

## **WATER ADVISORY COMMITTEE**

Notice of Meeting on **Wednesday, June 1, 2016 @ 9 am**  
Goldstream Conference Room, 2<sup>nd</sup> Floor, 479 Island Highway, Victoria, BC

P. Elworthy (Chair)  
B. June  
R. Neuman  
J. Rogers  
M. Williams

B. Moody (Vice-Chair)  
R. Machin  
C. Nowakowski  
F. Schultz  
T. Wood

A. Gibson  
R. Mersereau  
G. Orr  
M. Thompson

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### **AGENDA**

1. Approval of Agenda
2. Adoption of Minutes of April 6, 2016
3. Chair's Remarks
4. Presentations/Delegations
  - No one has registered to speak
5. Wildfire Risk Assessment (Report #WAC 2016-03)
6. Reports to the Regional Water Supply Commission
  - a) Proposed Amendments to the Greater Victoria Water Supply Area Protection Bylaw No. 2804 to Include the Leech Water Supply Area and Draft Water Supply Area Access and Special Use Request and Approval Policy and Procedure (Report #RWSC 2016-26)
  - b) Capital Regional District Ticket Information Authorization Bylaw – Amendment Bylaw No. 4094 (For Cross Connection Control Offences) (Report #RWSC 2016-22)
  - c) Capital Regional District Ticket Information Authorization Bylaw– Amendment Bylaw No. 4098 (for Water Conservation Offences) (Report #RWSC 2016-23)
7. Reports From Working Groups
8. Questions from Committee Members
9. Water Watch
10. New Business
11. Adjournment

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*To ensure a quorum is present, please call Margaret at 250.474.9606 if you or your alternate cannot attend.*



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**MINUTES OF A MEETING OF THE WATER ADVISORY COMMITTEE**  
**Held Wednesday, April 6, 2016 at 9 am in the Goldstream Conference Room,**  
**479 Island Highway, Victoria, BC**

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**PRESENT:** P. Elworthy, A. Gibson, R. Machin, R. Mersereau, R. Neuman, J. Rogers, M. Thompson, M. Williams, T. Wood; C. Nowakowski, G. Orr; B. Moody  
**Staff:** T. Robbins, A. Constabel, J. Ussery, M. Montague (Recorder)

The meeting was called to order at 9 am.

**1. APPROVAL OF AGENDA**

The following items were added to the agenda under New Business:

- TransCanada Trail
- Update on the status of the Conservation Bylaw revisions

**MOVED** by M. Williams and **SECONDED** by M. Thompson,  
that the Water Advisory Committee approve the agenda as amended.

CARRIED

**2. ADOPTION OF MINUTES OF FEBRUARY 3, 2016**

**MOVED** by T. Wood and **SECONDED** by R. Mersereau,  
that the Water Advisory Committee adopt the minutes of the meeting held February 3,  
2016.

CARRIED

**3. CHAIR'S REMARKS**

The Chair reported that he made a presentation to the Regional Water Supply Commission and the CRD Board on the proposed amendments to the Greater Victoria Water Supply Area Protection Bylaw No. 2804 to include the Leech Water Supply Area.

**4. PRESENTATION/DELEGATIONS**

No one registered to speak.

**5. CLIMATE CHANGE ADAPTATION STRATEGY FOR THE GREATER VICTORIA WATER SUPPLY AREA**

J. Ussery made a presentation to the Committee (copy attached) on the Climate Change Adaptation Strategy for the Greater Victoria Water Supply Area.

**MOVED** by R. Mersereau and **SECONDED** by R. Neuman,  
that the Water Supply Commission receive the report for information.

**6. WATER ADVISORY COMMITTEE ORIENTATION MATERIAL**

An orientation binder was handed out at the meeting. Members were asked to review the material and send updates to M. Montague for inclusion.

**7. REPORTS FROM WORKING GROUPS**

Water for Food - G. Orr provided a brief update on the Water for Food working group. The group is still in the process of developing a work plan.

Disaster Planning – M. Williams noted that the group had nothing to report at this time.

Water Value and Conservation – R. Mersereau provided an update. Some of the items the group is considering include: consistent billing throughout the municipalities; updating the brochure entitled “What’s our Water Worth”.

**8. QUESTIONS FROM COMMITTEE MEMBERS**

The committee members had not further questions.

**9. WATER WATCH**

**MOVED** by R. Mersereau and **SECONDED** by R. Neuman,  
that the Water Advisory Committee receive the report for information.

CARRIED

**10. NEW BUSINESS**

TransCanada Trail – J. Rogers recognized the work being done by CRD Parks and Integrated Water Services on the TransCanada Trail. A. Constabel provided an update on the status of the project.

Water Conservation Bylaw – T. Robbins provided an update on the status of the amendments to the Water Conservation Bylaws. The amended bylaw will be going to the Regional Water Supply Commission meeting on April 20 for review and then on to the CRD Board meeting for adoption.

**MOVED** by M. Williams and **SECONDED** by T. Wood,  
that the Water Advisory Committee supports the amendments to the Water Conservation Bylaw in principle.

CARRIED

**11. ADJOURNMENT**

**MOVED** by M. Williams and **SECONDED** by A. Gibson,  
that the meeting of the Water Advisory Committee be adjourned at 11:30 am.

CARRIED

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# Climate Change Adaptation

## Greater Victoria Water Supply Area

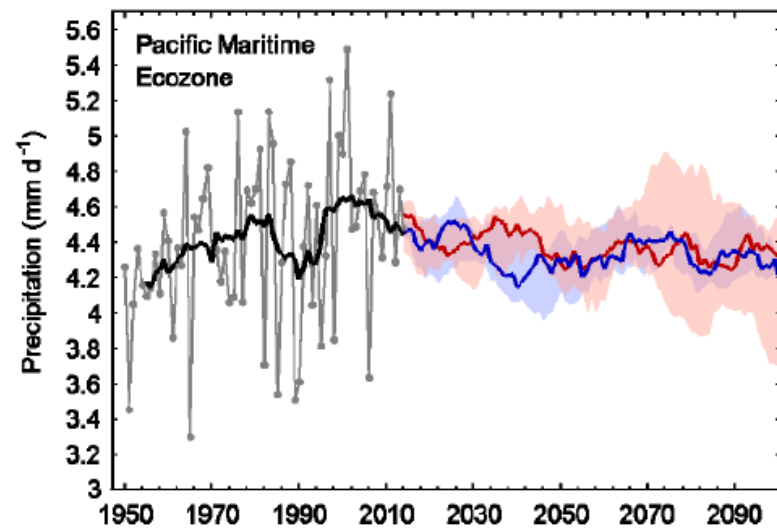
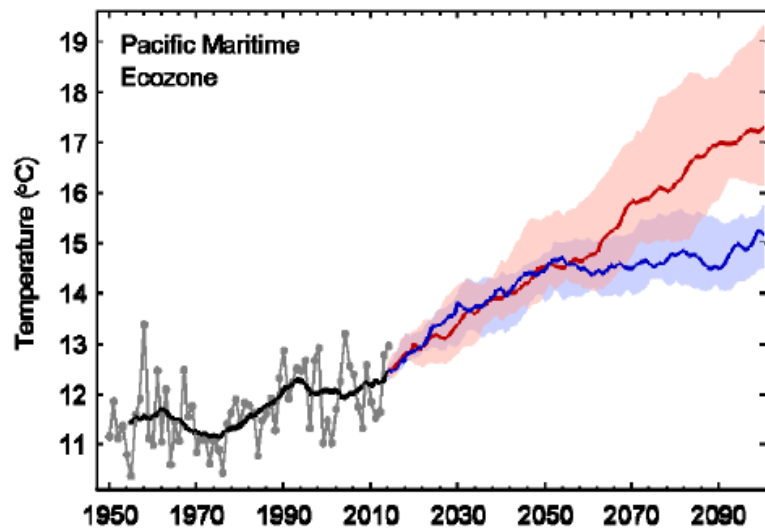
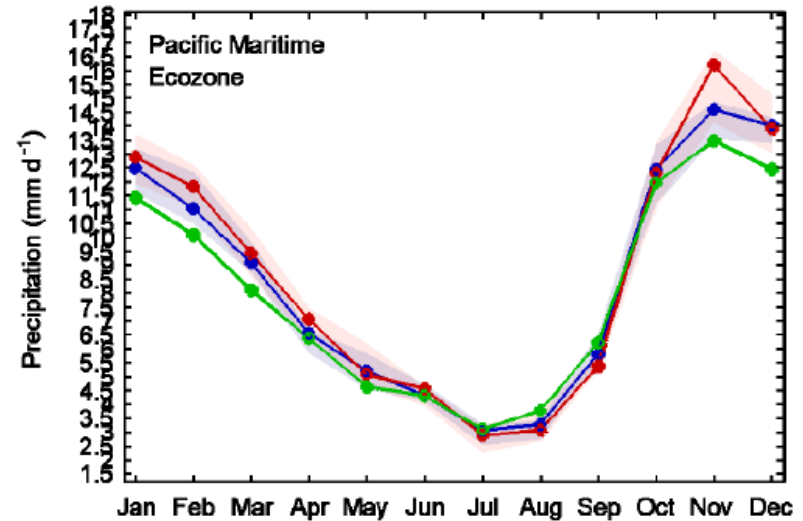
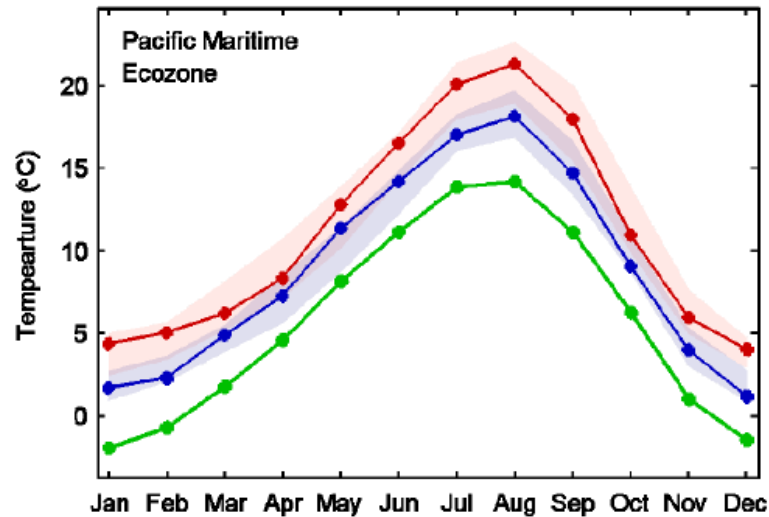


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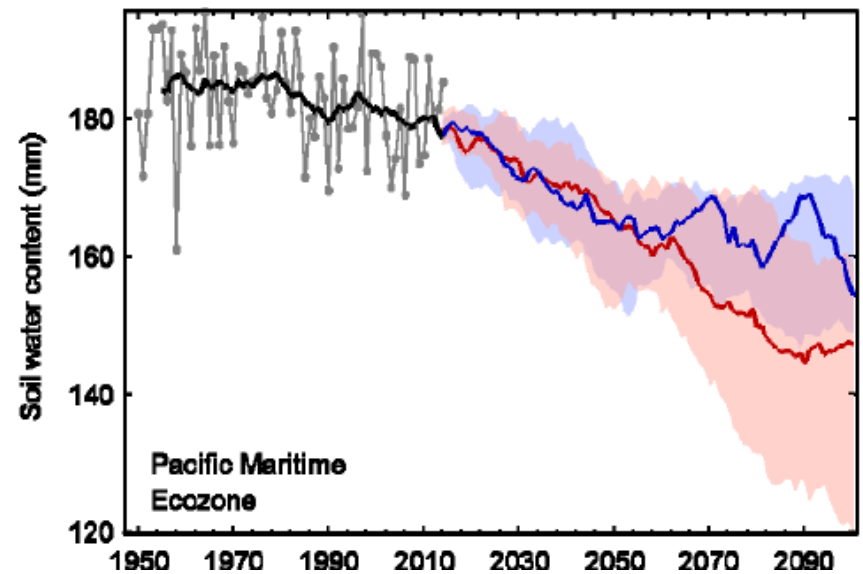
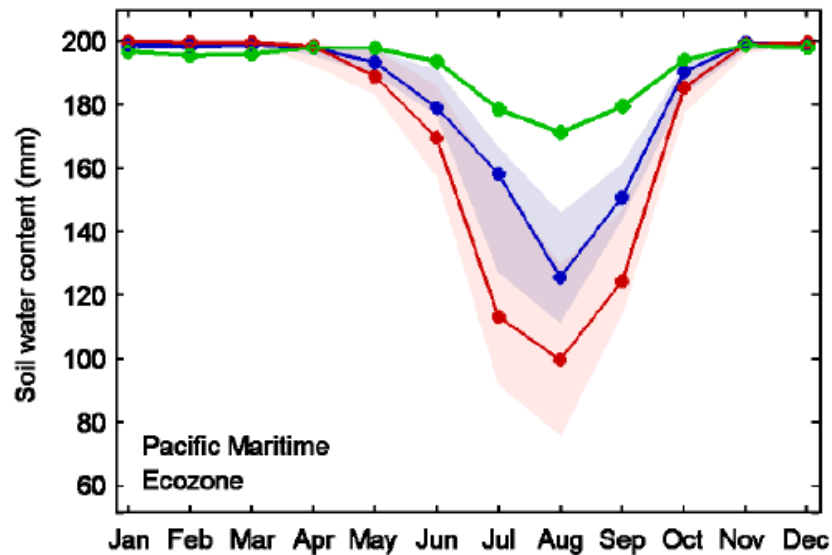
Brief overview of background and approach for the climate change adaptation strategy for the Greater Victoria Water Supply Area



# Predicted Changes in Climate

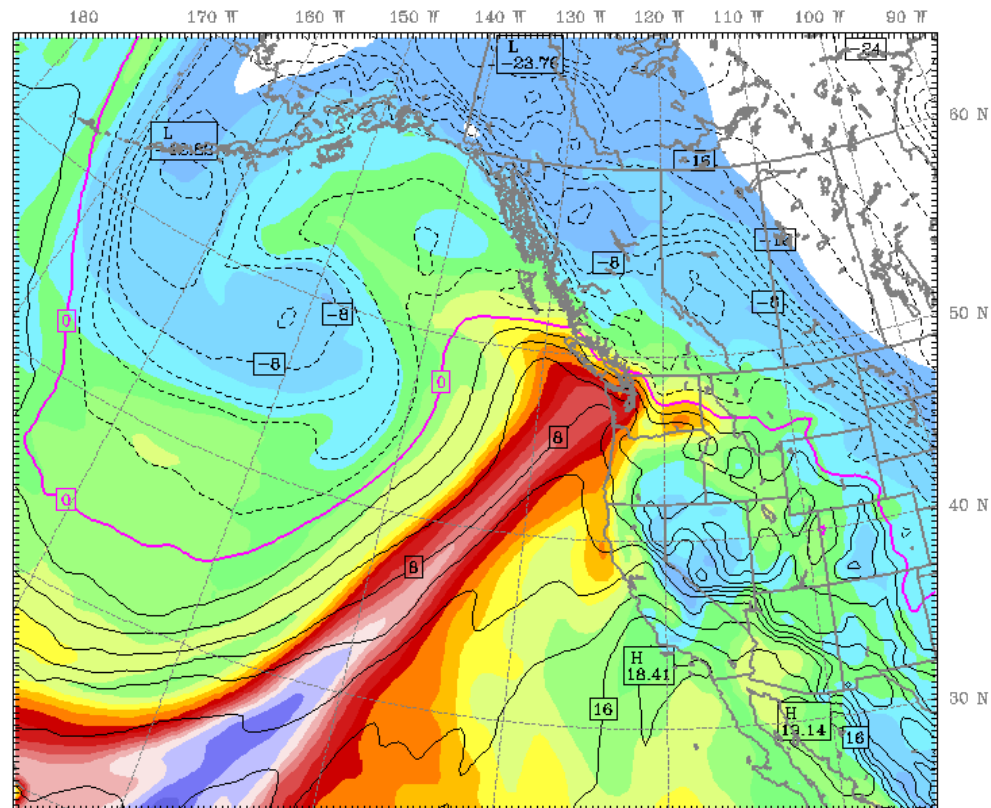


# Predicted Changes in Climate



# Predicted Changes in Climate

UW WRF-GFS 36km Domain  
Fcst: 60 h  
Column-integrated water vapor (mm)  
850 mb Temperature (C)  
Init: 00 UTC Fri 10 Dec 10  
Valid: 12 UTC Sun 12 Dec 10 (04 PST Sun 12 Dec 10)



CONTOURS: UNITS=C LOT= -30.000 HIGH= 18.000 INTERVAL= 2.0000  
0 7.5 15 22.5 30 37.5 45 52.5 60 67.5 75 82.5 90 mm  
Model Info: V3.1.1 KF YSU PBL Thompson Ther-Diff 36 km, 37 levels, 216 sec  
LW: RRTM SW: Dudhia DIFF: simple KM: 2D Smagor



# Potential Impacts of Climate Change



Initiatives and actions required to:


- prepare for the predicted effects of climate change
- reduce potential negative impacts on built, natural, and social systems

Planned and proactive risk management.



## Direction from 2012 Strategic Plan

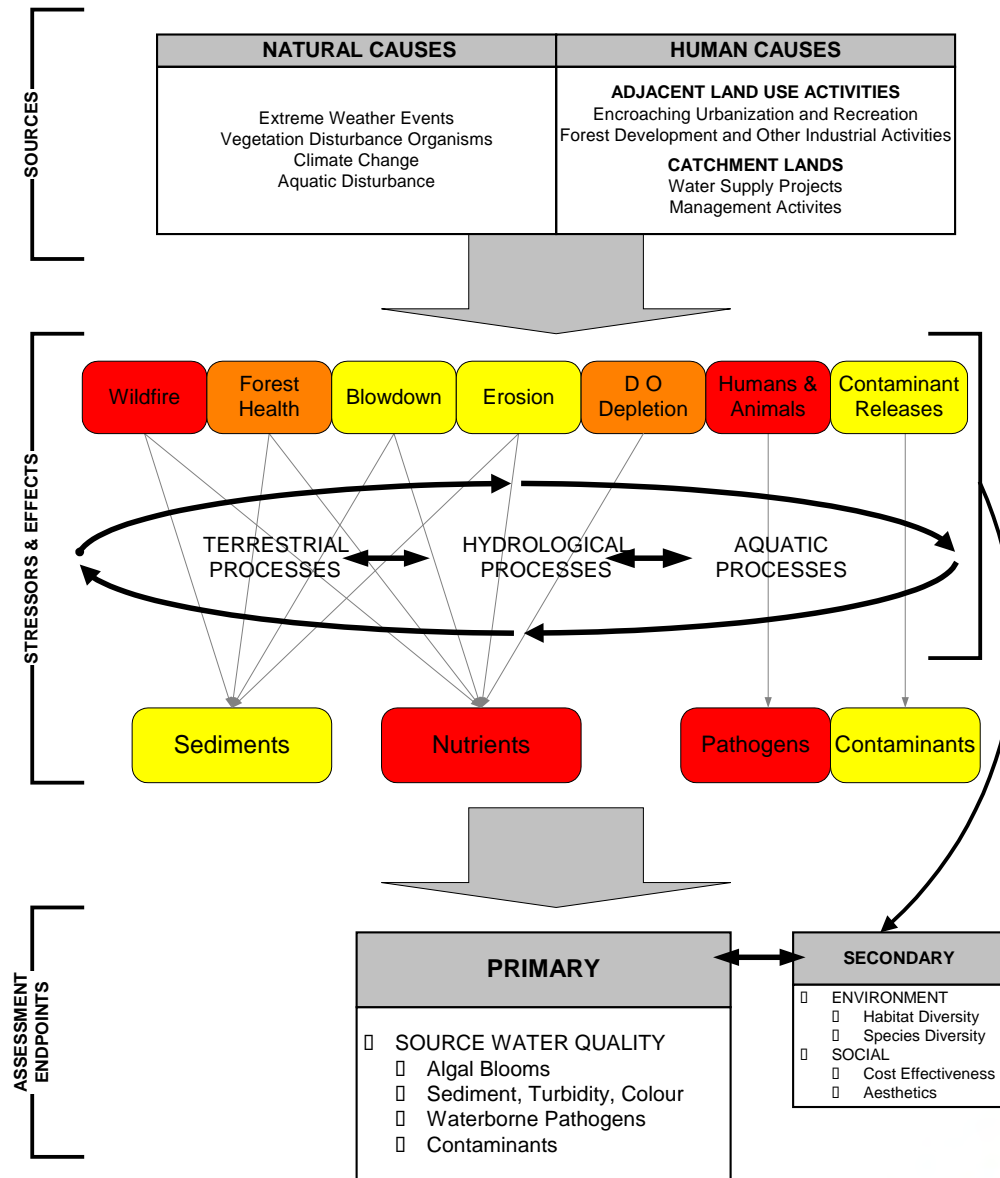
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- Consistent framework for analyzing issues and developing an adaptation strategy
  - Improved understanding of the potential effects of climate change on the GVWSA
  - Develop and implement adaptation strategy and restoration plans
  - Update design flow criteria for bridges and culverts
- 

# Steps for Preparing an Adaptation Strategy



# Assessment of Vulnerability and Risk



- Pacific Climate Impacts Consortium
- BC and US government publications
- Journal articles
- CCME guide for climate change adaptation in watersheds
- Other guidance documents



- Update of the Watershed Assessment for the GVWSA
- Drinking Water Safety Plan
- Vulnerability Assessment of the GVWSS
- CRD Corporate Climate Change program
- CRD Risk Management program



- Long-term forest monitoring plots
- Lake sediment core study
- Modelling forest growth and mortality with climate change
- Identifying changes in canopy gaps and areas of stressed vegetation



# Adaptation Strategy is a living document

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- Continual emergence of new guidance documents and other resources
- Updates and increased resolution in climate predictions
- New insights from research and monitoring



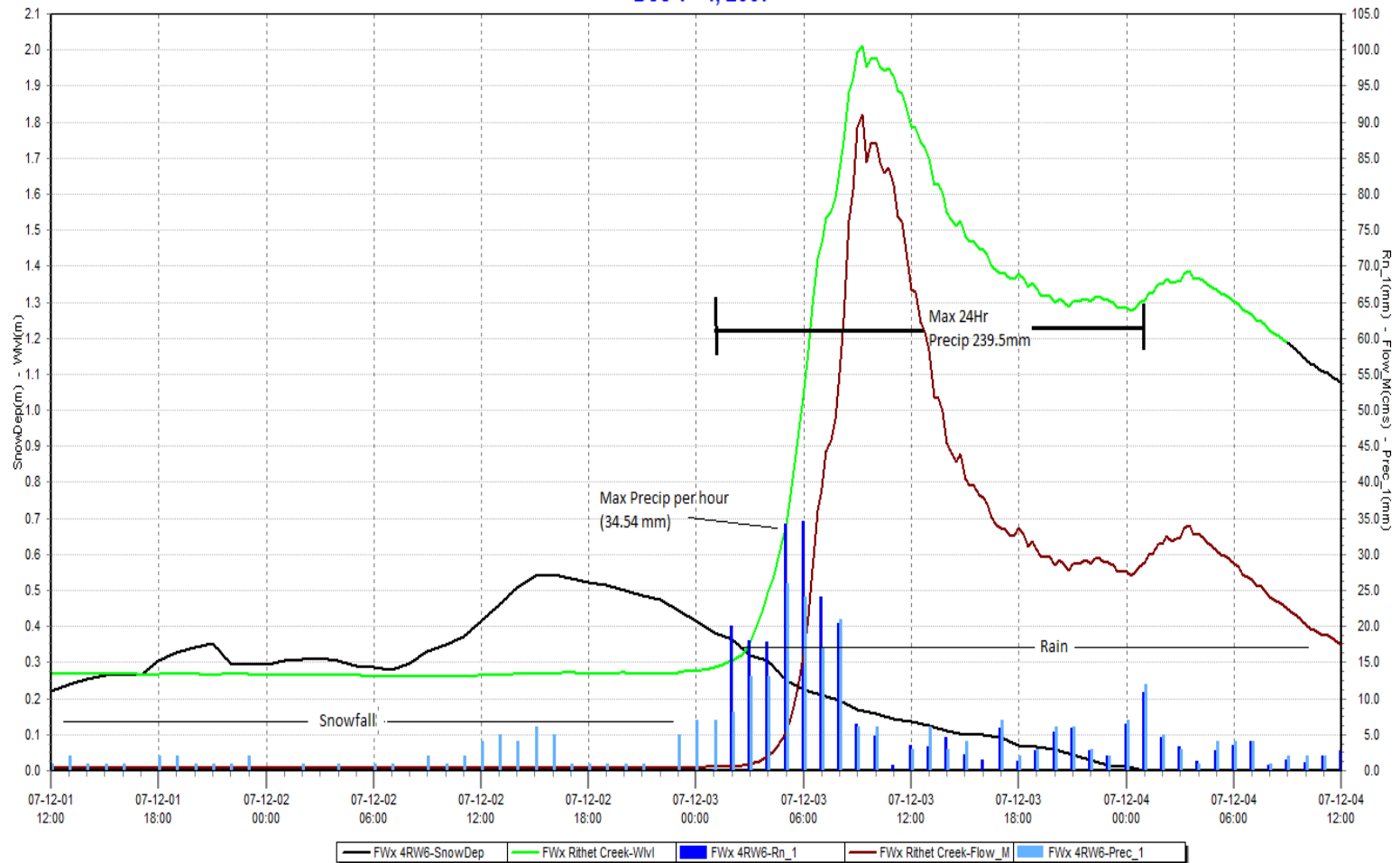
# Questions?

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# Extreme Weather Events

## 2007 Rain On Snow Dec 1 - 4, 2007



# Implications for Source Water Quality

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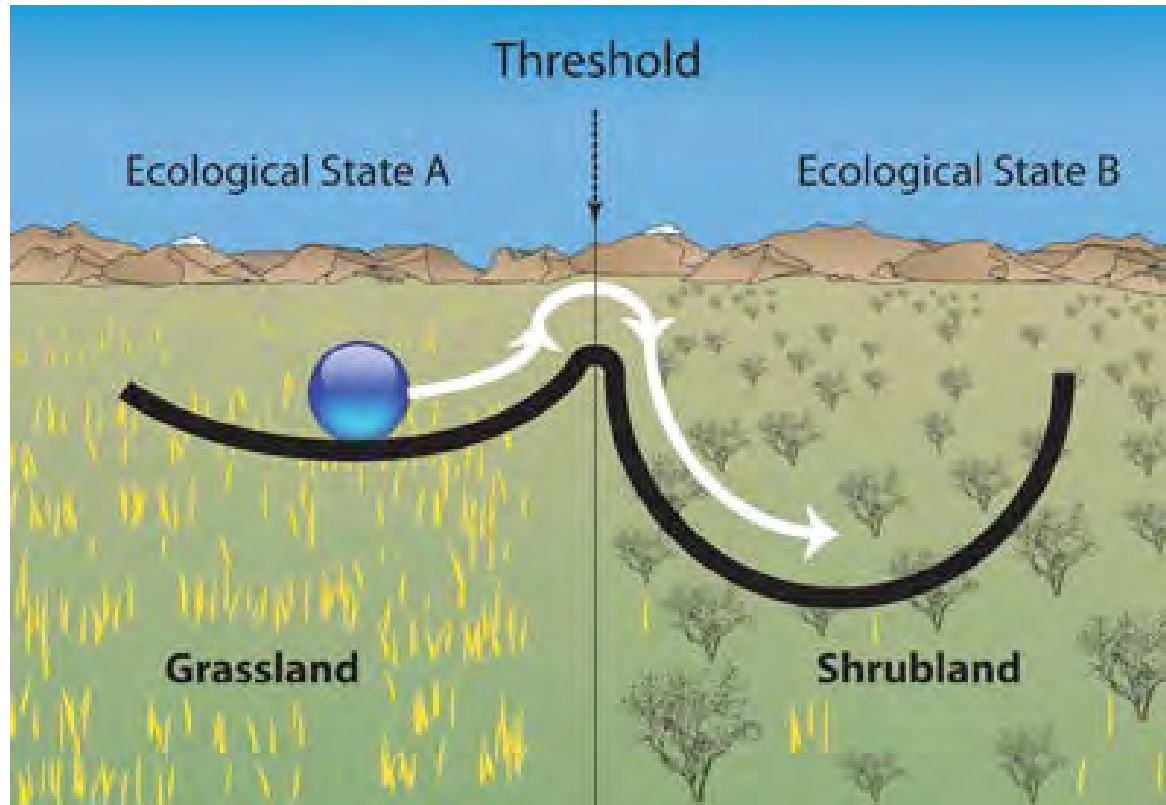
- Potential for increased frequency and severity of algal blooms with nutrients from storm events
- Alterations in algal species with increased temperature and reduced transparency



- Increase in number of years that reservoirs fill
- Increase in evaporation
- Change in pattern of inflow
- Reliability and supply forecasting models out of date



# When resilience is exceeded



1. Identify a few plausible future scenarios
2. Identify adaptation strategy for each
3. Look for commonalities and most effective actions
4. Implement actions that will be beneficial in all or most of the scenarios
5. Monitor effectiveness and adjust as needed

**REPORT TO WATER ADVISORY COMMITTEE  
MEETING OF WEDNESDAY, JUNE 1, 2016**

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**SUBJECT     WILDFIRE RISK ASSESSMENT**

**ISSUE**

The Wildfire Risk Assessment for the Greater Victoria Water Supply Area (GVWSA) is presented for information and feedback.

**BACKGROUND**

GVWSA wildfire risk information was requested by the Water Advisory Committee (WAC) following presentation of a Fire Event Report in 2014 (Report WAC #2014-03). Given other priorities for the WAC in late 2014 and 2015, the information was not presented earlier.

In 2005 – 2007 (prior to the acquisition of land in the Leech River watershed), the CRD retained B.A. Blackwell and Associates to assess the risks (probability and consequence) of a large-scale wildfire within and adjacent to the Greater Victoria Water Supply Area.

The risk assessment model used a series of map overlays to spatially evaluate the probability of a fire starting, spreading and being difficult to detect and suppress, and the consequences of wildfire to water quality, adjacent lands, regional air quality, and biodiversity.

The findings showed the **probability** of wildfire was greatest:

- in areas of young dense forest on steep slopes and higher elevations where forest fuel is abundant, access is difficult, and a wildfire could move into the forest crown and affect a large area.
- in the Leech Water Supply Area where there is a high likelihood of ignition from trespass and high forest fuel loading.
- to the north, east and south of the Sooke Water Supply Area due to likelihood of ignition on adjacent private land and the high forest fuel loading in these areas.

The findings showed the **consequences** of wildfire were greatest:

- in the southern portion of the Sooke Water Supply Area due to the impact an extensive burned area near the water supply intake would have on water quality of Sooke Lake Reservoir.
- adjacent to water disinfection facilities at Japan Gulch and Sooke River Road due to the importance of these facilities to the water supply system.
- adjacent to reservoirs in the Goldstream Water Supply Area.



The assessment recommended four key wildfire **risk reduction strategies**:

1. Carry out forest fuel reduction measures around key water supply facilities using provincial fire smart principles (fire smart refers to removal or reduction of forest fuels adjacent to manmade structures).
2. Continue to improve the CRD's capability for preventing, detecting and suppressing wildfires and rehabilitating burned areas.
3. Identify wildfire containment zones in high risk areas and expand existing fuel breaks around these areas.
4. Identify priority areas within the Water Supply Area for forest fuel reduction treatments to increase the protection of the wildfire containment zones and reduce fuels in these areas.

Since the Wildfire Risk Assessment was undertaken, the following **actions and treatments** have been implemented:

- Initial and ongoing **fire smart treatment** around key water supply facilities – the Japan Gulch Treatment Facility, Mt. McDonald Communications Facility, Sooke Caretaker's Facility, and fire weather/hydrometeorological stations. Some fire smart treatments required cooperation with CRD Regional Parks and BC Parks to implement fuel reduction in adjacent parks.
- **Air patrols** (small fixed wing aircraft flight around the GVWSA to detect smoke or fire) have been implemented twice per day during high and extreme wildfire danger rating periods since 2007. Additional wildfire suppression equipment in the form of a 4 wheel drive medium sized (2,700 L) water tender was acquired. Ground-based water delivery mapping was extended to the Leech WSA.
- Cooperative wildfire **suppression training** with the BC Wildfire Management Branch and CRD Regional Parks. Several Watershed Protection staff are receiving advanced wildfire suppression training and have worked on active wildfires in other areas to gain additional experience and expertise.
- The **wildfire containment zones strategy** recommended by B.A. Blackwell was further reviewed and refined to a strategic priority order of:
  - a. landscape level fuel break corridors concentrating on providing protection from wildfire originating from adjacent properties to the east, south and north, and between the Leech Water Supply Area and Sooke Water Supply Area;
  - b. forest fuel management in priority areas within the Leech Water Supply Area; and,
  - c. forest fuel management in priority areas within the Sooke Water Supply Area.
- In 2008, an **operating budget uplift** of \$100,000 per year was proposed and approved by the Regional Water Supply Commission to fund forest fuel management activities.
- Sections of **forest fuel break corridors** have been implemented in the northeast, east and south, with a corridor between the Leech and Sooke Water Supply Area being implemented in three phases over 2015, 2016 and 2017 (forest fuel breaks entail removal of understory material and thinning, not complete tree removal.)

- A comprehensive **Wildfire Management Plan** which fully incorporates the Leech Water Supply Area was completed in November 2015. The Wildfire Management Plan fully incorporates the findings of the Wildfire Risk Assessment.
- To gain a better understanding of the threats posed by post-wildfire conditions in the water supply area, a pilot **assessment of debris flow and sediment delivery potential** associated with post-wildfire conditions was conducted for a portion of the catchment area close to the intake at Sooke Lake Reservoir. The results are being used to develop a **post-wildfire rehabilitation plan** that will specify the location, types, and densities of erosion control measures to protect water quality in the reservoir. Additional areas may be assessed and planned for rehabilitation in future years.


### **CONCLUSION**

The 2007 Wildfire Risk Assessment provided valuable insights to management of the Greater Victoria Water Supply Area to avoid or mitigate large-scale wildfire. In order to ensure continued institutional knowledge, the assessment methodology, map outputs, discussion and conclusions were formally documented and bound in 2014.

### **RECOMMENDATION**

That the Water Advisory Committee:

1. Receive the staff report for information; and
2. Provide feedback on the implementation, to date, to address the strategic priorities for risk mitigation.

  
\_\_\_\_\_  
Annette Constabel, MSc, RPF  
Senior Manager, Watershed Protection

AC:mm

  
\_\_\_\_\_  
Ted Robbins, BSc, CTech  
General Manager, Integrated Water Services  
Concurrence

Attachment:

1. Wildfire Risk Assessment: Greater Victoria Water Supply Area and Adjacent Land

# Wildfire Risk Assessment

## Greater Victoria Water Supply Area and Adjacent Land



Report prepared by:

J. Ussery, Manager, Resource Planning  
CRD Integrated Water Services

and

B.A. Blackwell, RPF, RP Bio  
Principal  
BA Blackwell and Associates Ltd.

December 2014



**B.A. Blackwell  
& Associates Ltd.**



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The wildfire risk assessment was carried out by Bruce Blackwell of BA Blackwell and Associates Ltd. and managerial staff from Capital Regional District Water Services:

- Gordon Joyce, RPF, Senior Manager, Watershed Protection
- Stewart Irwin, Senior Manager, Water Quality
- Joel Ussery, Manager, Resource Planning
- Alan Barber, RPF, Manager, Watershed Operations

Forest Ecosystem Solutions carried out the computer programming work to adapt the Wildfire Risk Management System Model for the project.

Staff in BA Blackwell and Associates, and professional and technical staff in the Watershed Protection Division of CRD Water Services, collected and prepared data for the model.

D. Ohlson of Compass Resource Management Ltd. provided input on wildfire risk management strategies.

It was originally intended that a description of the wildfire risk assessment process and results would be included in a larger wildfire risk management plan to be prepared by Watershed Protection staff and the consultants. Once the assessment was completed, the Watershed Protection division moved directly into implementation of the risk reduction strategies and further work on the risk management plan was deferred. In 2014 it was decided to produce two separate documents: 1) a separate report on the wildfire risk assessment and 2) a wildfire management plan that incorporates some elements of the risk assessment but focuses on the wildfire environment and the components of the wildfire program to protect the Greater Victoria Water Supply Area.

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## Executive Summary

The *Strategic Plan for Water Management* (Acres International 1999) identified wildfire as a major threat to the quality of water in drinking water supply reservoirs in the portions of the Sooke and Goldstream watersheds that make up the Greater Victoria Water Supply Area (GVWSA). Given the characteristics of the GVWSA and the water supply system, a large-scale wildfire could:

- shut down, damage or destroy water supply facilities and infrastructure
- introduce ash, sediment, and debris into the drinking water supply and, in extreme cases, reduce reservoir capacity or require additional treatment to maintain water quality
- greatly increase nutrients and alter nutrient ratios in water supply reservoirs, potentially causing algal blooms, increases in toxin-producing green/blue algae, taste and odour problems, reduced effectiveness of water disinfection, and the clogging of water filters installed in institutions and homes

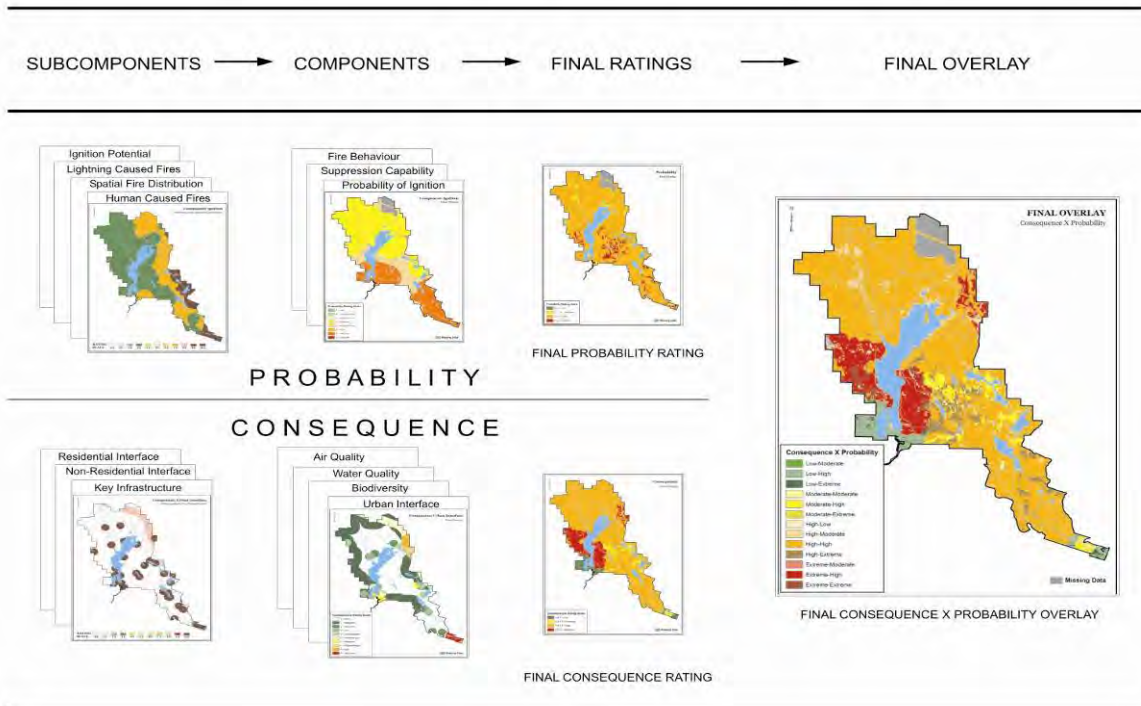
A large wildfire could also threaten residences, community infrastructure, commercial forests and parks on adjacent lands, and forest ecosystems in the GVWSA. The smoke produced by a wildfire could affect public health and close highways and airports.

In 2005 the CRD retained B.A. Blackwell and Associates to carry out an assessment of the risk associated with a large-scale wildfire in the GVWSA with a spatial model that had been used successfully in the Greater Vancouver Water District, national and provincial parks, and the municipalities of Cranbrook, Valemount and Whistler.

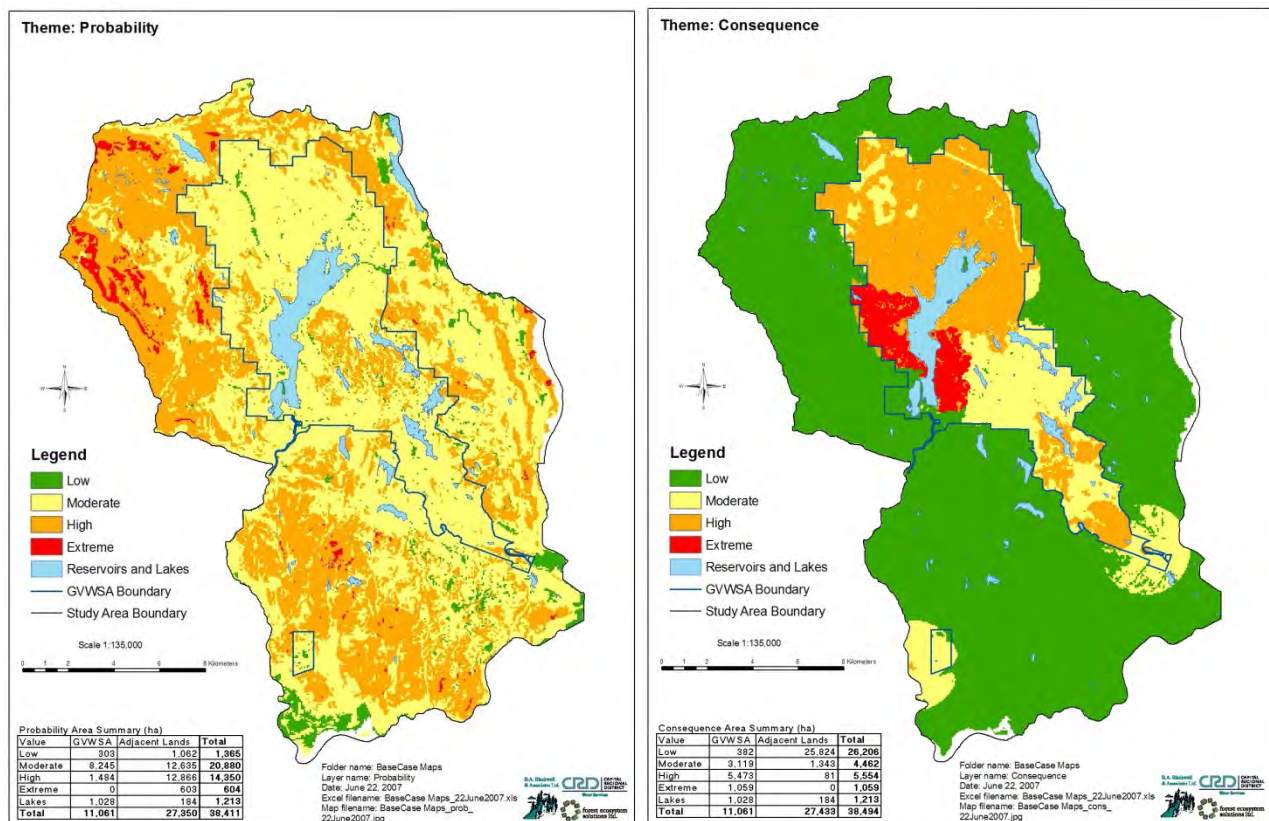
The risk assessment model uses a series of map overlays to examine the probability (likelihood) of a wildfire starting, spreading and being difficult to detect and suppress in relation to the potential consequences to identified values (illustrated below). Each of the maps is assigned a weighting of relative importance. The factors used to create each map are also ranked in importance. Water quality and the water disinfection facilities were given the highest weighting (75%) in the assessment of consequences. An overview of the model is provided in **Section 2**.

The risk assessment was conducted in two phases: 1) the GVWSA alone, and 2) the GVWSA and a large area of adjacent land where a wildfire could spread toward the water supply area.

The summary maps of the probability and consequences of a wildfire are compared (see below) to assess how areas of high and extreme probability of wildfire compare to the spatial distribution of values ranked in relation to potential level of consequence. The consequence rankings in the assessment are focused in the GVWSA due to the emphasis on water quality impacts in the model. As with any complex spatial model where there can be considerable uncertainty, it is most useful to focus on the broad patterns suggested by the output.



### Illustration of the Map Outputs of the Wildfire Risk Assessment Model for the Greater Victoria Water Supply Area Alone (Phase 1)



### Comparison of Summary Maps of Wildfire Probability and Consequences for the Greater Victoria Water Supply Area and Adjacent Land (Phase 2)

The results for the GVWSA in Phase 1 and 2 vary due to refinements in the weightings within the model in later stages of the analysis.

The description of the probability component of the model, and the results of the assessment of the probability of a wildfire being able to start, spread, and be difficult to detect and suppress are presented in **Section 3.1**. The output maps highlighted some key issues:

- The greatest areas of concern in the GVWSA are areas of younger, dense forest on steep slopes and higher elevations where access is difficult and a wildfire could gain momentum.
- Most of the Leech River watershed within the study area is of great concern given the area of high and extreme wildfire probability. The spread of a wildfire into the Sooke WSA from the Leech could pose a major threat to the water supply area.
- The high ranking of wildfire probability on private lands to the north, east and south of the Sooke WSA is also a serious concern. The greatest threat is a wildfire spreading into the Sooke WSA is from the south, both because of the close proximity to the water supply intake and the direction of prevailing winds.
- The area of high and extreme wildfire probability on adjacent lands will likely be reduced somewhat over time as the forest ages.

The description of the consequences component of the model, and the results of that portion of the assessment, are provided in **Section 3.2**. Several general conclusions were drawn from the final output map of the consequences of a wildfire to the GVWSA and adjacent land:

- A wildfire in any part of the Sooke WSA is of great concern given the dependency on Sooke Lake Reservoir for water supply.
- The area of greatest concern for a wildfire in the Sooke WSA is within the portion of the catchment of Sooke Lake Reservoir that drains directly in to the shallow mid and south basins near the water supply intake.
- Wildfire impacts on the water disinfection facilities at Japan Gulch and Sooke River Road could be an extreme consequence given the critical role of these facilities in the water supply system.
- Wildfire is also a major concern for areas that drain directly into the Goldstream and Japan Gulch reservoirs.
- There are important water supply facilities and power supply lines that are not reflected on the summary map of consequences. The output maps relating to those subcomponents of the model will need to be considered in decision-making that affects the risk to these important facilities.

The process of carrying out the assessment was just as important as the product. Refining the risk assessment model for the GVWSA and adjacent lands required the consultant and CRD staff to carefully think through the factors that contribute to probability and consequence. The elements that made up each subcomponent had to be determined and ranked in relative importance. Weightings had to be assigned to each subcomponent and component of the model to create a final output.

The insights gained from this process, and the review of the summary maps of probability and consequence, were combined to identify ways to improve the CRD wildfire management program for the GVWSA. Four general strategies were recommended:

1. Carry out forest fuel reduction measures around key water supply facilities using Fire Smart principles;
2. Continue to improve the CRD's capability for preventing, detecting, and suppressing wildfires and rehabilitating burned areas;
3. Identify wildfire containment zones in high risk areas and expand existing fuel breaks around these areas; and
4. Identify priority areas within the Water Supply Area for forest fuel reduction treatments to increase the protection of the wildfire containment zones and reduce fuels in these areas.

More information about these strategies and how they could reduce probability and consequences of a large-scale wildfire are provided in **Section 4**.

If all of these options were implemented, BA Blackwell and Associates estimate the risk of a catastrophic wildfire would be reduced by about 50%. In their opinion, it was unlikely that the risk of a large-scale wildfire could be reduced much lower given that the GVWSA and much of the adjacent land are forested areas with hot dry summers and the potential for fire starts.



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# Wildfire Risk Assessment

## Greater Victoria Water Supply Area and Adjacent Lands

### 1.0 Introduction

The Strategic Plan for Water Management (Acres International 1999) identified wildfire as a major threat to the quality of water in drinking water supply reservoirs in the Greater Victoria Water Supply Area (GVWSA) (**Map 1**). The GVWSA is dominated by coniferous forest, primarily comprised of Douglas-fir. The dominance of this species on SE Vancouver Island is the result of relatively frequent wildfires. Prior to the European colonization of the Island, there was likely considerable variation in the frequency and size of wildfires, but tree ring analyses suggest that large-scale wildfires occurred every 250-300 years, burning most of the standing trees in affected areas. While there has been a major focus on wildfire suppression in recent decades, the number of human-caused fire starts has increased with residential development and the expansion of recreational activities.

Surface reservoirs in the Sooke and Goldstream water supply areas<sup>1</sup> provide water to approximately 350,000 people within the Greater Victoria area for drinking, domestic purposes, horticulture, agriculture, and business and institutional uses. Due to the high quality of the water in these surface reservoirs, the lack of development in the water supply catchment areas, and the fact that 98% of the lands within the catchment areas of current water supply lands are owned and managed by the Capital Regional District (CRD), filtration of the water is not required before it enters the supply system.

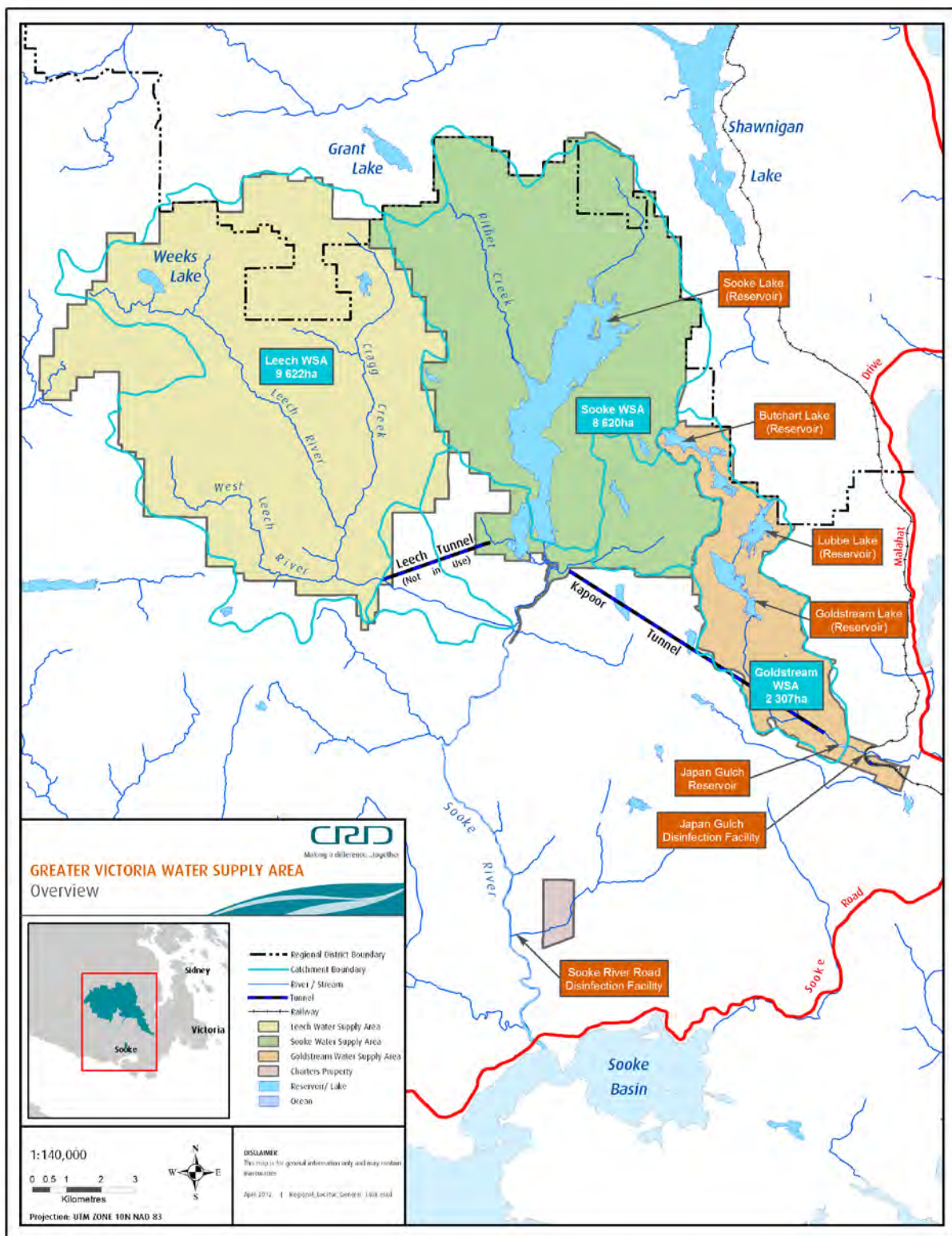
Instead, water from the supply reservoirs is disinfected using a three stage process. Ultraviolet light and free chlorine are used to kill or inactivate naturally-occurring biological contaminants, including bacteria, viruses and parasites. Then ammonia is added to produce chloramines to provide a disinfectant residual in the transmission and distribution systems. The effectiveness of these disinfection processes is reduced if the amount of sediment or organic material in the water increases.

Given the characteristics of the GVWSA and the water supply system, a large wildfire could:

- shut down, damage or destroy water supply facilities and infrastructure
- lead to erosion, debris flows and landslides, potentially introducing ash, sediment, and debris into the drinking water supply and, in extreme cases, reducing reservoir capacity or requiring additional treatment to maintain water quality

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<sup>1</sup> Wildfire is less of an immediate concern for future water supply lands in the Leech Water Supply Area. Water from the Leech River will likely not be used to supplement Sooke Lake Reservoir for several decades.



**Map 1. Overview of the Greater Victoria Water Supply Area** (the Leech Water Supply Area was not owned by the CRD at the time of the Wildfire Risk Assessment).

- greatly increase nutrients and alter nutrient ratios in water supply reservoirs, potentially causing algal blooms, increases in toxin-producing green/blue algae, taste and odour problems, reduced effectiveness of water disinfection, and the clogging of water filters installed in institutions and homes

A large wildfire could also negatively affect 'secondary values' within the GVWSA, such as remnant areas of old forest which have high provincial and regional conservation values and the species of conservation concern that rely on these areas.

Impacts from a large wildfire within or adjacent to the GVWSA would not be confined to the immediate area. Such fires can spread into adjacent residential areas or private managed forest lands, threaten infrastructure such as energy transmission lines, and generate considerable volumes of smoke, potentially causing health issues for people with asthma and related health concerns, and closing airports and highways.

## **Risk Assessment**

The 1999 *Strategic Plan for Water Management* set out a Risk Management Framework for the Greater Victoria Water Supply Area. Once an issue relating to risk was identified and given an initial screening to determine its priority, the Risk Management Framework requires a three step process for the assessment of risk:

1. Problem Formulation
2. Analysis
3. Risk Characterization

To assist with the initial screening and a more detailed risk assessment of a large wildfire in the GVWSA, the Strategic Plan presented a conceptual model for the factors relating to the start and spread of a wildfire and the potential impacts on terrestrial vegetation, soils, terrain, and hydrology and the quality of water in the supply reservoirs (**see Figure 1**).

To analyze the risk of a large scale wildfire in the GVWSA, the Strategic Plan recommended that the CRD conduct a Wildfire Threat Analysis using the Wildfire Threat Rating System developed by Hawkes and Beck (1997) to identify the areas in the GVWSA most at risk from a wildfire. This assessment would enable the CRD to characterize the risk and identify wildfire management zones that could be assigned different levels of priority for wildfire prevention (including forest fuel hazard reduction) and suppression response.

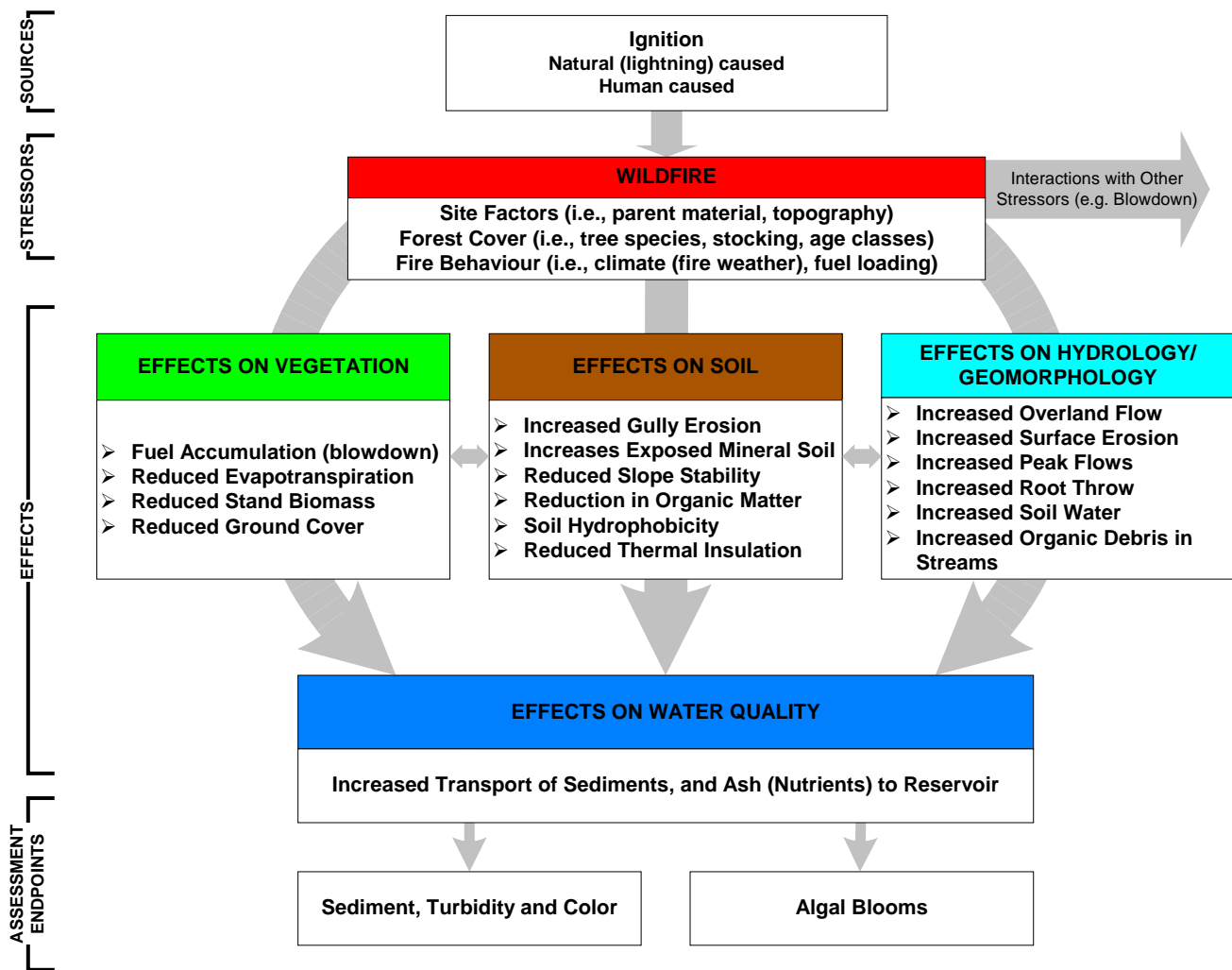


Figure 1. Conceptual Model of Wildfire Risk in the GVWSA from the *Strategic Plan for Water Management* (Acres International et. al. 1999)

The Wildfire Threat Analysis creates a series of map overlays to illustrate the location and ranking of four main components:

1. Wildfire ignition risk<sup>2</sup>
2. Values to be protected
3. Suppression capability
4. The likely behavior of a wildfire

<sup>2</sup> More accurately described as ignition potential



The map for each component is typically produced by considering a number of factors. For example, wildfire ignition risk is based on the spatial pattern of past wildfires caused by lightning and human activities. If one or more of these factors is more important, they can be assigned a different weighting in the creation of the map.

The output maps for each component are then overlaid (combined) to create a final wildfire threat map that illustrates how the individual components relate and interact.

Since each component may have a different level of importance in determining the final threat, the maps relating to these components can be given a different weighting when creating the final map. The implementation of the recommendation for a Wildfire Threat Analysis was delayed by the need to complete the Sooke Reservoir Expansion Project and carry out an inventory of terrain and ecosystems in the Sooke and Goldstream WSA.

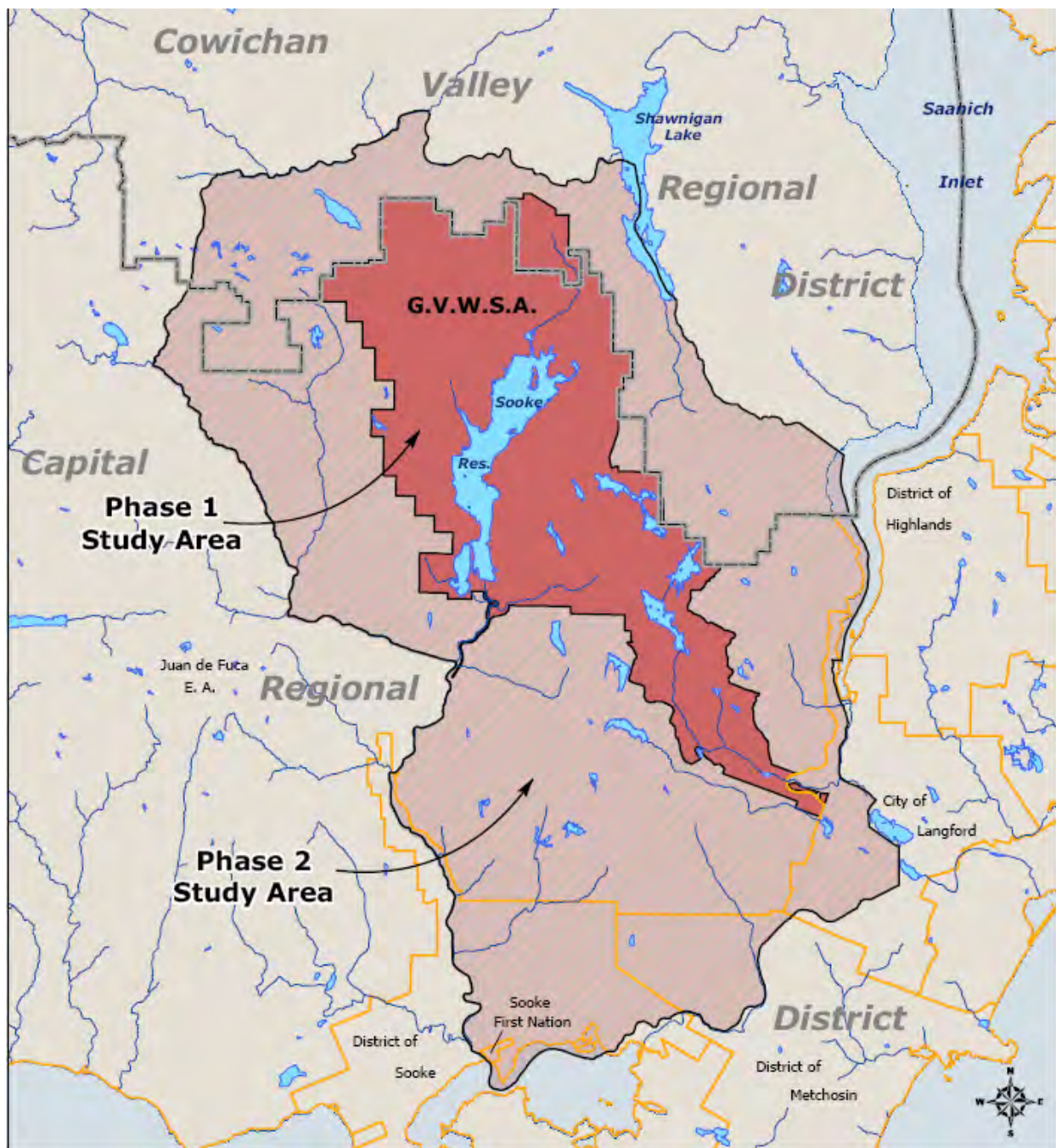
In 2004, the CRD began researching options for carrying out this analysis. It was discovered that BA Blackwell and Associates had refined the Wildfire Threat Rating System by making it more consistent with risk terminology and creating a spatial model for the analysis using standard Geographic Information System (GIS) software. This Wildfire Risk Management System (WRMS) model had been used by the Greater Vancouver Regional District to conduct a wildfire risk assessment of their water supply lands. The model had also been used to conduct wildfire risk assessments for numerous municipalities and a number of provincial parks in BC. After discussions with staff in these jurisdictions the CRD determined that the model was a good option for conducting the threat analysis recommended in the 1999 *Strategic Plan for Water Management*.

In early 2005, the CRD retained BA Blackwell and Associates to work with the CRD to assess the feasibility of applying their WRMS to an assessment of the risk of wildfire in the GVWSA. An initial information item on the project was provided to the Regional Water Supply Commission in March 2005 for their information. A presentation on the WRMS model was provided to the Commission in May of 2005.

Once the feasibility of this model for the risk assessment was confirmed, the CRD decided to proceed with the project. The risk assessment was carried out in two phases:

1. An assessment of a core area consisting of CRD lands in the Sooke and Goldstream water supply areas, and
2. An expanded study area that included lands adjacent to the GVWSA where there was the potential for a wildfire to spread into the core area (see **Map 2**).

The expanded study area was delineated by CRD staff using professional judgment. Phase 2 of the study was endorsed by the Regional Water Supply Commission in October 2006.



**Map 2. The Study Areas Associated with Each Phase of the Wildfire Risk Assessment for the GVWSA and Adjacent Lands**

A presentation and staff report on the results of Phase 2 of the wildfire risk assessment with recommendations for improving the wildfire management program was provided to the Regional Water Supply Commission on June 20, 2007.

This document presents the results of this wildfire risk assessment. It is organized into three main sections:

1. An overview of the Wildfire Risk Management System (WRMS) model, the process for refining the model for the GVWSA, and the structure and overall weightings of the model.
2. An overview of the results and significance of each component of the model using the output maps from Phase 2 of the wildfire risk assessment
3. A review of the four strategies that were recommended for the improvement of the CRD wildfire management program as a result of the wildfire risk assessment.

The document provides an overall summary of the risk assessment project. It does not include all the details associated with the data making up each subcomponent of the model.

## **2.0 Overview of the Model and its Application to the GVWSA**

The WRMS model developed by BA Blackwell and Associates built upon the map overlay and weighting approach in the Wildfire Threat Ranking System in a way that better integrated the accepted concept of risk (probability of an undesirable event multiplied by the consequences to identified values).

The primary components that make up probability and consequence were integrated into a spatial model that allowed weightings to be applied to each component. The model also included the key factors (subcomponents) that acted together to create each component. Each of these subcomponents was also mapped and could be given a weighting to reflect their relative importance.

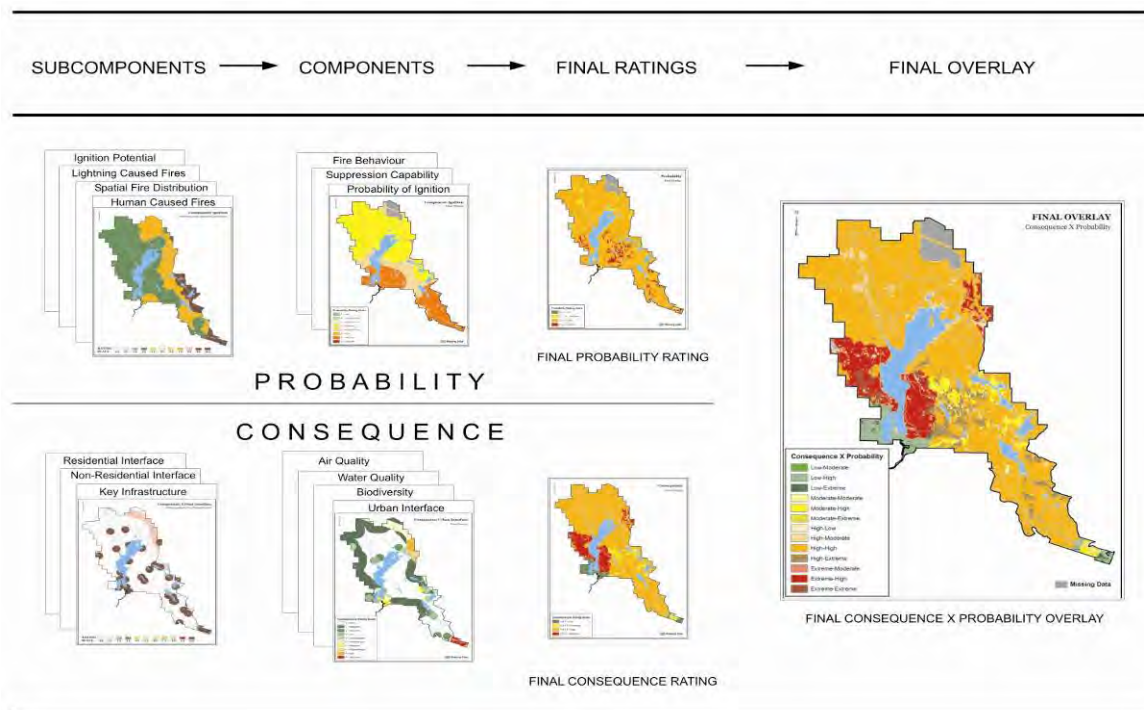
The built-in weighting capability of the model allowed for the effects of each of the components and subcomponents, and their interactions, to be assessed (Ohlson *et. al.* 2003).

The risk-based spatial approach incorporates a series of map overlays that illustrate and rank:

- the probability of a fire starting, spreading and being difficult to detect and suppress, and
- the consequences of wildfire on identified values

In the final output maps, the final probability values are multiplied by the final consequence values to obtain a map that illustrates the relative risk. An illustration of this process is provided in **Figure 2**.

Probability and consequence values, and the final risk rankings, are ultimately determined by the weighting given to each of the components and subcomponents in the model.



**Figure 2. Illustration of the Map Outputs of the Wildfire Risk Assessment Model**

## 2.1 Assessment of Feasibility

During the feasibility assessment component of the project, senior CRD staff in the Watershed Protection and Water Quality divisions worked with the principal and staff of BA Blackwell and Associates to identify the:

- required components and subcomponents for the analysis of the probability and consequences of wildfire in the GVWSA
- appropriate weightings for each of these components and subcomponents to best represent the characteristics of the GVWSA, realistic constraints to wildfire detection and suppression, and the values at risk
- the types of data inputs required for the model and the requirements and feasibility of assembling the required data for the GVWSA

The feasibility assessment was focused on applying the WRMS model to the lands within the GVWSA. Four meetings were held in the spring and summer of 2005 to work through these issues. The addition of elements to the model, the types of data to be used, and the rankings assigned were based to a great degree on the professional judgment of the people involved.

## Structure of the Model

The final structure of the model is illustrated in **Table 1**. Most of the standard components and subcomponents of the WRMS model that had been used in previous projects were retained for the risk assessment of the area within the GVWSA. This was not surprising as the model had been initially developed with input from the staff from the BC Ministry of Forests, Canadian Forest Service and the group responsible for the water supply lands in the Greater Vancouver Regional District (Ohlson *et. al.* 2003).

A couple of additions were made to the probability component relating to the difficulty of detecting and suppressing a wildfire. To better reflect wildfire patrol procedures in the GVWSA, a map of the area that could not be seen from designated wildfire vantage points was included in the assessment of constraints to detection. An existing map showing the range of effectiveness of standard water delivery systems within the GVWSA was also included. This map was derived from a computer model specifically developed for the GVWSA.

The majority of adjustments to the standard model occurred within the subcomponents associated with the Consequence components. This part of the model requires the identification and characterization of the values at risk from a large wildfire. Considerable thought went into each of these subcomponents to best incorporate the characteristics of the water supply area and water supply system, and the residences, infrastructure and other elements and uses on adjacent lands. These subcomponents are described in **Section 3**.

A few changes were made to the subcomponents within the Interface Areas and Infrastructure and Biodiversity components between Phase 1 (GVWSA) and Phase 2 (expanded study area) of the project. These will be discussed in **Section 3**.

## Weightings

The weightings assigned to the different elements of the model create a set of interactions that shape the output maps for subcomponent and component. These in turn combine to produce a spatial illustration of overall probability, consequence and risk (see **Figure 2**).

The weightings given to the components of probability and consequence are statements of understanding and values.

The relative contribution of the probability of ignition, wildfire behavior, and constraints to detection and suppression are based on the knowledge and experience of the people involved.

The weightings assigned to the values at risk result from a combination of agency responsibilities, technical knowledge, and consideration of internal and external impacts at multiple spatial scales.

**Table 1. – Structure of the Spatial Model Used in the Wildfire Risk Assessment for the GVWSA**

| <b>Probability Components and Weighting</b>  | <b>Subcomponents</b>   | <b>Explanation</b>   |
|--|--|--|
| Probability of Ignition  | <ul style="list-style-type: none"> <li>• Ignition potential</li> <li>• Location and frequency of wildfires caused by lightning</li> <li>• Location and frequency of wildfires caused by humans</li> </ul>  | Based on fuel type and past fire weather indices   |
| Potential Wildfire Behaviour<br>(at 90 <sup>th</sup> percentile fire weather conditions) | <ul style="list-style-type: none"> <li>• Fire intensity</li> <li>• Rate of spread</li> <li>• Crown fraction burned</li> </ul>  | Forest stands in the study area assigned a fuel type in the Canadian Fire Behaviour Prediction System  |
| Difficulty of Wildfire Detection and Suppression   | <ul style="list-style-type: none"> <li>• Constraints to detection</li> <li>• Proximity to water sources</li> <li>• Water delivery constraints</li> <li>• Helicopter arrival time</li> <li>• Air tanker arrival time</li> <li>• Terrain steepness</li> <li>• Proximity to roads and helipads</li> </ul> | <p>Cloud cover and vantage points</p> <p>Using CRD pumping limits model</p> <p>Time required to walk into areas</p>  |
| <b>Consequence Components and Weighting</b>  | <b>Subcomponents</b>   | <b>Explanation</b>   |
| Water Quality  | <ul style="list-style-type: none"> <li>• Importance to water supply</li> <li>• Proportion of water supply</li> <li>• Nutrients, colour, taste and odour</li> <li>• Turbidity</li> <li>• Areas where a fire could affect water quality</li> </ul>   | <p>Distinguish between primary and secondary water supply</p> <p>Sub-drainages given different rankings</p> <p>Proximity to intake for sediment and proximity to reservoir for nutrients</p> |
| Interface Areas and Infrastructure   | <ul style="list-style-type: none"> <li>• Residential land</li> <li>• Non-residential land</li> <li>• Key water supply infrastructure</li> <li>• Key community infrastructure</li> </ul>  | Ranking by building density<br>Commercial forest, park, etc.   |
| Air Quality  | <ul style="list-style-type: none"> <li>• Sensitivity of the 'airshed'</li> <li>• Proximity to population centres</li> <li>• Smoke production potential</li> <li>• Smoke venting potential</li> </ul>   | <p>Ability of smoke to move and mix</p> <p>Based on amount of fuel</p> <p>Based on elevation</p>   |
| Biodiversity   | <ul style="list-style-type: none"> <li>• Stands of old forest</li> <li>• Ecosystems or species of concern</li> </ul>   | <p>Old-growth and mature</p> <p>Using BC Conservation Data Centre records</p>  |

A variety of weightings were tested during the discussions associated with the development of the WRMS model for the GVWSA. The final weightings assigned to the basic components of probability and consequences in the model for the assessment of risk within the GVWSA were:

***Probability***

|  |            |
|--|------------|
| Ignition   | 30%        |
| Potential Wildfire Behaviour                     | 30%        |
| Difficulty of Wildfire Detection and Suppression | <u>40%</u> |
|  | 100%       |

***Consequence***

|                                    |            |
|------------------------------------|------------|
| Water Quality                      | 75%        |
| Interface Areas and Infrastructure | 10%        |
| Air Quality                        | 10%        |
| Biodiversity                       | <u>05%</u> |
|                                    | 100%       |

Each of the subcomponents of the WRMS model was also given a weighting to reflect their importance in shaping the components. The weightings assigned to each subcomponent, and the criteria associated with these weightings in Phase 1 (GVWSA) of the project are provided in Appendix 1.

Some changes to weightings of subcomponents were made between Phase 1 and Phase 2 of the project. These will be discussed in **Section 3**.

## **Data Requirements**

The feasibility assessment also involved a review of the data inputs required for the WRMS model. In general, most of the data requirements could be met with existing CRD spatial data for the GVWSA and adjacent lands. In some cases, the existing data were used to develop new data sets (e.g., forest attributes used to identify forest fuel types present in the GVWSA). A few new data sets were developed by CRD staff and BA Blackwell and Associates. The data sets used in the WRMS model are discussed in **Section 3**.

## **3.0 Overview of the Components of the Model**

This section provides an overview of the inputs and results of each component of the WRMS model for the GVWSA and adjacent lands. Each component is discussed in a separate subsection.

Each subsection begins with a description of the subcomponents used to develop that part of the model and the criteria and weightings associated with these subcomponents. The output maps for each of the two phases of the project are then presented, and the results and their interpretation are discussed.



Once all of the components of probability have been presented and discussed, the final probability maps for each phase of the project are reviewed. The same process is followed for consequence.

The overall results for the project, and the implications and recommendations for the protection and stewardship of the GVWSA, are discussed in **Section 4**.

### **3.1 Probability**

#### **3.1.1 Probability of Ignition**

The Ignition component of the WRMS model provides a spatial representation of the probability of a wildfire occurring under specified fire weather conditions. It combines a map of ignition potential derived from forest fuel type and past fire weather indices (Blackwell and Ohlson 2004) with maps showing the likelihood of a wildfire occurring in areas based on the past locations of fire starts from lightning and human activities.

The ignition potential map was developed by BA Blackwell and Associates using a tool called Wildfire Ignition Probability Predictor (WIPP), a tool from FORTester v1.0 (Lawson *et. al.* 1993). Using the 90<sup>th</sup> percentile fire weather conditions and the FBP fuel types assigned to the GVWSA and adjacent lands, the WIPP assigns the fuel types to one of three classes of ignition probability (no ignition, <50% probability, or >50% probability).

Records from the BC Ministry of Forests from 1920 to 2005 were used for the location of wildfire starts caused by lightning and humans. Five hundred metre buffer areas were established around each point for these two wildfire types and the Spatial Analyst feature of ArcGIS software was used to generate maps using an inverse distance weighted interpolation. The end result was a map for each wildfire type that showed potential in one of four categories – greater than four fires in the record, three to four, one to two, or zero.

The map of wildfire ignition potential under the 90<sup>th</sup> percentile fire weather conditions showed that all coniferous forest in the GVWSA had an extreme probability of ignition. All portions of the study area had an extreme probability of ignition with the exception of wetlands, deciduous forest, rock outcroppings, and developed areas.

The available records for lightning (which have a low reliability for accuracy) show strikes were relatively equally distributed across the landscape and thus had a low probability of occurrence. The only area with an extreme potential for lightning strikes was the southern-most section of the GVWSA, likely because of its proximity to Mount McDonald, which has had multiple strikes over the period when fire records are available.

The strongest influence on the Probability of Ignition component is human-caused wildfires. Wildfire starts in the fire record tended to be concentrated in rural residential areas to the east and well to the south of the GVWSA. However there are some areas of multiple fire starts to the south and east that are quite close to the boundary of the Sooke WSA and upper Goldstream WSA. The



lower portion of the Goldstream WSA and the area at the southernmost tip of the GVWSA are also close to concentrations of past fire starts.

These three sub-component maps were overlaid using a weighting of 40% for ignition potential, 50% for human-caused wildfires, and 10% for wildfires caused by lighting.

The final output map for the Probability of Ignition Component (see **Map 3**) showed that 87% of the GVWSA and 85% of the adjacent land had a high probability of ignition under the 90<sup>th</sup> percentile fire weather conditions. The relatively small proportion of areas of moderate probability of ignition were made up of wetlands, rock outcroppings, areas of deciduous forest, and cleared and developed areas.

Most of the areas of extreme probability of ignition were concentrated adjacent to residential areas, with a past record of multiple human-caused fire starts. Part of an area of extreme probability of ignition was delineated in the southernmost portion of the GVWSA and adjacent areas of parkland.

### 3.1.2 Potential Wildfire Behaviour

Potential wildfire behavior was determined using the Canadian Forest Fire Behaviour Prediction (FBP) System. The model Fire Behaviour Predictor 97 was used to calculate potential rate of spread, head fire intensity, and proportion of crown fraction burned for each of the fuel types mapped in the study areas under the 90<sup>th</sup> percentile fire weather conditions (extreme fire danger). Each of these three parameters formed a subcomponent of wildfire behaviour in the model.

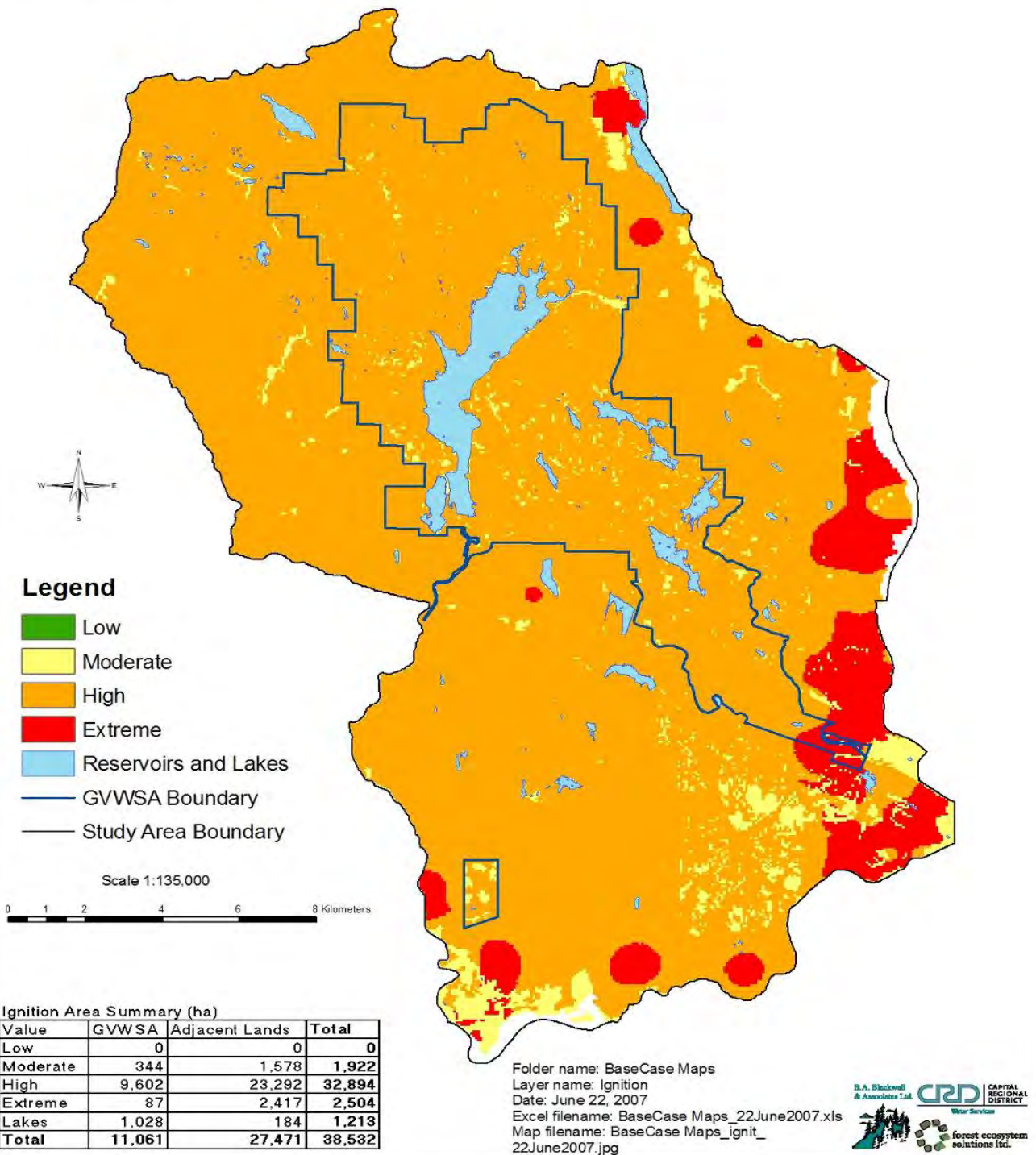
Rate of spread indicates the horizontal speed at which the wildfire moves across the fuel type (metres per minute). Fire intensity is the rate that heat energy is released from the wildfire (kilowatts per minute). Crown fraction burned is a measure of the proportion of tree crowns consumed by the wildfire (i.e., a measure of tree mortality).

Fire weather data (temperature, relative humidity, precipitation, and wind speed) were used to calculate Fine Fuel Moisture Code (FFMC) and Build Up Index (BUI) for use in the fire behaviour modeling. Slope and a wind speed of 10 kilometres per hour were also used as inputs to the fire behaviour model.

The fire weather indices (numeric values that represent forest fuel moisture content and potential rate of spread) are based on the cumulative history of air temperature, precipitation, humidity, and wind speed between April 1 and October 30 of each year. The fire weather indices used for modelling in the GVWSA and adjacent lands were compiled by the BC Ministry of Forests from historic records associated with SE Vancouver Island.

In preparation for the modelling, the existing forest cover mapping of the GVWSA was converted to 10 FBP fuel types by BA Blackwell and Associates (see **Table 2**). This fuel type mapping replaced the maps developed for the GVWSA by the Canadian Forest Service in the late 1990s (**Map 4**).

**Component: Ignition**  
**Theme: Probability**



**Map 3. Spatial Representation of the Probability of Wildfire Ignition within the Greater Victoria Water Supply Area and Adjacent Land**

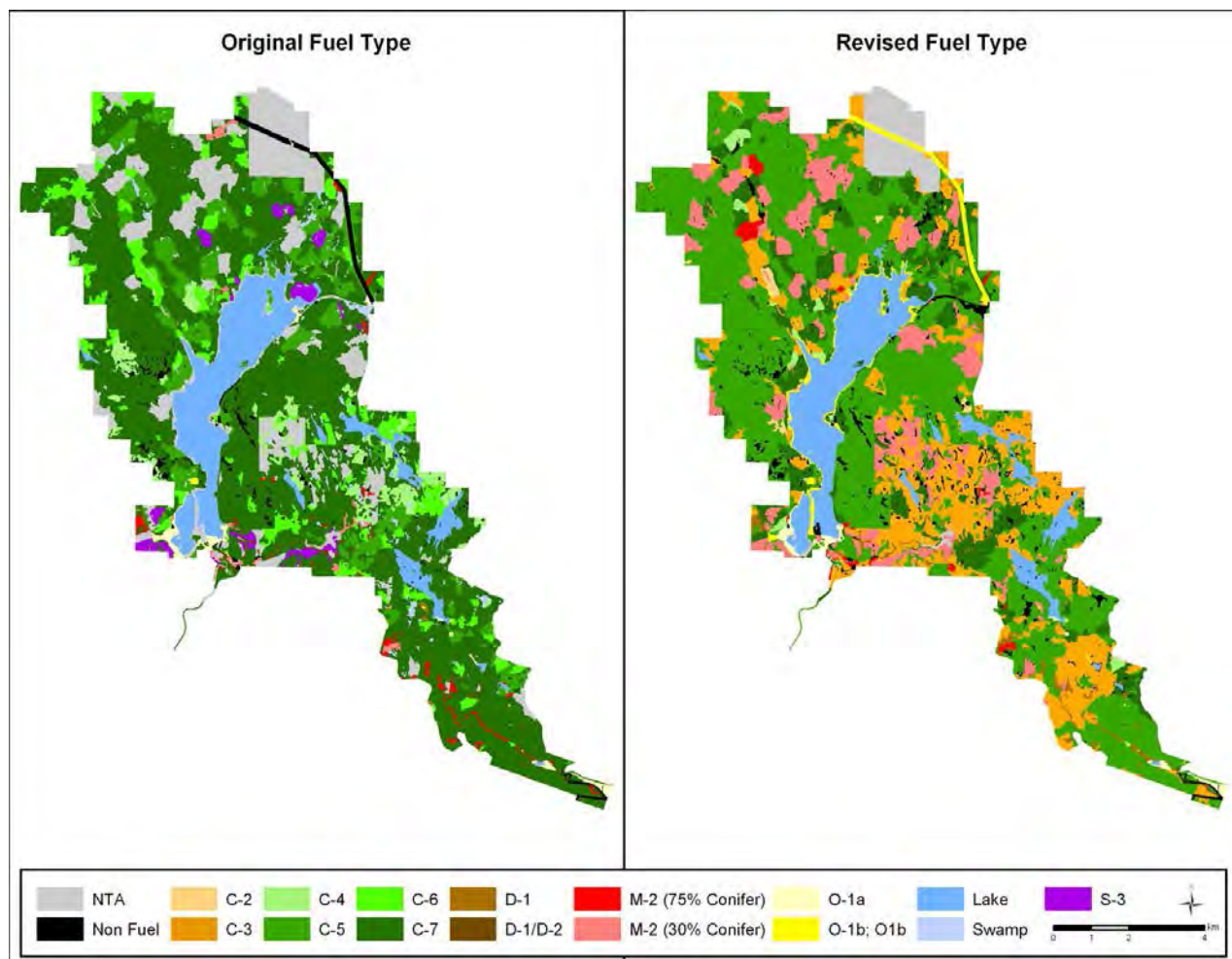
**Table 2. Fuel Types in the Greater Victoria Water Supply Area**

| Code     | General Description of this Forest Fuel Type in the GVWSA   | Equivalent FBP Fuel Type        | Total Area within GVWSA (ha) | % of Total Area |
|----------|---|---------------------------------|------------------------------|-----------------|
| C2       | Coniferous forest in pole sapling stage – 30-50 years old – ladder fuels  | Boreal spruce                   | 38.6                         | 0.4%            |
| C3       | Young coniferous forests with moderate to closed canopies, minimal ladder fuels, higher canopy base heights                               | Mature jack or lodgepole pine   | 1,772.9                      | 19.0%           |
| C4       | Coniferous, shrub-herb stands (<10m), and pole sapling stands (>10 m and < 40 years) with moderate to closed canopies, crowns integrated  | Immature jack or lodgepole pine | 85.1                         | 0.9%            |
| C5       | Coniferous, mature and old stands with gaps   | Red and white pine              | 4,836.6                      | 51.8%           |
| C7       | Coniferous, pole sapling and young forest stands with open canopies, typically more understory than C5, lots of salal, some rock outcrops | Ponderosa pine / Douglas-fir    | 1,128.6                      | 12.1%           |
| D1       | Deciduous stands (may overestimate fire behaviour since these stands are typically in leaf during fire season)                            | Leafless aspen                  | 137.2                        | 1.5%            |
| M2-25con | Mixed deciduous/coniferous stands – conifers comprise about 25% of stand  | Boreal mixed wood - green       | 990.8                        | 10.6%           |
| M2-c     | Young conifers plantations containing gaps dominated by shrubs such as salal, <i>Rubus</i> and <i>Vaccinium</i>                           | Boreal mixed wood - green       | 92.2                         | 1.0%            |
| O1a      | Wetter shrub types (hardhack)   | Matted grass                    | 62.6                         | 0.7%            |
| O1b      | Grass and shrubs such as Scotch broom and oceanspray  | Standing grass                  | 187.4                        | 2.0%            |

In the portion of the Phase 2 study area where there was no forest cover information available BA Blackwell and Associates used aerial photographs to map key attributes of forest stands and assigned them to these FBP fuel types (see **Map 5**).

The maps generated by Fire Behaviour Predictor 97 for rate of spread, head fire intensity and crown fraction burned were overlaid to create a summary map for the component of Wildfire Behaviour. Rate of spread and fire intensity were each assigned a weighting of 45%. Crown fraction burned was assigned a weighting of 10%. The weightings assigned to each of the subcomponents of the Wildfire Behaviour Component in Phase 1 were also used in Phase 2.

The spatial pattern of probability for Wildfire Behaviour in the GVWSA and adjacent lands is shown on **Map 6**.



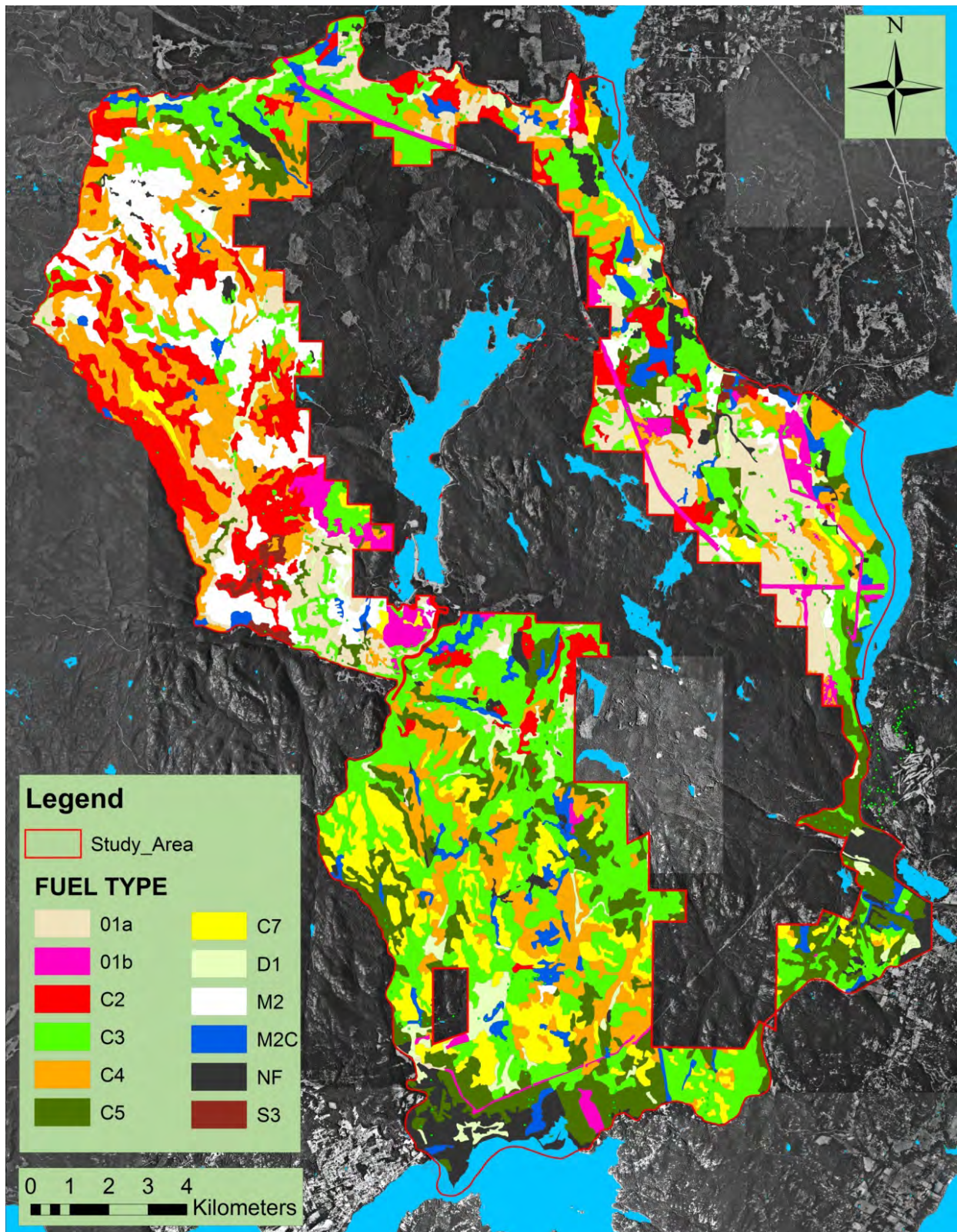
**Map 4. Comparison of the Original and Revised Maps of Canadian Fire Behaviour Prediction Fuel Types in the Sooke and Goldstream Water Supply Areas\***

\* The areas shown in gray on the map are missing data or were non-forested during the delineation of fuel type

In general, the young forest stands assigned to FBP fuel type C3 in the GVWSA showed high and extreme potential wildfire behavior, although other fuel types on steeper slopes also showed this type of behaviour due to the role of slope in accelerating the spread and intensity of wildfire. High and extreme wildfire behaviour occurs when wildfire is able to reach the forest canopy (crown fire) which results in rapid spread and the loss of most of the trees in the stand. Older forest stands, recently cleared areas, and forest stands in low relief areas showed low potential for wildfire behaviour (i.e., wildfire does not reach the forest canopy).

The areas assigned to the C2 and C3 fuel types outside of the GVWSA were most consistently mapped as exhibiting extreme wildfire behaviour potential. Areas of the C4 fuel in the steep hummocky hills in the southern portion of the study area also were mapped as exhibited extreme wildfire behaviour potential.

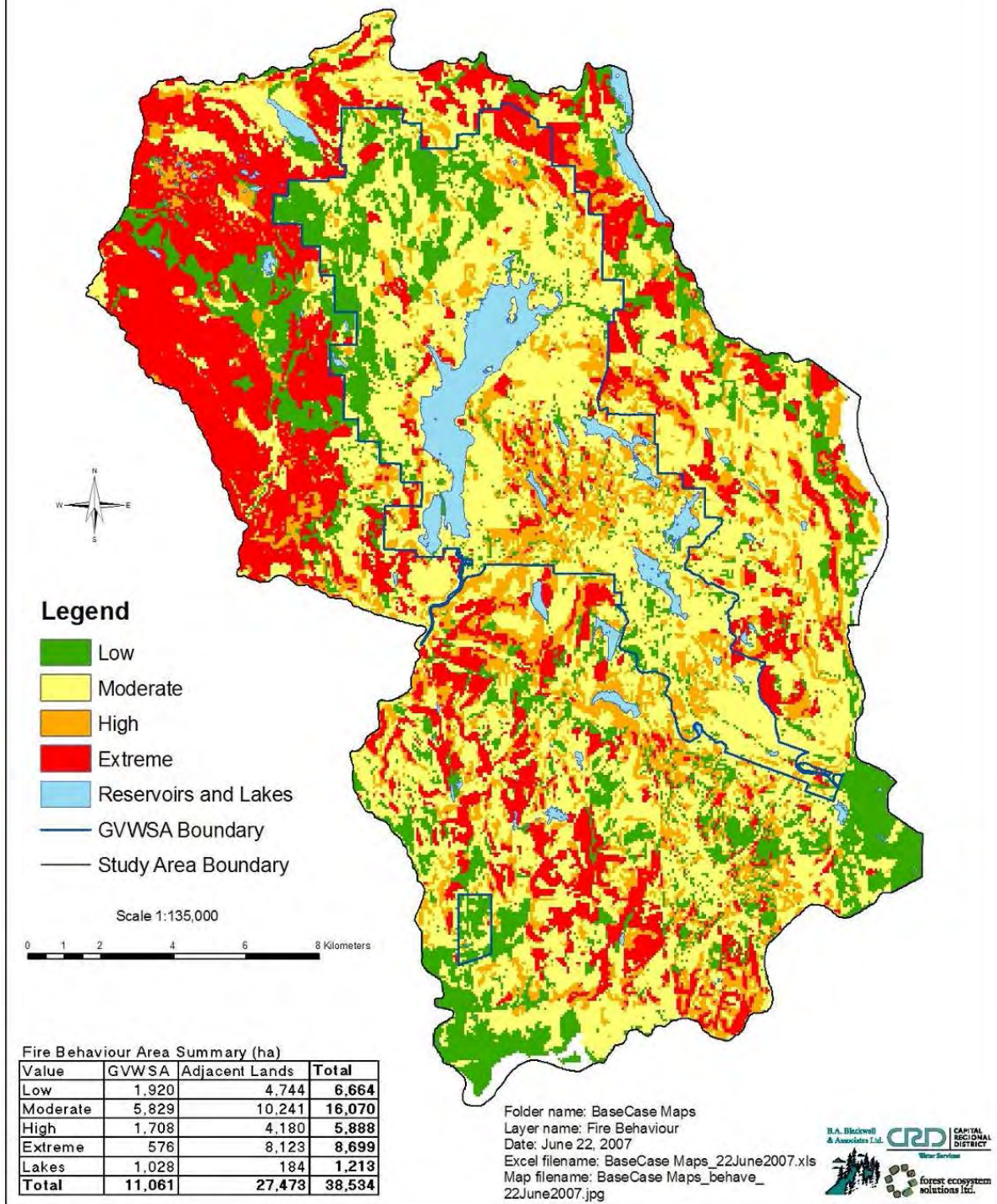




**Map 5. Canadian Fire Behaviour Prediction Fuel Types Mapped in the Expanded Study Area**



**Component: Fire Behaviour**  
**Theme: Probability**



**Map 6. Probability of Wildfire Behaviour in the Greater Victoria Water Supply Area and Adjacent Land**

A breakdown of the area in the GVWSA and the adjacent lands within each of the Wildfire Behaviour potential categories is provided in **Table 3**.

**Table 3. Comparison of the Area and Associated Percentage with Each Category for Wildfire Behaviour Potential in the GVWSA and Adjacent Lands**

| Wildfire Behaviour Potential | Area in GVWSA (ha) | % of Area in the GVWSA | Area on Adjacent Lands (ha) | % of Area on Adjacent Lands |
|------------------------------|--------------------|------------------------|-----------------------------|-----------------------------|
| Low                          | 1,920              | 19.1%                  | 4,744                       | 17.4%                       |
| Moderate                     | 5,829              | 58.1%                  | 10,241                      | 37.5%                       |
| High                         | 1,708              | 17.0%                  | 4,180                       | 15.3%                       |
| Extreme                      | 576                | 5.7%                   | 8,123                       | 29.8%                       |
| <b>Total*</b>                | <b>10,033</b>      |                        | <b>27,288</b>               |                             |

\* The total does not include the area within the GVWSA and adjacent lands occupied by reservoirs, lakes and ponds.

Just under 23% of the area within the GVWSA is mapped as exhibiting high or extreme wildfire behaviour potential under the 90<sup>th</sup> percentile fire weather conditions. Much of this area is within the Council Creek drainage that is used to divert water to Sooke Lake Reservoir in the winter. However, there are also areas of high and extreme wildfire behaviour potential in the Sooke and Goldstream water supply areas.

In contrast, almost 45% of the area adjacent to the GVWSA is mapped as exhibiting high or extreme potential wildfire behaviour. Much of this area is made up of young forest stands within the Leech River watershed directly to the west of Sooke Lake Reservoir, the primary water supply for the Greater Victoria Water Supply System (**Map 6**). However, there are areas of concern all around the northern, eastern and southern boundaries of the Sooke Water Supply Area.

The areas shown as exhibiting high and extreme wildfire behaviour potential to the west and east of the Goldstream Water Supply Area are within Sooke Hills Wilderness Regional Park. The mapping of the fuel types in these areas may not be accurate as the forest cover information for the park has not been updated since 1987. Therefore, these forest stands are older, and probably less of a hazard for potential wildfire behaviour, than indicated in the forest fuel mapping.

### 3.1.3 Wildfire Detection and Suppression Limitations

Given the high probability of ignition in the GVWSA, the presence of areas of high and extreme wildfire behaviour, and the potential impacts of wildfire on water quality and water supply infrastructure, an effective wildfire suppression program is an essential component of watershed protection and stewardship. The wildfire risk assessment provided an opportunity to test the assumptions and current approaches to wildfire detection and suppression in the GVWSA and adjacent lands. It also provided an opportunity to gain a clearer overview of the spatial constraints to quick detection and suppression (both ground-based and aerial support).

The component of the WRMS model assessing detection and suppression limitations is made up of a number of subcomponents:

- Constraints to detection
- Proximity to water sources
- Terrain steepness
- Proximity to roads
- Helicopter arrival time
- Air tanker arrival time

For the assessment of the GVWSA and adjacent lands, an additional subcomponent was added to utilize the output of a computer model developed specifically for the CRD that identified constraints to basic water delivery systems based on road access capability, slope, and the ability to get water to an area using a standard ground-based water delivery system.

### **Detection**

Although there is the potential for people outside the GVWSA and the adjacent land area to detect and report smoke, the model focused on the ability to see smoke from within the study area. There were two primary constraints to detection: 1) cloud cover during summer thunderstorms, and 2) the area which is not visible from the designated viewpoints in the GVWSA used by patrol crews.

The area subject to cloud cover during thunderstorms has been observed to be about 500 metres in elevation and above. The areas not visible from the viewpoints were identified through a GIS analysis by the CRD using the digital elevation model of the area.

At the time of the analysis, the areas with the highest constraints to detection were the portion of the study area in the Leech River watershed (due to road access difficulties) and higher elevations in the Goldstream WSA (due to cloud cover and viewpoint constraints).

### **Proximity to Water Sources**

The access to water was tested by identifying the distance of areas from permanent water bodies, year round streams, and mapped pumping stations (wetlands in the GVWSA with standing water that can be accessed by vehicle). Any area more than 300 metres away from a water source was considered to have an extreme limitation. Most of the GVWSA and adjacent lands fall into the extreme category.

### **Terrain Steepness**

Terrain steepness utilized the slope gradient information associated with terrain mapping to identify areas of steep terrain that would make access for wildfire suppression difficult. In the GVWSA areas with high and extreme access limitations due to steep slopes are concentrated on the ridges on either side of Sooke Lake Reservoir. In the adjacent lands steep slopes are concentrated above the Leech River, above Finlayson Arm (Malahat) and in the Sooke Hills terrain south of the GVWSA.



## **Proximity to Roads**

The proximity to roads provided an understanding of areas that needed to be accessed by foot and the time required to reach them. The only criterion for including roads in this mapping was that the road had to be passable for a four-wheel drive-vehicle. The roads were buffered by distance using tools in GIS to delineate areas that were furthest from any road. In the Phase 1 assessment, an area that was more than one kilometre from a road was judged to have a moderate to high limitation. In the Phase 2 analysis these criteria were changed a high limitation for areas between one and two kilometres from a road and an extreme limitation for areas more than two kilometres from a road.

Given the relatively high density of roads in the GVWSA, only the highest elevations require some walking for ground access. Within the adjacent lands, the map shows one large area where ground access is difficult. This is the area around Shields, Grasse and Crabapple lakes in the Sooke Hills which is within the Sea to Sea Regional Park Reserve.

However, in reality ground access is also quite difficult in the portion of the Leech River watershed within the study area. Although extensive system of roads exists in the area, many of them are overgrown or have washouts and are not accessible to vehicles, even those with four-wheel-drive capability.

## **Water Delivery Constraints**

The CRD model used to map areas with water delivery constraints is similar to some of the other subcomponents in the WRMS model. Slope and roads are integral to the model, but a key difference is that water delivery constraints relate to the type of vehicle that can access the roads in the study area in relation to the area that can be reached by a standard water delivery system.

If an area is accessible by a water tender truck there are essentially no constraints to water delivery. Areas that can only be reached by a four-wheel-drive initial attack truck have a much greater constraint. Areas with no road access and well away from a water source of course have the greatest constraint.

Not surprisingly there is a strong relationship between higher elevations and steeper terrain and water delivery constraints. Again most of the regional park land in the Sea to Sea/Sooke Hills area, and the portion of the Leech River watershed within the Phase 2 study area, were identified as having the greatest (extreme) water delivery constraints.

## **Helicopter Arrival Time**

If a wildfire grows beyond the size that can be suppressed by available ground crews and resources, aerial support for water drops becomes a critical component in suppression. A helicopter can also be used to drop crews and transfer water to areas inaccessible by road.

When the danger of wildfire increases to high, a helicopter with a water bucket are typically stationed at the BC Wildfire Management Branch Cobble Hill Fire Base, within about a 15 minute flight of the GVWSA. The radius of the area that could be reached within specific times was mapped for this subcomponent.

### **Air Tanker Arrival Time**

At the time of the wildfire risk assessment, air tankers (water bombers) were based at Sproat Lake on Vancouver Island and at Abbotsford on the Lower Mainland. These aircraft would be vital in suppression efforts for a large wildfire. This subcomponent uses a map showing the areas that could be reached within a certain flying time. It was assumed that the entire area could be reached within a 30 minute flight time.

### **Weighting and Output**

In Phase 1 of the wildfire risk assessment all of these subcomponents were weighted relatively equally. In Phase 2, the weightings of the subcomponents for detection and suppression constraints were revisited. In working through the factors that contribute to successful wildfire suppression, the importance of quick detection was reinforced. It was also recognized that the combination of factors in the CRD water delivery constraints model were perhaps the best predictor of difficulty with ground-based suppression. As a result, each of these two subcomponents was assigned a weighting of 30%, with the remaining 40% distributed relatively equally between the remaining subcomponents. The output ranking categories were also simplified to four from six.

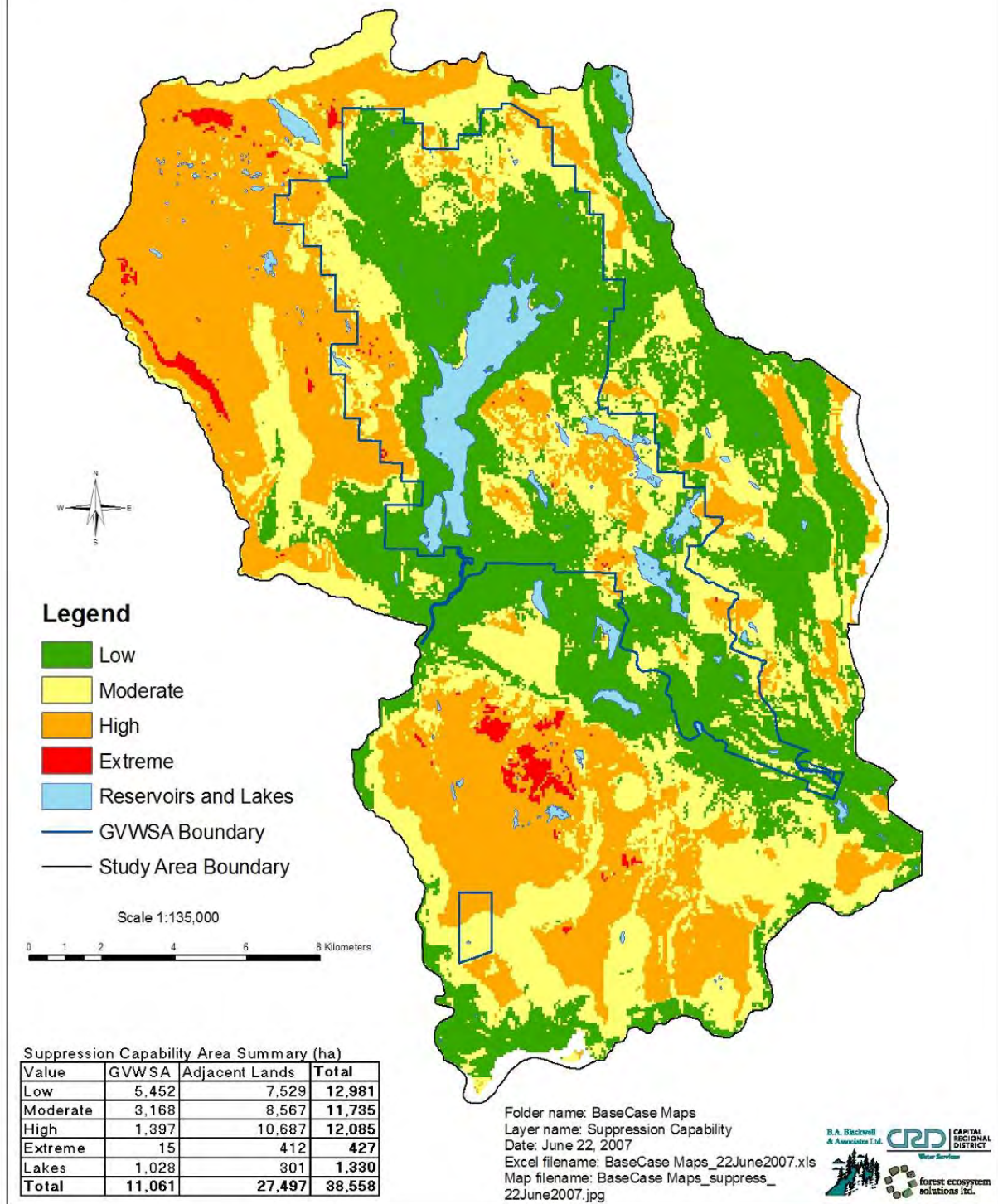
The output map for detection and suppression constraints for the entire Phase 2 study area (**Map 7**) illustrates that the extreme areas of constraint are located in the most isolated area (no roads) and on the steepest slopes that provide the greatest difficulty for water delivery. Areas of extreme detection and suppression constraints make up very small percentages of the GVWSA (0.1%) and adjacent lands (1.5%).

Areas with high and moderate constraints are concentrated at the upper elevations which have a combination of ground-based water delivery constraints, cloud cover potential, and in some cases are difficult to see from the designated vantage points in the GVWSA. This reinforced the recognition at the time that any wildfire in these areas will require an alternate system of delivering water, such as a relay systems and air support, so these resources can be requested as soon as the fire is detected.

Areas of high detection and suppression constraints made up approximately 14% of the GVWSA and 39% of the adjacent land. Areas with moderate constraints made up approximately 31.5% of the GVWSA and adjacent land. The largest concentration of areas with high and moderate constraints was in the Leech River watershed and the Sooke Hills.

A comparison of the ranking of detection and suppression constraints in the GVWSA and adjacent land is provided in **Table 4**.

**Component: Suppression Capability**  
**Theme: Probability**



**Map 7. Areas with Detection and Suppression Constraints in the Greater Victoria Water Supply Area and Adjacent Lands**

**Table 4. Comparison of the Area and Associated Percentage within Each Category for Constraints to Wildfire Detection and Suppression in the GVWSA and Adjacent Lands**

| Level of Constraint | Area in the GVWSA (ha) | % of Area in the GVWSA | Area on Adjacent Land (ha) | % Area on Adjacent Lands |
|---------------------|------------------------|------------------------|----------------------------|--------------------------|
| Low                 | 5,452                  | 54.3%                  | 7,529                      | 27.7%                    |
| Moderate            | 3,168                  | 31.6%                  | 8,567                      | 31.5%                    |
| High                | 1,397                  | 13.9%                  | 10,687                     | 39.3%                    |
| Extreme             | 15                     | 0.1%                   | 412                        | 1.5%                     |
| <b>Total*</b>       | <b>10,032</b>          |                        | <b>27,195</b>              |                          |

\* The total does not include the area within the GVWSA and adjacent lands occupied by reservoirs, lakes and ponds.

### 3.1.4 Summary Map of Probability

The maps for each of the components of probability were combined to create a summary map of the probability of a wildfire starting, spreading, and being difficult to detect and suppress. Ignition Potential and Potential Wildfire Behaviour were each given a weighting of 30% for the development of the summary map. Detection and Suppression Constraints was given a weighting of 40%.

Given that most of the study area for the wildfire risk assessment exhibited a relatively uniform potential for a wildfire start, the spatial patterns on the summary map of probability have been shaped by wildfire behaviour potential and constraints to detection and suppression (see **Map 8**).

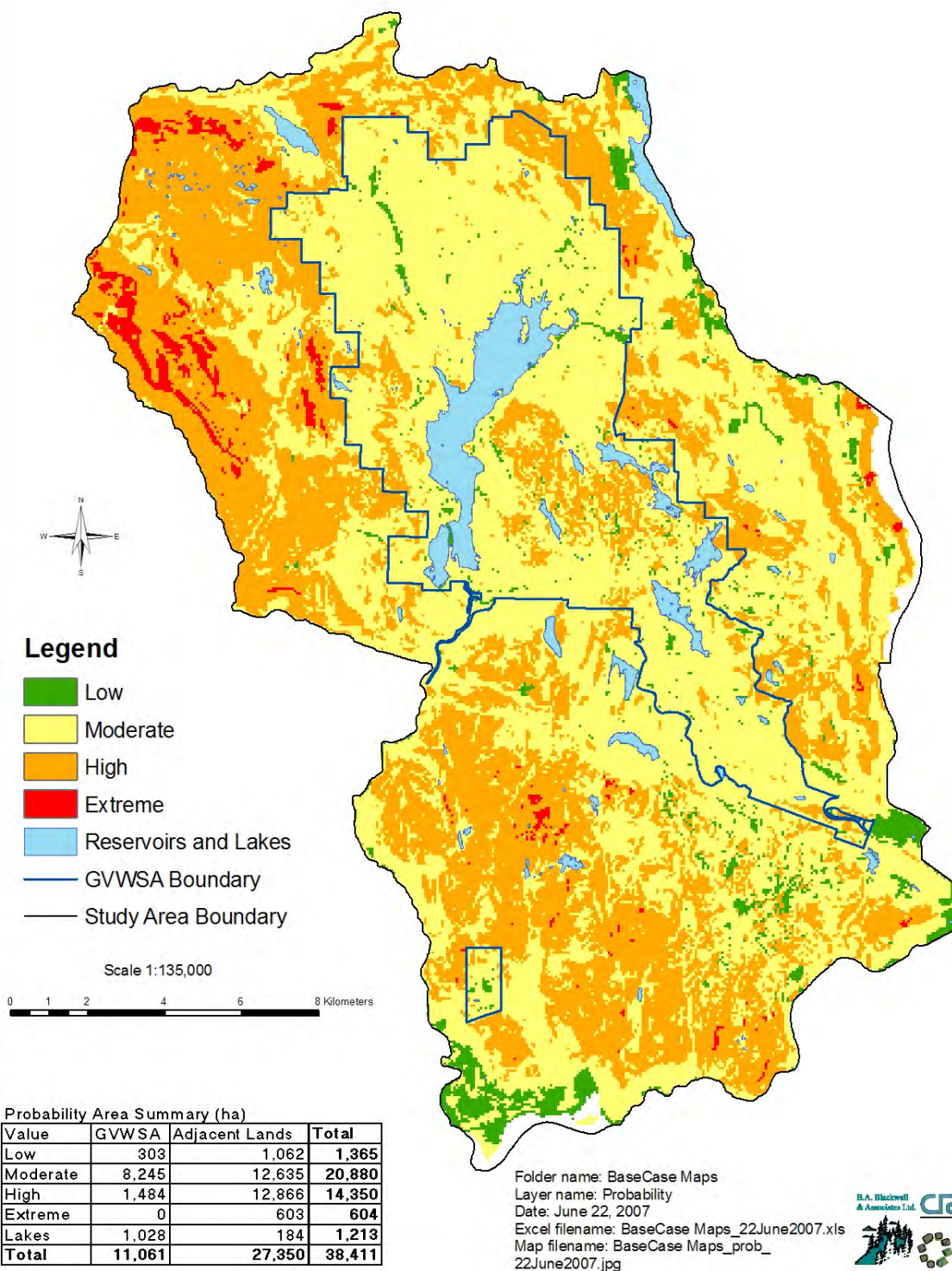
Dense young forests in terrain where detection and/or suppression were difficult were ranked as having a high potential for wildfire. Wetlands and developed low elevation areas were generally ranked as having a low probability for wildfire.

Only about 15% of the GVWSA was ranked with a high probability for wildfire. None of the area within the GVWSA was ranked as extreme. About 17.5% of the GVWSA had a low probability ranking.

Probability rankings in lands adjacent to the GVWSA were considerably higher. Approximately 47.5% of the area of adjacent lands was ranked as a high probability for a wildfire to start, spread, and be difficult to detect and suppress. About two percent of the area was ranked extreme. Most of the remainder of the area (46.5%) was ranked as moderate. Only about four percent was ranked as low. A comparison of the probability rankings between the GVWSA and adjacent lands is provided in **Table 5**.



## Theme: Probability



**Map 8. Summary Map Illustrating the Probability of a Wildfire Starting, Spreading, and Being Difficult to Detect and Suppress within the GVWSA and Adjacent Lands**

**Table 5. Comparison of the Area and Associated Percentage within Each Category for Wildfire Probability**

| <b>Probability</b> | <b>Area in the GVWSA (ha)</b> | <b>% of Area in the GVWSA</b> | <b>Area on Adjacent Land (ha)</b> | <b>% Area on Adjacent Lands</b> |
|--------------------|-------------------------------|-------------------------------|-----------------------------------|---------------------------------|
| Low                | 303                           | 3.0%                          | 1,062                             | 3.9%                            |
| Moderate           | 8,245                         | 82.2%                         | 12,635                            | 46.5%                           |
| High               | 1,484                         | 14.8%                         | 12,866                            | 47.4%                           |
| Extreme            | 0                             | 0.0%                          | 603                               | 2.2%                            |
| <b>Total*</b>      | <b>10,032</b>                 |                               | <b>27,166</b>                     |                                 |

\* The total does not include the area within the GVWSA and adjacent lands occupied by reservoirs, lakes and ponds. Differences in totals between tables are due to rounding factors.

Areas of high and extreme probability were concentrated in the Leech River watershed and in the Sooke Hills. Areas of high probability were also found in private managed forest lands directly to the north and south of the Sooke WSA. Patches of high probability area were also found in rural residential lands to the east of the Sooke and Goldstream WSAs.

## Conclusions

As with any complex spatial model, it is useful to focus on the broad patterns suggested by the output, rather than trying to understand and solve any small anomalies. Recognizing that there may be some minor issues with the data in some areas, several general conclusions can be drawn from the Phase 2 map of the probability of a wildfire starting, spreading and being difficult to detect and suppress:

- The greatest areas of concern in the GVWSA are areas of younger, dense forest on steep slopes and higher elevations where access is difficult and a wildfire could gain momentum.
- Most of the Leech River watershed within the study area is of great concern given the area of high and extreme wildfire probability. The spread of a wildfire into the Sooke WSA from the Leech could pose a major threat to the water supply area.
- The high ranking of wildfire probability on private lands to the north, east and south of the Sooke WSA is also a serious concern. The greatest threat is a wildfire spreading into the GVWSA from the south, both because of the close proximity to the water supply intake and the direction of prevailing winds.
- The area of high and extreme wildfire probability on adjacent lands will likely be reduced somewhat over time as the forest ages.

## 3.2 Consequences

A large and hot-burning wildfire will have major impacts on a forested landscape and native ecosystems. If that landscape also contains important drinking water sources, water supply and community infrastructure, and residences, the result could be catastrophic. Such a wildfire could also lead to considerable economic losses on commercial forest land.

The impacts of a wildfire are not confined to the area that is burned. Wildfires typically produce large volumes of smoke which may pose a threat to the health of people with breathing difficulties and could obscure, and effectively shut down, air and ground transportation.

To address the potential consequences of a large wildfire, the wildfire risk assessment for the GVWSA and adjacent lands examined implications for:

- Water quality
- Water supply infrastructure
- Residential lands
- Commercial forest
- Park land
- Air quality
- Biodiversity

These values at risk were addressed slightly differently in Phase 1 and Phase 2 of the risk assessment. The Phase 2 analysis made some modifications to subcomponents. These modifications will be described in the appropriate section.

An advantage of assessing the potential impacts on the lands adjacent to the GVWSA is to help understand the possible implications of a wildfire starting within the water supply area spreading to adjacent private and public lands.

### 3.2.1 Water Quality

The potential for impacts to water quality in the GVWSA was a primary focus of the risk assessment. There were two main factors to consider for spatially illustrating the potential impacts to water quality:

1. The relative importance of sub-drainages within the GVWSA, and the disinfection facility, in relation to water supply
2. The potential for generating nutrients and sediment that would degrade water quality given the biophysical characteristics of the GVWSA

Using the basic structure of the WRMS model developed for the Greater Vancouver water supply area, CRD staff in the Water Quality and Watershed Protection divisions modified or developed and ranked the subcomponents required for the application this component of the model to the GVWSA. BA Blackwell and Associates provided information on the potential for sediments and nutrients to be generated from a wildfire in different forest structural stages.

Five subcomponents were identified to assess potential consequences to water quality:

1. Relative importance of the catchment areas for water supply
2. Proportion of water supply
3. Proximity to the reservoir
4. Nutrients, color, taste and odour
5. Turbidity

The maps for these subcomponents utilize sub-drainage areas (management units) that have been delineated to assist with the stewardship of the GVWSA. These sub-drainage areas are illustrated on a map of potential wildfire impact ratings (**Map 9**).

Areas within the GVWSA, but outside of the catchment area of water supply reservoirs, were not included in these analyses.

### **Relative Importance of Reservoir Catchment Area**

Sooke Lake Reservoir is the primary water supply reservoir for the Greater Victoria Water Supply System. It is typically used 51 of 52 weeks per year. The four water supply reservoirs in the Goldstream River watershed are designated as a secondary (backup) water supply used during annual maintenance and in the event of a problem with water quality or infrastructure in the Sooke WSA. The area immediately around the water disinfection facility at Japan Gulch is included as an area of primary importance to water supply.

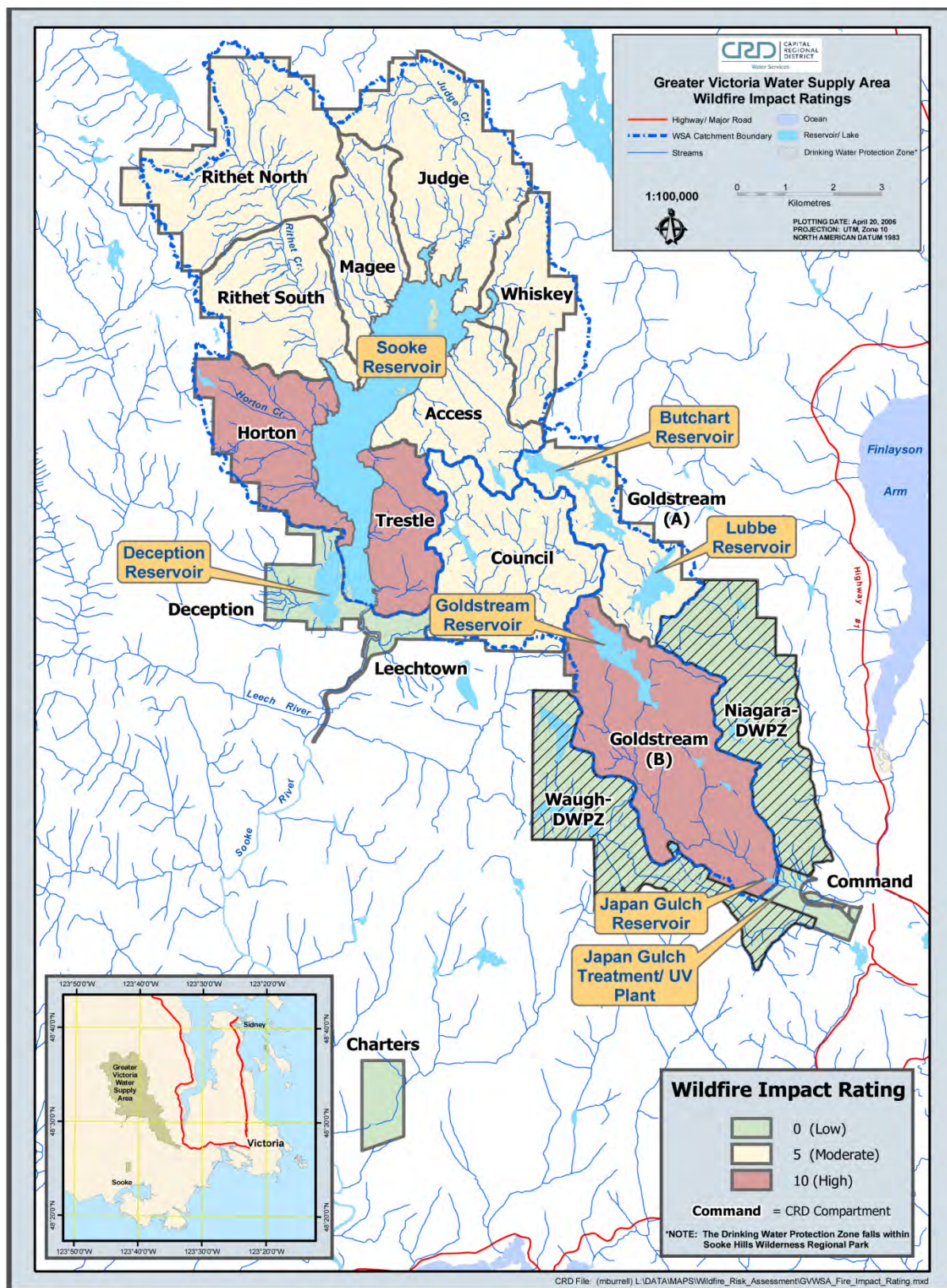
Each winter, water from the Council Creek watershed is diverted to Sooke Lake Reservoir. However, if there was a problem (such as impacts from a wildfire) in the Council, the diversion would not be undertaken. Therefore, it is ranked of less importance than the Goldstream WSA.

### **Proportional Contribution to the Water Supply**

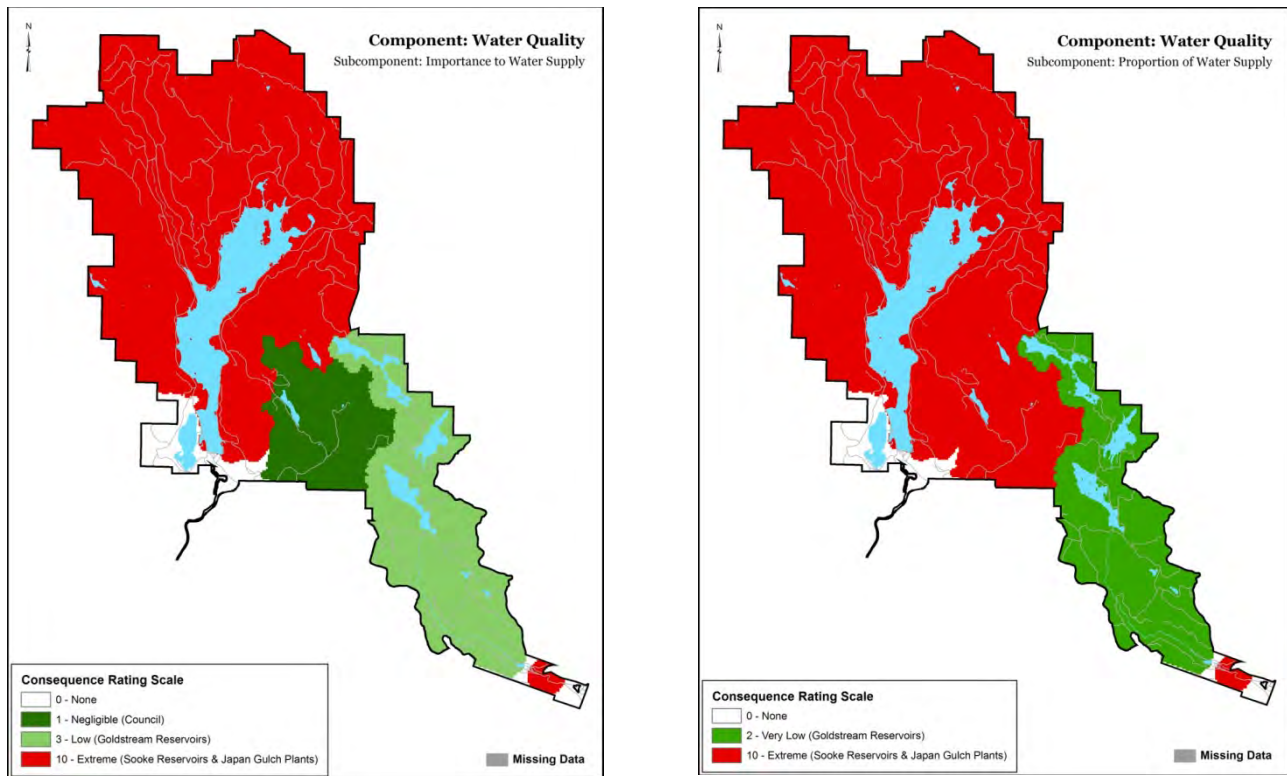
The proportion of water supply sub-component provides a measure of the relative contribution of the Sooke and Goldstream water supply areas to the water supply system. In Phase 1, the Council Creek subdrainage was included with the Sooke WSA in importance (see **Map 10**).

In Phase 2, the Council Creek catchment was separated from the Sooke WSA and given a very low ranking to indicate that the diversion channel could be kept closed if there were impacts to the area from a wildfire.





**Map 9. Wildfire Impact Ratings for the Management Units in the Greater Victoria Water Supply Area**



**Map 10. A Comparison of the Rankings for Importance to the Water Supply and Proportion of the Water Supply in the Sooke and Goldstream Water Supply Areas**

### Proximity to Water Supply Intake

This subcomponent is based on the assumption that an event closer to the intake has a greater potential to create an impact on water quality. The south and mid basins of Sooke Lake Reservoir are relatively shallow and would be much less effective at diluting a water quality issue than the larger and more distant north basin.

Similarly a water quality issue could quickly enter the water supply intake and the tunnel to the water disinfection facility from an impact at the south end of the reservoir.

Water is delivered differently in the Goldstream WSA. Water flows between the three main water supply reservoirs (Butchart, Lubbe and Goldstream) and then down the Goldstream River to an intake at the very small Japan Gulch Reservoir. If a water quality issues occurs in Goldstream Reservoir, the Goldstream River or Japan Gulch Reservoir when they were needed for water supply, it would be a major concern.

Given the characteristics of these two water supply systems, the Wildfire Impact Ratings map for the sub-drainage areas (**Map 10**) was used for this subcomponent.

In Phase 2 of the risk assessment, the mapping for this subcomponent was modified slightly. Only the two sub-drainages closest to the water intake on Sooke Lake Reservoir and a two-kilometre area around the water disinfection facilities at Japan Gulch and Sooke Lake Road were included.

### **Nutrients, Colour, Taste and Odour**

Since the water supply reservoirs in the GVWSA are quite nutrient poor, any additional phosphorous and nitrogen entering the reservoirs can trigger blooms of naturally occurring algae and cyanobacteria and potentially change the composition of the algal community to favour species that cause taste and odour issues or produce toxins.

Several assumptions were made for this subcomponent of the WRMS model:

- the primary source of nutrients entering the water supply reservoirs as a result of a wildfire would be ash from the burned vegetation,
- the amount of nutrients released would be related to the size of the trees making up the forest, and
- sub-drainages closest to the water supply intakes would be the largest source of such nutrients, followed by any sub-drainage where water flowed directly into water supply reservoirs.

Two sub-subcomponents were developed to represent these assumptions and combined to form this subcomponent. Proximity to water supply intake was given a 60% weighting. The nutrient input from burned vegetation was given a 40% weighting.

The subcomponent for nutrients, colour, taste and odour was given a 25% weighting in developing the consequence map for water quality.

### **Turbidity**

Given the stable (bedrock-controlled) terrain and coarse-textured rocky soils in the GVWSA, erosion and sediment transport are minimal and turbidity is not considered an issue in the water supply reservoirs. However, in severely burned areas where vegetation has been lost, soils have been exposed and soil structure may have been damaged by heat, there is the potential for erosion, sediment transport, and debris flows. If areas burned were close to the reservoir intakes, such events could likely result in major inputs of sediment entering the water supply.

In exploring this scenario, it was assumed that three factors were relevant: 1) the type of soil and its potential to remain in suspension, 2) the severity of the burn impacts on soil, which is related to the amount and type of vegetation burned, and 3) the proximity of the burned area to water supply intakes.

Therefore, three sub-subcomponents were developed. Soil type and burn severity were each given a 20% weighting for the turbidity subcomponent. Proximity to intake was given a 60% weighting.

The turbidity subcomponent was given a 25% weighting in developing the consequence map for water quality.

### **Consequence Map for Water Quality**

Each subcomponent relating to consequences to water quality was given a weighting in the development of the map for this component:

- Relative importance to water supply – 20%
- Proportion of water supply – 10%
- Proximity to water supply intake – 20%
- Nutrients, colour, taste and odour – 25%
- Turbidity – 25%

The spatial extent of the summary consequence map for water quality is limited to the catchment area of the GVWSA (some of which is outside the boundary of CRD property) and areas around the water disinfection facilities (see **Map 11**) .

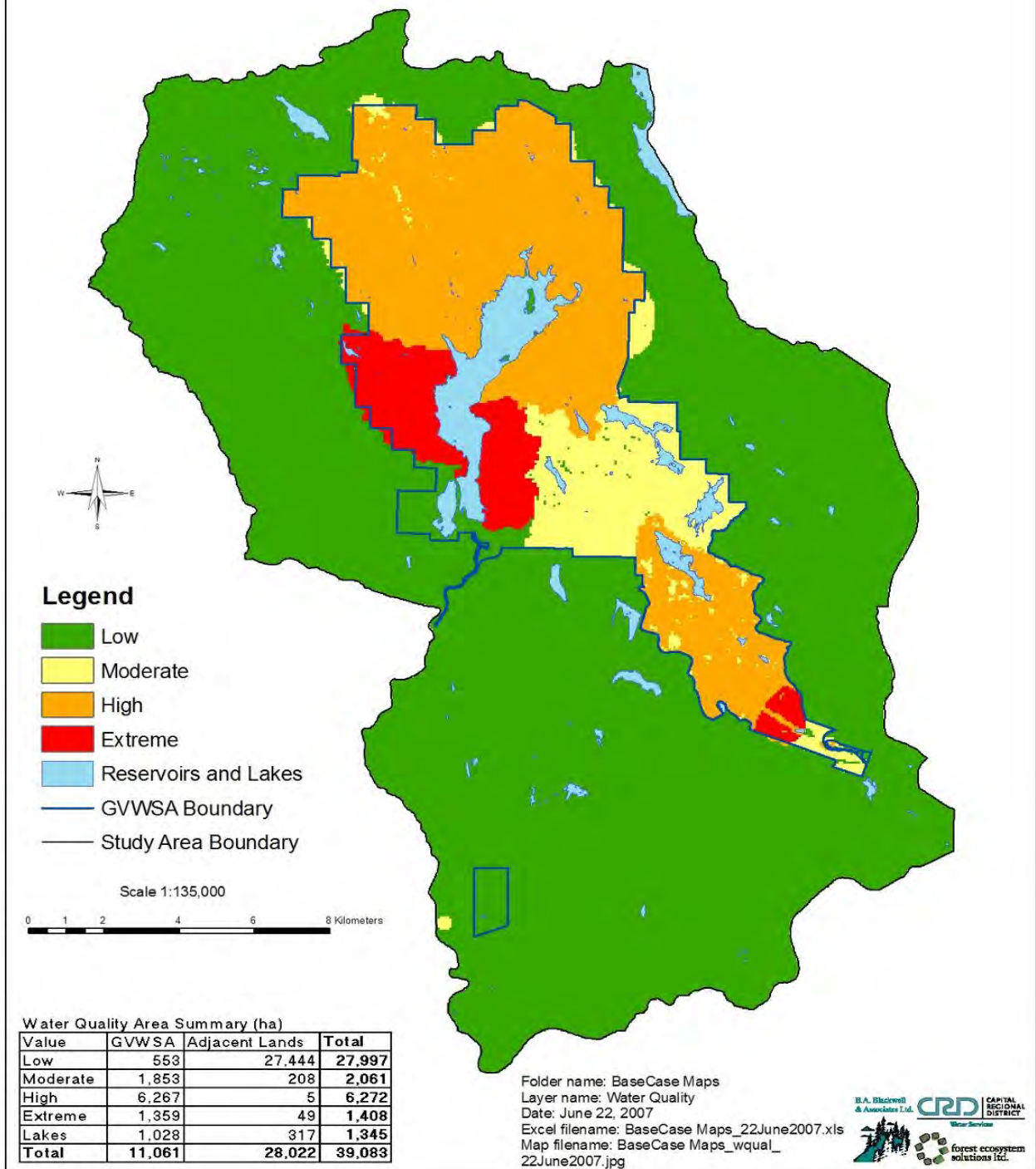
The summary consequence map illustrates the importance of the sub-drainages adjacent to the southern portion of Sooke Lake Reservoir and the lower portion of the Goldstream River catchment above Japan Gulch Reservoir. A wildfire burning in these areas would be considered likely to generate extreme consequences to water quality. These areas made up about 13.6% of the GVWSA. A small area outside the boundary of the GVWSA but within the catchment area of Sooke Lake Reservoir also was mapped with this ranking.

The remainder of the Sooke Water Supply Area, the catchment area for the Goldstream Reservoir and the remainder of the Goldstream River catchment were ranked as high consequence areas in the event of wildfire. Approximately 62.6% of the GVWSA was mapped with a high consequence ranking.

The catchment areas of the Lubbe and Butchart reservoirs, the Council Creek sub-drainage, and the areas around the water disinfection facilities were mapped with a moderate consequence ranking. This makes up about 18.5% of the GVWSA. Portions of the catchment of Sooke Lake Reservoir outside of the GVWSA and areas less likely to generate nutrients and turbidity in the Sooke and Goldstream water supply areas also received a moderate consequence ranking.



**Component: Water Quality**  
**Theme: Consequence**



**Map 11. Summary Map Illustrating the Ratings for Consequences to Water Quality in the Greater Victoria Water Supply Area and Adjacent Land**

### **3.2.2 Consequences for Interface Areas and Infrastructure**

Most communities in British Columbia are bordered by forested areas. In rural parts of communities, and rural residential lands in unincorporated areas, houses are often located within remaining areas of forest. The threat of wildfire is a major concern in such 'interface' areas. The protection of life and property is the highest priority in the wildfire management program in the province.

Most people think of interface fires as those spreading into communities and rural residential areas from surrounding lands, threatening structures and even entire neighbourhoods. However, fires that start in residential areas can spread into adjacent forest, threatening the standing timber in managed forest lands, and ecosystems and species of conservation significance in parks.

Important community infrastructure can also be threatened by wildfire. In the case of the GVWSA, the priority is water supply infrastructure, but the loss or damage to energy transmission corridors and communication facilities would have additional impact to residents of the CRD or the adjacent Cowichan Valley Regional District.

The Interface Areas and Infrastructure component of the WRMS model for the GVWSA and adjacent lands examined the potential consequences of a wildfire on:

1. Residential areas (ranked in priority by density of dwellings)
2. Non-residential areas (including managed forest lands, park, cultural/historic sites and recreation areas)
3. Key infrastructure (water supply, energy transmission and communications)

In Phase 2 of the risk assessment, infrastructure was divided into two separate subcomponents: water supply and community.

The Interface Areas and Infrastructure component was given an overall weighting of 10% in the assessment of consequences. This decision, and the assignment of weightings for all of the subcomponents of Interface Areas and Infrastructure, was made using professional judgment by CRD staff and BA Blackwell and Associates. This weighting reflects the dominant focus on water quality in the risk assessment.

#### **Residential Areas**

It was assumed that there was a direct relationship between level of consequence and the density of residential dwellings. The most recent digital aerial photo mosaic (orthophoto) for the study area was used to identify the density of dwellings on each separate property in large lot rural areas or within a suburban neighbourhood or a developed community. The density mapping outside the GVWSA was done by CRD staff.

In Phase 1 of the risk assessment, a buffer area was mapped in the portions of the GVWSA that were adjacent to areas containing residential dwellings. The area of highest concern was the southeastern tip of the GVWSA next to suburban areas in the City of Langford. A moderate area of concern was a newly developing rural residential (one and two acre) subdivision next to the main entrance to the Sooke WSA in the Cowichan Valley Regional District.

In Phase 2 of the risk assessment, each mapped property (using the provincial property dataset) was assigned a density class using a visual inspection of the orthophoto. In the time that had elapsed since Phase 1, an additional rural residential property development was proposed just to the east of the Butchart and Lubbe reservoirs in the Goldstream WSA. This proposed development was mapped to reflect its planned density.

### **Non-Residential Areas**

In Phase 1 of the risk assessment, buffers were mapped within the GVWSA where these areas bordered private managed forest land or park land (no other land category was needed). Private forest lands were given a higher consequence rating than park land.

In Phase 2, the actual location of private managed forest and park land were mapped. The relative ranking of these lands remained unchanged from Phase 1.

At the time of the risk assessment virtually all of the lands surrounding the Sooke WSA were private managed forest land. This included the lands in the Leech River watershed to the west that were later purchased by the CRD from TimberWest Forest Ltd. (December 2007). The lands on either side of the Goldstream WSA are within a regional park.

### **Infrastructure**

The infrastructure mapping in Phase 1, not surprisingly, was almost entirely associated with the water supply. Water supply infrastructure included:

- the Japan Gulch disinfection facilities,
- essential communications towers,
- a structure at Sooke Dam containing a backup power generator,
- the first portion of the above-ground concrete flow line that carried the water supply to Sooke
- a key pressure regulating structure (the Headtank),
- hydro-meteorological monitoring stations with structures and/or towers
- the caretaker's residence at the Sooke Gate entrance to the GVWSA, and
- the Field Operations Centre for the Watershed Protection Division.

The Infrastructure subcomponent map also included the portion of the large BC Hydro power transmission line that runs through a portion of the GVWSA. The mapping of these facilities, and the transmission line, included a 500 metre area around/adjacent to them to highlight the importance of an unburned buffer for protection.

In Phase 1, the Infrastructure subcomponent was assigned a weighting of 50% of the overall weighting for Interface Areas and Infrastructure.

In Phase 2 of the risk assessment, the mapped water supply infrastructure was expanded to include the remainder of the flowline to Sooke, and the water disinfection facility for Sooke. Infrastructure considered important to the community was separated out in a separate subcomponent. This included:

- the CRD power line that runs along the east side of Sooke Lake Reservoir and supplies power to the Headtank regulating facility for water pressure<sup>3</sup>
- the BC Hydro power line that supplies electricity to the water disinfection facilities at Japan Gulch<sup>3</sup>,
- all other BC Hydro transmission lines that ran through the expanded study area,
- the buried (but potentially vulnerable) high pressure natural gas pipeline that runs through Sooke Hills Wilderness Regional Park to the east of the Goldstream WSA, and
- an above-ground natural gas valve station along the route of the pipeline

In Phase 2 of the risk assessment, the 50% weighting for Infrastructure assigned in Phase 1 was divided between Water Supply Infrastructure and Community Infrastructure.

### **Consequence Map for Interface Areas and Infrastructure**

Each subcomponent relating to consequences to interface areas and infrastructure was given a weighting in the development of the map for this component:

- Residential Areas – 40%
- Non-Residential Areas – 10%
- Water supply infrastructure – 30%
- Community infrastructure – 20%

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<sup>3</sup> This power line should perhaps have been included in Water Supply Infrastructure subcomponent



The consequence map for Interface Areas and Infrastructure (**Map 12**) shows few areas with a high or extreme consequence ranking. This appears to be the result of a lack of overlap of features in each subcomponent.

The areas of high consequence are mostly where residential areas and the buffer area around power transmission lines overlap. Areas of extreme consequence are where residential areas, power transmission lines and buffers around important water supply facilities overlap.

All other features are ranked as moderate consequence, even if they were considered an extreme consequence ranking in their respective subcomponent.

However, the process of identifying these features was a very useful exercise in identifying consequence values, and the individual subcomponent maps provide valuable information on the relative importance of the features in this component.

A more focused compilation of the components of infrastructure essential to water supply (e.g., including essential power lines needed for water supply facilities in that subcomponent) and a higher weighting assigned to water supply infrastructure would have been more consistent with an emphasis on water supply in the risk assessment.

### **3.2.3 Consequences Relating to Air Quality**

The smoke generated by wildfire can spread over a very large area and can affect human health and interfere with essential regional transportation by greatly reducing visibility. The WRMS model incorporates four subcomponents that represent the factors determining the impacts associated with smoke from a large wildfire:

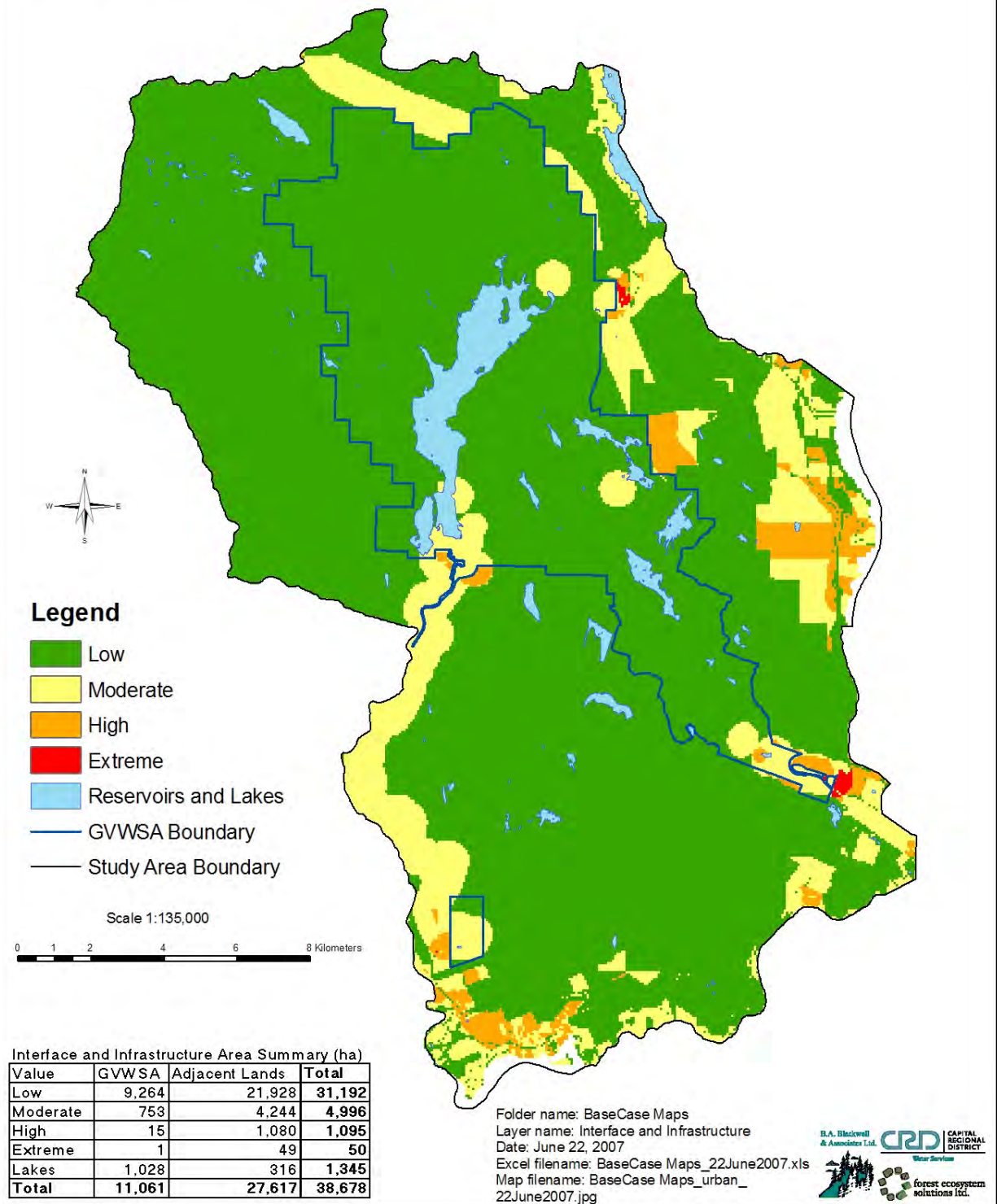
1. The sensitivity of the 'airshed' (how easily smoke can move throughout the study area)
2. The proximity of the area burning to population centres
3. How much smoke could be produced by the forest in each area
4. The potential for smoke to vent to the upper atmosphere in each area

This component was given an overall weighting of 10%.

#### **Airshed Sensitivity Rating**

Based on conversations with CRD staff examining air quality in the region, it was assumed that smoke could easily move throughout the study area (subject to prevailing winds). Therefore the all of the study areas in both Phase 1 and Phase 2 of the risk assessment were given the same extreme ranking.

**Component: Interface and Infrastructure**  
**Theme: Consequence**



**Map 12. Consequence Rankings Relating to Interface Areas and Infrastructure in the Greater Victoria Water Supply Area and Adjacent Land**

## **Proximity to Population Centres**

This subcomponent is based on the assumption that smoke generated nearest to residential areas will have a greater impact than smoke from a wildfire further away. Five distance categories were developed and maps were created based on the distance from residential areas mapped for the Interface and Infrastructure component.

## **Smoke Production Potential**

Smoke production during a wildfire is based on the amount of fuel, its moisture content, and the heat of combustion. Given that the risk assessment was based on the 90<sup>th</sup> percentile fire weather conditions (i.e., very dry fuels and high potential intensity of a wildfire) this subcomponent was based on the amount of available fuel. Forest stands were assigned to one of four categories based the size and density of trees.

Most of the forests in the GVWSA (70.5%) and the expanded study area (57.5%) were ranked as having an extreme potential to generate smoke.

## **Smoke Venting Potential**

Areas above 500 metres in elevation are assumed to be more likely to vent smoke to the upper atmosphere even during days with poor ventilation conditions. This subcomponent generated a map of areas with concerns about venting potential based on elevation categories.

Most of the GVWSA and the adjacent lands were within the elevation category 100-500 metres in elevation, which resulted in a high concern about the potential to vent away smoke.

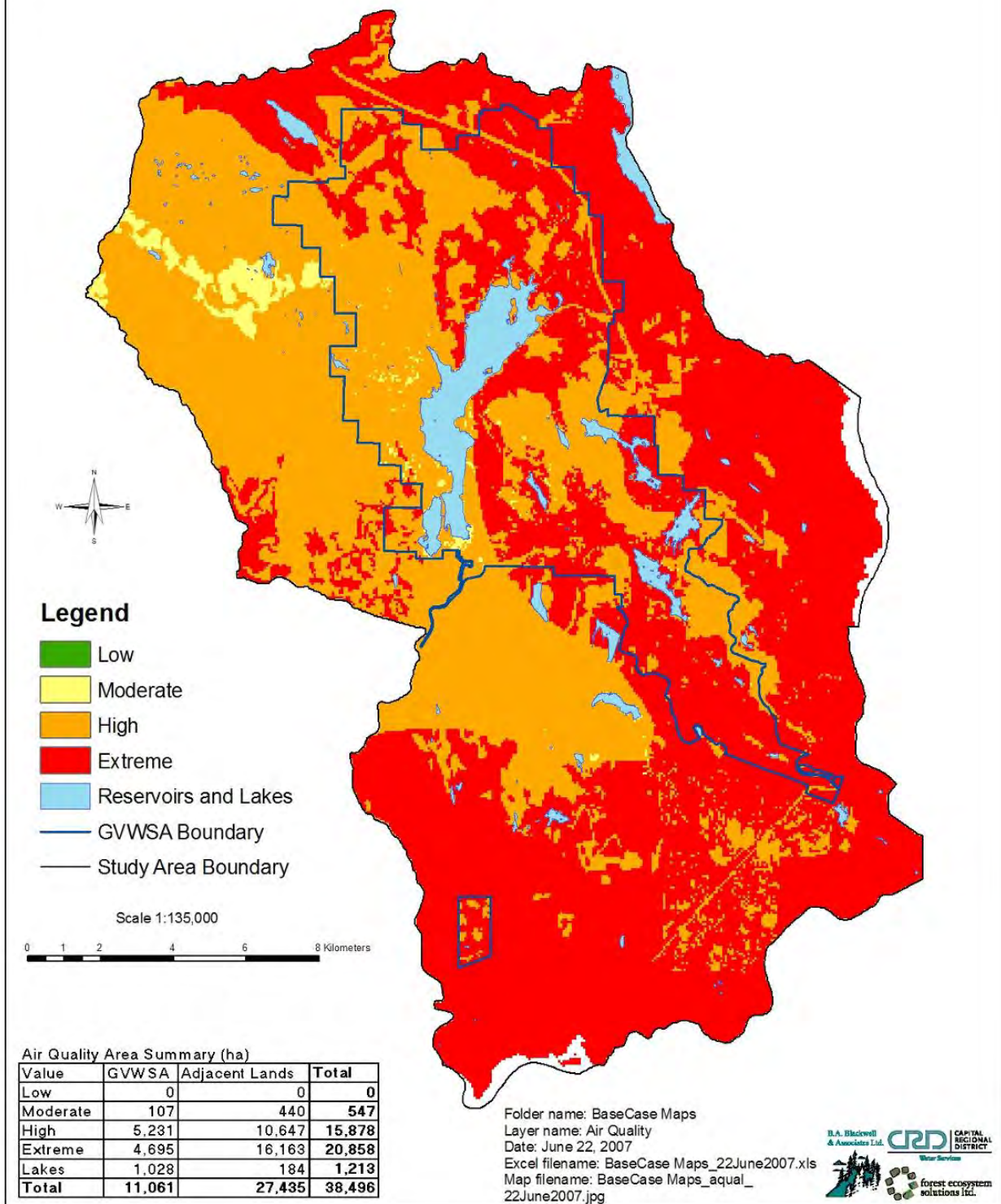
## **Consequence Map for Air Quality**

Each subcomponent relating to consequences to air quality was given a weighting in the development of the map for this component:

- Airshed Sensitivity Rating – 20%
- Proximity to population centres – 30%
- Smoke production potential – 20%
- Smoke venting potential – 30%

The areas of highest concern for generating smoke and causing major air quality concerns in the GVWSA and adjacent land are those at low elevations, closest to population centres, and containing forests with high potential fuel loadings (see **Map 13**).

**Component: Air Quality**  
**Theme: Consequence**



**Map 13. Consequence Rankings Relating to Air Quality in the Greater Victoria Water Supply Area and Adjacent Land**

Almost all of the GVWSA (99%) and the adjacent lands (98.5%) have the potential for a wildfire to cause high or extreme consequences for air quality. Only the young forests at higher elevations and well away from population centres, or areas with limited fuels received a moderate ranking.

### **3.2.4 Consequences for Biodiversity**

Although wildfire has been an integral component of the ecological processes shaping the diversity of ecosystems and species on southeast Vancouver Island, a large wildfire would be perceived to pose a major threat to ecosystems and species of high conservation value in the GVWSA and adjacent lands.

Due to history of logging and land development since European settlement of the area, many native ecosystems have been greatly altered or lost to residential areas or agriculture. Any remaining relatively undisturbed ecosystems are therefore considered to be of great value to sustaining native biodiversity and representing the pre-settlement landscape. Remnant areas of older (>150 years) coniferous forest in particular, and the species they support, are considered to be of provincial and regional conservation significance.

To acknowledge the potential impacts of a large wildfire on these conservation values, the WRMS model incorporates a Biodiversity component. In Phase 1 of the risk assessment, two subcomponents were identified:

1. Red and blue listed<sup>4</sup> older forest ecosystems
2. Locations of red and blue listed species tracked by the BC Conservation Data Centre

In Phase 2 of the risk assessment, a third subcomponent – areas of rock outcropping containing meadow vegetation communities and arbutus trees – were added. This subcomponent was limited to the area where the CRD had mapping available.

Given the emphasis on water quality in the wildfire risk assessment for the GVWSA and adjacent lands, this component was given an overall weighting of five percent.

### **Older Forest Ecosystems**

Older forest within the Greater Victoria Water Supply Area and adjacent lands where data were available, were mapped as representing an extreme consequence to biodiversity. Older regenerating forest was included in this mapping as a low to moderate consequence to represent future older forest.

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<sup>4</sup> At the time of the risk assessment, red-listed ecosystems were those considered endangered (potential for extirpation) in British Columbia. Blue-listed ecosystems were considered threatened with the possibility of becoming endangered if threats continued. Older age class of all forest site-series (types of forest communities) in the drier maritime subzones of the Coastal Western Hemlock Biogeoclimatic Zone and the Coastal Douglas Fir Biogeoclimatic Zone (i.e., within the risk assessment study area) were considered at risk in BC.

The subcomponent of older forest was given a weighting of 75% in Phase 1 in the development of the final overlay map for Consequences to Biodiversity. This weighting was reduced to 70% in Phase 2.

Approximately 34% of the GVWSA contains older forest stands versus 2.8% of the adjacent lands. Older forest on adjacent lands is concentrated in the Niagara Creek portion of Sooke Hills Wilderness Regional Park (to the east of the Goldstream WSA).

### **Records of the Conservation Data Centre**

The records of the Conservation Data Centre (CDC) are based on point locations where a species of concern occurs, surrounded by a buffer area that varies in size with the level of confidence of the location of the record. The CDC has no records of species within the GVWSA due to absence of surveys for these species. Records on the lands adjacent to the GVWSA are very sparse and typically have a very large buffer area indicating that there is uncertainty about the exact location.

For Phase 1 of the risk assessment, the entire GVWSA was given a low to moderate ranking given it was likely that there were some species of concern present and this subcomponent was given a 25% weighting in developing the final overlay map for Consequences to Biodiversity. In Phase 2 of the assessment, the subcomponent relating to the data from the CDC was not used.

### **Rock Outcroppings, Meadows and Arbutus Woodland**

Many plant species of conservation concern can be found in the meadow and seepage areas associated with rock outcroppings in the GVWSA and adjacent lands. Therefore, the location of rock outcroppings was included in Phase 2 of the wildfire risk assessment. In many of these rock outcrop areas, arbutus trees, and the native shrub manzanita may also be present. The mapping of these areas on adjacent lands was limited to CRD properties. This subcomponent was given a weighting of 30% in the development of the final overlay map for Consequences to Biodiversity.

### **Consequence Map for Biodiversity**

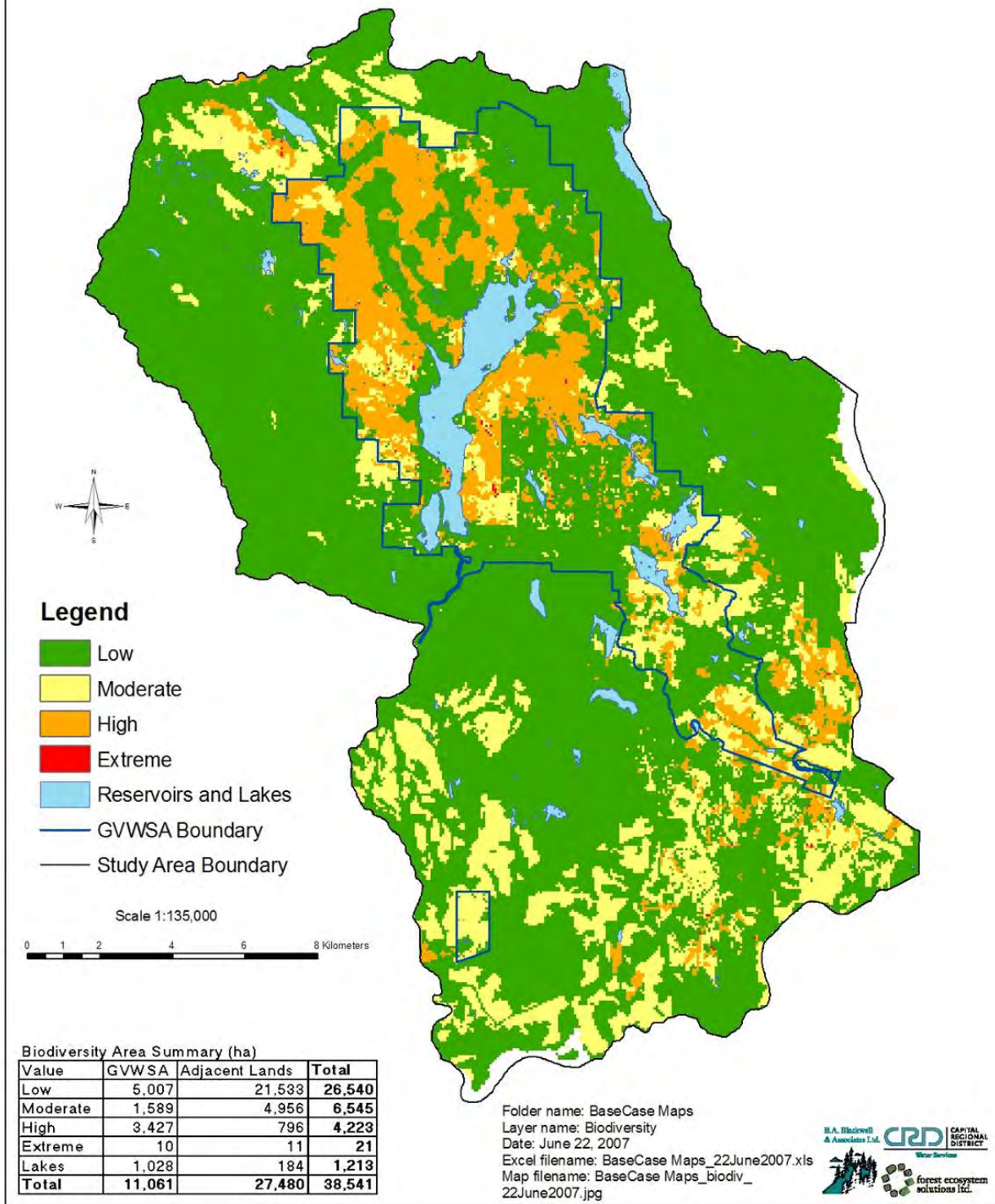
The subcomponents relating to consequences to biodiversity were each given a weighting in the development of the map for this component:

- Older forest – 70%
- Rock outcroppings, meadow and arbutus woodland – 30%

The map for Consequences to Biodiversity illustrates that most of the remnant areas of conservation concern are concentrated in the Sooke WSA (see **Map 14**). These areas are almost all older coniferous forest. The remaining areas of old forest on adjacent land are within Sooke Hills Wilderness Regional Park.



**Component: Biodiversity**  
**Theme: Consequence**



**Map 14. Consequence Rankings for Biodiversity in the Greater Victoria Water Supply Area and Adjacent Lands**

Much of the forest in the Goldstream WSA has been ranked as future old forest, although there are some areas that were classed as older forest. In all, 50% of the GVWSA is ranked as moderate to high consequence for loss of biodiversity. Areas of low consequence in the Sooke and Goldstream water supply areas are younger forests (<80 years old).

There are extensive areas of older (80-100 year old) second-growth forest and meadow in the Sooke Hills and Sooke Hills Wilderness and Mount Wells regional parks. It is assumed that forest in this age class had lower value than older forest and are classed as a moderate consequence for loss of biodiversity.

Most of the remaining landscape is ranked of low consequence to biodiversity due to logging and residential development.

### **3.2.5 Summary Map of Consequences**

The final maps for each of the consequence components in the WRMS model were combined to create a summary map of the consequences of a large wildfire on identified values in the GVWSA and adjacent land. Each subcomponent was assigned a ranking in the development of the summary map:

- Water quality – 75%
- Interface areas and infrastructure – 10%
- Air quality – 10%
- Biodiversity – 5%

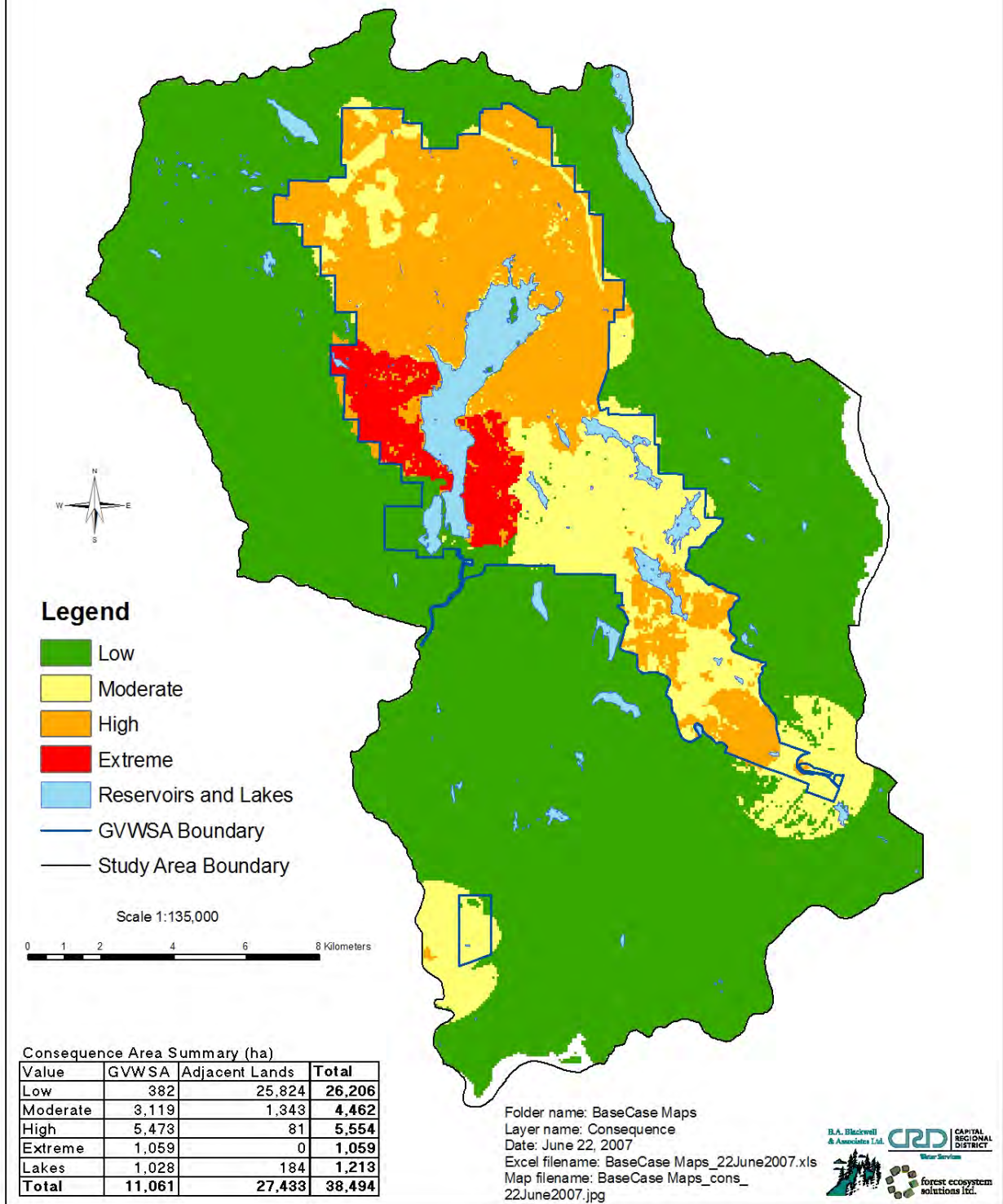
The large weighting on water quality has focused the spatial pattern of consequence rankings on lands within the GVWSA. Sub-drainage areas closest to the water supply intake within the primary water supply reservoir (Sooke Lake Reservoir) received the highest (extreme) potential consequence rankings. As the primary water supply area, most of the remainder of the Sooke WSA was ranked as high consequence, as were areas within the Goldstream WSA that drained directly into the Goldstream and Japan Gulch reservoirs and the sites of the water disinfection facilities.

Areas of high consequence within the areas of extreme consequence in the southern portion of the Sooke WSA contain younger forest that was less of a potential contributor to nutrient and sediment production in the event of a wildfire.

Approximately 10.6% of the GVWSA was assigned an extreme consequence ranking. A high consequence ranking was assigned to 54.5% of the GVWSA.



## Theme: Consequence



**Map 15. Spatial Ranking of the Consequences of a Large Wildfire in the Greater Victoria Water Supply Area and Adjacent Lands**

Areas of moderate consequence include the catchment areas of Lubbe and Buchart reservoirs and the Council Creek sub-drainage. Water from both areas can be held back from the water supply system (at least temporarily). A moderate consequence was also assigned to much of the area within two kilometres of the water disinfection facilities and younger forests in areas that did not directly drain into water supply reservoirs.

The consequences relating to other subcomponents of the model, including water supply infrastructure, do not appear on the summary map of consequences. This is the result of all adjacent lands being assigned a low, rather than a nil, consequence rating in the water quality subcomponent. Areas with a low ranking, and assigned a 75% weighting, effectively mask other rankings with considerably less (10% or 5%) weighting in the model.

If water supply infrastructure had a higher profile on the summary map of consequences, areas of extreme and high consequence would be concentrated just south of Sooke Lake Reservoir and at the southernmost portion of the GVWSA.

### **3.3 Conclusions**

Several general conclusions can be drawn from the Phase 2 map of the consequences of a wildfire to identified values in the GVWSA and adjacent land:

- A wildfire in any part of the Sooke WSA is of great concern given the dependency on Sooke Lake Reservoir for water supply.
- The area of greatest concern for a wildfire in the Sooke WSA is within the portion of the catchment of Sooke Lake Reservoir that drains directly in to the shallow mid and south basins near the water supply intake.
- Wildfire impacts on the water disinfection facilities at Japan Gulch and Sooke River Road could be an extreme consequence given the critical role of these facilities in the water supply system.
- Wildfire is also a major concern for areas that drain directly into the Goldstream and Japan Gulch reservoirs.
- There are important water supply facilities and power supply lines that are not reflected on the summary map of consequences. The output maps for the subcomponents in Interface Areas and Infrastructure need to continue to be considered in decision-making that affects the risk to these important facilities.

### 3.4 Knowledge Gaps and Uncertainty

While the best information available, or that could be assembled with a reasonable degree of effort, was used in the wildfire risk assessment there will inevitably be gaps, limitations or uncertainty associated with the application of these data to the wildfire risk assessment.

Given the success of wildfire suppression on SE Vancouver Island in recent decades there are considerable gaps in the knowledge of wildfire behaviour in the forest stands within the area, the potential burn severity associated with large wildfires, and the effects that such fires could have on watershed hydrology and the ecology of water supply reservoirs. In addition, the spatial scale, severity, and proximity to the water supply reservoirs of a wildfire will all be key factors in determining the impacts to water quality, water supply infrastructure, and other identified values.

There is some uncertainty associated with applying the Canadian Fire Behaviour Prediction System fuel types to the GVWSA and adjacent land. This classification was developed for boreal forests in Canada. While every effort has been made to correctly match fuel types with vegetation types, the validity of the forest fuel classification used in the wildfire risk assessment is somewhat uncertain until the behaviour of a wildfire in this area has been observed.

A primary concern for the wildfire risk assessment for the GVWSA is the limited understanding of fire effects on water quality. While there is some available information on how wildfire relates to the production and transport of nutrients and turbidity, no quantitative measures of how water quality may be impacted by a large fire are available.

As a result, the factors used in the subcomponents for water quality, and the rankings and weightings assigned to these factors, rely on best professional judgment. Further work to better understand the sensitivity of the reservoirs to changes in water quality related to fire is needed to improve the understanding of the potential effects of wildfire and how these effects might be mitigated.

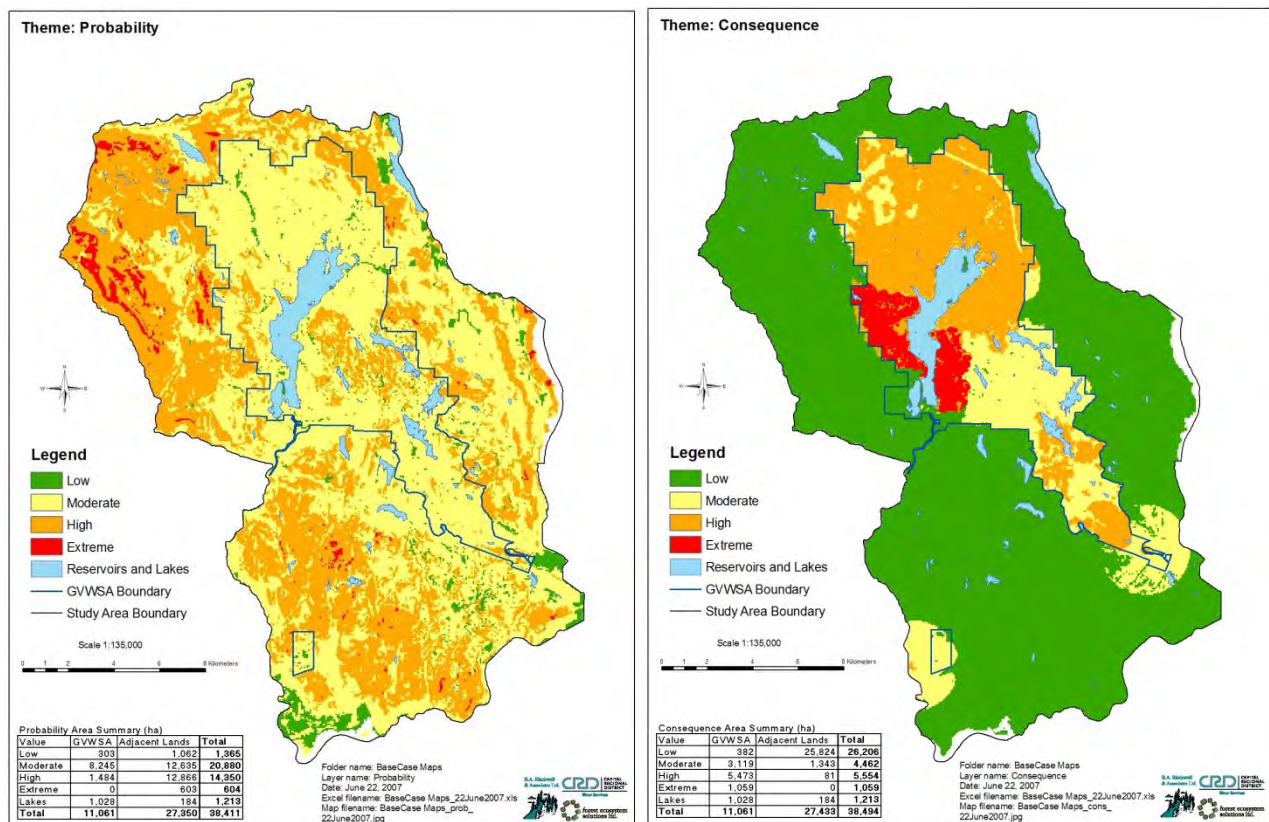
Finally, while some comparisons of output with different weightings were undertaken, there remains uncertainty about how the output of the model would vary with different rankings of the factors making up the subcomponents or the weighting of the subcomponents within each component.

Given these uncertainties, the consequences maps remain a 'guide' rather than the 'rule' in terms of setting priorities and applying resources to the protection of the GVWSA from landscape-level wildfire.

## 4.0 Recommendations for the Wildfire Management Program

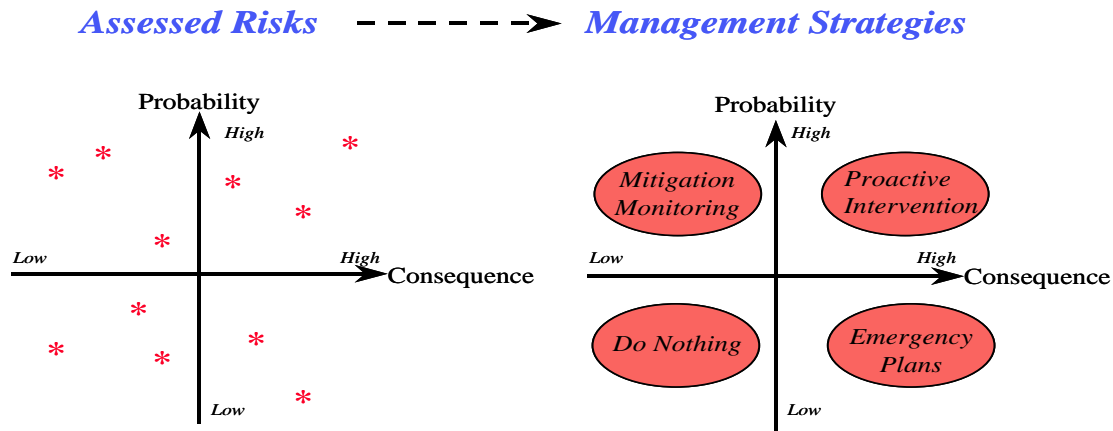
While the product of the wildfire risk assessment provided important information on the spatial patterns relating to probability and consequences, the process of carrying out the assessment was just as important. Refining the WRMS model for the GVWSA and adjacent lands required those involved to carefully think through the factors that contribute to probability and consequence. The elements that made up each subcomponent needed to be determined and ranked in relative importance. Weightings needed to be assigned to each subcomponent and component of the model to create a final output.

The insights gained from this process, and the review of the summary maps of probability and consequence (**Map 16**), were combined to identify ways to improve the CRD wildfire management program for the GVWSA.



**Map 16. Comparison of Summary Maps of Wildfire Probability and Consequences for the Greater Victoria Water Supply Area and Adjacent Land**

The interaction between wildfire probability and consequences was discussed and used to determine the level of management intervention that may be required to reduce risk (**Figure 3**).



**Figure 3. Level of Management Intervention in Relation to Probability and Consequence Rankings**  
(an approach developed by BA Blackwell and Associates)

Together, BA Blackwell and Associates and CRD staff recommended four strategies for reducing the probability and consequences of a large wildfire within the GVWSA:

1. Carry out forest fuel reduction measures around key water supply facilities using Fire Smart principles;
2. Continue to improve the CRD's capability for preventing, detecting, and suppressing wildfires and rehabilitating burned areas;
3. Identify wildfire containment zones in high risk areas and expand existing fuel breaks around these areas; and
4. Identify priority areas within the Water Supply Area for forest fuel reduction treatments to increase the protection of the wildfire containment zones and reduce fuels in these areas.

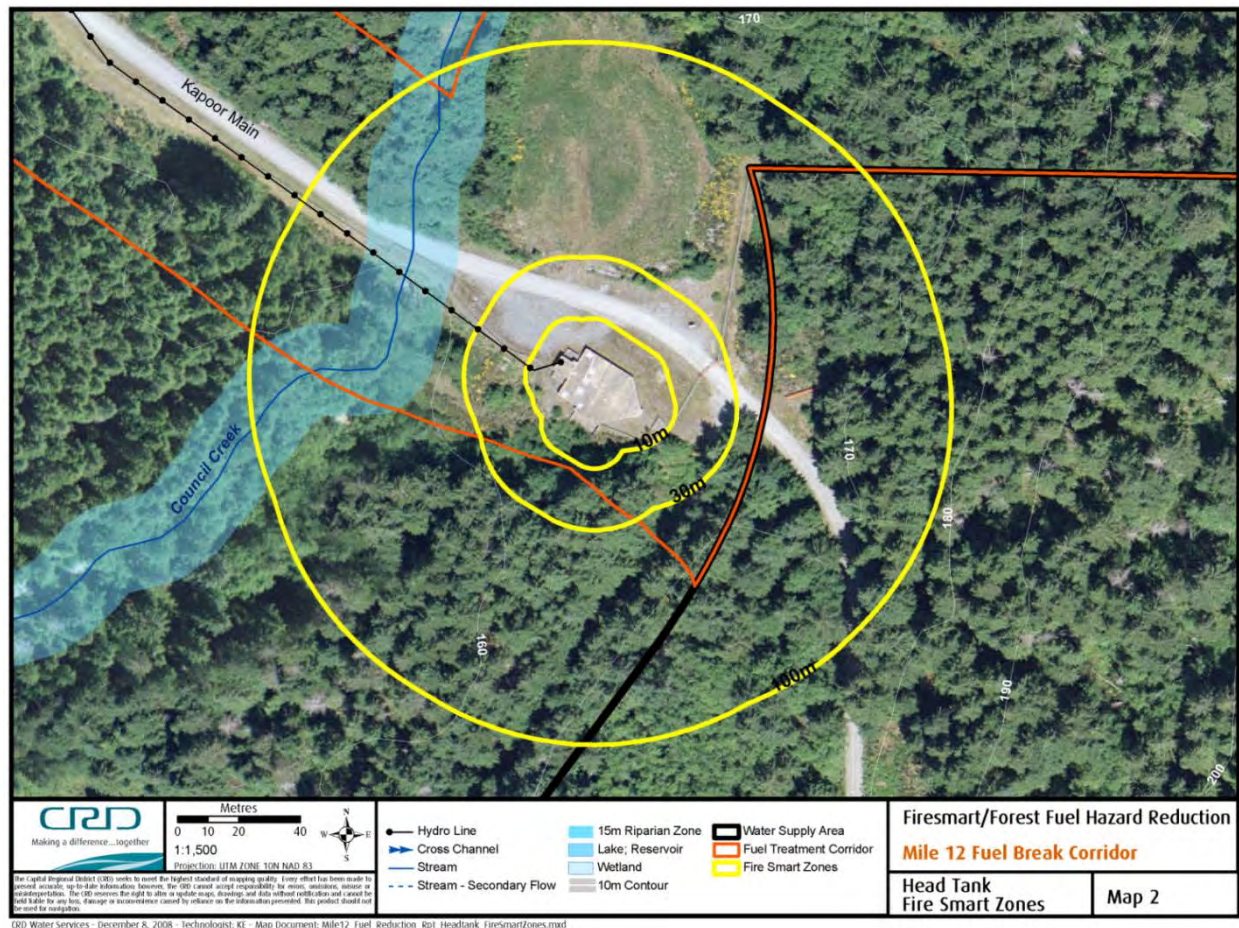
Strategies 1 and 2 built on initiatives currently underway or recommended in the *Strategic Plan for Water Management*.

However, these two strategies do not address hazardous forest fuels on lands within and adjacent to the GVWSA that increase the potential for a large-scale wildfire and extreme wildfire behaviour. Strategies 3 and 4 were developed to reduce the risk associated with these fuels.



## 4.1 Forest Fuel Reduction Around Key Facilities

In 2004, the CRD conducted Fire Smart assessments for all water supply facilities in the GVWSA. The Fire Smart methodology (reference) assesses potential hazards relating to wildfire at, and around, a structure of facility in three zones: 1) 0-10 metres, 2) 10-30 metres, and 3) 30-100 metres (see **Figure 4**).

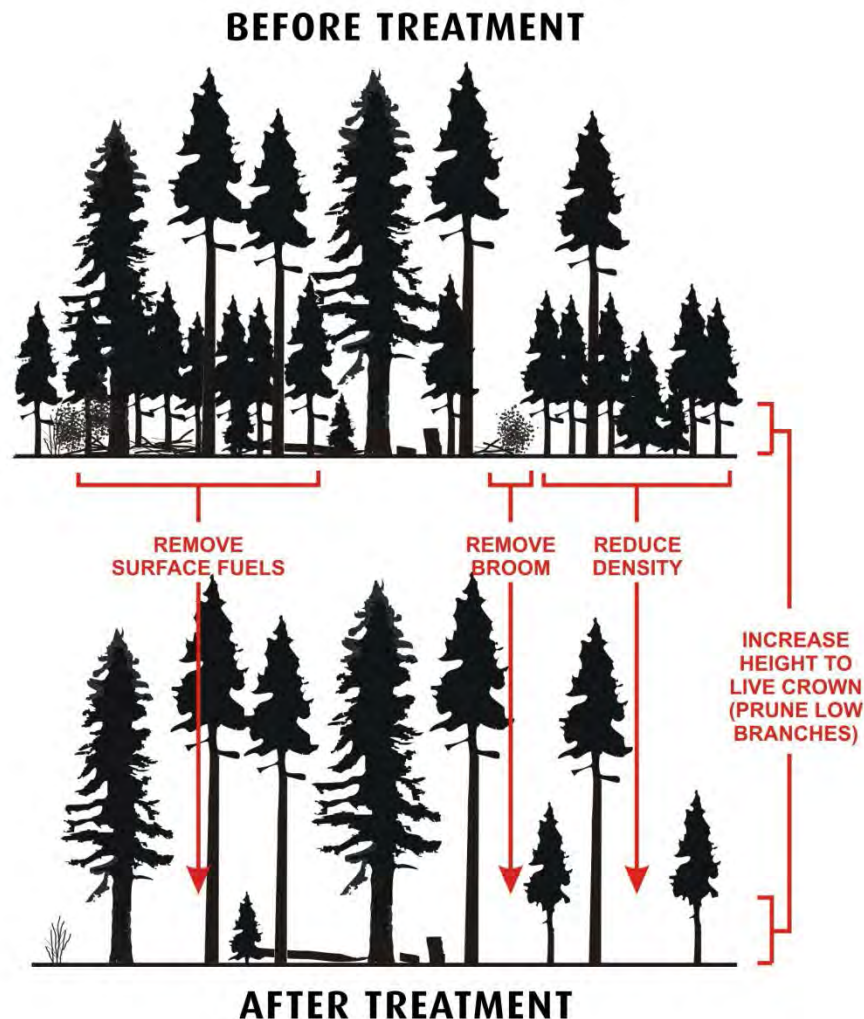


**Figure 4 – Fire Smart Zones Around the Head Tank Facility in the Greater Victoria Water Supply Area**

The water supply facilities ranked as highest importance in the Water Supply Infrastructure subcomponent of the WRMS model would be the priorities for hazard reduction treatment.

In planning the treatment, the vulnerability of the facility to wildfire and any other potential hazards (such as danger trees) is evaluated and a prescription (site-level plan) is developed for modifying the adjacent vegetation to reduce these hazards. The prescription includes operational requirements and constraints to guide the implementation of hazard reduction activities.

The prescription for forest fuel hazard reduction in the Fire Smart zones considers the vulnerability of the structure to wildfire and other hazards. Areas within 10 metres of the facility are generally cleared of all vegetation to reduce the threat from wildfire<sup>5</sup>. However, fuel hazard reduction treatments further away from the facility typically focus on reducing the potential for ground fire to reach the forest canopy and thinning the forest stand to cause an approaching crown fire to stall or burn less intensely before reaching the facility (see **Figure 5**).



**Figure 5. Example of Vegetation Management Strategies for Reducing Forest Fuel Hazard**  
(figure developed by BA Blackwell and Associates)

Where appropriate, forest fuel hazard could also be reduced by converting coniferous forest to deciduous tree species.

<sup>5</sup> This distance may increase if the facility is particularly vulnerable to wildfire or intense heat.



## 4.2 Improving the Wildfire Management Program

At the time of the wildfire risk assessment, the CRD had a well-established program in place for wildfire preparedness and response. This program included a considerable emphasis on prevention by carrying out patrols to deter trespass in the GVWSA that could lead to fire starts.

However, the wildfire risk assessment highlighted the potential for fire starts on adjacent lands to spread into the GVWSA. Incorporating outreach to adjacent land owners into wildfire prevention was identified as a priority to help reduce this threat.

The wildfire risk assessment also quickly highlighted the importance of rapid detection in preventing a small fire from increasing in size to a point where it could not easily be suppressed. This recognition led to the start of an aerial patrol of the GVWSA and adjacent land during periods of high and extreme fire danger using a fixed wing aircraft in 2007.

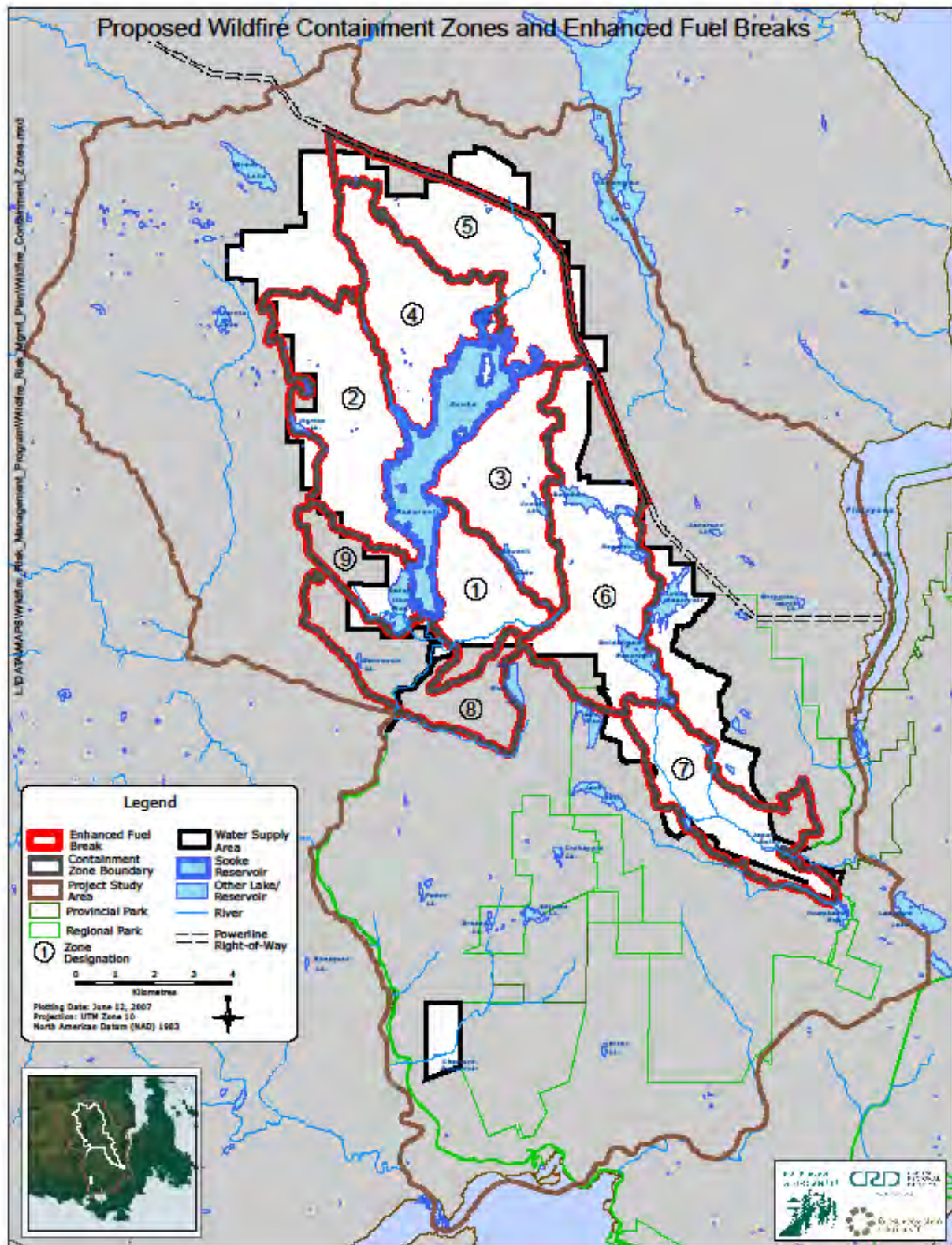
The use of the water delivery constraints model in the risk assessment also highlighted the limitation of ground-based water delivery by large water tenders (trucks). These vehicles carry 9,000 litres (L) of water but are restricted to good roads on low gradient terrain. Given that there are large areas with secondary roads and steeper terrain in the GVWSA and adjacent lands, the CRD purchased a smaller four-wheel-drive water tender to supplement the existing suppression capability.

Additional measures for improving wildfire prevention, preparedness, detection, suppression, and post-wildfire rehabilitation were identified in the 1999 Strategic Plan for Water Management. The integration of these recommendations into the CRD wildfire management program for the GVWSA will continue.

## 4.3 Wildfire Containment Zones and Forest Break Corridors

The wildfire risk assessment identified areas within the GVWSA subject to high or extreme consequences if affected by a wildfire spreading into these areas. Based on these results, and their experience with wildfire management planning in other jurisdictions, BA Blackwell and Associates suggested delineating wildfire containment zones in the GVWSA. Each zone would be protected by corridors where there was some interruption to the continuity of forest fuels that would interfere with the spread of a wildfire.

To illustrate the concept, BA Blackwell and Associates delineated nine wildfire containment zones within the GVWSA using the fuel break corridor generally following existing roads and utilizing a 14 kilometres of a major BC Hydro power transmission line right-of-way (ROW) as boundaries of the zones (see **Map 17**).



**Map 17. Proposed Wildfire Containment Zones and Forest Fuel Break Corridors in the Greater Victoria Water Supply Area and Adjacent Land**

To improve the effectiveness of roads as fuel breaks, it was recommended that forest fuel reduction be carried out within a strip 50 metres on either side of the road. This fuel reduction would focus on the removal of woody debris and small trees that could enable a ground fire to spread to the forest canopy (see **Figure 5**). It was suggested that such treatments be carried out on approximately 80 km (22%) of the 367 km of roads in the GVWSA.

The recommended approach to incorporating the BC Hydro ROW into the fuel break corridor was to work with BC Hydro to reduce the high density of the non-native shrub Scotch broom that had established in the corridor. While this species assisted BC Hydro by suppressing the growth of conifers that could pose a hazard to the transmission line, it is a highly combustible plant that would quickly spread a wildfire. It was proposed that the CRD work cooperatively with BC Hydro and cost-share the control of Scotch broom. Any broom control would be carried out manually as herbicides are not allowed within the portion of the ROW in the GVWSA.

If a network of such fuel breaks could be established, BA Blackwell and Associates estimated that it could result in a considerable reduction in the spatial extent of high and moderate wildfire probability within the GVWSA, especially in the Sooke WSA.

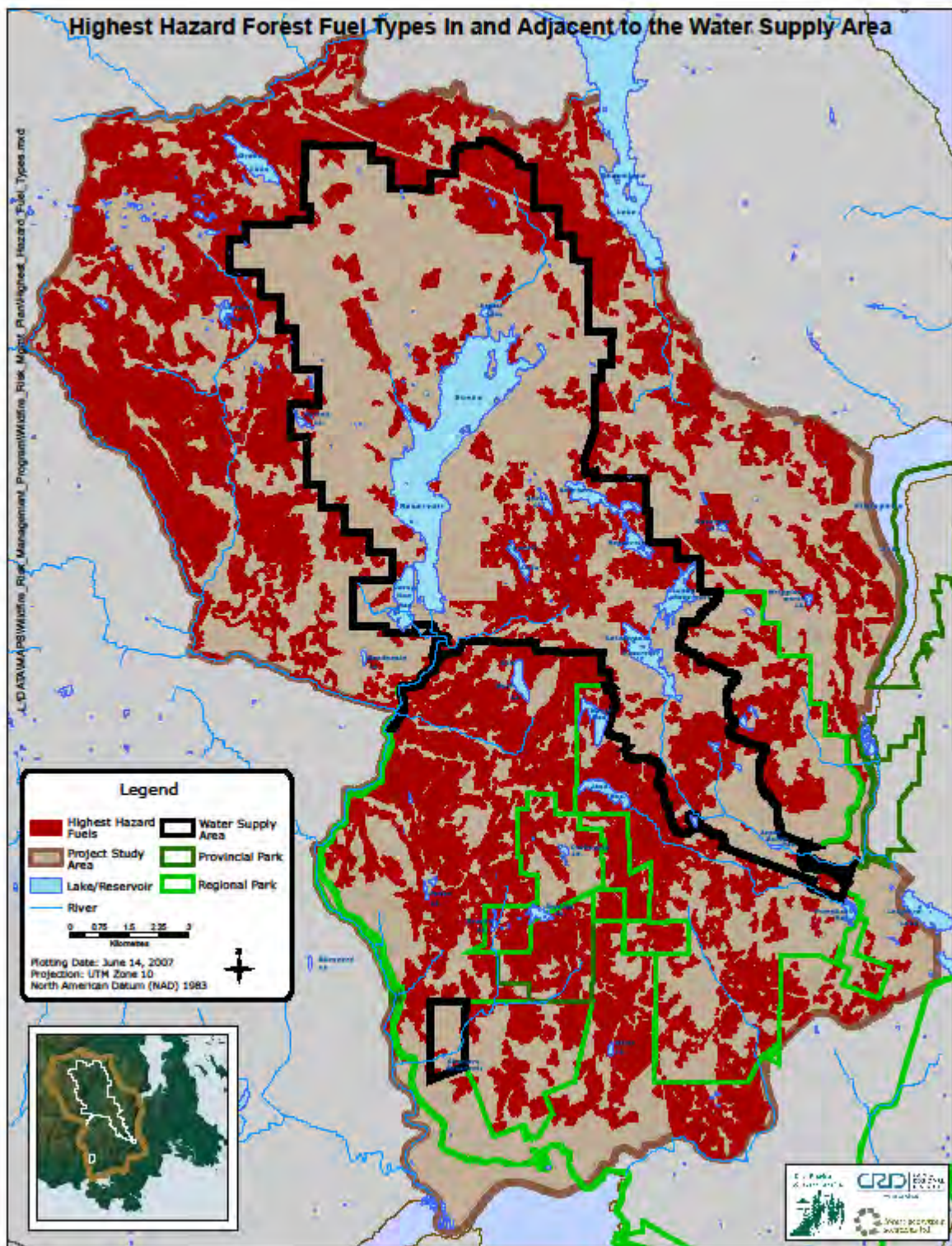
#### **4.4 Forest Fuel Reduction in Priority Areas**

The final strategy for improving the wildfire management program in the GVWSA was reducing forest fuel hazard in priority areas within the wildfire containment zones. As with the Fire Smart treatments and fuel breaks, the forest fuel reduction methodology will focus on removing surface and ladder fuels, with the goal of retaining large, well-spaced trees (Figure 5). It was recommended that detailed fire behaviour analyses be conducted to identify the areas where fuel reduction would be most effective. Approximately 17% (1,900 ha) of the Water Supply Area contains young dense forests identified as fuels of concern (see **Map 18**). Not all of these areas would require treatment.

#### **4.5 Effect of the Strategies**

The effects of risk reduction with the four proposed strategies would be cumulative. If all of these options were implemented, BA Blackwell and Associates estimated the risk of a catastrophic wildfire would be reduced by about 50%. In their opinion, it was unlikely that the risk of a large-scale wildfire could be reduced much lower given that the GVWSA and much of the adjacent land are forested areas with hot dry summers and the potential for fire starts.





**Map 18. Distribution of Forest Fuel Types Identified as a High Hazard in the Greater Victoria Water Supply Area and Adjacent Land**

## 5.0 References

- Acres International, 1999. *Strategic Plan for Water Management*. Volume 3: Watershed Management. Report prepared for the Capital Regional District Water Services Department in association with B.A. Blackwell and Associates, Compass Resource Management, Context Research, KPMG, Limnotek Research and Development, Northwest Hydraulic Consultants, Oikos Ecological Services and Phero Tech.
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- Hawkes, B and J. Beck. 1997. A Wildfire Threat Rating System. Technology Transfer Notes No.1 May, 1997. Forestry Research Applications. Pacific Forestry Centre. Natural Resources Canada. Canadian Forestry Service. 6 pp.
- Ohlson, D.W., Blackwell, B.A., Hawkes, B., Bonin, D. 2003. A Wildfire Risk Management System – An Evolution of the Wildfire Threat Rating System. *In*: Proceedings 3rd International Wildland Fire Conference and Exhibition. Sydney Australia. October 3-6, 2003.

## Appendix 1 Weightings of the Components and Subcomponents

### Wildfire Risk Assessment

### Greater Victoria Water Supply Area and Adjacent Land

| Probability Component (PC) |        | Weight (W) |
|----------------------------|--------|------------|
|                            | Scale  |            |
| Ignition                   | 0 - 10 | 30%        |
| Fire Behaviour             | 0 - 10 | 30%        |
| Suppression                | 0 - 10 | 40%        |
|                            |        | 100%       |

| Consequence Component (CC)   |        | Weight (W) |
|------------------------------|--------|------------|
|                              | Scale  |            |
| Interface and Infrastructure | 0 - 10 | 10%        |
| Water Quality                | 0 - 10 | 75%        |
| Air Quality                  | 0 - 10 | 10%        |
| Biodiversity                 | 0 - 10 | 5%         |
|                              |        | 100%       |

$$P\_Rating = \sum_{x=1}^3 PC_x \times W_x$$

$$C\_Rating = \sum_{x=1}^5 CC_x \times W_x$$

*Note:*

*Each probability component & each consequence component is itself calculated as a weighted sum of several attributes*



**Wildfire Risk Management Theme:****Probability****Wildfire Risk Management Component:****Ignition**

The Ignition component provides a rating of the probability of wildfire occurring in a given location based on historical fire frequency. The rating is calculated as a weighted sum rating using three or possibly four attributes: **Ignition Potential, Human Caused Fires, Lightning Caused Fires, and Spatial Distribution of Fires.**

**Component Attributes:**

| Attribute  | Indicator / Units                    | Rating Scale |    | Weight |
|--|--------------------------------------|--------------|----|--------|
| <b>Lightning Caused Fires</b><br><i>Indicator of historical frequency of lightning caused fires</i>  | # of fires/500m<br>buffer since 1920 | >4           | 10 | 10%    |
|  |                                      | 3 - 4        | 7  |        |
|  |                                      | 1 - 2        | 3  |        |
|  |                                      | 0            | 0  |        |
| <b>Human Caused Fires</b><br><i>Indicator of historical frequency of human caused fires</i>  | # of fires/500m<br>buffer since 1920 | >4           | 10 | 50%    |
|  |                                      | 3 - 4        | 7  |        |
|  |                                      | 1 - 2        | 3  |        |
|  |                                      | 0            | 0  |        |
| <b>Ignition Potential</b><br><i>Indicator of the potential for fire ignition based on fuel type and weather, calculated using WIPP (Wildfire Ignition Probability Predictor)</i> | Probability Class                    | Extreme      | 10 | 40%    |
|  |                                      | Very High    | 8  |        |
|  |                                      | High         | 6  |        |
|  |                                      | Moderate     | 4  |        |
|  |                                      | Low          | 2  |        |
| <b>Spatial Fire Distribution</b><br><i>Indicator of the potential fire size based on historic fire</i>   | To be determined -<br>no method yet  |              |    |        |
|  |                                      |              |    |        |
|  |                                      |              |    |        |

**Uncertainties:**

- weights assigned to each attribute are based on professional judgement
- climate change may lead to a change in lightning caused fires
- increasing development and human activities on adjacent lands could lead to an increase in human caused fires

**Information Sources:**

**Databases:** Ministry of Forests and Range Fire Database  
CRD Water Incident Database  
CRD Water Fire Weather Database  
Provincial lookup table (for WIPP)

**Communications:** CRD Water Operations staff



**Wildfire Risk Management Theme:****Probability****Wildfire Risk Management Component:****Fire Behaviour**

The Fire Behaviour component provides a rating of the probability of a wildfire exhibiting extreme behaviour in a given location given existing fuel types and 90th percentile weather conditions. The rating is calculated as a weighted sum rating using three attributes that are output from the FBP system: **Fire Intensity**, **Rate of Spread**, and **Crown Fraction Burned**.

**Component Attributes:**

| Attribute  | Indicator / Units   | Rating Scale   |    | Weight |
|--|---------------------|----------------|----|--------|
| <b>Fire Intensity</b><br><i>Indicator of the rate of heat energy released.</i><br>Determined for each fuel type using FBP with 90th percentile weather conditions, forest cover polygon slope and 10 km per hour winds.  | kilowatts per metre | > 10,000       | 10 | 45%    |
|  |                     | 4,001 - 10,000 | 8  |        |
|  |                     | 2,001 - 4,000  | 6  |        |
|  |                     | 501 - 2,000    | 4  |        |
|  |                     | 10 - 500       | 2  |        |
|  |                     | 0 - 9          | 0  |        |
| <b>Rate of Spread</b><br><i>Indicator of speed at which fire extends horizontally.</i><br>Determined for each fuel type using FBP system with 90th percentile weather conditions, forest cover polygon slope, and 10 km per hour winds.  | metres per minute   | > 20           | 10 | 45%    |
|  |                     | 16 - 20        | 7  |        |
|  |                     | 11 - 15        | 5  |        |
|  |                     | 6 - 10         | 3  |        |
|  |                     | 0 - 5          | 0  |        |
| <b>Crown Fraction Burned</b><br><i>Indicator of the proportion of tree crowns consumed by fire (i.e., a measure of tree mortality). Add information on how this is influenced - there is a lot of 0 on the map. This indicates there is no torching but may still be crown scorch mortality.</i> | %                   | 50 - 100       | 10 | 10%    |
|  |                     | 40 - 50        | 8  |        |
|  |                     | 20 - 39        | 6  |        |
|  |                     | 10 - 19        | 4  |        |
|  |                     | 1 - 9          | 2  |        |
|  |                     | 0              | 0  |        |

**Uncertainties:**

- weights assigned to each attribute based on professional judgement
- assigning FBP system fuel types developed for the boreal forest to coastal fuel types
- actual wind speeds and terrain during a fire will create alternate results

**Information Sources:**

**Literature and Reports:** Canadian Forest Fire Behaviour Prediction System

**Databases:** BC Terrain Resource Information Mapping Database  
 CRD Water Fire Weather Database  
 Forest / Fuels inventory: from FES via Bruce  
 Provincial lookup table for fire weather indices

**Models:** CFS Fire Behaviour Predictor 97

**Communications:**

**Other:**

**Wildfire Risk Management Theme:****Probability****Wildfire Risk Management Component:****Suppression Response Capability**

The Suppression component provides a rating of the probability that a wildfire could be quickly exterminated in a given location given existing resources. The rating is calculated as a weighted sum rating using six attributes: **Constraints to Detection**, **Proximity to Water Sources**, **Water Delivery Constraints**, **Helicopter Arrival Time**, **Air Tanker Arrival Time**, **Terrain Steepness**, and **Proximity to Roads**.

**Component Attributes:**

| Attribute  | Indicator / Units                     | Rating Scale        |    | Weight |
|--|---------------------------------------|---------------------|----|--------|
| <b>Constraints to Detection</b><br><i>Indicator of conditions (typical cloud cover elevation during thunderstorms and areas not visible from vantage points) that would interfere with the early detection of a fire</i> | N/A                                   | Cloud Cover         | 1  | 30%    |
|  |                                       | Viewpoints          | 9  |        |
|  |                                       |                     |    |        |
|  |                                       |                     |    |        |
| <b>Proximity to Water Sources</b><br><i>Indicator of the ability to access water quickly for fire fighting. Based on distance from all season streams and lakes and fire hydrants.</i>                                   | distance metres                       | >300                | 10 | 10%    |
|  |                                       | 101-300             | 7  |        |
|  |                                       | 0-100               | 2  |        |
|  |                                       |                     |    |        |
| <b>Water Delivery Constraints</b><br><i>Indicator of the ability to access areas by road with a water tanker and deliver water using a standard pumping system</i>   | ranking of water delivery limitations | Alternate Required  | 10 | 30%    |
|  |                                       | Access Not Assessed | 9  |        |
|  |                                       | Limited Access      | 8  |        |
|  |                                       | Partial Access      | 4  |        |
|  |                                       | Full Access         | 0  |        |
| <b>Helicopter Arrival Time</b><br><i>Indicator of time for helicopter arrival measured as flight time (concentric) from Victoria airport or Cobble Hill fire base</i>  | minutes                               | > 40                | 10 | 10%    |
|  |                                       | 31 - 40             | 7  |        |
|  |                                       | 21 - 30             | 5  |        |
|  |                                       | 11 - 20             | 3  |        |
|  |                                       | 0 - 10              | 0  |        |
| <b>Air Tanker Arrival Time</b><br><i>Indicator of time for air tanker arrival measured as flight time (concentric) from Abbotsford (tanker) or from Sproat Lake (Martin Mars).</i>                                       | minutes                               | > 40                | 10 | 5%     |
|  |                                       | 31 - 40             | 7  |        |
|  |                                       | 21 - 30             | 5  |        |
|  |                                       | 11 - 20             | 3  |        |
|  |                                       | 0 - 10              | 0  |        |
| <b>Terrain Steepness</b><br><i>Indicator of the difficulty of control/contain on the landscape.</i>  | slope class %                         | > 60                | 10 | 5%     |
|  |                                       | 41 - 60             | 7  |        |
|  |                                       | 21 - 40             | 3  |        |
|  |                                       | 0 - 20              | 0  |        |
| <b>Proximity to Roads and Helipads</b><br><i>Indicator of the ability to get suppression resources into an area: based on a bush walking rate of 1 km / hour.</i>  | minutes                               | > 120               | 10 | 10%    |
|  |                                       | 61 - 120            | 7  |        |
|  |                                       | 31 - 60             | 5  |        |
|  |                                       | 16 - 30             | 3  |        |
|  |                                       | 0 - 15              | 0  |        |

**Uncertainties:**

- weights assigned to each attribute and aircraft arrival times based on professional judgement
- viewscape analysis is based on terrain and does not factor in tree heights that affect area that can be viewed
- water delivery constraints uses a GIS-based digital elevation model to simulate the effects of terrain and elevation

**Information Sources:**

CRD Water Services digital elevation Model (DEM) for water delivery limitations  
 CRD Water GIS data for roads, water courses, wetlands and water bodies  
 TRIM digital elevation model for terrain steepness (slope % class)  
 Conversations with CRD Water Operations staff  
 CRD viewscape coverage

**Models:** CRD Water Pumping Limits Model



**Wildfire Risk Management Theme:****Consequence****Wildfire Risk Management Component:****Interface and Infrastructure**

The **Interface and Infrastructure** component provides a rating of the potential for a fire to pose a direct threat to people, property, and key facilities. The impact is calculated as a weighted sum rating using four attributes: **Residential Land, Non-Residential Land, Key Water Supply Infrastructure, Key Community Infrastructure**

**Component Attributes:**

| Attribute  | Indicator / Units                            | Rating Scale            |    | Weight |
|--|--|-------------------------|----|--------|
| <b>Residential Land</b><br><i>Indicator of threat to private property. Density class based on local government land use mapping and interpretation of 2005 aerial photographs</i>                        | Weight by density class                      | Urban                   | 10 | 40%    |
|  |  | Mixed                   | 8  |        |
|  |  | Isolated                | 5  |        |
|  |  | Undeveloped             | 2  |        |
|  |  | None                    | 0  |        |
| <b>Non-Residential Land</b><br><i>Indicator of potential threat to provincial and regional park land, private forest lands, recreational areas and trail corridors and historic and cultural sites</i>   | Financial Liability and Community Importance | Managed Forest          | 7  | 10%    |
|  |  | Designated Parkland     | 5  |        |
|  |  | Cultural/Historic Sites | 5  |        |
|  |  | BC Crown Land           | 3  |        |
|  |  | Recreational            | 3  |        |
| <b>Key Water Supply Infrastructure</b><br><i>Indicator of the threat to key water supply infrastructure and facilities - includes facilities, the flowline to Sooke and key power lines</i>              | Importance to Functioning of Water Supply    | Vital for Water Supply  | 10 | 30%    |
|  |  | Important               | 8  |        |
|  |  | Mod. Importance         | 6  |        |
|  |  | Low Importance          | 4  |        |
| <b>Key Community Infrastructure</b><br><i>Indicator of the threat to key community infrastructure and facilities - includes communications towers, major hydro lines, fire stations and gas stations</i> | Financial Liability and Community Importance | Vital to Community      | 10 | 20%    |
|  |  | Important               | 8  |        |
|  |  | Mod. Importance         | 6  |        |
|  |  | Low Importance          | 4  |        |

**Uncertainties:**

- weights assigned to each attribute based on professional judgement

**Information Sources:** Uses on adjacent lands derived from BC Assessment Authority broad land use categories for the CRD and CVRD and the interpretation of aerial photographs from June 2005

GIS data and consultations with staff from CVRD, CRD, Langford, Metchosin and Sooke

CRD Water GIS data for water supply infrastructure, parks, Trans Canada Trail, Galloping Goose Regional Trail, energy transmission rights-of-way and historic buildings

**Literature and Reports:** CRD Water Fire Smart Assessment of Water Supply Facilities

**Wildfire Risk Management Theme:**

**Consequence**

**Wildfire Risk Management Component:**

**Water Quality Impact**

The Water Quality Impact component provides a rating of the impact that a fire would have on the quality of water delivered to customers in the Greater Victoria Drinking Water System. The impact is calculated as a weighted sum rating using five attributes: **Importance of Reservoir to Water Supply; Proportion of Water Supply; Nutrients, Colour Taste and Odour; Turbidity; and Adjacent Areas Where a Fire Could Affect Water Quality.**

**Component Attributes:**

| Attribute  | Indicator / Units          | Rating Scale                              | Weight |
|--|----------------------------|---|--------|
| <b>Importance to Water Supply</b><br>Indicator of the need for the reservoir and treatment plant to be available for Water Supply purposes   | N/A                        | Sooke Reservoir Catchment                 | 10     |
|  |                            | Japan Gulch and Charters Treatment Plants | 10     |
|  |                            | Goldstream Reservoir and River Catchment  | 3      |
|  |                            | Lubbe and Butchart Reservoir Catchment    | 3      |
|  |                            | Council Creek Catchment                   | 1      |
| <b>Proportion of Water Supply</b><br>Indicator of proportion of regional water delivered by each source and passing through the treatment plant  | % of Total Supply          | Sooke Reservoir Catchment                 | 10     |
|  |                            | Japan Gulch and Charters Treatment Plants | 10     |
|  |                            | Goldstream Reservoirs and River Catchment | 2      |
|  |                            | Council Creek Catchment                   | 1      |
| <b>Nutrients, Colour, Taste, and Odour</b><br>Indicator of the potential for release of nutrients and dissolved materials that reach water supply intakes.                             | N/A                        | Proximity to Intake                       | 6      |
|  |                            | Nutrient Input Potential                  | 4      |
|  |                            |   |        |
| <b>Turbidity</b><br>Indicator of the potential for release of sediments that reach water supply intakes.   | N/A                        | Proximity to Intake                       | 6      |
|  |                            | Flammability & Burn Severity              | 2      |
|  |                            | Soil Types in Suspension                  | 2      |
| <b>Adjacent Areas Where a Fire Could Affect Water Quality</b><br>Areas within two kilometers of the Japan Gulch Treatment Plant and high consequence areas near Sooke Reservoir Intake | Area within two kilometers | Trestle and Horton Compartments           | 10     |
|  |                            | Japan Gulch and Charters Treatment Plants | 10     |
|  |                            |   |        |

**Uncertainties:**

- weights assigned to each attribute based on professional judgement

|   |  |    |     |
|---|--|----|-----|
| Proximity to Intake                             | Trestle and Horton Compartments            | 10 | 60% |
|   | Goldstream Reservoir and River Catchment   | 10 |     |
|   | Judge, Magee, Whiskey, Rithe South, Access | 8  |     |
|   | Council Creek Catchment                    | 8  |     |
|   | Lubbe and Butchart Reservoir Catchment     | 8  |     |
| Nutrient Input Potential from Burned Vegetation | Rithe North Compartment                    | 5  | 40% |
|   | Structural Stage 6 and 7                   | 10 |     |
|   | Structural Stage 4 and 5                   | 8  |     |
|   | Structural Stage 3                         | 6  |     |
|   | Structural Stage 1 and 2                   | 4  |     |
| Soil Types in Suspension                        | Morainal                                   | 5  | 20% |
|   | Fluvial                                    | 3  |     |
|   | Glaciofluvial                              | 2  |     |
|   | Colluvial                                  | 2  |     |
|   | Bedrock                                    | 1  |     |
| Flammability & Burn Severity                    | Structural Stage 5 and 6                   | 10 | 20% |
|   | Structural Stage 4 and 7                   | 7  |     |
|   | Structural Stage 3                         | 5  |     |
|   | Structural Stage 1 and 2                   | 3  |     |
|   | Trestle and Horton Compartments            | 10 |     |
| Proximity to Intake                             | Goldstream Reservoir and River Catchment   | 5  | 60% |
|   | Judge, Magee, Whiskey, Rithe South, Access | 5  |     |
|   | Council Creek Catchment                    | 5  |     |
|   | Lubbe and Butchart Reservoirs              | 3  |     |
|   | Rithe North Compartment                    | 3  |     |



**Wildfire Risk Management Theme:****Consequence****Wildfire Risk Management Component:****Air Quality Impact**

The Air Quality Impact component provides a rating of the impact that a fire would have on regional air quality within the CRD airshed. The impact is calculated as a weighted sum rating using four attributes: **Airshed Sensitivity Rating**, **Proximity to Population Centres**, **Smoke Production Potential**, and **Smoke Venting Potential**.

**Component Attributes:**

| Attribute  | Indicator / Units                           | Rating Scale              |    | Weight |
|--|---|---------------------------|----|--------|
| <b>Airshed Sensitivity Rating</b><br><i>This ability of smoke to move easily in and out of an airshed and spill into populated areas.</i>                                  |   | Regional Airshed          | 10 | 20%    |
|  |   |                           |    |        |
|  |   |                           |    |        |
| <b>Proximity to Population Centres</b><br><i>Indicator of the distance to populated areas that would be adversely affected by the smoke generated by a major wildfire.</i> | distance (D)<br>kilometres                  | D ≤ 500 m                 | 10 | 30%    |
|  |   | 1 km > D > 500 m          | 9  |        |
|  |   | 2 km > D > 1 km           | 7  |        |
|  |   | 5 km > D > 2 km           | 5  |        |
|  |   | 10 km > D > 5 km          | 3  |        |
|  |   | 25 km > D > 10 km         | 1  |        |
|  |   | D > 25 km                 | 0  |        |
| <b>Smoke Production Potential</b><br><i>Indicator of the potential for smoke production as a function of seral stage (overall biomass, forest floor depth, etc.)</i>       | N/A   | Structural Stages 5 and 6 | 10 | 20%    |
|  |   | Structural Stages 4 and 7 | 7  |        |
|  |   | Structural Stages 3       | 5  |        |
|  |   | Structural Stages 1 and 2 | 3  |        |
|  |   | No forest                 | 0  |        |
| <b>Smoke Venting Potential</b><br><i>Indicator of the potential for smoke dispersion, the higher the elevation the greater dispersion potential</i>                        | mixing height<br>by elevation (E)<br>metres | height < 100m             | 10 | 30%    |
|  |   | 500m > H > 100m           | 7  |        |
|  |   | 1000m > H > 500m          | 4  |        |
|  |   | H > 1000m                 | 1  |        |

**Uncertainties:**

- weights assigned to each attribute are based on professional judgement
- distance to population centres does not factor in prevailing winds that may influence the distribution of smoke

**Information Sources:****Literature and Reports:**

**Databases:** CRD Water and CRD Parks TEM data  
 Fuel Typing for Adjacent Lands  
 Population areas derived from BC Assessment Authority broad land use categories  
 and the interpretation of aerial photographs from June 2005

**Communications:****Other:**

**Wildfire Risk Management Theme:****Consequence****Wildfire Risk Management Component:****Biodiversity**

The biodiversity component provides a rating of the potential for a fire to pose a direct threat to valued ecosystem resources in the CRD. The impact is calculated as a weighted sum rating using four attributes: Sensitive Ecosystems Inventory, Older Forest, and **Conservation Data Centre Element Occurrences** (with a one kilometer resolution or better)

**Component Attributes:**

| Attribute  | Indicator / Units | Rating Scale                   |    | Weight |
|--|-------------------|--------------------------------|----|--------|
| <b>Stands of Older Forest</b><br><i>Indicator of the threat to Red &amp; Blue Listed forest ecosystems and species</i>           | Age Class         | Older Forest - 8 and 9         | 10 | 70%    |
|  |                   | Future Old Forest - 5, 6 and 7 | 5  |        |
|  |                   |                                | 0  |        |
| <b>Sensitive Ecosystems</b><br><i>Indicator of the threat to woodland and herbaceous ecosystems of conservation significance</i> |                   | Garry Oak Woodland *           | 10 | 30%    |
|  |                   | Meadows and rock outcrops      | 7  |        |
|  |                   | Arbutus Woodland *             | 5  |        |
| <b>CDC Element Occurrences</b><br><i>Indicator of the threat to CDC Red &amp; Blue Listed species &amp; ecosystems</i>           | 1km resolution    | Red                            | 10 | 0%     |
|  |                   | Blue                           | 5  |        |
|  |                   | Other                          | 0  |        |

\* Data for woodland ecosystems are not available at this time

**Uncertainties:**

- weights assigned to each attribute are based on professional judgement
- no BC Conservation Data Centre records exist within the Greater Victoria Water Supply Area, even though red and blue listed species are known to be present; this attribute will be updated as new records become available

**Information Sources:** BC Conservation Data Centre  
Sensitive Ecosystems Inventory  
Terrestrial Ecosystem Mapping  
Forest Cover Data  
Forest Fuel Typing by BA Blackwell and Associates

**Literature and Reports:**

**Databases:** CRD Water Services Forest Cover data and Terrestrial Ecosystem Mapping  
CRD Parks Ecosystem Mapping in the Sea to Sea Greenbelt Area  
Sensitive Ecosystems Inventory  
BC Conservation Data Centre records

**Communications:**

**Other:**

**REPORT TO REGIONAL WATER SUPPLY COMMISSION  
MEETING OF WEDNESDAY, MAY 18, 2016**

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**SUBJECT**     **PROPOSED AMENDMENTS TO THE GREATER VICTORIA WATER SUPPLY AREA PROTECTION BYLAW NO. 2804 TO INCLUDE THE LEECH WATER SUPPLY AREA AND DRAFT WATER SUPPLY AREA ACCESS AND SPECIAL USE REQUEST AND APPROVAL POLICY AND PROCEDURE**

**ISSUE**

The 'Greater Victoria Water Supply Area Protection Bylaw No. 2804 requires amendment in order to include the Leech Water Supply Area (WSA), to allow enforcement against undesirable access and activities occurring in the WSA, to accommodate the Trans Canada Trail, to accommodate First Nations cultural access and activities and to update the Bylaw. The Ticket Authorization Bylaw also require amendment to reflect proposed changes to Bylaw No. 2804, to increase minimum fine amounts and to include an escalation of fines for repeat offences.

**BACKGROUND**

Following the CRD Board's defeat in February 2016 of the first and second readings of Bylaw No. 4050, that would have seen amendments to the Greater Victoria Water Supply Area (GVWSA) Protection Bylaw to restrict unauthorized access to the Leech WSA, allow First Nations cultural use access in the Leech WSA in accordance with an agreement and not allow broad public recreational use access in the Leech WSA, staff prepared two reports with supplementary information for the Board's consideration at their April 20, 2016 meeting. At this meeting, the Board considered two motions on this issue as follows:

*That the CRD Board request that the Regional Water Supply Commission consider options for a permitting system for responsible recreational access to the Leech lands, including options for the issuance of fishing and hiking permits in the western portion of the Leech lands, and include this option in amendments to the Greater Victoria Water Supply Area Protection Bylaw No. 2804 and Ticket Authorization Bylaw No. 1857 for the Board's consideration.*

This motion was defeated with a tie weighted vote.

*That the CRD Board receive the report for information (Supplementary Information Regarding Amendment of the Greater Victoria Water Supply Area Protection Bylaw to Include the Leech Water Supply Area) and provide the Regional Water Supply Commission and staff direction to bring forward amendments to Bylaw No. 2804, in keeping with the previous Commission direction, that do not incorporate recreational access by permit in the Leech WSA in the short term while the area is not in use for drinking water supply.*

This motion passed with a weighted vote of 42-34.



### OBSERVATIONS

1. Although there has been a majority of the Commission that support the Bylaw amendments recommended to the Board in December, the Board's position is split based on the previously proposed amendments. The Board will ultimately need to support and adopt any bylaw amendments.
2. No Commission or Board members, regardless of their position on the previously proposed bylaw amendments, support the undesirable activities occurring in the Leech WSA, including tree cutting, camping and fires, off-road motorized vehicle use and garbage dumping and without a protection bylaw in place, the CRD remains unable to enforce against the undesirable access and activities.
3. The issue of amending the protection bylaw to include the Leech WSA has not been resolved due to lack of resolution on 'recreational access and activities'.

Given the above observations, staff are recommending minor adjustments to the previously proposed bylaw amendments and the establishment of a *Water Supply Area Access and Special Use Request and Approval Policy* and *Water Supply Area Access and Special Use Request and Approval Procedure*, along with an amended CRD *External Applicant Access and Special Use Request – Greater Victoria Water Supply Area* form. This approach would set out policy and procedure for water supply area access and special use requests, while leaving the decision making authority with the Regional Water Supply Commission, and presenting WSA Protection Bylaw amendments for the Commission and Board's consideration that ensure protection of the water supply areas by enabling enforcement against the undesirable access and activities occurring in the Leech WSA.

### GVWSA PROTECTION BYLAW AMENDMENT ADJUSTMENTS

The current protection bylaw and proposed bylaw amendments provide significant discretion to the General Manager, Integrated Water Services, to make decisions with respect to water supply area access and activities. The previous report to the Commission on December 16, 2015 set out an explanation of the changes and updates proposed to Bylaw No. 2804. Attachment 1 indicates the proposed initial changes (in red) and the 'new' proposed adjustments (in blue) to the existing Bylaw No. 2804, and Attachment 2 is a draft of Bylaw No. 4050, which is the 'new' proposed amending bylaw to Bylaw No. 2804.

The 'new' proposed bylaw adjustments allow for the consideration of a request for water supply area access and special use, leaving the authority to approve or not approve a request with the Regional Water Supply Commission. Specific adjustments have been proposed under sections 40 and 46 of the bylaw to reflect these provisions.

### DRAFT WATER SUPPLY AREA ACCESS AND SPECIAL USE REQUEST AND APPROVAL POLICY

A draft policy has been prepared (Attachment 3) which sets out direction for Water Supply Area Access and Special Use Requests and Approvals. The policy statement is as follows:

The Regional Water Supply Commission will consider requests for Water Supply Area access and special use. The Commission will be provided a CRD Integrated Water Services staff evaluation of each request and a recommendation for the Commission's consideration. The

Commission will approve or not approve a request which will determine whether or not the General Manager can issue a permit for access and special use.

#### **DRAFT WATER SUPPLY AREA ACCESS AND SPECIAL USE REQUEST AND APPROVAL PROCEDURE**

A draft procedure has been prepared (Attachment 4) which sets out the procedure for a group or individual to request access and undertake a special use in a water supply area. The procedure also sets out the general situations and conditions that CRD Integrated Water Services staff will use in evaluating a request for access and special use and in making a recommendation to the Regional Water Supply Commission respecting approval of a permit. As part of the application process, completion of an *External Applicant Access and Special Use Request – Greater Victoria Water Supply Area* form is required. The current form has been amended as proposed in Attachment 5, to reflect the new proposed approach.

#### **ALTERNATIVES**

That the Regional Water Supply Commission:

1. (a) Endorse the proposed amendments to Bylaw No. 2804, Greater Victoria Water Supply Area Protection Bylaw and Bylaw No. 1857, Schedule 27 of the Ticket Authorization Bylaw;  
(b) Recommend to the CRD Board that Bylaw No. 4050 cited as “Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 1, 2015” be introduced, read a first and second time, read a third time;  
(c) Recommend to the CRD Board that Bylaw No. 4051 cited as “Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment No. 56, 2015” be introduced, read a first and second time, read a third time; and  
(d) Approve the draft *Water Supply Area Access and Special Use Request and Approval Policy* and *Water Supply Area Access and Special Use Request and Approval Procedure*.
2. Not endorse or recommend the proposed amendments to the Greater Victoria Water Supply Area Protection Bylaw No. 2804, and the proposed amendments to Schedule 27 of the Ticket Authorization Bylaw No. 1857, or the draft *Water Supply Area Access and Special Use Request and Approval Policy* and *Water Supply Area Access and Special Use Request and Approval Procedure*, and provide staff with further direction on bylaw amendments.

#### **IMPLICATIONS**

##### **ENVIRONMENTAL AND SOCIAL**

The undesirable access and activities occurring in the Leech WSA, continue to put the water supply areas at risk and without a protection bylaw in place covering all of the CRD water supply area lands, the CRD remains unable to enforce against the undesirable access and activities. The proposed bylaw amendments and supporting documents would enable enforcement against the undesirable access and activities while defining policy and procedure for groups or individuals who are seeking access and special use.

**INTERGOVERNMENTAL**

The Traditional Use Access Agreement with T'Souke First Nation was developed in parallel with Bylaw No. 2804 amendments. The amendments proposed to Bylaw No. 2804 make allowance for T'Souke First Nation traditional use activities described under the Agreement and provides for potential further agreements with other First Nations. Any CRD access and special use permit issuance must consider and avoid conflicts with activities under Agreement with a First Nation.

**CONCLUSION**

The proposed amendments to the Greater Victoria Water Supply Area Protection Bylaw No. 2804 and supporting policy and procedure documents would enable enforcement against the undesirable access and activities occurring in the Leech WSA while defining the process for groups or individuals who are seeking water supply area access and special use. The proposed bylaw amendments would also accommodate the portion of the Trans Canada Trail passing through the water supply area, accommodate First Nations cultural access to the Leech WSA and would update the bylaw in keeping with current watershed protection standards. The proposed amendments to the Ticket authorization Bylaw No. 1857 would reflect proposed changes to Bylaw No. 2804, increase the minimum fines and include an escalation of fines for repeat offences to increase deterrence.

**RECOMMENDATION**

That the Regional Water Supply Commission:

1. (a) Endorse the proposed amendments to Bylaw No. 2804, Greater Victoria Water Supply Area Protection Bylaw and Bylaw No. 1857, Schedule 27 of the Ticket Authorization Bylaw;
- (b) Recommend to the CRD Board that Bylaw No. 4050 cited as "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 1, 2015" be introduced, read a first and second time, read a third time;
- (c) Recommend to the CRD Board that Bylaw No. 4051 cited as "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment No. 56, 2015" be introduced, read a first and second time, read a third time; and
- (d) Approve the draft *Water Supply Area Access and Special Use Request and Approval Policy* and *Water Supply Area Access and Special Use Request and Approval Procedure*.

|               |  |
|---------------|--|
| Submitted by: | Ted Robbins, B.Sc., C.Tech., General Manager, Integrated Water Service |
| Concurrence:  | Robert Lapham, MCIP, RPP, Chief Administrative Officer                 |

Attachments:

1. Proposed Amendments to Bylaw 2804
2. Bylaw 4050, "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 1, 2015"
3. Draft Water Supply Area Access and Special Use Request and Approval Policy
4. Draft Water Supply Area Access and Special Use Request and Approval Procedure
5. External Applicant Access and Special Use Request – Greater Victoria Water Supply Area form
6. Bylaw 4051, "Capital Regional District Ticket Information Authorization Bylaw, 1990, Amendment Bylaw No. 56, 2015"

CAPITAL REGIONAL DISTRICT BYLAW NO. 2804

\*\*\*\*\*

GREATER VICTORIA WATER SUPPLY AREA PROTECTION BYLAW

\*\*\*\*\*

WHEREAS the Capital Regional District has established a water supply service and has the authority ~~to adopt a Bylaw~~ under section 796.2 (1) (a) of the *Local Government Act* to regulate in relation to the service; make rules for the management of property under its control with the right to set conditions respecting access to and use of that property;

**NOW THEREFORE**, the Capital Regional District Board in open meeting assembled, enacts as follows:

1. DEFINITIONS IN THIS BYLAW

"aircraft" means any vehicle capable of deriving support in the atmosphere from reactions of the air, and includes helicopters, gliders, ultralights, rockets and unmanned aerial vehicles;

"alien species" means a species designated as a controlled alien species pursuant to the Controlled Alien Species Regulation;

"animal" means an organism other than a human;

"authorized designate" means an employee or an officer of the CRD provided with the written authority to act on another person's behalf;

"authorized personnel" includes, peace officer, conservation officer, or person appointed or employed by the CRD as a park officer, animal control officer, bylaw enforcement officer, watershed security officer, or other authorized CRD employee;

"Board" means the Board of Directors of the Capital Regional District;

"business" means carrying on a commercial or industrial undertaking of any kind or nature or the providing of professional, personal or other services for the purpose of gain or profit;

"CRD" means the Capital Regional District;

"cycle" means a device having any number of wheels that is propelled by human power and on which a person may ride;

"emergency personnel" includes any person, group or organization responding to emergency situations in the water supply area ~~lands~~;

"General Manager" means the General Manager of the CRD ~~Water Department Integrated Water Services Department~~ appointed by the Board and also any person lawfully acting in that capacity;

"Leech Water Supply Area" means the area identified as the Leech Water Supply Area on the map attached as Schedule "A" to this Bylaw;

"liquor" has the same meaning as in the Liquor Control and Licensing Act;

"motor vehicle" means a vehicle, not run on rails, that is designed to be self propelled;

"natural feature" means any native or non-native tree, shrub, flower, grass or plant of any kind; soil, sand, gravel, rock, mineral, wood, fallen timber or other living or dead natural material;

~~"hunt" means to trap, chase, pursue, worry, follow after or on the trail of, search for, shoot at, stalk, lie in wait for, or to attempt, in any manner, to capture, kill or injure any wildlife whether or not the wildlife is captured, killed or injured;~~

"permit" means a water supply area ~~lands~~-access and use permit issued under this bylaw;

~~"permit fee" includes the special use fee and the refundable security deposit prescribed by this bylaw for a water supply area lands access permit to carry out a special use;~~

"Regional Water Supply Commission" means the standing committee appointed by the Board for regional water supply service ~~-purposes~~;

"special use" means an activity not included in the operations of the CRD, that is carried on in the water supply area ~~lands~~ by persons who are not employees or contractors of the CRD;

"traffic control device" means a sign, signal, line, meter, marking, space, barrier or device, not inconsistent with the Motor Vehicle Act, placed or erected by authority of the Board or the General Manager or a person authorized by either of them to exercise that authority;

~~"trail" means any footpath, pathway or area of land held in fee simple, leased, or held under a registered easement or statutory right-of-way by the CRD;~~

"vehicle" means a device in, on or by which a person or thing is or may be transported or drawn on a highway, except a device designed to be moved by human power or used exclusively on stationary rails or tracks;

"vessel" means any ship or boat or any other description of vessel propelled by machinery, except a seaplane, used or designed to be used in navigation;

"water supply area ~~lands~~" means any water catchment and non-catchment lands, including the water bodies within the boundaries, owned and managed by the Capital Regional District, as shown on the maps attached as Schedule "A", but does not include the area marked "Trans Canada Trail" shown on Schedule "A";

"watercraft" means any vessel that is not being propelled by machinery;

~~"weed species" means a species designated as a noxious weed pursuant to the Weed Control Regulation;~~

"wildlife" means any native or non-native mammal, bird, insect, reptile, fish or other indigenous creature.

## ENFORCEMENT POWERS

2. All authorized personnel may enforce this bylaw in the course of their duties.

3. Any authorized personnel may order a person who does anything contrary to this bylaw to leave water supply area ~~lands~~ immediately, or within a period of time specified by the authorized personnel, and every person so ordered shall comply with the order and leave the water supply area ~~lands~~ immediately or within the specified time period.
4. The prohibitions in this bylaw do not apply to authorized personnel or agents of the CRD acting in the course of their authorized duties or employment.

#### FINES

5. A person who contravenes this bylaw commits an offence and is liable on conviction to a fine of not less than ~~\$50.00~~\$100.00 and not more than the maximum prescribed by the Offence Act.
6. If a contravention of this bylaw is committed or continued on more than one day, it constitutes a separate offence for each day on which it is committed or continued.
7. A person who commits an offence under this bylaw and was previously convicted of the same offence is deemed to have committed a subsequent offence for purposes of establishing the appropriate fine.
8. The penalty imposed under section 5 shall be in addition to and not in substitution for any other penalty or remedy imposed by this bylaw or any other statute, law or regulation.

#### NO ENTRY

9. No person, except emergency or authorized personnel or persons with the authority of the General Manager, shall enter the water supply area ~~lands~~.

#### PUBLIC CONDUCT

10. No person shall obstruct or interfere with any person or traffic lawfully using the water supply area ~~lands~~.
11. No person shall behave in a disorderly, dangerous or abusive manner in the water supply area ~~lands~~.

#### LIQUOR

- 11.12. No person shall ~~in water supply area lands~~ consume or possess liquor in the water supply area except in compliance with a license issued under the Liquor Control and Licensing Act and authorized by permit.

#### SIGNS

- 12.13. The General Manager may cause to be erected signs or other devices specifying one or more areas in the water supply area ~~lands~~ where specific activities are permitted, prohibited or restricted under the authority of this bylaw.
- 13.14. Every person in the water supply area ~~lands~~ must observe and obey every prohibition and restriction announced by a sign or other device erected under section ~~(913)~~.



## DAMAGE

~~44.15.~~ No person shall remove, destroy or damage any natural feature, either organic or inorganic, or other CRD property of any kind, in the water supply area ~~lands~~ except ~~with the~~ as authorized by permit or with written permission of the ~~g~~General m~~Manager or if permitted by permit.~~

~~45.16.~~ No person ~~in water supply area lands~~ shall in any way foul or pollute any ~~lake, stream, pond, watercourse or any CRD property on those lands or bodies of water~~ land, body of water, wetland, or watercourse in the water supply area.

~~46.17.~~ No person shall remove, destroy or damage any signs, notices, rules or regulations posted in the water supply area ~~lands~~ by and under the authority of the Regional Water Supply Commission or the General Manager.

~~47.18.~~ No person shall molest, disturb, frighten, injure, kill, catch, trap or snare any animal in the water supply area ~~lands~~ except as permitted by provincial or federal authorities ~~and the General Manager and with written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.~~

19. No person shall deposit any garbage, refuse, ~~empty or broken bottles, tin cans, paper or~~ other waste material upon the water supply area ~~lands~~.

20. No person shall introduce or cause to be introduced to the water supply area any alien species or weed species.

~~48.21.~~ No person shall introduce any living or non-living organic material into the water supply area except as authorized by permit or with the written permission of the General Manager.

## FIRE

~~49.22.~~ No person shall light or keep lit any fire in the water supply area ~~lands~~ except authorized ~~persons-personnel, and~~ other persons authorized by permit or with the written permission of the General Manager, ~~or under a permit or persons authorized by the terms of a written agreement between a First Nation and the CRD.~~

~~20.23.~~ No person shall throw or place upon the ground in the water supply area ~~lands~~ any lighted match, cigar, cigarette or other burning substance.

## TREES

~~21.24.~~ No person shall cut, deface, damage or cut down any tree or carry out any logging operation or facilitate such operation in the water supply area ~~lands~~ except as authorized by permit or written permission of ~~where authorized by~~ the General Manager ~~or permit,~~ or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

## CYCLES

~~22-25.~~ No person shall bring or ride any cycle in the water supply area ~~lands~~ except authorized personnel.-

## CAMPING

~~23-26.~~ No person shall camp or sleep overnight in the water supply area ~~lands~~ with or without a shelter of any kind, including, but not restricted to, a motor vehicle, recreational vehicle, tent, lean to, or other natural shelter, ~~without permission of the General Manager or by permit.~~ except as authorized by permit, with the written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

## STORAGE

~~24-27.~~ No person, including an owner of property adjacent to the water supply area ~~lands~~, shall use the water supply area ~~lands~~ for storage of any kind, ~~unless related to CRD activities or except as~~ authorized by permit or with the written permission of the General Manager.

## ANIMALS IN THE WATER SUPPLY AREA ~~LANDS~~

~~25-28.~~ No person shall bring in, allow animals in their custody to enter or have custody of ~~an~~ animals in the water supply area ~~lands~~ except emergency personnel or authorized personnel acting in the course of their duties.

## FIREARMS AND HUNTING

~~26-29.~~ No person shall hunt, carry or discharge any firearm, bow or crossbow in the water supply area ~~lands~~ except authorized personnel acting in the course of their duties, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

## VESSELS, ~~AND~~ WATERCRAFT AND AIRCRAFT

~~27-30.~~ No person shall ~~operate a helicopter, amphibious aircraft, vessel, watercraft or fishing device on or land an aircraft~~ within the water supply area ~~lands~~ except emergency or authorized personnel, as authorized by permit or ~~persons authorized with written permission of~~ by the General Manager.

~~28-31.~~ No person shall operate a vessel or watercraft on or within the water supply area except emergency or authorized personnel, by written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

## FISHING

~~32.~~ No person shall fish or take fish or attempt to take fish by any method in the water supply area, except by written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

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## VEHICLES

- ~~29.33.~~ (1) No person shall drive or propel any type of motor vehicle in the water supply area ~~lands~~ except on ~~public~~ roadways intended and maintained for the passage of vehicles or parking lots.
- (2) Emergency personnel, authorized personnel, and persons with the authority of the General Manager are exempt from this section.
- (3) Vehicles parked in areas signed as "No Parking" or "No Parking Area Tow Away Zone" may be towed away immediately at the owner's expense by order of authorized personnel. Vehicles left unattended for more than 48 hours may be towed away at the owner's expense by order of authorized personnel.

~~(1) The General Manager may, if in his opinion it is necessary for reasons of safety or convenience, cause the erection of appropriate signs closing any road or other areas within water supply area lands.~~

~~No person shall operate a vehicle in any part of water supply area lands posted as closed except authorized personnel.~~

- ~~30.34.~~ (1) The General Manager may, ~~if in his opinion it is necessary for reasons of safety and convenience, limit, by posting signs to that effect the speed at which vehicles may be operated on any road~~ limit the maximum driving speed on any road within the water supply area ~~lands~~ by posting speed limits.

- (2) No person shall operate a vehicle in the water supply area ~~lands~~ in excess of the posted speed limit.

- ~~34.35.~~ (1) The General Manager or authorized personnel acting on his behalf may cause signs or other traffic control devices to be placed in the water supply area ~~lands~~ for the purposes of sections ~~25 to 27 both inclusive~~ 13, 34, 43 and 44.

- (2) No person shall operate a vehicle in the water supply area ~~lands~~ contrary to posted signs or traffic control devices.

## COMMERCIAL SERVICES, ACTIVITIES OR DEMONSTRATIONS

- ~~32.36.~~ No person shall post, paint, or distribute any advertisement, sign, placard or handbill of any kind in the water supply area ~~lands~~.

- ~~33.37.~~ No person shall operate or station in the water supply area ~~lands~~ any vehicle displaying advertising or equipped with a public address system for the purpose of advertising, demonstration or attracting attention except ~~where as~~ authorized by permit or with the written permission of the General Manager ~~or by water supply area lands access permit~~.

## CONSTRUCTION

- ~~34.38.~~ No person shall build, or place any temporary structure or facilities in the water supply area ~~lands~~ except where authorized by permit or with the written permission of the General Manager ~~or by permit~~.

~~35.39.~~ No person shall build, or place any permanent structure or facilities in the water supply area ~~lands~~ except where authorized by permit.

#### WATER SUPPLY AREA ~~LANDS~~ ACCESS PERMITS

~~36.40.~~ No person shall, ~~in water supply area lands~~, conduct or carry on any special use or enter into or remain within ~~any~~the water supply area ~~lands~~ except where authorized by ~~a special permit~~ or written permission of the General Manager in accordance with this Bylaw, who will seek approval for access and special use from the Regional Water Supply Commission.

~~37.41.~~ Persons who have the right under an enactment ~~or an existing written agreement~~ to enter into or remain within the water supply area ~~lands~~ are not excepted from the requirement in section ~~(4033)~~ to obtain a permit.

~~42.~~ Persons who have the right under an existing written agreement to carry on any special use or enter into or remain within the water supply area are excepted from the requirement in section 40 to obtain a permit unless the terms of the written agreement require the person to obtain a permit from the General Manager pursuant to this Bylaw.

~~43.~~ The General Manager may close a road or roads, or a portion or all of the water supply area for reasons of safety, weather, operational concerns, road conditions and fire danger conditions by posting notices at water supply area entrances.

~~44.~~ The General Manager may restrict specific activities of permit holders for reasons of safety, weather, operational concerns, road conditions and fire danger conditions by posting notices at water supply area entrances.

~~38.45.~~ The General Manager or authorized designate may issue a permit for ~~special use~~access and use (including special use), if all of the conditions established under Section ~~4636~~ are met by the permit applicant.

~~39.46.~~ The General Manager is hereby delegated the authority to establish the conditions respecting the issuance of permits.

~~40.47.~~ (1) The General Manager and/or the Regional Water Supply Commission may:

- (a) refuse to issue a permit to any person or group who has previously contravened this bylaw;
- (b) revoke a permit if the special use is conducted in a manner which contravenes this bylaw;

~~41.48.~~ Where an applicant applies for a permit for access to the water supply area ~~lands~~, the applicant must pay a refundable security deposit of ~~\$50.00~~ \$500.00 which will be repaid upon return of ~~the keys~~ and ~~radio~~ other equipment owned by the Capital Regional District issued ~~required~~ as a condition of access.

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CITATION

42.49. This bylaw may be cited as "Capital Regional District Water Supply Area Regulations  
Bylaw No. 1, 2000 – Amendment 1, 2015.

Read a first time this                      day of                      , 2016.

Read a second time this                      day of                      , 2016.

Read a third time this                      day of                      , 2016.

ADOPTED this                      day of                      , 2016.

\_\_\_\_\_  
CHAIR

\_\_\_\_\_  
SECRETARY



**CAPITAL REGIONAL DISTRICT  
BYLAW NO. 4050**

\*\*\*\*\*  
**A BYLAW TO AMEND BYLAW 2804, "CAPITAL REGIONAL DISTRICT WATER  
SUPPLY AREA REGULATIONS BYLAW NO. 1, 2000"**  
\*\*\*\*\*

WHEREAS, Bylaw 2804, regulates the access and use of Greater Victoria Water Supply Area, lands owned and managed by the Capital Regional District for the purpose of a water supply service;

The Board of the Capital Regional District in open meeting assembled enacts as follows:

1. Bylaw No. 2804, "Capital Regional District Water Supply Area Regulations Bylaw, 2000" is amended as follows:
  - a. By deleting the first paragraph beginning with "Whereas" in its entirety and substituting the following:
 

"WHEREAS the Capital Regional District has established a water supply service and has the authority under section 796.2 of the *Local Government Act* to regulate in relation to the service;"
  - b. By adding new definitions under Section 1 DEFINITIONS IN THIS BYLAW as follows:
 

""aircraft" means any vehicle capable of deriving support in the atmosphere from reactions of the air, and includes helicopters, gliders, ultralights, rockets and unmanned aerial vehicles;"

""alien species" means a species designated as a controlled alien species pursuant to the Controlled Alien Species Regulation;"

""authorized designate" means an employee or an officer of the CRD provided with the written authority to act on another person's behalf;"

""Leech Water Supply Area" means the area identified as the Leech Water Supply Area on the map attached as Schedule "A" to this Bylaw;"

""hunt" means to trap, chase, pursue, worry, follow after or on the trail of, search for, shoot at, stalk, lie in wait for, or to attempt, in any manner, to capture, kill or injure any wildlife whether or not the wildlife is captured, killed or injured;"

""weed species" means a species designated as a noxious weed pursuant to the Weed Control Regulation;"
  - c. By deleting the definitions in Section 1 for "permit fee" and "trail" in their entirety;
  - d. By amending the definition of "emergency personnel" by removing the word "lands";
  - e. By amending the definition in Section 1 of "General Manager" by replacing "Water Department" with "Integrated Water Services Department";
  - f. By amending the definition in Section 1 of "special use" to remove the word "lands";

- g. By deleting the definition in Section 1 of “water supply area lands” in its entirety and replacing it with the following:

““water supply area” means any water catchment and non-catchment lands, including the water bodies within the boundaries, owned and managed by the Capital Regional District, as shown on the maps attached as Schedule “A”, but does not include the area marked “Trans Canada Trail” shown on Schedule “A””;

- h. By amending Section 3 under the heading ENFORCEMENT POWERS to remove each instance of the word “lands”;
- i. By inserting the following new Section after Section 3 under the heading ENFORCEMENT POWERS:

“The prohibitions in this bylaw do not apply to authorized personnel or agents of the CRD acting in the course of their authorized duties or employment.”;

- j. By amending Section 4 under the heading FINES to remove “\$50.00” and replace with “\$100.00”;
- k. By inserting the following three new Sections following section 4 under the heading FINES:

“If a contravention of this bylaw is committed or continued on more than one day, it constitutes a separate offence for each day on which it is committed or continued.”

“A person who commits an offence under this bylaw and was previously convicted of the same offence is deemed to have committed a subsequent offence for purposes of establishing the appropriate fine.”

“The penalty imposed under section 5 shall be in addition to and not in substitution for any other penalty or remedy imposed by this bylaw or any other statute, law or regulation.”;

- l. By amending Section 5 under the heading NO ENTRY and Sections 6 and 7 under the heading PUBLIC CONDUCT to replace each instance of “water supply area lands” with “the water supply area”;
- m. By deleting section 8 under the heading LIQUOR in its entirety and replacing it with:

“No person shall consume or possess liquor in the water supply area except in compliance with a license issued under the Liquor Control and Licensing Act and authorized by permit.”;
- n. By amending Section 9 and 10 under the heading SIGNS to replace each instance of “water supply area lands” with “the water supply area”;
- o. By amending Section 10 to replace “under section (9)” with “under section (13)”;
- p. By deleting sections 11 to 15 inclusive under the heading DAMAGE and replacing with the following:

“No person shall remove, destroy or damage any natural feature, either organic or inorganic, or other CRD property of any kind, in the water supply area except as authorized by permit or with written permission of the General Manager.

No person shall in any way foul or pollute any land, body of water, wetland, or watercourse in the water supply area.

No person shall remove, destroy or damage any signs, notices, rules or regulations posted in the water supply area by and under the authority of the Regional Water Supply Commission or the General Manager.

No person shall molest, disturb, frighten, injure, kill, catch, trap or snare any animal in the water supply area except as permitted by provincial or federal authorities and with written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

No person shall deposit any garbage, refuse, or other waste material upon the water supply area.

No person shall introduce or cause to be introduced to the water supply area any alien species or weed species.

No person shall introduce any living or non-living organic material into the water supply area except as authorized by permit or with the written permission of the General Manager.”;

- q. By deleting section 16 under the heading FIRE in its entirety and replacing it with the following:

“No person shall light or keep lit any fire in the water supply area except authorized personnel, other persons authorized by permit or with the written permission of the General Manager, or persons authorized by the terms of a written agreement between a First Nation and the CRD.”;

- r. By amending section 17 under the heading FIRE to replace “water supply area lands” with “the water supply area”;

- s. By deleting section 18 under the heading TREES in its entirety and replacing it with the following:

“No person shall cut, deface, damage or cut down any tree or carry out any logging operation or facilitate such operation in the water supply area except as authorized by permit or written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.”;

- t. By amending section 19 under the heading CYCLES to replace “water supply area lands” with “the water supply area”;

- u. By deleting section 20 under the heading CAMPING in its entirety and replacing it with the following:

“No person shall camp or sleep overnight in the water supply area with or without a shelter of any kind, including, but not restricted to, a motor vehicle, recreational vehicle, tent, lean to, or other natural shelter, except as authorized by permit, with the written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.”;

- v. By deleting section 21 under the heading STORAGE in its entirety and replacing it with the following:

“No person, including an owner of property adjacent to the water supply area, shall use the water supply area for storage of any kind, except as authorized by permit or with the written permission of the General Manager.”;

- w. By replacing the heading after section 21 from “ANIMALS IN WATER SUPPLY AREA LANDS” to “ANIMALS IN THE WATER SUPPLY AREA”;

- x. By deleting section 22 under the heading ANIMALS IN THE WATER SUPPLY AREA in its entirety and replacing it with the following:

“No person shall bring in, allow animals in their custody to enter or have custody of animals in the water supply area except emergency personnel or authorized personnel acting in the course of their duties.”;

- y. By deleting section 23 under the heading FIREARMS AND HUNTING in its entirety and replacing it with the following:

“No person shall hunt, carry or discharge any firearm, bow or crossbow in the water supply area except authorized personnel acting in the course of their duties, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.”;

- z. By deleting the heading after section 23 in its entirety and replacing it with “VESSELS, WATERCRAFT AND AIRCRAFT”;

- aa. By deleting section 24 under the heading VESSELS, WATERCRAFT AND AIRCRAFT and replacing it with the following:

“No person shall land an aircraft within the water supply area except emergency or authorized personnel, as authorized by permit or with written permission of the General Manager.”;

- bb. By inserting the following new section after section 24:

“No person shall operate a vessel or watercraft on or within the water supply area except emergency or authorized personnel, by written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.”;

- cc. By inserting a new heading and section after the VESSELS and WATERCRAFT sections as follows:

### "FISHING

No person shall fish or take fish or attempt to take fish by any method in the water supply area, except by written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.";

- dd. By deleting and replacing section 25 (1) in its entirety under the heading VEHICLES and replacing it with the following:

"No person shall drive or propel any type of motor vehicle in the water supply area except on roadways intended and maintained for the passage of vehicles or parking lots.";

- ee. By deleting in its entirety section 26(1) and (2) under the heading VEHICLES;

- ff. By deleting in its entirety section 27 (1) under the heading VEHICLES and replacing it with the following:

"The General Manager may limit the maximum driving speed on any road within the water supply area by posting speed limits.";

- gg. By amending section 27 (2), 28 (1) and (2) under the heading VEHICLES to replace each instance of "water supply area lands" with "the water supply area";

- hh. By amending section 28 (1) under the heading VEHICLES to replace "sections 25 to 27" with "sections 13, 34, 43 and 44";

- ii. By amending section 29 and 30 under the heading COMMERCIAL SERVICES, ACTIVITIES OR DEMONSTRATIONS to replace each instance of "water supply area lands" to "the water supply area";

- jj. By amending section 30 under the heading COMMERCIAL SERVICES, ACTIVITIES OR DEMONSTRATIONS to replace "except where authorized by the General Manager or by water supply area lands access permit" to "except as authorized by permit or with the written permission of the General Manager.";

- kk. By amending section 31 and 32 under the heading CONSTRUCTION to replace each instance of "water supply area lands" with "the water supply area";

- ll. By amending section 31 under the heading CONSTRUCTION to replace "where authorized by the General Manager or by permit" to "where authorized by permit or with the written permission of the General Manager.";

- mm. To delete sections 33 to 37 inclusive and the heading "WATER SUPPLY AREA LANDS ACCESS PERMITS" and replace it with the heading "WATER SUPPLY AREA ACCESS PERMITS" and the following amended and new sections:

"No person shall conduct or carry on any special use or enter into or remain within the water supply area except where authorized by permit or written permission of the General Manager in accordance with this Bylaw, who will seek approval for access and special use from the Regional Water Supply Commission.



Persons who have the right under an enactment to enter into or remain within the water supply area are not excepted from the requirement in section 40 to obtain a permit.

Persons who have the right under an existing written agreement to carry on any special use or enter into or remain within the water supply area are excepted from the requirement in section 40 to obtain a permit unless the terms of the written agreement require the person to obtain a permit from the General Manager pursuant to this Bylaw.

The General Manager may close a road or roads, or a portion or all of the water supply area for reasons of safety, weather, operational concerns, road conditions and fire danger conditions by posting notices at water supply area entrances.

The General Manager may restrict specific activities of permit holders for reasons of safety, weather, operational concerns, road conditions and fire danger conditions by posting notices at water supply area entrances.

The General Manager or authorized designate may issue a permit for access and use (including special use), if all of the conditions established under Section 46 are met by the permit applicant.

The General Manager and/or the Regional Water Supply Commission may:

- (a) refuse to issue a permit to any person or group who has previously contravened this bylaw;
- (b) revoke a permit if the special use is conducted in a manner which contravenes this bylaw;"

nn. By deleting section 38 under the heading WATER SUPPLY AREA ACCESS PERMITS in its entirety and replacing it with the following:

"Where an applicant applies for a permit for access to water supply area, the applicant must pay a refundable security deposit of \$500.00 which will be repaid upon return of keys and other equipment owned by the Capital Regional District issued as a condition of access.";

oo. By amending section 39 under the heading CITATION by adding ", Amendment 1, 2015" immediately after "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000.";

pp. By renumbering in consecutive order the remaining, amended and added sections of the bylaw from 1 (Definitions) to 48 (Citations); and,

qq. By deleting "Schedule A" maps Sheet 1 and 2 dated June 9, 2000 in their entirety and replacing them with the Schedule A maps attached to and forming part of this bylaw "Greater Victoria Water Supply Area CRD Bylaw 2804 Schedule A" map reference "ScheduleAupdate.mxd" dated December 9, 2015.

### CITATION

2. This bylaw may be cited as "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 1, 2015.

Read a first time this \_\_\_\_\_ day of \_\_\_\_\_,

Read a second time this \_\_\_\_\_ day of \_\_\_\_\_,

Read a third time this \_\_\_\_\_ day of \_\_\_\_\_,

ADOPTED this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

CHAIR

SECRETARY



## CAPITAL REGIONAL DISTRICT

## DEPARTMENT POLICY

|            |   |  |
|------------|---|--|
| Section    | Regional Water Supply   |  |
| Subsection | Integrated Water Services - Policies                          |  |
| Title      | WATER SUPPLY AREA ACCESS AND SPECIAL USE REQUEST AND APPROVAL |  |

**POLICY:**

The Regional Water Supply Commission will consider requests for Water Supply Area access and special use. The Commission will be provided a CRD Integrated Water Services staff evaluation of each request and a recommendation for the Commission's consideration. The Commission will approve or not approve a request which will determine whether or not the General Manager can issue a permit for access and special use.

**PURPOSE:**

The purpose of this policy is to ensure the Regional Water Supply Commission is aware of the number and type of water supply area access and special use requests and sets out the roles of the Commission and CRD staff in the approval process.

**RESPONSIBILITIES:**

The CRD Board will amend the Greater Victoria Water Supply Area Protection Bylaw as required.

The Regional Water Supply Commission will review and amend this policy as required.

The CRD Integrated Water Services staff will adhere to this policy.

**SCOPE:**

This policy applies to all requests for water supply area access and special use, except under the prescribed situations set out in the *CRD Integrated Water Services – Water Supply Area Access and Special Use Request and Approval Procedure*.

**DEFINITIONS:**

'Water Supply Area' means any water catchment and non-catchment lands, including the water bodies within the boundaries, owned and managed by the CRD, including the Sooke, Goldstream and Leech Water Supply Areas.

'Special Use' means an activity not included in the operations of the CRD that is carried on in the water supply area by persons who are not employees or contractors of the CRD.

**PROCEDURE:**

Requests for water supply area access and special use, except under the prescribed situations set out in the *CRD Integrated Water Services – Water Supply Area Access and Special Use Request and Approval Procedure* will be evaluated by CRD Integrated Water Services staff. CRD Integrated Water Services staff will provide a staff report to the Regional Water Supply Commission outlining the nature of the request and special use, the implications of the request, and a staff recommendation for the Commission consideration. The Commission may approve or not approve the request and may set certain conditions with an approval. With the Commission's approval, the General Manager, Integrated Water Services, will issue an access and special use permit and set out the conditions and requirements of the permit and the responsibilities of the permit holder.

|                    |  |              |  |
|--------------------|--|--------------|--|
| Approval Date:     |  | Approved By: |  |
| 1. Amendment Date: |  | Approved By: |  |
| 2. Amendment Date: |  | Approved By: |  |
| 3. Amendment Date: |  | Approved By: |  |
| Next Review Date:  |  | Reviewed By: |  |
| Supersedes:        |  |              |  |

Related Policy, Procedure or Guideline:

1. *CRD Integrated Water Services – Water Supply Area Access and Special Use Request and Approval Procedure*
2. *Greater Victoria Water Supply Area Protection Bylaw*



## CAPITAL REGIONAL DISTRICT

## DEPARTMENT PROCEDURE

|            |   |  |
|------------|---|--|
| Section    | Regional Water Supply   |  |
| Subsection | Integrated Water Services - Procedure                                   |  |
| Title      | WATER SUPPLY AREA ACCESS AND SPECIAL USE REQUEST AND APPROVAL PROCEDURE |  |

**PURPOSE:**

The purpose of this procedure is to set out the procedure for a group or individual to request access and undertake a special use in the Greater Victoria Water Supply Area. This procedure also sets out the general situations and considerations that CRD Integrated Water Services staff will use in evaluating a request for access and special use and in making a recommendation to the Regional Water Supply Commission respecting approval of a permit. The Regional Water Supply Commission will approve or not approve a request for access and special use unless under the prescribed situations set out below. A permit for access and special use will be issued by the General Manager once the Commission has approved a request. This procedure is to be used in conjunction with the Greater Victoria Water Supply Area Protection Bylaw and the CRD Integrated Water Services, Regional Water Supply Policy - Water Supply Area Access and Special Use Request and Approval.

1. The General Manager, Integrated Water Services, has the authority to approve routine access and special use requests based on the following prescribed situations:
  - a. CRD staff specifically required to conduct activities included in the operations of the CRD as part of their duties;
  - b. BC Hydro and Fortis Gas staff and contractors for utility work to be undertaken in the water supply areas;
  - c. Representatives of senior governments or regulatory agencies who, as part of their duties, are required to gain access to the water supply areas;
  - d. Staff and contractors of agencies or organizations who hold licences, leases or other agreements with the CRD who are required to gain access to the water supply areas to access, operate and maintain equipment such as communications equipment, occupying water supply area sites or who are required to transit CRD lands to access private lands;
  - e. Organizations or individuals touring the water supply areas with CRD staff escorts;
  - f. Organizations or individuals conducting research projects authorized by the CRD, and being supported by an accredited academic institution or government agency;
  - g. Contractors or tradespeople required to perform work as requested by CRD;
  - h. Directors of the CRD Board, members of the Regional Water Supply Commission and other CRD Commissions and Committees, municipal council members, and health authority officials;
  - i. Accredited media representatives with CRD staff escorts; and
  - j. Special purpose day/visitation access with CRD staff escorts.
2. All other requests for water supply area access and special use will be approved by the Regional Water Supply Commission in accordance with the *Regional Water Supply Policy – Water Supply Area Access and Special Use Request and Approval*.

**PROCEDURE:**

1. Groups or individuals requesting water supply area access or special use permission are to complete the CRD Integrated Water Services form *External Applicant Access and Special Use Request – Greater Victoria Water Supply Area*.
2. CRD Integrated Water Services staff will evaluate the request based on the information provided in the form and any other information provided by the applicant.

3. CRD Integrated Water Services Staff will provide a staff report to the Regional Water Supply Commission outlining the nature of the request and special use, the implications of the request, and a staff recommendation for the Commission's consideration.
4. The Commission will approve or not approve the request and may set certain conditions with an approval.
5. With the Commission's approval, the General Manager, Integrated Water Services will issue an access and special use permit and set out the conditions, requirements of the permit and the responsibilities of the permit holder.

|                    |  |              |  |
|--------------------|--|--------------|--|
| Approval Date:     |  | Approved By: |  |
| 1. Amendment Date: |  | Approved By: |  |
| 2. Amendment Date: |  | Approved By: |  |
| 3. Amendment Date: |  | Approved By: |  |
| Next Review Date:  |  | Reviewed By: |  |
| Supersedes:        |  |              |  |

Related Policy, Procedure or Guideline:

1. *CRD Integrated Water Services, Water Supply Area Access and Special Use Request and Approval Policy*
2. *Greater Victoria Water Supply Area Protection Bylaw*



Integrated Water Services, Watershed Protection Division  
**EXTERNAL APPLICANT ACCESS  
 AND SPECIAL USE REQUEST**  
**GREATER VICTORIA WATER SUPPLY AREA**

Application No. \_\_\_\_\_

Please Print and Fill Out All Applicable Sections.

**Primary Contact**

Applicant's Name: \_\_\_\_\_ Name of Agency:\* \_\_\_\_\_  
 Applicant's Title: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Applicant's Supervisor: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Agency Street Address: \_\_\_\_\_  
 City/Prov: \_\_\_\_\_ P. Code: \_\_\_\_\_  
 Agency Email: \_\_\_\_\_ Agency Fax: \_\_\_\_\_  
 Other Agency Numbers (cell, pager): \_\_\_\_\_  
 Agency Emergency Contact: Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Note: If Applicant is representing a group or work crew that will be using a single vehicle and working in the same location at all times, only one full application form is required. Provide contact information for all of the other workers in the crew on an *Additional Applicants Access Request* form. Orientation is required for the entire group.

\* If Applicant is not representing a group or agency, indicate 'Individual'.

**Personal Contact Information** (See Privacy Statement below.)

The personal information requested on this form is required to ensure continued protection of water quality and the Greater Victoria Water Supply Area lands; to provide a means for emergency contact; and to safeguard CRD Water equipment and facilities.

Home Address: Street: \_\_\_\_\_  
 City: \_\_\_\_\_ Prov. \_\_\_\_\_ P. Code: \_\_\_\_\_  
 Home Phone: \_\_\_\_\_ Other, if required (cell, pager, email): \_\_\_\_\_  
 Personal Emergency Contact: Name: \_\_\_\_\_ Phone: \_\_\_\_\_

**Privacy Statement**

CRD Water Services is committed to respecting your right to privacy. Personal information is collected under authority of CRD Bylaw 2804. The collection of personal information is subject to and protected by the Freedom of Information and Protection of Privacy Act and will only be used for the purposes for which it was originally collected or for a use consistent with that purpose. If you have any questions or concerns about any information collected here, please contact the Manager, WSER (250-391-3566). By signing this form you acknowledge and accept the collection of this information.

**Project / Purpose / Proposed Activity**

Project Name / Purpose of Application (please provide supporting documents)/Proposed Activity: \_\_\_\_\_

Note: Research Applications must be coordinated through the Watershed Protection Division. Please attach a copy of the research proposal and or work plan

Placer Miner Application - Attach claim location map and Claim Number: \_\_\_\_\_

Sponsoring Integrated Water Services (IWS) Division or other CRD Department (check one):

☐ Infrastructure Operations ☐ Infrastructure Engineering ☐ Watershed Protection  
☐ Water Quality ☐ Other CRD Department: \_\_\_\_\_  
☐ No CRD Sponsor

Name of Water Services Access Sponsor (Division Representative): \_\_\_\_\_

Name of Water Supply Area Co-Sponsor (Project Manager): \_\_\_\_\_  
 (If Required)

---

**Vehicle, Equipment and Transporting Dangerous Materials Information**

Vehicle Make: \_\_\_\_\_ Model: \_\_\_\_\_ Colour: \_\_\_\_\_

Vehicle Marking (Logo etc.): \_\_\_\_\_ License Plate Number: \_\_\_\_\_

Transporting Other Equipment (i.e. Heavy Equipment, Boat)? ☐ Yes ☐ No

If yes, what is it? \_\_\_\_\_

Transporting Fuel, Lubricants<sup>(1)</sup>, Chemicals or other Hazardous or Dangerous Material? ☐ Yes ☐ NoIf yes<sup>(2)</sup>, what is it and how much? \_\_\_\_\_Transporting Dangerous Goods Certification Required? ☐ Yes ☐ No

Transporting Dangerous Goods Certification Number : \_\_\_\_\_

<sup>(1)</sup> Over and above that normally found in the vehicle or piece of equipment. <sup>(2)</sup> Please attach MSDS for each product.

---

**Access Requirements** *To be filled out in consultation with Sponsor*

Location of Work or Activity (be specific and note all locations): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Access Dates: From: \_\_\_\_\_ To: \_\_\_\_\_

☐ Monday to Friday Times: \_\_\_\_\_ ☐ Weekend Times: \_\_\_\_\_☐ Statutory Holidays Which ones? \_\_\_\_\_ Times: \_\_\_\_\_

---

**Equipment Requirements** *To be filled out in consultation with Sponsor*

The following equipment is required; please indicate if you are requesting a loan.

VHF Radio - CRD Water Frequencies <sup>(1)</sup> Loan Requested? ☐ Yes ☐ NoEmergency Spill Kit Loan Requested? ☐ Yes ☐ NoWildfire Equipment Loan Requested? ☐ Yes ☐ No<sup>(1)</sup> If requesting approval to program personal radio to CRD Water Frequencies, please provide the following information:

Industry Canada File Number: \_\_\_\_\_

Industry Canada Licence Number: \_\_\_\_\_

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**On Site Safety Considerations**

Applicable Safety Plan provided? (details) \_\_\_\_\_

First Aid certif. / equip. to be provided: \_\_\_\_\_

---

**Insurance**

Proof of Insurance Provided:

Vehicle: ☐ Yes ☐ No Firefighting (April 1 – October 31) ☐ Yes ☐ NoGeneral Liability ☐ Yes ☐ No

---

Note: By signing here the Applicant declares (and declares on behalf of group applicants), that the information provided is true and accurate.**Applicant's Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_**IWS Sponsor Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_**WSA Co-Sponsor:** \_\_\_\_\_ **Date:** \_\_\_\_\_

(If Required)

## For Internal CRD Use Only

### Initial Risk Review

- ☐ Contaminants (Hazardous material amounts, boat, heavy)
- ☐ Pathogens (Sani facilities, animals)
- ☐ Wildfire (Blasting, grinding, welding)
- ☐ Sediments / Nutrients (Excavation,
- ☐ Cultural / Environmental
- ☐ Safety (Training & Equip., Appropriate Plan /

### Initial Comments:

### Conditions and Restrictions:

- ☐ Risk Mgmt. Plan

### Assessed Overall Risk to Water Quality or Other Values

Comments:

- ☐ Low
- ☐ Medium<sup>1</sup>
- ☐ High <sup>1</sup>

<sup>1</sup> Any application deemed a Medium or High Risk must be reviewed by the Senior Manager, Watershed Protection or Access Review Committee. Attach rationale for Medium or High Risk designation and recommendations on course of action.

### Fire Danger Rating

Expected fire danger rating during access dates      Very Low ☐      Low ☐      Moderate ☐      High ☐      Extreme ☐

### Inspections

Does the applicant require inspections or other action upon entry?

- ☐ No
- ☐ Yes
- ☐ Pro

### Insurance

Proof of Insurance Provided:

Vehicle: ☐ Yes ☐ No      Firefighting (April 1 – October) ☐ Yes ☐ No  
General Liability ☐ Yes ☐ No

### Security Chargehand Comments

Previous Issues / Application Checks

### Initial Determination

- ☐ Recommend approval of the application
- ☐ Do not recommend approval of the application (be specific):
- ☐ Recommend approval of the application with requirements / restrictions as above and in addition:
- ☐ Refer to Sr. Manager, or ARC (Medium or High Risk)
- Results of Further Risk Review

## CRD Signatures

Security Chargehand, Watershed Protection

Date

Manager, Wildfire, Security & Emergency Response

Date

(If Required)

Senior Manager, Sponsoring IWS Division (or Water Supply Area Co-Sponsor)

Date

(If Required)

Senior Manager, Watershed Protection Division

Date

## Approval for Access and Special Use Provided by Regional Water Supply Commission

☐ Yes Date: \_\_\_\_\_

☐ No, not required

General Manager, Integrated Water Services

Date

## Access Times and Keys

☐ Annual (Expires Jan 31) or;

Date From: \_\_\_\_\_

Date To: \_\_\_\_\_

☐ 24/7

☐ Saturday & Sundays

☐ Monday to Friday

☐ Statutory Holidays

☐ 7:00 a.m. - 4:30 p.m.

Other: \_\_\_\_\_

Autogate Access:

☐ Goldstream

☐ Sooke

Gate Key Requirements: (refer to Water Supply Area Access Control Maps)

☐ Goldstream Group

☐ Sooke Entrance

☐ Head Tank

☐ AMO Submaster

☐ KLC (Kapoor) Submaster

☐ Macdonald Main

☐ Survey Mountain

☐ E&N Kapoor Group

☐ Cragg Main

☐ Weeks Lake

☐ Mt. McDonald Compound

☐ Others

Specify: \_\_\_\_\_

## Refundable Key Deposit

☐ Contract Holdback (none)

☐ Researcher (\$100)

☐ Miner (\$500)

☐ Contractor / Consultant (\$250)

☐ Adjacent Land Owner / Non-CRD Contractor (\$500)

## Radio Frequencies

☐ Permission to Program

☐ File Number Checked

☐ Licence Number Checked

☐ Ongoing

☐ Long Term (> 1 year)

☐ Short Term

Expiry: \_\_\_\_\_

## Orientation and Key Loans

☐ Key Deposit Paid

☐ Orientation Complete

Date: \_\_\_\_\_

☐ Photo ID Card

☐ Autogate Active

☐ Dashboard ID Card

☐ Key(s) issued / No(s): \_\_\_\_\_

☐ Access Info. Folder issued

Other: \_\_\_\_\_

Return Date: \_\_\_\_\_

Security Chargehand or Alternate (Initials): \_\_\_\_\_

## Applicant Declaration

By signing here the Applicant confirms completion of orientation; declares that they are going to an approved worksite(s) within the GVWSA to carry out work authorized by the CRD IWS or its representatives; understands and agrees to adhere to applicable Bylaws, policies and procedures; are not currently ill with a known waterborne communicable disease; will use the sanitary facilities provided, and; will follow the instructions of CRD IWS personnel when required.

The Applicant confirms equipment loans as listed above and understands that any keys or equipment issued remain the property of CRD IWS. The applicant declares (and declares on behalf of their group or work crew as required), that the keys or equipment will be surrendered upon notice, that **keys must not be copied or loaned to others** and that they will return keys and equipment on the due date or make arrangements for the renewal of borrowing privileges.

Applicant

Date

---

**Routing**

- |  |  |
|--|--|
| <input type="checkbox"/> Applicant / Water Services Access Sponsor               | <input type="checkbox"/> Security Chargehand, Watershed Protection |
| <input type="checkbox"/> Manager Wildfire, Security and Emergency Response       | <input type="checkbox"/> Senior Manager WP (and ARC - If Required) |
| <input type="checkbox"/> If Required, Sr. Manager, Sponsor Div. / WSA Co-Sponsor | <input type="checkbox"/> If Required, General Manager              |

**Data Entry Date:** \_\_\_\_\_**Initials:** \_\_\_\_\_

CAPITAL REGIONAL DISTRICT  
BYLAW 4051

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**A BYLAW TO AMEND BYLAW 1857 “CAPITAL REGIONAL DISTRICT TICKET  
INFORMATION AUTHORIZATION BYLAW, 1990, AMENDMENT BYLAW NO. 56”**

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**WHEREAS**, Bylaw 1857 Schedule 27 documents fines for offences of the Water Supply Area Regulations Bylaw No. 1, 2000;

**NOW THEREFORE**, the Board of the Capital Regional District in open meeting assembled enacts as follows:

1. Bylaw No. 1857 of the “Capital Regional District Ticket Information Authorization Bylaw, 1990, Amendment Bylaw No. 56” is amended as follows:
  - a) By deleting Schedule 27 in its entirety and replacing it with the Schedule attached to and forming part of this Bylaw.
2. This Bylaw may be cited as “Capital Regional District Ticket Information Authorization Bylaw, 1990, Amendment Bylaw No. 56, 2015”.

|                        |        |      |
|------------------------|--------|------|
| READ A FIRST TIME THIS | day of | 2016 |
| READ A SECOND TIME     | day of | 2016 |
| READ A THIRD TIME THIS | day of | 2016 |
| ADOPTED THIS           | day of | 2016 |

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CHAIR

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CORPORATE OFFICER



SCHEDULE 27 TO BYLAW NO. 1857

WATER SUPPLY AREA  
REGULATIONS BYLAW NO. 1, 2000  
*(BI 2804)*

| <b>WORDS OR EXPRESSIONS<br/>DESIGNATING OFFENCE</b>            | <b>SECTION</b> | <b>FINE</b>   |
|--|----------------|---|
| 1. Unauthorized entry on water supply area lands               | 9.             | \$200.00 (first offence)<br>\$400.00 (second offence)<br>\$1,000.00 (third offence) |
| 2. Obstruct persons or traffic                                 | 10.            | \$100.00  |
| 3. Disorderly behavior   | 11.            | \$100.00  |
| 4. Unlawful use of liquor                                      | 12.            | \$100.00  |
| 5. Fail to obey sign   | 14.            | \$100.00  |
| 6. Damage to property/<br>natural feature in water supply area | 15.            | \$200.00 (first offence)<br>\$400.00 (second offence)<br>\$1,000.00 (third offence) |
| 7. Foul water supply area lands/water bodies                   | 16.            | \$200.00  |
| 8. Remove posted notices                                       | 17.            | \$100.00  |
| 9. Interfere with wildlife                                     | 18.            | \$200.00  |
| 10. Deposit garbage  | 19.            | \$200.00 (first offence)<br>\$400.00 (second offence)<br>\$1,000.00 (third offence) |
| 11. Introduce alien or weed species                            | 20.            | \$200.00  |
| 12. Introduce organic material without authorization           | 21.            | \$200.00  |
| 13. Unlawful fire  | 22.            | \$200.00  |
| 14. Deposit burning substance                                  | 23.            | \$200.00  |
| 15. Damage tree  | 24.            | \$100.00  |
| 16. Cut down tree  | 24.            | \$200.00  |

|     |  |        |   |
|-----|--|--------|---|
| 17. | Unauthorized cycling   | 25.    | \$100.00  |
| 18. | Unauthorized camping   | 26.    | \$100.00  |
| 19. | Prohibited storage   | 27.    | \$100.00  |
| 20. | Prohibited animal  | 28.    | \$200.00 (first offence)<br>\$400.00 (second offence)<br>\$1,000.00 (third offence) |
| 21. | Unauthorized hunting, carry or discharge of firearm, crossbow or bow | 29.    | \$200.00  |
| 22. | Unauthorized operation of aircraft                                   | 30.    | \$200.00  |
| 23. | Unauthorized operation of vessel or watercraft                       | 31.    | \$200.00  |
| 24. | Unauthorized fishing   | 32.    | \$200.00  |
| 25. | Driving off road   | 33.(1) | \$200.00  |
| 26. | Driving contrary to posted signs or traffic control devices          | 35.(2) | \$100.00  |
| 27. | Unlawful sign  | 36.    | \$100.00  |
| 28. | Prohibited public address system                                     | 37.    | \$100.00  |
| 29. | Prohibited temporary structure                                       | 38.    | \$100.00  |
| 30. | Prohibited permanent structure                                       | 39.    | \$200.00  |
| 31. | Entry into closed area   | 43.    | \$200.00  |
| 32. | Prohibited activity  | 44.    | \$200.00  |

**REPORT TO REGIONAL WATER SUPPLY COMMISSION  
MEETING OF WEDNESDAY, MAY 18, 2016**

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**SUBJECT**     **CAPITAL REGIONAL DISTRICT TICKET INFORMATION AUTHORIZATION  
BYLAW – AMENDMENT BYLAW NO. 4094 (FOR CROSS CONNECTION  
CONTROL OFFENCES)**

**ISSUE**

Amendment of the Capital Regional District (CRD) Ticket Information Authorization Bylaw (Bylaw No. 1857) to establish tickets for specific offences under CRD Cross Connection Control Bylaw No.1, 2008 (Bylaw No. 3516).

**BACKGROUND**

The CRD's Cross Connection Control (CCC) Program protects public health by removing or isolating sources of contamination that may backflow into the Regional Water Supply and forms part of the multi-barrier approach used by the CRD to protect water quality. The CCC Program is funded entirely by the Regional Water Supply service. The program operates under the umbrella of Bylaw No. 3516, which applies to the seven water suppliers (CRD Juan de Fuca Water – Metchosin, Langford, Colwood, Highlands, View Royal, Sooke, Juan de Fuca Electoral Area, Central Saanich, North Saanich, Oak Bay, Saanich, Sidney, and Victoria/Esquimalt) within the Regional Water Supply.

Re-audits of severe hazard facilities are due to commence before August 2016. It is anticipated that some cross connection requirements may still be found to be outstanding following the first round of audits, which began in 2009. Current enforcement options under Bylaw No. 3516 are limited and not cost effective. Penalties for contravention of Bylaw No. 3516 are currently set at a maximum of \$2,000 per offence. Offences can only be prosecuted by means of filing a Long Form Information in provincial court, which requires the assistance of legal counsel. Since adoption of the bylaw in 2008, there has only been one case that has been prosecuted in provincial court. Although the defendant pleaded guilty, this prosecution was costly in terms of staff time for administration, as well as for legal representation, advice and support. The Provincial Court Judge reduced the penalty for the conviction to \$1,000.

The CRD's Ticket Information Authorization (TIA) Bylaw (Bylaw No. 1857) provides a means of establishing tickets, up to a maximum of \$1,000 per offence, for a range of offences specified in a number of CRD Bylaws. Payment of a ticket is equivalent to a defendant pleading guilty to an offence. Issuance of tickets under the TIA Bylaw has been proven to be a cost-effective and efficient enforcement tool when managed with the assistance of the CRD's Bylaw Enforcement Division. In the few cases where a ticket is disputed and is referred to provincial court for a hearing, Bylaw Enforcement assists with the court hearing process.

Bylaw No. 4094, attached as Appendix A, has been prepared to contain a schedule of offences and fines pertaining to specific sections of CCC Bylaw No. 3516. The fines (tickets) vary in amount from \$100 to \$1,000 per offence, scaled to the estimated relative public health impact of the offence.

## **ALTERNATIVES**

### *Alternative 1*

That the Regional Water Supply Commission recommend to the CRD Board that Bylaw No. 4094, "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 57, 2016", attached as Appendix A, be introduced, read a first and second time, read a third time, and adopted.

### *Alternative 2*

That the Regional Water Supply Commission direct staff to undertake further analysis of enforcement options for the CCC Program for future consideration.

## **PUBLIC HEALTH IMPLICATIONS**

More efficient and effective enforcement of offences under CCC Bylaw No. 3516 throughout the region is expected to increase bylaw compliance and result in a lower risk of a public health incident occurring as a result of contamination of the drinking water supply.

## **INTER-JURISDICTIONAL IMPLICATIONS**

Previous discussions between CRD staff and representatives of the other six municipal water suppliers have indicated that there is general support for maintaining a consistent, fair and cost-effective approach to enforcement of compliance with Bylaw No. 3516.

## **ECONOMIC IMPLICATIONS**

Issuance of tickets under the CRD TIA Bylaw is known to be a very cost-effective and efficient alternative to prosecution of offences using the Long Form Information process currently set out in Bylaw No. 3516. Prosecution of a Long Form Information often requires multiple court appearances by legal counsel and can include substantial delays before a final verdict is reached. Prudent issuance of tickets for specific offences can save significant legal and administrative costs related to prosecutions.

The CCC Program Budget approved for 2016 includes estimated costs of \$3,000 for the assistance of CRD Bylaw Enforcement services in the issuance and tracking of tickets under Bylaw No. 3516.

## **CONCLUSION**

The CRD's CCC Program operates under the umbrella of Bylaw No. 3516. Current enforcement options under Bylaw No. 3516 are limited to a maximum penalty of \$2,000 per offence, which can be reduced or varied by the Provincial Court upon a conviction. Prosecutions of this type often require multiple court appearances and can include substantial delays, resulting in significant legal and administrative costs to the CRD.

Issuance of tickets under the CRD's TIA Bylaw have been proven to be a cost-effective and efficient enforcement tool when managed with the assistance of the CRD's Bylaw Enforcement Division. TIA Amendment Bylaw No. 4094, attached as Appendix A, has been prepared to increase the effectiveness and efficiency of enforcement actions under the CCC Bylaw.

### **RECOMMENDATION**

That the Regional Water Supply Commission recommend to the Capital Regional District Board that Bylaw No. 4094, "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 57, 2016", attached as Appendix A, be introduced, read a first and second time, read a third time, and adopted.

|               |   |
|---------------|---|
| Submitted by: | Heidi Gibson, M.N.R.M., Senior Manager, Environmental Partnerships        |
| Concurrence:  | Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services |
| Concurrence:  | Ted Robbins, B.Sc., C.Tech., General Manager, Integrated Water Service    |
| Concurrence:  | Robert Lapham, MCIP, RPP, Chief Administrative Officer                    |

TS:ce

Attachment: Appendix A – CRD Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 57, 2016 (Bylaw No. 4094)

**CAPITAL REGIONAL DISTRICT  
BYLAW NO. 4094**

\*\*\*\*\*  
**A BYLAW TO AMEND BYLAW NO. 1857, CAPITAL REGIONAL DISTRICT  
TICKET INFORMATION AUTHORIZATION BYLAW, 1990**  
\*\*\*\*\*

The Board of the Capital Regional District in open meeting assembled enacts as follows:

1. Bylaw No. 1857, Capital Regional District Ticket Information Authorization Bylaw, 1990, is amended as follows:
  - (a) Sections 3 and 4 of the Capital Regional District Ticket Information Authorization Bylaw, 1990 are amended by deleting the words "Schedules 2 to 35" wherever they appear and substituting "Schedules 2 to 36".
  - (b) Schedule "1" to Bylaw No. 1857 is amended by adding Section 35 as follows:
 

"35. Capital Regional District Cross Connection Bylaw Enforcement Officer  
Control Bylaw No. 1, 2008 Cross Connection Control Officer  
Cross Connection Control Inspector"
  - (c) by adding Schedule "36" attached as Appendix 1 to this Bylaw.
2. This Bylaw may be cited for all purposes as "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 57, 2016".

|                         |        |      |
|-------------------------|--------|------|
| READ A FIRST TIME THIS  | DAY OF | 2016 |
| READ A SECOND TIME THIS | DAY OF | 2016 |
| READ A THIRD TIME THIS  | DAY OF | 2016 |
| ADOPTED THIS            | DAY OF | 2016 |

Original signed by  
CHAIR

Original signed by  
CORPORATE OFFICER



SCHEDULE 36 TO BYLAW NO. 1857CAPITAL REGIONAL DISTRICT CROSS CONNECTION CONTROL BYLAW NO. 1, 2008

| <b>WORDS OR EXPRESSIONS<br/>DESIGNATING OFFENCE</b>                   | <b>SECTION</b>          | <b>FINE</b> |
|---|-------------------------|-------------|
| 1. Prohibited cross connection  | 5.1                     | \$1,000.00  |
| 2. Connection to unacceptable plumbing system                         | 5.2                     | \$1,000.00  |
| 3. Fail to report discovered cross connection                         | 6.1                     | \$250.00    |
| 4. Fail to ensure testing of backflow preventer                       | 7.1                     | \$1,000.00  |
| 5. Fail to report backflow preventer test results                     | 7.2                     | \$250.00    |
| 6. Fail to notify customer of test failure                            | 7.3                     | \$250.00    |
| 7. Fail to notify of repair or replacement                            | 7.4                     | \$500.00    |
| 8. Fail to display proof of testing                                   | 7.5                     | \$100.00    |
| 9. Fail to maintain file of test results                              | 7.6                     | \$100.00    |
| 10. By-pass of backflow preventer                                     | 8.1                     | \$1,000.00  |
| 11. Removal of backflow preventer                                     | 8.2                     | \$1,000.00  |
| 12. Tampering with backflow preventer                                 | 8.3                     | \$1,000.00  |
| 13. Fail to install backflow preventer on temporary water service     | 10.1                    | \$1,000.00  |
| 14. Fail to submit design level survey form                           | 11.                     | \$250.00    |
| 15. Turning on water service without premises isolation               | 12.                     | \$1,000.00  |
| 16. Fail to provide premises isolation for new severe hazard          | 13.1                    | \$1,000.00  |
| 17. Fail to provide premises isolation for new unknown occupancy      | 13.2                    | \$1,000.00  |
| 18. Fail to provide premises isolation for new moderate hazard        | 13.3                    | \$500.00    |
| 19. Fail to provide premises isolation for new minor hazard           | 13.4                    | \$500.00    |
| 20. Fail to provide premises isolation for existing severe hazard     | 14.1 (a) or (b)         | \$1,000.00  |
| 21. Fail to provide premises isolation for existing moderate hazard   | 14.2 (a) or (b)         | \$500.00    |
| 22. Fail to provide premises isolation for existing minor hazard      | 14.3 (a) or (b)         | \$500.00    |
| 23. Fail to provide premises isolation for restricted access premises | 15.                     | \$1,000.00  |
| 24. Inadequate or expired credentials                                 | 29.1 (a), (b)<br>or (c) | \$250.00    |

|  |              |            |
|--|--------------|------------|
| 25. Fail to register as certified tester             | 29.2         | \$100.00   |
| 26. Fail to maintain testing equipment               | 29.3         | \$250.00   |
| 27. Fail to calibrate testing equipment              | 29.4 or 29.5 | \$250.00   |
| 28. Fail to register as survey specialist            | 30.1         | \$250.00   |
| 29. Fail to install or maintain a backflow preventer | 31.5         | \$1,000.00 |
| 30. Fail to comply with direction of Officer         | 31.6         | \$1,000.00 |

**REPORT TO REGIONAL WATER SUPPLY COMMISSION  
MEETING OF WEDNESDAY, MAY 18, 2016**

---

**SUBJECT**     **CAPITAL REGIONAL DISTRICT TICKET INFORMATION AUTHORIZATION  
BYLAW – AMENDMENT BYLAW NO. 4098 (FOR WATER CONSERVATION  
BYLAW)**

**ISSUE**

Amendment of the Capital Regional District (CRD) Bylaw No. 1857, Ticket Information Authorization Bylaw, 1990, to establish tickets for specific offences under Bylaw No. 4099, Capital Regional District Water Conservation Bylaw No. 1, 2016.

**BACKGROUND**

On April 20, 2016, the Regional Water Supply Commission recommended that the CRD Board adopt Bylaw No. 4099, which repealed CRD Water Conservation Bylaw No. 3061, and replace it with the Capital Regional District Water Conservation Bylaw No. 1, 2016. This recommendation was subsequently approved by the Board on May 11, 2016. The new Water Conservation Bylaw clarifies the bylaw's intent and meaning, and includes amendments to water use restrictions that apply to public authorities, includes updated definitions, and revisions to the determining factors that the Commission may consider when determining effective dates of stages and restrictions. The new Water Conservation Bylaw will also prohibit the use of CRD drinking water in once-through cooling equipment, effective January 1, 2019.

To enforce the new Water Conservation Bylaw, an amendment to Bylaw No. 1857, Ticket Information Authorization Bylaw, 1990 is required to update Schedule 26, which contains fine levels for water conservation offences. Bylaw No. 4098, Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 58, 2016, is attached as Appendix A and includes the revised Schedule 26. A red-lined version of the current Schedule 26 is attached as Appendix B. Staff have reviewed other jurisdictions' fine levels and determined the proposed amendments are reasonable. The fine levels have not been increased since the Water Conservation Bylaw was implemented in 2001.

The goal of enforcement is to encourage voluntary compliance with the bylaw. Education and awareness have been, and will continue to be, the first step in achieving voluntary bylaw compliance. In cases where voluntary compliance cannot be achieved, a stepwise escalating enforcement approach will be applied.

**ALTERNATIVES**

*Alternative 1*

That the Regional Water Supply Commission recommend to the CRD Board that Bylaw No. 4098, "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 58, 2016", attached as Appendix A, be introduced, read a first and second time, read a third time, and adopted.

*Alternative 2*

That the Regional Water Supply Commission direct staff to undertake further analysis of enforcement options for the Water Conservation Program for future consideration.

**PUBLIC HEALTH IMPLICATIONS**

Managing water supply through efficient use of water helps contribute to reliable water quality, particularly during the hot summer months as it reduces draw down.

**ECONOMIC IMPLICATIONS**

Water Conservation educational and communications materials will be updated to reflect the changes. The cost will be covered by the core Demand Management Program budget.

**CONCLUSION**

The proposed changes to the Capital Regional District Ticket Information Authorization Bylaw, 1990 are required to enforce the newly-adopted Capital Regional District Water Conservation Bylaw No. 1, 2016. The proposed fine amounts are reasonable and are aligned with other jurisdictions. Bylaw enforcement occurs through a tiered process where voluntary compliance is achieved through education and awareness and is followed by formal legal proceedings such as tickets and/or court process when voluntary compliance is not achieved.

**RECOMMENDATION**

That the Regional Water Supply Commission recommend to the Capital Regional District Board that Bylaw No. 4098, "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 58, 2016", attached as Appendix A, be introduced, read a first and second time, read a third time, and adopted.

|               |   |
|---------------|---|
| Submitted by: | Heidi Gibson, M.N.R.M., Senior Manager, Environmental Partnerships        |
| Concurrence:  | Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services |
| Concurrence:  | Ted Robbins, B.Sc., C.Tech., General Manager, Integrated Water Service    |
| Concurrence:  | Robert Lapham, MCIP, RPP, Chief Administrative Officer                    |

DW:ce

Attachment: Appendix A – Bylaw No. 4098, "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 58, 2016"  
Appendix B – redlined version of Schedule 26 of Bylaw No. 1857

**CAPITAL REGIONAL DISTRICT  
BYLAW NO. 4098**

\*\*\*\*\*  
**A BYLAW TO AMEND BYLAW NO. 1857, CAPITAL REGIONAL DISTRICT  
TICKET INFORMATION AUTHORIZATION BYLAW, 1990**  
\*\*\*\*\*

The Board of the Capital Regional District in open meeting assembled enacts as follows:

1. Bylaw No. 1857, Capital Regional District Ticket Information Authorization Bylaw, 1990, is amended as follows:
  - (a) Schedule "1" to Bylaw No. 1857 is amended in section 25 by replacing that section as follows:
 

|  |   |
|--|---|
| "25. Capital Regional District Water Conservation<br>Bylaw No. 1, 2016 | Bylaw Enforcement Officer<br>Municipal Bylaw Enforcement Officer" |
|--|---|
  - (b) by adding Schedule "26" attached as Appendix 1 to this Bylaw.
2. This Bylaw may be cited for all purposes as "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 58, 2016".

|                         |        |      |
|-------------------------|--------|------|
| READ A FIRST TIME THIS  | DAY OF | 2016 |
| READ A SECOND TIME THIS | DAY OF | 2016 |
| READ A THIRD TIME THIS  | DAY OF | 2016 |
| ADOPTED THIS            | DAY OF | 2016 |

Original signed by \_\_\_\_\_  
CHAIR

Original signed by \_\_\_\_\_  
CORPORATE OFFICER

SCHEDULE 26 TO BYLAW NO. 1857CAPITAL REGIONAL DISTRICT WATER CONSERVATION BYLAW NO. 1, 2016**WORDS OR EXPRESSIONS  
DESIGNATING OFFENCE**

|     |  | <b>SECTION</b>      | <b>FINE</b> |
|-----|--|---------------------|-------------|
| 1.  | Deterioration of appliance resulting in waste of water       | 3.(2)               | \$200.00    |
| 2.  | Wasting water  | 3.(3)               | \$200.00    |
| 3.  | Wasting water during Stage 1                                 | 3.(3)               | \$200.00    |
| 4.  | Wasting water during Stage 2                                 | 3.(3)               | \$300.00    |
| 5.  | Wasting water during Stage 3                                 | 3.(3)               | \$400.00    |
| 6.  | Once Through Cooling Equipment Use                           | 3.(5)               | \$250.00    |
| 7.  | Once Through Cooling Equipment Use During Stage 1            | 3.(5)               | \$350.00    |
| 8.  | Once Through Cooling Equipment Use During Stage 2            | 3.(5)               | \$450.00    |
| 9.  | Once Through Cooling Equipment Use During Stage 3            | 3.(5)               | \$500.00    |
| 10. | Stage 1 – water lawn contrary to even address dates/times    | Sch. A 1.(1)(a)(i)  | \$200.00    |
| 11. | Stage 1 – water lawn contrary to odd address dates/times     | Sch. A 1.(1)(a)(ii) | \$200.00    |
| 12. | Stage 1 – water playing field contrary to dates/times        | Sch. A 1.(1)(b)(v)  | \$100.00    |
| 13. | Stage 1 – operate Public Spray Park contrary to restrictions | Sch. A 1.(1)(c)     | \$100.00    |
| 14. | Stage 1 – Public Authority watering contrary to dates/time   | Sch. A 1.(2)(c)     | \$100.00    |
| 15. | Stage 1 – watering golf courses contrary to dates/times      | Sch. A 1.(2)(d)     | \$200.00    |
| 16. | Stage 2 – water lawn contrary to even address dates/times    | Sch. A 2.(1)(a)(i)  | \$250.00    |



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|     |  |                      |          |
|-----|--|----------------------|----------|
| 17. | Stage 2 – water lawn contrary to odd address dates/times     | Sch. A 2.(1)(a)(ii)  | \$250.00 |
| 18. | Stage 2 – wash sidewalks/driveways/exterior surfaces         | Sch. A 2.(1)(b)(i)   | \$250.00 |
| 19. | Stage 2 – use motion-activated sprinkler device              | Sch. A 2.(1)(b)(ii)  | \$250.00 |
| 20. | Stage 2 – water cemetery lawn                                | Sch. A 2.(1)(b)(iii) | \$250.00 |
| 21. | Stage 2 - operate Public Spray Park contrary to restrictions | Sch. A 2.(1)(c)      | \$250.00 |
| 22. | Stage 2 – fill ornamental fountain                           | Sch. A 2.(1)(d)(i)   | \$250.00 |
| 23. | Stage 2 – operate ornamental fountain                        | Sch. A 2.(1)(d)(ii)  | \$250.00 |
| 24. | Stage 2 - water playing field contrary to dates/times        | Sch. A 2.(1)((e)(iv) | \$250.00 |
| 25. | Stage 2 – Public Authority watering contrary to dates/times  | Sch. A 2.(2)(c)      | \$200.00 |
| 26. | Stage 2 – watering golf courses contrary to dates/times      | Sch. A 2.(2)(d)      | \$250.00 |
| 27. | Stage 3 – water lawn or boulevard                            | Sch. A 3.(1)(a)(i)   | \$400.00 |
| 28. | Stage 3 – fill swimming pool, hot tub or garden pond         | Sch. A 3.(1)(a)(ii)  | \$400.00 |
| 29. | Stage 3 – operate a Public Spray Park                        | Sch. A 3.(1)(a)(iii) | \$400.00 |
| 30. | Stage 3 – fill/operate ornamental fountain                   | Sch. A 3.(1)(a)(iv)  | \$400.00 |
| 31. | Stage 3 – wash vehicle/boat                                  | Sch. A 3.(1)(a)(v)   | \$400.00 |
| 32. | Stage 3 – wash sidewalks/driveways/exterior surfaces         | Sch. A 3.(1)(a)(vi)  | \$400.00 |
| 33. | Stage 3 – use motion-activated sprinkler device              | Sch. A 3.(1)(a)(vii) | \$400.00 |
| 34. | Stage 3 – Public Authority watering contrary to dates/times  | Sch. A 3.(1)(b)      | \$400.00 |
| 35. | Stage 3 – watering golf courses contrary to dates/times      | Sch. A 3.(2)(b)      | \$250.00 |

SCHEDULE 26 TO BYLAW NO. 1857

CAPITAL REGIONAL DISTRICT WATER CONSERVATION BYLAW NO. 1, 2016

**WORDS OR EXPRESSIONS  
DESIGNATING OFFENCE**

|     |   | <b>SECTION</b>      | <b>ORIGINAL<br/>FINE</b> | <b>AMENDED<br/>FINE</b> |
|-----|---|---------------------|--------------------------|-------------------------|
| 1.  | Deterioration of appliance resulting in waste of water          | 3.(2)               | <del>\$75.00</del>       | \$200.00                |
| 2.  | Wasting water   | 3.(3)               | <del>\$75.00</del>       | \$200.00                |
| 3.  | Wasting water during Stage 1                                    | 3.(3)               | <del>\$75.00</del>       | \$200.00                |
| 4.  | Wasting water during Stage 2                                    | 3.(3)               | <del>\$75.00</del>       | \$300.00                |
| 5.  | Wasting water during Stage 3                                    | 3.(3)               | <del>\$75.00</del>       | \$400.00                |
| 6.  | Once Through Cooling Equipment Use                              | 3.(5)               | N/A                      | \$250.00                |
| 7.  | Once Through Cooling Equipment Use During Stage 1               | 3.(5)               | N/A                      | \$350.00                |
| 8.  | Once Through Cooling Equipment Use During Stage 2               | 3.(5)               | N/A                      | \$450.00                |
| 9.  | Once Through Cooling Equipment Use During Stage 3               | 3.(5)               | N/A                      | \$500.00                |
| 10. | Stage 1 – water lawn contrary to even address<br>dates/times    | Sch. A 1.(1)(a)(i)  | <del>\$75.00</del>       | \$200.00                |
| 11. | Stage 1 – water lawn contrary to odd address<br>dates/times     | Sch. A 1.(1)(a)(ii) | <del>\$75.00</del>       | \$200.00                |
| 12. | Stage 1 – water playing field contrary to dates/times           | Sch. A 1.(1)(b)(v)  | N/A                      | \$100.00                |
| 13. | Stage 1 – operate Public Spray Park contrary to<br>restrictions | Sch. A 1.(1)(c)     | N/A                      | \$100.00                |
| 14. | Stage 1 – Public Authority watering contrary to<br>dates/time   | Sch. A 1.(2)(c)     | N/A                      | \$100.00                |
| 15. | Stage 1 – watering golf courses contrary to dates/times         | Sch. A 1.(2)(d)     | N/A                      | \$200.00                |
| 16. | Stage 2 – water lawn contrary to even address<br>dates/times    | Sch. A 2.(1)(a)(i)  | <del>\$150.00</del>      | \$250.00                |

|     |  |                      |                     |          |
|-----|--|----------------------|---------------------|----------|
| 17. | Stage 2 – water lawn contrary to odd address dates/times     | Sch. A 2.(1)(a)(ii)  | <del>\$150.00</del> | \$250.00 |
| 18. | Stage 2 – wash sidewalks/driveways/exterior surfaces         | Sch. A 2.(1)(b)(i)   | <del>\$150.00</del> | \$250.00 |
| 19. | Stage 2 – use motion-activated sprinkler device              | Sch. A 2.(1)(b)(ii)  | N/A                 | \$250.00 |
| 20. | Stage 2 – water cemetery lawn                                | Sch. A 2.(1)(b)(iii) | N/A                 | \$250.00 |
| 21. | Stage 2 - operate Public Spray Park contrary to restrictions | Sch. A 2.(1)(c)      | N/A                 | \$250.00 |
| 22. | Stage 2 – fill ornamental fountain                           | Sch. A 2.(1)(d)(i)   | N/A                 | \$250.00 |
| 23. | Stage 2 – operate ornamental fountain                        | Sch. A 2.(1)(d)(ii)  | N/A                 | \$250.00 |
| 24. | Stage 2 - water playing field contrary to dates/times        | Sch. A 2.(1)(e)(iv)  | N/A                 | \$250.00 |
| 25. | Stage 2 – Public Authority watering contrary to dates/times  | Sch. A 2.(2)(c)      | N/A                 | \$200.00 |
| 26. | Stage 2 – watering golf courses contrary to dates/times      | Sch. A 2.(2)(d)      | N/A                 | \$250.00 |
| 27. | Stage 3 – water lawn or boulevard                            | Sch. A 3.(1)(a)(i)   | <del>\$225.00</del> | \$400.00 |
| 28. | Stage 3 – fill swimming pool, hot tub or garden pond         | Sch. A 3.(1)(a)(ii)  | <del>\$225.00</del> | \$400.00 |
| 29. | Stage 3 – operate a Public Spray Park                        | Sch. A 3.(1)(a)(iii) | N/A                 | \$400.00 |
| 30. | Stage 3 – fill/operate ornamental fountain                   | Sch. A 3.(1)(a)(iv)  | <del>\$225.00</del> | \$400.00 |
| 31. | Stage 3 – wash vehicle/boat                                  | Sch. A 3.(1)(a)(v)   | <del>\$225.00</del> | \$400.00 |
| 32. | Stage 3 – wash sidewalks/driveways/exterior surfaces         | Sch. A 3.(1)(a)(vi)  | N/A                 | \$400.00 |
| 33. | Stage 3 – use motion-activated sprinkler device              | Sch. A 3.(1)(a)(vii) | N/A                 | \$400.00 |
| 34. | Stage 3 – Public Authority watering contrary to dates/times  | Sch. A 3.(1)(b)      | N/A                 | \$400.00 |
| 35. | Stage 3 – watering golf courses contrary to dates/times      | Sch. A 3.(2)(b)      | N/A                 | \$250.00 |

## CAPITAL REGIONAL DISTRICT - INTEGRATED WATER SERVICES

### Water Watch

Issued: May 24, 2016

#### Water Supply System Summary:

##### 1. Useable Volume in Storage:

| Reservoir  | May 31<br>5 Year Ave |        | May 31/15 |        | May 22/16 |        | % Existing<br>Full Storage |
|------------|----------------------|--------|-----------|--------|-----------|--------|----------------------------|
|            | ML                   | MIG    | ML        | MIG    | ML        | MIG    |                            |
| Sooke      | 89,761               | 19,747 | 86,616    | 19,056 | 85,895    | 18,897 | 92.6%                      |
| Goldstream | 9,197                | 2,023  | 8,223     | 1,809  | 8,187     | 1,801  | 83.3%                      |
| Total      | 98,958               | 21,771 | 94,839    | 20,865 | 94,082    | 20,698 | 91.7%                      |

##### 2. Average Daily Demand:

|                              |           |            |
|------------------------------|-----------|------------|
| For the month of May         | 170.4 MLD | 37.49 MIGD |
| For week ending May 22, 2016 | 172.1 MLD | 37.86 MIGD |
| Max. day May 2016, to date:  | 191.7 MLD | 42.17 MIGD |

##### 3. Average 5 Year Daily Demand for May

|                       |                        |                         |
|-----------------------|------------------------|-------------------------|
| Average (2011 - 2015) | 135.7 MLD <sup>1</sup> | 29.84 MIGD <sup>2</sup> |
|-----------------------|------------------------|-------------------------|

<sup>1</sup>MLD = Million Litres Per Day      <sup>2</sup>MIGD = Million Imperial Gallons Per Day

##### 4. Rainfall May:

|                         |                             |
|-------------------------|-----------------------------|
| Average (1914 - 2015):  | 48.4 mm                     |
| Actual Rainfall to Date | 3.9 (8% of monthly average) |

##### 5. Rainfall: Sep 1 - May 23

|                        |                          |
|------------------------|--------------------------|
| Average (1914 - 2015): | 1535.1 mm                |
| 2015/2016              | 1745.8 (114% of average) |

##### 6. Water Conservation Action Required:

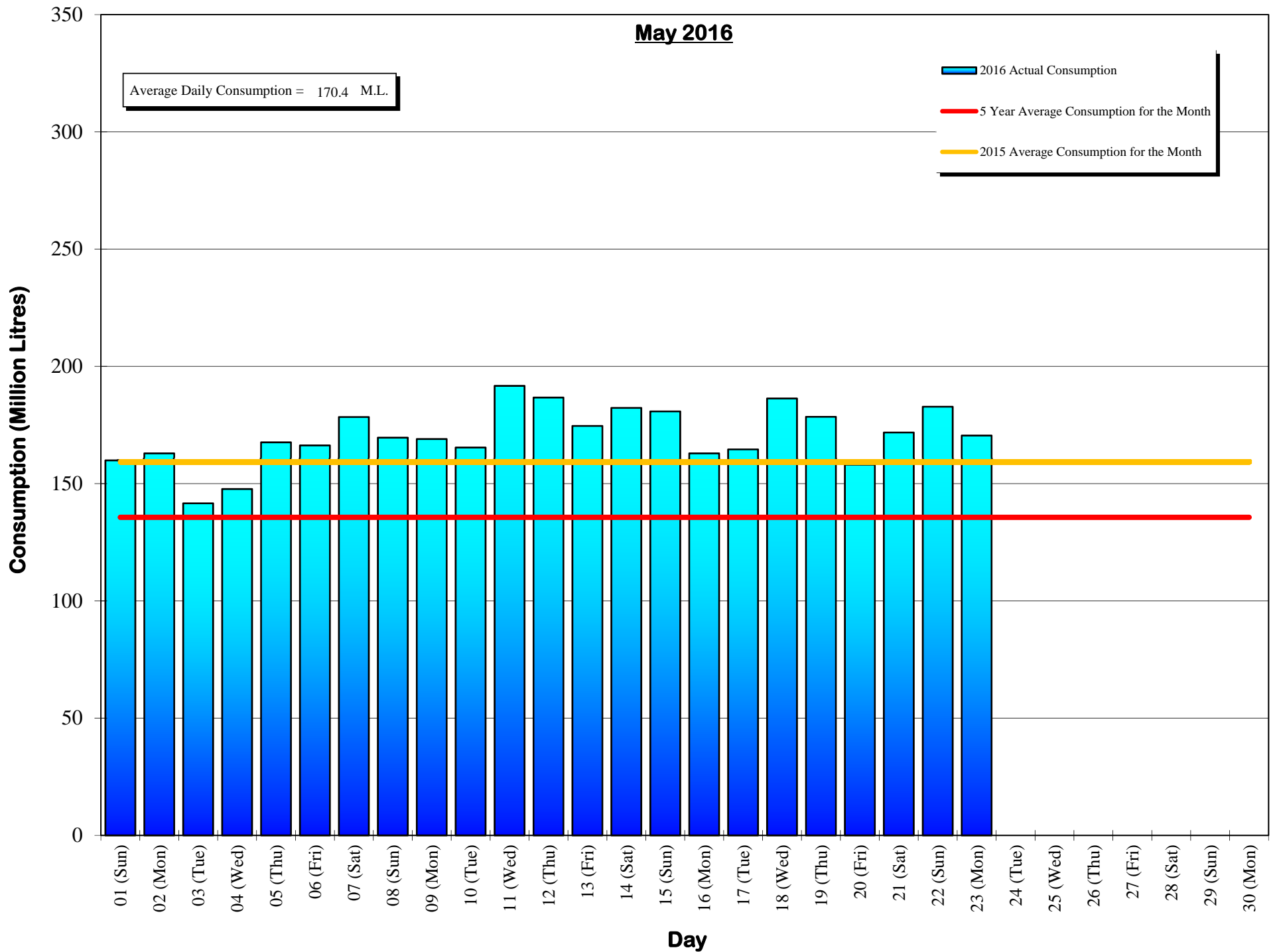
If each of us save a little, together we can save a lot.

Check our website at [www.crd.bc.ca/water](http://www.crd.bc.ca/water) for more information.

If you require further information, please contact:

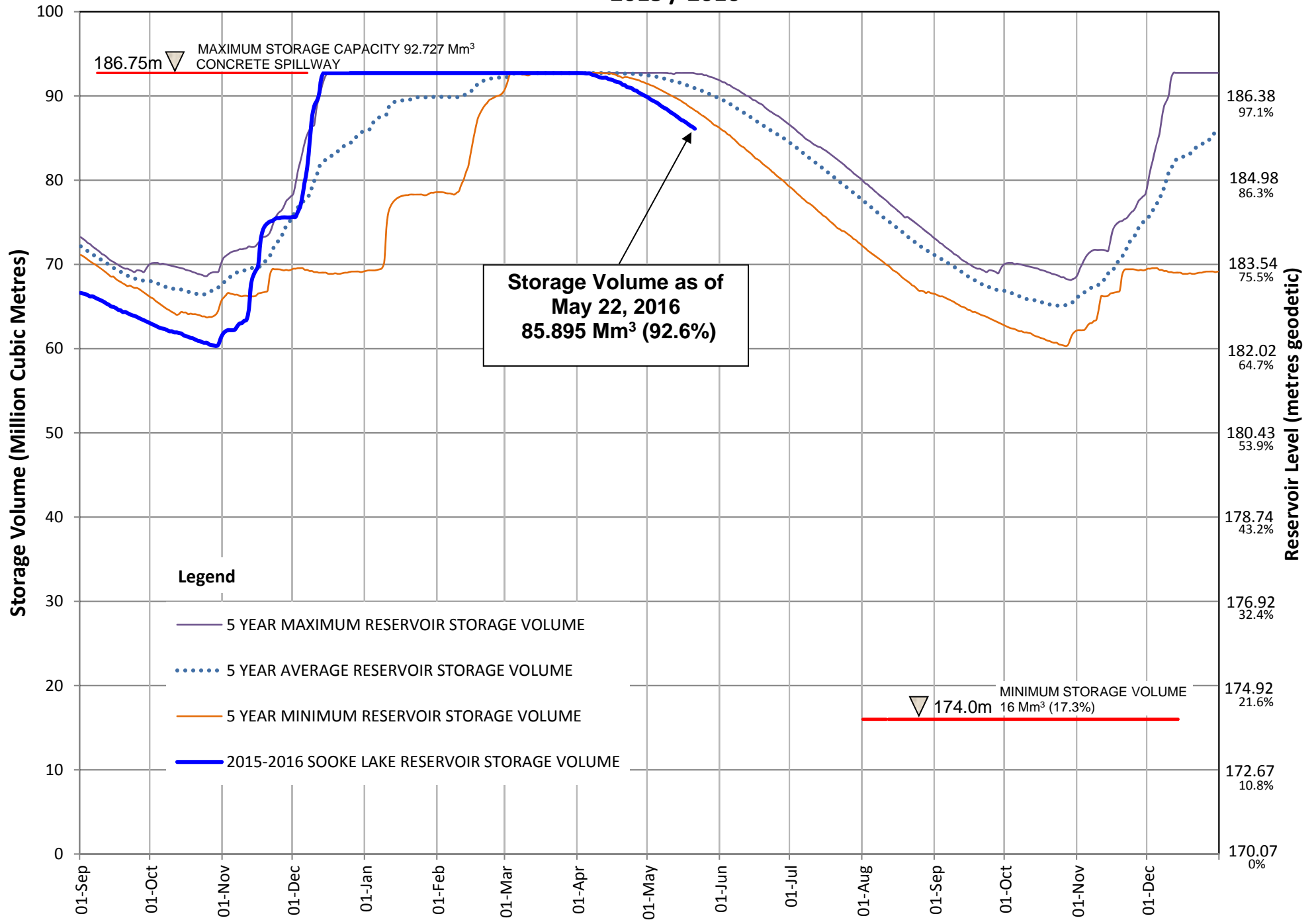
Ted Robbins, B.Sc., C.Tech  
General Manager, CRD - Integrated Water Services  
or  
Deborah Walker  
Demand Management Coordinator

Capital Regional District Integrated Water Services  
479 Island Highway  
Victoria, BC V9B 1H7  
(250) 474-9600



# SOOKE LAKE RESERVOIR STORAGE SUMMARY

2015 / 2016





# SOOKE LAKE RESERVOIR STORAGE

## 18 MONTH NORMAL RANGE

