


HALIFAX

P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 14.1.10
Halifax Regional Council
November 24, 2015

TO: Mayor Savage and Members of Halifax Regional Council

Original signed by 

SUBMITTED BY:

Richard Butts, Chief Administrative Officer

Original Signed by 

Mike Labrecque, Deputy Chief Administrative Officer

DATE: November 24, 2015

SUBJECT: Halifax Regional Fire & Emergency Operational Staffing

ORIGIN

May 12, 2015 – **MOVED** by Councillor Mason, seconded by Councillor Craig that Halifax Regional Council:¹

- 1) Request a staff report detailing a plan to meet the following direction of Regional Council within three years.
 - a) All fire trucks that are crewed by full time firefighters shall be crewed with four firefighters unless a safe alternative can be proposed; and
 - b) There shall be crewed aerials on the east and west sides of the harbour.
- 2) Further, direct that staff provide a report to Regional Council every six months with a progress update.

LEGISLATIVE AUTHORITY

The *Halifax Regional Municipality Charter* 2008, c. 39, s. 1. confers legislative authority to maintain and provide fire and emergency services by providing the service, assisting others to provide the service, or working with others to provide the service.

The *Fire Safety Act, An Act to Promote and Encourage Fire Safety*, 2002, c. 6, s. 1. confers legislative authority to make and enforce municipal by-laws relating to matters dealt with by the Fire Safety Act, the regulations or the Fire Code.²

Administrative Order 24, Respecting Fire and Emergency Service in Halifax Regional Municipality establishes Halifax Regional Fire & Emergency (HRFE) as a fire department pursuant to Section 294 of the *Municipal Government Act*, 1998, c.18, s1.

RECOMMENDATION ON PAGE 2

¹ See <https://www.halifax.ca/council/agendasc/documents/c150512.pdf>

² See <http://nslegislature.ca/legc/statutes/firesafe.htm>

RECOMMENDATION

It is recommended that Halifax Regional Council:

1. To improve the effectiveness and safety of fire protection and to crew apparatus, per Council's motion of May 12, 2015:
 - a) convert Station 4 (Lady Hammond) to an E Platoon station;
 - b) convert Station 11 (Patton Road) to a Volunteer station; and
 - c) convert Station 13 (King Street) to an E Platoon station.
2. Authorize staff to increase the HRFE's career firefighter complement from 413 positions to 423 positions, by close of fiscal 2017/2018.
3. Endorse the consolidation of equipment, career personnel and volunteer personnel in urban, suburban and rural fire stations, to more effectively and safely deliver fire services, as detailed in Table 2.

BACKGROUND

HRFE Operational Review and Staff Reports

Beginning in 2012, Halifax Regional Fire & Emergency (HRFE) performed a full operational and service review of their Business Unit. The resulting staff report³ brought together Fire Underwriter Study (FUS) facility recommendations, Regional Plan (RP+5) growth projections, Geographic Information System (GIS) response time mapping data, staffing requirements, building condition assessments and financial analysis.

The staff report's recommendations laid the groundwork for moving ahead with (budget neutral) infrastructure and operational changes that would result in reasonable fire protection, better business intelligence and an improved capacity to make informed choices about how best to allocate HRFE resources. The staff report attempted to address a disparity between the number, type and location of firefighting apparatus and current staffing levels. The report recommended that HRFE provide resources for aerial apparatus that are currently unstaffed or understaffed and that have been identified as essential to effective fire coverage in the urban core. Report recommendations included the closure of redundant fire stations and the redeployment of HRFE staff and apparatus.

Council proposed multiple amendments⁴ to HRFE's infrastructure and operational recommendations and requested that Fire Services analyze the proposed amendments. Included among the proposed amendments was a Council motion to provide the cost of staffing all stations with four fire fighters. Staff's Supplementary Report⁵ provided a comprehensive station-by-station analysis of volunteer, E platoon and career staffing models (together with station specific financial and operational implications).

Council Motions Regarding HRFE Operations (March 2015)

At a Committee of the Whole session on March 31, 2015, Council voted separately on multiple HRFE motions. The following summarizes the results of the voting⁶:

Motions Put and Defeated

- decommission Stations 4, 11 and 13; and;
- decommission volunteer Sub-stations 25, 31, 36 and 43

³ See <http://www.halifax.ca/council/agendasc/documents/150127cow3.pdf>

⁴ See <http://www.halifax.ca/council/agendasc/documents/cw150310.pdf>

⁵ See <http://www.halifax.ca/council/agendasc/documents/150331cow3ii.pdf>

⁶ See <http://www.halifax.ca/council/agendasc/documents/cw150331.pdf>

Motions Put and Passed

- reinstate services at Station 56;
- endorse the 5-Year Technology Roadmap;
- relocate Station 8 to the area between 102 and 101 and construct a new station on Larry Uteck Drive;
- investigate partnership opportunities with Halifax Stanfield International Airport;
- enter into/maintain fire coverage MOUs with Enfield , Hubbards and Ecum Secum;
- maintain E-Platoon staffing complements;
- increase career staffing to four at major rural stations;
- explore transitioning Station 28 to E Platoon staffing model;
- consult with Volunteer Fire Advisory Committee on HRFE's volunteer model;
- apply costs related to the Fire Services Review (2014) to the general tax rate;
- prepare the 2015/2016 HRFE Budget and Business Plan as proposed (incorporating direction given by way of Council motions); and
- return to Council with a revised Fire Service Delivery Target and Administrative Order 24 by March 2016.

HRFE prepared its 2015/2016 Budget based on Council's motions of March 31, 2015. HRFE's 2015/2016 Budget reflected seven new positions, bringing HRFE's firefighter staffing complement from 406 to 413. Per Council's staffing-related motions, two positions were budgeted to crew apparatus at Station 56 (Blackpoint) and five positions were budgeted to crew apparatus at Station 28 (Sheet Harbour)⁷. Although Council made a motion on March 10, 2015 to provide the cost of staffing all stations with four fire fighters⁸, Council did not vote on fire-service-wide staffing levels for firefighting apparatus.

Council Motion to Consider HRFE Staffing Alternatives

In May of 2015, Councillor Mason advised that he was bringing a motion forward because he believed there was a need for Council to provide clarity and direction to staff around Council's decision with regard to Fire Services. Following Council discussion, the following motion was put and passed:

MOVED by Councillor Mason, seconded by Councillor Craig that Halifax Regional Council:⁹

- 1) Request a staff report detailing a plan to meet the following direction of Regional Council within three years.
 - a) All fire trucks that are crewed by full time firefighters shall be crewed with four firefighters unless a safe alternative can be proposed; and
 - b) There shall be crewed aerials on the east and west sides of the harbour.
- 2) Further, direct that staff provide a report to Regional Council every six months with a progress update.

⁷ The seven positions budgeted in HRFE's 2015/2016 Budget, for Station 28 and 56 are part of E Platoon crew complements (7:00am-5:30pm Monday to Friday, excluding weekends and Statutory Holidays).

⁸ See <http://www.halifax.ca/council/agendasc/documents/cw150310.pdf>

⁹ See <https://www.halifax.ca/council/agendasc/documents/c150512.pdf>. For the sake of convenience, the full text of the motions made on March 31, 2015 is reproduced in Attachment1.

Consultant Engagement

In response to Council's motion of May 12, 2015, staff sought an independent apparatus and staffing review for Halifax Regional Fire & Emergency. Request for Proposal (RFP) #P15-096 was awarded to POMAX Consulting (POMAX).¹⁰ POMAX offers a range of consulting services including organizational and operations analysis, emergency response modeling, emergency preparedness, dispatch consolidation and recruitment and selection.¹¹

Working within the current approved 2006 service delivery standard and taking into consideration the Council and supplementary reports, the consultant was asked to build upon current recommendations and exhaust any and all other options for providing safe and effective fire protection within HRM, in keeping with direction provided by Regional Council. The consultant was directed to consider how HRFE deploys both apparatus and staff and make recommendations to support HRFE operating in the most safe, effective and efficient manner.

POMAX Consulting's (Draft) Apparatus and Staffing Report is attached for Council's consideration (see Attachment 3).

Environmental Scan – Staffing Levels in Other Jurisdictions

POMAX conducted an environmental scan of Canadian metropolitan sized/classed fire services (Vancouver, Calgary, Edmonton, Ottawa and Hamilton). Their review indicates that first responder apparatus in other jurisdictions are staffed with four personnel to provide an initial response crew of four firefighters. POMAX notes, however, that other fire departments operate specialty apparatus (including Aerials, Tankers and Heavy Rescue units) with crews of less than four firefighters. Apparatus crewed with less than four personnel in other jurisdictions, however, function as secondary responder units (i.e. respond to structure fires alongside other units).

Independent Validation of GIS Response Time Modeling

POMAX conducted an independent review of the methodology, rationales and conclusions of the response time modelling conducted by HRFE.¹² POMAX's response time modeling exercise validated HRFE's GIS response time modelling.¹³

To determine the accuracy of HRFE's response time model, POMAX staff built their own GIS response time model. POMAX compared their independent GIS modeling against AVL data obtained from six HRFE fire trucks. POMAX noted the limitations of the AVL data,¹⁴ but observed that the data available for analysis was of high quality and provided a continuous log of relatively accurate vehicle location versus time at regular intervals. Overall, POMAX concluded that the theoretical response times (GIS modeling) matched well with AVL data (with some minor deviations).¹⁵

¹⁰ See Attachment 2 – Request for Proposal (RFP) #P15-096 .

¹¹ See POMAX Consulting's web site for further details <http://www.pomaxinc.com/about/>.

¹² See Attachment 4 for a summary of the methodology used by HRFE to develop its GIS modeling of fire apparatus response times.

¹³ HRFE's GIS response time modelling is also consistent with externally produced GIS response time modelling provided in the Fire Underwriters Study (FUS).

¹⁴ POMAX notes that the AVL sample is very small and that more AVL data is available for urban stations, comparative to rural stations.

¹⁵ In downtown areas and around closely spaced intersections, emergency response times were a little higher compared to the theoretical model. Conversely, on relatively lesser active streets and in rural areas, the fire trucks seemed to travel slightly quicker than posted speed limits. Speed and travel time parameters in POMAX's GIS model were modified to reflect these observed deviations.

Using GIS response time mapping, POMAX has been able to:

- model station response times (5, 8 and 10 minutes);
- model gaps and overlaps in station coverage; and
- model scenarios to improve fire station coverage by reducing overlaps, and covering gaps.

POMAX has created station coverage maps using their independent GIS response time model (see Attachment 3).

Safe Staffing Levels

National Institute of Standards and Technology (NIST) research confirms that four-person crews are more efficient than two-person or three-person crews.¹⁶ Four-person crews provide the best chance at preventing loss of life, and loss of property, while maintaining the safety of responding firefighters. National Fire Protection Association (NFPA)¹⁷ standard 1710 requires a minimum crew of four firefighters per apparatus for safe, effective and efficient emergency operations. NFPA standard 1710 states that firefighters are not permitted to enter a burning structure until four personnel are on site (except under exceptional circumstances). Two-person or three-person crews can only prepare the site until additional personnel arrive at the scene.¹⁸

POMAX concurs with staff's position that firefighters and residents are best served when apparatus are crewed with four career personnel. POMAX's position on safe staffing levels is informed by a review of relevant fire service guidelines and standards, including NFPA 1710 (2016 Edition), The British Columbia Fire Services Playbook, Ontario Fire Marshal Public Fire Safety Guidelines and firefighter occupational health and safety requirements in British Columbia, Ontario and Nova Scotia. In its staffing review report, POMAX notes that responding with less than four firefighters, as an initial response crew, does not provide for firefighter safety and has a significant impact on public safety.

Consultant Station Closure Recommendations

POMAX concurs with staff's assessment that, "Stations 4, 11 and 13 could be decommissioned as an effective means to provide an efficient and effective fire protection service that meets the 2006 Approved Delivery Service Standards." Based on its independent GIS response time modeling, POMAX concludes that response in the areas covered by Station 4 (Lady Hammond), Station 11 (Patton Road) and Station 13 (King Street) will not be impacted by a reduction in staffing. Other stations, also responding into their coverage areas, have response times adequate to meet approved five minute, eight minute and ten minute response windows.

- The recommendation to decommission Station 4 (Lady Hammond) is based on the fact that all of the 16,707 fire risk points within the station 4 coverage zone can be covered by stations 3 and 5 within their 5 and 8 minute response zones.

¹⁶ According to the National Institute of Standards and Technology (NIST) Report on Residential Field Experiments (published April of 2010), four-person crews were found to be faster than two-person or three-person crews in all scenarios tested, including hose stretch, ground ladders and ventilation and water on fire tasks.

¹⁷ National Fire Protection Association (NFPA) is an advocate for fire prevention. NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and other risks.

¹⁸ In November 2008, OHS ordered HRFE to adopt section 8.5.7 of NFPA standard 1500 (Standard on Fire Department Occupational Safety and Health Program) as the normal practice in the initial response to all structural fires occurring within the municipality. Section 8.5.7, in conjunction with section 8.8.2, requires that a minimum of four firefighters be on scene where entry into the danger area is required.

- The recommendation to decommission Station 11 (Patton Road) is based on the fact that all 1,689 fire risk points within the station 11 coverage zone can be covered by station 10 within its 10 minute response zone.
- The recommendation to decommission Station 13 (King Street) is based on the fact that all 15,953 fire risk points within the station 13 coverage zone can be covered by stations 12, 14 and 15 within their respective 5 and 8 minute response zones.

Given the redundancy of staffing Station 4 (Lady Hammond), Station 11 (Patton Road) and Station 13 (King Street), any assignment of apparatus or deployment of personnel to these three stations can be considered surplus to Halifax's fire coverage needs.

DISCUSSION

PART 1 – STAFFING DEPLOYMENT AND APPARATUS ASSIGNMENT OPTIONS

Based on HRFE and POMAX analysis, staff are presenting Council with two staffing deployment and apparatus assignment options. Option #1 and Option #2, are both based on the 2006 Council approved service delivery standards. The 2006 fire service standards pertain to: (a) dispatch time; (b) firefighter turnout time; (c) response time and (d) staff complement.¹⁹

Both Option #1 and Option #2 propose the following:

- increase HRFE's career firefighter complement from 413 positions to 423 positions;
- put Aerials into service on the east and west sides of the harbour;
- convert Station 11 (Patton Road) to a Volunteer station;
- increase apparatus career crew complements to four at Stations 8 (Bedford), Station 16 (Eastern Passage), Station 17 (Cole Harbour Road) and Station 58 (Lakeside);²⁰
- staff the apparatus at Station 56 (Blackpoint) with two career crew (per Council's motion of March 31, 2015).

Option #1 and Option #2 differ in terms of the proposed status of Station 4 (Lady Hammond Road) and Station 13 (King Street) – 24-7 versus E Platoon. Option #1 and Option #2 also differ in terms of staffing deployments and apparatus assignments. If Option #1 is implemented, five apparatus would operate with less than four career crew. If Option #2 is implemented, all but one apparatus would be crewed with four career personnel.²¹ Option #1 and Option #2 are detailed in Table 1 and Table 2 (see below).

Option #1: Three Person Engine Crews and Two Person Aerial Crews

- Maintain Station 4 (Lady Hammond) as a 24-7 career station;
- Maintain staff Station 13 (King Street) as a 24-7 career station;
- Consolidate equipment, career personnel and volunteer personnel in urban, suburban and rural fire stations as outlined in Table 1.

¹⁹ Two different sets of service delivery levels were approved – one for fire protection districts with a population over 100 persons per km² – one for fire protection districts with a population under 100 persons per km² (see Attachment 5).

²⁰ See Attachment 6 for rationale for staffing apparatus at Stations 8, 16, 17 and 58 with four career personnel.

²¹ The Engine apparatus operating out of Station 56 (Blackpoint) would operate with two career crew, per Council's motion of March 31, 2015.

Table 1: Option #1 – Three Person Engine Crews and Two Person Aerial Crews

Station Number	Current Coverage Model	Proposed Coverage Model	Current Career Personnel ¹	Proposed Career Personnel ¹	Current Apparatus	Proposed Apparatus
02	24-7 Career	24-7 Career	20	30	1 Engine/4 crew	1 Engine/4 crew 1 Aerial/2 crew
03	24-7 Career	24-7 Career	30	20	1 Engine/4 crew 1 Aerial/2 crew	1 Engine/4 crew
04	24-7 Career	24-7 Career	20	15	1 Engine/4 crew	1 Engine/3 crew
08	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
11	24-7 Career	Volunteer	10	0	1 Engine/2 crew	1 Engine/volunteer crew
12	24-7 Career	24-7 Career	30	40	1 Quint/4 crew 1 Tactical/2 crew	1 Engine/4 crew 1 Aerial/2 crew 1 Tactical/2 crew ²
13	24-7 Career	24-7 Career	20	15	1 Engine/4 crew	1 Engine/3 crew
16	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
17	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
56	E Platoon	E Platoon	2	2	1 Engine/2 crew	1 Engine/2 crew
58	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
Totals	N/A	N/A	192	202	N/A	N/A

¹Personnel calculations account for coverage requirements including planned and unplanned absences.

²HRFE's Tactical Unit only has seating capacity for two career firefighters.

³Station 56 (Blackpoint) apparatus staffed with two career personnel, per Council's motion of March 31, 2015.

Option #1 is consistent with POMAX's assessment that Aerials can be safely crewed with two personnel and consistent with POMAX's assessment that apparatus operating out of Station 4 and Station 13 can be safely crewed with three career personnel. Three person crews are viewed, by POMAX, as safe because of overlapping coverage from nearby stations. As POMAX notes, given the redundancy of Station 4 (Lady Hammond) and Station 13 (King Street), these apparatus (crewed with three personnel) are able to essentially operate as secondary responder units.

Option 2: Four Person Engine Crews and Four Person Aerial Crews

- Convert Station 4 (Lady Hammond) to an E Platoon station;
- Convert Station 13 (King Street) to an E Platoon station;
- Convert Station 11 (Patton Rd) to a Volunteer station;
- Consolidate equipment, career personnel and volunteer personnel in urban, suburban and rural fire stations as outlined in Table 2.

Table 2: Option #2 – Four Person Engine Crews and Four Person Aerial Crews

Station Number	Current Coverage Model	Proposed Coverage Model	Current Career Personnel ¹	Proposed Career Personnel ¹	Current Apparatus	Proposed Apparatus
02	24-7 Career	24-7 Career	20	40	1 Engine/4 crew	1 Engine/4 crew 1 Aerial/4 crew
03	24-7 Career	24-7 Career	30	20	1 Engine/4 crew 1 Aerial/2 crew	1 Engine/4 crew
04	24-7 Career	E Platoon	20	5	1 Engine/4 crew	1 Engine/4 crew
08	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
11	24-7 Career	Volunteer	10	0	1 Engine/2 crew	1 Engine/volunteer crew
12	24-7 Career	24-7 Career	30	50	1 Quint/4 crew 1 Tactical/2 crew	1 Engine/4 crew 1 Aerial/4 crew 1 Tactical/2 crew ²
13	24-7 Career	E Platoon	20	5	1 Engine/4 crew	1 Engine/4 crew
16	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
17	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
56	E Platoon	E Platoon	2	2	1 Engine/2 crew	1 Engine/2 crew ³
58	24-7 Career	24-7 Career	15	20	1 Engine/3 crew	1 Engine/4 crew
Totals	N/A	N/A	192	202	N/A	N/A

¹Personnel calculations account for coverage requirements including planned and unplanned absences.

²HRFE's Tactical Unit only has seating capacity for two career firefighters.

³Station 56 (Blackpoint) apparatus staffed with two career personnel, per Council's motion of March 31, 2015.

PART 2 – RECOMMENDED COURSE OF ACTION

Recommended Course of Action and Council Direction

Staff recommend Option #2. The recommended course of action is consistent with Council's motion of May 12, 2015 regarding staffing of Aerials and safe staffing levels for apparatus. The recommended approach is also consistent with Council's direction regarding station closures (given on March 31, 2015).

Option #2

- keeps all fire stations open;
- achieves safe staffing levels for all apparatus crewed by career personnel; and
- puts Aerials into service on the east and west sides of the harbour.

Keeps Stations Open

Option #2 would maintain all current fire stations as active stations. No stations would be closed, although Station 4 (Lady Hammond) and Station 13 (King Street) would convert to E Platoon status and Station 11 (Patton Road) would convert to Volunteer status. Station conversions would take place according to the personnel (re)deployment timetable reflected in Table 3.

Achieves Safe Staffing Levels

The recommended course of action (Option #2) allows for an increased number apparatus with crews of four career personnel. As detailed above (see Table 2), in Option #2 all but one apparatus would be crewed with four career personnel.

The recommended approach (Option #2) ensures that:

- All E Platoon Stations are staffed with a career personnel complement sufficient to ensure that a four-person initial responding unit crew is available for call-out during the designated hours of career coverage.²²
- All 24-7 Career Stations are staffed with a career personnel complement sufficient to ensure that a four-person initial responding unit crew is available for call-out on a 24-7 basis.

As articulated in the Background to this report (see safe staffing models), four-person crews provide the best chance at preventing loss of life, and loss of property, while maintaining the safety of responding firefighters. While apparatus can be operated with crews of three or crews of two, doing so is sub-optimal. Firefighting and rescue options, are limited if the initial apparatus to arrive does not have four crew members.

Staffs Aerials on East and West of Harbour

Under Option #1 and Option #2, Aerial apparatus would be staffed on both sides of the harbour. Option #1 calls for a crew of two per Aerial. Option #2 calls for a crew of four per Aerial. Crewing Aerials with four personnel is preferred on the grounds of safety and efficacy. Crewing Aerials with four personnel also enhances firefighter deployment flexibility and improves HRFE's ability to manage overtime (see below).

Additional Benefits of Recommended Course of Action

In addition to achieving the above Council-articulated operational staffing objectives, the recommended approach (Option #2) also results in:

- enhanced personnel deployment flexibility;
- improved HRFE's ability to manage overtime; and
- expanded volunteer recruitment opportunities in the core.

Enhanced Deployment Flexibility

The recommended course of action (Option #2) enhances deployment flexibility. Reducing the number of stations with 24-7 coverage (through conversion to E Platoon and Volunteer status), frees up 40 firefighting personnel that can be redeployed to provide improved fire protection (see Table 2).

With Option #2, both Aerials would be crewed with four (once the HRFE career complement reaches 423). As the consultant has noted, Aerial apparatus can be operated safely with crews of two. However, staffing Aerials with crews of four enables HRFE to use the additional staff available for redeployment (two personnel, per shift, per apparatus) to backfill periodic vacancies. HRFE frequently experiences vacancies due to planned and unplanned absences and retirements. Staff that would otherwise be deployed to crew the Aerials can be redeployed to cover absences that would otherwise result in understaffed/unstaffed apparatus. Given that Aerials can function with crews of two (with limited functionality), drawing down on these Aerial crew complements can be done.

²² With the exception of Station 56 (Blackpoint), regarding which, Council has given specific direction to operate the E Platoon with a crew of two career personnel.

Improved Ability to Manage Overtime

While overtime can be used to cover absences, doing so places pressure on HRFE's overtime budget.²³ Overtime is not always guaranteed to fill gaps in coverage that are due to absences.²⁴ Firefighters can decline offered overtime. Filling vacancies can be challenging for geographically remote stations and can be challenging during certain times of year. Flexibility to safely redeploy crew from Aerials will allow HRFE to better manage its overtime budget.

As noted above, with the recommended approach (Option #2), personnel can be redeployed from one or both Aerials. In addition to reducing pressure on overtime budget, Aerial crew redeployment has the advantage of not being subject to refusal, as is the case with reliance on overtime as a backfilling strategy. The same overtime management flexibility does not exist with Option #1 due to increased backfilling pressures (additional career shifts at 24-7 stations) and due the lack of Aerial crew members available for redeployment.

While filling current vacancies will reduce overtime overage, only the recommended option (Option #2) will result in budgeted overtime savings. Staff anticipate that implementing Option #2 could result in a reduction in HRFE's overtime budget of up to fifteen per cent (15%) on an overtime budget of \$1.2Million.²⁵

Expanded Volunteer Recruitment Opportunities in the Core

The recommended approach (Option #2) would provide volunteer recruitment opportunities that are not available with Option #1. Option #2 calls for the conversion of Station 4 and Station 13 to E Platoon status. To date, HRFE volunteer recruitment has been restricted to suburban and rural areas. Urban core recruitment has not previously been feasible since no meaningful opportunities for volunteering have been available in the core. Stations in the core have been historically staffed exclusively with career personnel.

HRFE is proposing conversion of Station 4 (Lady Hammond) and Station 13 (King Street) to E Platoon status. Doing so would open up opportunities for volunteers to take ownership of urban stations during off-hours, when career firefighters are absent (i.e. evenings, weekends, and statutory holidays). This scenario opens up new avenues for volunteer recruitment, and new opportunities for growing the base of volunteers available for recruitment into the career force. Locating E Platoon stations inside the core also has the effect of increasing parity between residents living inside and outside the core. Residents in rural and suburban settings have historically had the advantage of exposure to, and experience in, the fire service through voluntary service.²⁶ To facilitate conversion of Station 4 (Lady Hammond) and Station 13 (King Street) to E Platoon status, HRFE will undertake a recruitment drive focused on bringing urban residents into the pool of available fire services volunteers.

²³ In 2014/2015, HRFE (Operations Division) had a budget of \$1.189 Million and spent \$2.975 Million, which amounted to an overspend of \$1.786 Million.

²⁴ Where overtime is refused, HRFE is sometimes forced to temporarily close stations. If compelled to shut a station, HRFE temporarily closes a station with low fire risks and low call volumes, to redeploy personnel to cover stations that have significant fire risks and high call volumes.

²⁵ This overtime savings calculation is based on the following assumptions 1) career personnel are deployed as outlined in Table 2; and 2) all vacancies are filled.

²⁶ Fire service volunteers must reside within a very restricted radius of the station where they volunteer. Volunteers must be within a five minute travel window. As such, residents in the urban core are (with very few exceptions) excluded from volunteering at HRFE's existing E Platoon stations, simply by virtue of being physically/geographically too far removed from the E Platoon stations.

PART 3 – STAFFING PLAN

Forecasted Retirements and Vacancies

HRFE's proposed staffing plan calls for the recruitment of ten positions, to bring the career complement up to 423 by end of fiscal 2017/2018. Reaching this targeted complement requires recruiting enough personnel to account for vacancies that arise, including vacancies due to voluntary departures, terminations and retirements. Based on historical trends, ten to twelve firefighters retire annually. HRFE currently has twelve vacant positions with an additional four confirmed retirements scheduled for the remainder of 2015. A total of 76 employees are currently eligible to retire. Barring any material collective bargaining changes or changes to the pension plan, HRFE anticipates another 16 retirements by end of 2016.

Career Recruit Firefighter Training

Career recruit training currently takes place over a 16-week-period (including pre-course preparation) and is delivered to 16 career recruits. The instructor to student ratio, because this is medium risk skills training, is 1:4 (plus a lead instructor). Each career recruit training session incorporates seconded career firefighters (drawn from HRFE's pool of career firefighters).

HRFE is able to run two recruitment training sessions each year, for a total annual recruitment of 32 firefighters. Accounting for current vacancies and projected vacancies (including vacancies due to pending retirements) HRFE anticipates that the proposed 423 position complement of career firefighters can be achieved over two years. HRFE projects recruiting, training and hiring enough personnel to reach a personnel complement of 423 by end of fiscal 2017/2018 (net of filling existing and projected vacancies).

Staffing Priorities

HRFE has assessed its existing service gaps and staffing deficits to determine its staffing priorities. Given that the proposed personnel complement target (423 career personnel) will not be reached until 2017/2018, HRFE will allocate personnel surplus to needs using the following prioritization order:

1. First responder apparatus (Engines and Quints) that are currently understaffed (i.e. less than four crew) operating out of stations that have 4 in 5 and/or 12 in 8 firefighter assembly shortfalls.
2. Secondary responder apparatus (Aerials) that are currently unstaffed.
3. Secondary responder apparatus (Aerials) that are currently understaffed (i.e. less than four crew).

Priority will be given to stations with higher call volumes, higher required fire flows and/or higher fire risks (within their respective service/catchment areas).

Table 3: Personnel (Re)Deployment Schedule

Station Number	Staffing Action	Firefighters In/Deployed	Firefighters Out/Redeployed	Timing
Station 04	Convert 24-7 to E Platoon Station	0	15	2016/17 Q3
Station 11	Convert 24-7 to Volunteer Station	0	10	2015/16 Q4
Station 13	Convert 24-7 to E Platoon Station	0	15	2016/17 Q3
Station 08	Increase Engine staffing to 4 crew	5	0	2016/17 Q1
Station 16	Increase Engine staffing to 4 crew	5	0	2016/17 Q3
Station 17	Increase Engine staffing to 4 crew	5	0	2016/17 Q3
Station 58	Increase Engine staffing to 4 crew	5	0	2016/17 Q1
Station 12	Increase Aerial staffing to 2 crew ¹	10	0	2016/17 Q3
Station 02	Increase Aerial staffing to 3 crew	5	0	2016/17 Q3
Station 12	Increase Aerial staffing to 3 crew	5	0	2016/17 Q3
Station 02	Increase Aerial staffing to 4 crew	5	0	2017/18 Q2
Station 12	Increase Aerial staffing to 4 crew	5	0	2017/18 Q2
Totals		50²	40²	

¹Unstaffed Aerial that is currently not in service.

²Differential is accounted for through recruitment, training and hiring of 10 career firefighters over a two year period (2016/2017 and 2017/2018) to bring full HRFE personnel complement from 413 to 423.

FINANCIAL IMPLICATIONS

Per Council's Committee of the Whole motion of March 31, 2015, any additional costs related to the Fire Services Review – 2014 will be applied to the general tax rate as an increase to the tax rate targets provided to staff, by motion of Regional Council on October 21, 2014. Any budget implications following Council's consideration of apparatus staffing options will be incorporated into the 2016/2017 business plan and budget process.

The recommended course of action (Option #2) has no financial implications for the 2015/2016 budget. Option #2 will have financial implications for HRFE's budget in fiscal 2016/2017 (\$200,000) and in fiscal 2017/2018 (\$674,000). Additional equipment costs of \$200,000 will be incurred in 2016/2017 equipping volunteers. A \$120,000 increase in the volunteer honorarium allowance will be incurred in 2017/2018, coinciding with recruitment of volunteers in the urban core (to operate out of the E Platoon stations). Equipment costs of \$50,000 and \$504,190 in salary expenses will be incurred in 2017/2018.

Financial implications for both fiscal 2016/2017 and fiscal 2017/2018 are summarized in Table 4.

Table 4: Summary of Financial Implications (Option #2)

Expense	Units	Unit Cost	Expenditure	Fiscal Year
Volunteer Equipment	40	\$5,000	\$200,000	2016/2017
Career Staff Equipment	10	\$5,000	\$50,000	2017/2018
Career Salaries	10	\$50,419 ²⁷	\$504,190	2017/2018
Volunteer Honorariums	40	\$3,000 ²⁸	\$120,000	2017/2018

²⁷ The salary cost calculation is based on Firefighter 4th Class pay scale (including benefits) payable in the initial year of hire. This compensation will increase to \$100,838 in year four when the new hires progress to the Firefighter 1st Class pay scale.

²⁸ HRFE volunteer honorariums are payable in November of each calendar year. Although volunteers will be brought on in 2016/2017, the honorariums will, therefore, be payable in fiscal 2017/2018.

Table 5 (see below) reflects operational and up-front costs associated with volunteer, E Platoon and 24-7 fire stations.²⁹ Costs for staffing reflect costs incurred in year four and onwards. This approach has been taken as it better reflects the true ongoing costs of operating a station on a go-forward basis. Operating costs reflect average cost by station type. Equipment costs per volunteer station reflect the cost of equipping 15 volunteers – the minimum volunteer complement for a viable volunteer station as discussed in the Fire Underwriters Study (FUS). Station retrofitting costs are presented as \$125,000 per station (averaging the \$50,000-\$200,000 retrofitting cost range).

Table 5: Per-Station Cost Estimate

Expense*	Volunteer	E-Platoon	24-7 (4 crew)	24 7 (3 crew)	24 7 (2 crew)
Staffing	Honorariums	\$530,000	\$2,118,000	\$1,484,000	\$994,000
Operating	\$36,000	\$46,000	\$98,000	\$98,000	\$98,000
Fleet (Maintenance)	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total Ongoing Cost	\$51,000	\$591,000	\$2,231,000	\$1,597,000	\$1,107,000
Equipment	\$75,000	\$25,000	\$100,000	\$70,000	\$45,000
Recruitment Training	\$0	\$140,000	\$560,000	\$392,000	\$252,000
Total One-Time Cost	\$0	165,000	\$660,000	\$462,000	\$297,000
Station Retrofitting	\$0	\$125,000	TBD	TBD	TBD
New Station Construction	\$0	\$2M - \$4M	\$5M - \$7M	\$5M - \$7M	\$5M - \$7M

* Figures rounded to nearest \$1,000 increment.

Career Staffing Costs: Staffing costs for newly hired career firefighters increase over time. Firefighters are hired on as firefighters 4th class and progress towards firefighter 1st class over a four year period. Engineers act as drivers of firefighting apparatus. Lieutenants may supervise a maximum of three personnel, including themselves, whereas a captain may supervise a firefighting crew of any size.

²⁹ Equipment, station retrofitting, operating/fleet maintenance and recruitment training cost calculations reflected in Table 5 are fully detailed in HRFE's Supplementary Report to Council. See <http://www.halifax.ca/council/agendasc/documents/150331cow3ii.pdf> (pages 5-8).

Table 6: Firefighter Pay Scales by Classification

Classification	Salary and Benefits
Firefighter 4 th Class	\$50,419
Firefighter 3 rd Class	\$70,586
Firefighter 2 nd Class	\$85,712
Firefighter 1 st Class	\$100,838
Engineer ³⁰	\$104,872
Lieutenant 2	\$112,938
Lieutenant 1	\$114,955
Captain 2	\$116,972
Captain 1	\$122,013

E Platoon Staffing Model: The E Platoon staffing model uses a blend of career and volunteer firefighters. E Platoon stations are staffed by career firefighters from Monday to Friday (10.5 hour long, daytime only shifts), excluding statutory holidays. Volunteer firefighters provide E Platoon station coverage in the evenings, on weekends, statutory holidays and during the daytime when available. A staffing complement of five career firefighters per E Platoon station is necessary to ensure that 4-person crews are available for call-out. A five person FTE staff complement consists of one captain, one engineer, and three firefighters. This configuration allows for coverage of training and planned and unplanned absences (vacation, illness etc.) with supplemental overtime staffing assignments.

Table 7: E Platoon Staffing Costs

Year of Operation	Total Staffing Cost * (Per Station)
Year One	\$378,143
Year Two	\$438,644
Year Three	\$484,022
Year Four +	\$529,397

* Costs based on IAFF salaries effective as of October 2015.

24/7 Staffing Model: The 24/7 staffing model uses all career firefighters. A staffing complement of 20 career firefighters which comprises four Platoons (A, B, C and D) is necessary to ensure that 4-person crews are available for call-out. A 20-person staff FTE personnel complement consists of four captains, four engineers, and twelve firefighters. This configuration allows for coverage of training, and of planned and unplanned absences (vacation, illness etc.).

Note that the 20-person staffing complement for a 24-7 station will be increased in cases where more than one apparatus is operated out of a fire station. Staffing of a Tactical apparatus requires an additional 8 firefighters. Staffing of an Aerial apparatus requires an additional 20 firefighters consisting of four lieutenants, four engineers, and twelve firefighters.

³⁰ Note that where a firefighter has not achieved a classification of firefighter 1st class and is required to function as an engineer, their pay will be equal to their base salary plus a premium of 4%.

Table 8: 24/7 Staffing Costs

Year of Operation	Total Staffing Cost * (Per Station)
Year One	\$1,512,571
Year Two	\$1,754,578
Year Three	\$1,936,090
Year Four +	\$2,117,587

* Costs based on IAFF salaries effective as of October 2015.

COMMUNITY ENGAGEMENT

No additional community engagement has taken place. However, as noted in staff's report to Council, dated December 15, 2014³¹, while conducting the HRFE Operational Review, staff sent out over 100 surveys to external fire and emergency services stakeholders. In addition, an internal survey was sent to 1,100 employees. HRFE received 271 completed surveys, including several group responses, which provided over 3,000 individual comments.

ENVIRONMENTAL IMPLICATIONS

There are no identified environmental implications.

ALTERNATIVES

1. To improve the effectiveness and safety of fire protection and crew apparatus, per Council's motion of May 12, 2015:
 - a) Maintain Station 4 (Lady Hammond) as a 24-7 career station with a crew of 3;
 - b) Maintain staff Station 13 (King Street) as a 24-7 career station with a crew of 3;
 - c) Consolidate equipment, career personnel and volunteer personnel in urban, suburban and rural fire stations as outlined in Table XX.
2. Authorize staff to recruit, train and hire firefighter personnel to increase the HRFE's career firefighter complement from 413 positions to 423 positions, by close of fiscal 2017/2018.
3. Endorse the consolidation of equipment, career personnel and volunteer personnel in urban, suburban and rural fire stations, to more effectively deliver fires services, as detailed in Table 1

ATTACHMENTS

Attachment 1	Committee of the Whole HRFE Motions – March 31, 2015
Attachment 2	Halifax Regional Fire & Emergency Request for Proposal (RFP) #P15-096 http://novascotia.ca/tenders/pt_files/tenders/P15-096.pdf
Attachment 3	POMAX Consulting (Draft) Apparatus and Staffing Report
Attachment 4	HRFE GIS-Based Response Time Modeling
Attachment 5	Council Approved Service Delivery Standards (2006)
Attachment 6	Rationale for Staffing Stations 8, 16, 17 and 58 with Crews of Four

³¹ See <http://www.halifax.ca/council/agendasc/documents/150127cow3.pdf>

A copy of this report can be obtained online at <http://www.halifax.ca/council/agendasc/cagenda.php> then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 902.490.4210, or Fax 902.490.4208.

Report Prepared by: Scott Sheffield, Community Developer 902.490.3941

Financial Approval by: _____
Amanda Whitewood, Director of Finance and Information Technology/CFO, 902.490.6308

Report Approved by: _____
Doug Trussler, Fire Chief, 902.490.4239

**ATTACHMENT 1 –
Committee of the Whole HRFE Motions – March 31, 2015**

The following motions were moved at the March 31, 2015 session of Committee of the Whole:

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council endorse the 5-Year Technology Roadmap objectives in the Discussion section of the staff report dated December 15, 2014 and include the year one objectives (Data Management and Process Review, HRFE Dispatch Project, and HRFE FDM Review and Enhancements) in the 2015/2016 capital budget. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council endorse the consolidation of equipment, career personnel and volunteer personnel in the core fire stations, to more effectively deliver fires services, and authorize staff to decommission station 4 (Lady Hammond). **MOTION PUT AND DEFEATED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council authorize staff to decommission Station 11 (Patton Road). **MOTION PUT AND DEFEATED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council and authorize staff to decommission Station 13 (King Street). **MOTION PUT AND DEFEATED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council authorize staff to initiate the process to improve and increase coverage by relocating Station 8 to the area between the 102 and 101 intersections and Bedford Commons, and construct a new station on Larry Uteck Drive. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council authorize staff to investigate partnership opportunities with Halifax Stanfield International Airport to improve service delivery. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council endorse the following:

- a) Improve the rural fire response by:
 - i. maintaining E Platoon complements, as per the Discussion section of the staff report dated December 15, 2014 and as set out in Attachment 1 (proposed staffing model);
 - ii. increasing career staff to four in major rural stations; and
 - iii. investigating options to transition Station 28 (Sheet Harbour) to E Platoon staffing level. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council direct staff to maintain 24/7 Volunteer staffing, as per the Discussion section of the December 15, 2014 staff report and as set out in Attachment 1 (proposed staffing model) as amended to delete Black point. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council decommission volunteer sub-stations 25 (Ostrea Lake-Pleasant Point), 31 (East Ship Harbour), 36 (Meaghers Grant), and 43 (Grand Lake - Oakfield). **MOTION PUT AND DEFEATED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council maintain the existing fire coverage MOU with Enfield. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council Investigate entering into fire coverage MOUs with communities bounding Halifax Regional Municipality, including Hubbards and Ecum Secum and continue volunteer recruitment initiatives. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend that Regional Council direct staff to return to Council with a revised Fire Service Delivery Target and Administrative Order 24 no later than March 2016, following further detailed analysis of the 2006 Service Delivery Standard. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole direct staff to proceed to prepare the 2015/2016 Halifax Regional Fire & Emergency Business Unit Budget and Business Plan as proposed in the accompanying presentation, incorporating any additional direction provided by motion or motions of Committee of the Whole, including any budget implications associated with the reinstatement of services at the Black Point Fire Station, for inclusion in the proposed HRM 15/16 Budget and Business Plan documents. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor that Committee of the Whole direct that any additional costs related to the Fire Services Review – 2014 be applied to the general tax rate as an increase to the tax rate targets provided to staff by motion of Regional Council on October 21, 2014. **MOTION PUT AND PASSED.**

MOVED by Councillor Whitman, seconded by Councillor Walker that Committee of the Whole recommend to Regional Council to direct that the volunteer model to be revised only after input is provide from the HRFE Volunteers through the Volunteer Fire Advisory Committee, the purpose of which is to find a sustainable model and appropriate number. **MOTION PUT AND PASSED.**

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Section 1 Introduction

Halifax Regional Municipality has contracted with Pomax Consulting to provide an independent staffing review of Halifax Fire and Rescue Services.

Halifax Fire and Emergency (HRFE) delivered two operational review reports to Halifax Regional Council - "Fire Services Operational Review – Update, December 15, 2014" and "Fire Services Operational Review – Supplementary Report March 19, 2015."

Among other things, the reports prepared by HRFE recommended decommissioning of stations 4, 11 and 13. Council did not approve the recommendation, and gave direction three stations are to remain open. There may be opportunities to change the staffing models for these stations given the fact that they have redundant coverage areas with other stations.

In these reports HRFE also recommended that all career staffed apparatus be staffed by 4 firefighters in line with fire service standards and operational requirements of the department. Additionally, based on the recommendations of a recent Fire Underwriters Survey, the reports also recommended that a second aerial unit be placed in service on the Dartmouth side of the harbour.

Subsequently, Halifax Regional Council passed the following motion.

- 1) Request a staff report detailing a plan to meet the following direction of Regional Council within three years.
 - a. All fire trucks that are crewed by full time firefighters shall be crewed with four firefighters unless a safe alternative can be proposed.
 - b. There shall be crewed aerials on the east and west sides of the harbor.
- 2) Further direct that staff provide a report to Regional Council every six months with a progress update.

The consultant report is to:

- Provide a report that builds upon and supplements the completed work to date and current Council direction. The report will include alternative recommendations for HRFE's staffing model and utilization of firefighting apparatus on career, volunteer, and composite staffing options that achieve the safest, most efficient use of resources within the current staffing complement while meeting the demands of fire protection in the community.
- Take into consideration the staffing and scheduling models of other similar sized jurisdictions that achieve efficiencies and provide a reasonable level of fire protection to their communities.
- Provide any additional recommended resource requirements, associated budget implications and how these could be phased in within three years as per the Council Resolution will be highlighted. Current resources and assets include: 413 operations positions, 18 core stations.

Desired state: to staff with 4 person crews on each apparatus including 2 staffed aerials and/or recommendations to achieve a safe staffing level while maintaining appropriate crew sizes for effective response.

1.1 Scope Assignment

The scope of the study is described as follows:

Working with current service delivery standards, current approved operational staffing levels, emergency fleet composition, and core station locations;

- a) Determine options for a safe and cost efficient way to crew apparatus within stations within the current delivery standard/target;
- b) Build upon the work already completed to date on the operational review including;
 - FUS
 - Station Location work
 - GIS response time modelling
- c) Review current HRFE staffing model and utilization of firefighting apparatus;
- d) Determine alternative options that exist while working within existing approved operation positions (413) in order to crew two aerials (East and West) in the current core station complement;
- e) Complete an environmental scan of similar jurisdictions who rely on crew levels of less than 4 per truck to deliver fire services;
- f) Research options that exist to safely crew select apparatus with less than 4 in order to crew higher priority apparatus; and
- g) Recommend the safest, most efficient use of resources within the current staffing model and highlight any additional recommended resource requirements and associated budget implications and how these could be phased in within three years as per the Council motion.

We understand that the service delivery standards for HRFE are scheduled for review in 2016 but any recommendations in this report are to be made in reference to the 2006 Approved Service Delivery Standards. We have reviewed and are familiar with the origin and provisions of these standards.

1.2 Report Timetable

We understand that HRFE is scheduled to report on this review to HRM Council on November 24, 2015. In discussions with the project steering Committee confirmed that the following schedule meets the needs of the project review.

- November 9, 2015 - Preliminary Report delivered to HRFE. This report is to contain the essential research and recommendations required to allow HRFE to begin development of their November 24 report to council. It is understood that much of the background information is known to HRFE and contained in the two operational review reports delivered to council by HRFE.
- November 30, 2015 – On or about November 30, a final report will be delivered to HRFE.

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Section 2 Executive Summary

2.1 Steps of the Review

We have taken the following steps to meet the requirements of this project:

- a) We reviewed the operational review reports previously delivered to council by HRFE - “Fire Services Operational Review – Update, December 15, 2014” and “Fire Services Operational Review – Supplementary Report March 19, 2015.”
- b) We conducted an independent review of the methodology, rationales and conclusions of the response modelling conducted by HRFE for the two operational review reports.
- c) We conducted an environmental scan of information related to the safe and effective provision of fire protection service, including NFPA 1710, 2016 Edition, The British Columbia Fire Services Playbook, Ontario Fire Marshal Public Fire Safety Guidelines and fire fighter occupational health and safety requirements in British Columbia, Ontario and Nova Scotia. We also note that the Nova Scotia Ministry of Labour has issued an order for HRFE to comply with the NFPA 1500 requirement to have 4 people on scene before entry can be made into a structure fire except when it can be done safely to effect a critical rescue with less than 4 people in scene.
- d) We reviewed apparatus staffing in similar jurisdictions as suggested by the project Steering Committee (Vancouver, Calgary, Edmonton, Hamilton and Ottawa).
- e) We remained in regular communication with HRFE senior staff during our review of the operational reports prepared by HRFE and as we reviewed various alternative staffing models to ensure our recommendations were practical and appropriate to the needs and circumstances of HRM.

2.2 Results of Our Review

2.2.1 Response Modelling

In order to determine the accuracy of the HRFE response model and conclusions derived from the city’s modeling exercise, POMAX staff independently tested the methodology and modeling, and reviewed the city’s conclusions. The consultants agree with the rationale and outcome as previously presented by Halifax Fire & Emergency Services.

We note that Halifax Fire & Emergency Services and Integrated Emergency Services are currently undertaking enhancements to the data collection technology and procedures for recording essential time components of emergency responses. Future analysis will benefit from this initiative and the resulting improved accuracy of emergency response statistics.

Following are the primary findings from the response modelling:

- a. It was observed that our response model test results were a close match with Halifax staff developed contours. A network contour development requires certain modelling assumptions, including travel speed, vehicle turning time penalties, etc. We weren't able to confirm with Halifax staff the exact model building assumptions that were involved in building the contours, nevertheless the very close match between Halifax's and POMAX's response time model confirmed the validity of Halifax's emergency response modelling process and resulting contour development.
- b. In order to validate the theoretical model with on ground realities, we utilized the Automatic Vehicle Location data obtained from six fire trucks in about four to five stations. Although the data obtained was a very small sample of what could be considered representative data for sound calibration work, the automated information generated by an AVL system is very high quality and provides a continuous log of relatively accurate vehicle location vs time at regular intervals. However, scarce AVL data meant that other factors which can impact response times, such as time of day or seasonal conditions, could not be taken into account to the extent that we would prefer. However, that is a limitation of current technology and not reflective of the accuracy of the work performed by Halifax Fire & Emergency Services and the city.
- c. The AVL data covered the downtown areas better than rural areas. Because of the relative scarcity of information, POMAX, with agreement from Halifax staff, undertook a validation exercise so that the theoretical response time could be cross checked against the AVL data and could be cautiously expanded across the region.
- d. The consultants observed that, overall, the theoretical response times satisfactorily matched the AVL data with some minor deviations. For example, in downtown areas and around closely spaced intersections, emergency response times were a little higher compared to the theoretical model. Conversely, on less active streets and in rural areas, fire trucks seemed to travel slightly faster than posted speed limits. The speed and travel time parameters in the model were modified to reflect these observations. Additionally, a few roads were observed to demonstrate consistently and considerably different travel speed than the posted speed limit. We made the assumption that the posted speed limits in the software data base were incorrect or obsolete, and travel speeds were manually changed in the base data to reflect those observations.
- e. The validation exercise has created a fire response model that staff can be confident, with a caveat of relatively scarce representative sample data. POMAX strongly advises that the AVL capability be enhanced to include all emergency response vehicles, given the return for investment it provides. After such deployment, the model must be recalibrated to better reflect on-ground conditions.

2.2.2 Stations 4, 11 and 13

Pomax undertook our own assessment of the effect of decommissioning stations 4, 11, and 13 and distributing staff to other stations in order to staff aerial apparatus and bolster some locations that are currently staffed with fewer than four career firefighters. Four maps are attached as Appendix A.

- Map 1 indicates the area to which four career firefighters can respond within five minutes if stations 4, 11, and 13 remain active (status quo).
- Map 2 indicates the area to which four career firefighters can respond within five minutes if stations 4, 11, and 13 are not staffed and firefighters are redistributed to other stations.
- Map 3 indicates the area to which twelve career firefighters can respond within eight minutes if stations 4, 11, and 13 remain active (status quo).
- Map 4 indicates the area to which twelve career firefighters can respond within eight minutes if stations 4, 11, and 13 are not staffed and firefighters are redistributed to other stations.

Comparing Map 1 with Map 2 demonstrates that not staffing stations 4, 11, and 13 has no negative effect on response in the core area and has the added advantage of improved response times for four career staff within five minutes to the areas of stations 8, 58, and 16.

Comparing Map 3 with Map 4 demonstrates that not staffing stations 4, 11, and 13 has no negative effect on response in the core area and has the added advantage of improved response times for twelve career staff within eight minutes to the areas of stations 8, 9, 17, and 18.

Our conclusion is that decommissioning stations 4, 11, and 13, and optimizing staff distribution to other stations maintains the required 2006 coverage targets throughout the core, and improves protection in other areas.

As a result of the methodology validation, modeling, and Pomax's tests described in Section 2.2.1 and 2.2.2, the consultants concur with Halifax Fire & Emergency Service's recommendation that decommissioning stations 4, 11, and 13

- can be accomplished without affecting efficient and effective fire protection in the core area
- will not compromise the 2006 Approved Delivery Service Standards which will continue to be met, and
- fire protection to other areas will be improved.

We recognize that HRM Council has made the decision to maintain stations 4, 11, and 13 as active, operational stations. For that reason we have made alternative recommendations in Section 2.2.3 regarding staffing of those stations to provide the required FTEs to staff an additional aerial while maintaining the existing HRFE complement of 413 FTEs.

2.2.3 Staffing Models

Council's motion regarding this project indicated that all fire trucks that are crewed by full time firefighters shall be crewed with four firefighters unless a safe alternative can be proposed. We understand the term "safe alternative" to include both public and firefighter safety. Our review of fire service standards and fire fighter health and safety literature and legislation indicate that responding with less than four fighters as the initial response crew to a structure fire does not provide for firefighter safety and has a significant impact on public safety as both interior search and rescue and interior firefighting activities are critically impacted with a smaller initial response force.

We have provided alternative staffing models that include staffing specific fire trucks with less than four firefighters. However, these alternatives address the issue of arrival of 4 firefighters on scene within 5 minutes which is the current service delivery standard for HRFE. It is understood that any fire trucks responding to structure fires with less than 4 firefighters respond with other vehicles that provide the 5 minute response time required by the service delivery standards.

2.2.4 Similar Jurisdictions

Our review of similar jurisdictions indicates that apparatus are generally staffed with 4 personnel to provide an initial response crew of 4 firefighters. There are some cases of aerial units being staffed with 2 firefighters (or a firefighter and an officer) but in these cases the aerial always responds with another unit similar to the Halifax model at station 3. Halifax station 3 has an engine staffed with 4 firefighters and an aerial staffed with 2 firefighters (normally a lieutenant and a firefighter) and the aerial responds with other units to a structure fire. Results of our review of similar municipalities are found in Table 1: Review of Similar Jurisdictions.

Table 1: Review of Similar Jurisdictions

City	# firefighters per apparatus	Apparatus staffing at 3 or less	Council Policy	Financial Issue	Service Delivery Standards
Vancouver		4 rescue units staffed with 1 lieutenant and 1 firefighter	No		Standards specific to Vancouver which is +30 seconds beyond NFPA 1710
Calgary	4 on engines	2 on aerials, rescue, and ancillary units	No	Financial factors	1 st unit in 7 minutes (dispatch, turnout, and travel time) and 12 firefighters in 11 minutes
Edmonton	Pumpers, aerials and rescues staffed with 4	5 tankers staffed with 2 firefighters	Master Fire Plan approved by Council	N/A	1st unit in 7 minutes (dispatch, turnout and travel time) and 16 firefighters in 11 minutes
Ottawa					
Hamilton					

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Section 3 Recommendations for Alternative Staffing Models

The direction given for this project is to determine alternative options that exist while working within existing approved operation positions (413) in order to crew two aerials (East and West) in the current core station complement. We understand this direction to mean that we are to provide alternatives to the staffing models presented in the two HRFE operational review reports of December, 2014 and March, 2015. We have developed alternative staffing models that maintain the current complement of 413 FTEs as directed in the scope of assignment for this project. Additionally we have provided alternatives that require additional staff to achieve those models.

3.1 Second Aerial Assignment to Station 12

HRFE staff have identified station 12 as the most effective location for a second aerial. This meets the requirement to place an aerial on each side of the harbor and also provides quick access to the road and highway systems to move throughout the east side of the harbour. We concur with this location and recommend that this second aerial be staffed by 1 lieutenant and a firefighter and that the quint currently stationed there be replaced with an engine. The quint should be reassigned to another station.

Recommendations to staff the aerial with a lieutenant would require a promotion to lieutenant. We are presenting a number of options to provide staffing of the second aerial at station 12 within the current complement of 413 FTEs.

3.1.1 Reduced Staffing at Stations 4 and 13

For council's consideration we are providing an alternative staffing model that would have the staff at stations 4 and 13 reduced from 4 to 3 firefighters and the 8 firefighters that become available be assigned to the aerial to be located at station 12.

- Fire service standards, notably NFPA 1710, require 4 people on initial response apparatus that respond to low to medium risk structure fire.
- The two operational reviews conducted by HRFE and reported to Council recommend that stations 4, 11 and 13 be decommissioned.

The recommendation to decommission station 4 is based on the fact that all of the 16,707 fire risk points within station 4 coverage zone can be covered by stations 3 and 5 within their 5 and 8 minute response zones to meet the 2006 Approved Service Delivery Standards.

The recommendation to decommission station 13 is based on the fact that all 15,953 fire risk points within station 13 coverage zone can be covered by stations 12, 14 and 15 within their respective 5 and 8 minute response zones to meet the 2006 Approved Service Delivery Standards.

Our conclusion is that response in the areas covered by stations 4 and 13 will not be impacted by a reduction in staffing because the other stations also responding into these areas have response times adequate to meet the requirements of the 2006 Approved Delivery Standards. This is a somewhat unique situation in that Council has decided to keep stations 4 and 13 open and there is considerable overlap in the response zones meeting the 5 and 8 minute service delivery requirements. Therefore, we are able to recommend a reduction from 4 career firefighters at stations 4 and 13 to 3 firefighters on each fire truck and recommend reassignment of these 8 to staff the aerial placed at station 12.

We are making an assumption that HRFE has made provision to account for absences of assigned staff (vacation, sick time, lieu time, etc.) with additional staff. The common practice is that assignment of 4 firefighters on 24/7 basis requires a total of 5 FTEs. Therefore assignment of 2 firefighters 24/7 requires 10 FTEs. So our assumption is that the 8 reassignments to station 12 include coverage for absences within the current complement.

3.1.2 Station 11 Converts to a Volunteer Station

We recommend that station 11 be converted to a volunteer station and the 8 FTEs assigned to staff the aerial to be located at station 12.

The operational reviews conducted by HRFE recommended decommissioning of Station 11 based on the following facts:

- Station 11 responds to an average of 41 calls annually
- All of the 1,689 fire risk points in the station 11 coverage area are within the 10 minute response zone for station 10
- There are low exposures and few hazards within the station 11 coverage area
- There would be no impact on the insurance ratings if station 11 was decommissioned

Regarding the decommissioning of station 11, HRFE report, "Fire Services Operational Review – Update, December 15, 2014" indicated that if station 11 is decommissioned all 1,689 fire risk points will remain covered within the 10 minute response zone for station 10 which will meet the 2006 Approved Service delivery Standards for areas of the municipality with a population density of under 100 persons per square kilometer.

Council decided that station 11 would remain open. We have conferred with HRFE staff who concur that the option to staff the station with volunteers is viable operationally and that there will be sufficient persons willing to become volunteers in that area.

HRFE report, "Fire Services Operational Review – Supplementary Report March 19, 2015" indicates that conversion of station 11 to a volunteer station is a reasonable option for staffing of station 11. The report states:

“ Due to volunteer turn-out and travel times, conversion to a volunteer staffing model will mean that this station will function as a secondary responder. Recruitment of volunteers would need to be undertaken. While volunteer recruitment has not previously taken place for Station 11 (Patton Road), volunteer recruitment has been successful for nearby stations (i.e. Station 10 (Millwood Drive) – composite staffing model and Station 9 (Metropolitan Avenue) – composite staffing model). Individuals currently volunteering in the area may be able to volunteer at Station 11 (Patton Road).”

3.1.3 Staff Aerial at Station 12 With Increased Complement

We understand that HRM wishes to contain the costs of fire protection for the municipality by maintaining the existing complement of 413 FTEs for HRFE. However, within the context of an independent and objective review, we are providing an alternative staffing model to maintain the existing staffing levels of 4 firefighters at stations 4 and 13 and 2 firefighters at station 11. This option would see the aerial placed at station 12 and staffed by 1 lieutenant and 1 firefighter. This results in a staff increase of 10 firefighters to maintain 2 firefighters on the aerial 24/7. In addition, there would be one promotion to fill the lieutenant position on the aerial.

3.1.4 Reduce Staffing on E Platoons

We have reviewed the option to reduce staffing on E Platoons from 4 firefighters to 3 firefighters and the possibility of reassigning those FTEs to staff the aerial proposed for station 12. In discussions with HRFE staff, it became clear that HRFE senior management is currently working with the E Platoon system to optimize the response capabilities in areas outside of the core. Staffing of 4 firefighters at E Platoon stations is necessary because the number of volunteers available to respond in these station coverage zones during these times is limited.

We note that the review of the Approved Service Delivery Standards scheduled for 2016 may provide opportunities to adjust the staffing models in the areas outside the core and subsequently, adjust the placement of some E Platoon stations.

3.1.5 Dynamic Resource Modelling

Another option, which is more strategic in nature because it depends on strong data analysis which is not yet available to Halifax Fire and Emergency Services, is dynamic deployment which is widely used in the United Kingdom.

A dynamic deployment model of fire service is based on four precepts:

- education
- prevention
- robust data, and
- suppression

The intent of dynamic deployment is to allocate resources to areas of highest risk and incident occurrence based on the time of day and week. In its simplest form, in a hypothetical situation where:

- workers vacate a commercial area between 5:00 PM and 8:00 AM, and
- statistics show few incidents requiring response occurring in that location, during those hours, in previous years, and
- those workers repopulate residential areas from 5:00 PM to 8:00 AM, and data shows an increase in response requirements to the residential areas during those hours,

then apparatus and staff would be moved towards residential areas where incidents occur. During the daytime, when the pattern reverses, resources would relocate to the commercial area. This dynamic deployment example is very simple and, in real life, would be supported by education and prevention efforts to decrease all incidents requiring response.

Dynamic deployment is enabled by a risk model of resource allocation that requires robust data, which will be supported by Halifax Fire & Emergency's technology initiative. There are several stages of risk analysis leading to the implementation of dynamic deployment, and efficient and effective use of resources. These include:

- Identifying risk and common incidents and the impact on life and economy
- Estimating the risk level including frequency
- Discovering and assessing options such as public education and prevention, or if suppression preparedness is adequate
- Deciding on targets and response standards which can vary based on risk within time of year, day, and hour of day, and
- Identifying action that might mitigate incident frequency

Decisions for each locale will be based on

- the best prevention activity,
- protection activity (level of response), and
- the response standard.

With this information at hand Halifax Fire & Emergency Services would be able to make evidence based decisions for deployment that would be dynamic depending on the risk circumstances, rather than based primarily on coverage and travel time.



Request for Proposals FS 2015-01
The Corporation of the Town of Collingwood
Fire Services Master Plan

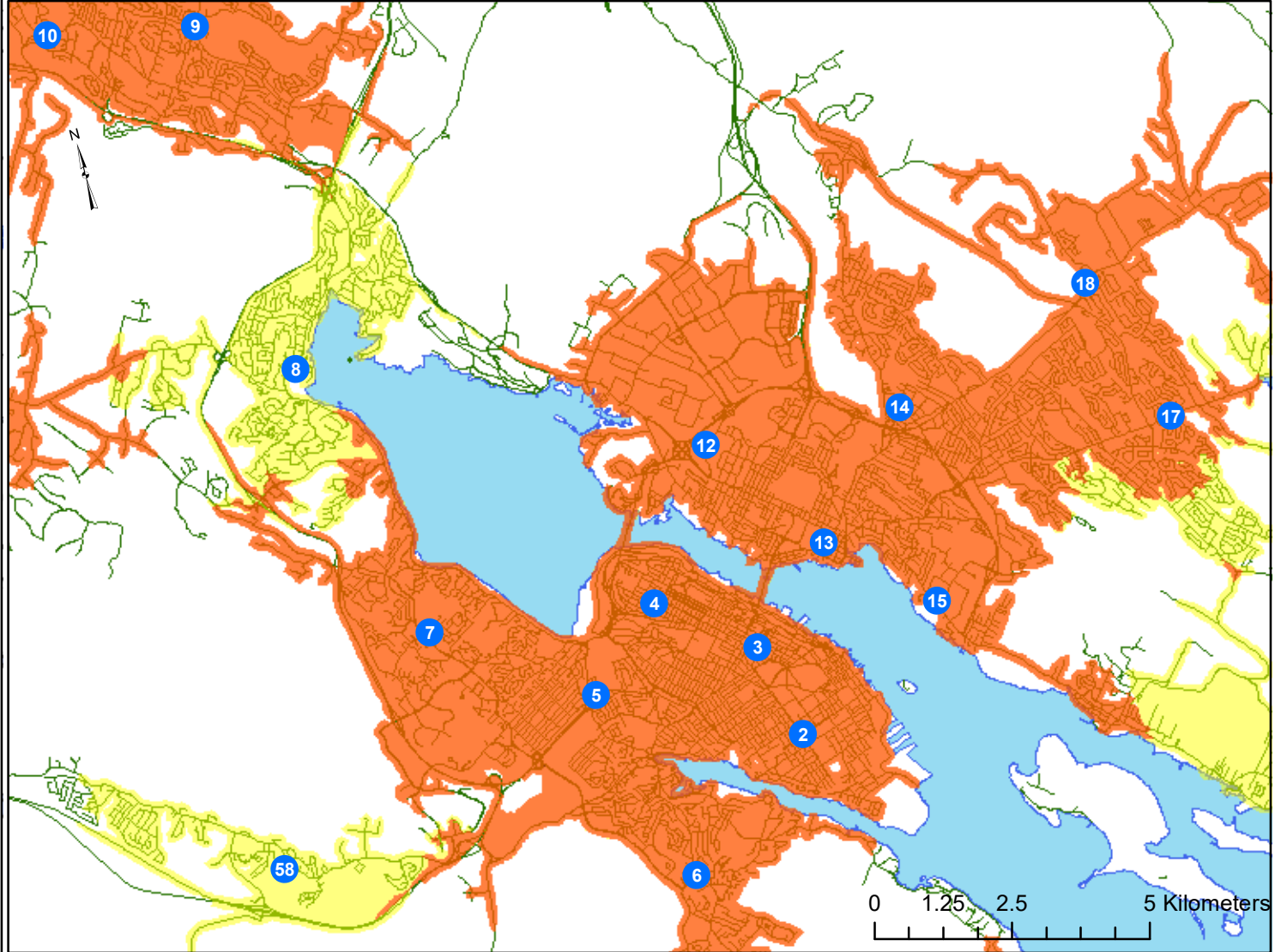
Appendix A: Response Contour Exhibits

Map 1. Halifax Regional Fire and Emergency

4 Staff Response Within 5 Minutes

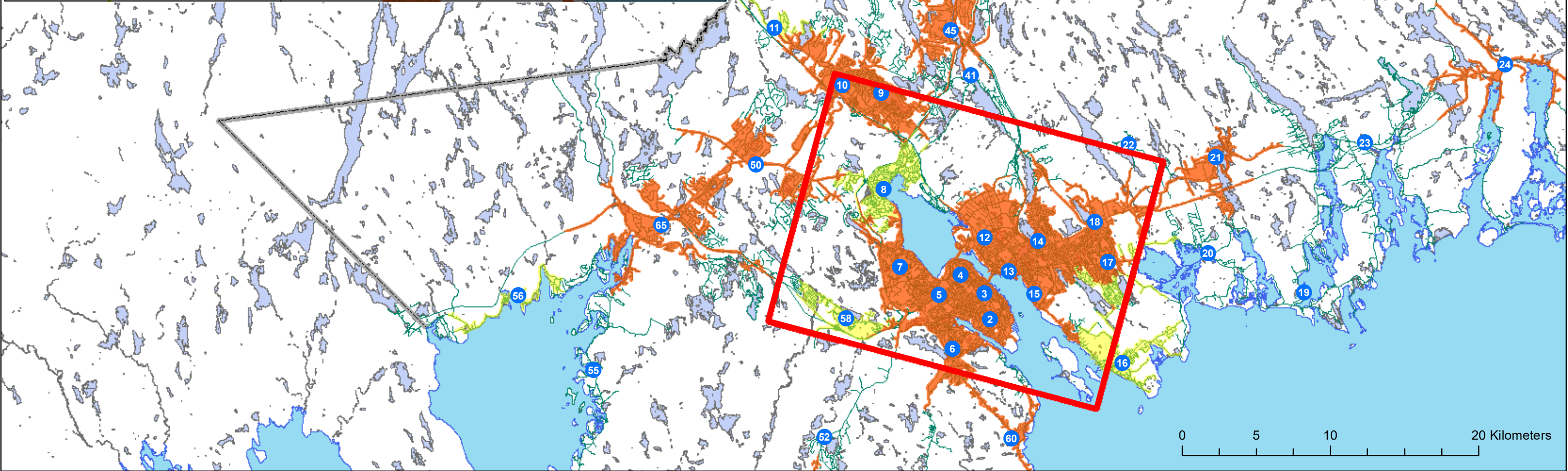
Scenario: Status Quo

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Legend

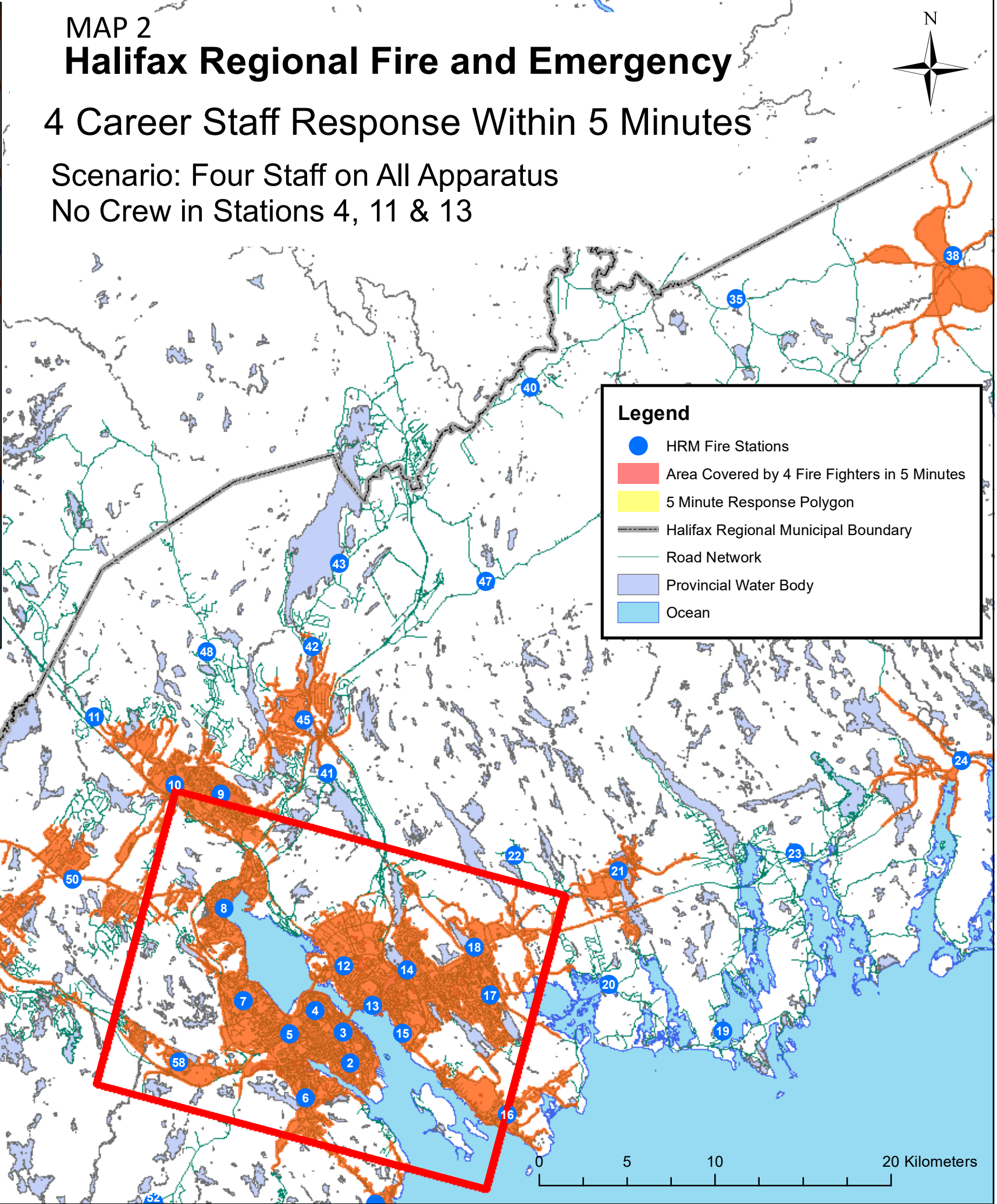
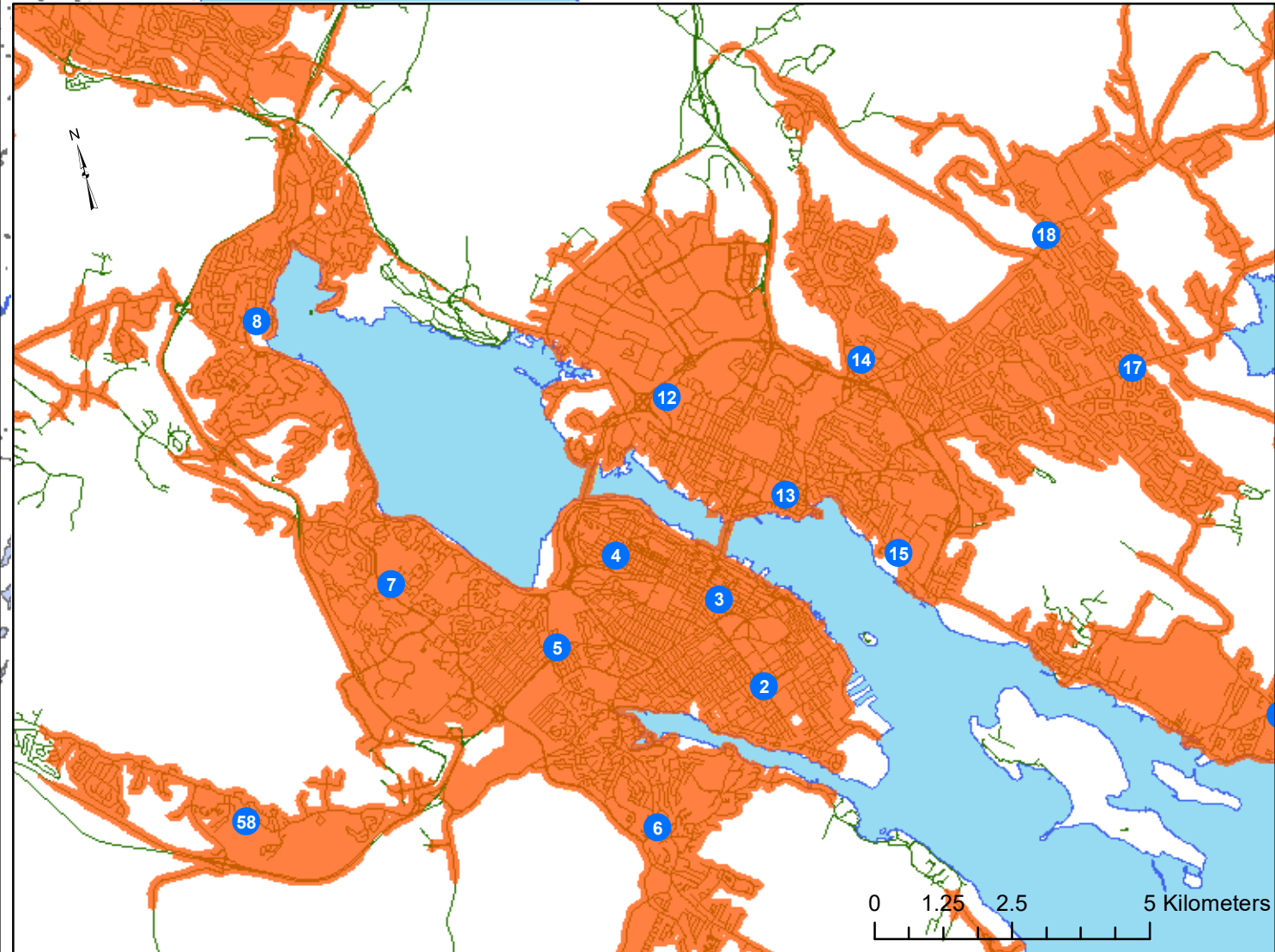
- HRM Fire Stations
- Area Covered by 4 Fire Fighters in 5 Minutes
- 5 Minute Response Polygon
- Halifax Regional Municipal Boundary
- Road Network
- Provincial Water Body
- Ocean



MAP 2 Halifax Regional Fire and Emergency

4 Career Staff Response Within 5 Minutes

Scenario: Four Staff on All Apparatus
No Crew in Stations 4, 11 & 13

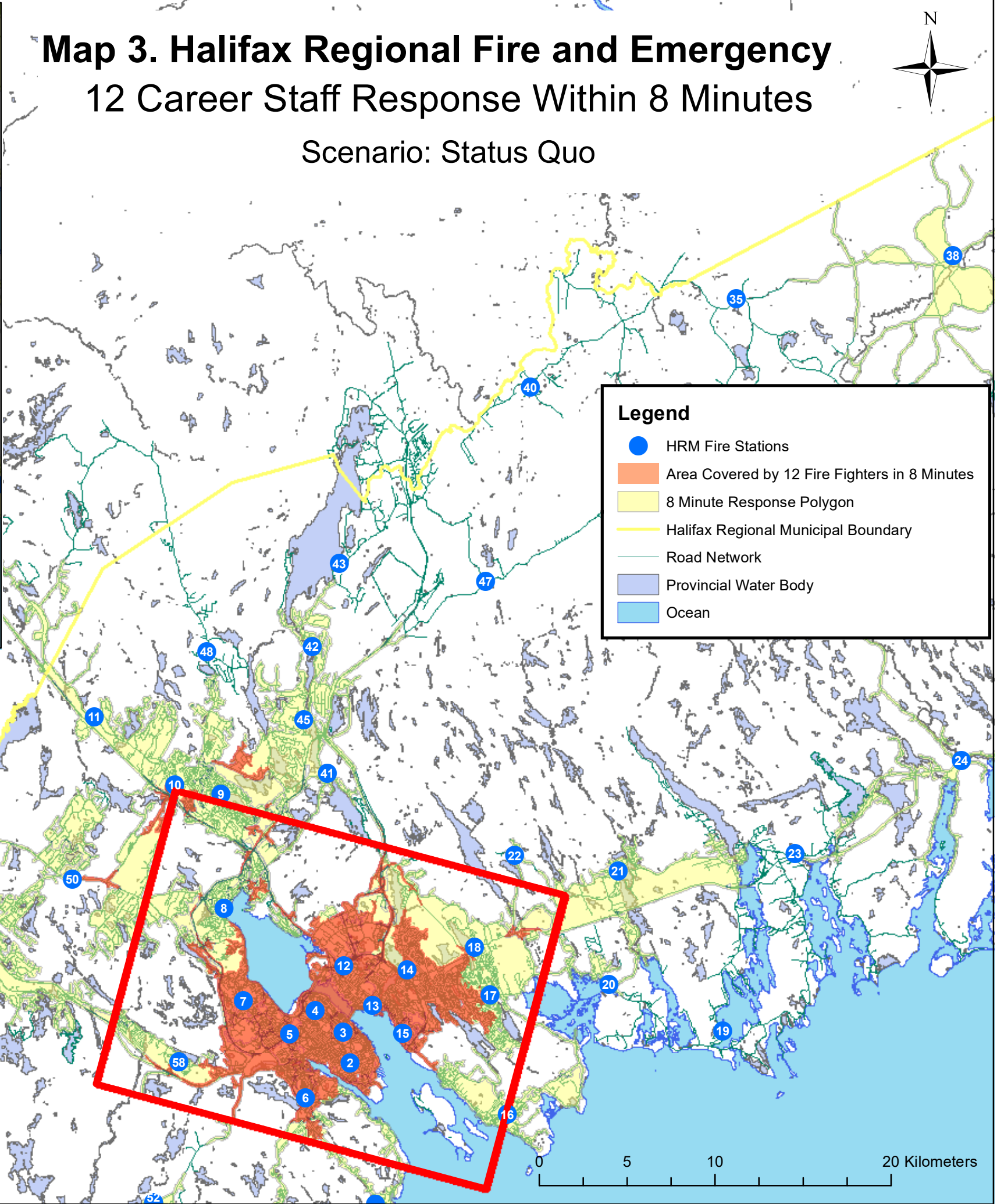
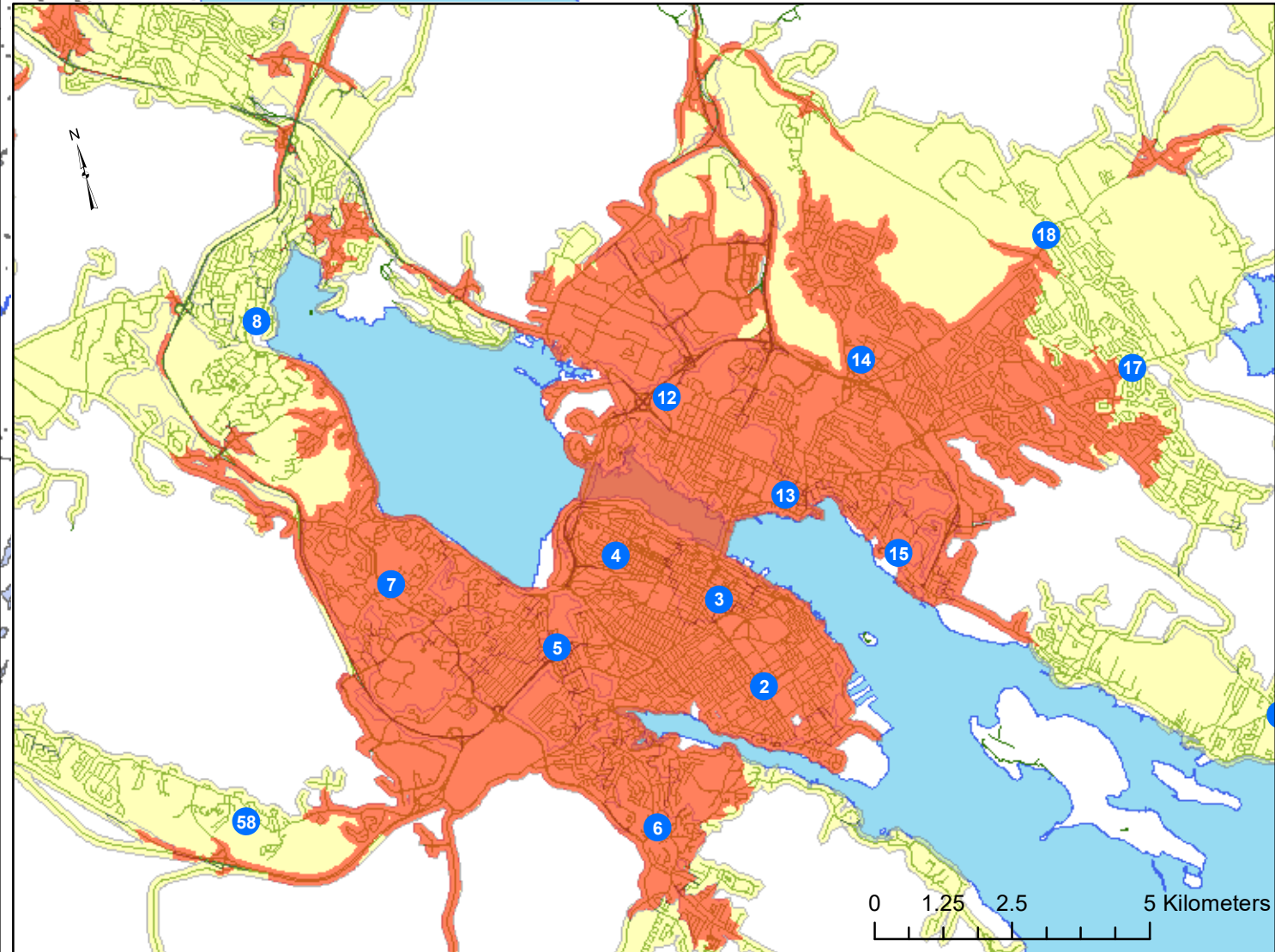


Legend

- HRM Fire Stations
- Area Covered by 4 Fire Fighters in 5 Minutes
- 5 Minute Response Polygon
- Halifax Regional Municipal Boundary
- Road Network
- Provincial Water Body
- Ocean

Map 3. Halifax Regional Fire and Emergency 12 Career Staff Response Within 8 Minutes

Scenario: Status Quo



Legend

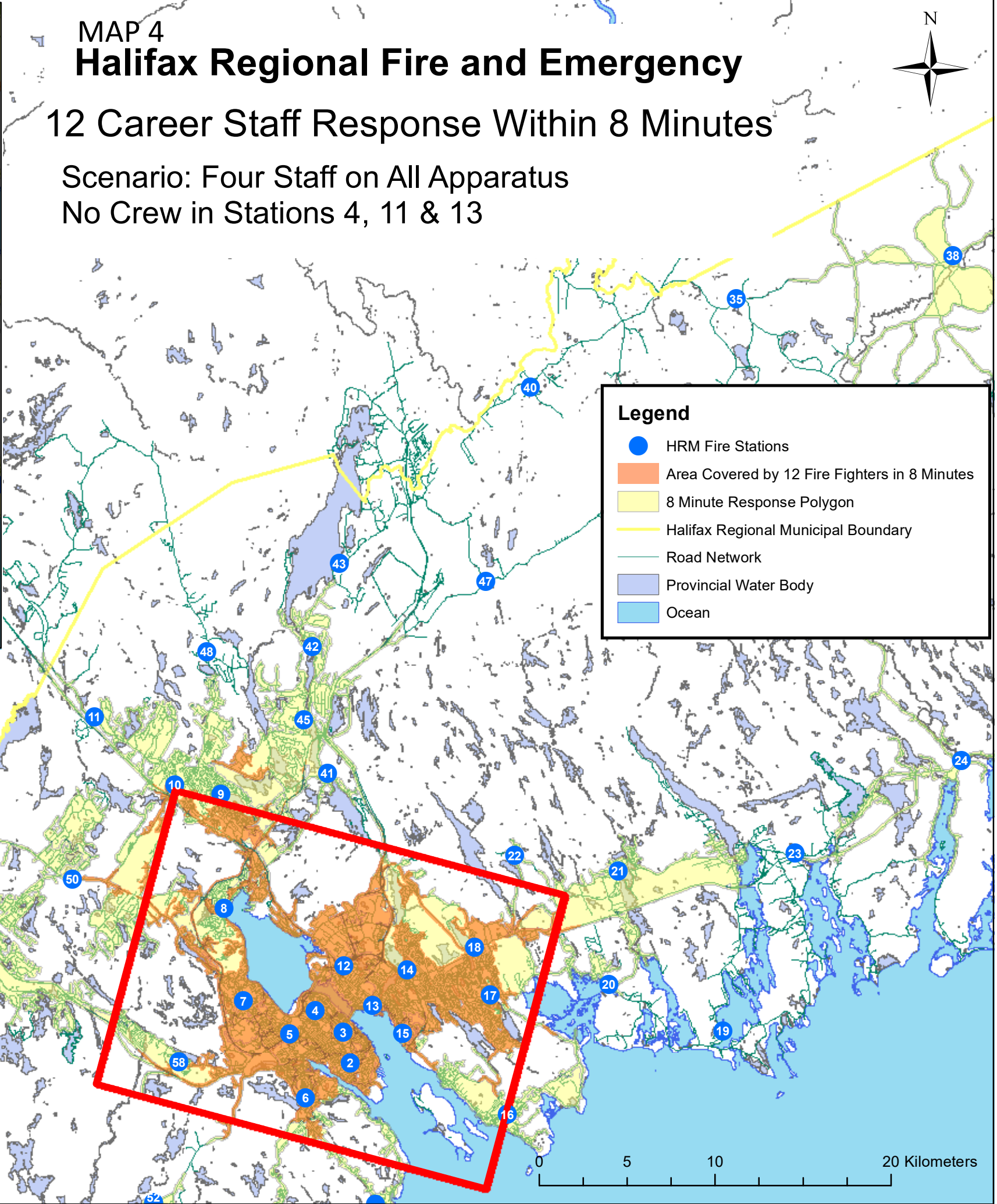
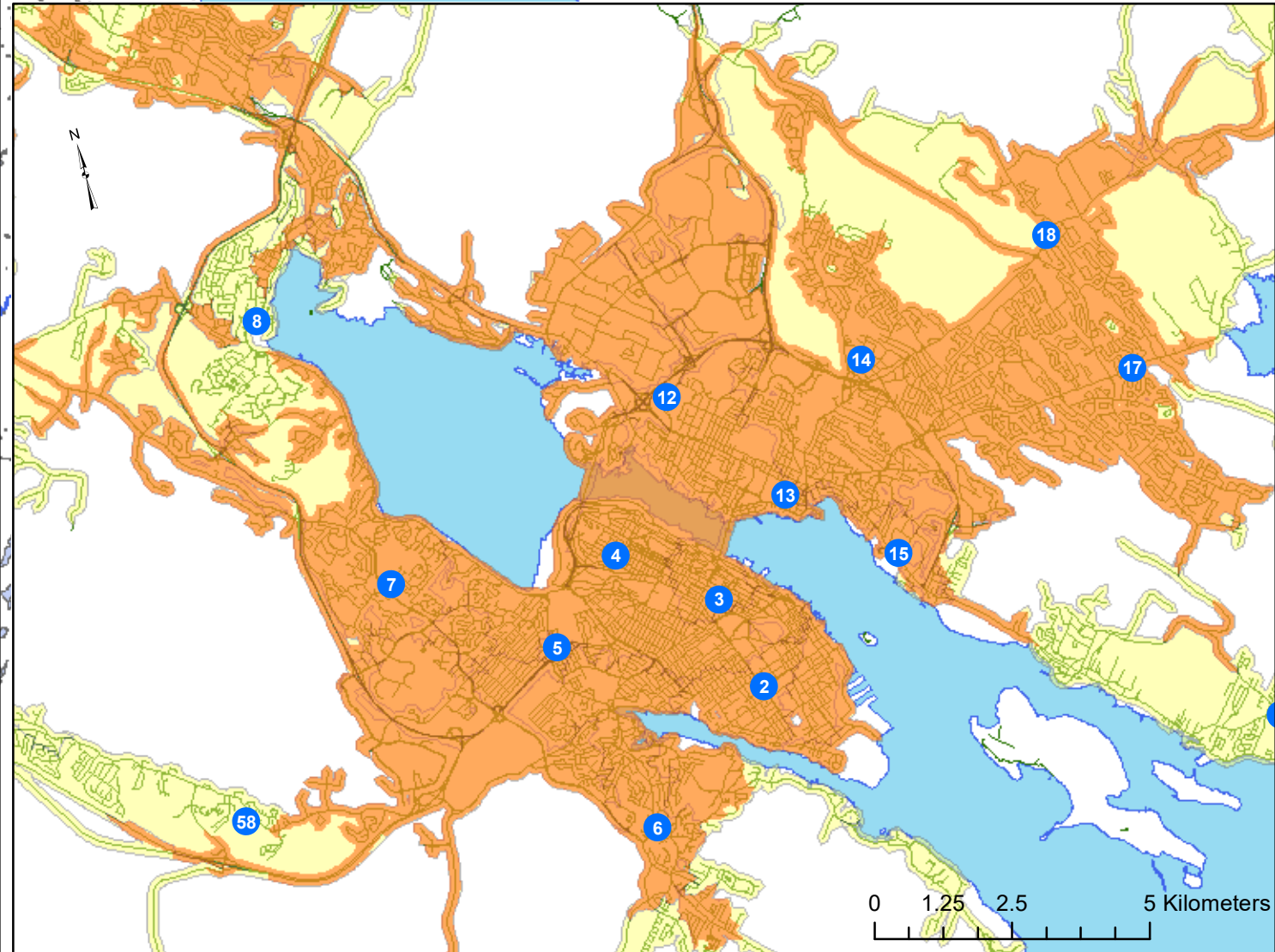
- HRM Fire Stations
- Area Covered by 12 Fire Fighters in 8 Minutes
- 8 Minute Response Polygon
- Halifax Regional Municipal Boundary
- Road Network
- Provincial Water Body
- Ocean



MAP 4 Halifax Regional Fire and Emergency

12 Career Staff Response Within 8 Minutes

Scenario: Four Staff on All Apparatus
No Crew in Stations 4, 11 & 13



Legend

- HRM Fire Stations
- Area Covered by 12 Fire Fighters in 8 Minutes
- 8 Minute Response Polygon
- Halifax Regional Municipal Boundary
- Road Network
- Provincial Water Body
- Ocean

ATTACHMENT 4

GIS BASED RESPONSE TIME MODELING HRFE METHODOLOGY

In the absence of reliable Computer Aided Dispatching (CAD) data, HRFE turned to Geographic Information System (GIS)¹ modeling. HRFE's GIS technician generated street network layers in GIS using demand points (building types), posted speed limits (by zones), traffic pre-emption (Opticom)², traffic calming locations, intersection locations and turn data. Street network details were combined with traffic flow patterns and physical distance (from station to incident destination) to map projected response times. Consistent with Council approved standards,³ HRFE's GIS technician modeled five minute, eight minute and ten minute response times for all HRFE fire stations.

To verify reliability of GIS projected response times, HRFE staff compared GIS-modelling-based response time projections against known, real-life response times. A total of six HRFE apparatus are currently equipped with Automated Vehicle Locator (AVL)⁴ technology (Stations 2,3,4,5 and 12). Captured AVL/GPS data (from MDT equipped fire apparatus) includes date, time, vehicle speed and geographic position (used to calculate vehicle start and stop times). The AVL/GPS data shows that fire apparatus travel at, or just above, the posted speed limits. When start, stop and turn penalties are factored into the total response time model, vehicle speed averages out close to the posted speed limit (validating HRFE's theoretical GIS-based travel time calculations). Congruence of GIS-projections with real-life experience suggests that the GIS modelling is accurate.

¹ See https://en.wikipedia.org/wiki/Geographic_information_system for GIS overview.

² HRFE first responders use Emergency Vehicle Pre-emption (EVP) to reach emergency scenes. Opticom uses GPS technology and highly secure radio communications for remote, real-time traffic system management. EVP allows emergency responders to move through traffic signal controlled intersections quickly and safely.

³ See Attachment 5 for Council approved HRFE service delivery particulars.

⁴ An automatic vehicle locator (AVL) is a device that makes use of the Global Positioning System (GPS) to enable real-time remote tracking of vehicle location.

ATTACHMENT 5

CURRENT HRFE SERVICE DELIVERY LEVELS

On February 14, 2006, Halifax Regional Council voted to approve staff's recommended service delivery levels for fire and emergency services in the municipality.¹ Approved standards are reproduced in Table 9 and Table 10 below. Provision was made for extraordinary exemptions (to address natural disasters and states of emergency) and acceptable exemptions (to address island properties not accessible by public roadway, private roads).

**TABLE 9: HRFE SERVICE DELIVERY LEVELS
POLULATION DENSITY OF 100+ PERSONS PER SQUARE KM**

Type	Particulars
Dispatch	Dispatch time of 60 seconds.
Turnout	Staff turnout time of 60 seconds.
Response	Response time of 5 minutes or less (90% of the time) for single unit responses, or for the first arriving unit of a multiple-unit response.
	Response time of 8 minutes or less (90% of the time) for subsequent arriving units of a multiple unit response or alarm assignment.
Complement	A full alarm assignment consists of 2 engines, 1 aerial, and 1 tactical unit, for a total of 12 personnel.
Incident Officers	An incident safety office and a dedicated incident commander be dispatched on full alarm assignments, with no response time criteria.
Subsequent Alarm	A subsequent alarm assignment consists of a minimum of 2 units (configuration acceptable to incident commander) for a total of 8 additional personnel.

...

**TABLE 10: HRFE SERVICE DELIVERY LEVELS
POLULATION DENSITY OF LESS THAN 100 PERSONS PER SQUARE KM**

Type	Particulars
Dispatch	Dispatch time of 60 seconds.
Turnout	Staff turnout time of 60 seconds.
	Volunteer turnout time of 6 minutes or less (90% of the time).
Response	Response time of 10 minutes or less (90% of the time) for single unit responses, or for the first arriving unit of a multiple-unit response.

¹ See <http://www.halifax.ca/council/documents/c060214.pdf> Item 9.1.6 Halifax Region Fire and Emergency Service Delivery Levels. See also <http://www.halifax.ca/council/agendasc/documents/FireEmergencyServiceDelivery.pdf>

ATTACHMENT 6

RATIONALE FOR STAFFING STATIONS 8, 16, 17 AND 58 WITH FOUR CAREER PER APPARATUS

Option #1 and Option #2 both will result in improved compliance with service delivery standards at stations that are currently operating with understaffed apparatus. Both Option #1 and Option #2 call for increasing the complement of career personnel to four in stations located on the periphery of the urban core.

Stations 8, 16, 17 and 58 are currently operating with three career firefighters per apparatus. Proposed personnel redeployment in Option #1 and Option #2 would bring all four of these stations up to four person apparatus crews. Crewing apparatus with four career personnel will have the benefit of allowing first responders to immediately engage in fire suppression and rescue operations, when arriving on scene, without the need to wait for additional fire services vehicles to arrive. This will have the effect of increasing the frequency with which the five minute response time target can be met to have four firefighters assembled. Overlapping station coverage areas reduce, but not eliminate, the likelihood of not meeting firefighter assembly targets.

Fluid fire response models can undermine the ability of crews from neighbouring stations to assemble. When fires occur, HRFE's operational practice is to re-position apparatus to back-fill areas of coverage left unprotected when apparatus from stations respond to calls. This fluid apparatus repositioning, may or may not impact HRFE's capacity to assemble enough firefighters on scene (in cases where an apparatus is crewed with less than four firefighters). Impact would depend on the extent/timing of the repositioning, as well as where the incidents occur in relation to the repositioned apparatus.

Concurrent calls further complicate assembling four firefighters within five minutes. Concurrent calls are relatively infrequent. They also often occur in fire coverage areas that are remote from one another – thus not impacting response from a common pool of fire service personnel and apparatus. Concurrent fires can, however, occur in locations that are relatively close to one another. Geographically close, concurrent calls may necessitate responses from units that would normally be able to back up apparatus staffed with less than four firefighters.

As noted in POMAX's staffing review report, an increase in career crew from three personnel to four personnel (operating out of Stations 8, 16, 17 and 58) will allow responding units to better meet HRFE's 2006 service delivery standards. POMAX's response time maps model assembly of firefighters – 4 firefighters assembled within 5 minutes (4 within 5) and twelve firefighters assembled within eight minutes (12 within 8). These response times and assembly targets are based on Council approved 2006 service delivery standards.

Coverage improvements can be summarized as follows:

- **4 within 5:** By increasing staffing to four at Stations 8, 16, 17 and 58, four firefighters can be assembled within five minutes in all station coverage areas with the exception of very small sections of Stations 16 and 17's coverage areas.
- **12 within 8:** Despite increasing staffing to four at Stations 8, 16, 17 and 58, there will be areas of Stations 16 and 58, and a smaller section of Station 8, where HRFE is unable to assemble twelve firefighters on scene within eight minutes. However, increasing staffing to four at Stations 8, 16, 17 and 58 will result in complete eight minute response coverage for all of Stations 17 and 18's coverage areas.

Based on POMAX's findings and HRFE's own modelling and analysis, bringing crew staffing up to four career personnel per apparatus is advisable for all stations currently staffed with fewer than four career personnel (for first response apparatus). Crewing with four will increase the frequency with which the five, eight and ten minute response time targets can be met.