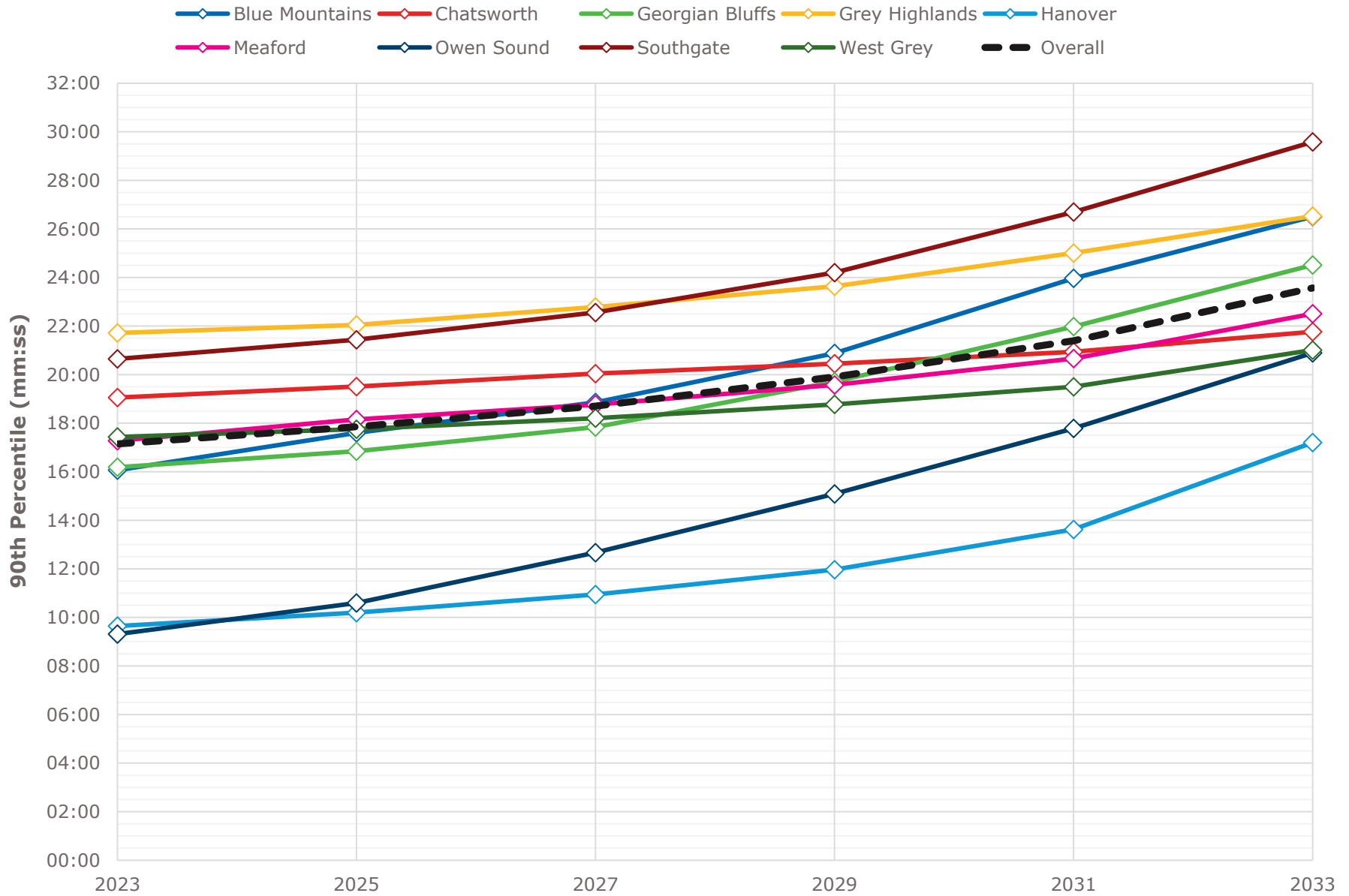
Grey County Paramedic Service

Resource Requirement: Maintaining Current Performance in 2033

Modelling Results

P4 8-Minute Performance

LTM	Validated Position	Adding Resources	Difference
Blue Mountains	46.8%	52.1%	5.3%
Chatsworth	25.0%	34.3%	9.3%
Georgian Bluffs	33.4%	31.1%	-2.3%
Grey Highlands	30.0%	34.0%	3.9%
Hanover	84.9%	86.6%	1.7%
Meaford	53.9%	61.7%	7.8%
Owen Sound	89.3%	91.8%	2.5%
Southgate	44.4%	55.8%	11.4%
West Grey	46.9%	53.6%	6.8%
Overall	**61.6%**	**65.6%**	**4.0%**

P4 15-Minute Performance

LTM	Validated Position	Adding Resources	Difference
Blue Mountains	89.9%	93.7%	3.8%
Chatsworth	69.3%	79.8%	10.5%
Georgian Bluffs	87.3%	85.6%	-1.7%
Grey Highlands	64.6%	65.3%	0.7%
Hanover	98.1%	98.4%	0.3%
Meaford	88.1%	88.4%	0.3%
Owen Sound	97.8%	98.8%	1.0%
Southgate	72.6%	75.4%	2.8%
West Grey	83.5%	85.7%	2.2%
Overall	**87.5%**	**89.8%**	**2.3%**

Potential Performance Standards

LTM	Population	Area (sq. km)	Pop. Density	TWGM	TWGM Rank	Base Position P4 Performance		Suggested 90th Percentile	Maintaining Performance in 2033	
						Average	90th Percentile		Average	90th Percentile
Owen Sound	21,612	24	892	1525.8	1	06:02	08:13	08:30	05:43	07:41
Hanover	7,967	10	814	1150.4	2	06:17	09:01	08:30	06:07	09:00
Blue Mountains	9,390	285	33	106.4	3	10:01	15:01	15:00	09:18	13:53
Meaford	11,485	588	20	83	4	08:53	16:10	15:00	08:12	15:59
Southgate	8,716	643	14	29.9	5	11:06	19:19	15:00	10:13	20:05
West Grey	13,131	875	15	26.7	6	09:57	16:59	15:00	09:17	16:37
Georgian Bluffs	11,100	600	19	25.6	7	10:42	15:41	15:00	10:59	15:52
Grey Highlands	10,424	879	12	18.5	8	12:54	21:13	18:00	12:33	21:04
Chatsworth	7,080	594	12	13.4	9	12:26	18:48	18:00	10:51	17:37

Grey County Paramedic Service

Resource Requirement: Meeting Suggested Performance Standards

Modelling Results

Modelled Scenario

LTM	Performance					90th %ile Standard
	8-Minute	10-Minute	15-Minute	Average	90th Percentile	
Blue Mountains	53.7%	68.5%	95.4%	08:55	13:23	15:00
Chatsworth	46.0%	60.1%	84.2%	09:41	16:49	18:00
Georgian Bluffs	43.3%	57.8%	91.1%	09:47	14:43	15:00
Grey Highlands	41.4%	52.3%	79.0%	10:37	17:44	18:00
Hanover	93.5%	96.8%	99.5%	05:25	07:06	08:30
Meaford	71.0%	79.7%	93.3%	07:02	13:26	15:00
Owen Sound	93.8%	97.4%	99.2%	05:30	07:18	08:30
Southgate	74.0%	78.3%	91.3%	07:17	14:23	15:00
West Grey	59.9%	73.4%	92.2%	08:16	14:03	15:00
Overall	**71.3%**	**79.8%**	**93.7%**	**07:30**	**13:13**	

Difference to Validated Position

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	6.9%	12.2%	5.6%	-01:06	-01:40
Chatsworth	22.7%	23.3%	15.5%	-02:55	-02:05
Georgian Bluffs	11.5%	8.3%	4.2%	-01:02	-01:06
Grey Highlands	11.6%	13.3%	16.1%	-02:27	-04:02
Hanover	8.6%	3.6%	1.4%	-00:52	-01:55
Meaford	17.2%	13.0%	5.2%	-01:51	-02:46
Owen Sound	4.4%	3.1%	1.4%	-00:31	-00:54
Southgate	29.3%	29.6%	18.7%	-03:47	-04:53
West Grey	12.4%	11.6%	8.6%	-01:37	-02:52
Zooa	4.5%	6.7%	10.1%	-01:26	-03:19
Overall	**9.7%**	**9.3%**	**6.4%**	**-01:19**	**-03:01**

Grey County Paramedic Service

Resource Requirement: Meeting Suggested Performance Standards

Modelling Results

Average Weekly Vehicle Hours

Station	Ambulance	Difference to Base	Peak Vehicles
Owen Sound	504	252	4
Meaford	336	168	2
Markdale	168	0	1
Hanover	336	168	2
Dundalk	336	168	2
Durham	252	84	2
Craigleith	262	84	2
Chatsworth	168	0	1
Holstein	168	168	1
Holland Centre	84	84	1
Feversham	168	168	1
Cobble Beach	84	84	1
Total	**2,866**	**1,428**	**20**

Grey County Paramedic Service

'Do Nothing' with Alternate Future Demand Levels

Modelling Results

P4 8-Minute Performance

Difference

LTM	Validated	Annual Demand Increase			Annual Demand Increase		
		+3.8%	+5.8%	+7.8%	+3.8%	+5.8%	+7.8%
Blue Mountains	46.8%	39.9%	35.6%	29.4%	-6.9%	-11.2%	-17.4%
Chatsworth	25.0%	19.5%	17.8%	15.5%	-5.5%	-7.2%	-9.5%
Georgian Bluffs	33.4%	23.9%	21.5%	18.2%	-9.5%	-11.9%	-15.2%
Grey Highlands	30.0%	28.8%	26.0%	22.0%	-1.2%	-4.1%	-8.0%
Hanover	84.9%	76.4%	69.7%	60.5%	-8.6%	-15.2%	-24.4%
Meaford	53.9%	41.6%	36.0%	29.5%	-12.2%	-17.9%	-24.4%
Owen Sound	89.3%	78.2%	69.3%	57.4%	-11.2%	-20.0%	-31.9%
Southgate	44.4%	44.3%	36.0%	29.8%	-0.1%	-8.4%	-14.6%
West Grey	46.9%	41.3%	37.3%	32.1%	-5.5%	-9.5%	-14.8%
Overall	**61.6%**	**53.5%**	**47.5%**	**39.8%**	**-8.2%**	**-14.1%**	**-21.8%**

P4 15-Minute Performance

Difference

LTM	Validated	Annual Demand Increase			Annual Demand Increase		
		+3.8%	+5.8%	+7.8%	+3.8%	+5.8%	+7.8%
Blue Mountains	89.9%	82.6%	75.2%	64.6%	-7.3%	-14.7%	-25.3%
Chatsworth	69.3%	62.8%	57.8%	51.7%	-6.5%	5.9%	-17.6%
Georgian Bluffs	87.3%	75.1%	68.7%	60.4%	-12.2%	-12.1%	-26.9%
Grey Highlands	64.6%	62.0%	58.0%	51.4%	-2.6%	10.6%	-13.2%
Hanover	98.1%	93.2%	88.3%	80.8%	-4.9%	-22.9%	-17.2%
Meaford	88.1%	77.0%	70.7%	61.7%	-11.1%	-12.9%	-26.4%
Owen Sound	97.8%	90.4%	84.3%	75.5%	-7.4%	-22.6%	-22.3%
Southgate	72.6%	66.0%	55.6%	48.4%	-6.6%	2.6%	-24.1%
West Grey	83.5%	78.6%	74.2%	66.9%	-5.0%	-8.3%	-16.7%
Overall	**87.5%**	**80.5%**	**74.5%**	**66.3%**	**-6.9%**	**-12.2%**	**-21.2%**

Grey County Paramedic Service

P4 Performance : FRU Reintroduced with Treat & Release

Modelling Results

Modelled Scenario

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	51.7%	65.9%	93.4%	09:24	13:58
Chatsworth	30.9%	46.1%	77.2%	11:24	18:01
Georgian Bluffs	34.8%	49.9%	88.8%	10:29	15:17
Grey Highlands	33.7%	42.0%	65.1%	12:37	21:09
Hanover	86.4%	92.3%	98.3%	06:09	09:06
Meaford	61.4%	71.2%	88.6%	08:17	15:50
Owen Sound	93.0%	96.7%	98.9%	05:18	07:23
Southgate	55.2%	57.9%	75.0%	10:21	20:17
West Grey	53.4%	66.6%	85.5%	09:20	16:41
Overall	**66.0%**	**74.5%**	**89.9%**	**08:11**	**15:05**

Difference to 2033 Core Scenario

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	-0.4%	-0.5%	-0.3%	00:06	00:05
Chatsworth	-3.3%	-3.5%	-2.5%	00:33	00:24
Georgian Bluffs	3.7%	4.4%	3.3%	-00:30	-00:35
Grey Highlands	-0.3%	-0.2%	-0.2%	00:04	00:05
Hanover	-0.2%	-0.3%	-0.1%	00:02	00:06
Meaford	-0.3%	-0.2%	0.3%	00:04	-00:09
Owen Sound	1.2%	0.5%	0.1%	-00:25	-00:18
Southgate	-0.6%	-0.6%	-0.4%	00:08	00:12
West Grey	-0.3%	-0.3%	-0.3%	00:03	00:04
Overall	**0.3%**	**0.1%**	**0.1%**	**-00:07**	**-00:03**

2033 Maintain Performance: FRUs

2033 Core Scenario with FRUs at Cobble Beach and Feversham

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	52.2%	66.8%	94.1%	09:14	13:47
Chatsworth	38.1%	54.1%	83.0%	10:16	17:02
Georgian Bluffs	45.6%	59.7%	90.7%	09:38	14:49
Grey Highlands	40.8%	51.5%	76.8%	11:01	18:57
Hanover	86.5%	92.5%	98.3%	06:08	09:02
Meaford	61.7%	71.6%	88.5%	08:12	15:53
Owen Sound	92.5%	96.7%	99.0%	05:37	07:34
Southgate	60.1%	63.2%	79.7%	09:23	18:00
West Grey	53.7%	67.0%	85.8%	09:17	16:36
Overall	**67.5%**	**76.4%**	**91.4%**	**08:01**	**14:21**

Difference to 2033 Core

LTM	Performance				
	8-Minute	10-Minute	15-Minute	Average	90th Percentile
Blue Mountains	0.1%	0.4%	0.3%	-00:04	-00:06
Chatsworth	3.9%	4.5%	3.2%	-00:34	-00:35
Georgian Bluffs	14.5%	14.2%	5.2%	-01:21	-01:04
Grey Highlands	6.8%	9.2%	11.5%	-01:32	-02:07
Hanover	-0.1%	-0.1%	0.0%	00:01	00:02
Meaford	0.0%	0.1%	0.2%	-00:01	-00:06
Owen Sound	0.7%	0.5%	0.3%	-00:06	-00:08
Southgate	4.4%	4.7%	4.3%	-00:49	-02:05
West Grey	0.0%	0.0%	0.1%	-00:00	-00:01
Overall	**1.9%**	**2.0%**	**1.6%**	**-00:17**	**-00:46**

Grey County Paramedic Service

Core 2033 Resourcing with Changes to Offload Delays

Modelling Results

P4 8-Minute Performance

LTM	2033 Core Scenario	Time at Hospital		Time at Hospital	
		PreCovid-19	Increase	PreCovid-19	Increase
Blue Mountains	52.1%	52.1%	51.7%	0.0%	-0.4%
Chatsworth	34.3%	36.2%	33.2%	2.0%	-1.0%
Georgian Bluffs	31.1%	32.1%	30.5%	1.0%	-0.6%
Grey Highlands	34.0%	34.1%	33.6%	0.1%	-0.4%
Hanover	86.6%	87.0%	85.8%	0.4%	-0.8%
Meaford	61.7%	62.2%	60.5%	0.5%	-1.1%
Owen Sound	91.8%	93.4%	91.0%	1.6%	-0.8%
Southgate	55.8%	56.3%	54.8%	0.5%	-0.9%
West Grey	53.6%	53.8%	52.8%	0.2%	-0.8%
Overall	**65.6%**	**66.5%**	**64.8%**	**0.9%**	**-0.8%**

Difference

P4 15-Minute Performance

LTM	2033 Core Scenario	Time at Hospital		Time at Hospital	
		PreCovid-19	Increase	PreCovid-19	Increase
Blue Mountains	93.7%	93.8%	93.4%	0.1%	-0.3%
Chatsworth	79.8%	82.1%	78.2%	2.3%	-1.6%
Georgian Bluffs	85.6%	86.9%	84.7%	1.4%	-0.9%
Grey Highlands	65.3%	65.5%	65.0%	0.2%	-0.3%
Hanover	98.4%	98.4%	98.2%	0.1%	-0.2%
Meaford	88.4%	88.8%	87.6%	0.5%	-0.7%
Owen Sound	98.8%	99.2%	98.6%	0.4%	-0.2%
Southgate	75.4%	75.9%	74.7%	0.5%	-0.8%
West Grey	85.7%	86.0%	85.0%	0.2%	-0.7%
Overall	**89.8%**	**90.4%**	**89.2%**	**0.6%**	**-0.5%**

Difference

Emergency
Service
Planning
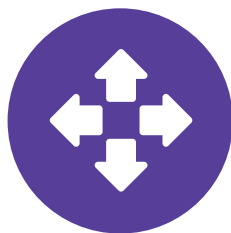
Optimizing
Locations

Software
Solutions

ORH

PLAN. PREPARE. **PERFORM.**