Community Wildfire Resiliency Plan

District of Wells

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Submitted by:

B.A. Blackwell & Associates Ltd.
270 – 18 Gostick Place
North Vancouver, BC V7M 3G3
Ph: 604-986-8346
Email: bablackwell@bablackwell.com

Submitted to:

District of Wells
4243 Sanders Ave
Wells, BC V0K 2R0
Ph: 250-994-3330
Email: clerk@wells.ca

B.A. Blackwell & Associates Ltd.

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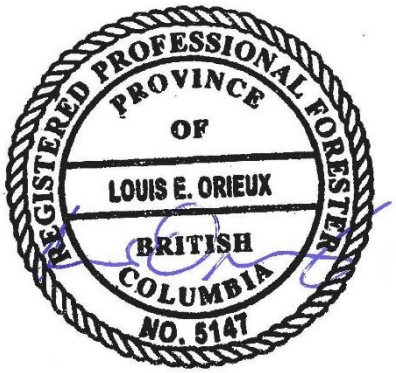
REGISTERED PROFESSIONAL SIGN AND SEAL

RPF PRINTED NAME	
Louis Orieux	5147
DATE SIGNED	
December 6, 2022	
I certify that the work described herein fulfills the standards expected of a member of the Association of British Columbia Forest Professionals and that I did personally supervise the work.	
Registered Professional Forester Signature and Seal	



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EXECUTIVE SUMMARY

The Community Wildfire Resiliency Plan (CWRP) process (evolving from the Community Wildfire Protection Plan - CWPP) was created in British Columbia (BC) as a response to the devastating 2003 wildfire in Kelowna. As an integral part of the Community Resiliency Investment (CRI) Program, managed by the Union of BC Municipalities, CWRPs aim to develop strategic recommendations based on the seven FireSmart disciplines (Education, Legislation and Planning, Development Considerations, Interagency Cooperation, Emergency Planning, Vegetation Management, and Cross-Training) to assist communities in improving safety and reducing the risk of damage to property and critical infrastructure from wildfires.

This CWRP provides the District of Wells (Wells) with an action plan that can be used to guide the improvement and/or development of emergency plans, emergency response, evacuation plans, communication and education programs, bylaw development in areas of fire risk, and the management of potentially hazardous forest lands for the community's Wildland-Urban Interface (WUI).

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction outcomes. A total of 37 recommendations and action items are presented in a tabularized format (Table 1) in this Executive Summary and are more thoroughly discussed in their appropriate sections within the document. Recommendations and action items within this plan should be considered a toolbox of options to help reduce the wildfire threat to Wells. Wells will have to further prioritize implementation based on resources, strengths, constraints, and availability of funding, and regularly update the prioritization and course of action as variables change through time.

In small, tight-knit communities such as Wells, enforcement of bylaws and regulations can be difficult as policing one's own neighbours can be socially divisive and the operational capacity of the municipal government to do so is often limited or non-existent. Although recommendations have been put forth regarding legislation and development considerations, FireSmart activities on private and municipal property, FireSmart education, and implementing planned and proposed fuel treatment units adjacent to the community are the most important recommendations in this Plan. Although the key to reducing WUI fire structure loss is to reduce structure ignitability, the likely best mitigation strategy for Wells should be one centered on vegetation management around structures and the community, and continued resident FireSmart education. Public outreach on the range of available activities and the prioritization of activities should help residents to feel empowered to complete simple risk reduction activities on their property. An additional key recommendation for the community is to secure a permanent secondary access/egress route.

Field work allowed for verified and updated fuel types and wildfire threat assessments to be combined with an office-based analysis to update the local wildfire threat for Wells' WUI (Section 4: Wildfire Risk Assessment; Appendix A: Local Wildfire Risk Process). A key subcomponent of this analysis is the *wildfire threat class* (analyzing fuels, weather, and topography sub-components), which has the following classes:

- Very Low: Waterbodies with no forest or grassland fuels, posing no wildfire threat;

- Low: Developed and undeveloped land that will not support significant wildfire spread;
- Moderate: Developed and undeveloped land that will support surface fires;
- High: Landscapes or stands that are continuous forested fuels that will support candling, intermittent crown or continuous crown fires. These landscapes are often steeper slopes, rough or broken terrain and/or south or west aspects. High polygons may include high indices of dead and downed conifers; and
- Extreme: Continuous forested land that will support intermittent or continuous crown fires.

The results of the wildfire threat class analysis shows that over half (65%) of Wells' WUI is classified as Moderate wildfire threat or greater. Higher (*Moderate, High, and Extreme*) wildfire threat areas in Wells' WUI are generally located on forested slopes. Within that, the High and Extreme wildfire threat areas are generally located on the warmer and drier west and south facing aspects. This, along with other analyses presented and discussed throughout the document, show that wildfire is a real threat to the community. Wells has begun planning and preparing for a wildfire emergency through available FireSmart resources (e.g., resident education) but should look to this CWRP on how to continue this process effectively.

Table 1: Wells Community Wildfire Resiliency Plan

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Education - Section 5.1							
Visitors							
1	High	Keep local fire danger rating signs updated. BCWS has fire danger rating signs at the beginning of Highways 26 and 97 and one at the end of Highway 26 at the Bowron Junction.	Highway signs are visible to all visitors entering the region. Having these signs accurately updated will make both tourists and residents aware of the current Fire Danger Rating for Wells and the surrounding area.	Wells, BCWS, WVFB	Current and ongoing	Signs kept updated.	n/a
2	High	Develop a FireSmart/Wildfire Preparedness page on Well's website (with a direct link from the opening webpage). Include links to FireSmart BC and other relevant wildfire resources. Consider showing the current Fire Danger Rating on the Wells' website frontpage.	Visitors (and residents) to Wells will use the Wells webpage as a source for information – this should be utilized to educate for FireSmart and wildfire awareness.	Wells	1 Year	Webpage created.	CRI FCFS funding is available (~$3000 contracted service. ~40 hours for set-up. Additional hours for updates as required)
3	High	Work with any large festivals or events bringing large numbers of visitors to the community (i.e., ArtsWells Festival) to develop a FireSmart preparedness page on their festival's website (or a link to Wells', if/when developed). Consider specific FireSmart language and recommendations for camping.	ArtsWells Festival (on hold since the start of the COVID-19 pandemic) attracted 2,200 people to Wells every summer, many of whom camp. The fire risk associated with this influx of people is recognized by the CFRC and providing FireSmart and wildfire information to any event a priority.	Wells (Festivals or Events)	Created for any Festival or Event	Webpage/information/link to Wells' FireSmart webpage created	$800: 8 hours @ $100/hour for a webpage developer
4	Moderate	Consider encouraging Destination BC to launch a FireSmart campaign.	Working with Destination BC will ensure that FireSmart messaging is distributed to people outside the region who may plan to visit.	Wells (Destination BC)	1 year as a pilot	Reduction in nuisance fires and awareness of Wells wildfire hazard by out-of-region tourists.	4-8 hours engagement
5	Moderate	Work with the Ministry of Transportation and Infrastructure (MOTI) to display targeted 'No Campfires	Highway signs are visible to all visitors entering the region. MOTI already posts	Wells (MOTI)	Seasonal	Reduction in nuisance fires and/or campfires during fire bans. Evaluate cost/benefit.	4-8 hours engagement

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
		– Fire Ban in Effect" messages on Highway signs (fixed signs and deployable signs).	some FireSmart messaging along other Provincial highway routes.				
Residents							
6	High	Launch a FireSmart social media campaign targeting platforms and online community groups used by Wells' residents.	It is estimated 30-50% of residents are active in social media groups specific to Wells. This can be a cost effective and wide-reaching method used to continue FireSmart education within the community. [CRI FCFS funding is available to hire a consultant to develop FireSmart social media campaigns.]	Wells (consultant)	Annual	Increased FireSmart awareness amongst Wells' residents.	CRI FCFS funding available Contracted services to develop (~$5,000 and deliver~$2,000)
7	High	Continue to promote FireSmart approaches for wildfire risk reduction to homeowners, businesses, and stakeholders through FireSmart workshops, open houses, and/or presentations. Supply FireSmart resources during these engagement campaigns and promote the FireSmart Begins at Home mobile app as a method of conducting home assessments.	FireSmart BC resources help present a unified message. Print resources are popular and easy to distribute. [FireSmart branded tents, banners, t-shirts can be purchased with CRI FCFS funding.]	Wells	Annual	Quantity of resources distributed/number of times used at events.	CRI FCFS up to cost maximums FireSmart Education Kit up to $1,600 each
8	Moderate	Promote/educate FireSmart to young community members: - Encourage School District 28 to adopt and deploy existing wildfire education programs. - Consult with the Association of BC Forest Professionals (ABCFP) and BCWS as well as the local fire department and FireSmart representatives to facilitate and recruit volunteer teachers and	FireSmart education for youth can lead to wildfire awareness being a normal part of their lives as well as bringing information home to their families.	Wells (ABCFP, BCWS, FireSmart Representatives	Yearly (pre-fire season)	One FireSmart education day per school year.	CRI FCFS funding available (FireSmart BC Education box - $800 Junior K- Grade 12)

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
		experts to deliver FireSmart curriculum at the local Wells Elementary School (field trips, guest speakers, etc.).					
Administration							
9	High	Hire a FireSmart coordinator to manage Wells' FireSmart program.	Small municipalities have limited capacities to manage add-on programs such as this. An internal FireSmart coordinator is an efficient way to deliver programs.	Wells	Ongoing	FireSmart coordinator in place by Dec. 2023.	CRI FCFS funding available
Legislation, Planning and Development - Section 5.2							
10	High	Complete or schedule periodic updates of the CWRP. The frequency of updates is highly dependent upon major changes which would impact local wildfire risk or the rate at which wildfire risk reduction efforts are implemented. An evaluation of major changes (including funding program changes that may lead to new opportunities) and the potential need for a CWRP update should be initiated every 5 years.	A current (i.e., no more than 5 years old) CWRP is a requirement for further funding under the UBCM CRI Program.	Wells (Consultant)	5 years from adopting this CWRP document	Wells always has an up-to-date CWRP and action plan.	CRI FCFS funding is available (~$30,000-40,000 for full document / $15,000 for update)
11	High	Conduct a full review and update of the Wells OCP to imbed FireSmart principles within the stated objectives and policies and to guide future land use and development decisions. See Table 3 for example policies and recommendations for updating.	The small, but dense community size makes all structures susceptible to ember ignition as well as structure-to-structure ignition. Embedding FireSmart and wildfire preparedness into the community's plans, policies, and goals will greatly reduce wildfire and fire risk to the community.	Wells (Consultant)	5 Years	OCP updated.	CRI FCFS funding is available
12	High	Imbed FireSmart constructure and landscaping principles into future development. This can be accomplished via DPA updates/creation or bylaw	The small, but dense community size makes all structures susceptible to ember ignition as well as structure-to-structure ignition. FireSmart	Wells (Consultant)	5 Years	FireSmart principles for structures and landscaping embedded into regulation or policy.	CRI FCFS funding is available

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
		updates/creation. The DPA or bylaws should strongly consider addressing: a) Fire-resistant roofing b) Fire-resistant siding c) A 1.5m non-combustible zone d) FireSmart landscaping[1] See Table 4 for example bylaws with recommendations for updating.	construction and landscaping principles, if applied to new and major renovations, will greatly reduce wildfire and fire risk to the community.				
13	High	Conduct FireSmart Critical Infrastructure Assessments for Wells infrastructure. Apply FireSmart principles in construction and vegetation setbacks as soon as possible. Additionally, encourage private critical infrastructure owners (i.e., Telus Communications – cell tower) to do the same.	Protecting Wells' critical community infrastructure is critical to wildfire response and recovery.	Wells (Consultant; Private Stakeholders)	5 years	All infrastructure has an assessment and mitigation recommendations stated on municipal infrastructure.	CRI FCFS: funding received as part of 2022 grant.
14	Moderate	Conduct a water supply analysis to determine how long 'fire flows' can be maintained on the existing system, even in 'peak drought scenarios' and high-use periods (include accounting for festivals and events) when water resources will become scarce. Explore opportunities to increase the Wells water reservoir capacity as required.	A capacity analysis of Wells' water system should be conducted before backup reservoirs are planned and installed. The Wells reservoir is limited to 2-3 days' worth of water (at normal consumption rates) during times of power outages, greatly limiting fire response availability.	Wells	5 years	Water supply analysis completed, informing opportunities/requirements for increased water reservoir capacity.	CRI FCFS funding available
Interagency Cooperation - Section 5.3							
15	High	Continue hosting Wells Emergency Management Committee meetings, incorporating recommended FireSmart,	The small amount of municipal owned land within Wells' WUI means that the activities of other land managers have a	Wells (CFRC)	Ongoing	2-6 meetings annually.	At least 8 municipal hours per meeting to

[1] Reference the FireSmart BC Landscaping Guide: https://firesmartbc.ca/resource/landscaping-guide/

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
		wildfire, and land managers as recommended for Community FireSmart and Resiliency Committee (CFRC) topics, discussions, and planning.	stronger influence on Wells' wildfire risk profile. Coordinated action can be more effective and take less effort.				prepare, host and debrief. CRI FCFS funding up to $2,000 per meeting.
16	High	Engage with forest licensees and private managed forest landowners/operators within the WUI to identify parts of the license/operations area that are in the WUI and what goals would be for this zone regarding harvesting, post-harvest debris disposal, and reforestation prescriptions so that both harvesting operations and the future forest stand maintain or enhance wildfire resiliency, especially at interface edges/within Wells' WUI.	Reduce interface wildfire risk throughout managed forest lands that are closest to structures in the WUI. Slash management and stand discontinuity are priorities for wildfire risk reduction.	Wells (TFL 52, Community Forest, Barkerville Gold Mines)	Ongoing	Forest landowners and managers know where their tenure area overlaps with the WUI and are actively reducing wildfire risk within them.	Time and cost dependent
17	High	Continue to have relevant Wells staff attend annual FireSmart BC conferences, hosted by the BC FireSmart Committee.	Participation will continue to foster a strong relationship between Wells and FireSmart BC/Canada, and grow the local government's knowledge of FireSmart and the CRI FCFS program.	Wells	Ongoing	Attendance minimum every two years.	CRI FCFS funding is available (cost/time dependent on conference location)
Cross Training & Fire Department Resources - Section 5.4							
Training							
18	High	Wells Volunteer Fire Brigade (WVFB) should continue planning structural firefighting training with Quesnel Volunteer Fire Department.	WVFB does not regularly train with BCWS due to scheduling conflicts for both agencies. Training with Quesnel Volunteer Fire Department may be a good option that would still allow sharing of expertise and equipment, and could capitalize on limited BCWS time.	Wells (Quesnel Volunteer Fire Department)	Annually	Annual training between WVFB and Quesnel Volunteer Fire Department.	Volunteer time

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
19	High	WVFB should organize an annual practical training session using wildland equipment with BCWS.	Wildland-specific training is integral to WUI wildfire response.	Wells (BCWS)	Annually	WVFB undergoes annual practical training with wildland equipment.	Volunteer time
20	High	Members of the WVFB should be trained in SPP-WFF1 including annual refresher.	Many members do not have current formal training. The SPP-WFF1 course is specific for structural fire fighters who could respond to wildland fires in their service area.	WVFB	Annually	All members of the WVFB trained in SPP-WFF1 and refresh the course annually.	CRI FCFS funding available Member time plus compensation for course instructor
21	Moderate	Wells emergency management personnel should be trained in ICS-100, WRR Basics, and Local FireSmart Representative training.	ICS-100 and WRR Basics will help the municipal staff work with BCWS and MOF respectively. Internal Local FireSmart Representative training is helpful for delivering FireSmart programs.	Wells	2 years	Wells Emergency Management personal are all trained in ICS-100, and some have WRR Basics and LFR training.	CRI FCFS funding available Staff time and course cost
Equipment							
22	High	Support WVFB in obtaining necessary wildfire equipment. Much of WVFB's current equipment was noted as being aging and unreliable. Included in this is the acquisition of structural sprinkler protection units.	Fire departments are the first to respond to interface wildfires. Proper equipment is required for effective response. Consult with BCWS what equipment is needed and acquire on a priority basis and as funds/funding allows.	WVFB (Wells)	5 years	WVFB obtains sufficient wildland equipment.	CRI FCFS funding available for assessment, inventory, and purchase of FireSmart structure protection equipment Examples: - Honda 1" WX pump: ~$500 - Collapsible 2500-gallon tank $3000
Response							

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
23	High	Complete and participate in regular testing of, and updates to, the Wells Emergency Management Plan. Include yearly (pre-fire season is best) wildfire emergency simulation exercises. Identify hazards, barriers to access (i.e., locked gates, tight or no turnarounds), and other response issues and develop measures to address them.	Include the Community FireSmart Resiliency Committee (CFRC).	Wells (CFRC)	Bi-yearly (pre-fire season)	Table-top response exercises conducted at least once every two years.	CRI FCFS funding is available (8 planning hours; 8 person-hours per exercise)
Emergency Planning - Section 5.5							
24	High	Mount/install acquired Emergency Evacuation signs.	On the ground emergency evacuation route signage lessens confusion on evacuation directions during emergencies.	Wells	1 Year	Signs installed.	Wells (time dependent on number of signs acquired)
25	High	Work with the road permit holders of available resource road access/egress routes so that a minimum of one additional route is always kept in evacuation-ready condition during fire season.	More than one access/egress route for community evacuation and emergency access.	Wells (resource road permit holders)	5 Years	One additional route is always kept in evacuation-ready condition during fire season.	Wells (unknown)
26	High	All resource road locked gates that provide access to the Wells' Wildland-Urban Interface (WUI) or access/egress routes should have copies kept in a centralized location (i.e., Wells Municipal Hall).	To limit constraints on community evacuation and access to the surrounding WUI for wildland fire fighting response. To strengthen this recommendation, keys could be in two places in case the Municipal Hall building burns down. RCMP should have a set of keys too.	Wells (resource road/gate managers)	1 Year	All gates have keys in at least one location.	Wells (unknown)
27	Moderate	Invest in back-up generators for any Wells critical infrastructure that does not have one.	Some water and sewer infrastructure have a backup generator, but all other critical infrastructure should also be equipped.	Wells	5 Years	Backup generators for all Wells critical infrastructure.	Cost varies - ~$10,000

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
28	Moderate	Identify and map water access points for pumps and sumps and share this information with BCWS.	Wells has many large natural water bodies to draw from in the event of a wildfire. Shuttling or pumping water from lakes and rivers to fill bladders may be planned in advance. Quick access to water for wildland fire fighting needs can increase fire suppression capabilities for WVFB and BCWS crews.	Wells	5 Years	Pump and sump locations mapped and data shared with BCWS.	Wells (time and effort dependent)
29	Moderate	Develop pre-incident wildfire plans and local daily action guidelines based on expected wildfire conditions. Consider adding these to the Wells Emergency Management Plan.	Any information (pre-planned information or current local wildfire conditions/risks) that local governments can provide to BCWS crews responding to wildfire is helpful.	Wells	5 Years	Wildfire specific pre-incident wildfire plans and local daily action guidelines developed.	Wells (time and effort dependent)
30	Moderate	Lobby BCWS and other applicable agencies to install a Fire Weather Station near Wells.	There is no Fire Weather Station that provides fire weather data specific to Wells, Barkerville, and the surrounding area. Owing to the large number of recreationalists and tourists in the summer fire season, having accurate fire weather data could allow for more specific wildfire emergency planning.	Wells, BCWS	5 Years	A fire weather station near Wells has been installed	unknown
Vegetation Management - Section 5.6							
Residential FireSmart							
31	High	Complete FireSmart Home Ignition Zone (HIZ) assessments Wells received funding for.	FireSmart HIZ assessments encourage action in the Priority Zones of the community through education and by providing recommendations that can be implemented to lower wildfire and fire risks.	Wells (LFR; consultant)	2 Years	½ of FireSmart assessment funding total completed.	CRI FCFS: funding received as part of 2022 grant
32	High	In conjunction with the FireSmart HIZ assessments, make residents aware of the rebate program Wells received funding for.	The rebate program could incentivize residents to start actioning FireSmart HIZ assessment recommendations on their structures and landscaping.	Wells (LFR; consultant)	Ongoing	Residents actively using rebate program for FireSmart activities.	CRI FCFS: funding received as part of 2022 grant

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
33	High	Continue making a FireSmart rebate program available for Wells residents. Future CRI FCFS funding requirements will require FireSmart HIZ and CIIZ assessments be completed to qualify for FireSmart activities like the rebate program.	The rebate program could incentivize residents to start actioning FireSmart HIZ assessment recommendations on their structures and landscaping.	Wells (LFR; consultant)	Annually	Residents actively using rebate program for FireSmart activities.	CRI FCFS: funding received as part of 2022 grant
34	High	Develop and implement a community chipping/debris disposal service available to Wells residents.	Free debris disposal is a good incentive to complete FireSmart work and helps reduce backyard burning. Other local governments have seen great uptake.	Wells (consultant)	Annually: spring - fall	Chipping program initiated for 2024.	CRI FCFS funding available Example $25,000 - $35,000: ~$300/hr for chipper @ 25-40 properties/day plus administration and supervision. CRI FCFS
Fuel Management Treatments							
35	High	Implementation of the Ministry of Forests (MOF - Quesnel Natural Resource District) planned fuel management treatment units in Wells' WUI should be a leading priority of Wells.	Some of these areas were identified in the past 2006 CWPP. As stated in this CWRP, they are high priority interface areas on the windward side of values. Although they fall on Crown land, all units may be approved for funding under CRI FCFS (Stream 1) because of their direct interface location to the community – Wells should immediately engage with UBCM CRI, BCWS, and MOF to determine the best course of action.	Wells (MOF; forest land managers)	5 Years	Treatment completed on all CLWRR planned units.	CLWRR program (CRI FCFS funding available) ~$10,000/hectare for a ~20 ha unit for a local contractor
36	High	Apply for funding through CRI FCFS, or encourage MOF CLWRR program, to fund prescription development and then implementation of additionally proposed	Additionally proposed treatment units within this plan are located in the direct interface of the community and on the windward side of values.	Wells (MOF; forest land managers; consultant)	5 Years	CWRP proposed treatment units have completed prescriptions; implementation being planned for.	CRI FCFS funding available (or completed under the CLWRR program)

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
		fuel management treatment units within this plan (Wells-1 and Wells-2).					~$400/hectare prescription development cost for a ~20 ha unit for a local contractor
37	Moderate	Wells and forest land managers within the WUI should consider opportunities to use trails and roads within the WUI as fuel breaks.	Forest Enhancement Society of BC (FESBC) wildfire fuel treatment funding has been utilized by other BC communities (such as in Burns Lake) to plan and implement fuel treatments along bike and recreation trails on Crown land.	Wells (MOF; forest land managers)	5 Years	Potential trails and roads identified that can be utilized for fire breaks; discussions with FESBC in progress to acquire funding to develop prescriptions and implement treatment.	FESBC funding Cost dependent on level of effort and uptake

TABLE OF CONTENTS

SECTION 1: Introduction 1
1.1 Overview 1
1.2 Plan Goals 1
1.3 Plan Development Summary 2
SECTION 2: Relationship to Other Plans and Legislation 3
2.1 Linkages to CWPPs/CWRPs 3
2.2 Local Authority Emergency Plan 4
2.3 Other Local Plans 5
2.4 Local Bylaws 6
2.5 Higher-Level Plans and Legislation 10
SECTION 3: Community Description 11
3.1 Wildland-Urban Interface 11
3.2 Community Information 13
3.2.1 Critical Infrastructure 15
3.2.2 Electrical Power 16
3.2.3 Water and Sewage 17
3.2.4 Hazardous Values 17
3.2.5 Cultural Values 19
3.2.6 High Environmental Values 19
3.2.7 Other Resource Values 19
SECTION 4: Wildfire Risk Assessment 21
4.1 Wildfire Environment 21
4.1.1 Topography 22
4.1.2 Fuel 24
4.1.3 Weather 27
4.2 Wildfire History 30
4.3 Local Wildfire Threat Assessment 33
4.3.1 WUI Risk Class Analysis 34
4.4 Hazard, Risk, and Vulnerability Assessment 37

SECTION 5: FireSmart Principles 38
5.1 Education 39
5.2 Legislation, Planning and Development Considerations 44
5.3 Interagency Cooperation 49
5.4 Cross-Training and Fire Department Resources 52
5.5 Emergency Planning 56
5.6 Vegetation Management and Other FireSmart Activities 62
SECTION 6: Appendices i
6.1 Appendix A: Local Wildfire Risk Process i
6.1.1 Appendix A-1: Fuel Typing Methodology and Limitations i
6.1.2 Appendix A-2: Wildfire Fire Threat Spatial Analysis Methodology iii
6.1.3 Appendix A-3: WUI Risk Spatial Analysis Methodology vi
6.1.4 Appendix A-4: Wildfire Threat Plot Locations vi
6.1.5 Appendix A-5: Proximity of Fuel to the Community vii
6.2 Appendix B: WUI Threat Assessment - Worksheets and Photos x
6.3 Appendix C: Maps x
6.4 Appendix D: List of First Nations and Associated Governments Consulted xi

LIST OF TABLES

Table 1: Wells Community Wildfire Resiliency Plan v
Table 2: Wells' Emergency Management Plan and its relationship to the CWRP 4
Table 3: Other Local Plans and relationship to CWRP 5
Table 4: Wells Bylaws and their relation to the CWRP 6
Table 5: Higher-Level Plans 10
Table 6: Land Ownership within the WUI of Wells 11
Table 7: Wells Socio-Economic Statistics 14
Table 8: Wells Critical Infrastructure (within and adjacent to the WUI) 15
Table 9: Species and Ecosystems at Risk in the WUI – BC Conservation Data Center 19
Table 10: Slope Percentage and Fire Behaviour Implications 22
Table 11: Slope Position of Value and Fire Behaviour Implications 23
Table 12: Fuel types in the Wildland-Urban Interface 25
Table 13: Biogeoclimatic Zones and Natural Disturbance Types in Wells' WUI 30
Table 14: Wildfire threat summary for the WUI 34

Table 15: WUI risk class ratings 35
Table 16: FireSmart vulnerability and resilience factors within Wells 39
Table 17: Education recommendation and action items 41
Table 18: Legislation, planning and development recommendation and action items 47
Table 19: Wells Emergency Management Committee - CFRC recommended additions 49
Table 20: Interagency cooperation recommendation and action items 51
Table 21: Wells Volunteer Fire Brigade's firefighting resources 53
Table 22: Cross-training recommendation and action items 54
Table 23: Example of a Wildfire Response Preparedness Condition Guide 58
Table 24: Emergency preparedness recommendation and action items 60
Table 25: Vegetation management action items 64
Table 26: Summary of Proposed Fuel Treatment Units 67
Table 27: Fuel Type Categories and Crown Fire Spot Potential. Only summaries of fuel types encountered within the WUI are provided ii
Table 28: Description of variables used in spatial analysis for WUI wildfire risk assessment iv
Table 29: Fire Threat Class scoring components v
Table 30: WUI Risk Classes and their associated summed scores vi
Table 31: Summary of Wildfire Threat Assessment (WTA) Worksheets vii
Table 32: Proximity to the Interface ix

LIST OF FIGURES

Figure 1: Population trends For Wells (2001-2021) 13
Figure 2: Graphic display of the fire behaviour triangle, and a subset of characteristics within each component. 22
Figure 3: Average number of danger class days during the fire season for the Benson weather station (2010-2020) 27
Figure 4: Daily average initial spread index rose for Big Valley weather station during the fire season (April – October) 28
Figure 5: Historical Wildfire Ignitions (WUI; by decade) 31
Figure 6: Wells Community Hall – example of critical infrastructure needing FireSmart materials improvements 45
Figure 7: A pre-incident planning checklist that can be used to help develop a pre-incident wildfire suppression plan and maps 57
Figure 8: FireSmart Home and Critical Infrastructure Ignition Zone (HIZ, CIZ) viii

LIST OF MAPS

Map 1: Wildland-Urban Interface in Wells 12
Map 2: Values at Risk in Wells' Wildland-Urban Interface 18
Map 3: Updated fuel types in Wells' WUI 26
Map 4: Natural disturbance regimes and historical fire ignitions and occurrences within Wells' WUI 32
Map 5: Local wildfire threat assessment of Wells' WUI 36
Map 6: Wells Fuel Treatments (Crown Land Wildfire Risk Reduction Program and CWRP Proposed) 66

FREQUENTLY USED ACRONYMS

AOI	Area of Interest
BC	British Columbia
BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
CFFDRS	Canadian Forest Fire Danger Rating System
CLWRR	Crown Land Wildfire Risk Reduction: Stream 2 of the UBCM CRI Program, administered by MOF
CRI	Community Resiliency Investment
CWRP	Community Wildfire Resiliency Plan
CWPP	Community Wildfire Protection Plan
DPA	Development Permit Area
EMBC	Emergency Management British Columbia
EPA	Emergency Program Act
FBP	Fire Behavior Prediction System
FCFS	FireSmart Community Funding and Supports: Stream 1 of the UBCM CRI Program
HIZ	Home Ignition Zone
ICS	Incident Command System
MOF	Ministry of Forests
MOTI	Ministry of Transportation and Infrastructure
NDT	Natural Disturbance Type
PSTA	Provincial Strategic Threat Assessment
UBCM	Union of British Columbia Municipalities
VAR	Values at Risk
WUI	Wildland-Urban Interface
WVFB	Wells Volunteer Fire Brigade

SECTION 1: INTRODUCTION

1.1 OVERVIEW

In January 2022, B.A. Blackwell and Associates Ltd. was retained by District of Wells (Wells) to update the previous 2009 Wells-Barkerville Community Wildfire Protection Plan (CWPP)[2] to a Wells specific Community Wildfire Resiliency Plan (CWRP). A CWRP is both a localized risk assessment and an action plan to improve wildfire resiliency in a region. This plan accounts for landscape and policy changes that have occurred in the last 13 years and takes advantage of the newest community wildfire planning framework in BC. CWRPs have a stronger focus on the seven FireSmart™ disciplines[3] and on interagency collaboration.

A CWRP has its roots in the Community Wildfire Protection Plan (CWPP) framework, which was originally established in BC in response to the series of devastating wildfires in 2003. Since then, many communities in BC have continued to face an ever-increasing threat of wildfire, as the 2017, 2018, and 2021 fire seasons proved to be three of the most historically damaging seasons on record. CWRPs are currently being developed at many jurisdictional and geographic scales, and are individually tailored to address the needs of different communities in response to their size, their capacity, and the unique threats that they face.

Despite these differences, the goals of a CWRP remain the same: to improve wildfire prevention, wildfire preparedness, and wildfire response and recovery in the face of ever-increasing wildfire risk. Implementing recommendations in this CWRP will improve public safety and reduce the risk of damage to values at risk from wildfires.

1.2 PLAN GOALS

This CWRP identifies the level of interface wildfire risk in Wells by providing a current and accurate understanding of the threats to human life, infrastructure, and values at risk from wildfire. This CWRP is intended to serve as a framework to guide the implementation of specific actions and strategies to:

1) Increase the efficacy of fire suppression and emergency response,
2) Reduce potential impacts and losses to property and critical infrastructure from wildfire, and
3) Reduce wildfire behavior threat within the community.

To help guide and accomplish the above strategies, this CWRP will provide Wells with:

1) An assessment of wildfire risk to the community,
2) An assessment of values at risk and potential consequences from wildfire,
3) Maps of fuel types and recommended areas for fuel treatments,

[2] Completed by by Mustang Wildfire Services
[3] Education, Legislation & Planning, Development Considerations, Interagency Cooperation, Cross-Training, Emergency Planning and Vegetation Management

4) An assessment of emergency response capacity, and
5) Options and strategies to reduce wildfire risk in the seven FireSmart disciplines: education, legislation and planning, development considerations, interagency cooperation, cross-training, emergency planning, and vegetation management.

CWRPs are funded in BC by the Union of BC Municipalities (UBCM) under the Community Resiliency Investment (CRI) FireSmart Community Funding and Supports Program. As per funding requirements, this CWRP is completed according to the 2021 CRI template.

1.3 PLAN DEVELOPMENT SUMMARY

The planning for this CWRP is based on the Wildland-Urban Interface (WUI) of Wells. The WUI is traditionally understood as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.[4] For the purpose of a CWRP, the WUI is defined as a one-kilometer buffer around a structure density of six or more structures per square kilometre. Further information on Wells and its WUI is found in Section 3.

The CWRP process consists of five general phases:

1) Formation of the Community FireSmart Resiliency Committee (CFRC); see Section 5.3. Consultation with the CFRC and information sharing with stakeholders and First Nations occurred throughout the plan's development;
2) Review of relevant plans and legislation regarding emergency response and wildfire (Section 2);
3) Community description and identification of values at risk (Section 3);
4) Assessment of the local wildfire risk (Section 4); and
5) Analysis and action plan for each of the seven FireSmart disciplines (Section 5).

[4] FireSmart Canada. 'What is the wildland urban interface?' https://www.firesmartcanada.ca/what-is-firesmart/understanding-firesmart/what-is-the-wui/

SECTION 2: RELATIONSHIP TO OTHER PLANS AND LEGISLATION

This section reviews all local community plans relevant to wildfire and emergency management and Wells bylaws, as well as higher-level plans and legislation to identify linkages and content that is relevant to community wildfire planning.

2.1 LINKAGES TO CWPPS/CWRPS

2009 Wells-Barkerville Community Wildfire Protection Plan (CWPP)

Mustang Wildfire Services completed a CWPP jointly for Wells and Barkerville in 2009. Recommendations were reviewed and incorporated into this plan. Below is a summary of the recommendations from the 2009 CWPP that were directly relevant to Wells and their *status*:

- Members of the Wells Volunteer Fire Department should be trained in the assessment of individual residences and on the benefits of the FireSmart program, and be encouraged to promote the FireSmart principles within the community.
    - *FireSmart education and assessments are part of Wells' 2021 FCFS CRI grant (see Section 5).*

- The District of Wells should incorporate a requirement into the current, and any future, building bylaw that all new home construction, major modifications, and renovations conform to the FireSmart principles.
    - *Not addressed. Discussed in Section 5.2.*

- The District of Wells should obtain a Sprinkler Protection Unit, with 10 sprinklers and the ancillary equipment to deploy and operate them. The Sprinkler Protection Unit would be capable of protecting up to five residences, and should be housed in the fire hall ready for deployment.
    - *Not addressed. Discussed in Section 5.4.*

- The District of Wells Volunteer Fire Department should acquire additional wildland firefighting equipment, as identified in this plan, and carry out annual testing of it.
    - *Partially addressed (see Sections 5.3 and 5.4).*

- Local Wells–Barkerville teaching staff should be trained in the FireSmart program and encouraged to include education on FireSmart in the curriculum for school children.
    - *Not addressed. Discussed in Section 5.1.*

- Project works identified in Tables 1, 2, and 3 [Table 1 is specific to Wells; proposed fuel treatment units] should be carried out to help lessen the potential impact of an interface wildfire.
    - *Partially addressed (CRD Transfer Station – proposed; Stromville – treated). Discussed in Section 5.6.*

Table 1. District of Wells Proposed Works

Treatment Area or Expenditure	Size (ha)	Cost/ha	Total Cost	Prescription Cost	Comments
Island Mountain - Crown	2.03	$8,500	$17,255	$600	Pilot project – hand work
Island mountain - Private	13.55				
Stromville - Crown	6.76	$7,200	$48,672	$800	Pilot Project – hand work
Meadow	4.10	$1,200	$4,920	$400	Pilot Project – hand work
CRD Waste Transfer Station	1.63	$5,500	$8,965	$400	Pilot Project – hand work Will need co-ordination with CRD
Sprinkler Protection Unit			$3,000		
Project Administration & Implementation			$6,500		
Total	**28.07**		**$89,312**	**$2,200**	

2.2 LOCAL AUTHORITY EMERGENCY PLAN

Emergency preparedness and response is guided by higher level emergency management legislation such as the provincial Emergency Program Act.[5] The Emergency Program Act describes the various roles and administrative duties of the province and local governments with regards to emergency, the implementation of higher-level emergency plans, the processes of declaring a state of emergency, and coordinating post disaster relief programs and assistance.

Wells' emergency management is provided by the municipality. The District of Wells Emergency Management Plan and associated documents were recently updated in 2021. The planning process also included the development of the Wells Emergency Management Committee, which includes individuals from BC Emergency Health Services, Barkerville Gold Mines - Osisko Development, RCMP, BC Ambulance Services, and relevant local Wells municipal staff (Emergency Operations Centre Director, Public Works Superintendent, Fire Chief, etc.).

Table 2 below describes Wells' Emergency Management Plan and its relation to the CWRP. Local emergency management, and associated recommendations, is discussed in further detail in Section 5.5.

Table 2: Wells' Emergency Management Plan and its relationship to the CWRP

Local Plan	Description and Relation to CWRP
Wells Emergency Management Plan 2021	Outlines structural and organizational requirements for coordinated response and recovery from emergencies in Wells, including: decision-making tools for evacuation or shelter in place; EOC levels and communications protocols; describes the stages of evacuation; lists emergency contacts and communications; summarizes staffing requirements; details EOCs and reception centres; identifies critical infrastructure and significant buildings to the community. Wildfire is identified in the Hazards, Risk, and Vulnerabilities section as a specific threat that needs to be to be planned for effective emergency preparedness. Wildland and Urban Interface Fire is scored in the Risk Assessment Matrix as "High Risk".

[5] British Columbia Provincial Government. 2020. *Emergency Program Act.* Retrieved from: Emergency Program Act (gov.bc.ca)

	- Major Emergency Action Plans for Major Forest Fire, Urban Interface Fire, Major Fire Smoke, and Massive Urban Fire are contained within the main document. Each of these plans detail (a combination of): Actions, Response, Evacuation Events, Isolation Events, and Contact Lists.

2.3 OTHER LOCAL PLANS

Table 3 lists additional local plans relevant to wildfire management, emergency planning, and evacuation planning on Wells. It describes these plans and their relation to the CWRP as wells as identifies any gaps.

Table 3: Other Local Plans and relationship to CWRP

Local Plans	Description and Relation to CWRP
Wells Official Community Plan (Bylaw 106)	**1.0 Introduction** An official community plan must include statements and map designations for the area covered by the plan respecting the following: (d) Restrictions on the use of land that is subject to hazardous conditions or that is environmentally sensitive to development; *- Wildfire is not mentioned as a "hazardous condition".* (e) The approximate location and phasing of any major road, sewer and water systems; *- Water systems, including hydrants, increase resiliency to wildfire and fire suppression efforts.* **2.2 Objectives** (h) To provide safe potable water for domestic use within the water specified area, and an adequate quantity of water at sufficient pressure for the fire protection area *- "Adequate quantity of water at sufficient pressure for the fire protection area" increases resiliency to wildfire and fire suppression efforts.* **3.2 b. Policies** General Policy: An area of Wells, designated on the Official Community Plan map as 1930's Mining Town Development Permit Area (DPA) pursuant to Section 919.1(f) of the Local Government Act, R.S.B.C. 1996, c. 323 for the purpose of preserving and enhancing the 1930's mining town heritage of the community. This area may be referred to as the "1930's Mining Town Development Permit Area". *- The intent of the DPA is to preserve the heritage character of the community and to provide attractive visual landscape to encourage visitors to stop and increase tourism.* *- FireSmart principles should be incorporated to increase the resiliency of structures to wildfire.* **3.9 a. Objectives** (1) To provide safe potable water for domestic use and an adequate quantity of water at sufficient pressure for fire protection for the Wells Water Specified Area. *- "To provide… an adequate quantity of water at sufficient pressure for fire protection" increases resiliency to wildfire and fire suppression efforts.* (3) To prevent and protect against the loss of life and property, by fire, within the Wells Fire Protection Specified Area.

	- Specifically stating fire (which includes wildfire but is best to state "wildfire" specifically as well) as an objective triggers it to be planned for. **3.9 b. Policies** (3) Fire Protection: The District will assist in coordinating the provision of the best possible fire fighting equipment; the implementation of a volunteer training program; and the carrying out of educational and awareness programs. *- "Best possible fire fighting equipment" should include wildfire fighting equipment.* *- Education is one of the seven FireSmart disciplines.*

2.4 LOCAL BYLAWS

Table 4 below lists Wells municipal bylaws and their relation to the CWRP as wells as identifies any gaps relating to wildfire management, emergency planning, and evacuation planning.

Table 4: Wells Bylaws and their relation to the CWRP

Plans/Bylaws	Section	Description and Relation to CWRP
Emergency Measures Bylaw (Bylaw 10)	3.2	The Council shall appoint an Emergency Coordinator to facilitate emergency preparedness, response and recovery measure. *- Wildfire resiliency planning one component of emergency preparedness.*
	3.3	Subject to the approval of the Council, the Emergency Executive Committee may: (b) enter into agreements with regional districts or other municipalities for the purpose of emergency assistance or the formulation of coordinated emergency preparedness, response or recovery; and *- Mutual aid agreements between fire departments increases wildfire resiliency and wildfire response.*
	4.1	The Wells Emergency Executive committee shall prepare and present to the Council for annual review and approval a list of hazards to which the municipality is subject and which also indicates the relative risk of occurrence. *- Wildfire should be included in the list of hazards.*
Fire Services Bylaw (Bylaw 142)	7.5	The Fire Chief and any Member or other person authorized by the Fire Chief to act on behalf of the Fire Chief as an Incident Commander may exercise one or more of the following powers: (b) with reasonable concern, enter on property and inspect premises for conditions that may cause a fire, increase the danger of a fire, or increase the danger to persons or property from fire; *- Reducing fire conditions on private property reduces fire and wildfire risk to that property and the community.* (d) require an owner or occupier to undertake any actions the Fire Chief considers necessary for the purpose of removing or reducing any thing

Plans/Bylaws	Section	Description and Relation to CWRP
		or condition the Fire Chief considers is a Fire Hazard or increases the danger of fire; *- Reducing fire conditions on private property reduces fire and wildfire risk to that property and the community.*
	9.1	The Volunteer Fire Brigade shall provide services as set out in Schedule A of this Bylaw. *- Schedule A includes wildland fire suppression within the Town Limits or requested by the Ministry of Forests.* *- Fire Prevention includes public fire safety education - FireSmart should be included.*
	10.1	The limits of the jurisdiction of the Fire Chief, and the Officers and Members of the Volunteer Fire Brigade will extend to the areas and boundaries of the District of Wells as set out in Schedule B of this Bylaw and no part of the fire apparatus shall be used beyond the limits of the District of Wells without the express authorization of a written contract or agreement providing for the supply of firefighting services outside the municipal boundaries. *- Schedule B: Fire response area is the extents of the District of Wells boundary. Includes Mutual Aid and Firefighting Assistance Agreement with the Barkerville Heritage Trust and an agreement between Wells and the Cariboo Regional District for Fire Protection and Prevention of areas included in Map B.*
	10.2	In the event of an out-of-jurisdiction Incident that poses potential danger to the District or in the best interest of the District, subject to the approval of the Fire Chief and where consent in accordance with Section 13 of the Community Charter has been provided, Equipment, Apparatus and personnel of the Fire Brigade may be used outside the geographic boundaries of the District and/or outside of the jurisdictional boundaries set out in Schedule B. *- Would include fighting wildfires.*
	17.1	The Fire Chief may, at his or her discretion, suspend any or all outdoor burning for reasons of public nuisance or public safety, including but not limited to, air quality and risk of fire spread, and in such event no person shall carry on open burning within the District. *- Local burn bans reflect local wildfire conditions, increasing wildfire resiliency for the community.*
	18.2	Volunteer Fire Brigade pumper connections shall be located and positioned in accordance with the Building Code and approved by the Fire Chief or designate. *- Allows for placement of fire hydrants where required and reflecting fire risk.*
	23.1	A person must not cause or permit Combustible Materials, growth, waste, or rubbish of any kind to accumulate in or around premises in such a manner as to endanger property or constitute a Fire Hazard.

Plans/Bylaws	Section	Description and Relation to CWRP
		- Reducing fire conditions on private property reduces fire and wildfire risk to that property and the community.
	23.2	The Fire Chief may order any person to remove or otherwise deal with accumulation or materials or growth referred to in subsection 21.1 above and upon receipt of such order, that person shall take whatever action is specified in the Fire Chief's order within the time period specified therein, failing which the Volunteer Fire Brigade may take whatever action is necessary to remove the Fire Hazard at the expense of the person to whom the order is directed or the owner or occupier of the premises. *- Reducing fire conditions on private property reduces fire and wildfire risk to that property and the community.*
	23.3 - 23.7	Safely and appropriately regulates: Ash disposal, grease disposal, storing of combustible materials, fuel leaking from vehicles *- Reducing fire conditions on private property reduces fire and wildfire risk to that property and the community.*
	24.2	The owner of vacant premises must promptly act to ensure that, at all times: (a) the premises are free from litter and debris or accumulations of combustible or flammable materials except where storage of combustible or flammable materials is in strict accordance with the Fire Code and this Bylaw; (b) all openings in the premises are securely closed and fastened in a manner acceptable to the Fire Chief or designate so as to prevent fires and the entry of unauthorized persons; and (c) Sprinkler Systems and Fire Alarm Systems remain operational as per requirements of the Fire Code. *- Reducing fire conditions on private property, especially vacant properties with no possibility of immediate resident fire response, reduces fire and wildfire risk to that property and the community.*
	26.1	The Fire Chief and any Member designated by the Fire Chief is hereby authorized to enter at all reasonable times upon any premises to inspect and determine whether or not: (a) the premises are in such a state of disrepair that a fire starting therein might spread so rapidly as to endanger life or other premises or property; (b) the premises are so used or occupied that fire would endanger life or property; (c) combustible or explosive materials are being kept on the premises or other flammable conditions exist in or about the premises so as to endanger life or property; (d) in the opinion of the Fire Chief or a Member, a Fire Hazard exists in or about the premises; or (e) the requirements of this Bylaw and the Fire Code are being complied with. *- Reducing fire conditions on private property reduces fire and wildfire risk to that property and the community.*

Plans/Bylaws	Section	Description and Relation to CWRP
Bylaw to regulate the construction, alteration, repair, moving or demolition of buildings and structures (Bylaw 4997)	7.10, 9, 11, 17, 28	This bylaw has been enacted for the purpose of regulating construction within Cariboo Regional District in the general public interest. *- There is no direct mention of wildfire, use of fire-resistance materials, or any preventive regulations for fire.* *- Subsection 17.2 is the most relevant section of the bylaw, stating that the owner shall, before construction commences, determine the safety of the site with respect to "other hazard" which can include wildfire, accessibility to potable water and proper access to the site by fire-fighting vehicles.* *- Section 28 provides climate data with no reference to wildfire season.*
District of Wells Heritage Designation (1999) a bylaw to designate heritage properties (Bylaw 16)	2.b 3	Alterations that require permit: i. The material composition of all exterior finishes; ii. The size, shape, material composition and glazing of all windows and doors; iii. The shape of the roof of the building. For the purposes of Section 2, 'normal repair" means the replacement of elements of the structure or finishing materials of a building with components that are equivalent to those being replaced in material composition, dimensions and quality, except where the elements or materials being replaced are not original to the building in which case a heritage alteration permit is required. *- No language or reference to use of fire-resistant materials.* *- Different interpretations of Section 3 may create some problem if the goal is to replace some of the materials with fire-resistant materials.*
A Bylaw to Require the Servicing of New Parcels under one hectare in size with municipal water and sewer service. (Bylaw 57)	1 2	That any new parcel created by subdivision of a size less than one (1) hectare shall be serviced by both municipal water and municipal sewer with a capacity suitable to the intended use of the property except where: a) two or more parcels are being combined into a single parcel; or b) the effect of the subdivision would not increase the number of parcels, but would adjust the boundaries between existing parcels provided no parcel would be reduced to less than ten (10) per cent or more of its original size; or c) an accretion is added to a parcel. That the sizing, location and scheduling of installation of any service extension required under this Bylaw shall be determined by the District of Wells. *- Municipal water requirements and services to properties, primarily residences or those planned as residential, reduce fire risk to those properties and the ability to protect themselves from wildfire.*

2.5 HIGHER-LEVEL PLANS AND LEGISLATION

Table 5 below lists higher-level plans and legislation relevant to wildfire planning and risk mitigation on Wells. Land and resource use plans help guide where and how activities like resource extraction and infrastructure development occurs on the landscape, which affects both wildfire threat and consequence. Fuel management prescriptions, FireSmart vegetation plans, and burn plans must also address these plans as they relate to on-the-ground restrictions and policies for forest modification.

Table 5: Higher-Level Plans

Issuing Government	Plan/Legislation	Description and Relationship to CWRP
Province of BC	Cariboo-Chilcotin Land Use Plan	All of the WUI is within the Cariboo-Chilcotin Land Use Plan. A key part of implementing the CCLUP was completing the Quesnel Sustainable Resource Management Plan (non-legal guidance). *Legal planning objectives within the CCLUP that overlap with the WUI include those for:* *- Buffered Trails and Trail Areas* *- Grizzly Habitat* *- Lakeshore Management Class* *- Scenic Areas*
Province of BC	BC Provincial Open Burning Smoke Control Regulation	Governs open burning relating to land clearing, forestry operations and silviculture, wildlife habitat enhancement, and community wildfire risk reduction. *- All of Wells' WUI is within Medium Smoke Sensitivity Zone.*
Province of BC	BC Building Code (2018)	Governs how new construction, building alterations, repairs and demolitions are completed; establishes minimum requirements for safety, health, accessibility, fire/structural protection of buildings and water/energy efficiency. *- Applies to the construction and development of residential housing and other community infrastructure on Wells.* *- The Code does not include FireSmart standards, which must be defined at a local level.*
Province of BC	FRPA Values & Government Action Regulations (GARs)	Provide direction for establishment of land designations and features that require special management. *Planning objectives within the GARs that overlap with the WUI include those for:* *- Old Growth Management Areas* *- Visual Landscape Inventory*
Province of BC	Tree Farm License Management Plans (TFLMPs) Community Forest Management Plans (CFMPs)	TFLMPs and CFMPs provide a general description of the License area, a list of publicly available planning documents that guide operations, and a timber supply analysis which guides the Chief Forester of BC in determining the annual allowable cut (AAC) for it. Strategies to address government objectives that are reflected in higher-level plans are given. *- TFL52 (licensed to West Fraser Timber Company) overlaps with the WUI.* *- K3R Wells-Barkerville Community Forest (managed by West Fraser Timber Company) overlaps with the WUI.*

SECTION 3: COMMUNITY DESCRIPTION

This section defines the planning area and provides general demographic information about Wells. An understanding of population trends, land use patterns, and values at risk can help best direct FireSmart outreach and risk mitigation activities.

3.1 WILDLAND-URBAN INTERFACE

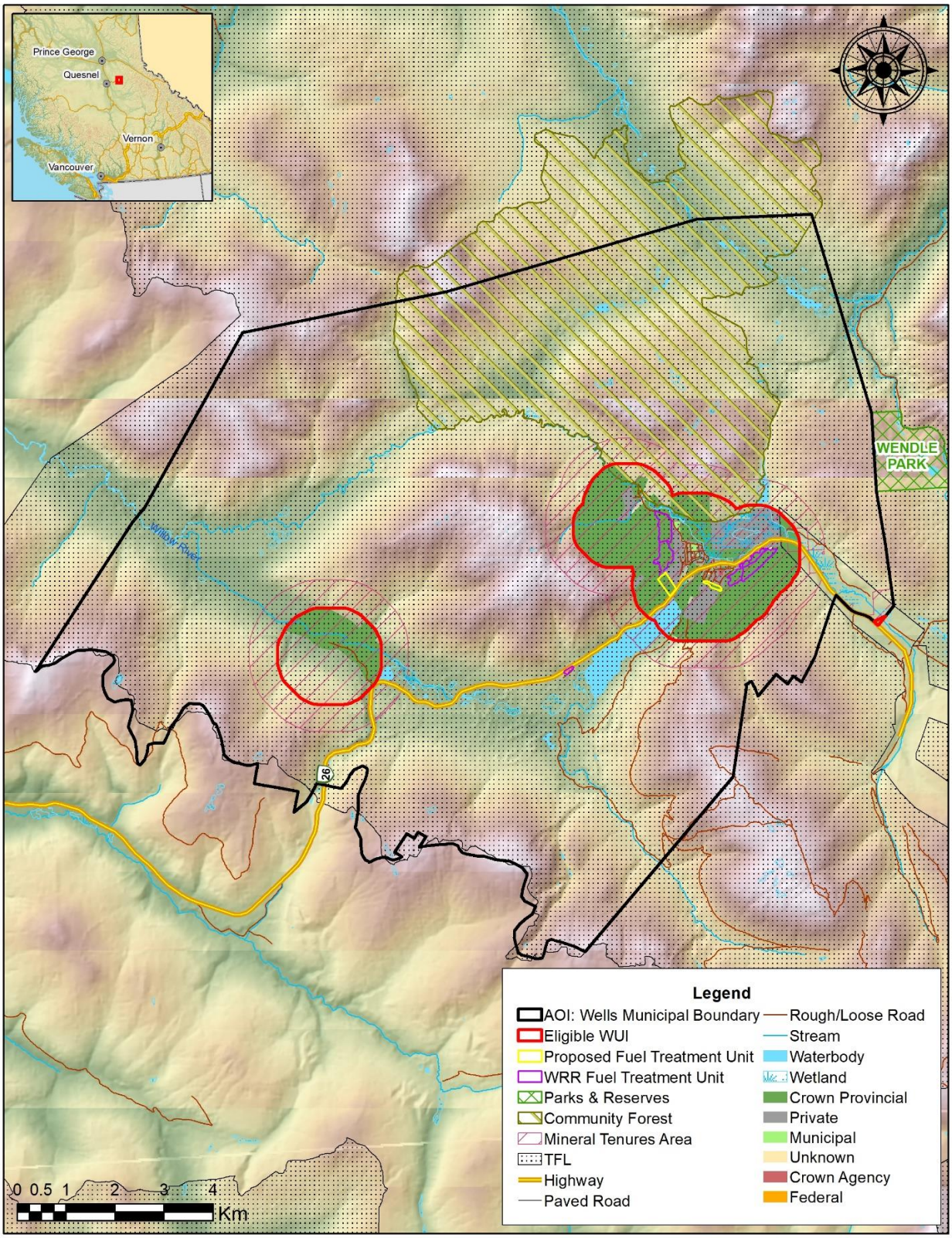
The Wildland-Urban Interface (WUI) is defined by FireSmart Canada as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. For the purpose of the FireSmart Community Funding and Supports program, the 'eligible WUI' is considered only as the area one kilometre from a structure density class greater than six structures per square kilometre. BC Wildfire Service generates WUI Risk Class maps, eligible Wildland-Urban Interface boundaries, and other associated spatial data to assist with initiatives related to wildfire risk reduction, including the FCFS program.[6] Field work and GIS analyses for this CWRP cover only the one kilometre 'eligible WUI', a total of 1,439.2 hectares.

A breakdown of area by ownership type is listed in Table 6. The majority (86%) of Well's WUI is Crown Provincial land. Private land accounts for almost all the remaining area, at 14%. The Wells municipal boundary, WUI, and land ownership types are illustrated in Map 1. The WUI is composed of two separate "bubbles". The smaller WUI bubble (west) was found to be based on archaic structure data (likely old mining structures), confirmed by Wells and field assessments. Currently, there are only a few small forestry field office portable trailers and stored forestry equipment. This WUI bubble has been retained as in-scope for the plan, but most of the field assessment effort and recommendations within this plan are focused on the WUI bubble of the main Wells community.

Table 6: Land Ownership within the WUI of Wells

Land Ownership	Area (Ha)	Percent of WUI (%)
Crown Agency	1.3	<1%
Crown Provincial	1,236.8	86%
Municipal	3.9	<1%
Private	196.8	14%
Unknown	0.2	<1%
Federal	0.2	<1%

[6] Wildland Urban Interface Risk Class Maps - Province of British Columbia (gov.bc.ca)



Map 1: Wildland-Urban Interface in Wells

3.2 COMMUNITY INFORMATION

80 kilometres east of Quesnel, the incorporated municipality of the District of Wells is a small, historic mining town in the western foothills of the Cariboo Mountains, near the end of Highway 26.[7] Inhabited since time immemorial by the Dakelh Nation in the Athapaskan language group, early colonial settlement began in the 1930s when the community was built as a company town for Fred Wells' Gold Quartz Mine.[7] A booming gold-rush town (tied to two gold mines) in the 1940s, Wells' population peaked at 4,500 and then began to dwindle once both mines closed (the last closing in 1967).[7] Many unique heritage buildings remain and have been restored for preservation. For the past 50 years, tourism has been the main economic driver for Wells, which in conjunction with its neighbouring community Barkerville, sees upwards of 66,000 visitors per year, primarily in the summer months.[8] The "ArtsWells Festival of All Things Art" hosted by both Wells and Barkerville and established in 2003, sees upwards of 2,200 attendees, volunteers, artists, and vendors over a four-day period each summer (the festival has been on hold since the start of the COVID-19 pandemic). However, the recent start-up of Barkerville Gold Mine Ltd.'s local operations may bring mining back as Wells' main economic driver.

Wells is accessed by Highway 26 (Barkerville Highway) which bisects the community east-west. The north edge of the community is bordered by a large wetland; the south and east edges are bordered by conifer forest stands; and the west edge by a wetland/grassland complex that leads into Jack of Clubs Lake.

Shown below in Figure 1, Wells' population has decreased on average 2% over the last 20 years, with the most significant population change being an 11% decrease occurring between 2011 and 2016.[9]

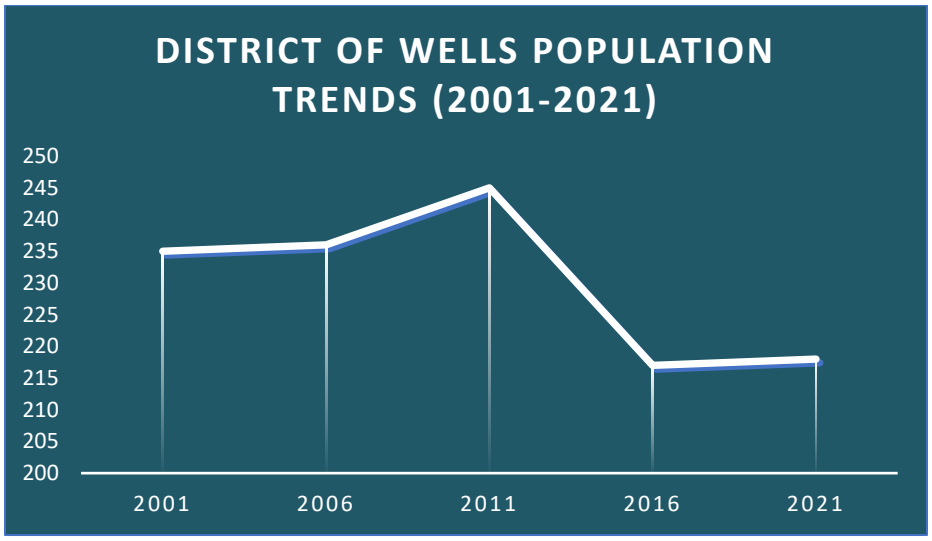


Figure 1: Population trends For Wells (2001-2021)

[7] https://www.wells.ca/about/wells
[8] Barkerville.ca
[9] Statistics Canada census data compiled and summarized at: https://townfolio.co/bc/bowen-island/demographics

The large increase of summer visitors to the area increases the wildfire risk. Since some visitors don't comply with provincial and local fire bans (often simply due to ignorance), and many visitors are unaware of local wildfire risks, more summer visitors increase a) the likelihood of a human-caused wildfire, and b) the consequence of a wildfire – more people to evacuate.

Additional relevant socio-economic statistics for Wells are shown below in Table 7.

Table 7: Wells Socio-Economic Statistics[10]

Metric	Value
Population	
Total Population	218
Number of people <14 years old	30
Number of people 15-64 years old	148
Number of people >65 years old	40
Median Age (years)	51.2[11]
Housing	
Total private dwellings	156
Average Taxable Property Value	$185,853
Income and Employment	
Median Total Income of Households[12]	$42,880
Employment Rate	56.1%
Unemployment Rate	14.8%
Education	
No certificate, diploma or degree	21%
Secondary school or equivalent	28%
Post-secondary college, apprenticeship, diploma, etc.	18%
Post-secondary university degree	18%

The municipality provides garbage collection (via private contractor), water and sewer, an emergency program, roads and infrastructure (maintenance provided by contract with EMCON Road Maintenance), permits, and bylaw enforcement. Wells Volunteer Fire Brigade (WVFB) is responsible for municipal fire protection. WVFB is the only fire service in the area and is 100% dependent on volunteers. Additional garbage and recycling facilities are provided by the CRD at the Wells Transfer Site ~3.5 kilometres southwest of town and accepts wood waste from trees and yard trimmings. Emergency Health Services are provided by BC Ambulance Service. There are local paramedics on call for 911 emergency services. Locally, Wells has emergency health services only. Non-emergency services are provided in Quesnel.

Wells is comprised mostly of hilly terrain with streams and rivers in the valleys between. The forested hills are comprised mostly of mixed sub-alpine fir (*Abies amabalis*) and Engelmann spruce (*Picea engelmannii*)

[10] Statistics Canada census data compiled and summarized at: https://townfolio.co/bc/bowen-island/demographics
[11] The median age for BC is 43.0.
[12] In 2015, pre-tax. BC median is $69,995.

with some lodgepole pine (*Pinus contorta*) and mixed deciduous species. Wells has a subarctic climate resulting in long, cold, and snowy winters accompanied by short and cool summers due its altitude and latitude. Its growing season averages only 66 days.[13] Wells is within the BC Wildfire Service (BCWS) Quesnel Fire Zone which is part of the greater Cariboo Fire Centre. The closest BCWS fire base to Wells is located 80 kilometres west, in Quesnel.

3.2.1 CRITICAL INFRASTRUCTURE

Critical infrastructure can be defined as assets that are essential for the functioning of government and society, namely: water, food, transportation, health, energy and utilities, safety, telecommunications and information technology, government, finance, and manufacturing.

Table 8 (and displayed on Map 2) lists critical infrastructure for Wells as determined by Wells municipal representatives and the Wells Fire Chief. Reception Centres and Emergency Operation Centres (EOC) were established as part of the Wells Emergency Program. Water and electric systems are discussed in more detail in Sections 3.2.2 and 3.2.3.

Table 8: Wells Critical Infrastructure (within and adjacent to the WUI)

Map ID: Type	Name	Address	Jurisdiction	Risk & Resilience Factors
1: Primary EOC	Wells Municipal Hall	4243 Sanders Ave	District of Wells	*Risks:* - construction materials *Resilience:* - limited flammable vegetation surrounding
n/a: Secondary EOC	Barkerville Visitor Reception Centre	4 Front St, Barkerville	Province of BC	*Not assessed (outside of WUI)*
2: Fire Hall	Wells Volunteer Fire Department	2314 Baker St	District of Wells	*Risks:* - construction materials *Resilience:* - limited flammable vegetation surrounding
3: Civic Infrastructure	Water Reservoir/ Storage Tank	~250m west of Burnette Avenue	District of Wells	*Risks:* - none noted *Resilience:* - construction materials - vegetation cleared 10m surrounding structure - planned BCWS WRR Fuel Treatment unit adjacent on west edge

[13] "Canadian Climate Normals 1981-2010 Station Data". Environment Canada. 2013-09-25.

Map ID: Type	Name	Address	Jurisdiction	Risk & Resilience Factors
4: Civic Infrastructure	Water Well and Treatment	Intersection of Ski Hill Rd and Gardener St	District of Wells	*Risks:* - surrounded by C-3 forest fuel type *Resilience:* - n/a
5: Civic Infrastructure	Sewage Pond	0.5 km northwest of town on Hard Scrabble Rd	District of Wells	*Risks:* - none noted *Resilience:* - limited flammable vegetation surrounding
6: Communications	Communication Tower/Building	Behind (south of) the Fire Department	District of Wells (Telus Communications Inc.)	*Risks:* - construction materials *Resilience:* - limited flammable vegetation surrounding
7: Communications	Telus Cellular Tower	South of town; west of Barkerville Gold Mines office	Telus Communications (On Private Land)	*Risks:* - surrounded by C-3 forest fuel type *Resilience:* - structure is metal
8: Emergency Response	BC Ambulance RCMP	Barkerville Hwy; central Wells	On Federal Land	*Risks:* - construction materials *Resilience:* - limited flammable vegetation surrounding
9: Hazardous	Wells Refuse Site	10720 Barkerville Hwy	Cariboo Regional District	*Risks:* - upwind of Wells - wood waste (combustible) *Resilience:* - planned BCWS Fuel Treatment unit adjacent and downwind.

3.2.2 ELECTRICAL POWER

A large fire has the potential to impact electrical service by causing disruption in network distribution through direct or indirect processes. For example, heat from flames or fallen trees associated with a fire event may cause power outages. Additionally, vegetation encroachment on power lines can be a wildfire ignition source - a tree branch lying between two conductors can produce high-temperature electrical arcs. BC Hydro overhead power lines service Wells through a service line following Highway 26 from Quesnel. There are no major transmission right-of-ways within the WUI.

Secondary power sources for critical infrastructure are important to reduce community vulnerability in the event of an emergency that cuts power for days, or even weeks. Vulnerabilities for secondary power sources include mechanical failure, potentially insufficient power sources should a wide-scale outage occur, and diesel fuel shortage in the event of long outages or road closures. Wells should invest in back-up generators for all Wells-owned infrastructure, including fire halls, water and wastewater systems, and the Emergency Operations Centers, as required (addressed in Section 5.5). Currently, the radio tower,

Municipal Hall, water treatment facility, and water lift pump have backup power sources or generators. Additionally, the municipality owns one large and one small portable generator.

3.2.3 WATER AND SEWAGE[14]

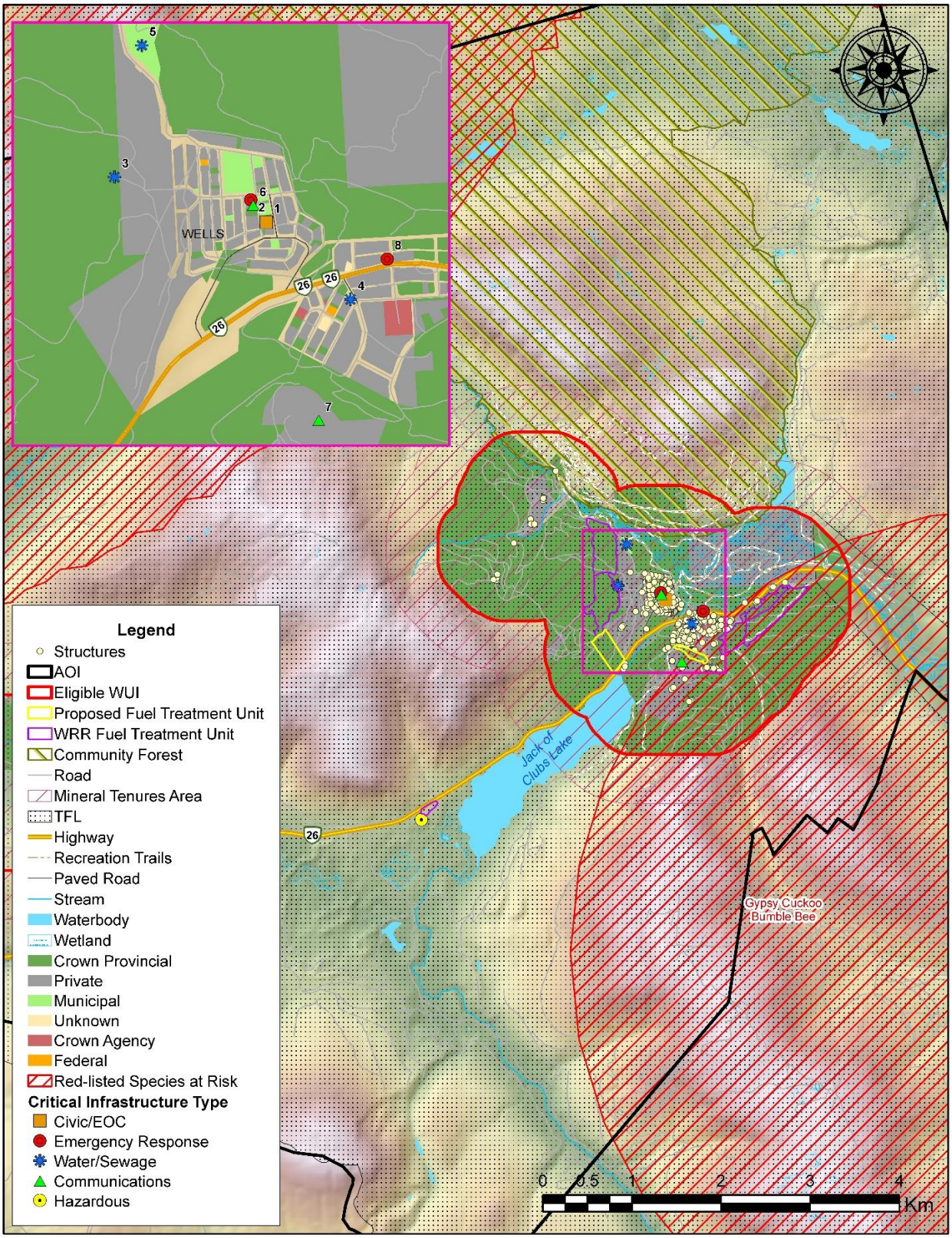
Wells obtains water from a single groundwater supply commissioned in 1987. The current groundwater supply consists of a 47 metre deep well and associated well pump. The well head is located outside the pump house in a 1.8 metre diameter corrugated metal culvert, 3.4 metres deep. The wellhead culvert is covered and the entire area fenced. A sump pump is installed in the culvert to prevent flooding. The water is pumped to and stored in a ~1,000,000-litre metal above ground reservoir that gravity feeds to town. The water system is operated by the municipality, and is supplied to all homes and businesses in the town. Additionally, the system feeds 21 fire hydrants located throughout the main town. Noted through past power-outage experiences, the reservoir can hold two to three days' worth of water for Wells (at normal use rates). Noted by the Fire Chief, additional known water sources for firefighting services (ponds, streams, etc.) are not mapped.

The Wells lagoon, located ~500 metres northwest of town, is a single cell wastewater lagoon complete with aeration. Aeration is provided from blowers, located in the blower building, and distributed by submersed air supply lines, installed on the floor of the lagoon. Raw wastewater enters the southeast corner of the lagoon via gravity collection piping. Once treated, the effluent exits the lagoon in the northwest corner. The treated effluent is then conveyed by the lagoon outfall piping into the Willow River to the north.

3.2.4 HAZARDOUS VALUES

Hazardous values are defined as values that pose a safety hazard to emergency responders and include large propane facilities, landfills, rail yards, storage facilities containing explosives, pipelines, etc. Anywhere combustible materials, explosive chemicals, or gas/oil is stored can be considered a hazardous value. Protecting hazardous values from fires is important in preventing interface fire disasters. Hazardous values identified within Wells' WUI are the gas station behind the Jack O Clubs General Store, and the many exterior propane/gas tanks on home and business properties used for cooking and heating. Maintaining FireSmart vegetation surrounding these values as well as using FireSmart (non-combustible) construction materials for the structures adjacent to them would greatly reduce the structures' and values' fire risk (for fire ignition, but more so for their ability to propagate and exacerbate a fire) – further addressed in Section 5: FireSmart Principles.

[14] Water and sewage system descriptions provided by Wells municipal staff



Map 2: Values at Risk in Wells' Wildland-Urban Interface

3.2.5 CULTURAL VALUES

Cultural values have the potential to be impacted by wildfire or wildfire suppression activities through physical damage or alteration. There are no documented historic and archeological sites within the WUI, but there is potential for sites to be found given the long history of use by the Dakelh Nation. Known archeological sites are protected under the Heritage Conservation Act, which applies on both private and public lands.

Prior to stand modification for fire hazard reduction (i.e., prescribed fuel treatments and FireSmart vegetation management), archeological assessments may be required to ensure that known or unknown cultural resources are not inadvertently damaged or destroyed, and that First Nations strategies for land management in their traditional territory are complied with. Fuel treatment activities must include consultation with all identified First Nations at the site level and with sufficient time for meaningful review and input regarding their rights and interests prior to prescription finalization or implementation.

3.2.6 HIGH ENVIRONMENTAL VALUES

Table 9 below lists the ecosystem or species at risk occurrences that have been identified through the B.C. Conservation Data Center (CDC) and/or have been specifically observed and recorded within the WUI boundary. Through consultation with the CDC and a biologist or qualified professional, all site-level operational plans must identify and mitigate potential impacts to ecosystems or species at risk. Blue and Red listed occurrences are shown above on Map 2.

Table 9: Species and Ecosystems at Risk in the WUI – BC Conservation Data Center

Common Name	Scientific Name	Category	BC List	Habitat Type
Caribou (Southern Mountain Population)	*Rangifer tarandauspop. 1*	Vertebrate Animal	Red	Terrestrial; Forest Needleleaf
Gypsy Cuckoo Bumble Bee	*Bombus bohemicus*	Invertebrate Animal	Red	Terrestrial

3.2.7 OTHER RESOURCE VALUES

Barkerville Gold Mines Ltd (BGM) owns and operates the Cariboo Gold Project, an underground gold mine and associated infrastructure. The main office is in the southwest corner of Wells, within the WUI (no hazardous materials are stored there). The mining area extends south from Wells towards Barkerville and is outside, but directly adjacent, to the WUI with storage areas for explosives used in operations. BGM has a site evacuation plan that can be implemented as part of any hazard, including wildfire. Under this plan, all explosive and equipment are moved into the middle of a large operations clearing. BGM shares maps, hazards, and access with BCWS every year. Recently (early 2022), BCWS toured the mining operations site to provide recommendations towards wildfire resiliency, safety, and evacuation. Any fuel management

activity within the WUI should consider the impact on mining activities, especially for smoke impacting air intake vents.

The Wells-Barkerville Community Forest (managed by the Community Forests' Board of Directors)[15] and Tree Farm Licence 52 (managed by West Fraser Timber Company) have significant tenure areas within Wells' WUI. Forest activities can both increase and decrease wildfire risk in WUI areas. Any fuel management activity within the WUI should consider the impact on forestry activities, and any forestry activities within the WUI should consider the impact on wildfire risk to the community (further discussed in Section 5.3).

Other important resource values that should be considered are those that draw the many tourists to the area. Examples include the Wells' "Significant Buildings": Wells Community Hall, Wells Curling Rink, Wells Community Facility Centre, Wells Auditorium/Gymnasium (school), Jack O Clubs General Store and Restaurant, and Wells General Store and Market.[16] All significant buildings, municipal or private, should look to have FireSmart assessments completed for them and the resulting recommendations acted upon – further addressed in Section 5: FireSmart Principles.

[15] The Directors have sold standing timber to West Fraser and, as part of that agreement (expiring December 31, 2023), West Fraser has assumed some, but not all, of the management responsibilities. The Directors retain overall management responsibility for the Community Forest.

[16] As identified in the Wells Emergency Management Plan

SECTION 4: WILDFIRE RISK ASSESSMENT

This section summarizes the factors that contribute to local wildfire risk in Wells. Section 4.1 discusses the wildfire environment in Wells: topography, fuel, and weather and includes climate change projections affecting the wildfire environment of the area. Section 4.2 discusses wildfire history in the area. Section 4.3 describes the analysis used to classify the local wildfire threat and WUI threat for Wells.

The local wildfire risk assessment helps to identify the parts of the WUI that are most vulnerable to wildfire so that wildfire risk reduction actions can be implemented effectively.

The relationship between wildfire risk and wildfire threat is defined as follows:

Wildfire Risk = Probability X Consequence

Where:

Wildfire risk is the potential losses incurred to human life and values at risk within a community in the event of a wildfire.

Consequences are the repercussions associated with fire occurrence in an area. Higher consequences are associated with densely populated areas, areas of high biodiversity, etc.

Probability is the threat of wildfire occurring in an area and is expressed by the ability of wildfire to ignite and then consume fuel on the landscape – its *wildfire threat*. Wildfire threat is driven by three major components of the wildfire environment:

1) Topography – slope and terrain (increase/decrease rate of spread), and aspect (fuel dryness)
2) Fuel – loading, size and shape, arrangement (horizontal and vertical), compactness, chemical properties, and fuel moisture.
3) Weather – temperature, relative humidity, wind speed, and direction and precipitation.

4.1 WILDFIRE ENVIRONMENT

There are three environmental components that influence wildfire behavior: topography, fuel, and weather. These components are generally referred to as the 'fire behaviour triangle' (Figure 2); the ways in which they individually influence the wildfire environment of the WUI will be detailed below. *Fuel is the only component of the fire triangle that can be managed.*

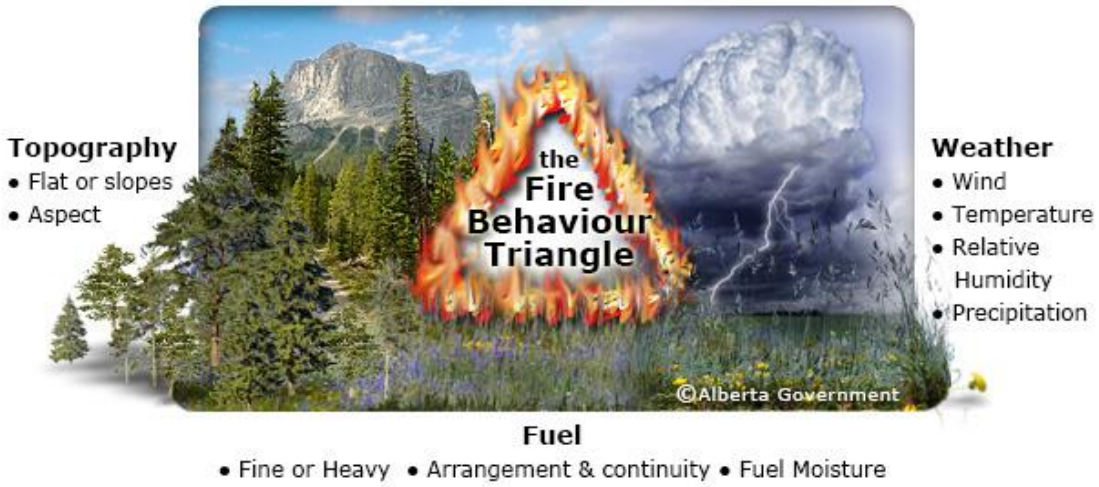


Figure 2: Graphic display of the fire behaviour triangle, and a subset of characteristics within each component.[17]

4.1.1 TOPOGRAPHY

Slope steepness influences a fire's trajectory and rate of spread; slope position relates to the ability of a fire to gain momentum uphill. Other factors of topography that influence fire behaviour include aspect, elevation, and configuration of features on the landscape that can restrict (i.e., water bodies, rock outcrops) or drive (i.e., valleys, exposed ridges) the movement of a wildfire.

Table 10 shows the percent of the WUI by slope steepness class, with corresponding fire behavior implications. Just under half (46%) of the WUI is on <20% slope and would experience little flame and fuel interaction caused by slope. The other 54% of the WUI is on slopes >20% and would experience varying rates of flame and fuel interaction caused by slope that would accelerate a fire's rate of spread.

Table 10: Slope Percentage and Fire Behaviour Implications

Slope	Percent of WUI	Fire Behaviour Implications
<20%	46%	Very little flame and fuel interaction caused by slope, normal rate of spread.
21-30%	27%	Flame tilt begins to preheat fuel, increase rate of spread.
31-45%	16%	Flame tilt preheats fuel and begins to bathe flames into fuel, high rate of spread.
46-60%	10%	Flame tilt preheats fuel and bathes flames into fuel, very high rate of spread.
>60%	1%	Flame tilt preheats fuel and bathes flames into fuel well upslope, extreme rate of spread.

Table 11 shows the fire behaviour implications of slope position of a value. Values located in the lower slope are at the least risk. Values located mid-slope are at increased risk as they are threatened by faster

[17] Province of Alberta.

rates of fire spread due to the pre-heating of fuels and longer flame lengths. Values in the upper 1/3 of a slope are at highest risk as they are impacted by extreme rates of spread.

Table 11: Slope Position of Value and Fire Behaviour Implications

Slope Position of Value	Fire Behaviour Implications
Bottom of Slope/ Valley Bottom	Impacted by normal rates of spread.
Mid Slope - Bench	Impacted by increased rates of spread. Position on a bench may reduce the preheating near the value. (Value is offset from the slope).
Mid Slope – Continuous	Impacted by fast rates of spread. No break in terrain features affected by preheating and flames bathing into the fuel ahead of the fire.
Upper 1/3 of slope	Impacted by extreme rates of spread. At risk to large continuous fire run, preheating and flames bathing into the fuel.

Almost all homes and critical infrastructure in Wells are located on lower, flat benches with a few homes along the lower 1/3 of adjacent slopes. This limits their exposure to higher fire behaviour implications and thus lowers their fire risk associated with slope.

Important infrastructure, such as the water reservoir tower and the Telus communication tower, are located mid to upper slope surrounded by conifer forests. This infrastructure would be impacted by high to extreme rates of spread and preheating from fires spreading uphill from below them. Infrastructure situated like these are often damaged or temporarily disabled by wildfires – for example, in the summer of 2021, two hill-top cell towers were damaged by the Lytton wildfire.[18]

Additionally, steep-sided valleys, both large and small, are also a risk factor in the WUI as they funnel winds that can drive fire through main valleys, then up and down side tributary valleys. Devils Canyon, southwest of Wells, funnels prevailing fire season winds from the southwest towards Wells. Smaller creek draws (often running up/down the valley slopes of larger drainages) provide additional convective features that can drive the fast upslope spread of fire.

[18] Roden, B. July 1, 2021. TELUS working to restore communication in Lytton after fire damages infrastructure. Ashcroft Cache Creek Journal. https://www.ashcroftcachecreekjournal.com/news/telus-working-to-restore-communication-in-lytton-after-fire-damages-infrastructure/

4.1.2 FUEL

Although fuel structure varies throughout the WUI, the major risk factor that is common to almost the entire WUI is the continuity of forest cover. Most of the WUI is dominated by conifer and mixed wood forests that can carry fire.[19] The town of Wells, although small, is densely developed – there is little vegetative fuel of concern within town, but the outer structures are almost all interface with the surrounding forest fuels. Natural fuel breaks exist, most notably the large deciduous shrub dominated wetland on the north – northeast edge of town. However, there is a component of grass within the wetland that, during dry summer months, can carry fire.

Historical logging, fires, mining, and forest health outbreaks have affected fuel characteristics in the WUI. Past fires reduce fuel continuity, while disease outbreaks (past mountain pine beetle mortality of lodgepole pine; current balsam bark beetle mortality of subalpine fir) resulting in mortality increase standing and down fuel loads and continuity, fuel dryness, and combustibility. Historically, logged/cleared stands are generally more fire-prone as second-growth conifer stands usually regenerate in high densities. However, logging can be used to lower wildfire risk by breaking up the continuity of forest fuels within an area.

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines sixteen fuel types based on characteristic fire behaviour under defined conditions.[20] BC Wildfire Service maintains a provincial fuel type layer that was confirmed and updated for this CWRP. It should be noted that a locally observed fuel type may have no exact analog within the FBP system. In these cases, the most appropriate fuel type to predict fire behaviour was assigned. Furthermore, fuel types depend heavily on Vegetation Resource Inventory (VRI) data, which is gathered and maintained to inform timber management objectives, not fire behaviour prediction. Although a subjective process, the most appropriate fuel type was assigned based on research, experience, and practical knowledge; this system has been successfully used within BC, with continual improvement and refinement, for 20 years.[21] In some areas, aerial imagery is of low spatial resolution and/or ground access is impossible, making fuel type assessment difficult.

Table 12 lists the percentage of fuel types in the WUI. The fuel types present that should be considered most hazardous in terms of fire behaviour are C-3, C-4 equivalents, and M-1/2. M-1/2 fuel types within the WUI have been attributed to conifer stands with high amounts of dead and down conifer trees from beetle attack thus exhibiting high surface fuel continuity and low overstory crown closure. Under drought conditions, fuel consumption and fire intensity of these M-1/2 attributed fuel types can be hazardous due to the continuity of dead woody fuels. A C-7 or O-1a/b fuel type often can support a rapidly spreading

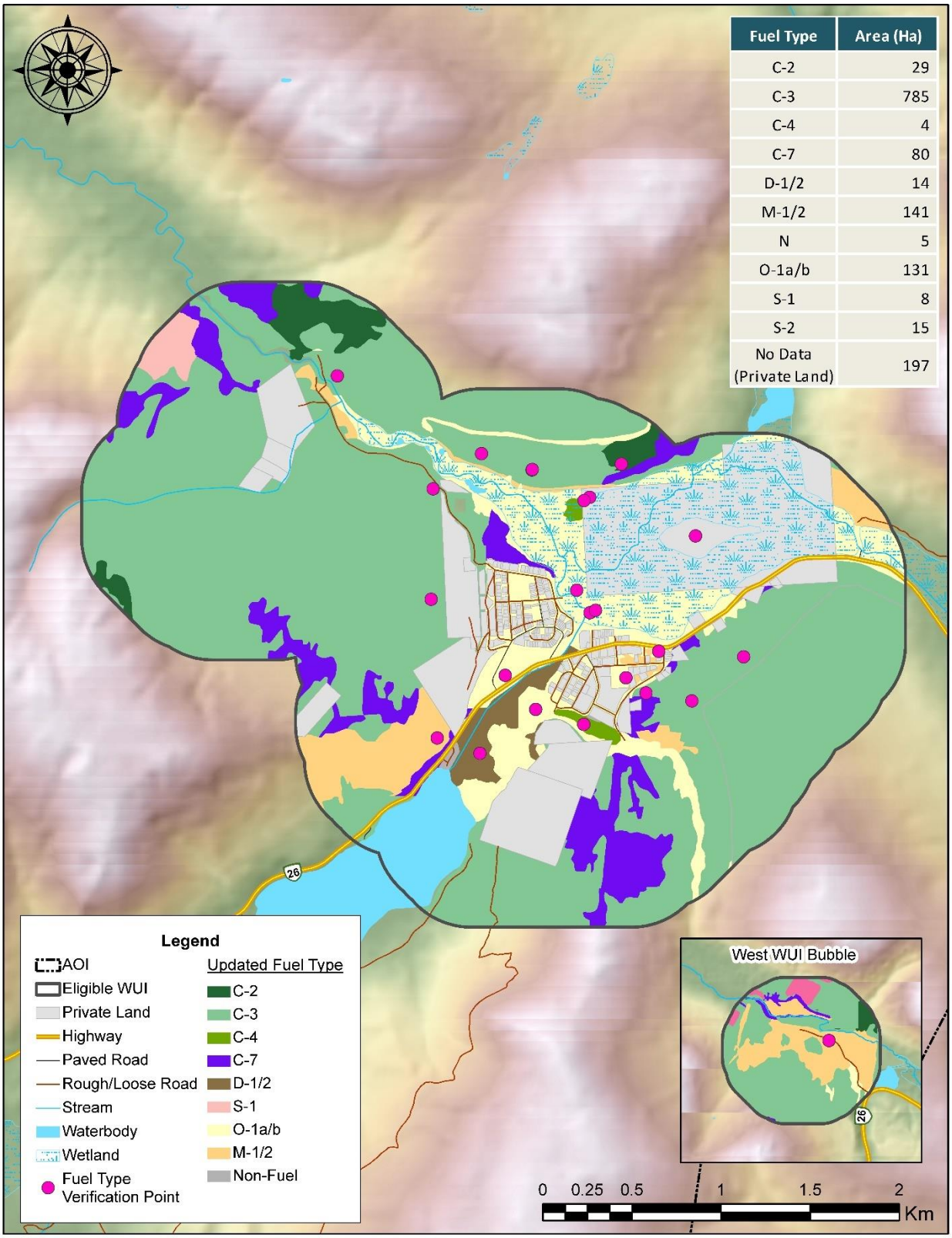
[19] Fires in 2019, 2020, and 2021 demonstrate that potential.
[20] Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3.
[21] Perrakis, D., G. Eade, and D. Hicks. 2018. BC Wildfire Service. Ministry of Forests, Lands, and Natural Resource Operations. British Columbia Wildfire Fuel Typing and Fuel Type Layer Description

grass or surface fire capable of damage or destruction of property and jeopardizing human life, although it is recognized as a highly variable fuel type dependent upon the level of curing.[22]

Areas in the WUI classified as D-1/2 include deciduous shrub wetlands and deciduous dominated riparian areas. C-7 was assigned to more open forest stands with little understory fuel continuity. C-3 was assigned to fully stocked, immature conifer-dominated stands. O-1a/b is a sparse 'grassland' fuel type, assigned to open fields. Where fuel types could not be updated from imagery with a high level of confidence, the original PSTA fuel type determination was retained. It should be noted that both fuel type and threat on private land (14% of the WUI) cannot be classified. Updated fuel types in Wells' WUI are shown below on Map 3. Detailed fuel type descriptions and their associated wildfire risk can be found in Appendix A-1: Fuel Typing Methodology and Limitations.

Table 12: Fuel types in the Wildland-Urban Interface

Fuel Type	CWRP 2021: % of Public Land in the WUI	Area (ha)
C-2	2 %	29
C-3	56 %	785
C-4	<1 %	4
C-7	6 %	80
D-1/2	1 %	14
M-1/2	10 %	141
N	<1 %	5
O-1a/b	9 %	131
S-1	<1 %	8
S-2	1 %	15
No Data (Private Land)	14 %	197



Map 3: Updated fuel types in Wells' WUI

4.1.3 WEATHER

Wells has a subarctic climate resulting in long, cold, and snowy winters accompanied by short and cool summers. Although extreme high temperature events are not normal, all months from April to October have had record highs above 25°C.[23]

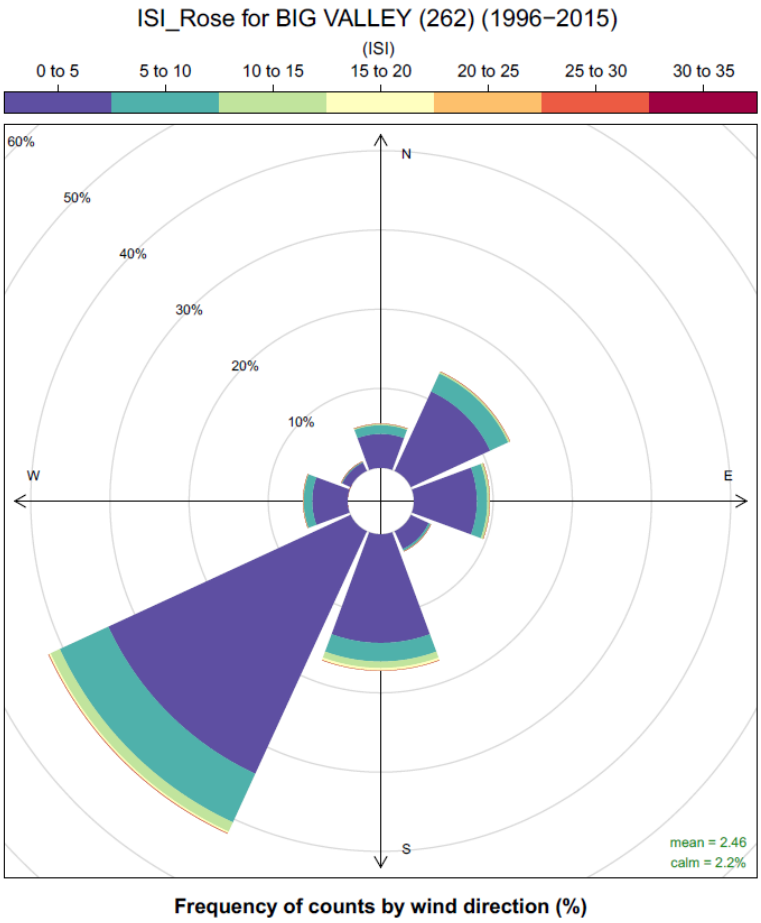
Fire weather data for the WUI was summarized from the Benson BCWS weather station[24], located 39 kilometres southwest of Wells. Figure 3 shows the average number of 'high' and 'extreme' fire danger days during the fire season (April – October). Within the WUI, fire weather peaks in August, with an average of seven moderate, three high, and two extreme fire danger days. Also, July and September both have high fire danger days. Moderate fire danger days are recorded from May to September, indicating there is fire weather risk across all those months.

Figure 3: Average number of danger class days during the fire season for the Benson weather station (2010-2020)

Hourly wind speed and direction are also recorded at BCWS weather stations. Data is publicly available in the form of average Initial Spread Index (ISI) roses.[25] The Initial Spread Index (ISI) is a numeric rating of the expected rate of fire spread that combines the effects of wind speed and fine fuel moisture (controlled by temperature and relative humidity). ISI roses can help plan the location of fuel treatments on the

[23] https://en.wikipedia.org/wiki/Wells,_British_Columbia#Climate
[24] BCWS identified the Benson fire weather station as more closely approximating Well's fire weather (excluding wind direction), despite it being further away from Wells than the Big Valley fire weather station. The Big Valley fire weather station was noted as being wetter and higher in elevation.
[25] https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management

landscape to protect values at risk based on the predominant wind direction and frequency of higher ISI values. Wildfire that occurs upwind of a value poses a more significant threat to that value than one which occurs downwind.



The Big Valley fire weather station, located ~21 km north of Wells, was used for ISI data. During the fire season, the Big Valley fire weather station shows that, during the peak fire season months of July and August, winds are primarily from the southwest. When analyzed for a 24-hour period (not displayed), the winds are generally weaker from the north during the night, and then stronger from the southwest during the day. The data shows that, overall, fire season winds would drive fire spread in a general northeast direction. Thus, a fire south and west of Wells poses the largest threat to the community.

Figure 4: Daily average initial spread index rose for Big Valley weather station during the fire season (April – October)

Climate Change

Climate change is a serious and complex aspect to consider in wildfire management planning. Numerous studies outline the nature of climate change impacts on wildland fire across Canada, and globally.[26] Although there are uncertainties regarding the extent of these impacts on wildfire, the frequency, intensity, severity, duration, and timing of wildfire and other natural disturbances is expected to be

[26] Flannigan, M.D et al. 2009. *Implications of changing climate for global wildland fire.* International Journal of Wildland Fire 18, 483-507.

altered significantly with the changing climate.[27] Despite the uncertainties, trends within the data are visible.

The Fraser Basin Council published the Climate Projections for the BC Northeast Region in June 2019. The following climate predictions affecting wildfire risk are made for the region:

- *Summers will be considerably warmer:* an increase from 12 days to 32 days on average per year over 25°C by 2050. Projected temperatures will trigger significant heat stress across the region.
- *Increase precipitation across all seasons; summer to remain the wettest season:* even though precipitation is projected to increase slightly, hotter temperatures (equaling increased evaporation) could lead to drier, hotter summers, posing increased risk of wildfire.
- *Summer streamflow to decrease in all basins:* less precipitation will fall as snow, decreasing summer melting and streamflow levels, leading to increased stress to water system.
- *More extreme storm events in the future:* As climate warms, more moisture is held in the atmosphere resulting in more intense precipitation and winds [which can bring down trees on power lines] during extreme storm events.

Climate scientists expect that the warming global climate will trend towards wildfires that are increasingly larger, more intense, and difficult to control; it is likely that these fires will be more threatening to Wells due to increased potential fire behaviour, fire season length, and fire severity. Researchers studying the relationship between climate change and potential impacts of wildfires to Canadian forests have found that:

- Fuel moisture is sensitive to temperature change, and projected spring precipitation increases will be insufficient to counteract the impacts of the projected summer precipitation decreases and increases in temperature. Results conclude that future conditions will include drier fuels and a higher frequency of extreme fire weather days.[28]
- The future daily fire severity rating (a seasonally cumulative value) is expected to have higher peak levels, and head fire intensity is expected to increase significantly in western Canada. The length of fire seasons is expected to increase, and the increase will be most pronounced in the northern hemisphere. Fire season severity seems to be sensitive to increasing global temperatures; larger and more intense fires are expected, and fire management will become more challenging.[29, 30]

[27] Dale, V., L. Joyce. S. McNulty, R. Neilson, M. Ayres, M. Flannigan, P. Hanson, L. Irland, A. Lugo. C. Peterson, D. Simberloff, F. Swanson, B. Stocks, B. Wotton. 2001. *Climate Change and Forest Disturbances*. BioScience 2001 51 (9), 723-734.
[28] Flannigan, M.D., B.M. Wotton, G.A. Marshall, W.J. deGroot, J. Johnston, N. Jurko, A.S. Cantin. 2016. *Fuel moisture sensitivity to temperature and precipitation: climate change implications*. Climatic Change (2016) 134: 59-71. Retrieved from: https://link.springer.com/content/pdf/10.1007%2Fs10584-015-1521-0.pdf.
[29] Flannigan, M.D., A.S. Cantin, W.J. de Groot, M. Wotton, A. Newbery, L.M. Gowman. 2013. *Global wildland fire season severity in the 21st century*. Forest Ecology and Management (2013) 294: 54 - 61.
[30] Jandt, R. 2013. *Alaska Fire Science Consortium Research Brief.* 2013-3.

4.2 WILDFIRE HISTORY

HISTORIC FIRE REGIME

Wells' WUI can be classified into 'natural disturbance types' (NDTs) according to biogeoclimatic zones and their associated size and frequency of natural disturbances that historically occur within them.[31] Table 13 lists (and displayed on Map 4) the distributions of biogeoclimatic zones and associated NDTs in the WUI.

Table 13: Biogeoclimatic Zones and Natural Disturbance Types in Wells' WUI

Biogeoclimatic Zone	Natural Disturbance Type	Area (ha)	Percent (%)
SBSwk1: Sub-Boreal Spruce wet cool	**NDT2**	612.1	42.5%
ESSFwk1: Engelmann-Spruce-Subalpine Fir wet cool	**NDT1**	826.8	57.5%
ESSFwc3: Engelmann-Spruce-Subalpine Fir wet cold	**NDT1**	0.3	

Just over half of the WUI (57.5%) is categorized as NDT1 – ecosystems with rare stand-initiating events. Historically, these forests existed as contiguous tracts of old seral stage forest in which stand structure was complex because major stand-initiating events were rare. However, current forest practices greatly alter these forests compared to historical conditions. The other 42.5% of the WUI is categorized as NDT2 – ecosystems with infrequent stand-initiating events. Wildfires were often of moderate size (20 – 1000 hectares), with larger fires occurring after long droughts. Historic ecosystems were mature with patches of younger forest resulting from disturbance. The mean disturbance return interval for these ecosystems is approximately 200 years. Within NDT1 and 2 ecosystems in a 100 kilometre radius of Wells, there have been 16 recorded historical fires greater than 2000 hectares (occurring between 1922 and 2017). These fires show the possibility of these ecosystems to carry large fires locally.

HISTORICAL WILDFIRE OCCURRENCES

Based on the BCWS historical wildfire datasets, wildfires in the District of Wells municipal boundary[32] are infrequent and ignitions rarely result in a wildfire event. Although lightning is the most common cause of ignitions in the WUI (as depicted below in Figure 5), person-caused ignitions still account for 25% of known recorded ignitions, emphasizing the importance of fire education and regulation. Historical fire ignition and perimeter data for the WUI is depicted on Map 4.[33]

[31] BC Biodiversity Guidebook. 1990.
[32] The municipal boundary was chosen as the area to discuss historical wildfire occurrences as Wells' WUI's small scale does not allow for proper discussion of such events as wildfire from outside the WUI has a strong likelihood of impacting values within it.
[33] Fire ignition data is available from 1951-2020 and fire perimeter data is available from 1919-2020.

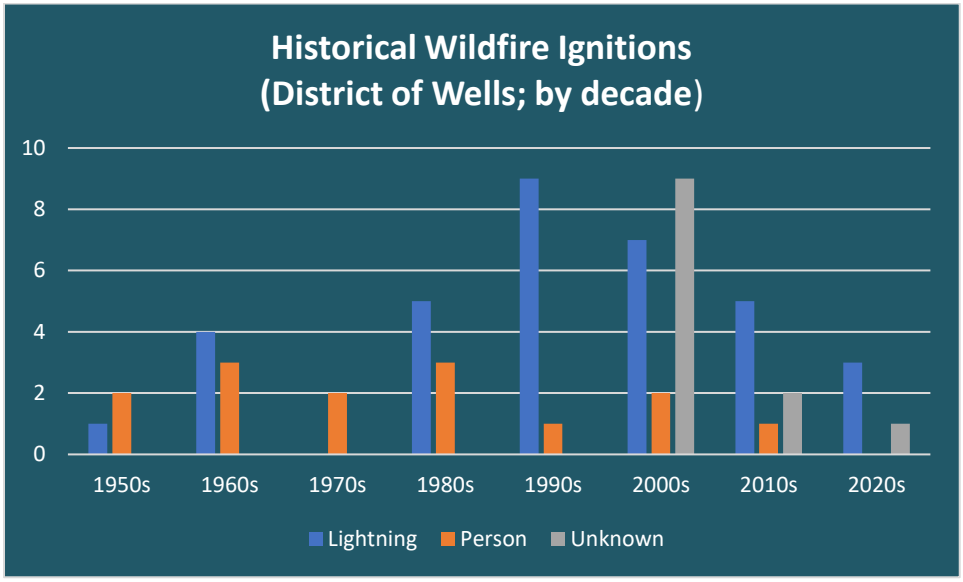
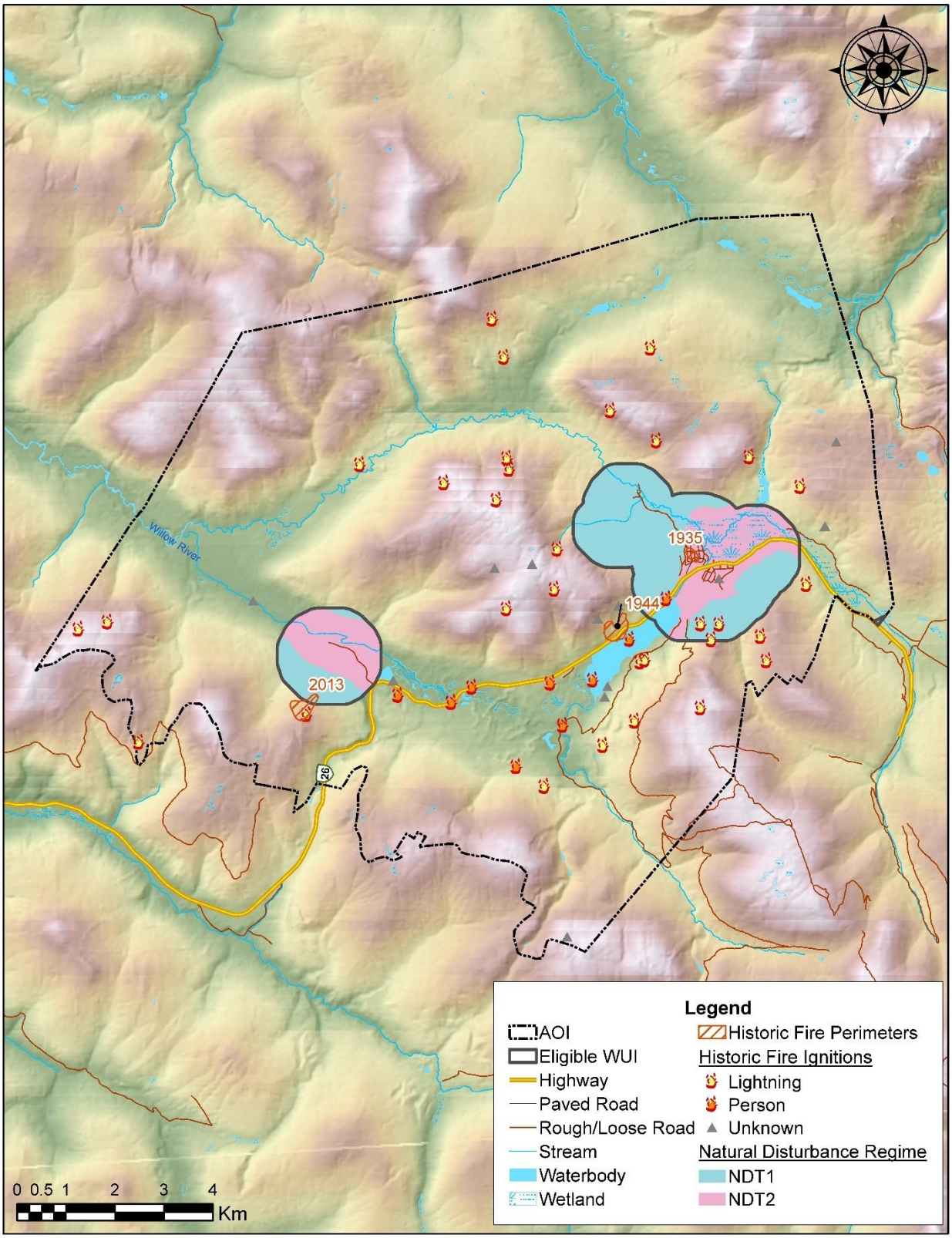


Figure 5: Historical Wildfire Ignitions (WUI; by decade)

There have been three past wildfires of note in the District of Wells, two of which were person-caused, varying in size between 5 and 17 hectares, the most recent occurring in 2013. Additionally, just outside of the municipal boundary, lightning strikes in 2021 started fires on Cow Mountain (south of Wells) as well as near Bowron Lakes (east of Wells). This demonstrates wildfire ignition threat and size, and the corresponding threat to the ecosystem.



Map 4: Natural disturbance regimes and historical fire ignitions and occurrences within Wells' WUI

4.3 LOCAL WILDFIRE THREAT ASSESSMENT

There are two main components of the local risk assessment: the *wildfire behaviour threat class* (fuels, weather, and topography sub-components) and the *WUI risk class* (structural sub-component). The local wildfire threat assessment process includes several key steps as outlined in Appendix A: Local Wildfire Risk Process and summarized as follows:

- Fuel type attribute assessment – ground truthing/verification and updating as required to develop a local fuel type map.
- Consideration of the proximity of fuel to the community – recognizing that fuel closest to the community usually represents the highest hazard.
- Analysis of predominant summer fire spread patterns – using wind speed and wind direction during the peak burning period using ISI Rose(s) from BCWS weather station(s) (Figure 4). Wind speed, wind direction, and fine fuel moisture condition influence wildfire trajectory and rate of spread.
- Consideration of topography in relation to values (Table 10 and Table 11) – slope percentage and slope position of the value are considered, where slope percentage influences the fire's trajectory and rate of spread and slope position relates to the ability of a fire to gain momentum uphill.
- Stratification of the WUI – according to relative wildfire threat based on the above considerations, other local factors, and field assessment of priority wildfire risk areas.

A total of 10 Wildfire Threat Assessment (WTA) plots were completed and 74 other field stops (e.g., fuel type verification, qualitative notes, and/or photograph documentation) were made across the WUI (see Appendix A-4: Wildfire Threat Plot Locations and Map 5) over a number of field days in June of 2022. WTA plots were completed in interface (i.e., abrupt change from forest to residential development) and intermix (i.e., where forest and structures are intermingled) areas of the WUI, on public land, to support development of priority treatment areas.

Wildfire Threat Class Analysis

Classes of the wildfire threat class analysis are as follows:

- Very Low: Waterbodies with no forest or grassland fuels, posing no wildfire threat;
- Low: Developed and undeveloped land that will not support significant wildfire spread;
- Moderate: Developed and undeveloped land that will support surface fires that are unthreatening to homes and structures;
- High: Landscapes or stands that are continuous forested fuels that will support candling, intermittent crown fires, or continuous crown fires. These landscapes are often steeper slopes, rough or broken terrain and/or south or west aspects. High polygons may include high indices of dead and downed conifers; and
- Extreme: Continuous forested land that will support intermittent or continuous crown fires.

The results of the wildfire threat class analysis are shown on Map 5 and in Table 14 below. The analysis shows that over half (65%) of Wells' WUI is classified as Moderate wildfire threat or greater. 21% is classified as Low or Very Low wildfire threat. 14% of the WUI is private land and as such has not been allocated wildfire threat data.

Higher (*Moderate, High, and Extreme*) wildfire threat areas in Wells' WUI are generally located on forested slopes. Within that, the High and Extreme wildfire threat areas are generally located on the warmer and drier west and south facing aspects. Lower (*Low and Very Low*) wildfire threat areas are generally located in the deciduous dominated wetlands and drainages as well as the partially logged forested areas mostly associated with mining activities.

Table 14: Wildfire threat summary for the WUI

Wildfire Threat		
Threat Class	**Hectares**	**% of WUI**
Extreme	118	8%
High	180	13%
Moderate	644	44%
Low	270	19%
Very Low/No Threat (Water)	30	2%
No Data (Private Land)	197	14%

4.3.1 WUI RISK CLASS ANALYSIS

WUI risk classes are quantified when the wildfire threat (see above) is assessed as High or Extreme, causing potential unacceptable wildfire risk when near communities and developments (i.e., structures and values at risk). WUI risk classes are described below:

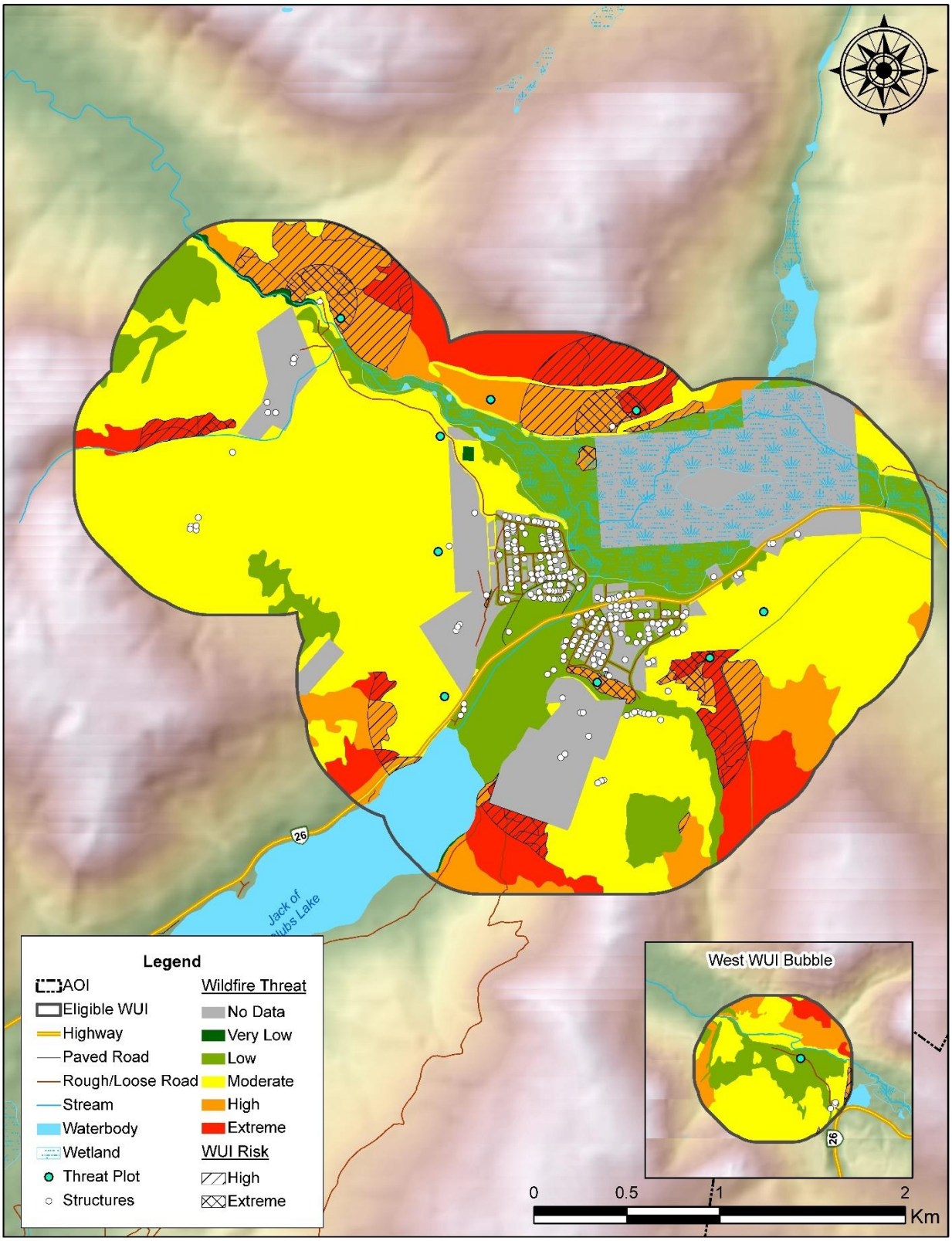
- **Low**: The high or extreme threat is sufficiently distant from developments, having no direct impact of the community and is located over 2 km from structures;
- **Moderate**: The high or extreme threat is sufficiently distant from developments, having no direct impact of the community and is located 500 m to 2 km distance from structures;
- **High**: The high or extreme threat has potential to directly impact a community or development and is located 200 m to 500 m from structures; and
- **Extreme**: The high or extreme threat has potential to directly impact a community or development and is located within 200 m from structures.

21% of Wells' WUI qualifies for this analysis. Table 15 below (and also displayed on Map 5) summarizes the WUI risk class ratings within the WUI. One fifth (20%) has a Moderate WUI risk class or greater. Private land and strata land were not assessed.

Table 15: WUI risk class ratings

WUI Risk		
Risk Class	**Hectares**	**%**
Extreme	22	1%
High	92	6%
Moderate	184	13%
Low	<1	<1%
N/A (Moderate, Low, or Very Low Wildfire Threat)	944	66%
No Data (Private Land)	197	14%

For detailed field data collection and spatial analysis methodology for the local threat assessment and classification, see Appendix A-3: WUI Risk Spatial Analysis Methodology.



Map 5: Local wildfire threat assessment of Wells' WUI

4.4 HAZARD, RISK, AND VULNERABILITY ASSESSMENT

The purpose of a Hazard, Risk, and Vulnerability Analysis is to help a community make risk-based choices to address vulnerabilities, mitigate hazards, and prepare for responding to and recovering from hazard events. The HRVA process assesses sources of potential harm, their likelihood of occurring, the severity of their possible impacts, and who or what is particularly exposed or vulnerable to these impacts.[34]

Wells has completed a Hazard, Risk and Vulnerability Analysis as part of its 2021 Emergency Management Plan (pages 15 – 17). Wildland/Urban Interface fire is identified as high consequence. Additionally, the potential of a wildfire to close the one main road in/out (Highway 26/Barkerville Highway) was noted as a vulnerability to the community that could seriously affect its emergency response, routine resupply, and communications.

Future iterations of Wells' Hazard, Risk and Vulnerability Analysis should look and refer to the most recent Community Wildfire Resiliency Plan for the most up to date wildfire risk analyses and vulnerabilities to the community, as well as key recommendations to focus on.

[34] Government of BC. HRVA Example Report. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/local-government/hrva/hrva_forms-step_8-anytown_bc-sample_hrva_report.pdf

SECTION 5: FIRESMART PRINCIPLES

FireSmart™ is the leading program in the country aimed at empowering the public and increasing neighbourhood resilience through wildfire mitigation measures. It has been formally adopted by almost all Canadian provinces and territories, including British Columbia in 2000. The FireSmart program covers a wide breadth of preventative measures that are founded in the seven FireSmart disciplines: Education, Legislation and Planning, Development Considerations, Interagency Cooperation, Emergency Planning, Vegetation Management, and Cross-Training. These seven disciplines, and the guiding principles behind FireSmart, can be applied at several spatial scales, and are not restricted to any type of land ownership, forest type or property type.

Many of the recommendations proposed in this plan are eligible for funding under the UBCM CRI FireSmart Community Funding and Supports (FCFS) program. Changes to this funding program were announced in July 2022 that are applicable to funding applications for 2023 and beyond. The most important of these changes include:

- All eligible activities must be capable of completion by the applicant within two years of the date of grant approval.
- Increased funding available for hiring and training Firesmart positions.
- Funding available for assessment, inventory, and purchase of FireSmart structure protection equipment.
- Regarding FireSmart projects for community assets:
    - To be eligible for funding, all community asset projects must have completed a FireSmart Home Ignition Zone Assessment, FireSmart Critical Infrastructure Assessment, or a FireSmart Home Partners Assessment.
- Rebates for retrofitting existing structures and new construction (up to 50% of the *total cost*).

Looking forwards to the 2024 application intake and beyond, the application guide highlights that it will be required for all applicants to have *all* the following FireSmart components developed/active in their community:

- A person hired/contracted acting in a FireSmart position as a FireSmart coordinator (can be a title added to a current employee/contractor or a new hire).
- An active Community FireSmart & Resiliency Committee.
- A current CWRP or CWPP that is acceptable to the BCWS Wildfire Prevention Officer/Prevention Specialist or the FNESS Mitigation Specialist/Liaison. This includes assessment and identification of FireSmart and fuel management priorities

Community Overview

During CWRP development, FireSmart vulnerability and resilience factors for the town of Wells were noted (Table 16). This incorporates field observations, the local risk assessment, information gathered through stakeholder questionnaires and Community FireSmart Resiliency Committee meetings, and information from the Fire Chief.

Table 16: FireSmart vulnerability and resilience factors within Wells

Vulnerability	Resilience
- Forest interface edge on leading wind edge - Structures (older and newer) wood or vinyl siding - Wood piles against or within 10m of home - Small lots = structures very close together - Isolated community	- Hydrants - Relatively flat topography of developed area - Metal roofs - Urban vegetation largely low in fire hazard - Municipal properties mostly maintained vegetation - Large wetlands and lakes provide natural fire breaks

Funding for this CWRP was part of a larger approved 2022 CRI FCFS program application by Wells. That application also included funding for:

- Education: FireSmart workshops and presentations.
- Training: Local FireSmart Representative; S100.
- Risk Management: Assessment and FireSmart activities on up to 200 structures including residential, municipal, and Crown Provincial; Rebate program for completed FireSmart activities.

The following sections provide information on each FireSmart discipline. An analysis of actions that have been implemented in Wells is listed, as well as any relevant gaps identified by the Fire Chief, BCWS, and Wells Municipal representatives. Each section contains a table of recommended actions for Wells relating to that FireSmart discipline. Most actions are fundable through the CRI FCFS program. Each recommendation includes a rationale, lead agency, timeline, and estimated resources to complete (if known).

5.1 EDUCATION

Public education and outreach play a critical role in helping a community prepare for and prevent a wildfire. Participating in wildfire risk reduction and resiliency activities also promotes a sense of empowerment and shared responsibility. This discipline often supports the successful implementation of many other FireSmart disciplines by building awareness and understanding within both residents and visitors.

FireSmart education and awareness was a focus of the first Wells Community FireSmart Resiliency Committee (CFRC) meeting in June 2022. Participants discussed the strengths and weaknesses of the community and identified opportunities and avenues for focused action. Education directed at tourists, specifically weekend campers and locally-based festival participants, was identified as a priority. Illegal campfires are an issue, as well as the use of off-road vehicles (dirt bikes and ATVs) without spark arrestors or proper fire extinguishing equipment. The importance of creating a receptive audience and triggering action was also brought up.

Wells had planned six FireSmart community sessions between April 2020 and May 2021, but all were cancelled due to COVID-19 reasons. Another community event scheduled May 9, 2022, was also cancelled

due to COVID-19 reasons. Last year, the Wells Volunteer Fire Brigade (WVFB) contacted property owners to discuss clearing out flammable materials from their properties, but this resulted in limited action. The WVFB also conducted a general FireSmart education campaign via social media. Currently, Wells has posted fire safe backcountry recreation signage at the entrances to major off-road vehicle (ORV) backcountry trails, and will post fire ban notices at these points when in effect. WVFB members also conduct regular patrols to monitor for campfires during fire bans.

Wells should look to continue to apply for funding to support FireSmart education through community events and social media. Discussed during the initial CFRC meeting in June 2022, it is estimated that 30-50% of residents are active in some form of social media group specific to Wells, so additional social media outreach could reach a large audience. The CFRC meeting also noted that education to smaller community groups (i.e., by small groups of adjacent homes or sections of a block) could be received better than one-on-one door to door outreach (would feel less accusatory), or whole community events (where residents may think they can just get the information from someone else who went). Additional education opportunities to explore would be FireSmart education to local youth attending the Wells Community School, as well as keeping Fire Danger Rating signs, located at the beginning of Highways 26 and 97, and one at the end of Highway 26 at the Bowron Junction, updated (especially during the fire season).

CRI FCFS funding is available to hire/contract a person to act in a FireSmart position as a FireSmart coordinator (can be a title added to a current employee/contractor or a new hire). Planning, organizing, and executing Wells' FireSmart program would run through them, including education and most other recommendations proposed in this plan. Due to the limited capacity of small municipalities like Wells, the community should make acquiring a FireSmart coordinator a priority.

Table 17 below details recommended FireSmart education actions that Wells can implement.

Table 17: Education recommendation and action items

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Education - Section 5.1							
Visitors: Tourist education cited as a primary Education priority by the Community FireSmart Resiliency Committee (CFRC)							
1	High	Keep local fire danger rating signs updated. BCWS has fire danger rating signs at the beginning of Highways 26 and 97 and one at the end of Highway 26 at the Bowron Junction.	Highway signs are visible to all visitors entering the region. Having these signs accurately updated will make both tourists and residents aware of the current Fire Danger Rating for Wells and the surrounding area.	Wells, BCWS, WVFB	Current and ongoing	Signs kept updated.	n/a
2	High	Develop a FireSmart/Wildfire Preparedness page on Well's website (with a direct link from the opening webpage). Include links to FireSmart BC and other relevant wildfire resources. Consider showing the current Fire Danger Rating on the Wells' website frontpage.	Visitors (and residents) to Wells will use the Wells webpage as a source for information – this should be utilized to educate for FireSmart and wildfire awareness.	Wells	1 year	Webpage created	CRI FCFS funding is available (~$3000 contracted service. ~40 hours for set-up. Additional hours for updates as required)
3	High	Work with any large festivals or events bringing large numbers of visitors to the community (i.e., ArtsWells Festival) to develop a FireSmart preparedness page on their festival's website (or a link to Wells', if/when developed). Consider specific FireSmart language and recommendations for camping.	ArtsWells Festival (on hold since the start of the COVID-19 pandemic) attracted 2,200 people to Wells every summer, many of whom camp. The fire risk associated with this influx of people is recognized by the CFRC and providing FireSmart and wildfire information to any event a priority.	Wells (Festivals or Events)	Created for any Festival or Event	Webpage/information/link to Wells' FireSmart webpage created	$800: 8 hours @ $100/hour for a webpage developer
4	Moderate	Consider encouraging Destination BC to launch a FireSmart campaign.	Working with Destination BC will ensure that FireSmart messaging is distributed to people outside the region who may plan to visit.	Wells (Destination BC)	1 year as a pilot	Reduction in nuisance fires and awareness of Wells wildfire hazard by out-of-region tourists	4-8 hours engagement
5	Moderate	Work with the Ministry of Transportation and Infrastructure (MOTI) to display targeted 'No	Highway signs are visible to all visitors entering the region. MOTI already posts some	Wells (MOTI)	Seasonal	Reduction in nuisance fires and/or campfires during fire bans. Evaluate cost/benefit	4-8 hours engagement

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
		Campfires – Fire Ban in Effect" messages on Highway signs (fixed signs and deployable signs).	FireSmart messaging along other Provincial highway routes.				
Residents: Resident FireSmart education and FireSmart action initiation/uptake cited as a primary Education priority by the CFRC							
6	High	Launch a FireSmart social media campaign targeting platforms and online community groups used by Wells' residents.	It is estimated 30-50% of residents are active in social media groups specific to Wells. This can be a cost effective and wide-reaching method used to continue FireSmart education within the community. [CRI FCFS funding is available to hire a consultant to develop FireSmart social media campaigns.]	Wells (consultant)	Annual	Increased FireSmart awareness amongst Wells' residents	CRI FCFS funding available Contracted services to develop (~$5,000 and deliver~$2,000)
7	High	Continue to promote FireSmart approaches for wildfire risk reduction to homeowners, businesses, and stakeholders through FireSmart workshops, open houses, and/or presentations. Supply FireSmart resources during these engagement campaigns and promote the FireSmart Begins at Home mobile app as a method of conducting home assessments.	FireSmart BC resources help present a unified message. Print resources are popular and easy to distribute. [FireSmart branded tents, banners, t-shirts can be purchased with CRI FCFS funding.]	Wells	Annual	Quantity of resources distributed/number of times used at events	CRI FCFS up to cost maximums FireSmart Education Kit up to $1,600 each
8	Moderate	Promote/educate FireSmart to young community members: - Encourage School District 28 to adopt and deploy existing wildfire education programs. - Consult with the Association of BC Forest Professionals (ABCFP) and BCWS as well as the local fire department and FireSmart representatives to facilitate and recruit volunteer teachers and experts to deliver FireSmart curriculum at the local Wells Community School (field trips, guest speakers, etc.).	FireSmart education for youth can lead to wildfire awareness being a normal part of their lives as well as bringing information home to their families.	Wells (ABCFP, BCWS, FireSmart Representatives	Yearly (pre-fire season)	One FireSmart education day per school year	CRI FCFS funding available (FireSmart BC Education box - $800 Junior K-Grade 12)
Administration							

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
9	High	Hire a FireSmart coordinator to manage Wells' FireSmart program.	Small municipalities have limited capacities to manage add-on programs such as this. An internal FireSmart coordinator is an efficient way to deliver programs.	Wells	Ongoing	FireSmart coordinator in place by December 2023	CRI FCFS funding available

5.2 LEGISLATION, PLANNING AND DEVELOPMENT CONSIDERATIONS

Legislation and planning regulations are effective tools for reducing wildfire risk, and are quite effective when applied by municipalities. These regulations are often rooted in an Official Community Plan (OCP): a document that acts as an aspirational expression of the objectives and policies of the local government, and provides government with a long-range framework to guide, monitor, and evaluate future land use and development. Wells' OCP and bylaws relevant to FireSmart and wildfire planning and preparedness were reviewed in Section 2.

The Wells OCP speaks to providing adequate water at sufficient pressure for the fire protection area which is reflected in the water services bylaw and visible with the many fire hydrants located throughout town. However, if Wells' water reservoir pump system loses power, the reservoir can provide approximately 2-3-days' worth of water to the community under normal usage (not including any firefighting needs), and has run dry during periods of high use, such as in 2017 during the ArtsWells festival.

Wells' OCP falls short in incorporating FireSmart specifically into many key objectives and policies, thus limiting FireSmart incorporation into legislation and policy. CRI FCFS funding is available to contract wildfire professionals to review OCPs and provide draft language, specific to wildfire and FireSmart, that can be incorporated into objectives and policies when the OCP is being updated. Example objectives and policies that can be updated in Wells' OCP include:

- Section 1.0, (d): Include Wildfire as a hazardous condition.
- Section 3.2, (b): Incorporate FireSmart into the 1930's Mining Town Development Permit Area.
- Section 3.9, (a) (3): Specifically state wildfire as an objective to be planned for.

Two of the most powerful influences that legislation and planning can have on local wildfire risk and resiliency is through a) regulating human-caused fires through Open Burning bylaws and b) regulating FireSmart construction and landscaping through wildfire hazard Development Permit Areas (DPAs) or building bylaws. The powers given to the Wells Fire Chief through the recently updated Fire Services Bylaw are robust and cover all major fire and wildfire risks that should be considered, including implementing local fire bans. Wells does not have an existing interface wildfire hazard DPA, or equivalent.

Pursuant to Section 5 of the 2015 BC Building Act, municipalities may not establish technical regulations related to buildings [in their Building Bylaw]. For that reason, most local governments choose to enact FireSmart requirements for new buildings through a Development Permit Area application process. The purpose of DPAs is to ensure that new development (new builds or major renovations) is consistent with the policies of the OCP. Incorporating a specific interface wildfire protection DPA will guide development design to minimize wildfire hazards and contribute to the fire safety of the neighbourhood/community, thus limiting property damage should a wildfire occur. The following aspects should be considered in the OCP review and interface wildfire hazard DPA development:

1. Establish DPA objectives (e.g., minimize risk to property and people from wildfires, minimize risk to forested areas surrounding the municipality, and conserve the visual and ecological assets of the forests surrounding communities, etc.).
2. Where possible, it is recommended to mandate FireSmart construction materials, some of which may be beyond the BC Building Code within the established wildfire hazard development permit area.
3. Engage the development community and the public in the DPA development process to educate, inform, and allow for input. This can be accomplished in a variety of formats, including, but not limited to, workshops, informational sessions, or open houses.

DPAs can incorporate as many or as few FireSmart construction and landscaping principles to achieve the level of risk reduction acceptable by the community and the municipality. However, three key principles have been proven to provide the greatest risk reduction and should be seriously considered:[35]

- Installing fire-resistant roofing.
- Installing fire-resistant structure siding.
- Creating a 1.5 metre non-combustible zone surrounding the structure.

Figure 6: Wells Community Hall – example of critical infrastructure needing FireSmart materials improvements

It is important to note (and identified by the CFRC during community legislation and planning discussions) that in small, tight-knit communities such as Wells, enforcement of such regulations can be difficult as policing one's own neighbours can be socially divisive and the operational capacity of the municipal government to do so is limited. Wells will have to review available options on how to incorporate real FireSmart development updates and practices within the community and choose what will work best for the local government, businesses, and residents, which could mean incorporating the desired FireSmart building and landscaping policies into existing and new bylaws (such as a specific landscaping bylaw). If Wells considers a stand-alone or amendment

[35] As noted in FireSmart BC's recently published "An examination of the Lytton, BC wildland-urban fire destruction" document and additionally detailed and discussed in the National Research Council's "National Guide for Wildland-Urban Interface Fires".

building bylaw to incorporate FireSmart policies into development, some of the provisions will need provincial approval.

Wells has received funding under its current CRI FCFS grant for assessment and FireSmart activities on up to 200 structures, including residential, municipal, and Crown Provincial, within the community. The municipality should commit to following through on the high priority recommendations provided in the assessment on all municipal structures and infrastructure – by taking the lead, the community may follow.[36]

Recommendations and action items that Wells can implement relating to legislation, planning and development are detailed below in Table 18.

[36] To be eligible for CRI FCFS mitigation work funding in 2023 and beyond, all community asset projects must have completed a FireSmart Home Ignition Zone Assessment or equivalent.

Table 18: Legislation, planning and development recommendation and action items

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Legislation, Planning and Development - Section 5.2							
10	High	Complete or schedule periodic updates of the CWRP. The frequency of updates is highly dependent upon major changes which would impact local wildfire risk or the rate at which wildfire risk reduction efforts are implemented. An evaluation of major changes (including funding program changes that may lead to new opportunities) and the potential need for a CWRP update should be initiated every 5 years.	A current (i.e., no more than 5 years old) CWRP is a requirement for further funding under the UBCM CRI Program.	Wells (Consultant)	5 years from adopting this CWRP document	Wells always has an up-to-date CWRP and action plan	CRI FCFS funding is available (~$30,000-40,000 for full document / $15,000 for update)
11	High	Conduct a full review and update of the Wells OCP to imbed FireSmart principles within the stated objectives and policies and to guide future land use and development decisions. See Table 3 for example policies and recommendations for updating.	The small, but dense community size makes all structures susceptible to ember ignition as well as structure-to-structure ignition. Embedding FireSmart and wildfire preparedness into the community's plans, policies, and goals will greatly reduce wildfire and fire risk to the community.	Wells (Consultant)	5 Years	OCP updated	CRI FCFS funding is available
12	High	Imbed FireSmart constructure and landscaping principles into future development. This can be accomplished via DPA updates/creation or bylaw updates/creation. The DPA or bylaws should strongly consider addressing: a) Fire-resistant roofing b) Fire-resistant siding c) A 1.5m non-combustible zone d) FireSmart landscaping[37] See Table 4 for example bylaws with recommendations for updating.	The small, but dense community size makes all structures susceptible to ember ignition as well as structure-to-structure ignition. FireSmart construction and landscaping principles, if applied to new and major renovations, will greatly reduce wildfire and fire risk to the community.	Wells (Consultant)	5 Years	FireSmart principles for structures and landscaping embedded into regulation or policy	CRI FCFS funding is available

[37] Reference the FireSmart BC Landscaping Guide: https://firesmartbc.ca/resource/landscaping-guide/

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
13	High	Conduct FireSmart Critical Infrastructure Assessments for Wells infrastructure. Apply FireSmart principles in construction and vegetation setbacks as soon as possible. Additionally, encourage private critical infrastructure owners (i.e., Telus Communications – cell tower) to do the same.	Protecting Wells' critical community infrastructure is critical to wildfire response and recovery.	Wells (Consultant; Private Stakeholders)	5 years	All infrastructure has an assessment and mitigation recommendations stated on municipal infrastructure	CRI FCFS: funding received as part of 2022 grant
14	Moderate	Conduct a water supply analysis to determine how long 'fire flows' can be maintained on the existing system, even in 'peak drought scenarios' and high-use periods (include accounting for festivals and events) when water resources will become scarce. Explore opportunities to increase the Wells water reservoir capacity as required.	A capacity analysis of Wells' water system should be conducted before backup reservoirs are planned and installed. The Wells reservoir is limited to 2-3 days' worth of water (at normal consumption rates) during times of power outages, greatly limiting fire response availability.	Wells	5 years	Water supply analysis completed, informing opportunities/requirements for increased water reservoir capacity	CRI FCFS funding available

5.3 INTERAGENCY COOPERATION

The goal of interagency cooperation is to broaden from a single department- or agency-based siloes approach to a landscape-level, multi-agency approach.[38] This increases the ability of local governments to plan for and respond to emergencies effectively. For a small municipality like Wells, interagency cooperation is especially crucial – the small amount of municipal owned land within the WUI means that the activities of other land managers have a stronger influence on Wells' wildfire risk profile.

A Community FireSmart and Resiliency Committee (CFRC) is recommended as part of the CWRP development process (and mentioned previously, required for all CRI FCFS approved funding applications starting in 2024). A CFRC reflects the key planners and responders most involved in local FireSmart, wildfire resiliency planning, wildfire and emergency response, and land management specific to the WUI. Committees such as this foster collaborative problem solving and planning, and delineate required roles and actions during times of emergency response.

As part of Wells' 2021 Emergency Management Plan development, the "Wells Emergency Management Committee" was developed. This committee is to be used jointly as Wells' CFRC – thus eliminating redundancies and creating efficiencies of both time and resources. Recommended additions specific to wildfire planning and mitigation to the committee are listed below in Table 19. These persons should be involved in meetings for discussions relating to wildfire management, evacuation, and fuel or FireSmart vegetation treatments.

Table 19: Wells Emergency Management Committee - CFRC recommended additions

Agency/Land Manager	Title
BCWS Cariboo Fire Centre	Wildfire Officer – Prevention
BCWS Quesnel Fire Zone	Wildfire Officer
Wells-Barkerville Community Forest	Board Member
TFL 52 West Fraser Timber	Planning Superintendent (or as determined by West Fraser Timber) – Quesnel Division

It is recommended the CFRC focus on the following important risk reduction and planning measures during its initial meetings:

- Management of resource roads as additional access/egress routes:
  - Having multiple access/egress routes is the #1 FireSmart community planning priority for reduction of risk to life.
- Management of forest resources to reduce WUI fuel loading and forest continuity (such as within the community forest):

[38] CRI FCSF 2021 CWRP Supplemental Instruction Guide

    - Forestry activities can either increase wildfire risk (through fuels accumulations and unsafe work practices) or decrease wildfire risk (through proper cut-block placement, size, and distribution, clean-up of combustible fuels within harvested areas (i.e., slash – scattered and piled), and reforestation techniques/planting).
- Completing planned fuel treatments under the MOF (previously MFLNRORD) Wildfire Risk Reduction program:
    - Addressed in Section 5.6.
- Placement and development of additional resource roads (forestry and mining) and recreation trails, and management of current ones, as fuel breaks:
    - Addressed in Section 5.6.
- FireSmart on private property:
    - Addressed in Section 5.6.

BCWS and Wells both noted in CFRC information gathering questionnaires that they have a great relationship with West Fraser Mills (WFM; TFL 52 manager). WFM helps with air patrols, ground patrols, initial attack, support on large project fires, and supplying some wildfire fighting equipment. Additionally, BCWS stores some equipment at the Wells airfield during the fire season.

Because of pivotal infrastructure connected to Barkerville and Barkerville Gold Mine operations, communication and response to past local wildfires has been swift and the WVFB hall has been a base of operations for patrols. Local road network and industry knowledge has proven invaluable to BCWS access on certain properties, such as in 2021 following lightning strikes on Cow Mountain (a Barkerville Gold Mine property) – highlighting the importance of interagency cooperation to Wells and local stakeholders.

Mutual Aid Agreements allow for resources to be shared across jurisdictional boundaries bolstering firefighting capabilities to adjacent communities when needed. Wells has fire response mutual aid agreements with Barkerville Historic Town & Park and with Barkerville Gold Mine for select properties within municipal limits. Wells also has a mutual aid for training agreement with Quesnel Volunteer Fire Department, but no formal aid agreement with Quesnel for fire response.

Recommendations and action items that Wells can implement to continue growing interagency relationships and increase interagency cooperation are listed below in Table 20.

Table 20: Interagency cooperation recommendation and action items

Item	Priority	Recommendation	Rationale	Lead	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Interagency Cooperation - Section 5.3							
15	High	Continue hosting Wells Emergency Management Committee meetings, incorporating recommended FireSmart, wildfire, and land managers as recommended for Community FireSmart and Resiliency Committee (CFRC) topics, discussions, and planning.	The small amount of municipal owned land within Wells' WUI means that the activities of other land managers have a stronger influence on Wells' wildfire risk profile. Coordinated action can be more effective and take less effort.	Wells (CFRC)	Ongoing	2-6 meetings annually	At least 8 municipal hours per meeting to prepare, host and debrief CRI FCFS funding up to $2,000 per meeting
16	High	Engage with forest licensees and private managed forest landowners/operators within the WUI to identify parts of the license/operations area that are in the WUI and what goals would be for this zone regarding harvesting, post-harvest debris disposal, and reforestation prescriptions so that both harvesting operations and the future forest stand maintain or enhance wildfire resiliency, especially at interface edges/within Wells' WUI.	Reduce interface wildfire risk throughout managed forest lands that are closest to structures in the WUI. Slash management and stand discontinuity are priorities for wildfire risk reduction.	Wells (TFL 52, Community Forest, Barkerville Gold Mines)	Ongoing	Forest landowners and managers know where their tenure area overlaps with the WUI and are actively reducing wildfire risk within them	Time and cost dependent
17	High	Continue to have relevant Wells staff attend annual FireSmart BC conferences, hosted by the BC FireSmart Committee.	Participation will continue to foster a strong relationship between Wells and FireSmart BC/Canada, and grow the local government's knowledge of FireSmart and the CRI FCFS program.	Wells	Ongoing	Attendance minimum every two years	CRI FCFS funding is available (cost/time dependent on conference location)

5.4 CROSS-TRAINING AND FIRE DEPARTMENT RESOURCES

All staff and agency partners who are expected to participate in the development and implementation of this plan, or participate in a wildfire response and recovery, should be appropriately trained. This includes Wells municipal staff and Wells Volunteer Fire Brigade (WVFB) members. Training opportunities for Wells emergency management staff, as funded in the 2023 CRI FCFS program include:

- Introduction to Emergency Management in Canada (basic concepts and structure of emergency management); and
- ICS-100 (introduction to an effective system for incident command, control, and coordination of response at an emergency site; available online).

Funding is also available for local government staff to receive FireSmart training; e.g., Local FireSmart Representative, Wildfire Mitigation Specialist, or other training unique to their position.

The Quesnel Volunteer Fire Department has provided support and training to WVFB over the years. Pre-Covid-19 pandemic (2020), formal training plans of the WVFB by the Quesnel Volunteer Fire Department were in place, but cancelled. On its own, the WVFB conducts weekly exterior-attack practices. WVFB's wildfire training should be formalized and enhanced. All members should aim to be trained in S-100 (basic fire suppression and safety)[39] then look to be further trained in the more comprehensive SPP-WFF1 (Wildland Firefighter Level 1; includes S-100, S-185, and ICS-100). Additional training opportunities for WVFB members as funded in the 2023 CRI FCFS include:

- Wildfire Risk Reduction Basics Course (free, online course for non-forest professionals that provides an introduction to the key concepts to minimize the negative impacts of wildfires in BC);
- Fire Life & Safety Educator (public education course for fire safety education);
- ICS-100 (Incident Command System - introduction to an effective system for command, control, and coordination of response at an emergency site; available online);
- S-185 Fire entrapment avoidance and safety (general knowledge course on wildfire safety and entrapment avoidance for local governments, contract crews, and First Nations);
- S-231 Engine Boss (training for structure protection program in a WUI event);
- WSPP-115 (training for structure protection unit crews) and WSPP-FF1(train the trainer);
- Task force leader (for structure protection only; course for wildfire personnel to monitor and assess specialty resources that work together to accomplish a common wildfire task); and
- Structure Protection Group Supervisor (GrpS) (for structure protection only; course for wildfire personnel to implement assigned portion of the Incident Action Plan and be responsible for all operations conducted in the division/group).

Regular in-person cross-training between BCWS and structural fire crews is also important as crews are likely to work together and use each others' equipment in the event of an interface wildfire. It may also be important to include community leaders in BCWS cross-training opportunities, as they have knowledge

[39] Wells received S-100 training funding as part of its 2022 CRI FCFS grant

of community water sources and existing suppression systems. The volunteer nature of WVFB limits cross training opportunities, as members are typically only available in the evenings. BCWS crews don't work in the evenings and are frequently busy with fires. There has been no cross-training between BCWS and WVFB to date, however there are active discussions to schedule some in the future.

All structural fire departments should maintain a level of wildland-specific training and equipment. Table 21 summarizes the available firefighting resources to WVFB and its members. It is recommended that WVFB work with BCWS to train with wildfire fighting equipment and regularly evaluate the need for more equipment and training. Mentioned previously, CRI FCFS funding is available starting in 2023 for FireSmart structure protection equipment, which includes sprinkler structure units.

Table 21: Wells Volunteer Fire Brigade's firefighting resources

Fire Department	Number of Stations	Number of Members	Apparatus Type (blue = structural) (red = wildland)	Apparatus Details
Wells Volunteer Fire Brigade (WVFB)	1	1 Fire Chief 9-12 Volunteers	Fire Engine (x2)	1) primary response with foam system 2) ladder-boom engine
			PPE	- Standard required PPE equipment
			Structural Protection	- Structural response water curtains.
			Water Pumps and associated equipment	- Mark III water pump - 50 ft hose line with connectors - hand pumps - sprinklers - drafting tanks and lines

Emergency simulation exercises involving those who participate in wildfire response and recovery create valuable cross-training opportunities. For Wells, this would include the members of the CFRC and can be organized and actioned through it. No emergency response or evacuation exercises for Wells have taken place to date (tabletop nor real-world), but in 2017 the local wildfire situation prompted Wells to open its Emergency Operations Centre to begin planning evacuation of its most at-risk residents. Identifying and addressing weaknesses in evacuation communication, coordination, and implementation from real-world events and simulation exercises should be prioritized.

Table 22 lists recommendations for the Wells related to Cross-Training and Fire Department resources.

Table 22: Cross-training recommendation and action items

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Cross-Training and Fire Department Resources - Section 5.4							
Training							
18	High	Wells Volunteer Fire Brigade (WVFB) should continue planning structural firefighting training with Quesnel Volunteer Fire Department.	WVFB does not regularly train with BCWS due to scheduling conflicts for both agencies. Training with Quesnel Volunteer Fire Department may be a good option that would still allow sharing of expertise and equipment, and could capitalize on limited BCWS time.	Wells (Quesnel Volunteer Fire Department)	Annually	Annual training between WVFB and Quesnel Volunteer Fire Department	Volunteer time
19	High	WVFB should organize an annual practical training session using wildland equipment with BCWS.	Wildland-specific training is integral to WUI wildfire response.	Wells (BCWS)	Annually	WVFB undergoes annual practical training with wildland equipment	Volunteer time
20	High	Members of the WVFB should be trained in SPP-WFF1 including annual refresher.	Many members do not have current formal training. The SPP-WFF1 course is specific for structural fire fighters who could respond to wildland fires in their service area.	WVFB	Annually	All members of the WVFB trained in SPP-WFF1 and refresh the course annually	CRI FCFS funding available Member time plus compensation for course instructor
21	Moderate	Wells emergency management personnel should be trained in ICS-100, WRR Basics, and Local FireSmart Representative training.	ICS-100 and WRR Basics will help the municipal staff work with BCWS and MOF respectively. Internal Local FireSmart Representative training is helpful for delivering FireSmart programs.	Wells	2 years	Wells Emergency Management personal are all trained in ICS-100, and some have WRR Basics and LFR training	CRI FCFS funding available Staff time and course cost
Equipment							
22	High	Support WVFB in obtaining necessary wildfire equipment. Much of WVFB's current equipment was noted as being aging and unreliable. Included in this is the acquisition of structural sprinkler protection units.	Fire departments are the first to respond to interface wildfires. Proper equipment is required for effective response. Consult with BCWS what equipment is needed and acquire	WVFB (Wells)	5 years	WVFB obtains sufficient wildland equipment	CRI FCFS funding available for assessment, inventory, and purchase of

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
			on a priority basis and as funds/funding allows.				FireSmart structure protection equipment Examples: - Honda 1" WX pump: ~$500 - Collapsible 2500-gallon tank $3000
Response							
23	High	Complete and participate in regular testing of, and updates to, the Wells Emergency Management Plan. Include yearly (pre-fire season is best) wildfire emergency simulation exercises. Identify hazards, barriers to access (i.e., locked gates, tight or no turnarounds), and other response issues and develop measures to address them.	Include the Community FireSmart Resiliency Committee (CFRC).	Wells (CFRC)	Bi-yearly (pre-fire season)	Table-top response exercises conducted at least once every two years	CRI FCFS funding is available (8 planning hours; 8 person-hours per exercise)

5.5 EMERGENCY PLANNING

When several wildfire emergencies are taking place throughout the province, BCWS resource availability may become scarce. Deployment of provincial resources occurs based on the Provincial Coordination Plan for Wildland-Urban Interface Fires.[40] Therefore, local government wildfire preparedness and resource availability are critical components of community wildfire resilience – individuals and agencies need to be ready to act. Plans, mutual aid agreements, resources, training, and emergency communications systems make for effective wildfire response.

Wells has a newly updated (2021) Emergency Management Plan that addresses wildfire as well as other hazards. Aspects of it are summarized in Section 2.2.

The greatest risk identified to Wells in a wildfire emergency is access and egress for response and community evacuation. Highway 26 provides east-west movement, but can be easily cut off at several pinch-points (e.g., Devils Canyon) or from falling debris. That leaves gravel resource roads, managed by multiple permit holders and in varying degrees of condition, as the only other access/egress routes. The most likely of these available are:[41]

- Route 1: 2400 road → 700 Road (north then west to Dunkley)
- Route 2: 3100 Road (south to Likely via Barkerville)

Wells should work with the road permit holders of these and other available access/egress routes so that a minimum of one other route is always kept in evacuation-ready condition during fire season. Any locked gates on these roads (including any roads that provide access to forest land within the WUI) should have copies made and saved at the Wells Municipal Hall for retrieval by required emergency personnel. The municipality has procured evacuation route signs, but has yet to install them. This should be set as an emergency planning priority.

A second risk identified to Wells is not being able to rely on its municipal water system for continued, prolonged fire suppression actions. If Wells were to invest in sprinkler protection units and deploy them for use, they may not be able to work as long as required to protect the community. Most of Wells is surrounded by running water (Lowhee Creek, Willow River, Williams Creek, bog/muskeg that is often saturate by overflow, and Jack of Clubs Lake). Wells and the WVFD should look to identify and map water access points for pumps and sumps and share this information with BCWS.

A pre-incident plan is a compilation of essential fire management information needed to save valuable time during fire suppression operations. During a busy wildfire season provincial resources are stretched thin, and any information that local governments can provide to BCWS crews is helpful. A pre-incident

[40] Provincial Coordination Plan for Wildland Urban Interface Fires. 2016. Retrieved from: https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/bc-provincial-coord-plan-for-wuifire_revised_july_2016.pdf
[41] As discussed in the June 2022 CFRC meeting.

plan should be developed and tested using tabletop simulations, and if necessary, revised prior to every fire season. BCWS should be involved in this process to ensure that any mapping done as part of the Fire Management Planning process is not unnecessarily duplicated. Figure 7 contains a checklist of discussion points and considerations during pre-incident plan development.

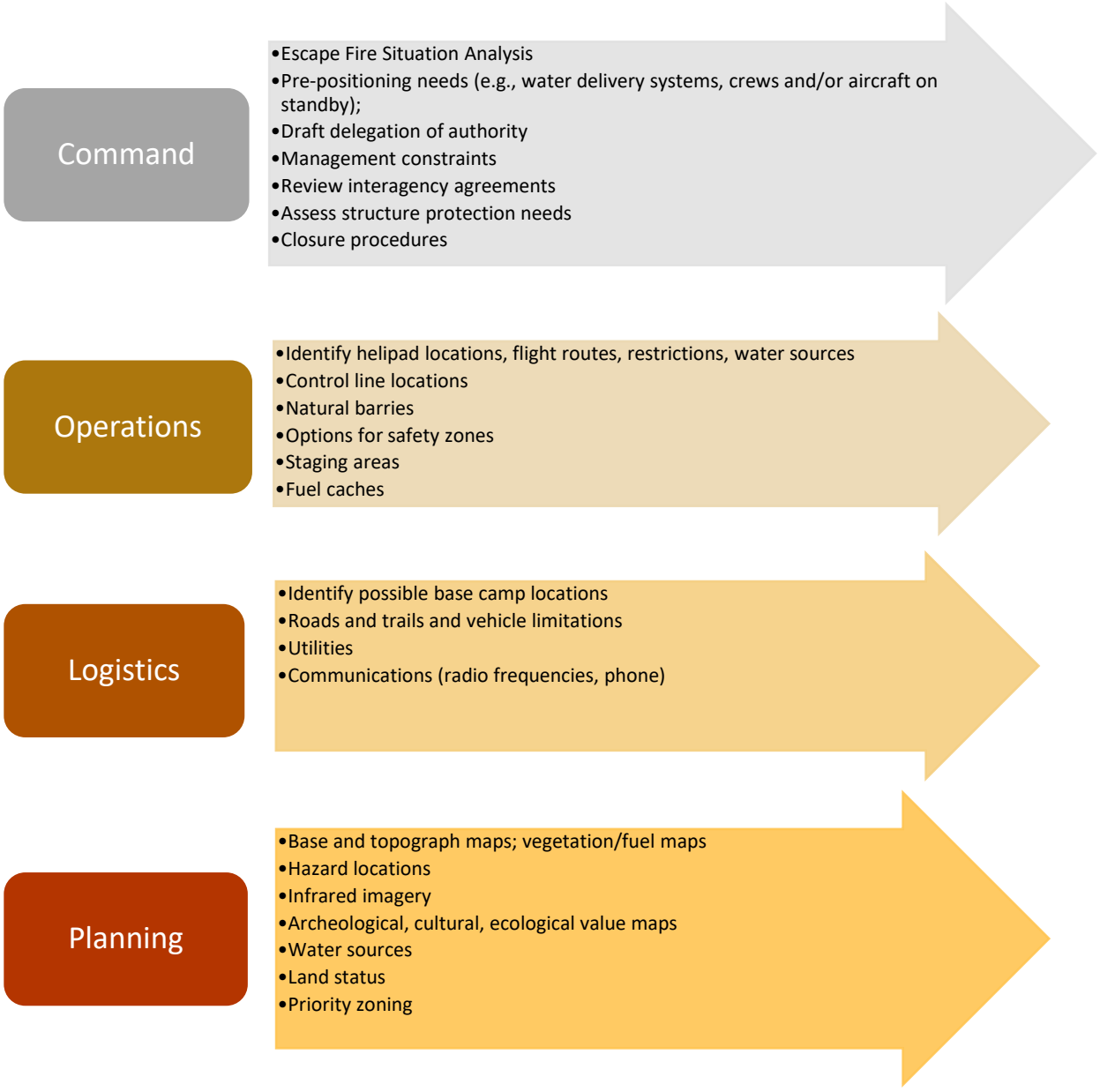


Figure 7: A pre-incident planning checklist that can be used to help develop a pre-incident wildfire suppression plan and maps

Wells could also consider developing local daily action guidelines based on expected wildfire conditions. Table 23 below provides a template that can be tailored specifically to Wells, outlining actions staff can take as fire danger levels change throughout the year (but primarily throughout the fire season). Some of

these actions, like daily fire patrols during fire bans and periods of high and extreme wildfire danger, are already implemented by Wells and the WVFB.

Table 23: Example of a Wildfire Response Preparedness Condition Guide[42]

FIRE DANGER LEVEL	ACTION GUIDELINES
LOW	• All Community staff on normal shifts.
MODERATE	• All Community staff on normal shifts. • Information gathering and dissemination through Wells' CFRC.
HIGH	• All community staff on normal shifts. • Daily detection patrols by staff. • Regional fire situation evaluated. • Daily fire behavior advisory issued. • Wildland fire-trained community staff and EOC staff notified of Fire Danger Level. • Establish weekly communications with CFRC. • Hourly rain profile for all weather stations after lightning storms.
EXTREME	• Rain profile (see above). • Daily detection patrols by staff. • Daily fire behavior advisory issued. • Regional fire situation evaluated. • EOC staff considered for stand-by. • Wildfire Incident Command Team members considered for stand-by/extended shifts. • Designated community staff or contractors: water tender and heavy machinery operators, arborists may be considered for stand-by/extended shifts. • Consider initiating natural area and trail closures. • Provide regular updates to the community via social media and radio adverts. • Update public website as new information changes.
FIRE(S) ONGOING	• All conditions apply as for Extreme (regardless of actual fire danger rating). • Provide regular updates to media/structural fire departments/staff on fire situation. • Mobilize EOC support if evacuation is possible, or fire event requires additional support. • Implement Evacuation Alerts and Orders based on fire behavior prediction and under the direction of the Fire Chief/BCWS.

The Wildfire Response Preparedness Guide above, as well as other in-season planning for a wildfire emergency and response, is dependent upon reliable fire weather data. The two closest BCWS Fire Weather Stations to Wells do not provide Wells and its surrounding area accurate fire weather data – Benson station is a lower in elevation, Big Valley weather station is higher in elevation, and Mathews

[42] From FireSmart Community Funding and Supports 2021 CWRP Supplemental Instruction Guide

weather station is too wet. Wells should lobby for BCWS and applicable agencies to install a fire weather station that services it and Barkerville, as well as the surrounding area (that is heavily trafficked by tourists and recreationalists) so that accurate data is available to these communities and the region.

Recommendations and action items that Wells can implement to continue productive and effective emergency planning are detailed below in Table 24.

Table 24: Emergency preparedness recommendation and action items

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Emergency Planning - Section 5.5							
24	High	Mount/install acquired Emergency Evacuation signs.	On the ground emergency evacuation route signage lessens confusion on evacuation directions during emergencies.	Wells	1 Year	Signs installed	Wells (time dependent on number of signs acquired)
25	High	Work with the road permit holders of available resource road access/egress routes so that a minimum of one additional route is always kept in evacuation-ready condition during fire season.	More than one access/egress route for community evacuation and emergency access.	Wells (resource road permit holders)	5 Years	One additional route is always kept in evacuation-ready condition during fire season	Wells (unknown)
26	High	All resource road locked gates that provide access to the Wells' Wildland-Urban Interface (WUI) or access/egress routes should have copies kept in a centralized location (i.e., Wells Municipal Hall)	To limit constraints on community evacuation and access to the surrounding WUI for wildland fire fighting response. To strengthen this recommendation, keys could be in two places in case the Municipal Hall building burns down. RCMP should have a set of keys too.	Wells (resource road/gate managers)	1 Year	All gates have keys in at least one location.	Wells (unknown)
27	Moderate	Invest in back-up generators for any Wells critical infrastructure that does not have one.	Some water and sewer infrastructure have a backup generator, but all other critical infrastructure should also be equipped.	Wells	5 Years	Backup generators for all Wells critical infrastructure	Cost varies - ~$10,000
28	Moderate	Identify and map water access points for pumps and sumps and share this information with BCWS.	Wells has many large natural water bodies to draw from in the event of a wildfire. Shuttling or pumping water from lakes and rivers to fill bladders may be planned in advance. Quick access to water for wildland fire fighting needs can increase fire suppression capabilities for WVFB and BCWS crews.	Wells	5 Years	Pump and sump locations mapped and data shared with BCWS	Wells (time and effort dependent)

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
29	Moderate	Develop pre-incident wildfire plans and local daily action guidelines based on expected wildfire conditions. Consider adding these to the Wells Emergency Management Plan.	Any information (pre-planned information or current local wildfire conditions/risks) that local governments can provide to BCWS crews responding to wildfire is helpful.	Wells	5 Years	Wildfire specific pre-incident wildfire plans and local daily action guidelines developed	Wells (time and effort dependent)
30	Moderate	Lobby BCWS and other applicable agencies to install a Fire Weather Station near Wells.	There is no Fire Weather Station that provides fire weather data specific to Wells, Barkerville, and the surrounding area. Owing to the large number of recreationalists and tourists in the summer fire season, having accurate fire weather data could allow for more specific wildfire emergency planning.	Wells, BCWS	5 Years	A fire weather station near Wells has been installed	unknown

5.6 VEGETATION MANAGEMENT AND OTHER FIRESMART ACTIVITIES

As discussed in Section 4.1, fuel is the only aspect of the fire behavior triangle that can be modified to reduce wildfire threat. Fuel or vegetation management reduces potential wildfire intensity and ember exposure to people, structures, and other values through manipulation of both natural and cultivated vegetation within or adjacent to a community. A well-planned vegetation management strategy can greatly increase fire suppression effectiveness and reduce damage to property and to values.

Vegetation management can largely be accomplished through two different activities:

1. *Residential-scale FireSmart landscaping*: The removal, reduction, or conversion of flammable [landscaping] plants to create more fire-resistant areas in the FireSmart Non-Combustible Zone and Priority Zones 1, 2, and 3 (see Appendix A-5: Proximity of Fuel to the Community for more information and a diagram of the Home Ignition Zone).

2. *Fuel management treatments*: The manipulation or reduction of living or dead forest and grassland fuels to reduce the rate of spread and head fire intensity and enhance likelihood of successful suppression.

Residential-scale FireSmart landscaping

FireSmart standards applied to structures and associated residential landscaping increase the efficacy of adjacent fuel management treatments. Incentivizing homeowners and residents to conduct FireSmart activities on their homes and landscaping can be difficult. However, there are several funding opportunities through the CRI FCFS program to jumpstart actions. As part of its current CRI FCFS grant, Wells acquired grant funding to complete FireSmart Home Ignition Zone Assessments and Critical Infrastructure Assessments. These assessments will detail specific FireSmart structure upgrade and landscaping recommendations private landowners and the municipal government can then action on. Additionally, Wells acquired funding for a rebate program for completed FireSmart activities. To further increase uptake of residential-scale FireSmart landscaping, Wells should apply for CRI FCFS funding to implement a community chipping program[43] – this allows residents to safely and at no cost dispose of woody yard waste, further reducing fire risk on their properties.

Fuel management treatments

Fuel treatment opportunities may be a linear fuel break (minimum of 1 km) or polygon treatments for discrete areas. The intent of establishing fuel treatments is to modify fire behaviour and should be designed to keep surface fires on the ground and avoid becoming more dangerous crown fires. Fuel treatments also provide anchor points to fire-fighting crews for suppression activities.[44] The application

[43] Wells has a dedicated annual spring clean up day with a BBQ which can be built upon with the chipper program.
[44] BC Wildfire Service. 2020. 2020 Fuel Management Prescription Guidance. https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_fuel_management_prescription_guidance_final.pdf

of appropriate suppression tactics in a timely manner with sufficient resources is essential for fuel treatments to be effective. Fuel treatment units require periodic maintenance to retain their effectiveness.

The Provincial Crown Land Wildfire Risk Reduction (CLWRR) program, administered by the Ministry of Forests (MOF), includes fuel management planning and treatment activities focused on provincial Crown land located around communities. Shown below on Map 6 and described in Table 26, there are five CLWRR treatment units surrounding Wells (one treated in 2019, one planned for treatment in 2022 but outside Wells' WUI; three prescribed within Wells' WUI).[45] Some of these treatment units were identified in the past 2006 CWPP. If they were not already planned, they would have been identified for prescription and treatment as part of this plan as they are in high priority interface areas on the windward side of values. Although they fall on Crown land, all the CLWRR units within Wells' WUI could be approved for funding under CRI FCFS (Stream 1) because of their direct interface location to the community.[46] Implementation of these polygon treatment units should be a leading priority for Wells.

Supplementing and building upon these completed and planned treatment units, two additional units are proposed, both polygon units within the WUI (Wells-1 and Wells-2; shown on Map 6 and described in Table 26).

There is an opportunity for Wells and the forest land managers within the WUI (Wells-Barkerville Community Forest, Barkerville Gold Mine, etc.) to utilize trail and road networks as fuel breaks. Forest Enhancement Society of BC (FESBC) wildfire fuel treatment funding was utilized for recent treatments in Barkerville, and has been utilized by other BC communities (such as in Burns Lake) to plan and implement fuel treatments along bike and recreation trails on Crown land.[47] Although not proposed as specific treatment units within this plan, Wells (in conjunction with WUI forest land managers) should explore funding opportunities to plan and implement road and trail-side fuel treatments, especially on those most used by industry and recreationalists in the summer fire season.[48]

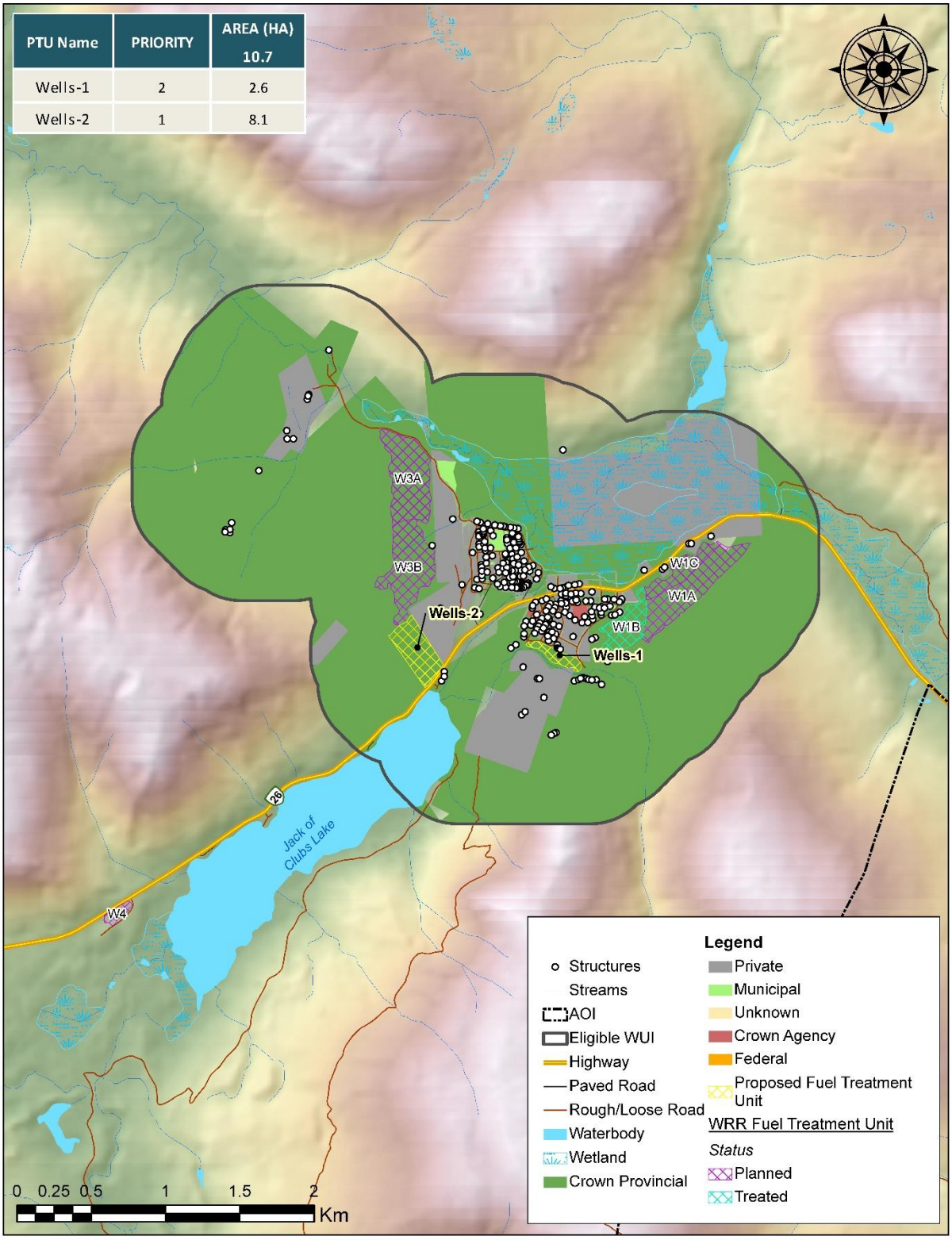
Associated vegetation management recommendations and action items are listed in Table 25.

[45] Managed by the Quesnel Natural Resource District Land and Resource Coordinator
[46] All CLWRR treatment units were assessed as part of this CWRP
[47] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.fesbc.ca/wp-content/themes/ZenGarden/assets/pdf/2021-summer-accomplishments.pdf
[48] The Cariboo-Chilcotin Land Use Plan contains legal buffered trails and trail areas within the WUI that should be managed appropriately.

Table 25: Vegetation management action items

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Vegetation Management - Section 5.7							
Residential FireSmart							
31	High	Complete FireSmart Home Ignition Zone (HIZ) assessments Wells received funding for.	FireSmart HIZ assessments encourage action in the Priority Zones of the community through education and by providing recommendations that can be implemented to lower wildfire and fire risks.	Wells (LFR; consultant)	2 Years	½ of FireSmart assessment funding total completed	CRI FCFS: funding received as part of 2022 grant.
32	High	In conjunction with the FireSmart HIZ assessments, make residents aware of the rebate program Wells received funding for.	The rebate program could incentivize residents to start actioning FireSmart HIZ assessment recommendations on their structures and landscaping.	Wells (LFR; consultant)	Ongoing	Residents actively using rebate program for FireSmart activities	CRI FCFS: funding received as part of 2022 grant.
33	High	Continue making a FireSmart rebate program available for Wells residents. Future CRI FCFS funding requirements will require FireSmart HIZ and CIIZ assessments be completed to qualify for FireSmart activities like the rebate program.	The rebate program could incentivize residents to start actioning FireSmart HIZ assessment recommendations on their structures and landscaping.	Wells (LFR; consultant)	Annually	Residents actively using rebate program for FireSmart activities	CRI FCFS: funding received as part of 2022 grant.
34	High	Develop and implement a community chipping/debris disposal service available to Wells residents.	Free debris disposal is a good incentive to complete FireSmart work and helps reduce backyard burning. Other local governments have seen great uptake.	Wells (consultant)	Annually: spring - fall	Chipping program initiated for 2024	CRI FCFS funding available Example $25,000 - $35,000: ~$300/hr for chipper @ 25-40 properties/day plus administration and supervision. CRI FCFS

Item	Priority	Recommendation	Rationale	Lead (Involved)	Timeframe	Metric for Success	Funding Source / Est. Cost ($) / Person Hours
Fuel Management Treatments							
35	High	Implementation of the Ministry of Forests (MOF - Quesnel Natural Resource District) planned fuel management treatment units in Wells' WUI should be a leading priority of Wells.	Some of these areas were identified in the past 2006 CWPP. As stated in this CWRP, they are high priority interface areas on the windward side of values. Although they fall on Crown land, all units may be approved for funding under CRI FCFS (Stream 1) because of their direct interface location to the community – Wells should immediately engage with UBCM CRI, BCWS, and MOF to determine the best course of action.	Wells (MOF; forest land managers)	5 Years	Treatment completed on all CLWRR planned units	CLWRR program (CRI FCFS funding available) ~$10,000/hectare for a ~20 ha unit for a local contractor
36	High	Apply for funding through CRI FCFS, or encourage MOF CLWRR program, to fund prescription development and then implementation of additionally proposed fuel management treatment units within this plan (Wells-1 and Wells-2).	Additionally proposed treatment units within this plan are located in the direct interface of the community and on the windward side of values.	Wells (MOF; forest land managers; consultant)	5 Years	CWRP proposed treatment units have completed prescriptions; implementation being planned for	CRI FCFS funding available (or completed under the CLWRR program) ~$400/hectare prescription development cost for a ~20 ha unit for a local contractor
37	Moderate	Wells and forest land managers within the WUI should consider opportunities to use trails and roads within the WUI as fuel breaks.	Forest Enhancement Society of BC (FESBC) wildfire fuel treatment funding has been utilized by other BC communities (such as in Burns Lake) to plan and implement fuel treatments along bike and recreation trails on Crown land.	Wells (MOF; forest land managers)	5 Years	Potential trails and roads identified that can be utilized for fire breaks; discussions with FESBC in progress to acquire funding to develop prescriptions and implement treatment	FESBC funding Cost dependent on level of effort and uptake



Map 6: Wells Fuel Treatments (Crown Land Wildfire Risk Reduction Program and CWRP Proposed)

Table 26: Summary of Proposed Fuel Treatment Units

PTU Name	Total Area (ha)	Priority	Wildfire Behavior (ha)				Overlapping Values / Treatment Constraints	Treatment Rationale
			Extreme	High	Mod.	Low		
CWRP Proposed Fuel Management Treatments								
Wells-1	2.6	High	2.5	0.1	0.0	0.0	Polygon treatment unit on Crown land, upwind of values, bordering homes and apartment buildings on its north edge and a large stream on its south edge. South of the stream is forested private property. There is an overhead BC Hydro transmission line bisecting the unit east-west. Access is easy via Hong Street and the terrain is simple. Overlaps Visual Landscape Inventory polygon and legal Old Growth Management polygon.	Reduce fire threat immediately upwind of Wells residences as well as the potential for a fire to spot at this location. Very high-density C-4 equivalent stand with nearly 100% horizontal fuel continuity. Site level WUI threat assessment score = moderate.
Wells-2	8.1	High	0.0	0.0	8.1	0.0	Polygon treatment unit on Crown land, upwind of values, bordering private property to the east and Highway 26 to the south. The north edge abuts CLWRR treatment unit 3B. Steep slope (~60%) with resource road above and Highway 26 below as the only means of access. Overlaps Visual Landscape Inventory polygon and legal Old Growth Management polygon.	Effectively creates a linear fuel break anchored from the Jack of Clubs Lake on the south to Willow River at the north end. South facing slope with a large number of dead standing conifers and dead down conifers (greatly increasing surface fuel loading and horizontal fuel continuity) as a result of beetle attack. Site level WUI threat assessment score = high.
CLWRR Fuel Management Treatments								
W1A	14.0	Moderate	0.7	0.0	13.3	0.0	ORV recreation trail within the unit. Partial overlap with legal OGMA. Overlap with Visual Landscape Inventory polygon. South of private property and homes. Access via resource road for Barkerville Gold Mines. Moderate-steep (30-50%) slope.	Interface forest stand between homes on the north and a high-use resource road accessing Barkerville Gold Mines mining operations on the south. Site level WUI threat assessment score = moderate.
W1B	6.9	n/a	n/a				Area previously treated.	n/a; retreatment not needed. Site level WUI threat assessment score = low.
W1C	5.1	High	0.0	0.0	5.0	0.1	Immediately adjacent (south) of private property and homes. Overlap with Visual Landscape	Interface forest stand between homes on the north and a high-use resource road accessing Barkerville Gold Mines

PTU Name	Total Area (ha)	Priority	Wildfire Behavior (ha)				Overlapping Values / Treatment Constraints	Treatment Rationale
			Extreme	High	Mod.	Low		
							Inventory polygon. Access via Highway 26. Moderate-steep (30-50%) slope.	mining operations on the south. Directly adjacent to Highway 26, the main access/egress route for the community and responders. Site level WUI threat assessment score = moderate.
W3A	14.8	High	0.0	0.0	14.8	0.0	Borders private property on its east. Overlaps Visual Landscape Inventory polygon and legal Old Growth Management polygon. Access via resource roads on its north and south edges. Gentle to moderate slope (20-40%).	Interface forest stand between homes and private property upwind of values and the town of Wells. Site level WUI threat assessment score = moderate.
W3B	14.6	High	0.0	0.0	14.6	0.0		
W4	1.4	High	n/a				Located outside Wells' WUI at the Wells Transfer Site operated by Cariboo Regional District.	Creates a fuel break buffer surrounding hazardous materials. WVFB responds to multiple fires at the refuse centre each year. The refuse centre is located upwind of Wells. A fire that starts here would move towards the community via predominant fire season winds and nearly continuous forest.

SECTION 6: APPENDICES

6.1 APPENDIX A: LOCAL WILDFIRE RISK PROCESS

Field Data Collection

The primary goals of field data collection are to confirm or correct the provincial fuel type, complete Wildfire Threat Assessment Plots, and assess other features of interest to the development of the CWRP. This is accomplished by traversing as much of the WUI as possible (within time, budget, and access constraints). Wildfire Threat Assessment plots are completed on the 2020 version form, and as per the Wildland-Urban Interface Threat Assessment Guide.

For clarity, the final threat ratings for the WUI were determined through the completion of the following methodological steps:

1. Update fuel-typing using orthophotography provided by the client and field verification.
2. Update structural data using critical infrastructure information provided by the client, field visits to confirm structure additions or deletions, and orthophotography.
3. Complete field work to ground-truth fuel typing and assess site-level threat ratings.
4. Threat assessment analysis using field data collected and rating results of Wildfire Threat Assessment plots.

6.1.1 APPENDIX A-1: FUEL TYPING METHODOLOGY AND LIMITATIONS

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines five major fuel groups and sixteen fuel types based on characteristic fire behaviour under defined conditions.[49] Although a subjective process, the most appropriate fuel type was assigned based on research, experience, and practical knowledge; this system has been used within BC, with continual improvement and refinement, for 20 years.[50] It should be noted that there are significant limitations with the fuel typing system which should be recognized.

Significant limitations with the fuel typing system should be recognized. These include: a fuel typing system designed to describe fuels which sometimes do not occur within the WUI; fuel typing is not updated in private land; fuel types which cannot accurately capture the natural variability within a polygon; and, limitations in the data used to create initial fuel types.[50]

There are several implications of the fuel typing limitations, which include: fuel typing further from the developed areas of the study generally has a lower confidence; and, fuel typing should be used as a

[49] Forestry Canada Fire Danger Group. (1992). *Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3*

[50] Perrakis, D.B., Eade G., and Hicks, D. (2018). Natural Resources Canada. Canadian Forest Service. *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description* 2018 Version.

starting point for more detailed assessments and as an indicator of overall wildfire risk, not as an operational, or site-level, assessment.

Table 27 summarizes the fuel types by general fire behaviour (crown fire and spotting potential) found within the WUI. These fuel types were used to guide the wildfire threat analysis.

Table 27: Fuel Type Categories and Crown Fire Spot Potential. Only summaries of fuel types encountered within the WUI are provided

Fuel Type	FBP / CFDDRS Description	WUI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type – Crown Fire / Spotting Potential
C-2	Boreal Spruce	Moderately well-stocked black spruce leading stands with tree crowns extending near to or at the ground.	Surface and crown fire, low to very high fire intensity and rate of spread.	Moderate to High
C-3	Mature jack or lodgepole pine	Fully stocked, late young forest (balsam or lodgepole pine leading with some black spruce), with crowns separated from the ground.	Surface and crown fire, low to very high fire intensity and rate of spread.	High*
C-4	Immature jack or lodgepole pine	Pure, dense or lodgepole pine (or other conifer) stands (>10,000 stems per hectare). Near complete vertical and horizontal continuity.	Rapidly spreading, high-intensity fire through the interconnected crowns.	Moderate to High
C-7	Ponderosa pine and Douglas-fir	Low-density, uneven-aged forest, crowns separated from the ground, understory of discontinuous grasses and shrubs. Exposed bed rock and low surface fuel loading.	Surface fire spread, torching of individual trees, rarely crowning (usually limited to slopes > 30%), moderate to high intensity and rate of spread.	Moderate
M-1/2	Boreal mixedwood (leafless and green)	Moderately well-stocked mixed stand of conifers and deciduous species, low to moderate dead, down woody fuels; areas harvested 10-20 years ago.	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer).	<26% conifer (Very Low); 26-49% Conifer (Low); >50% Conifer (Moderate)
O1a/b	Grass	Matted and standing grass communities; sparse or scattered shrubs, trees and down woody debris. Seasonal wetlands that have the potential to cure.	Rapidly spreading, high-intensity surface fire when cured.	Low
D-1/2	Aspen (leafless and green)	Deciduous stands.	Always a surface fire, low to moderate rate of spread and fire intensity.	Low
S-1	Jack or lodgepole pine slash	Slash resulting from clearcut logging of lodgepole pine leading stands. Slash is typically one or two seasons old, retaining 50% of the foliage. No post-logging treatment has been applied.	Always a surface fire, low to high rate of spread and fire intensity, depending on wind speeds	Low

Fuel Type	FBP / CFDDRS Description	WUI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type – Crown Fire / Spotting Potential
S-2	White spruce or balsam slash	Slash resulting from clearcut logging of white spruce or balsam leading stands. Slash is typically one or two seasons old, retaining 10-50% of the foliage. No post-logging treatment has been applied.	Always a surface fire, low to high rate of spread and fire intensity, depending on wind speeds.	Low
W	N/A	Water	N/A	N/A
N	N/A	Non-fuel: irrigated agricultural fields, golf courses, alpine areas void or nearly void of vegetation, urban or developed areas void or nearly void of forested vegetation	N/A	N/A

**C-3 fuel type is considered to have a high crown fire and spotting potential within the WUI due to the presence of moderate to high fuel loading from dead standing and partially or fully down woody material, and moderately continuous conifer ladder fuels.*

The resulting updated fuel types were shown on Map 3 and discussed in Section 4.1.2.

6.1.2 APPENDIX A-2: WILDFIRE FIRE THREAT SPATIAL ANALYSIS METHODOLOGY

As part of the CWRP process, spatial data submissions are required to meet the defined standards in the Program and Application Guide. Proponents completing a CWRP can obtain open-source BC Wildfire datasets, including Provincial Strategic Threat Analysis (PSTA) datasets from the British Columbia Data Catalogue. Wildfire spatial datasets obtained through the BC Open Data Catalogue used in the development of the CWRP include, but are not limited to:

- PSTA Spotting Impact
- PSTA Fire Density
- PSTA Fire Threat Rating
- PSTA Lighting Fire Density
- PSTA Human Fire Density
- Head Fire Intensity
- WUI Human Interface Buffer (2Km buffer from structure point data)
- Wildland Urban Interface Risk Class
- Current Fire Polygons
- Current Fire Locations
- Historical Fire Perimeters
- Historical Fire Incident Locations
- Historical Fire Burn Severity
- Fuel Type

As part of the program, proponents completing a CWRP are provided with a supplementary Structure point dataset from BC Wildfire Services.

The provided PSTA data does not transfer directly into the geodatabase for submission, and several PSTA feature classes require extensive updating or correction. In addition, the Fire Threat determined in the PSTA is fundamentally different than the localized Fire Threat feature class that is included in the Local Fire Risk map required for project submission. The Fire Threat in the PSTA is based on provincial scale inputs - fire density, spotting impact; and head fire intensity; while the spatial submission Fire Threat is based on the components of the Wildland Urban Interface Threat Assessment Worksheet.

Local Spatial Analysis

Not all attributes on the Wildfire Threat Assessment form can be determined using a GIS analysis on a landscape/polygon level. To emulate as closely as possible the threat categorization that would be determined using the Threat Assessment form, the variables in Table 28 were used as the basis for building the analytical model. The features chosen are those that are spatially explicit, available from existing and reliable spatial data or field data, and able to be confidently extrapolated to large polygons.

Table 28: Description of variables used in spatial analysis for WUI wildfire risk assessment

WUI Threat Sheet Attribute	Used in Analysis?	Comment
Fuel Subcomponent		
Duff depth and Moisture Regime	No	Many of these attributes assumed by using 'fuel type' as a component of the Fire Threat analysis. Most of these components are not easily extrapolated to a landscape or polygon scale, or the data available to estimate over large areas (VRI) is unreliable.
Surface Fuel continuity	No	
Vegetation Fuel Composition	No	
Fine Woody Debris Continuity	No	
	No	
Live and Dead Coniferous Crown Closure	No	
Live and Dead Conifer Crown Base height	No	
Live and Dead suppressed and Understory Conifers	No	
Forest health	No	
Continuous forest/slash cover within 2 km	No	
Weather Subcomponent		
BEC zone	Yes	Although included, these are broad classifications, meaning most polygons in the Study Area will have the same value
Historical weather fire occurrence	Yes	
Topography Subcomponent		
Aspect	Yes	
Slope	Yes	Elevation model was used to determine slope.
Terrain	No	
Landscape/ topographic limitations to wildfire spread	No	
Structural Subcomponent		
Position of structure/ community on slope	No	Too difficult to quantify – this is a relative value.
Type of development	No	Too difficult to analyze spatially.

WUI Threat Sheet Attribute	Used in Analysis?	Comment
Position of assessment area relative to values	Yes	Only distance to structures is used in this analysis, being above, below or sidehill too difficult to analyze spatially.

The other components are developed using spatial data (BEC zone, fire history zone) or spatial analysis (aspect, slope). A scoring system was developed to categorize resultant polygons as having relatively low, moderate, high or extreme Fire Threat, or Low, Moderate, High or Extreme wildfire threat class. Table 29 below summarizes the components and scores to determine the Fire Threat.

Table 29: Fire Threat Class scoring components

Attribute	Indicator	Score
Fuel Type	C-1	35
	C-2	
	C-3	
	C-4	
	M-3/4,>50% dead fir	
	C-6	25
	M-1/2, >75% conifer	20
	C-7	
	M-3/4, <50% dead fir	
	M-1/2, 50-75% conifer	15
	M-1/2, 25-50% conifer	10
	C-5	
	O-1a/b	
	S-1	
	S-2	
	S-3	
	M-1/2, <25% conifer	5
	D-1/2	0
	W	0
	N	0
Weather - BEC Zone	AT, irrigated	1
	CWH, CDF, MH	3
	ICH, SBS, ESSF	7
	IDF, MS, SBPS, CWHsds1 & ds2, BWBS, SWB	10
	PP, BG	15
Historical Fire Occurrence Zone	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7	1
	G3, G8, R3, R4, V6, G1, G9, V8	5
	G7, C5, G4, C4, V1, C1, N6	8
	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2	10
	N7, K4	15
Slope	<16	1
	16-29 (max N slopes)	5

Attribute	Indicator	Score
	30-44	10
	45-54	12
	>55	15
Aspect (>15% slope)	North	0
	East	5
	<16% slope, all aspect	10
	West	12
	South	15

Limitations

There are obvious limitations in this method, most notably that not all components of the threat assessment worksheet are scalable to a GIS model, generalizing the Fire Behaviour Threat score. The Wildfire Threat Score is greatly simplified, as determining the position of structures on a slope, the type of development and the relative position are difficult in an automated GIS process. Structures are considered, but there is no consideration for structure type (also not included on threat assessment worksheet). This method uses the best available information to produce accurate and useable threat assessment across the study area in a format which is required by the UBCM CRI program.

6.1.3 APPENDIX A-3: WUI RISK SPATIAL ANALYSIS METHODOLOGY

To determine the WUI Risk score, only the distance to structures is used. Buffer distance classes are determined; <200m, 200m-500m and >500m) but only for polygons that had a 'high' or 'extreme' Fire Threat score from previous assessment. To determine WUI Risk; those polygons within 200m are rated as 'extreme', within 500m are rated as 'high', within 2km are 'moderate', and distances over that are rated 'low'. WUI Risk Classes and associated assumed scores are summer below in Table 30.

Table 30: WUI Risk Classes and their associated summed scores

WUI Risk Class	Score
Very Low	0
Low	0-35
Moderate	35-55
High[51]	55-65
Extreme	>65

6.1.4 APPENDIX A-4: WILDFIRE THREAT PLOT LOCATIONS

Table 31 displays a summary of all Wildfire Threat Assessment (WTA) plots completed during CWRP field work. The original WTA plot forms and photos will be submitted as a separate document. The following

[51] WUI risk is only assessed for polygons with wildfire threat ratings of high or extreme.

ratings are applied to applicable point ranges: Low (0-48); Moderate (49 – 66); High (67 – 80); Extreme (>81).

Table 31: Summary of Wildfire Threat Assessment (WTA) Worksheets

Wildfire Threat Assessment Plot ID	Geographic Location	Wildfire Behaviour Threat Class
Wells-1	West WUI bubble, adjacent to the Slough Creek 2100 Forest Road	High
Wells-2	West edge of the town of Wells within CL WRR treatment unit W3B	Moderate
Wells-3	Forest stand on the north side of the Willow Creek wetland within the Wells-Barkerville Community Forest	Moderate
Wells-4	West of Wells-3; forest stand on the north side of the Willow Creek wetland within the Wells-Barkerville Community Forest	High
Wells-5	Northwest of Wells-4; forest stand on the north side of Willow Creek within the Wells-Barkerville Community Forest.	Moderate
Wells-6	Northwest edge of town of Wells within CL WRR treatment unit W3A.	Moderate
Wells-7	East edge of town of Wells within CL WRR treatment unit W1B.	Low
Wells-8	Northeast of Wells-7; East edge of town of Wells within CL WRR treatment unit W1A.	Moderate
Wells-9	South edge of town of Wells within proposed treatment unit Wells-1.	Moderate
Wells-10	Southeast edge of town, across Highway 26 from the Wells Visitor Information Centre. Within proposed treatment unit Wells-2.	High

6.1.5 APPENDIX A-5: PROXIMITY OF FUEL TO THE COMMUNITY

The correlation between structure loss and wildfire are described below.

Home and Critical Infrastructure Ignition Zones

Multiple studies have shown that the principal factors regarding home and structure loss to wildfire are the structure's characteristics and immediate surroundings. The area that determines the ignition potential of a structure to wildfire is referred to as (for residences) the Home Ignition Zone (HIZ) or (for critical infrastructure) the Critical Infrastructure Ignition Zone (CIIZ).[52,53] Both the HIZ and CIIZ include the

[52] Reinhardt, E., R. Keane, D. Calkin, J. Cohen. 2008. *Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States*. Forest Ecology and Management 256:1997 - 2006. Retrieved from: Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States | Treesearch (usda.gov)

[53] Cohen, J. *Preventing Disaster Home Ignitability in the Wildland-urban Interface.* Journal of Forestry. p 15 - 21. Retrieved from: Preventing Disaster: Home Ignitability in the Wildland-Urban Interface | Journal of Forestry | Oxford Academic (oup.com)

structure itself and four concentric, progressively wider Priority Zones out to 100 m from the structure (Figure 8 below). More details on priority zones can be found in the FireSmart Manual.[54]

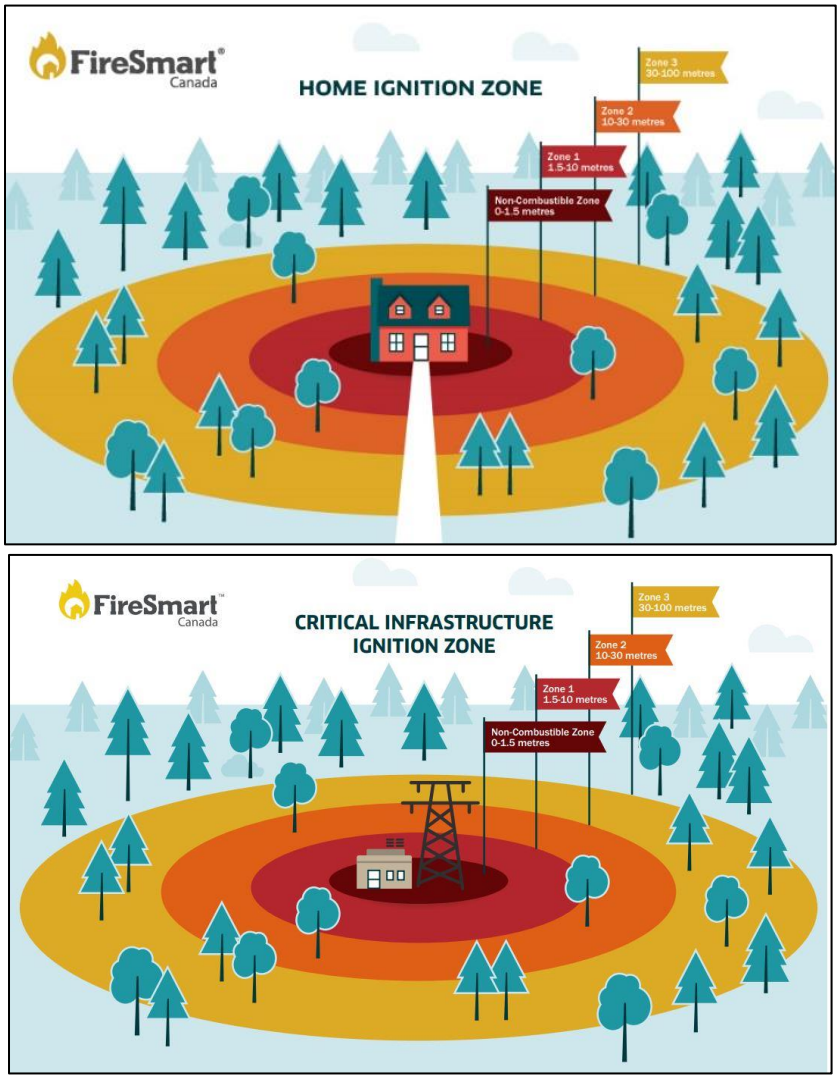


Figure 8: FireSmart Home and Critical Infrastructure Ignition Zone (HIZ, CIZ)

It has been found that during extreme wildfire events, most home destruction has been a result of low-intensity surface fire flame exposures, usually ignited by embers. Firebrands can be transported long distances ahead of the wildfire, across fire guards and fuel breaks, and accumulate within the HIZ/CIIZ in densities that can exceed 600 embers per square meter. Combustible materials found within the HIZ/CIIZ combine to provide fire pathways allowing spot surface fires ignited by embers to spread and carry flames or smoldering fire into contact with structures.

Because ignitability of the HIZ/CIIZ is the main factor driving structure loss, the intensity and rate of spread of wildland fires beyond the community has not been found to necessarily correspond to loss potential.

[54] Available for download here: FireSmartBC_HomeownersManual_Printable.pdf

For example, FireSmart homes with low ignitability may survive high-intensity fires, whereas highly ignitable homes may be destroyed during lower intensity surface fire events.[53] Increasing ignition resistance would reduce the number of homes simultaneously on fire; extreme wildfire conditions do not necessarily result in WUI fire disasters.[55] It is for this reason that the key to reducing WUI fire structure loss is to reduce structure ignitability. Mitigation responsibility must be centered on structure owners. Risk communication, education on the range of available activities, and prioritization of activities should help homeowners to feel empowered to complete simple risk reduction activities on their property.

Table 32: Proximity to the Interface

Proximity to the Interface	Descriptor*	Explanation
WUI 100 *HIZ/CIIZ and Community Zones*	(0-100 m)	This Zone is always located adjacent to the value at risk. Treatment would modify the wildfire behaviour near or adjacent to the value. Treatment effectiveness would be increased when the value is FireSmart.
WUI 500 *Community and Landscape Zones*	(100-500 m)	Treatment would affect wildfire behaviour approaching a value, as well as the wildfire's ability to impact the value with short- to medium- range spotting; should also provide suppression opportunities near a value.
WUI 2000 *Landscape Zone*	(500-1000 m)	Treatment would be effective in limiting long - range spotting but short-range spotting may fall short of the value and cause a new ignition that could affect a value.
Landscape Zone	> 1000 m	This should form part of a landscape assessment and is generally not part of the zoning process. Treatment is relatively ineffective for threat mitigation to a value, unless used to form a part of a larger fuel break / treatment.

**Distances are based on spotting distances of high and moderate fuel type spotting potential and threshold to break crown fire potential (100m). These distances can be varied with appropriate rationale, to address areas with low or extreme fuel hazards.*

[55] Calkin, D., J. Cohen, M. Finney, M. Thompson. 2014. *How risk management can prevent future wildfire disasters in the wildland-urban interface*. Proc Natl Acad Sci U.S.A. Jan 14; 111(2): 746-751. Retrieved from: How risk management can prevent future wildfire disasters in the wildland-urban interface (nih.gov)

6.2 APPENDIX B: WUI THREAT ASSESSMENT - WORKSHEETS AND PHOTOS

Provided separately as PDF package.

6.3 APPENDIX C: MAPS

Provided separately as PDF package.

6.4 APPENDIX D: LIST OF FIRST NATIONS AND ASSOCIATED GOVERNMENTS CONSULTED

Government	Contact Title	Email(s)	Address
Neskonlith Indian Band	Chief and Council	referrals@neskonlith.net	Chase, BC
Tsilhqot'in National Government	TNG Portal	TNG Portal	253 Fourth Ave. North, Williams Lake, BC
Northern Shuswap Tribal Council Society	NStQ Portal	NStQ Portal https://nstqconnect.com/referrals	17 First Avenue South, Williams Lake, BC
Xat'sull First Nation	Chief and Council	reception@xatsull.com	3405 Mountain House Road, Williams Lake, BC
Lhtako Dene Nation	Chief and Council	tracey@lhtako.com bruce@lhtako.com	1515 Arbutus Rd, Quesnel, BC