APPENDIX "A"

M.D. SUBDIVISION EGRESS EVALUATION

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INTRODUCTION

This study aims to assess current evacuation procedures and identify potential improvements for safe and efficient evacuation during various emergencies. Included within this document is the terms of reference for an all-hazards egress study focused on the M.D. of Bonnyville No. 87's (M.D.'s) rural subdivisions.

OVERVIEW		
Scope	The study will encompass the entirety of the M.D. but will focus primarily on subdivisions or areas with high population density.	
Deliverables	A comprehensive evaluation outlining the study methodology, findings, and recommendations, including digital maps illustrating evacuation routes, hazards, and potential bottlenecks.	
Assumptions	For planning purposes, incidents were assumed to have occurred during the spring, summer, and fall seasons, where temperatures are higher, vegetation is abundant, there is a higher transient population, and a higher occurrence of inclement weather-related events. Furthermore, it was assumed that each residence (full- time or part-time use) was assumed to have four occupants.	
Planning	Extensive consultation and collaboration will occur for recommendations that involve the Summer Village of Pelican Narrow and Spring Beach Resort.	
Budget	Any estimates on budget items have been provided in the most basic of terms at a very high level. A budget review would need to be undertaken following a review of this report.	
Schedule	As this report is provided for information purposes only, a timeline for the implementation of recommendations will not form part of this report.	
Disclaimer	This study provides recommendations and does not constitute a guarantee of complete safety during an emergency. This study will provide valuable insights to improve evacuation planning and emergency preparedness for residents of rural subdivisions.	

OVERVIEW

Objectives

The three objectives of this evaluation are to:

- Identify the range of natural and humancaused hazards that could impact rural subdivisions (e.g., wildfires, floods, hazardous materials spills – For reference to this risk analysis, see Appendix A – Hazard Identification Risk Assessment).
- 2. Evaluate and analyze the specific challenges associated with egress in rural settings, such as:
 - Limited road networks, capacities, and potential bottlenecks.
 - Hazards or fuel sources nearby.
 - Weather conditions impacting travel.
 - Availability of emergency services.
 - Accessibility considerations for people with disabilities or limited mobility.
 - Signage and communication systems.
 - Community demographic and geographic considerations.

- 3. Develop recommendations for improving evacuation procedures in rural subdivisions, including:
 - Infrastructure upgrades.
 - Evacuation route planning and prioritization.
 - Communication strategies for residents.
 - Public education and preparedness programs.
 - Addressing the needs of vulnerable populations.

ASSESSMENT

Observation, Collection, & Analysis

DATA COLLECTION & REVIEW

- Review existing plans, hazard maps, and demographic data.
- Conduct interviews with emergency management officials, partners, and stakeholders where needed.
- Analyze historical evacuation data from past emergencies (if available).

FIELD OBSERVATIONS

- Assess the condition and capacity of evacuation routes.
- Identify potential obstacles that could hinder evacuation (e.g., bridges, narrow roads).
- Evaluate signage and communication infrastructure (e.g., emergency alerts, evacuation route markers).

DATA ANALYSIS & REPORTING

- Compile findings on hazards, existing evacuation plans, and identified challenges.
- Develop recommendations for improving all-hazards evacuation in rural subdivisions.
- Prepare a comprehensive report summarizing the study findings and recommendations.

ASSESSMENT

Threat Assessment Methodology

	Insignificant 1	Minor 2	Significant 3	Major 4	Severe 5
5 Almost Certain	Medium 5	High 10	Very high 15	Extreme 20	Extreme 25
4 Likely	Medium 4	Medium 8	High 12	Very high 16	Extreme 20
3 Moderate	Low 3	Medium 6	Medium 9	High 12	Very high 15
2 Unlikely	Very low 2	Low 4	Medium 6	Medium 8	High 10
1 Rare	Very low 1	Very low 2	Low 3	Medium 4	Medium 5

Figure 1, Risk Matrix

Three measures were used in this evaluation to assess the threat to a particular area:

POPULATION DENSITY

The concentration of people within a geographic area relative to the land area in question.

PROXIMITY TO RISK SOURCE

The impact potential for any risk source within a geographic area, (e.g. nearby overgrown forest or industrial complex with high-risk agents therein).

EGRESS POTENTIAL

Egress points and the potential for escape from a geographic area. More exit routes = higher egress potential. Subdivisions were assigned a risk level according to the Risk Matrix in Figure 1. Risk areas are defined as follows:

- High Mitigation strategies are imminently required.
- Medium Mitigation strategies may be required. (Not included in this study)
- Low A Low category was not included in this study.

Using the methodology outlined above, areas determined to be at risk within the M.D. in descending order include:

- Crane Lake West 14
- Moose Lake Peninsula 12
- Moose Lake North 9
- Muriel Lake 9

MITIGATION STRATEGIES

Structural & Non-Structural Mitigation

Mitigation strategies will be divided into two categories; namely structural and nonstructural recommendations.

STRUCTURAL MITIGATION

As according to Prevention Web (n.d), structural mitigation is defined as the application of physical construction to reduce or avoid the impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems.

For the purpose of this evaluation, structural mitigation recommendations will be specific to each subdivision. As such, they will be included within each subsequent section of this report. Recommendations may include the following:

- Vegetation management practices
- Development initiatives
- Evacuation route signage

NON-STRUCTURAL MITIGATION

Prevention Web (n.d) defines nonstructural mitigation as measures that do not involve physical construction, rather they employ the use of knowledge and practice or agreement to reduce disaster risk and impacts through the application of policies and laws, public awareness raising, training, and education. Non-structural mitigation recommendations are more general in nature and may be applied across the M.D. Recommendations may include the following:

- Public engagement opportunities, which may include the distribution of educational information and emergency management related giveaways or gifts.
- Public education, such as encouraging the community to work towards FireSmart principles, sharing information on updated evacuation routes, procedures, and signage, and informing the community of emergency communication tools such as Alberta Emergency Alert, and Voyent Alert!
- Development standards, that may include developing a vegetation management strategy and ensuring building plans/codes align with Wildland Urban Interface (WUI) standards.
- Training and exercises, such as conducting mock evacuation exercises in high-risk areas in collaboration with emergency services e.g. EMS, FIRE, RCMP, Public Safety.



CRANE LAKE

SUBDIVISIONS INCLUDED IN THE ANALYSIS:

Crane Lake West



Figure 2, Crane Lake West

Overview

Crane Lake is situated in the northeast portion of the M.D. of Bonnyville. Crane Lake is categorized as a Wildlife Urban Interface (WUI) community located in the Forestry Protection Zone within Alberta. It is divided into two sections referred to as Crane Lake East, and Crane Lake West.

Roads Surface Cold Mix Gravel Hot Mix Provincial HWY Gravel (AB) Road

As shown in Figure 3 above, we can see a visual representation of the road surface composition for this area categorized by road surface type and location. The current egress route, TWP RD 635A, is composed of Cold Mix, with RGE RD 444 to the east consisting of Hot Mix.

Population

This risk area was noted to have a higher proportion of cabins in comparison to permanent residences:

POPULATION DATA

- Permanent Residences 10
- Cabins 22
- Manufactured Homes 10

CAMPGROUNDS

- Bodina Resort 46 campsites, 3 cabins
- Crane Lake West 24 campsites





Figure 5, RGE RD 635A

Hazards & Risks

As noted in the Wildfire Mitigation Study prepared in 2020, CPP Environmental concluded that Crane Lake is particularly vulnerable to wildfires due to the high density of structures, lack of access to safe zones, large conifer patches, abundant ladder fuels within the community, and the topography of the area (pg. 9).

The risk increases during the summer months when the transient population is most likely to return. Mitigation projects as identified in the Wildfire Mitigation Study involving vegetation control have been completed were possible. However, this area remains at elevated risk due to the current egress route as seen in Figure 5, and the amount of vegetation control still needed in the area, albeit on private land.

Crane Lake West possess egress challenges that will hinder evacuation efforts as there is only one main egress route, TWP RD 635A, for residents to reach RR RD 444 to the east. Ideally, for evacuation purposes, all developments and/or subdivisions should have at least two access routes.



TWP RD 635A is approximately 1.4 km in length, 10 m across at its narrowest point, and 20 m at its widest (tree line to tree line). It is surrounded by a mix of coniferous and deciduous trees that encroach upon the roadway.

Figure 6, TWP RD 635A



As seen in Figure 7, residential and cabin properties and driveways within Cold Lake West Subdivision are abundant with foliage and vegetation. TWP RD 635A has no ditches, nor can they effectively be installed.

Figure 7, TWP RD 635A



Numerous secondary powerlines traverse across TWP RD 635A. Most secondary powerlines are surrounded by dense brush and foliage. FireSmart notes in their guidebook: Protecting your Community from Wildfire (2003) that secondary services are more susceptible to being overgrown with vegetation" (pg. 3-28).

Figure 8, TWP RD 635A



Figure 9, Oil Lease/Dead End

To the north of Crane Lake west subdivision is an oil lease road that extends further into the forest protection area. While this pathway could facilitate egress to the northwest, this would not be using conventional motor vehicles. In most cases, Off-Highway vehicles or pedestrian traffic would be the more likely approach. That said, this path leads deeper into the forest which would be counterproductive should an evacuation be required.

Potential Mitigation Strategies



Figure 10, Connect TWP 635A to TWP RD 635

Structural Mitigation

1. Vegetation Management

- Mulch/brush/clear vegetation on TWP RD 635A from Crane Lake West Subdivision to RGE RD 444 (1.4 km) to the road allowance boundary.
 - Anticipated Timeline: 3 days
 - Cost Estimate: \$4000/day
 - Total: \$12,000 \$15,000
- 2. Signage
 - Install evacuation route signage along Spruce Street, and RGE RD 635A, towards RGE RD 444.

3. Development

- 3.1. Widen TWP RD 635A roadway from Crane Lake West Subdivision to RGE RD 444 (1.4 km).
 - Anticipated Timeline: Dependent on easements.
 - Cost Estimate \$ 600,000
- 3.2. Construct a 1.9 km road to a Class 5 standard on a 20M Right of Way (RoW) connecting TWP RD 635A south to TWP RD 635. See Figure 10.
 - Anticipated Timeline: 3 months
 - Cost Estimate: \$400,000-\$600,000

MOOSE LAKE PENINSULA (WARD 2)

MOOSE LAKE PENINSULA

SUBDIVISIONS INCLUDED IN ANALYSIS:

Eagles Nest, Birch Grove, Elk Haven, Hillside Estates, Willow Ridge Estates, Chateau Estates, Turcotte Subdivision, Silver Ridge Estates, Moose Lake Meadows, Model Developments, Fontaine Subdivision, Sunset Beach, Chatwin Lake Estates, Drouin Subdivision, and included is the Summer Village of Pelican Narrows.



Figure 11, Moose Lake Peninsula

Overview

As identified in the Figure 11 above, this region features a peninsula which is surrounded on three sides by water or ice and has two major egress roads for the entire area, namely TWP RD 610 and 611, both of which exit east onto HWY 28.

Road Surface Mix



Figure 12, Road Surface Mix

The composition of roads within the Moose Lake Peninsula is primarily Hot Mix, with a few Cold Mix and Gravel roads distributed throughout. In Figure 12, Road Surface Mix above, we can see a visual representation of the road surface composition for this area further categorized by road surface type and location.

Population



Figure 13, Population Density

Moose Lake Peninsula has a high population density with approximately 400 houses, the vast majority of which are yearround, full-time homes.

POPULATION DATA

- Permanent Residences 411
- Cabins 74
- Manufactured Homes 20

CAMPGROUNDS

Vezeau Beach - 23 campsites

SUMMER VILLAGES (TRANSIENT POPULATIONS)

Pelican Narrows - Approximately 200 semi-permanent residents



Figure 14, Current Egress Routes

Hazards & Risks

As we look closer at the road system, vegetation, and home clusters in Figure 14, we see that this area is a blend of open fields, standing trees, and rural properties of between 1 – 3 acres in size. It is bordered to the west by the Summer Village of Pelican Narrows and to the south by the Summer Village of Bonnyville Beach.

This area poses some egress challenges which are aggravated by the following:

- High population density relative to land mass.
- Surrounded year-round on three sides by water or ice.
- Standing trees and vegetation (fuel) present throughout the area.
- In some cases, partial development has led to roads and connectors not being linked well.
- Two municipalities in the assessment area, both of which have different roadway priorities and systems of governance.



Figure 15, Subdivisions of Note

Hazards & Risks Cont.

As identified in Figure 15, we see that those subdivisions outlined in red are not served well by the road system. The residents at Turcotte Subdivision and Silver Ridge Estates have only one egress route along RGE RD 464, as it connects to either the west access road to Moose Lake Meadows or TWP RD 611. There are approximately seventy-five lots with residences in this area, with potential for Silver Ridge Estates to expand an additional 40-50 lots in short order.

Additionally, RGE RD 464 between TWP RD 612 and the west entrance to Moose Lake Meadows has mature and thick vegetation on both sides of the roadway with a gap of approximately 20 m. A wildfire or chemical spill along RGE RD 464 could prevent residents from Turcotte Subdivision or Silver Ridge Estates from egressing to the south. Unfortunately, there are currently no other egress routes for these two subdivisions should RGE RD 464 be blocked, which makes this a problem area in need of mitigation.



Figure 16, TWP RD 612

In Figure 16, we can see TWP RD 612 is partially developed, with the roadway abruptly ending in private property and bush. Development would allow TWP RD 612 to connect RGE RD 464 and 465, providing a secondary egress to the west for residents in the northern section of the peninsula in Turcotte and Silver Ridge Estates.



Figure 17, TWP RD 612

TWP 612 is classified as an undeveloped road allowance. Additional right of way may need to be purchased to complete construction.



In the northwest section of Moose Lake Peninsula is Redwood Acres. This area was identified to be particularly congested, with narrow roadways, dense foliage, and limited to one potential egress route.

Figure 18, Redwood Acers



Figure 19, Redwood Acers

As seen in Figure 19, the foliage near Redwood Acres encroaches upon the roadway. A potential mitigation strategy for this portion of Moose Lake Peninsula is to connect the roadway system between Eagle's Nest, and the north portion of Pelican Narrows. According to survey plan 032 0788 (See Appendix A), Greenwood Drive extends to the boundary of the adjacent Summer Village and aligns with the current roadway system.

Potential Mitigation Strategies



Figure 20, Potential Mitigation Options

Structural Mitigation

4. Development

- 4.1. Construction of 1.4 km of road to a Class 4 standard on a 20M RoW connecting RGE RD 464 to RGE RD 465. See Figure 20.
 - Anticipated Timeline: 1.5 months
 - Cost Estimate: \$400,000-\$600,000, + \$300,000-\$400,000 for an Asphalt Concrete Pavement (ACP) surface *
- 4.2. Construction of 200 m road to a Class 5 standard on a 20M RoW connect Greenwood Drive to Pelican Drive. See Figure 20.
 - Anticipated Timeline: 1.5 months
 - Cost Estimate: \$75,000-\$100,000, + \$50,000-\$75,000 for an ACP surface*.

5. Signage

5.1. Install evacuation route signage on RGE RD 465 and RGE RD 464.

*Estimate based on both projects being completed at the same time.

MOOSE LAKE NORTH (WARD 2)

MOOSE LAKE NORTH

SUBDIVISIONS INCLUDED IN THE ANALYSIS:

Moose Lake Estates & Evergreen Estates, Tercier Beach

Moose Lake Estates & Evergreen Estates



Figure 21, Moose Lake & Evergreen Estates

Overview

As identified in the Figure 21 above, both Moose Lake Estates and Evergreen Estates sit on the northeast side of Moose Lake. Directly to the west of both subdivisions is the Moose Lake Provincial Park and Camp St. Louis, and to the south is Moose Lake. Both subdivisions rely on one egress route, RGE RD 470 leading to the north.

Road Surface Mix



Figure 22, Road Surface Mix

The composition of roads within Moose Lake Estates and Evergreen Estates is Hot Mix. In Figure 22 above, we can see a visual representation of the road surface composition for this area further categorized by road surface type and location.

Population



residents.
POPULATION DATA

Moose Lake Estates and Evergreen Estates

combined have a moderate population density with the majority being permanent

- Permanent Residences 37
- Cabins 7
- Manufactured Homes 7

CAMPGROUNDS

- Camp St. Louis 60 attendees/week
- Moose Lake Provincial Park 59 campsites

Figure 23, Population Density



Figure 24, Current Egress Routes

Hazards & Risks

The higher presence of permanent residences in comparison to seasonal cabins poses higher risk in terms of evacuation. Both Moose Lake Estates and Evergreen Estates will possess some egress challenges that will hinder evacuation efforts as there is one potential egress route north to HWY 660 through RGE RD 470.

Both subdivisions are surrounded by thick, dense vegetation, coniferous trees, and standing deadfall that totals more then 80% of the subdivision and infringes on the sole egress route north towards HWY 660. The southernmost subdivision, Moose Lake Estates, is more isolated in comparison to Evergreen Estates due to bordering Moose Lake to the south. While Evergreen Estates is closer in proximity to HWY 660, the dense coniferous trees to the west and the sole egress route place it at higher risk.



Moose Lake Estates sole entrance off RGE RD 470. Moose Lake Estates is characterized by dense foliage and vegetation, and Moose Lake to the south and east.

Figure 25, Woodland RD, Eastbound



Figure 26 , RGE RD 470, Southbound

As seen in Figure 26, RGE RD 470 is approximately 1.2 km in length, and 30 m across, with no points that are increasingly narrow or wide.



In Figure 27, note the entrance to Evergreen Estates is surrounded by dense vegetation and foliage, with HWY 660 to the north. To the west is private land, and Moose Lake Provincial Park.

Figure 27, RGE RD 470, Northbound



Pine Drive within Evergreen Estates is lined with large Jackpine trees, along with dense foliage and vegetation. To the left in Figure 28, sits a large heavily forested municipal reserve lot owned by the Municipality of Bonnyville No. 87. Currently, there are no development plans for this parcel of land.

Figure 28, Pine Drive, Eastbound

Potential Mitigation Strategies



Figure 29, Mulch, Bruch/Clear Vegetation in Moose Lake Estates and Evergreen Estates

Structural Mitigation

6. Vegetation Management

- 6.1. Mulch/brush/clear vegetation on RGE RD 470 (1 km), Spruce Ave (750 m), Pine Drive (575 m), Woodland RD (530 m) to the road allowance boundary, and thin the Municipal Reserve Lot (7.56 Acers). See Figure 29.
 - Anticipated Timeline: 3 days
 - Cost Estimate: 4000/day
 - Total: \$12, 000 \$15, 000

7. Signage

7.1. Install evacuation route signage on Woodland Drive, RGE RD 470, Spruce Ave, and Pine Drive.

MOOSE LAKE NORTH

Tercier Beach



Figure 30, Tercier Beach

Overview

Tercier Beach borders the northwest portion of Moose Lake. To the west of Tercier Beach are two summer camps, Moose Lake Baptist Bible Camp and Moose Lake Gospel Camp (Figure 29). Both camps are active during the summer, with large populations of children between the ages of 1-18. The camps are separated by a small unnamed creek that runs north to south between HWY 660 and Moose Lake. Moose Lake Baptist Bible Camp would egress to the east using RGE RD 472A, while Moose Lake Gospel Camp connects to HWY 660 via private roadway.

Road Surface Mix Cont.



Figure 31, Road Surface Mix

The composition of roads within Tercier Beach Subdivision is Cold Mix, with a few of the southernmost road sections being gravel. In Figure 31 above, we can see a visual representation of the road surface composition for this area further categorized by road surface type and location.

Population



Figure 32, Population Density

Tercier Beach was determined to have moderate population density with most of the residences being cabins.

POPULATION DATA

- Permanent Residences 8
- Cabins 50+
- Manufactured Homes 4

CAMPGROUNDS/CAMPS

- Moose Lake Gospel Camp
- Moose Lake Baptist Bible Camp



Figure 33, RGE RD 472A

Hazards & Risks

Tercier Beach Subdivision differs sightly due to the large transient populations as the result of approximately fifty cabins to the west that will increase the risk level during the summer months but reduce risk during the off season.

As with Moose Lake Estates, Tercier Beach Subdivision possess egress challenges that will hinder evacuation efforts as there is one main egress route north to HWY 660 through RGE RD 472A which serves the subdivision and the east portion of Moose Lake Baptise Bible Camp, and one private driveway that provides access for the west portion of the Bible Camp north to HWY 660. Looking at Figure 33 above, TWP RD 612 is partially developed; however, it does not connect to the west portion of Moose Lake Baptist Bible Camp.

This risk is further compounded in Tercier Beach Subdivision as it is surrounded by thick, dense vegetation and standing deadfall that totals more then 80% of the subdivision and infringes on the main egress route north towards HWY 660.



The sole egress route, RGE RD 472A, is approximately 1.75 km in length, 15 m across at its narrowest point, and 20 m at its widest (tree line to tree line).

Figure 34, RGE RD 472A, Southbound



As seen in Figure 36, TWP RD 612 is a deadend roadway that is abundant in foliage and vegetation. The road leads toward a steep embankment and creek to the west. Moose Lake Gospel Camp is located on the opposite side of the creek. Upon observation, we noted there are no routes that currently connect Moose Lake Gospel Camp to the west portion of Tercier Beach Subdivision.

Figure 35, TWP RD 612 Eastbound

Potential Mitigation Strategies



Figure 36, Potential Egress Route Connecting TWP RD 612 to HWY 660

Structural Mitigation

8. Vegetation Management

- 8.1. Mulch/brush/clear vegetation on Woodland Drive (450 m), Poplar St (150 m), Spruce St. (150 m), Main St. (330 m), and TWP 612 (712 m) to the road allowance boundary.
 - Anticipated timeline: 3 days
 - Cost Estimate: \$4000/ day
 - Cost Total: \$12,000 \$15,000
- 9. Signage
 - 9.1. Install evacuation route signage on Spruce Street, Poplar Street Main Street, TWP RD 612, and RGE RD 472A.

10. Development

- 10.1. Construction of 850M of a road to a Class 5 standard on a 20M RoW to connect the west portion of TWP RD 612 to HWY 660 via the road allowance and pre-existing road near the bin sites. See Figure 36.
 - Anticipated Timeline: One
 month
 - Cost Estimate: \$300,000 -\$400,000 for a gravel road, plus an additional \$75, 000 -\$100, 000 for environmental issues.



MURIEL LAKE

SUBDIVISIONS INCLUDED IN THE ANALYSIS:

Eau Claire, Muriel Viewpoint

Eau Claire



Figure 37, Eau Claire

Overview

Eau Claire Subdivision sits on the northwest portion of Muriel Lake. To the southwest is a large RV site, Spring Beach Resort, that hosts a large transient population in the summer months (Figure 37). There is no access to Spring Beach Resort via Eau Claire Subdivision.

Road Surface Mix



Figure 38, Road Surface Mix

The composition of roads within Eau Claire is Cold Mix. In Figure 38 above, we can see a visual representation of the road surface composition for this area further categorized by road surface type and location.

Population



Upon evaluation, Eau Claire was determined to have moderate population density with most residences being cabins and or RV's/trailers.

POPULATION DATA

- Permanent Residences 6
- Cabins 7
- Manufactured Homes 4

CAMPGROUNDS

• Spring Beach Resort – 130 lots



Figure 40, RGE RD 455A

Hazards & Risks

Upon evaluation of Eau Claire, there are more cabins in comparison to permanent residential properties, in addition to a large trailer/RV park to the west that contains one permanent residential home and approximately 130 RV lots.

There are some potential egress challenges as there is one main egress route for residents/cabins on the east side by means of RGE RD 455A to TWP RD 601A. Residents of the trailer park have no access to RGE RD 455A, however there is a private route that runs both northwest to RGE RD 460. The subdivision and trailer park are largely (80%) surrounded by dense vegetation and foliage that impedes upon the sole evacuation route.



RGE RD 455A, is approximately 540 m long, 11 m wide at the narrowest point, and 20 m at the widest (from tree line to tree line).

Figure 41, RGE RD 455A



Figure 42, RGE RD 455A

RGE RD 455A is narrow. The dense foliage and vegetation surrounding the egress route overhangs upon the road in certain locations. The vegetation is composed of deciduous trees, with a few confider standings distributed throughout the area.



Spring Beach RV Resort is located to the west of Eau Claire Subdivision. There is no thru access between the RV Resort and Subdivision. Residents of the RV resort will egress via a gravel access road that extends to west to RGE RD 460.

Figure 43, Spring Beach Resort



The private roadway extending towards Spring Beach Resort is narrow and overgrown with dense foliage and vegetation. As a result, emergency services vehicles such can not readily access Spring Beach Resort in the event of an emergency.

Figure 44, Spring Beach Resort

Potential Mitigation Strategies



Figure 45, Mulch and Brush RGE RD 455A

Structural Mitigation

11. Vegetation Management

- 11.1. Mulch/brush/clear vegetation on RGE RD 455A, and Eau Claire Drive (Approx. 1 km) to the road allowance boundary. See Figure 45.
 - Anticipated Timeline: 3 days
 - Cost Estimate: \$4000/day
 - Cost Total: \$12,000 \$15,000

12. Signage

12.1. Install evacuation route signage along Eau Claire Drive, and RGE RD 455A.

MURIEL LAKE

Muriel Viewpoint



Figure 46, Muriel Viewpoint

Overview

Muriel Viewpoint sits on the east side of Muriel Lake. This subdivision possesses some potential egress challenges as there is one sole egress route, Muriel View Drive, that runs southeast through dense forest and foliage. This risk is further exacerbated by the fact that Muriel Viewpoint Subdivision is isolated on a peninsula that extends north towards Muriel Lake (Figure 46). With no other egress route, residents may become isolated if Muriel View Drive is blocked.

Road Surface Mix Cont.



Figure 47, Road Surface Mix

The composition of roads within Muriel Viewpoint is Cold Mix. In Figure 47 above, we can see a visual representation of the road surface composition for this area further categorized by road surface type and location.

Population



Figure 48, Population Density

Muriel Viewpoint was determined to have moderate population density with the majority of residences being cabins.

POPULATION DATA

- Permanent Residences 8
- Cabins 25
- Manufactured Homes 2



Figure 49, Current Egress Routes

Hazards & Risks

As with Eau Claire, Muriel Viewpoint consists of a higher proportion of cabins to residential properties; however, it is unique due to its isolation on a peninsula that extends into Muriel Lake. The sole egress route for residents, Muriel View Drive, exits the south side of the subdivision and continues east towards HWY 657. The risk is further compounded by the southern portion of the Muriel Viewpoint subdivision that also relies on Muriel View Drive for evacuation purposes. While the subsiding Muriel Lake may offer a temporary route out of the subdivision for residents, it is not a permanent solution.



Muriel View Drive is approximately 1 km in length, with an approximate minimum width of 15 m and a maximum of 20 m. The exit to the left in Figure 53 is the entrance to a trail passable only by truck that exits on Muriel Lake Trail.

Figure 50, Muriel View Drive, Southbound



Figure 51, Muriel View Drive, Northbound

Muriel View Drive is surrounded by dense vegetation and foliage on both the east and west side. This egress routes serves both the north and south portions of Muriel Viewpoint.

Potential Mitigation Strategies



Figure 52, Potential Egress Route

Structural Mitigation

13. Vegetation Management

- 13.1. Mulch/brush/clear vegetation on Muriel View Drive from Muriel Viewpoint Subdivision to HWY 657 (1 km) to the road allowance boundary.
 - Anticipated Timeline: 4 days
 - Cost Estimate: \$4000/day
 - Cost Total: \$16, 000 \$20, 000

14. Signage

14.1. Install evacuation route signage along Muriel View Drive.

15. Development

- 15.1. Construction of 750M of a road to a Class 5 standard on a 20M RoW from Muriel View Subdivision east to HWY 657 (750 m). See Figure 52.
 - Anticipated Timeline: One
 month
 - Cost Estimate: \$250, 000 -\$350,000 for gravel surface road.

SUMMARY

Both non-structural and structural recommendations are covered in this subdivision egress evaluation. Non-structural mitigation recommendations include:

- Public engagement opportunities
- Public education
- Development standards
- Training and exercises

Structural mitigation measures are specific to each subdivision. Recommendations from this egress evaluation are summarized in Table 1 below, and include:

- Vegetation/brush management
- Signage
- Roadwork

Table 1: Summary of Structural Mitigation Strategies

AREA	STRATEGY	DESCRIPTION		
Crane Lake West	Vegetation/ Brush Management	• Mulch/brush/clear vegetation on TWP RD 635A from Crane Lake West Subdivision to RGE RD 444 (1.4 km) to the road allowance boundary.		
	Signage	 Install evacuation route signage along Spruce Street, and RGE RD 635A, towards RGE RD 444. 		
	Roadwork	 Widen TWP RD 635A roadway from Crane Lake West Subdivision to RGE RD 444 (1.4 km). Construct a 1.9 km road to a Class 5 standard on a 20M RoW connecting TWP RD 635A south to TWP RD 635. 		
Moose Lake Peninsula	Signage	 Install evacuation route signage on RGE RD 465 and RGE RD 464 south, towards Lake Ave. 		
	Roadwork	 Construction of 1.4 km of road to a Class 4 standard on a 20M RoW connecting RGE RD 464 to RGE RD 465. Construction of 200 m road to a Class 5 standard on a 20M RoW connect Greenwood Drive to Pelican Drive. 		

SUMMARY					
AREA	STRATEGY	DESCRIPTION			
Moose Lake North	Vegetation/ Brush Management	 Mulch/brush/clear vegetation on RGE RD 470 (1 km), Spruce Ave (750 m), Pine Drive (575 m), Woodland RD (530 m) to the road allowance boundary, and thin the Municipal Reserve Lot (7.56 Acers). Mulch/brush/clear vegetation on Woodland DR (450 m), Poplar St (150 m), Spruce St. (150 m), Main St. (330 m), and TWP 612 (712 m) to the road allowance boundary. 			
	Signage	 Add evacuation route signage on Woodland Drive, RGE 470, Spruce Ave, and Pine Drive. Add evacuation route signage on Spruce Street, Poplar Street Main Street, TWP RD 612, and RGE RD 472A. 			
	Roadwork	 Construction of 850M of a road to a Class 5 standard on a 20M RoW to connect the west portion of TWP RD 612 to HWY 660 via the road allowance and pre-existing road near the bin sites. 			
Muriel Lake	Vegetation/ Brush Management	 Mulch/brush/clear vegetation on RGE RD 455A, and Eau Claire Drive (Approx. 1 km) to the road allowance boundary. Mulch/brush/clear vegetation on Muriel View Drive from Muriel Viewpoint Subdivision to HWY 657 (1 km) to the road allowance boundary. 			
	Signage	 Add evacuation route signage along Eau Claire Drive. And RGE RD 455A. Add evacuation route signage along Muriel View Drive. 			
	Roadwork	 Construction of 750M of a road to a Class 5 standard on a 20M RoW from Muriel View Subdivision east to HWY 657 (750 m). 			

GLOSSARY

All-Hazards: refers to both natural and man-made hazards which may include wildfires, flooding, power outages, impact weather, and so on.

Class 4: A roadway that typically carries less than 200 vehicles per day (VPD), has a low proportion of truck traffic (less than 5%), has 8.0 m top width with gravel driving surface, and a standard ROW of 20.0 m. It is not likely to provide direct access to a provincial highway; it provides a direct connection to a Class 2 roadway, to another Class 3 roadway, or a Class 4 roadway.

Class 5: This standard is intended for a low volume, low speed local road, has a 6.0m to 7.0m top width with a gravel surface, and a ROW of 20.0m. A standard 6.0m wide roadway is intended where three or less residences are serviced. A 7.0 m roadway is typically used for a traffic volume of less the 25 vehicles per day (VPD).

Non-Structural Mitigation: Measures not involving physical construction which use knowledge, practice, or agreement to reduce disaster risks and impacts, through policies and laws, public awareness raising, training and education. Common non-structural measures include building codes, land-use planning laws and their enforcement, research and assessment, information resources and public awareness programmes. **Public Engagement:** Planned two-way discussion with individuals, organizations, or groups with the intent to gather input, clarify information, and foster understanding among those interested and/or affected by an issue and to inform decision making processes.

Risk Matrix: a binary matrix that is used to define the level of risk by considering the category of likelihood against the category of impact on a variable.

Structural Mitigation: Any physical construction to reduce or avoid impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems. Common structural measures for disaster risk reduction include dams, flood levies, ocean wave barriers, earthquake-resistant construction, and evacuation shelter.

Vegetation: refers to live, dead, or decomposing plant material that, for the purpose of this report, may affect fire behaviour.

Wildland Urban Interface: The area where human development meets or intermingles with the natural environment.

REFRENCES

FireSmart: Protecting Your Community from Wildfire (2003) *Government of Alberta*. Available at: FireSmart-Protecting-Your-Community.pdf (firesmartcanada.ca)

FireSmart Guidebook for Community Protection: A Guidebook for Wildland/Urban Interface Communities (2013) Government of Alberta. Available at: FireSmart Guidebook for Community Protection - A Guidebook for Wildland-Urban Interface Communities (alberta.ca)

Structural and Non-Structural Measures (no date) *Prevention Web*. Available at: https://www.preventionweb.net/terminology/structural-and-non-structural-measures.

Wildfire Mitigation Strategy: FRIAA Project Grant Agreement FFP-19-07 (2020) *CPP Environmental.* Available at:

https://investmdbonnyville.com/DocumentCenter/View/4115/Wildfire-Mitigation-Strategy

APPENDICES



Appendix A. Survey Plan 032 0788

Appendix B. Risk Assessment Summary (2022)

Priority	Hazard	Risk Score	Risk Level
1	Human Health Emergency	72	Extreme
2	Airplane Crash	60	Extreme
3	Forest Fire (Wildfire)	60	Extreme
4	Extreme Cold	54	Extreme
5	Extreme Heat	45	Very High
6	Blizzards	36	High
7	Tornado	36	High
8	Floods (Rainfall / Run-off)	27	Moderate
9	High Intensity Residential Fire	27	Moderate
10	Oil and Gas Emergency	27	Moderate
11	Wind	24	Moderate
12	Terrorism	20	Low
13	Bridge / Structural Collapse	18	Low
14	Civil Disturbance	18	Low
15	Floods (Watercourse)	18	Low
16	Hazmat (Fixed Site) - Pipeline / Storage Facility	18	Low
17	Pipelines	18	Low
18	Water Pollution / Contamination	18	Low
19	Water Main Break	16	Low
20	Air Quality	12	Low
21	Chemical, Biological, Radiological, Nuclear Event	12	Low
22	Hail	12	Low
23	Hazmat (Transportation) - Road	12	Low
24	Toxic Gas Release	12	Low
25	Communication Equipment Failure	8	Very Low
26	Drought	8	Very Low
27	Agricultural Plant Disease / Pest Infestation	6	Very Low
28	Cyber Threat	6	Very Low
29	Farm Animal Disease	6	Very Low
30	Computer / Hardware / Software Failure	4	Very Low