FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES
c/o Risk Management Services

February 5th, 2010

FINAL

Salt Spring Island Fire Rescue
105 Lower Ganges Road
Salt Spring Island, BC
V8K 2T1

Attention: Mr. Tom Bremner, Fire Chief – Salt Spring Island Fire Rescue (SSIFR)
Mr. Mike Schubart, Chair – Salt Spring Island Fire Protection District (SSIFPD)

Re: Fire Underwriters Survey – Salt Spring Island Fire Protection District

A survey of Salt Spring Island Fire Protection District's fire defences was conducted from November 25th – 27th, 2009. The results of this survey are now complete and offered for your information. Fire Underwriters Survey (FUS) conducted the assessment primarily for fire insurance grading and classification purposes. The following report provides a brief description of the grading process and outlines significant findings of the assessment. In addition and at the request of SSIFPD, this report also includes comments and general recommendations that are aimed at improving the level of fire protection within the SSIFPD for fire insurance grading purposes.

Note that comments made within this report are general statements giving indication where fire protection improvements can be considered. This report was not commissioned to provide detailed recommendations nor was the assessment an operational audit.

A Fire Underwriters Survey normally includes an evaluation of both fire department operations and emergency water supplies. During the previous survey, emergency water supplies were not evaluated at the request of various waterworks districts and utilities on Salt Spring Island. The main intent of this Fire Underwriters Survey was to ensure that available emergency water supplies were evaluated in addition to updating information on fire department operations in order to produce an up-to-date fire insurance grade reflective of the current levels of fire protection on Salt Spring Island.

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1. Fire Insurance Grading Result

The Public Fire Protection Classification (PFPC) is a numerical grading system scaled from 1 to 10 that is used by Commercial Lines[1] insurers. Class 1 represents the highest grading possible and Class 10 indicates that little or no fire protection is in place. The PFPC grading system evaluates the ability of a community's fire protection programs to prevent and control major fires that may occur in multi-family residential, commercial, industrial, and institutional buildings; and course of construction developments.

Fire Underwriters Survey also assigns a second grade for a community's fire protection. The second grading system, entitled Dwelling Protection Grade (DPG), assesses the protection available for small buildings such as single-family dwellings and is used by Personal Lines[2] insurers.

The DPG is a numerical grading system scaled from 1 to 5. One (1) is the highest grading possible and 5 indicates little or no fire protection present. This grading reflects the ability of a community to handle fires in small buildings.

The fire insurance grades that were previously applied to the SSIFPD were as follows:

1. ***SSIFPD Public Fire Protection Classification (PFPC)***

   Class 6 Applies to properties insured under Commercial Lines within 5 road km of an SSIFR fire hall, and within 150 metres of a recognized hydrant.

   Class 9 Applies to properties insured under Commercial Lines within 5 road km of an SSIFR fire hall, but are not within 150 m of a recognized hydrant.

   Class 10 Applies to all other properties insured under Commercial Lines.

2. ***SSIFPD Dwelling Protection Grade (DPG)***

   Grade 3A Applies to properties insured under Personal Lines within 8 road km of an SSIFR fire hall and within 300 m of a recognized hydrant.

   Grade 3B Applies to properties insured under Personal Lines within 8 road km of an SSIFR fire

1 Commercial Lines: A distinction marking property and liability coverage written for business or entrepreneurial interests (includes institutional, industrial, multi-family residential and all buildings other than detached dwellings that are designated single family residential or duplex) as opposed to Personal Lines.
2 Personal Lines: Insurance covering the liability and property damage exposures of private individuals and their households as opposed to Commercial Lines. Typically includes all detached dwellings that are designated single family residential or duplex.

hall but not within 300 m of a recognized hydrant.

Grade 5 Applies to all other properties insured under Personal Lines.

Although improvements have been made to the fire protective services in the SSIFPD since the last Fire Underwriters Survey, a change to the PFPC cannot be made until improvements are made to the water supplies in addition to changes to the fire department. As a community develops so too must the level of fire protection in order to maintain its fire insurance grade as was found to be the case during this Fire Underwriters Survey; as a result; the following fire insurance grading classifications will now be assigned to the SSIFPD.

1. ***SSIFPD Public Fire Protection Classification (PFPC)***

Class 6 Applies to properties insured under Commercial Lines within 5 road km of an SSIFR fire hall, and within 150 metres of a recognized hydrant connected to the North Salt Spring Waterworks District (NSSWD) or the Fulford water distribution system.

Class 9 Applies to properties insured under Commercial Lines within 5 road km of an SSIFR fire hall, but are not within 150 m of a recognized hydrant.

Class 10 Applies to all other properties insured under Commercial Lines.

2. ***SSIFPD Dwelling Protection Grade (DPG)***

Grade 3A Applies to properties insured under Personal Lines within 8 road km of an SSIFR fire hall fire hall and within 300 m of a recognized hydrant connected to the North Salt Spring Waterworks District (NSSWD), the Maracaibo Estates Private Water Utility, or the Fulford water distribution system.

Grade 3B Applies to properties insured under Personal Lines within 8 road km of an SSIFR fire hall fire hall but not within 300 m of a recognized hydrant.

Grade 5 Applies to all other properties insured under Personal Lines.

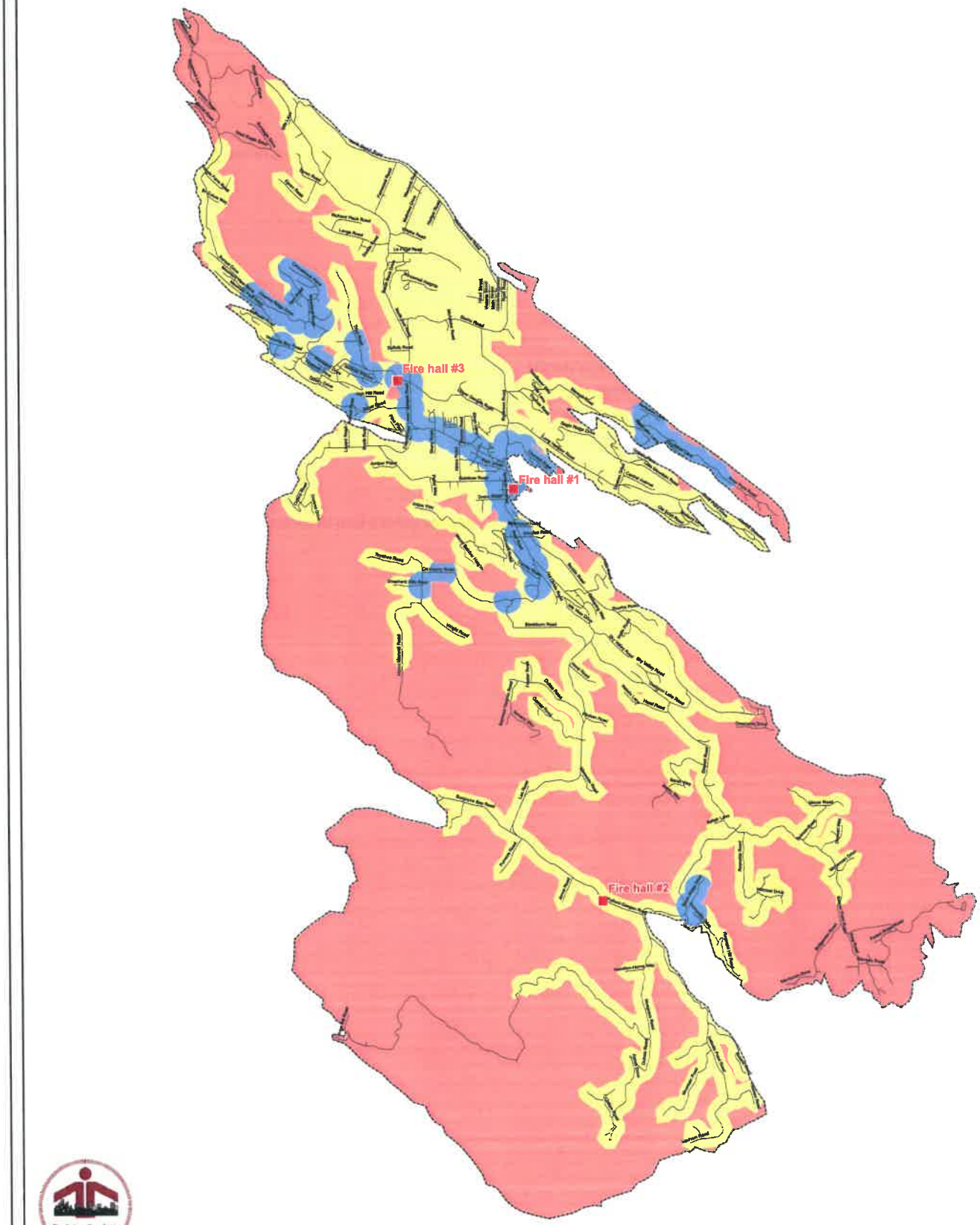
As a result of this assessment, the following water supply systems are recognized by FUS for fire insurance grading purposes (it should be carefully noted that even though these systems are recognised for fire insurance grading purposes, some hydrants on these systems may not be recognised; this is discussed later in this letter):

- North Salt Spring Island Waterworks District (NSSWD) water distribution system
- Maracaibo Estates Private Water Utility
- Fulford water distribution system

The following water supply systems are currently not recognized by FUS for fire insurance grading purposes:

- Scott Point Waterworks District water distribution system
- Mount Belcher ID water distribution system
- Beddis water distribution system
- Cedar Lane water distribution system
- Cedars of Tuam water distribution system
- Fernwood water distribution system
- Harbour View ID water distribution system
- Reginald Hill water distribution system
- High Hill road water distribution system
- Swan Point water distribution system

In areas of SSI where non recognized water supply systems are located a fire insurance grading of PFPC Class 9 and DPG 3B applies.



SALT SPRING ISLAND

Figure 1-1 Dwelling Protection Grades

Scale = 1:27,000

Fire Underwriters Survey

Legend

- Fire Hall
- Road
- Fire Protection Area
- DPG 3A
- DPG 3B
- DPG 5

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.

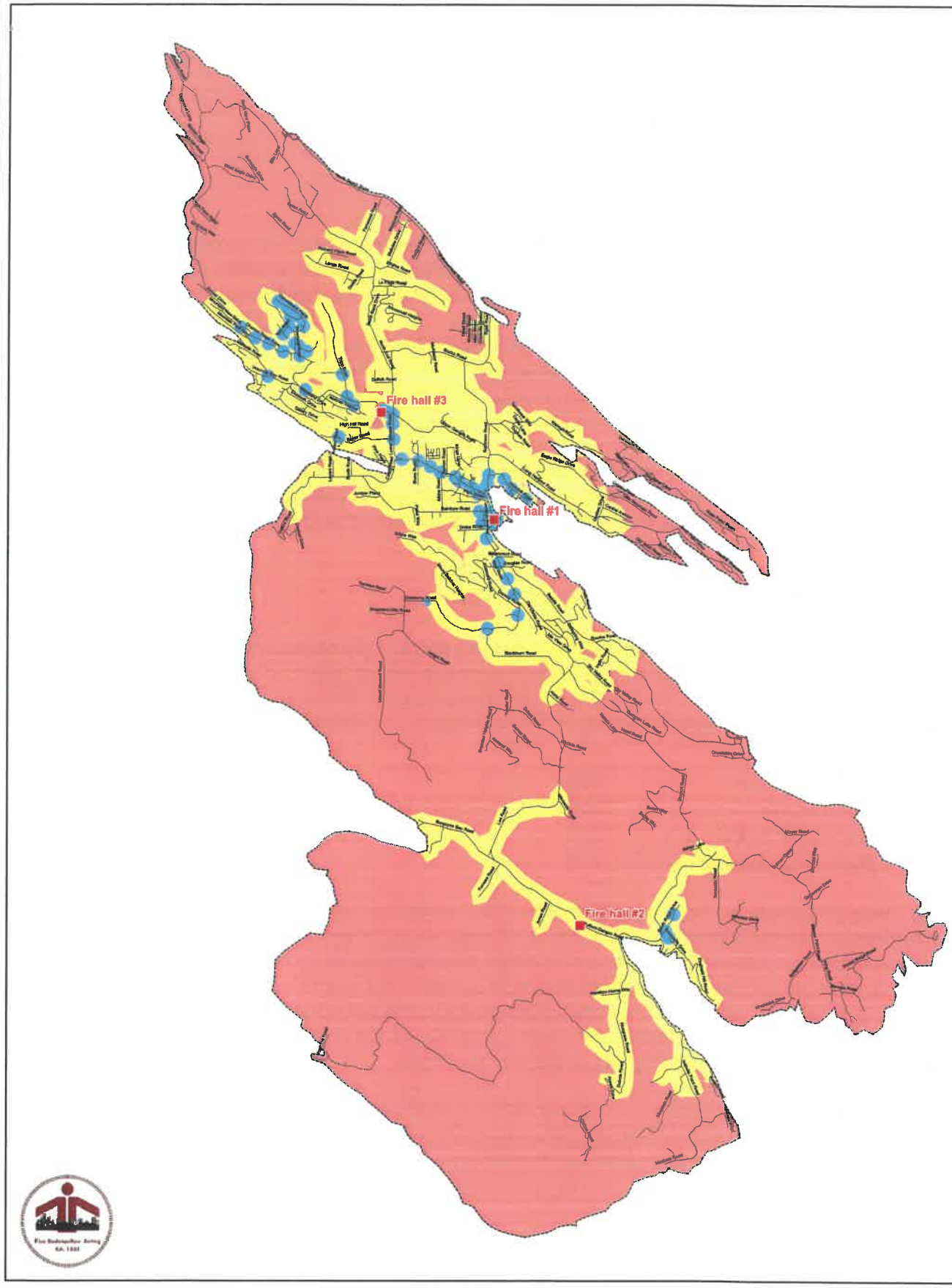


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Figure 1-2 Public Fire Protection Classifications

Scale = 1:27,000 (0, 500, 1,000, 2,000 Meters)

Fire Underwriter Survey

Legend

- Fire Hall
- Road
- Fire Protection Area
- PFPC 6
- PFPC 9
- PFPC 10

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2. Fire Underwriters Survey

Fire Underwriters Survey is a national organization that represents more than 85 percent of the private sector property and casualty insurers in Canada. Fire Underwriters Survey provides data to program subscribers regarding public fire protection for fire insurance statistical and underwriting evaluation.

Fire Underwriters Survey offices maintain data from surveys on fire protection programs throughout Canada. The results of these surveys are used to establish the Public Fire Protection Classification (PFPC) and Dwelling Protection Grade (DPG) for each community. The PFPC and DPG is also used by underwriters to determine the amount of risk they are willing to assume in a given community or section of a community.

The overall intent of the grading systems is to provide a measure of the ability of the protective facilities within a community to prevent and control the major fires that may be expected to occur by evaluating in detail the adequacy, reliability, strength and efficiency of these protective facilities.

2.1. Public Fire Protection Classification System

The Public Fire Protection Classification grading system is a measure of a community's overall programs of fire protection. The ability of a community's fire defences are measured against recognized standards of fire protection relative to fire hazard and fire / life safety risk present within the community. The following areas of fire protection are reviewed in the survey and have the following weights within the PFPC grading system:

- Fire Department 40%
- Water Supply 30%
- Fire Safety Control 20%
- Fire Service Communications 10%

The above classifications are conveyed to subscribing companies of Fire Underwriters Survey. FUS subscribers represent approximately 85-90% of the fire insurance underwriters in Canada. Subscribers use this information as a basis in their fire insurance underwriting programs to set limits on the amount of risk they are willing to assume within a given portion of a community, and to set fire insurance rates for commercial properties. Improved fire protection grades may result in increased competition for insurance underwriting companies placing their business within a community. Our analysis indicates that an improved fire protection grade has a positive effect on fire insurance rates.

In addition, PFPC classifications are a measure of the fire protection within a community. Many progressive communities use the classification system to assess the performance of their fire protection programs, and to plan the direction of fire protective services for the future of the community.

2.2. Dwelling Protection Grading System

Dwelling Protection Grades are based on a 1 to 5 grading system; DPG 5 indicates little or no fire protection being available. Most small and midsize communities that have a gradable emergency water supply are assigned a DPG 3A rating, which the insurance industry has termed fully protected. DPG 3B refers to communities, or portions of communities, that have a recognized fire department but are not protected with a recognized water supply. The insurance industry has termed this 'semi-protected'. Within the Fire Underwriters Survey grading, a grade of 3B indicates that the fire department is equipped, trained, prepared and adequately staffed to provide "Standard Shuttle Service" to a fire event within a reasonable response time (i.e. utilize a pumper, tender and various related equipment to deliver water to a fire site and provide structural fire fighting at the fire event).

The protected assignment refers to DPG 1 to DPG 3A. An unprotected designation refers to DPG 5. DPG 3B and 4 are given the semi-protected designation.

Many insurers have simplified the Dwelling Protection Grading system to a simple three tier system. This is typical for setting insurance premium rates for detached single family residences only.

Different insurers utilize the Dwelling Protection Grades differently to set their own rates based on the marketplace and their own loss experiences. The three tier system that is typically used by many insurers is shown in Table 2-2 FUS Grades Correlation to Commonly used Insurance Terminology and Simplified Grades.

Table 2-2 FUS Grades Correlation to Commonly used Insurance Terminology and Simplified Grades

Insurance Bureau of Canada Dwelling Protection Grades. Statistical "5 tier" System:	System Used by Many Insurance Companies Underwriting "3 tier" System:	Insurance Companies refer to this Grade as:
1 2 3A	Table 1	Protected
3B 4	Table 2	Semi - Protected
5	Table 3	Unprotected

Improvements that would have a cumulative positive effect on fire insurance grading classifications and fire protection ability are discussed within this report. The intent of identifying areas where improvements can be made is to provide the Salt Spring Island Fire Protection District direction in their community fire protection planning – if so desired and supported by the community.

3. Overview of the Assessment Process

There isn't any one universal model of fire defence that can be applied to all situations or to a community requiring this emergency service. Ideally, the strength of a fire protection program is balanced between the risk of serious fire and the community's fire loss experience. Fire defences should be tailored with these issues in mind. To gauge the needs of the fire service based on experience alone would be to ignore perils that have not yet occurred. Ignoring experience and focusing on risk alone may tend to build-up a fire department force beyond the financial acceptability of the community paying for this service.

FUS measures the ability of a fire department against the risk of fire likely to occur within a community. This measurement is usually not determined by the most significant risk, nor is it based on the average fire risk. Our measurement tends to focus on those structures where there is a considerable risk to fire and life safety, and where total or temporary loss of a particular structure would have a significant impact on a community's tax base and economy. A fire department should be structured and supported to effectively deal with everyday emergencies while at the same time being capable of controlling and extinguishing most fires that may occur.

To achieve this objective, the structure of a fire department must be tailored to the needs of a community, and will vary for each community. Each component of fire defences must be evaluated and developed to achieve the desired and correct level of benefit. For this reason no two fire departments will be the same. Some of the factors that must be balanced and tailored against the fire risk, degree of criticality, community expectation, fire experience, and the ability to financially support this emergency service, are as follows:

- Type, number and condition of fire apparatus
- Pumping capacity
- Response to alarm protocols
- Response times to critical risks
- Adequacy of the fire fighter and emergency responder training program including specialized training
- Emergency communication systems
- Ancillary equipment
- Fire department roster type and response levels
- Fire safety education
- Building controls
- Fire prevention inspections

- Adequacy & reliability of emergency water supplies
- Automatic fire protection systems
- Management of emergency services

FUS examines the entire program of a community's fire defences in order to assess and grade the overall program. For instance, strengths in community fire safety can offset some deficiencies in emergency water supplies, and vice versa. Alternatively, there are some areas within a FUS grading that carry substantial weight, such as:

- The type of manning (i.e. career fire fighters vs. volunteers),
- The quality of training programs,
- The type of apparatus and ancillary equipment for the hazards present,
- The condition, age and maintenance of fire apparatus and fire suppression equipment,
- The distribution of companies relative to fire risk,
- The availability, adequacy and reliability of emergency water supplies
- Response to alarms procedures, and
- Fire safety inspections.

The Survey has found that SSIFPD has good programs of protection in the areas of:

- Organization, administration, management and planning of the fire department
- Risk and hazard planning programs
- Pre-fire planning program
- Recruit and drill training program
- Officer strength
- Fire prevention and public education programs

Alternatively, the Survey found that improvements would be beneficial in the following protection programs:

- Reliability of response to alarms
- Suitability and functionality of fire stations
- Lack of adequate training facilities
- Emergency water supply coverage across the District

4. Community Risk and Hazard Assessment

4.1. Background

A fire hazard and risk assessment was conducted throughout Salt Spring Island to aid in determining the community's fire protection needs and to assist in assessing the adequacy of the water supply and fire

department. A risk and hazard assessment, along with a response distance review, community growth assessment and assessment of trends of emergency responses, lays the groundwork for determining fire protection needs within a community. This assessment is important in determining organizational structure, personnel requirements, training requirements, fire apparatus and fire equipment needs, response time requirements and adequacy of fire station location.

The "Risk and Hazard Assessment" is an evaluation of the life safety risks, fire loading and risk of fire that is present in a given area.

4.2. Fire Risk Assessment on Salt Spring Island

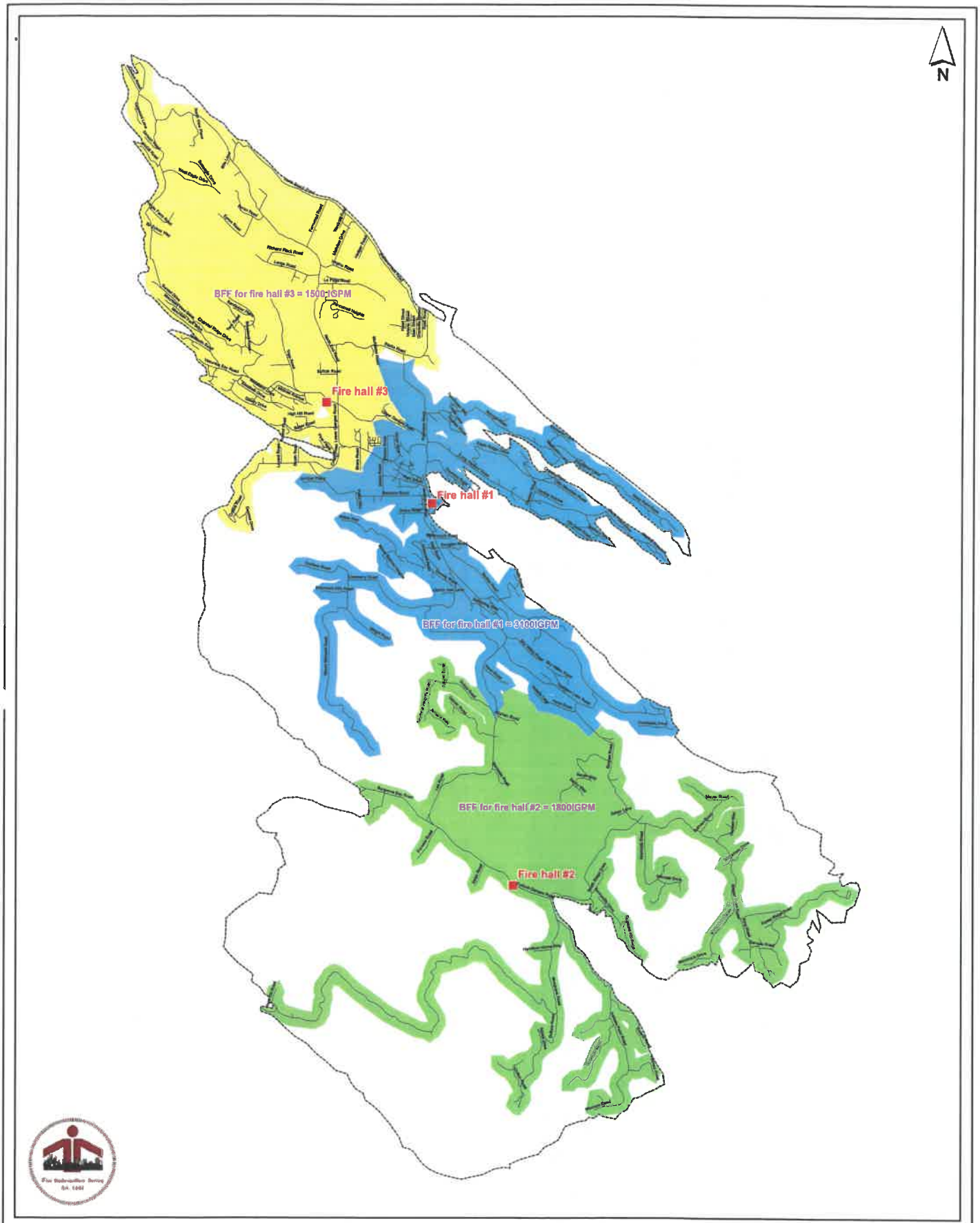
Salt Spring Island building stock consists of:

- Single residential homes
- Multi-family residences and town homes
- Commercial and Mercantile space, such as
  - Restaurants
  - Tourist services
  - Hotels and Motels
- Service buildings
- Light industrial

Required Fire Flows (may be described as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposures) were calculated for what was considered, in conjunction with the fire department and specific site inspections, to be the major risks within the community and at the same time being representative of the community. In all 50 Required Fire Flows (RFF) were calculated for the community using the methodology described in the Fire Underwriters Survey 1999 Guideline "Water Supply for Public Fire Protection", see Appendix B.

The previous Fire Underwriters Survey set a Basic Fire Flow for the island; however, in order to better represent the distribution of structures throughout the island, and to make more specific recommendations, Basic Fire Flows were determined for 3 districts (based off of fire hall locations) from the analysis of the required fire flows, as shown in Figure 4-2 Basic Fire Flow by district. It is important to stress that the Basic Fire Flow assigned is not the peak required fire flow and is intended to be adequate for 90% of the typical structure fires that are expected to occur based on the Required Fire Flows calculated during the risk assessment. Notably, Required Fire Flows were not calculated for all buildings throughout the community and specialized risks with high fire flows should be reviewed on an ongoing basis.

Basic Fire Flows are then used in conjunction with Table 4-2 Fire Underwriters Survey – Table of Effective Response to determine and grade against the requirements for fire insurance grading purposes.



SALT SPRING ISLAND

Figure 4-2 Basic Fire Flow by District

Scale = 1:27,000 0 500 1,000 2,000 Meters

Fire Underwriters Survey

Legend

- Fire Hall
- Road
- Fire Protection Area
- BFF for fire hall #1 = 3100IGPM
- BFF for fire hall #2 = 1800IGPM
- BFF for fire hall #3 = 1500 IGPM

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.

Table 4-2 Fire Underwriters Survey – Table of Effective Response

The following Table aids in the determination of Engine and Ladder Company distribution and total members needed. It is based on availability within specified response travel times in accordance with the fire potential as determined by calculation of required fire flows, but requiring increases in availability for severe life hazard.

RISK RATING	BUILDING DISTRICT EXAMPLES	FIRE FLOW L/min X1000	FIRE FLOW Approx. Igpm Range	INITIAL RESPONSE TO ALARMS Engine Companies	INITIAL RESPONSE TO ALARMS Ladder Companies	1st DUE Engine Company, Minutes	2nd DUE Engine Company, Minutes	1st DUE Ladder Company, Minutes	TOTAL AVAILABILITY NEEDED Engine Companies. No.	TOTAL AVAILABILITY NEEDED Engine Companies. Min.	TOTAL AVAILABILITY NEEDED Ladder Companies No.	TOTAL AVAILABILITY NEEDED Ladder Companies Min.
1 (a)	Very small buildings, widely detached buildings.	2	400	1	0	7.5	-	*9	1	7.5	*1	9
(b)	Scattered development (except where wood roof coverings).	3	600	1	0	6	-	*7.5	1	6	*1	7.5
2	Typical modern, 1 - 2 storey residential subdivision 3 - 6 m 10 - 20 ft. detached).	4-5	800-1,000	2	0	4	6	*6	2	6	*1	6
3 (a)	Close 3 - 4 storey residential and row housing, small mercantile and industrial.	6-9 10-13	1,200-2,000 2,200-2,800	2 2	1(if required by Hazards)	3.5 3.5	5 5	*4 *4	2 3	5 6	*1 *1	4 4
3 (b)	Seriously exposed tenements. Institutional. Shopping Centres Fairly large areas, fire loads, and exposures.	14-16 17-19	3,000-3,600 3,800-4,200	2 2	1 1	3.5 3.5	5 5	4 4	4 5	7 7	1 **1	4 4
4 (a)	Large combustible institutions, commercial buildings, multi-storey and with exposures.	20-23 24-27	4,400-5,000 5,200-60,00	2	1	2.5 2.5	4 4	3.5 3.5	6 7	7.5 7.5	2 2	5 5
4 (b)	High fire load warehouses and buildings like 4(a).	28-31 32-35	6200-6800 7000-7600	3	1	2.5 2.5	3.5 3.5	3.5 3.5	8 9	8 8	3 3	7 7
5	Severe hazards in large area buildings usually with major exposures. Large congested frame districts.	36-38 39-42 43-46	7,800-8,400 86,00-9,200 9,400-10,000	3	3	2 2 2	3.5 3.5 3.5	2.5 2.5 2.5	10 12 14	8 9 9	4 5 6	7.5 8 9

5. Water Supply Assessment

5.1. Background

Water supplies for fire fighting are a critical component of the community's fire defence systems. Water supplies for fire fighting were evaluated for adequacy in several areas including but not limited to:

- Fire Flow Delivery – the ability of the water system to deliver the Basic Fire Flow .
- Storage Adequacy – quantity of stored water reasonable for expected demands and duration of appropriate flows during expected fire events.
- Distribution System Adequacy – layout and arrangement of piping and pump capabilities, looping/grid design of pipe networks for maximum versatility and minimum losses.
- Hydrant Distribution – appropriate spacing and distribution to minimize hose lays and other delays in setting up an initial attack during structure fires.
- System Design and Installation – the overall design of the system with regard to redundancy, and capability to continuously provide full service to all areas during all foreseeable events (including catastrophic events and/or perils).
- Maintenance of System and Components – system and component maintenance meets recognized standards and improved reliability of the system.

This section highlights some of the significant findings of the fire insurance grading emergency water supply review. Areas where improvements can be made have been noted.

In brief, the situation of the availability of emergency water supplies for fire insurance grading purposes on Salt Spring Island is a complicated one. Many of the systems are aging and administration and governance of the systems can make any changes lengthy. Records of many of the systems are old and outdated, and in many cases conflicting records exist making it a difficult task to truly assess the systems. The majority of the systems seem to have been designed purely for domestic purposes and not for fire protection purposes; however, hydrants have been installed on some of these systems including some installation on 2" mains.

Previous to the survey, it was noted that many of the systems contain a significant amount of 4" mains and in some cases 2" mains which can reduce the available flow. The Water Supply for Public Fire Protection, 1999 states:

> ".....minor distributors supplying residential districts should consist of mains at least 150mm in size and arranged so that the lengths on the long sides of blocks between intersecting mains do not exceed 200m. Where longer lengths of 150mm pipe are necessary 200mm or larger intersecting mains should be used"
>
> "The lateral street connection should not be less than 150mm"

AWWA Manual M31 – Distribution System Requirements for Fire Protection states:

> "Distribution piping should be sized and spaced to meet design flow. The minimum size of

water mains for providing fire protection and serving fire hydrants is 6-in. in diameter. Larger size mains will be necessary to achieve required fire flow and maintain the minimum residual pressure specified."

SSIFR noted that there are issues with the water supplies and that they would use hydrants on 4" mains as a secondary source which would be supplemented with tender shuttles and other static sources. Note that the fire response from each fire hall is with a pumper and tender.

It was also noted by the North Salt Spring Waterworks District that there are issues surrounding the delivery of fire flows from 4" mains and testing on these hydrants was not carried out at the request of NSSWD.

Further to these comments, hydrants on 4" mains on Salt Spring Island were not recognised as a water supply point for fire insurance grading purposes; however, it should be carefully noted that the SSIFR stated that they will use all hydrants on Salt Spring Island as a water source even if there are low fire flows available. As already mentioned, these hydrants may only be used as a secondary source which is supplemented with tender shuttles from static sources.

The following water distribution systems were assessed during the survey:

- North Salt Spring Island Waterworks District (NSSWD) water distribution system
- Maracaibo Estates Private Water Utility
- Fulford Harbour Waterworks District water distribution system
- Beddis water distribution system
- Cedar Lane water distribution system
- Cedars of Tuam water distribution system
- Highland water distribution system
- Fernwood water distribution system
- Harbour View ID water distribution system
- Reginald Hill water distribution system
- High Hill road water distribution system
- Erskine Heights Water Utility
- Swan Point water distribution system
- Mount Belcher ID water distribution system
- Scott Point Waterworks District water distribution system

5.2. Brief Overview

5.2.1. North Salt Spring Island Waterworks District (NSSWD) water distribution system

This water distribution system consists of two interconnected systems and was treated as such as part of this survey. The north part of this system is fed from St. Mary's Lake through pumps with storage on the system; the south part of the system is gravity fed from Maxwell Lake with storage on the system. The initial system was installed in approximately 1913. There are areas of weak flow on this system due to 4" mains. This

system has been recognised for fire insurance grading purposes; however, not all of the 124 hydrants on the system have been recognised, i.e. hydrants on or fed from 4" and 2", see Figure 5-2-1 150m and 300m Recognised Hydrant Coverage Area (NSSWD). This system graded with a relative PFPC 8.

The system specifications can be seen in Table 5-2 Recognised Water Systems Analysis
Also volume analysis can be seen in Figure 5-2 Recognised Water Systems Analysis
Flow test results can be seen in Appendix A

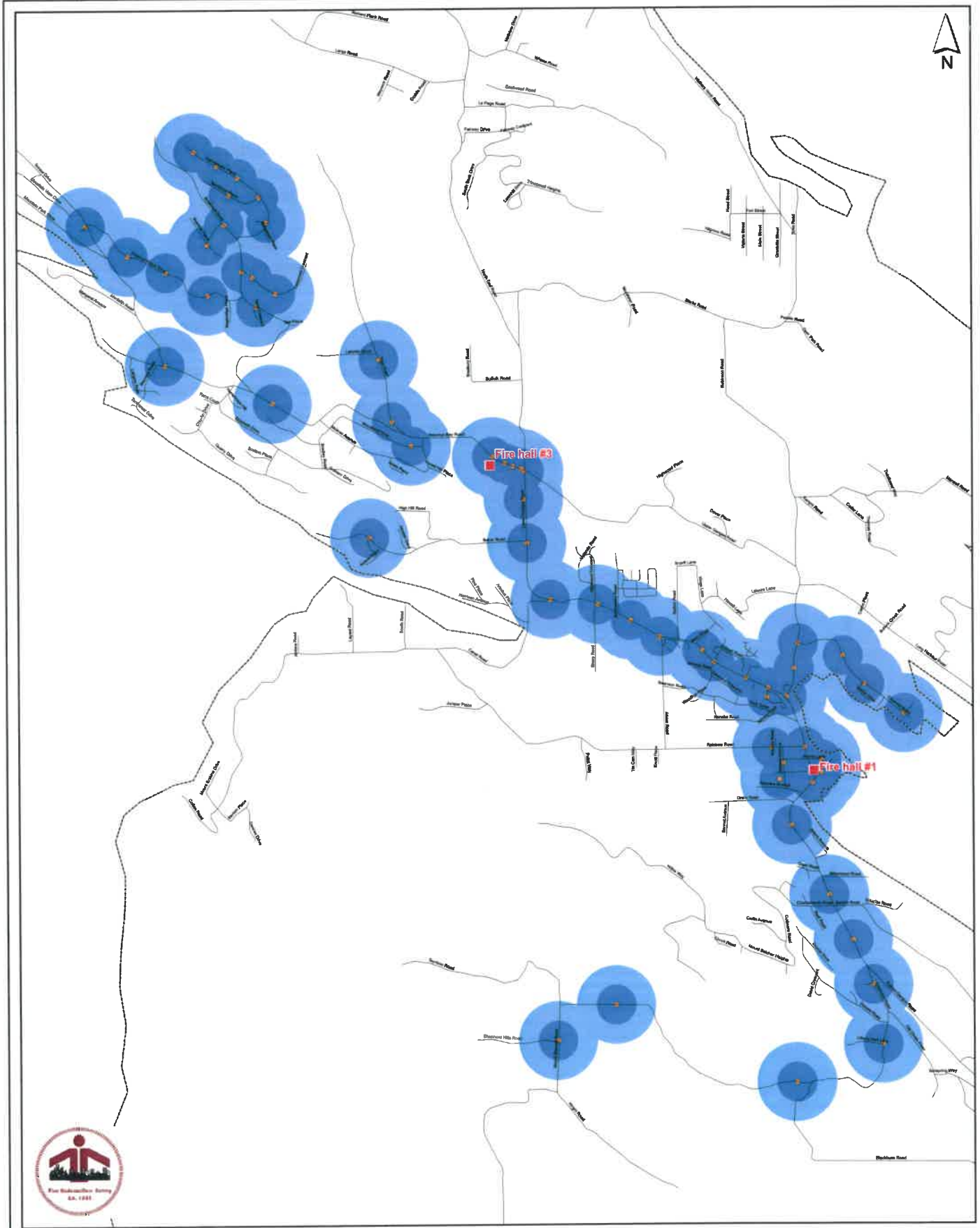


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Figure 5-2-1 150m and 300m Recognised Hydrant Coverage Area (NSSWD)

Scale = 1:9,000

Fire Underwriters Survey

Legend

- Recognized Hydrant
- Fire Hall
- Road
- Fire Protection Area
- 150m Hydrant Coverage Area
- 300m Hydrant Coverage Area

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.

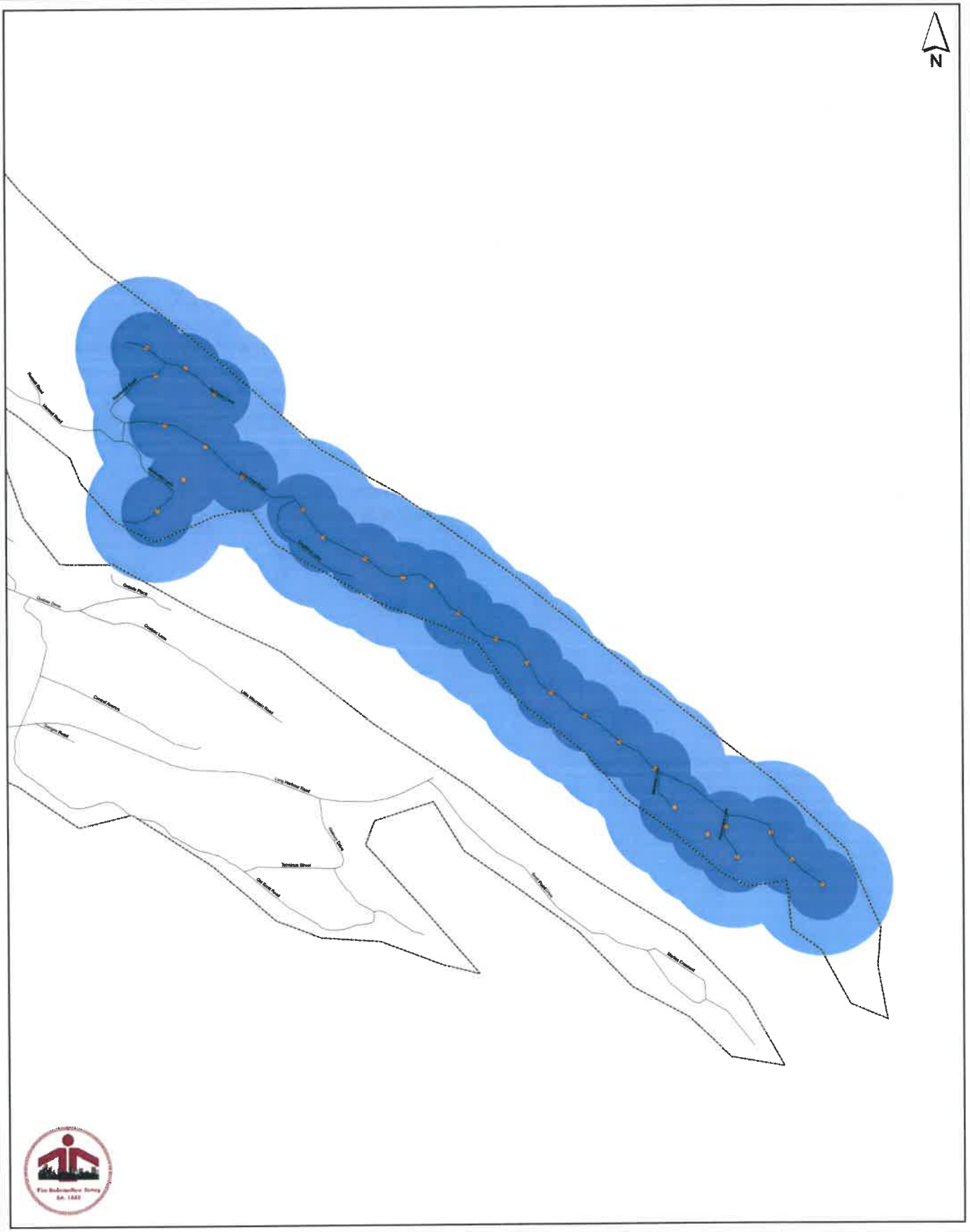
5.2.2. *Maracaibo Estates Private Water Utility*

The water source for this system, installed in approximately 1980, is from 6 wells which feed to two reservoirs. Most of the system is gravity fed from the reservoirs; however, there is also a fire booster pump in place. All mains on this system are 6" with exception of one short length of 4". There are 28 hydrants on the system which are recognised for fire insurance grading purposes, see Figure 5-2-2 150m and 300m Recognised Hydrant Coverage Area (Maracaibo). This system graded with a relative PFPC 5.

Maracaibo Estates also owns a 1 ton Isuzu truck equipped with a 330 Imp. gallon water tank, pump, foam dispensing equipment, and miscellaneous fire fighting equipment.

During the first flow test on the system, the fire pump do not come online during flow and pressure was less than 20psi.

The system specifications can be seen in Table 5-2 Recognised Water Systems Analysis
Also volume analysis can be seen in Figure 5-2 Recognised Water Systems Analysis
Flow test results can be seen in Appendix A



SALT SPRING ISLAND

Figure 5-2-2 150m and 300m Recognised Hydrant Coverage Area (Maracaibo)

Scale = 1:5,000

Fire Underwriters Survey

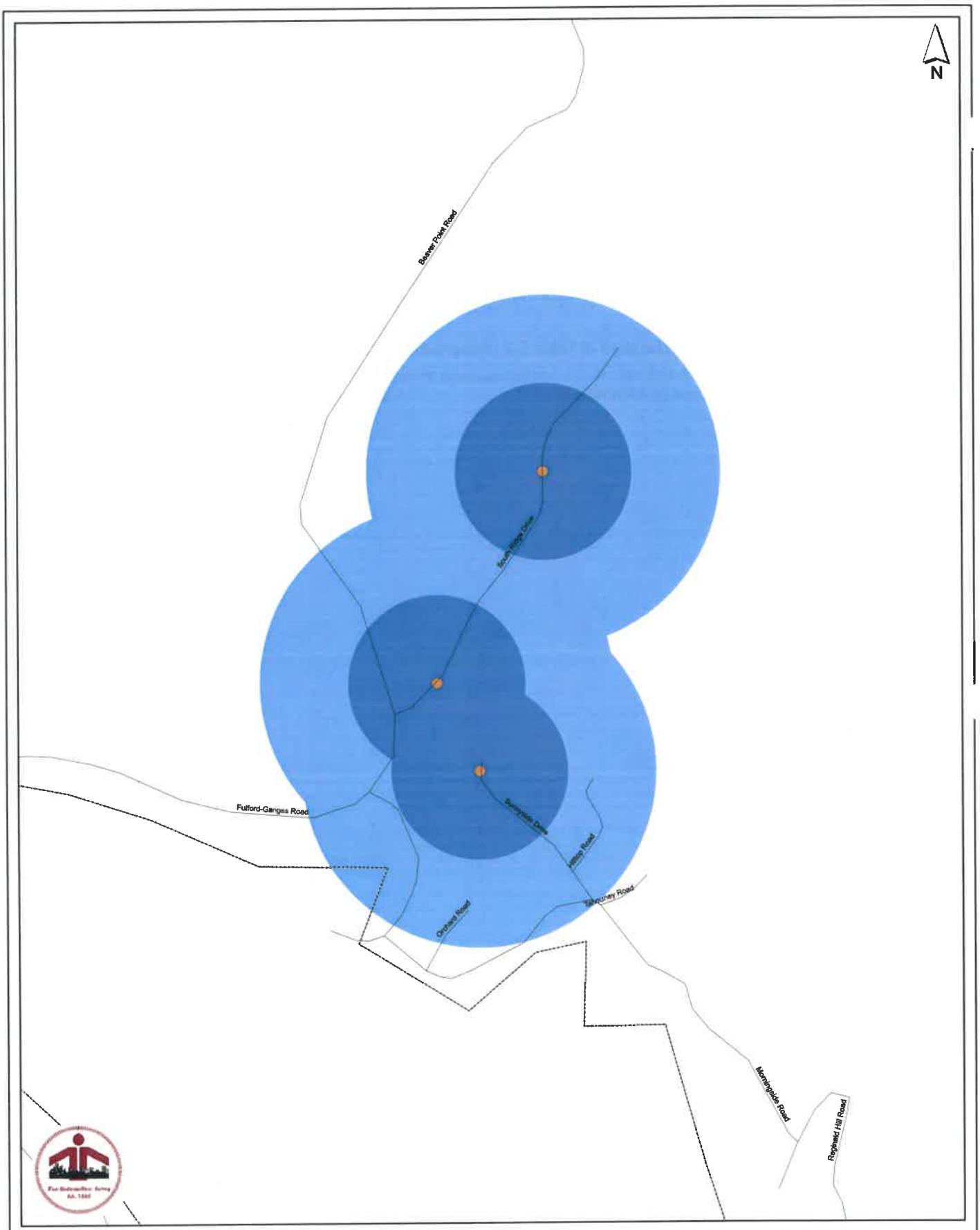
Legend

- Recognized Hydrant
- Fire Hall
- Road
- Fire Protection Area
- 150m Hydrant Coverage Area
- 300m Hydrant Coverage Area

5.2.3. *Fulford Harbour Waterworks District water distribution system*

Recent additions have been made to this system including 6" mains, 80000 Imp. gallon reservoir, booster pumps and hydrants. The water source is gravity fed from Weston Lake through a DAF multi-media filter to 2 booster pumps to process at 3 l/sec and 2 booster pumps to reservoir at 3 l/sec. 3 hydrants on this system have been recognised for fire insurance grading purposes, see Figure 5-2-3 150m and 300m Recognised Hydrant Coverage Area (Fulford). This system graded with a relative PFPC 8.

The system specifications can be seen in Table 5-2 Recognised Water Systems Analysis
Also volume analysis can be seen in Figure 5-2 Recognised Water Systems Analysis
Flow test results can be seen in Appendix A.



SALT SPRING ISLAND

Figure 5-2-3 150m and 300m Recognised Hydrant Coverage Area (Fulford)

Scale = 1:2,000 (0, 50, 100, 200 Meters)

Fire Underwriters Survey

Legend

- Recognized Hydrant
- Fire Hall
- Road
- Fire Protection Area
- 150m Hydrant Coverage Area
- 300m Hydrant Coverage Area

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.

5.2.4. *Beddis water distribution system*

Water is pumped (2 lake pumps through process at 4 l/sec) from Cusheon Lake through a rapid sand single media filter to 2 booster pumps to reservoir #1 at 4 l/sec and 2 booster pumps to reservoir #2 at 2 l/sec. The two reservoirs have a total capacity of 19000 Igal. The system is composed completely of 4" mains with 9 hydrants. This system does not meet the minimum requirements in order to be recognised for fire insurance grading purposes due to storage requirements and pipe size.

5.2.5. *Cedar Lane water distribution system*

Work is currently being carried out on this system for domestic supply purposes by the Capital Regional District. Water is supplied to the system from 2 wells (well 1 at 1-3 Igpm and well 5 at 4-5 Igpm) through a 20 micron filter with a 12000 Igal storage tank on the system. The system is composed mainly of 4" mains, with two hydrants, and one short section of 6", with one hydrant. This system does not meet the minimum requirements in order to be recognised for fire insurance grading purposes due to storage requirements and pipe size.

5.2.6. *Cedars of Tuam water distribution system*

Water is supplied from 2 wells at 1-2 Igpm to a 10000Igal reservoir and then gravity fed to the system. There are no hydrants on this system and therefore it has not been recognised for fire insurance grading purposes.

5.2.7. *Highland water distribution system*

Water is pumped from St. Mary's Lake by 2 pumps at 8 l/sec through a multi and carbon filter. 2 booster pumps feed to reservoir #1 at 8 l/sec, 2 booster pumps feed to reservoir #2 at 3 l/sec and 2 booster pumps feed to a pneumatic system at 3 l/sec. The system is composed completely of 4" mains with 10 hydrants on the system. Although this system has been identified by the SSIFR as a secondary source, it does not meet the minimum requirements in order to be recognised for fire insurance grading purposes due to pipe size.

5.2.8. *Fernwood water distribution system*

Water is pumped from St. Mary's Lake at 5 l/sec through a multi and carbon filter to total storage of 30000 Igal. There are no hydrants on this system and therefore it has not been recognised for fire insurance grading purposes.

5.2.9. *Harbour View ID water distribution system*

Water is supplied from 3 wells to the storage of 13000 Igal. There are no hydrants on this system and therefore it has not been recognised for fire insurance grading purposes.

5.2.10. *Reginald Hill water distribution system*

There are two distribution systems, each fed by 2 wells with storage of 5000 Igal. There are no hydrants on these system and therefore have not been recognised for fire insurance grading purposes.

5.2.11. *High Hill road water distribution system*

Water from two wells is pumped to a 4000 Igal tank and then gravity fed to the system. This system has not been recognised for fire insurance grading purposes due to storage requirements.

5.2.12. *Erskine Heights Water Utility*

Water from two wells is pumped to a 25000 Igal tank and then gravity fed to the system. The system is composed of both 6" and 4" mains with all hydrants on the 4" mains. This system has not been recognised for fire insurance grading purposes due to pipe size.

5.2.13. *Swan Point water distribution system*

Water is pumped directly from a well to a fire storage reservoir of 25000 Igal and then gravity fed to the hydrant. Flow testing was carried out on the system and a static pressure of approximately 3 psi was observed. The minimum flow requirements in order to be recognised for fire insurance grading purposes is the provision of minimum flow of 1000 L/min for two hours at a minimum residual pressure of 20 psi; therefore, this system could not be recognised for fire insurance grading purposes.

5.2.14. *Mount Belcher ID water distribution system*

Water is pumped from 4 wells with a 25000 Igal storage tank on the system which is composed completely of 4" mains. There are 3 hydrants on the system; however, no flow testing was carried out due to main size and at the request of the water system operator and is not recognised for fire insurance grading purposes.

5.2.15. *Scott Point Waterworks District water distribution system*

This system was not assessed at the request of the Scott Point Waterworks District and will continue to remain unrecognised for fire insurance grading purposes.

Recommendation 1 Review Water Supplies in Accordance with Benchmarks

Following is a summary of some of the more significant requirements of Fire Underwriters Survey against which a water supply is graded for fire insurance purposes (for the complete document covering the requirements of the Fire Underwriters Survey for water supplies, see appendix B). It is recommended that the water distribution systems on Salt Spring Island be reviewed against the Fire Underwriters Survey requirements (while also considering the requirements of the AHJ) in order to identify where upgrades can be made. The installation of a system conforming to all may not be fiscally realistic and necessary upgrades in order to achieve a level of recognition for fire insurance grading purposes should be considered on a case-by-case basis. It should also be noted that the above are solely the recommendations of the Fire

Underwriters Survey for fire insurance grading purposes.

- The minimum size water supply credited by FUS must be capable of delivering not less than 1000 L/min for two hours in addition to any domestic consumption at the maximum daily rate. Ideally the system should be capable of delivering the peak Required Fire Flow for the required duration as set out in the Water Supply for Public Fire Protection, 1999 (see Appendix B) in addition to any domestic consumption at the maximum daily rate
- A fully adequate system can deliver the necessary fire flow at any point in the distribution gridiron for the applicable time period as specified in Appendix B with consumption at the maximum daily rate. This delivery should be possible under certain emergency or unusual conditions. Essentially, the source of supply, including impounding reservoirs and each part of the supply works, should be able to maintain the maximum daily consumption rate plus the maximum Required Fire Flow.
- System design should meet the Required Fire Flows (see Appendix B, Part 2) in the community. As noted, the protection of buildings by automatic sprinkler systems can reduce the Required Fire Flows.
- In order to provide reliability, duplication of some or all parts of the system will be necessary, the need for duplication being dependent upon the extent to which the various parts may reasonably be expected to be out of service as a result of maintenance and repair work, an emergency or some unusual condition.
- The principal pressure requirement is the ability to deliver water in sufficient quantity to permit fire department pumpers to obtain an adequate supply from hydrants. To overcome friction losses in the hydrant branch, hydrant and suction hose, a minimum residual pressure of 150kPa in the main is required during flow. Residual pressures that exceed 500kPa during large flows are of value as they permit short hose-lines to be operated directly from hydrants without supplementary pumping.
- The effect on adequacy must be considered for such factors as frequency, severity and duration of droughts, physical condition of dams and intakes; effects from earthquakes, floods, forest fires, and ice dams or other ice formations; silting-up or shifting of channels; possibility of contamination of watershed or source; absence of watchmen or electronic supervision where needed. Where there is a risk of disruption, special precautions or alternate supplies should be arranged.
- A gravity system delivering supply from the source to distribution directly without the use of pumps is advantageous from a fire protection point of view because of its inherent reliability.
- Pumping capacity, where the system or service is supplied by pumps, should be sufficient, in conjunction with storage when the two most important pumps are out of service, to maintain the maximum daily consumption rate plus the maximum Required Fire Flow at required pressure for the required duration. To be adequate, remaining pumps in conjunction with storage, should be able to provide Required Fire Flows for the specified durations at any time during a period of five days with consumption at the maximum daily rate. The rate of flow from such storage must be considered in terms of any limitation of water main capacity.
- Electric power supply to pumps should be so arranged that a failure in any power line or the repair or replacement of a transformer, switch, control unit or other device will not prevent the delivery, in conjunction with elevated storage, of Required Fire Flows for the required durations at any time during a period of two days with consumption at the maximum daily rate. The possibility of power systems or network failures affecting large areas should be considered. In-plant auxiliary power or internal combustion driver standby pumping are appropriate solutions to these problems in many cases.
- At least a five day supply of fuel for internal combustion engines or boilers used for regular domestic

supply should be provided.

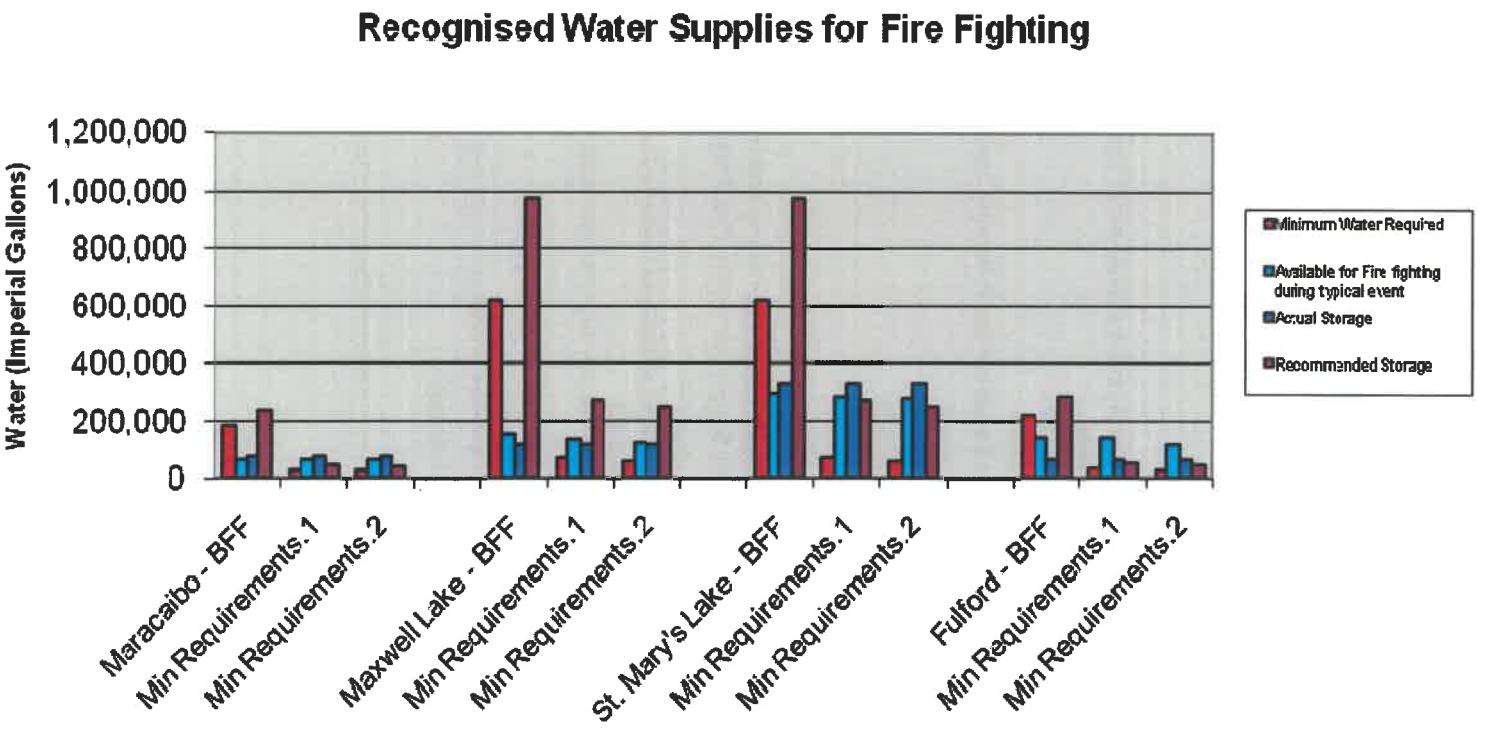
- Pumping stations, treatment plants, control centres and other important structures should be located, constructed, arranged, and protected so that damage by fire, flooding, or other causes will be held to a minimum. They should contain no combustible material in their construction and if exposures exist, suitable protection should be provided.
- All system components, piping and equipment should be so arranged that a failure in any necessary device will not prevent the delivery, in conjunction with storage, of the Required Fire Flows for the specified duration at any time during a period of two days with consumption at the maximum daily rate.
- Operating personnel should be competent, adequate, and continuously available as may be required to maintain both the domestic and fire services.
- Supply mains cut off for repair should not drastically reduce the flow available to any district. This includes all pipe lines or conduits on which supply to the distribution systems is dependent, including intakes, suction or gravity lines to pumping stations, flow lines from reservoirs, treatment plant piping, force mains, supply and arterial mains, etc. Consideration should be given to the greatest effect that a break, joint separation, or other failure could have on the delivery of the maximum daily consumption rate plus Required Fire Flow at required pressure over a three day period.
- Mains should be in good condition and properly installed. Normally, pipe rated for a working pressure of 1000kPa is required. Mains should be so laid as not to endanger one another, and special construction should be provided to prevent their failure at stream crossings, railroad crossings, bridges, and other points where required by physical conditions; supply mains should be valved at one and a half kilometre intervals and should be equipped with air valves at high points and blow offs at low points. The general arrangement of the system should be considered with respect to the time required to isolate breaks. Arterial feeder mains should provide looping throughout the system for mutual support and reliability, preferably not more than 1000 metres between mains. Dependence of a large area on a single main is a weakness. The gridiron of minor distributors supplying residential districts should consist of mains at least 150mm in size. Where longer lengths of 150mm pipe are necessary, 200mm or larger mains should be used. Where dead-ends and a poor gridiron are likely to exist for a considerable period or where the layout of the streets and the topography are not well adapted to this arrangement, 200mm pipe should be used. Both the ability to meet the Required Fire Flows and reliability of a reasonable supply by alternate routing must be taken into account.
- Hydrants should conform to AWWA Standard for Dry Barrel Hydrants or ULC listing. Hydrants should have at least two 65mm outlets. Where Required Fire Flows exceed 5000l/min or pressures are low, there should also be a large pumper outlet. The lateral street connection should not be less than 150mm. Hose threads, operating and cap nuts on outlets should conform to Provincial Standard dimensions. A valve should be provided on lateral connections between hydrants and street mains. Cisterns are considered unsatisfactory as an alternative to pressure hydrants. The number and spacing of hydrants should be as indicated in the table titled "Standard Hydrant Distribution", see Appendix B.
- Hydrants should be inspected at least semi-annually and after use. The inspection should include operation at least once a year. Hydrants should be kept in good condition and suitable records of inspections and repairs be maintained. It is recommended that hydrants are maintained in accordance with AWWA M17.

- Hydrant locations and spacing should be convenient for fire department use. Hydrants should be located at intersections, in the middle of long blocks and at the end of long dead-end streets. Distribution density of hydrants should be in accordance with the Required Fire Flows indicated in the table titled "Standard Hydrant Distribution", see Appendix B. The planning of fire hydrant locations should be a cooperative effort between the water utility and the fire department.
- Complete, up-to-date plans and records essential for the proper operation and maintenance of the system should be available in a convenient form (preferably digital), suitably indexed and safely filed. These should include plans of the source as well as records of its yield and a reliable estimate of the safe yield; plans of the supply works including dams, intakes, wells, pipelines, treatment plants, pumping stations, storage reservoirs and tanks; and a map of the distribution system showing mains, valves, and hydrants. Plans and maps should be in duplicate and stored at different locations. Detailed distribution system plan maps should be available for maintenance crews. Records of consumption, pressures, storage levels, pipes, valves, hydrants, and of the operations of the supply works and distribution system, including valve and hydrant inspections and repairs should be maintained.

Table 5-2 Recognised Water Systems Analysis

											Variables -->	A	B	C	D	Eq.I	E	Eq.II		
	BFF	Fire Duration	ADD	MDD	PHD	Storage 1	Total Storage	Total Refill Rate	Refill during Event Duration	Total Available Water Resources		Required Fire Storage	Domestic Storage (incl. agr.)	Emergency storage	Concurrent Domestic Demand ---	Recommended storage	Concurrent Domestic Demand ---	Minimum Storage Req'd	Supply Good?	Supply Adequate?
Notes -->								derated 25-50%		derated 20-50%		BFFxDuration	.25 MDD	.25 (MDD+Fire)	PHDxDuration		MDDxDuration			
Units -->	*Igpm*	*hrs*	*MGD*	*MGD*	*IGPM*	*I. gal*	*I. gal*	*IGPM*	*I. gal*	*I. gal*		*I. gal*	*I. gal*	*I. gal*	*I. gal*	*I. gal*	*I. gal*	*I. gal*	*Eq.I*	*Eq.II*
Maracaibo - BFF	1500	2.0	0.0213		30	72,000	72,000	21.69	2,603	60,203		180,000	5,330	46,333	3,553	235,216	1,777	181,777	NO	NO
Min Requirements.1	220	2.0	0.0213		30	72,000	72,000	21.69	2,603	60,203		26,400	5,330	7,933	3,553	43,216	1,777	28,177	Yes	Yes
Min Requirements.2	265	1.5	0.0213		30	72,000	72,000	21.69	1,952	59,552		23,850	5,330	7,295	2,665	39,140	1,333	25,183	Yes	Yes
Maxwell Lake - BFF	3100	3.0	0.5		694	118,400	118,400	320	57,600	152,320		558,000	125,000	170,750	125,000	978,750	62,500	620,500	NO	NO
Min Requirements.1	220	2.0	0.5		694	118,400	118,400	320	38,400	133,120		26,400	125,000	37,850	83,333	272,583	41,667	68,067	NO	Yes
Min Requirements.2	265	1.5	0.5		694	118,400	118,400	320	28,800	123,520		23,850	125,000	37,213	62,500	248,563	31,250	55,100	NO	Yes
St. Mary's Lake - BFF	3100	3.0	0.5		694	331,200	331,200	160	28,800	293,760		558,000	125,000	170,750	125,000	978,750	62,500	620,500	NO	NO
Min Requirements.1	220	2.0	0.5		694	331,200	331,200	160	19,200	284,160		26,400	125,000	37,850	83,333	272,583	41,667	68,067	Yes	Yes
Min Requirements.2	265	1.5	0.5		694	331,200	331,200	160	14,400	279,360		23,850	125,000	37,213	62,500	248,563	31,250	55,100	Yes	Yes
					0		0		0	0		0	0	0	0	0	0	0	NO	NO
Fulford - BFF	1800	2.0	0.034		47	64,000	64,000	734	88,080	139,280		216,000	8,500	56,125	5,667	286,292	2,833	218,833	NO	NO
Min Requirements.1	220	2.0	0.034		47	64,000	64,000	734	88,080	139,280		26,400	8,500	8,725	5,667	49,292	2,833	29,233	Yes	Yes
Min Requirements.2	265	1.5	0.034		47	64,000	64,000	734	66,060	117,260		23,850	8,500	8,088	4,250	44,688	2,125	25,975	Yes	Yes

Figure 5-2 Recognised Water Systems Analysis



5.3. Water Storage

The determination method of Required Fire Flows (RFF), Basic Fire Flows (BFF), fire event duration, and minimum hydrant distribution is detailed in the Fire Underwriters Survey document "Water Supplies for Public Fire Protection", see Appendix B.

The absolute minimum water storage for fire fighting for any water system to be recognized for fire insurance purposes is 24,000 Igal.

The maximum capacity of the reservoirs and the refill rate of the reservoirs (for the typical fire event duration) are de-rated with a safety factor for the calculation of the total available water resources for fire fighting.

Water supply systems designed to provide fire protection should meet the following to be considered a "Good Supply" with regard to adequacy of storage.

The required total effective storage should be based on the following formula:

Total Storage Required = A + B + C + D

Where:

A = fire protection storage capacity as calculated (based on Basic and Required Fire Flows determined utilizing the accepted Standard "Water Supply for Public Fire Protection" and Fire Underwriters Survey methodologies

B = equalization storage capacity equal to 25% of projected maximum day demand (MDD)

C = emergency storage capacity (25% of (A + B))

D = Concurrent demand capacity; (Calculated volume equal to the Peak Hour Demand (PHD) flow rate for the typical fire event duration)

Water supply systems designed to provide fire protection should meet the following to be considered an "Adequate Supply" with regard to adequacy of storage.

The required minimum storage of the water system to be considered adequate for fire insurance grading is based on the following formula:

Minimum Storage Required = A + E

Where:

A = fire protection storage capacity as calculated (based on Basic and Required Fire Flows determined utilizing the accepted Standard "Water Supply for Public Fire Protection" and Fire Underwriters Survey methodologies

E = Calculated volume equal to MDD flow rate for the typical fire event duration

Alternatively, to meet the minimum requirements for fire insurance grading, water systems without storage may be able to qualify as an "Adequate Supply" if they are consistently available3.

The required minimum fire flow availability of the water system (to be considered adequate for fire insurance grading) is based on the following formula:

Minimum flow availability = BFF + PHD

Where:
BFF = Basic Fire Flow
PHD = Peak Hourly Demand = (MDD/24) x 2

The formulas noted above may be modified if the level of risk within the community is unusual or if the situation warrants. In some cases alternatives to the above noted formulas are developed and considered based on specific situations.

Ideally, the water supply should be capable of providing fire flows to all built-up areas of the protected community. The water supply system should be designed and constructed such that water supplies are uninterrupted even during system maintenance, main breaks, reservoir cleaning, extended periods of drought, and catastrophic events (such as seismic events, wind storm, power failures, etc.). This can be achieved through the use of redundant design with multiple sources and storage locations, looped distribution system, back-up power, and other safety factors included within the scope of good engineering practices.

For each of the recognised water systems, Figure 5-2 Recognised Water Systems Analysis shows a comparison of the minimum water required (for firefighting) to the recommended storage capacity (to qualify as a "Good Water Supply"). The figures also show the amount of water that is actually available for firefighting (including reservoir refill during fire event) and the quantity of water storage in the system. It should be noted that although the recognised water systems meet the minimum requirements for fire insurance grading purposes, the systems do not have sufficient storage to meet the Basic Fire Flow as can be seen in Figure 5-2 Recognised Water Systems Analysis.

Recommendation 2 Flow Test all Hydrants

It has been noted that some flow testing has occurred on Salt Spring Island; however, due to the nature of the water distribution systems it is recommended that all hydrants be flow tested and marked in accordance with NFPA 291 - Recommended Practice for Fire Flow Testing and Marking of Hydrants, recent edition. The

[3] For water supplies to be considered to be consistently available, documentation must be provided of water levels of source(s) for a minimum of 25 years (50 years preferred). Additionally, detailed documentation of system reliability (including all main breaks and other service interruptions) must be provided for a minimum of 25 years (50 years preferred)

SSIFR should become familiar with areas of weak flow.

Recommendation 3 Further Establish Water Use Agreements

It was noted that a water use agreement exists with NSSWD; the fire department should continue to establish water use agreements with each water system on the island. Each agreement should contain a hold harmless statement for SSIFPD and SSIFR when using water supplies.

Recommendation 4 Long Range Planning and Awareness of Emergency Water Supplies

Long range planning should focus on the improvement of water supplies for fire protection by making the various water supply boards aware of the adequacy of their water systems in providing emergency water supplies.

Recommendation 5 Install Dry Hydrants on Identified Static Water Supplies

While it has been noted that some dry hydrants have been installed at strategic locations throughout the island, dry hydrants in accordance with NFPA 1142 - Standard on Water Supplies for Suburban and Rural Fire Fighting 2007 Edition should be installed on all static water supply sources used by fire department apparatus as drafting points. All dry hydrants should be maintained in accordance with the standard. The "Fire Underwriters Survey Alternate Water Supplies for Public Fire Protection" (section 2.4) states:

> "Fire Underwriters Survey treats dry hydrants with suction points in the same way as it treats standard (pressurized) fire hydrants. Any property within 300 metres of a dry hydrant may be eligible for a Dwelling Protection Grade better than 3B, provided the building is within eight kilometres by road of a responding fire station, the fire department is recognized as meeting the criteria for a Dwelling Protection Grade of 3A or better and the fire department has adequate apparatus to effectively utilize the dry hydrant through suction."

In order for dry hydrants to be considered as recognised for fire insurance grading purposes, SSIFR should complete and return the WS7 – Dry Hydrant Recognition form, see Appendix C, for the following currently installed dry hydrants:

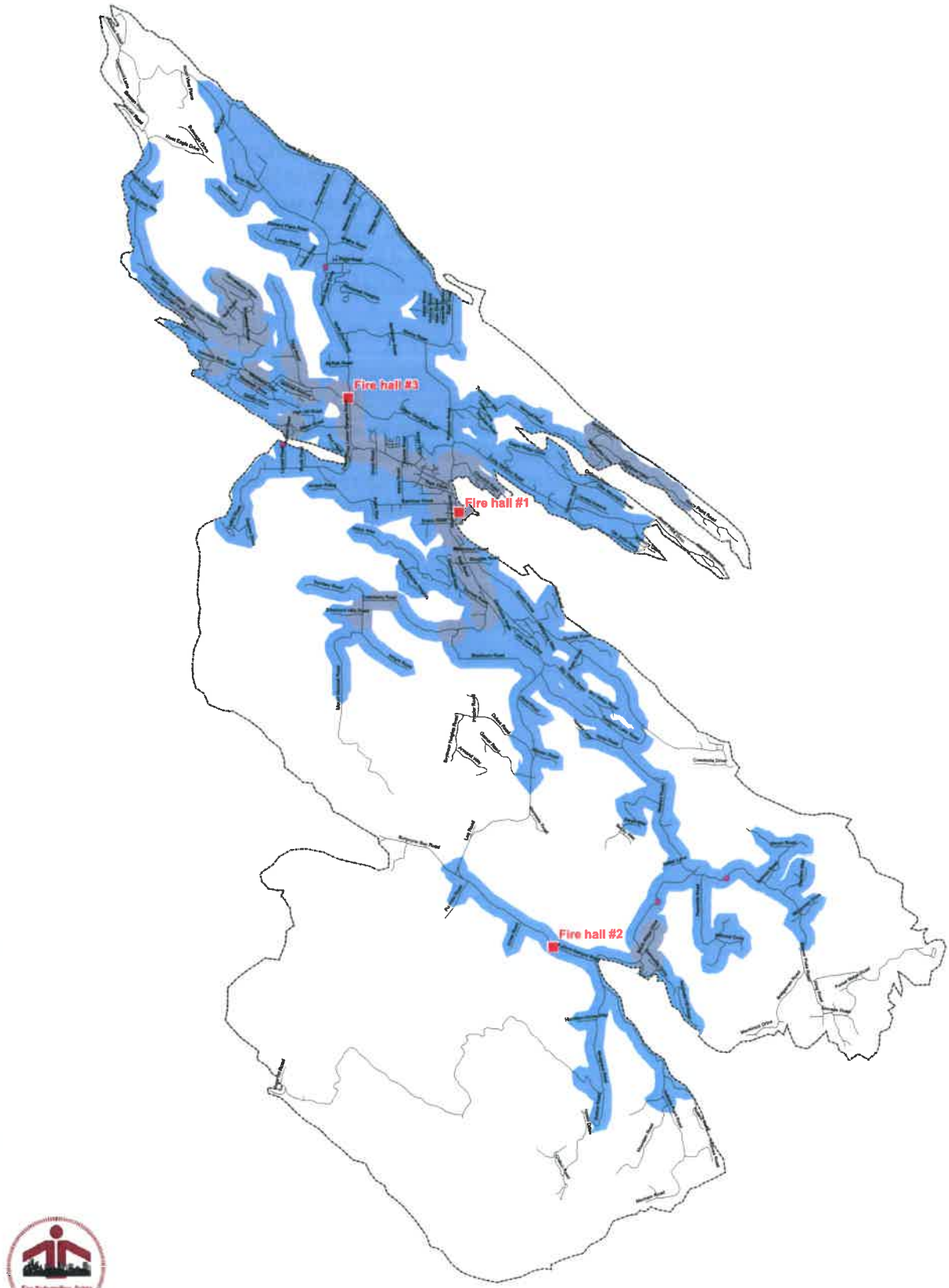
- Dry Hydrant on St. Mary's Lake near the intersection of North End road and Le Page road
- Dry Hydrant on Weston Lake at 756 Beaver Point road
- Dry hydrant on west side of Stowell Lake
- Hydrant on the Swan Point water distribution system

Recommendation 6 Superior Tanker Shuttle Service Accreditation

SSIFR should consider using these static water sources with dry hydrants and/or currently recognised water distribution systems for Superior Tanker Shuttle Service Accreditation for areas not covered by recognised hydrants. Regarding recognition of Superior Tanker Shuttle Service Accreditation by the insurance industry, "Fire Underwriters Survey Alternate Water Supplies for Public Fire Protection" (section 2.5, Conclusion) states:

> "While it is up to individual insurers to determine their own level of comfort with recognizing or not recognizing the Fire Underwriters Survey Accredited Superior Tanker Shuttle Service, FUS recommends that accredited services be recognized as providing a reasonable equivalency to hydrant protection. Due to the need for specialized equipment, training and practice to deliver the service, it is imperative that Superior Tanker Shuttle Service be accredited according to a recognizable standard and that re-accreditations occur at a reasonable frequency."

The "Fire Underwriters Survey Alternate Water Supplies for Public Fire Protection" is available for download at www.fireunderwriters.ca. Figure 5-3 Possible Superior Tanker Shuttle Service Accreditation area shows the possible coverage area should the SSIFR achieve Accreditation for each of the fire halls. Note that this figure indicates a coverage area representing 5km road distance from a recognised water supply point and 8km from a fire hall and that these are the benchmarks under which Accreditation occurs. Fire Underwriters Survey should be contacted for further information on Accreditation and testing procedures.



SALT SPRING ISLAND

Figure 5-3 Possible Superior Tanker Shuttle Service Accreditation Area

Scale = 1:27,000

Fire Underwriters Survey

Legend

- Dry Hydrant
- Fire Hall
- Road
- Fire Protection Area
- Hydrant Protected Area
- STSS Response Area

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.

6. Fire Department Assessment

6.1. Apparatus in service

The FUS grading schedule evaluates the needed number of fire apparatus that are in service relative to the community's fire risk and fire hazard. The greater the risk and hazard rating, the more resources are needed to control or suppress a given fire, and consequently the greater the number of fire apparatus that are required. In assessing the number of pumper trucks that can be credited available for service a number of factors are considered including:

- Apparatus type,
- Apparatus condition
- Apparatus age
- Apparatus maintenance programs
- Community emergency response profile requirements
- The number and location of emergency response points

SSIFR apparatus have not changed since the last Fire Underwriters Survey, see Table 6-1 Apparatus Summary; however, due to an increase in the Basic Fire Flow for fire hall #1, the FUS grading schedule calls for 2 pumpers for initial response in each fire district, see Figure 4-2 Basic Fire Flow by district. Due to the proximity of fire hall #1 to fire hall #3, additional credit is received in the fire insurance grading index. Although, the majority of emergency calls may come from the Ganges area, the fire insurance grading index does not consider history of fire events.

Although fire apparatus should respond to first alarms for only the first fifteen years of service up to a maximum of 20 years for small communities and rural centres, FUS continues to partially recognise apparatus over 20 years of age provided the apparatus successfully meets the recommended annual tests and has been deemed to be in excellent condition. Tender T3 has reached 23 years; however, it was credited due to the fact that a replacement has been purchased and should be delivered in January 2010. It was noted that SSIFR has ordered a pumper for delivery in April/May 2010, and that the two mini-pumpers will be replaced with two CAFS systems within the next 18 months. When new apparatus is put into operation, SSIFR should notify FUS.

Table 6-1 Apparatus Summary

Hall	Year	Unit Identification	Vehicle Type	Pump & Tank GPM – Gallons	Manufacturers	Age
1	2003	E-1	Pumper/Rescue	1050 x 700	E-1 - Superior	6
1	2000	T-1	Tanker	420 x 1500	Superior	9
1	1994	M-1	LAV	400 x 200	Pierce / Ford	15
2	1997	E-2	Pumper	1050x 1000	Superior	12
2	1994	T-2	Tanker	420 x 1500	Superior / Freightliner	15
2	1994	M-2	LAV	400 x 200	Pierce / Ford	15
3	1992	E-3	Pumper	1050 x 700	Superior / Pierce	17
3	1986	T3	Tanker	250 x 1500	Anderson/International	23

As already stated, the Basic Fire Flow for the area associated with fire hall #1 has increased to 3100 IGPM. Table 4-2 Fire Underwriters Survey – Table of Effective Response indicates that a ladder apparatus is now required for fire insurance grading purposes. As discussed in the previous Fire Underwriters Survey, when evaluating the building profiles at the future Channel Ridge development, a ladder apparatus will likely be needed.

Recommendation 7 Aerial Apparatus

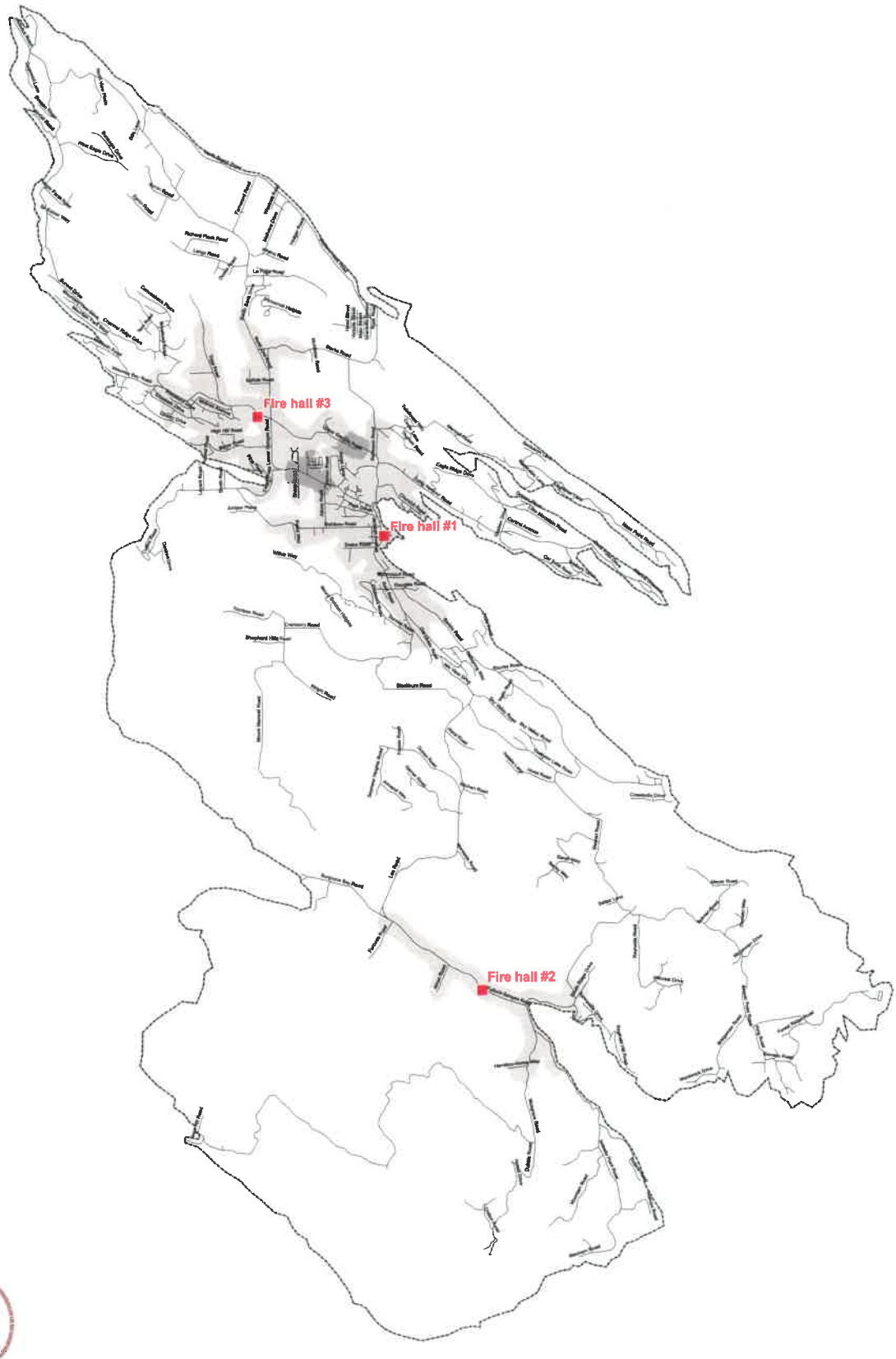
SSIFPD should consider planning the needs and merits of an aerial ladder apparatus to meet the profile of the community and the proposed building stock at the Channel Ridge development.

6.2. Distribution of Response

Maps Figure 6-1a 2.5km Road Response, Figure 6-2b 5km Road Response, and Figure 6-2c 8km Road Response illustrate 2.5km, 5km, and 8km road response distance respectively.

All commercial properties should ideally be located 2.5km road distance from a fire hall and all residential properties should be ideally located within 5km road distance from a fire hall. Figure 6-2a 2.5km Road Response and Figure 6-2b 5km Road Response indicate that the majority of commercial properties conform to this benchmark; however, response to residential properties can be excessive. 8km response by road is the maximum recognisable distance for residential properties for fire insurance grading purposes; therefore, any properties not covered as indicated by Figure 6-2c 8km Road Response are not recognised for fire insurance grading purposes.

It can be seen that once the Channel Ridge development is completed, commercial properties will likely not receive recognition (pending site layout) for fire insurance grading purposes (maximum recognisable response distance for commercial properties is 5km) as can be seen in Figure 6-2b 5km Road Response. An assessment will need to be completed once Channel Ridge is built in order to determine what effect it will have on the fire insurance grading index, i.e. the development may have an overall negative effect on the PFPC classification.



SALT SPRING ISLAND

Figure 6-2a 2.5km Road Response

Scale = 1:27,000

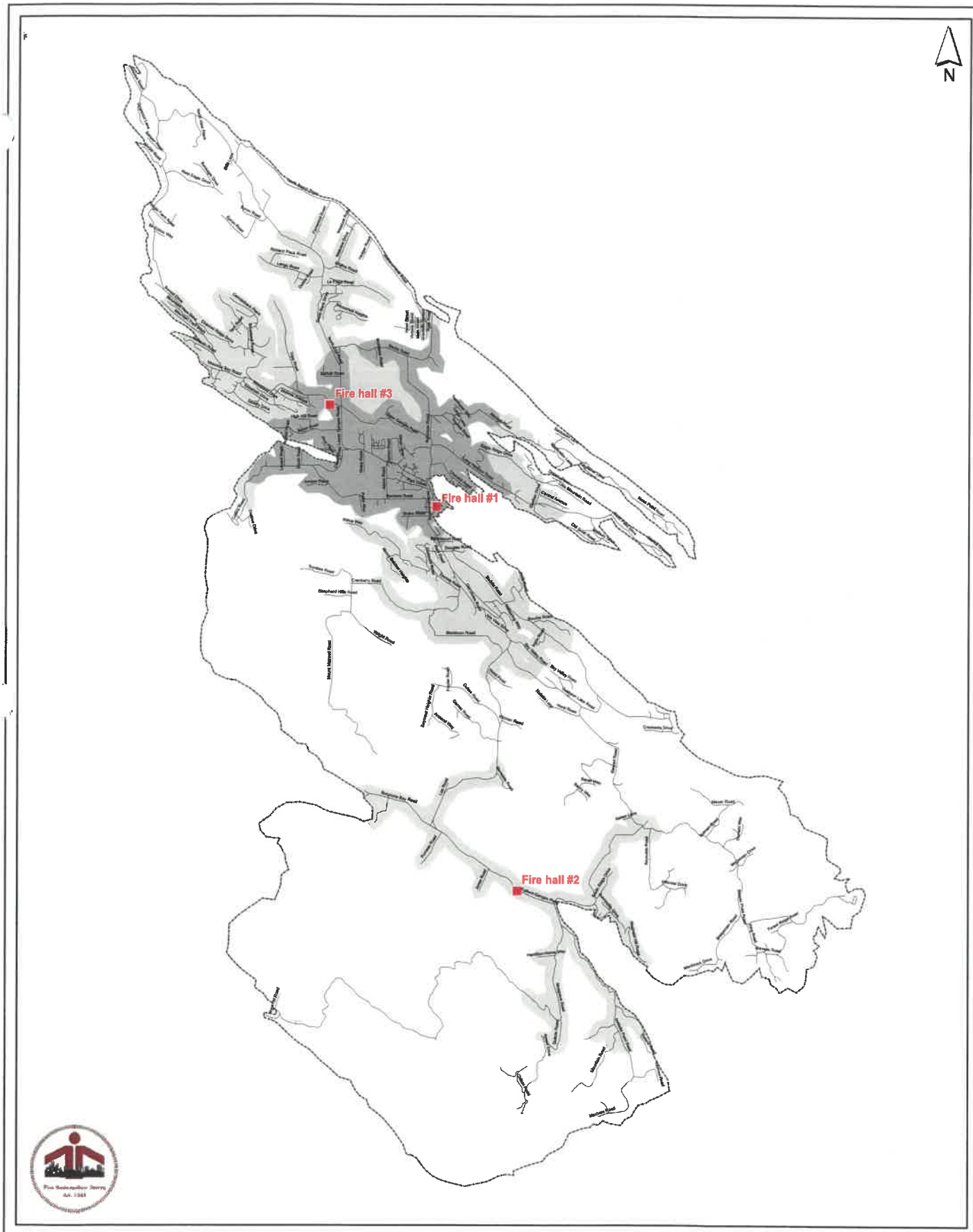
0 800 1,000 2,000 Meters

Fire Underwriters Survey

Legend

- Fire Hall
- Road
- Fire Protection Area
- Covered By: One Fire Hall
- Covered By: Two Fire Halls

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.



SALT SPRING ISLAND

Figure 6-2b 5km Road Response

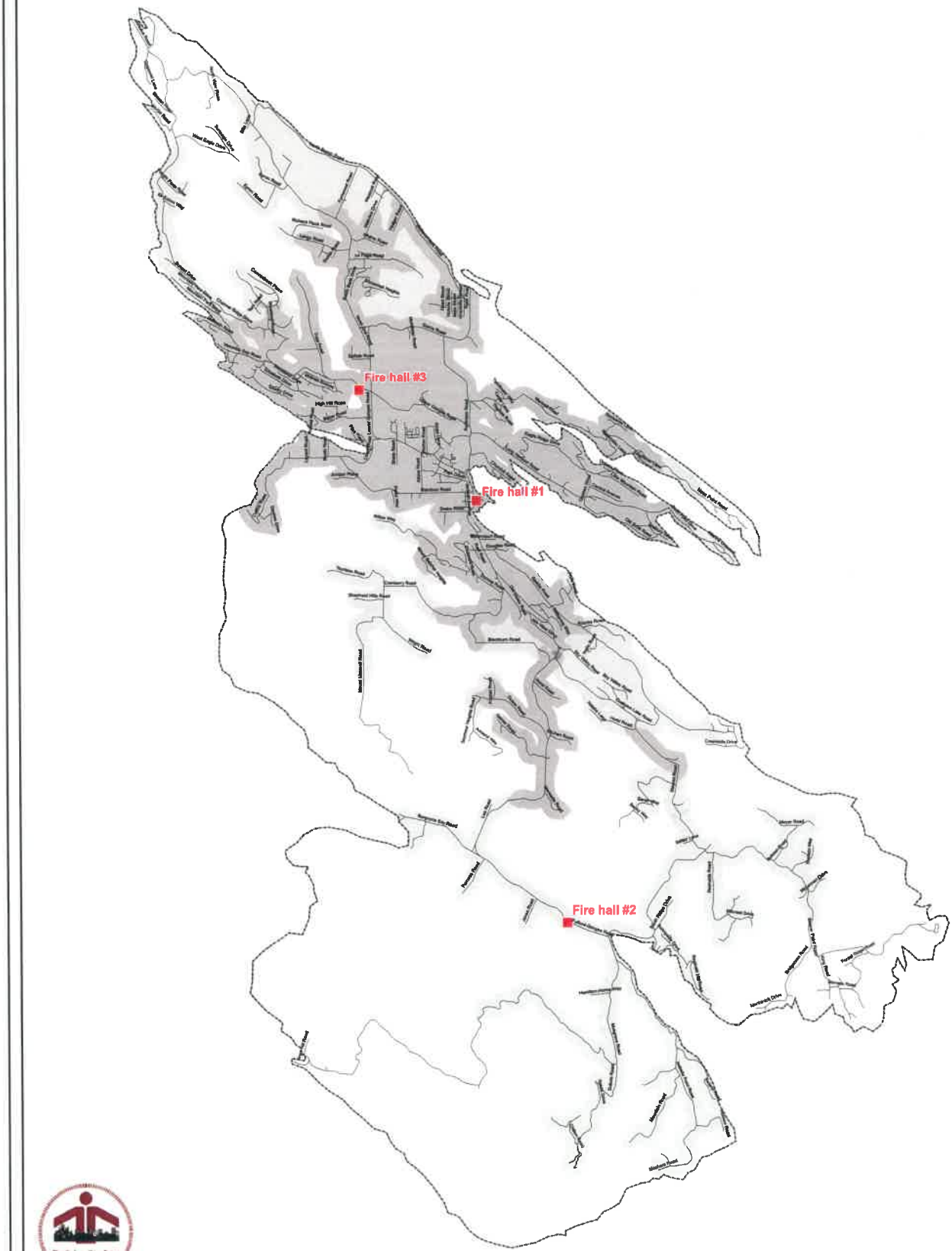
Scale = 1:27,000 0 500 1,000 2,000 Meters

Fire Underwriters Survey

Legend

- Fire Hall
- Road
- Fire Protection Area
- Covered By: One Fire Hall
- Covered By: Two Fire Halls

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.



SALT SPRING ISLAND

Figure 6-2c 8km Road Response

Scale = 1:27,000 0 600 1,200 2,400 Meters

Fire Underwriters Survey

Legend

- Fire Hall
- Road
- Fire Protection Area
- Covered By: One Fire Hall
- Covered By: Two Fire Halls
- Covered By: Three Fire Halls

The maps and figures are intended to generally show the areas covered by SSIFR. These maps and figures are not intended to illustrate the exact response distance for each of the areas shown; however, they are intended to be used as a visual tool to assist the readers in showing areas where a delayed response is possible and understanding some of the basic methodologies used within the fire insurance grading. The accuracy of these maps is based on underlying data; field data should be used to confirm this data and accuracy of these maps. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map.

6.3. Design, Maintenance and Condition of Apparatus

The fire insurance grading evaluates the overall maintenance and service program for fire apparatus and equipment. Well documented, preventative maintenance service performed by an in-house mechanical service department is the benchmark used for comparison. Mechanical service should be available on demand when needed.

Since the last Fire Underwriters Survey, the following changes have been noted:

- Fire department pumpers are now serviced annually by Profire
- Individual apparatus service files are now kept
- Software is used to facilitate record keeping
- Replacement of T3 arriving in January

6.4. Number of Chief and Line Officers

The survey found that the number of chief and line officers currently in place whether career or volunteer continues to be sufficient given the number of pumpers in service and response districts.

6.5. Total Fire Force Available

The previous Fire Underwriters Survey credited 37 fire fighters including all line officers whether they are career or volunteer. 53 fire fighters have been credited in the current Fire Underwriters Survey which includes 47 volunteers and 6 career members. It was noted from incident response tracking that the average total turnout to structure fires is 25 for 2008 and 2009.

Career staff normally work day time hours with 2 to 3 members on duty during the week and one member on duty at weekends. A duty crew system is used for 24/7 coverage. All career staff are currently stationed at fire hall #1 in Ganges.

Recommendation 8 Career Fire Fighters

To maintain (considering future development) or improve the commercial classification, the available fire forces should be improved for the SSIFR. Note that the available fire forces can only be improved through the addition of career fire fighters as within the fire insurance grading index volunteers can only be credited up to 50% of the required fire force and are also assigned a lesser credit than career fire fighters, i.e. SSIFR has reached maximum credit for volunteers.

It has been noted that providing further career staffing is being explored in the "Salt Spring Island Fire Protection District 10 Year Plan 2008-2017". Obviously, there are many factors to consider in further career staffing and the fire insurance grading is only one such factor.

6.6. Fire Equipment

This survey found that SSIFR is adequately equipped with ancillary firefighting equipment.

6.7. Training

6.7.1. Training Programs and Qualifications

The SSIFR training program rated highly. Notable changes since the last Fire Underwriters Survey are:

- SOG #3.06.01.01 now requires 100% attendance at training sessions until the completion of basic training and to the satisfaction of the Training Officer.
- BC Fire Fighter Modular Program put in place (NFPA 1001 equivalency).
- SOG #3.06.01 requires members to attend a minimum of 100 hours of regular scheduled training in a calendar year.

These improvements have been credited in the fire insurance grading index.

6.7.2. Training Facilities

Currently, limited training can be carried out at the fire halls and fire fighters need to be sent off island for live fire training instruction. The classroom could not be assessed during the survey due to its use as a polling station.

Recommendation 9 Training Ground

The previous Fire Underwriters Survey identified the need for a fully functional training ground for the SSIFPD which would improve the fire department's training in the following areas:

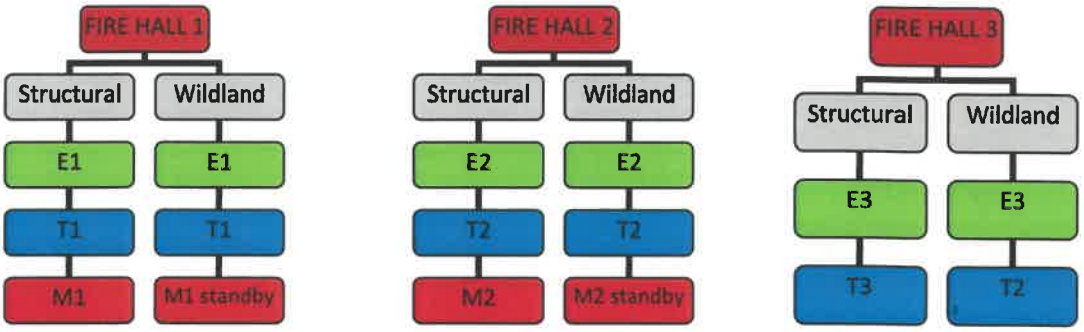
- Recruit driver training
- Pumps and pumping
- Laddering
- Wet drills
- Live fire drills
- Auto extrication
- Vehicle fires
- Forest interface fire training
- Pump service tests
- Improved indoor and outdoor classroom facilities
- SCBA rescue training
- Hazardous material spills response
- Flammable liquid and gas fires

This recommendation still stands. Although the SSIFPD has available property at fire hall #2 that could be used for this purpose, it was reported that local residents have objections.

6.8. Response to Alarms

An "Officers Page" is utilized for incidents other than fire or smoke showing. A general page is used for alarms of fire. Fire fighters respond directly to an incident unless they are close to a fire hall, which is different from the traditional system of responding as a company. Although responding as a company is the preferred approach, previous tracking of calls in the "Salt Spring Island Fire Protection District 10 Year Plan 2008-2017" indicated that response times would be longer if an engine remained at a hall until full crew turnout.

Since the last Fire Underwriters Survey, a pre-arranged fire response has been developed as follows:



Response times were identified in "Salt Spring Island Fire Protection District 10 Year Plan 2008-2017" and targets have been recommended to meet the requirements of NFPA 1720.

6.9. Operating Guidelines

SSIFR has a well developed, comprehensive and current set of operating guidelines. It has been noted that the recommendation from the previous Fire Underwriters Survey regarding developing a standard operating guideline for safety practices and procedures that need to be followed when conducting live fire or similar training has been put in place in the updates to Section 6 of the SOGs.

6.10. Special Protection Requirements

Special protection requirements on SSI include bush and grass fire exposures and marina fire fighting requirements. Previously, an off road air foam (CAFS) light attack vehicle with pump and roll capability was recommended. It was noted that the SSIFR is planning to replace the current mini pumpers with mini pumpers with CAFS within the next 18 months.

It is noted that while the SSIFR has various options for access to a marine vessel, the SSIFR does not currently have dedicated access to a vessel.

6.11. Fire Department Records

SSIFR utilize an internally created custom data collection software program to capture personnel, training, pre-incident planning, fire and hazard mapping, incident reports and fire prevention inspections. Although SSIFR work well with this program, support and maintenance of the system is becoming an issue as the software developer (an ex-member of the SSIFR) is no longer readily available. It was also noted that mechanical service records have improved.

Recommendation 10 Database Management Software

Acquire digital tracking and management software. Several boxed database programs are available that are specifically designed to assist in managing fire departments and consideration should be given to the benefits of using one that is suited to this fire department's needs. When considering the various options for digital tracking and management programs, due consideration should be given to the size of the department and potential integration with other software/platforms that the department (or related departments such as engineering and accounting) may already use.

6.12. Fire Stations

Of the three fire halls, fire hall #2 and fire hall #3 essentially serve the function of satellite fire halls with limited ability to handle administration and training at this time. These fire halls serve the purpose of apparatus storage and response points. It was previously noted that fire hall #2 has sufficient space for adequate training facilities.

Fire hall #1 is the primary fire hall with administration, management, public access, and training activities taking place here; however, the hall has limited space for office, storage, workshop, and classroom/meeting rooms. The building is of wood frame construction and may have seismic issues. Outstanding issues of this fire hall are as follows:

- No adequate training facilities
- Very limited storage space
- Limited workshop space
- Very limited administration office space
- No adequate vehicle exhaust
- Combustible construction
- Excessive public access to the site including public parking on the front apron
- Access and egress issues
- Front apron in poor condition and reported to accumulate water
- Storage space may not be adequate to house an aerial apparatus

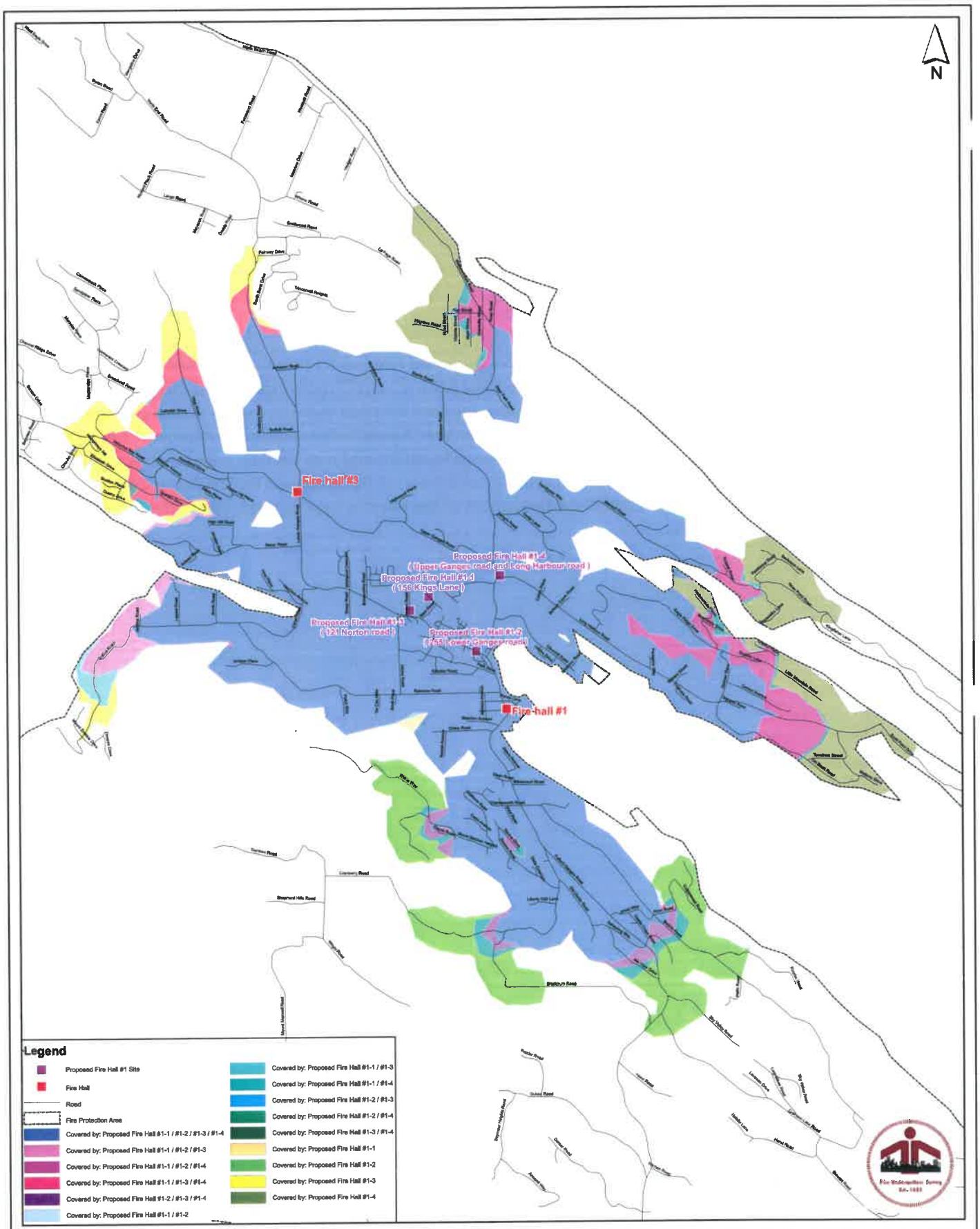
Recommendation 11 Fire Hall Location

It was noted during the survey that consideration of a new location for fire hall #1 is in progress. It is recommended that the location of fire hall #1 be maintained close to the Ganges Village core as already

stated. Figure 6-3 5km Response from Proposed Fire Hall #1 Sites shows the possible 5km road response coverage area for the following locations:

- Upper Ganges road and Long Harbour road
- 156 Kings Lane
- 255 Lower Ganges road
- 121 Norton road

It can be seen from Figure 6-12 5km Response from Proposed Fire Hall #1 that the proposed location will have little effect on the response coverage area from the point of view of road response distance; therefore, the decision on location should not weigh heavily on response area and more on ease of access and egress to major routes. As already discussed in section 6.2, when the Channel Ridge development is completed, the above fire hall locations may not be the optimal fire hall locations and may have an adverse effect of the PFPC classification, noting that commercial properties will likely not be recognised for fire insurance grading purposes (pending site layout). A complete assessment of the effect is beyond the scope of this letter but can be completed separately.



SALT SPRING ISLAND

Figure 6-12 5km Response from Proposed Fire Hall #1 Sites

Scale = 1:12,500 0 250 500 1,000 1,500 Meters

Fire Underwriters Survey

The maps and figures are intended to generally show a 5km road distance from a fire hall. These maps and figures are not intended to illustrate the exact response distance. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map. In all cases, field data should be used to confirm the data and accuracy of these maps.

6.13. Pre – Incident Planning

SSI FR has a pre-fire planning program in effect with approximately 121 pre plans completed. Apart from the command vehicle these pre plans are not digitally available on apparatus. Credit has been applied in the fire insurance grading index.

Recommendation 12 Make Pre Plans Available on all Pumper Apparatus

Allow pre plans to be digitally available on all pumper apparatus.

6.14. Fire Service Administration

A new fire chief, holding a number of qualifications and certifications, has recently been appointed is contributing to the management and administration of the fire department. It is noted that monthly and year end reports, budget projections and strategic plans are regularly developed.

Since the last Fire Underwriters Survey a 10 year plan has been developed which will continually be updated every 2 years thereby identifying further planning needs. The SSIFPD supports the SSIFR while continuing to meet the levels of service the community is willing to support. The Salt Spring Island Fire Protection District 10 Year plan identifies expected costs.

6.15. Fire Prevention

SSIFPD's fire safety programs have continued to maintain a relative PFPC class 4; notable strengths being in the areas of:

- Public Educations programs
- SOG on annual fire inspections cycle for commercial, mercantile, industrial, public assembly buildings.

Recommendation 13 Reassess Resources to Meet Inspection Frequency

It was noted during the survey that the fire department was having difficulty meeting the inspection frequency as set out in SOG #5.07.01 with approximately 300 inspections not completed for 2009 at the time. It is recommended that SSIFR maintain their inspection frequency through refocusing of inspection duties and resources.

6.16. Emergency Communications

The relative classification in this area of the fire insurance grading index has been maintained at PFPC 4. The previous FUS recommendations still stand.

Recommendation 14 Radio Communications

Incident radio communications should be recorded and archived by the SSIFR. Any dead spots should be removed.

7. Conclusion

This Fire Underwriters Survey found that SSIFR has implemented a sufficient number of the previous recommendations in order to maintain their current overall PFPC and DPG classifications; however, due to the dependence of the fire insurance grading index on water supplies, any future improvement to the PFPC classification will not be possible until improvements are made to the emergency water supplies (note that this is not relevant to the Maracaibo water distribution system which graded a PFPC relative class 5. In this case the PFPC classification is due to the excessive response distance from the fire hall. There is little commercial development in Maracaibo).

As updates to the water systems are complicated, it is advisable, as previously discussed, from the point of view of the Fire Underwriters Survey that SSIFR consider Dry Hydrant Recognition and Superior Tanker Shuttle Service Accreditation.

We would like to thank the Salt Spring Island Fire Protection District as well as the members of the Salt Spring Island Fire Rescue for their valuable and courteous assistance in conducting this survey and preparation of the survey report.

Please note that this report is Private and Confidential. The underlying data of this report has been developed for fire insurance grading and classification purposes.

Sincerely,

Robert McGuinness
Fire Protection Specialist
Fire Underwriters Survey

APPENDIX A – Flow test results

WATER FLOW TEST REPORT

FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	SFR + Commercial	Test No.	1
Municipality:	Salt Spring Island - Fulford	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	26-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a Left: n/a	Right:	n/a

Size of Main: _____ Dead End: _____ Two Ways: _____ Loop: _____

Source Reliable: _____ If not explain: _____

Comments: _____

TEST DATA:

Location of test hydrants; Residual: Off Beaver Point road

Flow: Off Beaver Point road

FLOW HYDRANT(S)		Orifice #2	Orifice #3	Orfice #4
SIZE OPENING:	2.5			
COEFFICIENT:	0.85			
PITOT READING:	40			
GPM:	1003	0	0	

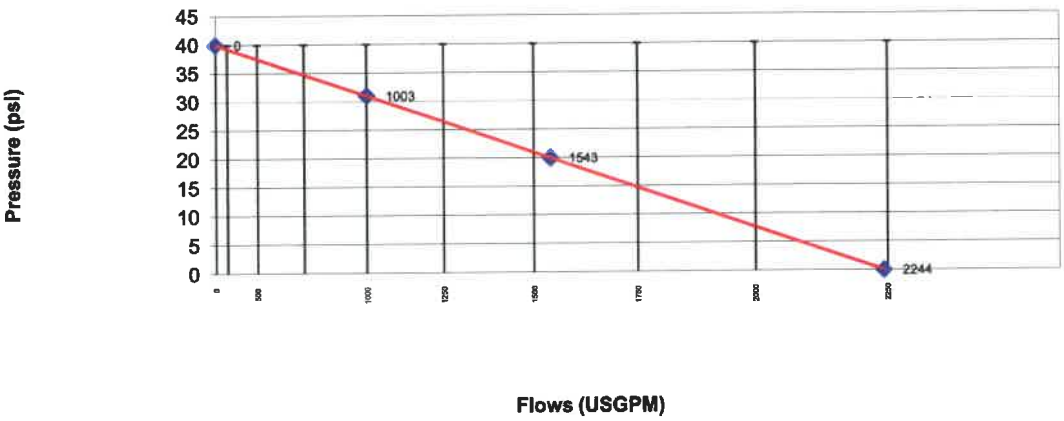
TOTAL FLOW DURING TEST: 1003 USGPM / 3795 L/MIN / 835 IGPM

STATIC READING: 40 PSI RESIDUAL: 31 PSI

RATED CAPACITY:			AT 0 PSI	
	1543	USGPM	2244	USPGM
	1285	IGPM	1869	IGPM
	5841	L/MIN	8492	L/MIN

REMARKS:

Fire Underwriters Survey Hydrant Flow Test Chart



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WATER FLOW TEST REPORT

FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	SFR	Test No.	2
Municipality:	Salt Spring Island NSWWD	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	26-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2 to 3
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a Left: n/a	Right:	n/a

Size of Main: 6 inch Dead End: Two Ways: Loop:

Source Reliable: If not explain:

Comments:

TEST DATA:

Location of test hydrants; Residual: Sanpiper road - Channel Ridge

Flow: Sanpiper road - Channel Ridge

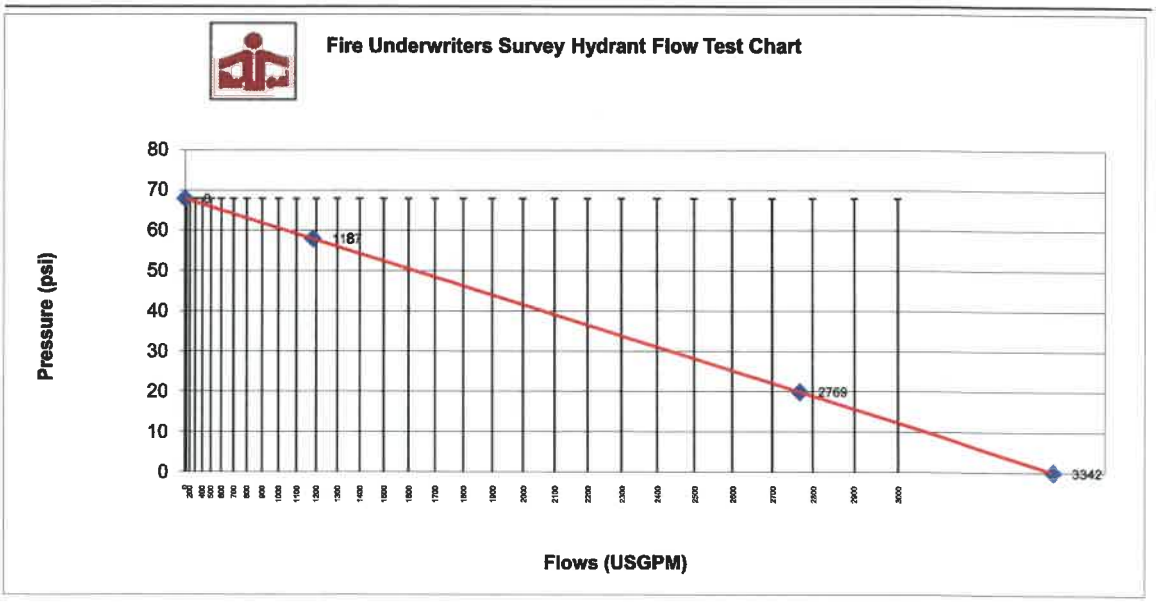
FLOW HYDRANT(S)			Orifice #2	Orifice #3	Orfice #4
	SIZE OPENING:	2.5			
	COEFFICIENT:	0.9			
	PITOT READING:	50			
	GPM:	1187	0	0	

TOTAL FLOW DURING TEST: 1187 USGPM; 4492 L/MIN; 989 IGPM

STATIC READING: 68 PSI RESIDUAL: 58 PSI

RATED CAPACITY:			AT 0 PSI		
	2769	USGPM		3342	USPGM
	2306	IGPM		2784	IGPM
	10480	L/MIN		12648	L/MIN

REMARKS:



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WATER FLOW TEST REPORT

FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	SFR	Test No.	3
Municipality:	Salt Spring Island NSWWD	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	26-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2 or 3
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a Left: n/a	Right:	n/a

Size of Main: 6 inch Dead End: x Two Ways: Loop:

Source Reliable: If not explain:

Comments:

TEST DATA:

Location of test hydrants; Residual: Boaodwell rd at Tern road

Flow: Murrelet Place at Tern road

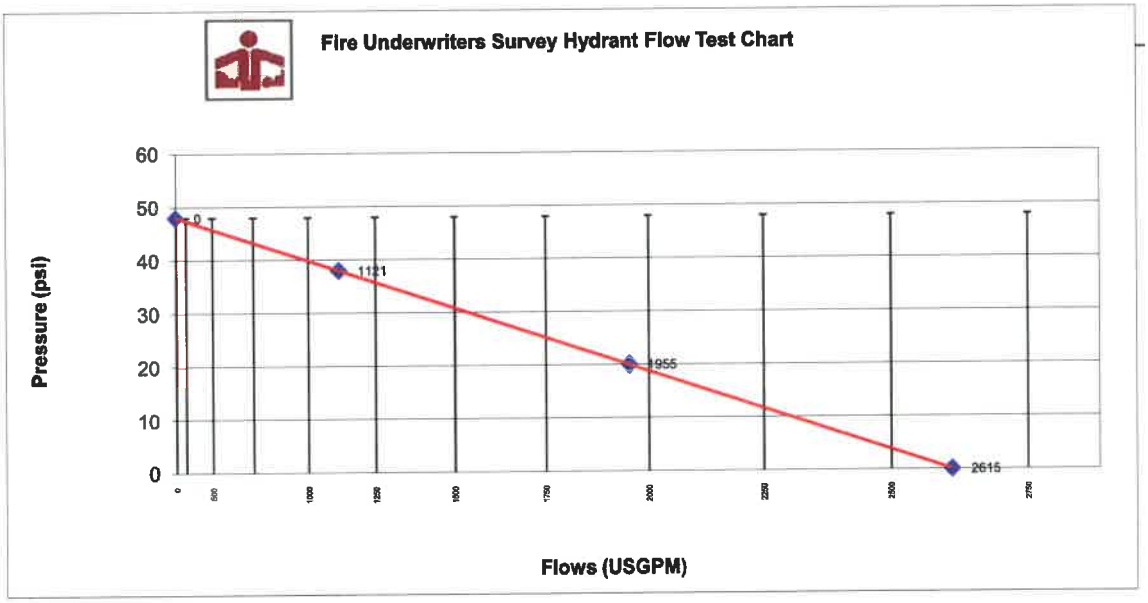
FLOW HYDRANT(S)		Orifice #2	Orifice #3	Orfice #4
SIZE OPENING:	2.5			
COEFFICIENT:	0.85			
PITOT READING:	50			
GPM:	1121	0	0	

TOTAL FLOW DURING TEST: 1121 USGPM; 4243 L/MIN; 934 IGPM

STATIC READING: 48 PSI RESIDUAL: 38 PSI

RATED CAPACITY:			AT 0 PSI	
	1955	USGPM	2615	USPGM
	1628	IGPM	2178	IGPM
	7398	L/MIN	9897	L/MIN

REMARKS:



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WATER FLOW TEST REPORT

FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	SFR	Test No.	4
Municipality:	Salt Spring Island NSWWD	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	26-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2 to 3
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a Left: n/a	Right:	n/a

Size of Main: 6 inch Dead End: Two Ways: Loop:

Source Reliable: If not explain:

Comments:

TEST DATA:

Location of test hydrants; Residual: Sunset drive at Channel Ridge drive

Flow: Sunset drive at Channel Ridge drive

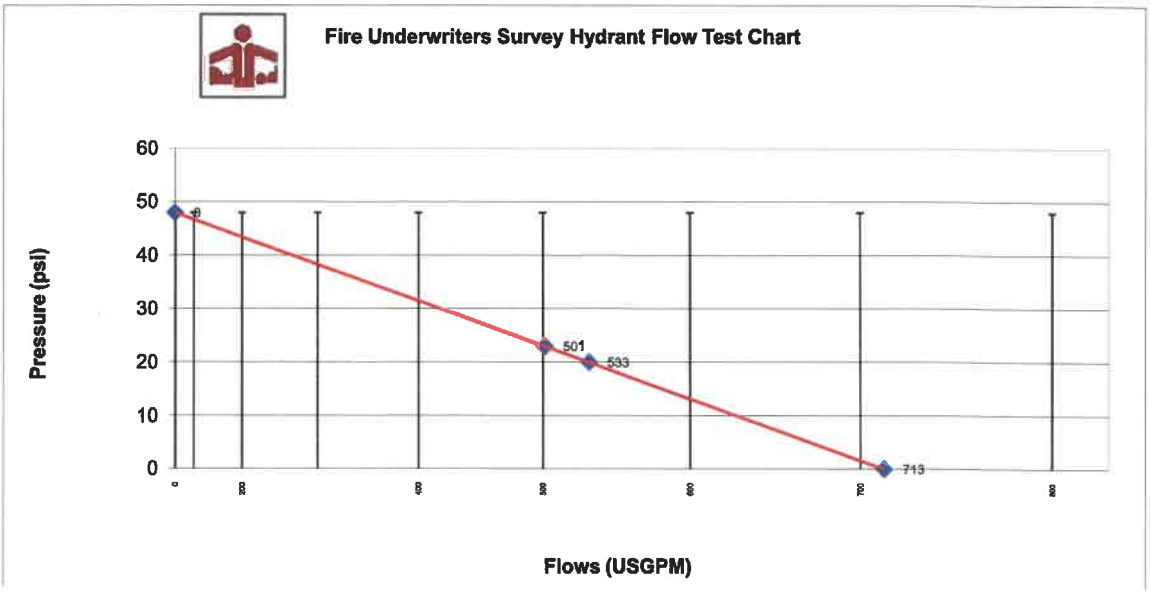
FLOW HYDRANT(S)		Orifice #2	Orifice #3	Orfice #4
SIZE OPENING:	2.5			
COEFFICIENT:	0.85			
PITOT READING:	10			
GPM:	501	0	0	

TOTAL FLOW DURING TEST: 501 USGPM; 1897 L/MIN; 418 IGPM

STATIC READING: 48 PSI RESIDUAL: 23 PSI

RATED CAPACITY:			AT 0 PSI	
	533	USGPM	713	USPGM
	444	IGPM	594	IGPM
	2017	L/MIN	2699	L/MIN

REMARKS:



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WATER FLOW TEST REPORT

FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	Commercial	Test No.	5
Municipality:	Salt Spring Island NSWWD	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	26-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a Left: n/a	Right:	n/a

Size of Main: _____ Dead End: _____ Two Ways: _____ Loop: _____

Source Reliable: _____ If not explain: _____

Comments: _____

TEST DATA:

Location of test hydrants; Residual: Hereford ave

Flow: Arts Spring centre

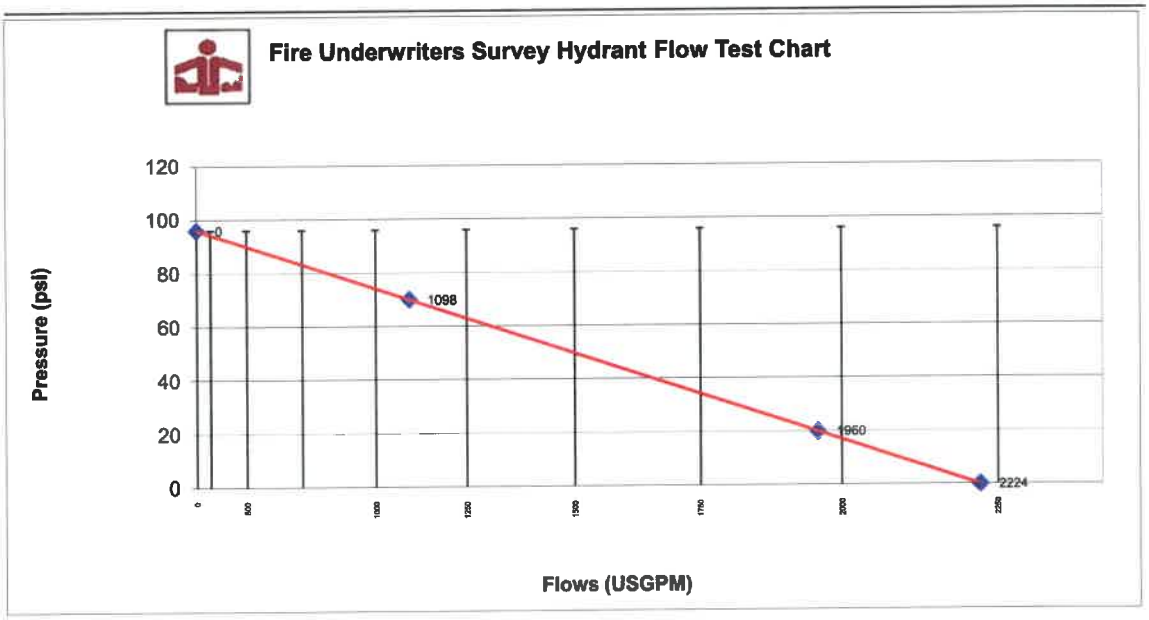
FLOW HYDRANT(S)		Orifice #2	Orifice #3	Orfice #4
SIZE OPENING:	2.5			
COEFFICIENT:	0.85			
PITOT READING:	48			
GPM:	1098	0	0	

TOTAL FLOW DURING TEST: 1098 USGPM / 4157 L/MIN / 915 IGPM

STATIC READING: 96 PSI RESIDUAL: 70 PSI

RATED CAPACITY:		AT 0 PSI	
	1960 USGPM		2224 USPGM
	1633 IGPM		1852 IGPM
	7419 L/MIN		8416 L/MIN

REMARKS:



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WATER FLOW TEST REPORT

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A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	SFR	Test No.	7
Municipality:	Salt Spring Island - Maracaibo	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	27-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a Left: n/a	Right:	n/a

Size of Main: 6 inch Dead End: Two Ways: Loop:

Source Reliable: If not explain:

Comments:

TEST DATA:

Location of test hydrants; Residual: Nose Point road

Flow: Kingfisher lane

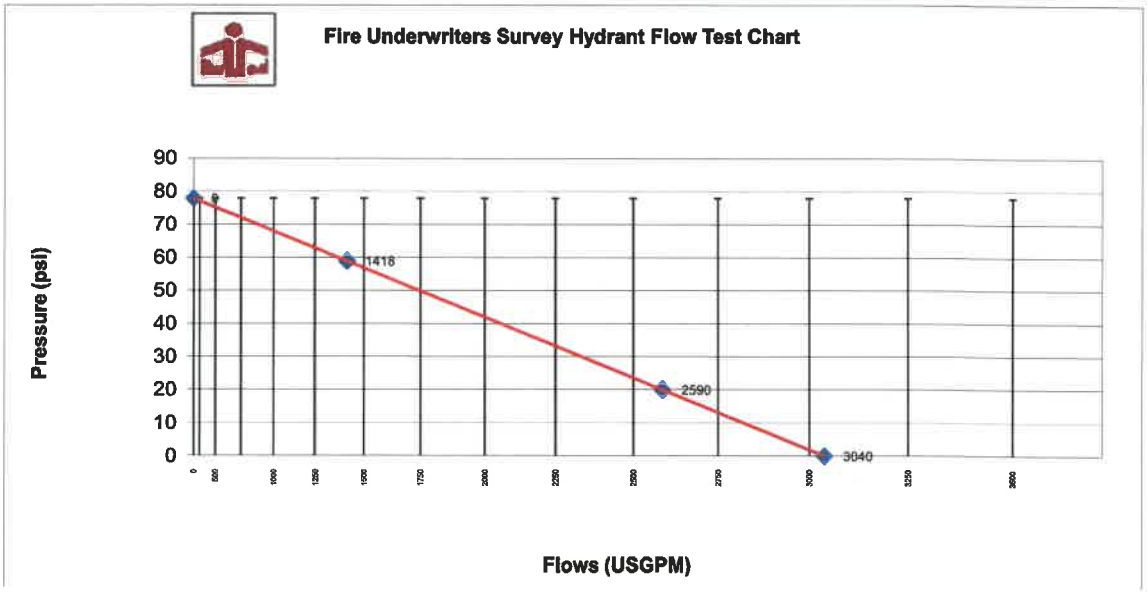
FLOW HYDRANT(S)		Orifice #2	Orifice #3	Orfice #4
SIZE OPENING:	2.5			
COEFFICIENT:	0.85			
PITOT READING:	80			
GPM:	1418	0	0	

TOTAL FLOW DURING TEST: 1418 USGPM; 5367 L/MIN; 1181 IGPM

STATIC READING: 78 PSI RESIDUAL: 59 PSI

RATED CAPACITY:		AT 0 PSI	
	2590 USGPM		3040 USPGM
	2158 IGPM		2532 IGPM
	9805 L/MIN		11506 L/MIN

REMARKS:



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WATER FLOW TEST REPORT

FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	SFR	Test No.	8
Municipality:	Salt Spring Island - Maracaibo	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	27-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a	Left: n/a	Right: n/a

Size of Main: 6 inch Dead End: Two Ways: Loop:

Source Reliable: If not explain:

Comments:

TEST DATA:

Location of test hydrants; Residual: Nose Point road

Flow: Nose Point road

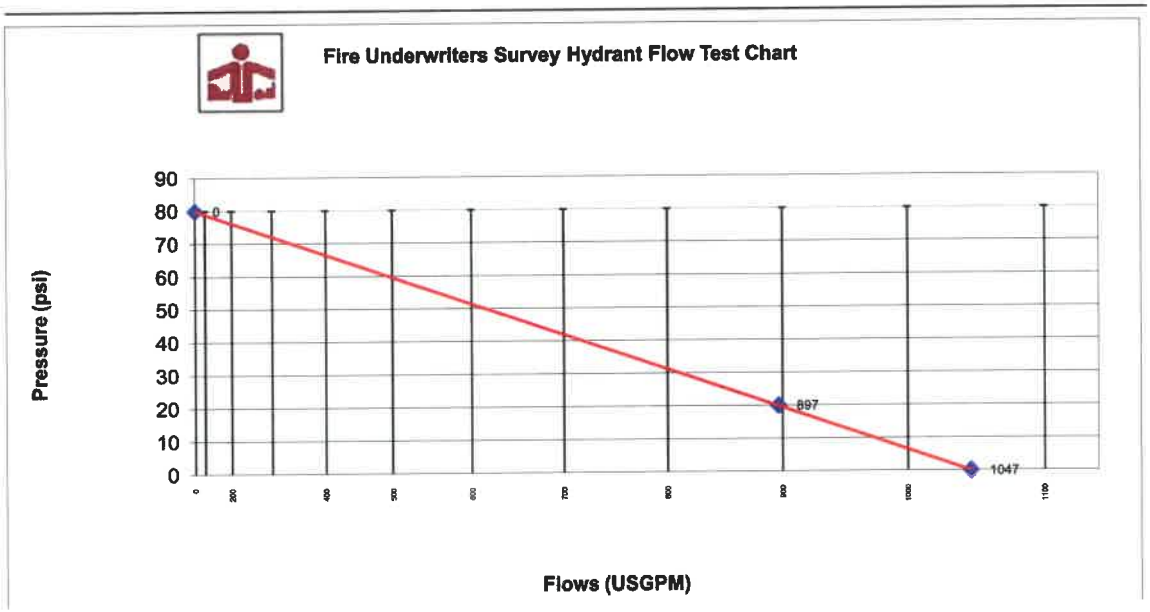
FLOW HYDRANT(S)		Orifice #2	Orifice #3	Orfice #4
SIZE OPENING:	2.5			
COEFFICIENT:	0.85			
PITOT READING:	32			
GPM:	897	0	0	

TOTAL FLOW DURING TEST: 897 USGPM; 3394 L/MIN; 747 IGPM

STATIC READING: 80 PSI RESIDUAL: 20 PSI

RATED CAPACITY:		AT 0 PSI	
	897 USGPM		1047 USPGM
	747 IGPM		873 IGPM
	3394 L/MIN		3965 L/MIN

REMARKS:



Provided by:
Fire Underwriters Survey
Municipal Engineering Division

3999 Henning Drive
Burnaby, BC V5C 6P9
1-800-665-5661

WATER FLOW TEST REPORT

FIRE UNDERWRITERS SURVEY
A SERVICE TO INSURERS AND MUNICIPALITIES

Available Fire Flow Calculator

Name of Risk:	SFR	Test No.	9
Municipality:	Salt Spring Island - Maracaibo	Test By:	Sunjeev Sodi/RMG
Purpose of Test:	Fire Inurance Grading	Date:	27-Nov-09
Type of Construction	Wood Frame		
Ground Floor Area		# of storeys	2
Occupancy		Sprinklered?	no
Exposures	Front: n/a Rear: n/a Left: n/a	Right:	n/a

Size of Main: _____ Dead End: _____ Two Ways: _____ Loop: _____

Source Reliable: _____ If not explain: _____

Comments: _____

TEST DATA:

Location of test hydrants; Residual: End of Nose Point road

Flow: End of Nose Point road

FLOW HYDRANT(S)		Orifice #2	Orifice #3	Orfice #4
SIZE OPENING:	2.5			
COEFFICIENT:	0.85			
PITOT READING:	11			
GPM:	526	0	0	

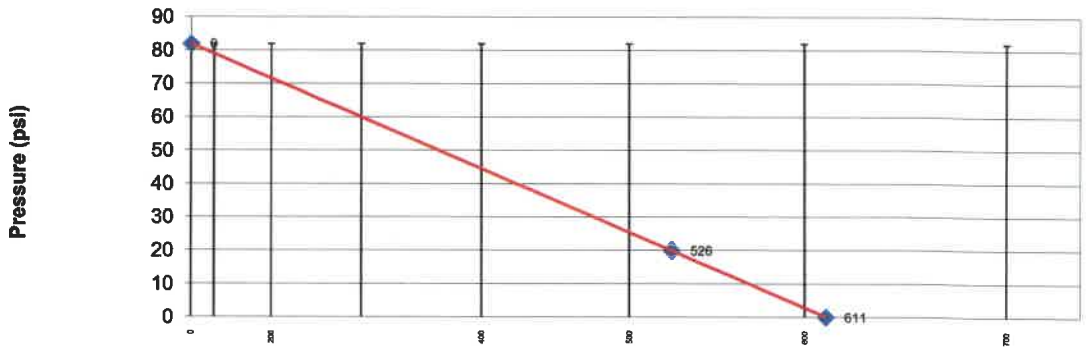
TOTAL FLOW DURING TEST: 526 USGPM; 1990 L/MIN; 438 IGPM

STATIC READING: 82 PSI RESIDUAL: 20 PSI

RATED CAPACITY:		AT 0 PSI	
526	USGPM	611	USPGM
438	IGPM	509	IGPM
1990	L/MIN	2314	L/MIN

REMARKS:

Fire Underwriters Survey Hydrant Flow Test Chart



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APPENDIX B – Water Supply for Public Fire Protection