DISTRICT OF HOPE

REGULAR MEETING OF COUNCIL AGENDA

Tuesday, October 11, 2022 at 7:00 pm.
Council Chambers
325 Wallace Street, Hope, British Columbia

IMPORTANT: FOR ATTENDEES – MASKS ARE OPTIONAL

For those in attendance at District of Hope Open Council Meetings and Public Hearings, please be advised that the Hope Ratepayers Association is recording these meetings and hearings. The District, in no way, has custody or control of the recordings.

Therefore, all persons who do not want their presentation or themselves recorded, please approach the Clerk to declare same and the District will relay this to the Association so that you can freely speak.

1. CALL TO ORDER

2. APPROVAL OF AGENDA

Recommended Resolution:

THAT the October 11, 2022 Regular Council Meeting Agenda be adopted as presented.

3. ADOPTION OF MINUTES

(a) Regular Council Meeting **(1)**

Recommended Resolution:

THAT the Minutes of the Regular Council Meeting held September 26, 2022 be adopted as presented.

(b) Public Hearing Record **(8)**

Recommended Resolution:

THAT the Record of the Public Hearing held September 26, 2022 be received.

4. DELEGATIONS

(a) Storm Water Master Plan **(11)**

Mr. Dave Underwood of TRUE Consulting will be in attendance to present the District of Hope Storm Water Master Plan.

Recommended Resolution:

THAT the District of Hope Stormwater Master Plan, as prepared by TRUE Consulting and dated July 2022, be received.

5. STAFF REPORTS

(a) Report dated October 5, 2022 from the Director of Community Development
Re: Retail Sale of Cannabis Licence – Unit C – 821 Sixth Avenue **(153)**

Recommended Resolution:

BE IT RESOLVED THAT Council of the District of Hope (**recommends/does not recommend**) a licence to be issued to the applicant for a cannabis store Unit C – 821 Sixth Avenue;

FURTHER THAT Council comments on the prescribed considerations of the potential impact on the community if the application is approved;

FURTHER THAT Council, at the Regular Meeting of September 26, 2022, authorized staff to gather views of residents/businesses in a 50 metre radius from the subject property which was fulfilled by mail and hand delivery of public notice, advertisement in one issue of the local newspaper, and by signage posted on the subject property; and

FURTHER THAT Council held a Public Hearing on October 11, 2022 to gather the views of the residents/businesses of which are contained in the Record of Public Hearing.

6. COMMITTEE REPORTS

There are no Committee reports.

7. MAYOR AND COUNCIL REPORTS

8. PERMITS AND BYLAWS

(a) District of Hope Official Community Plan Amendment Bylaw No. 1530, 2022
Re: 1275 7th Avenue **(159)**

Recommended Resolution:

THAT *District of Hope Official Community Plan Amendment Bylaw No. 1530, 2022,* to amend the Table of Concordance to add Comprehensive Development (CD-10) as a Compatible Zoning category under the Urban/Suburban Residential Land Use Designation, be adopted time this 11th day of October, 2022.

(b) District of Hope Zoning Amendment Bylaw No. 1531, 2022
Re: 1275 7th Avenue **(160)**

Recommended Resolution:

THAT *District of Hope Zoning Amendment Bylaw No. 1531, 2022,* to rezone the southwestern 0.79 hectare (1.95 acre) portion of the property at 1275 7th Avenue from Institutional (P-2) to a Comprehensive Development (CD-10) zone, be adopted this 11th day of October, 2022.

(c) District of Hope Zoning Amendment Bylaw No. 1536, 2022
Re: Storage of Vehicles in Residential Areas Bylaw Amendment **(165)**

Recommended Resolution:

THAT *District of Hope Zoning Amendment Bylaw No. 1536, 2022,* to provide provisions on the number of vehicles stored in residential areas, be adopted this 11th day of October, 2022.

(d) District of Hope Zoning Amendment Bylaw No. 1537, 2022
Re: 477 Hudson Bay Street **(167)**

Recommended Resolution:

THAT *District of Hope Zoning Amendment Bylaw No. 1537, 2022,* to rezone the property locally known as 477 Hudson Bay Street from Single Family Residential (RS-1) to Institutional (P-2), be adopted this 11th day of October, 2022.

(e) District of Hope Water Utility Amalgamation Project Loan Authorization Bylaw No 1477, 2020 **(169)**

Recommended Resolution:

THAT *District of Hope Water Utility Amalgamation Project Loan Authorization Bylaw No. 1477, 2020* be adopted this 11th day of October, 2022.

9. FOR INFORMATION CORRESPONDENCE

(a) For Information Correspondence **(170)**

Recommended Resolution:

THAT the For Information Correspondence List dated October 11, 2022 be received.

(b) Accounts Payable Cheque Listing **(201)**

Recommended Resolution:

THAT the Accounts Payable Cheque Listing for the period of September 1-30, 2022 be received.

10. OTHER PERTINENT BUSINESS

11. QUESTION PERIOD

Call for questions from the public for items relevant to the agenda.

12. NOTICE OF NEXT REGULAR MEETING

Monday, October 24, 2022 at 7:00 pm.

13. ADJOURN

MINUTES OF THE REGULAR COUNCIL MEETING

Monday, September 26, 2022
Council Chambers, District of Hope Municipal Office
325 Wallace Street, Hope, British Columbia

Council Members Present: Mayor Peter Robb
Councillor Scott Medlock
Councillor Victor Smith
Councillor Heather Stewin
Councillor Dusty Smith
Councillor Craig Traun

Staff Present: John Fortoloczky, Chief Administrative Officer
Donna Bellingham, Director of Corporate Services
Jas Gill, Director of Community Development
Mike Olson, Director of Finance
Branden Morgan, Deputy Corporate Officer/EA

Others in attendance: 23 members of the public

1. CALL TO ORDER

Mayor Robb called the meeting to order at 6:59 p.m. and opened by acknowledging that the meeting is being held on the unceded and traditional lands of the Stó:lō people, Chawathil, Peters, Yale, and Union Bar First Nations.

2. APPROVAL OF AGENDA

Moved / Seconded

THAT the September 26, 2022 Regular Council Meeting Agenda be adopted as presented.
CARRIED.

3. ADOPTION OF MINUTES

(a) Regular Council Meeting

Moved / Seconded

THAT the Minutes of the Regular Council Meeting held August 8, 2022 be adopted as presented. **CARRIED.**

(b) Special Regular Council Meeting

Moved / Seconded

THAT the Minutes of the Special Regular Council Meeting held August 18, 2022 be adopted as presented. **CARRIED.**

(c) Public Hearing Record

Moved / Seconded

THAT the Record of the Public Hearing held August 8, 2022 be received. **CARRIED.**

(d)

Public Hearing Record

Moved / Seconded

THAT the Record of the Public Hearing held August 29, 2022 be received. **CARRIED.**

4. DELEGATIONS

(a) Landstrom Road Taxpayers

Don Garrett, a member of the Landstrom Road Taxpayers, noted he was in attendance to address Council, and representing 33 Landstrom Road residents, regarding the property at 21415 Trans Canada Highway. In his presentation, Mr. Garrett raised the following concerns:

- Blatant disregard for District of Hope bylaws by the property owner
- Installation of water, metered electrical connections, and septic systems installed on multiple sites that have been cleared graveled, and levelled
- Numerous trailers have been hooked up at the site
- Current owners have not brought the site back to its original state after the failed Temporary Use Permit applications and it has been two years since the TUP's were presented: January 25, 2021 and March 22, 2021.

He indicated that this a simple infraction and the District needs to commence enforcement. Mr. Garrett noted that he wants a written response from the District no later than October 6, 2022.

5. STAFF REPORTS

(a) Report dated September 9, 2022 from the Director of Community Development Re: Retail Sale of Cannabis Licence – Unit C – 821 Sixth Avenue

The Director of Community Development advised that in accordance with the District of Hope policy, this site is compliant and therefore we have to move towards the notification process.

Moved / Seconded

THAT Council authorize staff to gather views of residents/businesses in a 50 metre radius from the subject property at Unit C – 821 Sixth Ave for the consideration of an application for Non-Medical Cannabis Retail Store (CRS) licence; and

FURTHER THAT A Public Hearing be held in order to provide the public with the opportunity to express their views and comments. **CARRIED.**

(b) Report dated September 20, 2022 from the Director of Community Development Re: Flood and Erosion, Geotechnical Hazard and Streamside Protection Development Permits – 66532 Summer Road

The Director of Community Development advised that the applicant has applied for a new single family dwelling home to be approved and any approved secondary structures for the site and therefore requires the development permits mentioned in the recommendations.

Moved / Seconded

THAT a Flood and Erosion, Geotechnical Hazard, and Streamside Protection Development Permits be approved for the property legally described as Lot 37 District Lot 56 YDYD Plan 17267; PID 001-536-656; 66532 Summer Road for the construction of a

new single family dwelling home and approved accessory structures subject to the District of Hope receiving a satisfactory certified report from a qualified professional confirming site-specific safe building envelopes; and

FURTHER THAT the Director of Community Development be authorized to endorse the Flood and Erosion, Geotechnical Hazard, and Streamside Protection Development Permit and required covenant document; and

FURTHER THAT for purposes of the Development Permit validity period, the conditions of the Development Permit shall expire on September 26, 2024; and

FURTHER THAT for the purposes of Section 504 of the *Local Government Act*, "*substantially start any construction"* shall mean the completion of the foundation for the new single family dwelling. **CARRIED.**

6. COMMITTEE REPORTS

There were no Committee reports.

7. MAYOR AND COUNCIL REPORTS

Mayor Robb Reported:

- He thanked EMBC, BC Wildfire Services, the Fraser Valley Regional District, and the District of Hope Fire Department for the quick response and strong communication during our wildfire event, noting that the plan unfolded as it should.
- He attended board meetings at the Regional District for Corporate Services, Hospital Board, and Regional Board, stating that he has nothing to report for the community at this time.
- He attended the Golden Agers meeting, passing on a reminder that this Saturday is a Pancake Breakfast from 9-11am, October 29th is the Flea Market, and December 10th will be their annual Christmas Party held at the Golden Agers Hall.
- He congratulated Chawathil First Nation's new Chief and Council following their recent election.
- He reminded everyone that it is time for COVID booster shots, noting that a clinic will be conducted at the Legion starting Monday from 9am to 3:45pm.

Councillor Traun Reported:

- He had nothing to report.

Councillor Stewin Reported:

- She attended the Public Hearing at the Rec Centre for the BC Housing project.
- She attended quite a few Purple Lights meetings, reminding everyone that the kick-off will on October 1st at 6pm in Memorial Park, which will be livestreamed for those that cannot attend.
- She attended UBCM, noting that it was wonderful, and thanked staff for arranging to have a seeing-eye person attend with her. She attended sessions regarding healthcare and housing.

Councillor V. Smith Reported:

- He attended UBCM, stating that it was enlightening to attend and he was able to meet a lot of good contacts. He attended sessions regarding housing, emergency

preparedness, and employee issues.

- He attended the Community Futures conference in Revelstoke.
- He reminded everyone that the Chamber of Commerce meeting will be on Thursday, the last one where he is President before the upcoming election.

Councillor Medlock Reported:

- He attended a celebration of the 75th Anniversary of the Independence of India just north of Hope.
- He missed the Public Hearing for the BC Housing project, but watched the video recordings of the meeting.
- He attended UBCM, noting that he appreciated the event and that the community allows them to go, commenting that it is nice to get together with like-minded people and find out what other communities have done in situations. He attended sessions regarding agriculture, lessons learned from an atmospheric river, and emergency preparedness.
- He attended the Community Futures conference in Revelstoke.

Councillor D. Smith Reported:

- He attended UBCM, and thanked staff for getting all of the accommodations ready for them. He met many different members that he probably would not have spoken to before about different events coming towards Hope. He spoke to Mayor Braun, Abbotsford Mayor, regarding what he went through with the floods and supportive housing.
- He congratulated all of the individuals that put their name forward for Mayor and Council, noting that it is a big feat and those people should get a pat on the back for even putting their names forward.

8. PERMITS AND BYLAWS

(a) District of Hope Zoning Amendment Bylaw No. 1534, 2022 Re: 63790 Yvonne Avenue

Moved / Seconded

THAT *District of Hope Zoning Amendment Bylaw No. 1534, 2022*, to rezone the property at 63790 Yvonne Avenue from Single Family Residential (RS-1) to Single Family Residential with a Secondary Dwelling (RS-1S), be adopted this 26th day of September, 2022. **CARRIED.**

(b) District of Hope Official Community Plan Amendment Bylaw No. 1530, 2022 Re: 1275 7th Avenue

Council discussed the following points regarding the proposed BC Housing project:

- Stories of success with similar projects from other communities heard during the UBCM Homelessness and Addiction session; people shared that there have been ups and downs, with some situations where crime rates went up in some areas and down in others, but stabilized over time.
- Stories of success in our own community, operating supportive housing at the motel.
- There is no perfect place to have the supportive housing. When the other existing supportive housing facilities in town close down, there needs to be a place for them to go.

- Concerns regarding location, size, security and designation as a wet facility from the previous Public Hearing were not addressed by BC Housing in their new proposal.
- Success of the Thunderbird Project due to the location.
- Size of the District of Hope compared to the landmass of other communities that are running smaller supportive housing projects.
- Lack of resources and staffing available in the community with regards to RCMP, Hospital and Fire Department.
- As a Council, they are tasked to come together and face a problem head-on and solve it. People who do this for a living came to Council with a solution to a problem that the community is facing.
- Supportive housing is needed in the community, and this project fits the Official Community Plan as part of the housing needs portfolio.
- The building, three stories high, will be energy efficient, designed in the appearance of a longhouse with indigenous art, and will be built to fit with the community.
- This project will not solve the problem, but it will help.

Moved / Seconded

THAT *District of Hope Official Community Plan Amendment Bylaw No. 1530, 2022,* to amend the Table of Concordance to add Comprehensive Development (CD-10) as a Compatible Zoning category under the Urban/Suburban Residential Land Use Designation, be read a third time this 26th day of September, 2022. **CARRIED.**

Opposed: Councillor Traun, Councillor D. Smith

(c) District of Hope Zoning Amendment Bylaw No. 1531, 2022
Re: 1275 7th Avenue

Moved / Seconded

THAT *District of Hope Zoning Amendment Bylaw No. 1531, 2022,* to rezone the southwestern 0.79 hectare (1.95 acre) portion of the property at 1275 7th Avenue from Institutional (P-2) to a Comprehensive Development (CD-10) zone, be read a third time this 26th day of September, 2022. **CARRIED.**

Opposed: Councillor Traun, Councillor D. Smith

(d) District of Hope Zoning Amendment Bylaw No. 1536, 2022
Re: Storage of Vehicles in Residential Areas Bylaw Amendment

Moved / Seconded

THAT *District of Hope Zoning Amendment Bylaw No. 1536, 2022,* to provide provisions on the number of vehicles stored in residential areas, be read a third time this 26th day of September, 2022. **CARRIED.**

(e) District of Hope Zoning Amendment Bylaw No. 1537, 2022
Re: 477 Hudson Bay Street

Council thanked the group involved with the project, noting how important it is to have a place for people with developmental disabilities to live.

Moved / Seconded

THAT *District of Hope Zoning Amendment Bylaw No. 1537, 2022,* to rezone the property locally known as 477 Hudson Bay Street from Single Family Residential (RS-1) to Institutional (P-2), be read a third time this 26th day of September, 2022. **CARRIED.**

(f) District of Hope 2023-2024 Permissive Tax Exemption Amendment Bylaw No. 1538, 2022

Council inquired regarding the percentage exemption that has been given to other projects in the past. The Director of Finance noted that the 25% exemption being given to this project is in line with what has been given in the past to similar type properties.

Moved / Seconded

THAT *District of Hope 2023 – 2024 Permissive Tax Exemption Amendment Bylaw No. 1538, 2022* be given first, second and third reading, this 26th day of September, 2022.
CARRIED.

9. FOR INFORMATION CORRESPONDENCE

(a) For Information Correspondence

Moved / Seconded

THAT the For Information Correspondence List dated September 26, 2022 be received.
CARRIED.

(b) Accounts Payable Cheque Listing

Moved / Seconded

THAT the Accounts Payable Cheque Listing for the period of August 1 – 31, 2022 be received. **CARRIED.**

10. OTHER PERTINENT BUSINESS

There was no other pertinent business.

11. QUESTION PERIOD

There were no questions raised.

12. NOTICE OF NEXT REGULAR MEETING

Tuesday, October 11, 2022 at 7:00pm.

13. RESOLUTION TO PROCEED TO CLOSED MEETING

The Mayor called for a motion to move to a closed meeting at 7:44pm.

Moved / Seconded

THAT the meeting be closed to the public to consider matters pursuant to Section 90(1)(i) of the *Community Charter* [the receipt of advice that is subject to solicitor client privilege, including communications necessary for that purpose] re: Station House and 21415 Trans Canada Highway and for the purpose of receiving and adopting closed meeting minutes.
CARRIED.

14. RETURN TO OPEN MEETING

The Mayor reconvened the Regular Council Meeting at 9:02pm.

15. ADJOURN

Moved / Seconded

THAT the Regular Council Meeting adjourn at 9:02pm. **CARRIED.**

Certified a true and correct copy of the Minutes of the Regular Meeting of Council held September 26, 2022 in Council Chambers, District of Hope, British Columbia.

_____ _____

Mayor **Director of Corporate Services**

THE DISTRICT OF HOPE
RECORD OF A PUBLIC HEARING

Monday, September 26, 2022
Council Chambers, District of Hope Municipal Office
325 Wallace Street, Hope, British Columbia

Council Members Present: Mayor Peter Robb
Councillor Scott Medlock
Councillor Victor Smith
Councillor Heather Stewin
Councillor Craig Traun
Councillor Dusty Smith

Staff Present: John Fortoloczky, Chief Administrative Officer
Donna Bellingham, Director of Corporate Services
Jas Gill, Director of Community Development
Mile Olson, Director of Finance
Branden Morgan, Deputy Corporate Officer/EA

Others Present: 20 members of the public

Mayor Robb called the Public Hearing to order at 6:30 p.m.

The purpose of the Public Hearing is to hear input on amendments to the ***District of Hope Zoning Bylaw No. 1324, 2012*** as follows:

- ***District of Hope Zoning Amendment Bylaw No. 1536, 2022***
- ***District of Hope Zoning Amendment Bylaw No. 1537, 2022***

Mayor Robb read the Chairperson's Statement regarding the proceedings and conduct for the public hearing.

District of Hope Zoning Amendment Bylaw No. 1536, 2022

> **Purpose:** To amend section 5.6 of *District of Hope Zoning Bylaw No. 1324, 2012* to implement a limit on the storage of vehilces in residential areas within the District of Hope.

The Director of Community Development advised that during the June 13, 2022 Committee of the Whole Meeting, Council provided staff with direction to amend section 5.6 to limit the storage of vehicles in residential areas, with limits for six (6) vehicles on single family residential lands and eight (8) on comprehensive development zones and residential lands where a secondary dwelling or secondary suite exists. These limits are to include the parking and storage of vehicles, including recreational vehicles, camper or trailer, utility trailer and a pleasure boat not kept for gain or sale. Currently as the bylaw exists there are no acutal limits

The Mayor noted that no written submissions had been received and staff confirmed that no late submissions have been received.

The Mayor called for a first and second time for any questions or comments from the public; nothing was raised.

The Mayor then called for any questions or comments from Council. Council sought clarity on the comprehensive development zones, there is currently a CD-8 zone on

Foster Road of which the property has multiple residence beyond a secondary dwelling. The Director of Community Development noted that this amendment will put a cap on all parking, whether parked or stored vehicles (licensed and unlicensed). The aim of the CD zones is for those residence that have single family dwellings. The particular CD-8 zone has language already built into it that dictates usages specific to parking.

The Mayor noted that this section of the Public Hearing is closed and no further input can be heard pertaining to Zoning Amendment Bylaw No. 1536, 2022.

District of Hope Zoning Amendment Bylaw No. 1537, 2022

> **Property:** legally described as Lots 15, 16 & 17 Section 9 TWP 5 RGE 26 W6M Plan 879; PID 011-998-369, 011-998-385; 011-998-393; locally recognized as **477 Hudson Bay Street 3rd.**
>
> **Purpose:** to rezone the property from Single Family Residential (RS-1) to Instiututional (P-2).

The Director of Community Development noted that the application is to enable a community care facility to be built on the property. The concept is for a three-storey building to contain up to 14 dwelling units. A concept drawing had been submitted and if successful the applicant would go through a Hope Intensive Development Permit and perhaps a variance for the rear yard. Since there are multiple lots, at the stage of the building permit, the lots would need to be consolidated into one.

The Mayor noted that no written submissions had been received and staff confirmed that no late submissions have been received.

The Mayor called for input from the public:

Natalie Cosco: [redacted] – who will maintain the building and yard and pay for that maintenance. Mayor Robb noted that his understand is that the Society (Fraser Inclusive & Supporting House [F.I.S.H.]), a member of the society is in attendance to provide clarity.

Mr. Garry Vath: Director for F.I.S.H. – while the Socieity is still finalizing their plans, they intend to have 24-hour staffing for care of the property, residence and provide security. There will be ongoing programs for the residents with cognitive disabiliies and with partnership from Community Living BC there will be a mix of these services provided, along with individual assistance to those residents. The Society may also be to obtain some other funding that can go towards the management and maintenance of the property.

Mr. Garry Vath: [redacted] – he added that Society did what they could to advise the area residents of their proposal and to gain support, they have obtained seven pages of signatures to support the project. They provided people with the brochure that tells the story of who they are, their plan and history. To date the feedback that they have received has been positive.

The Mayor called a further time for any questions or comments from the public; hearing none, the Mayor declared the Public Hearing closed at 6:43 p.m.

Certified Correct:

_____

Donna Bellingham,

Director of Corporate Services

Stormwater Master Plan

District of Hope

ENGINEERING ■ PLANNING ■ URBAN DESIGN ■ LAND SURVEYING

Agenda

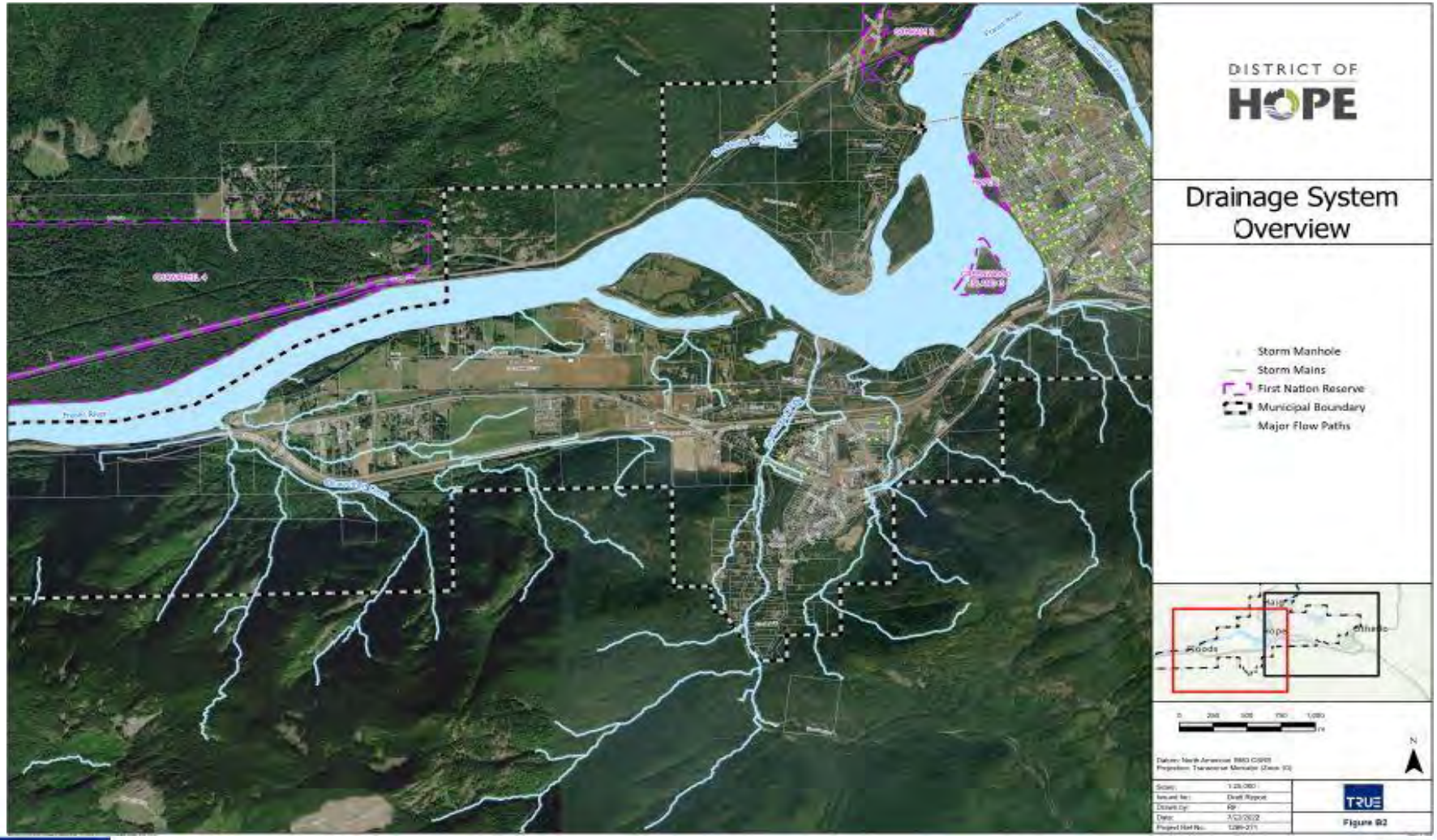
- Project Scope
- Background Information and Context
- Model Development
- Model Calibration
- Climate Change
- Findings and Conclusions
- Recommendations
- Questions

Scope

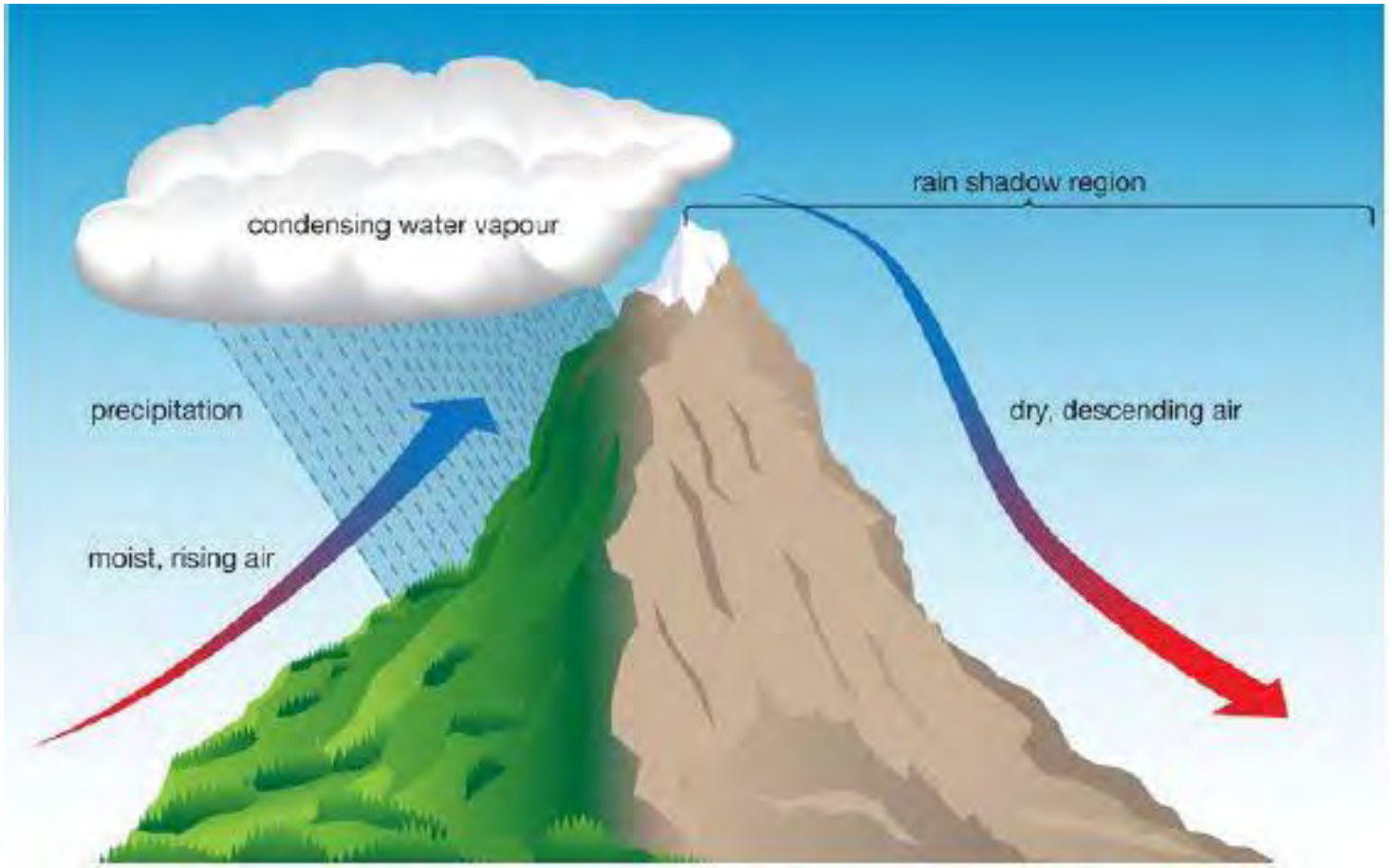
- Establish capacity and shortcomings of existing storm sewer system infrastructure
- Provide guidance for the review of development proposals
- Assess impact of population growth (land development) and climate change
- Identify future infrastructure requirements
- Prepare cost estimates and phasing plan
- *Limitation: does not include effects of flooding or backwater events from major swift water watercourses*

Background Information and Context

Background Information and Context



Background Information and Context



Background Information and Context

- District IOCP includes several policy statements and objectives related to the development and upkeep of the SWMP
- Subdivision and Development Servicing Bylaw and Design Criteria Manual provides guidance for new developments
- Previous Studies have been commissioned by the District and other related governing bodies
  - 1987 Stanley Associates – East Kawkawa Lake Drainage
  - 1999 Northwest Hydraulics - Silverhope Ck Flood Hazard
  - 2002 Northwest Hydraulics – Johnson Road Flood Hazard
  - 2017 LCI Engineering – Lower Coquihalla Flood Hazard

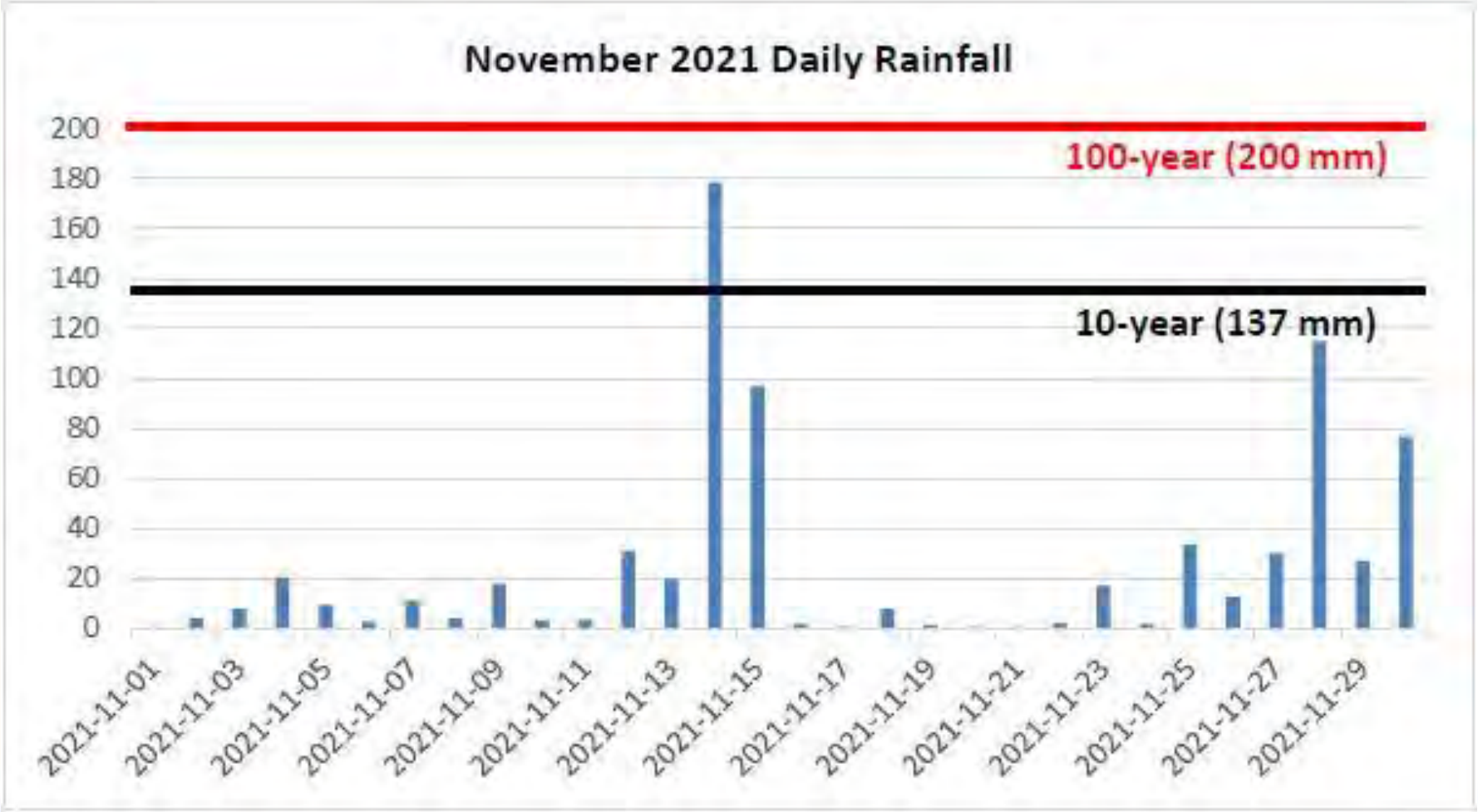
Model Development

- PCSWMM industry-standard GIS-based computational software suite
  - Delineation of subcatchments
  - Determine subcatchment parameters
    - Impervious area/land use
    - Soil conditions
    - Slope
  - Input District assets (pipes, culverts, etc)
  - Development of design storms

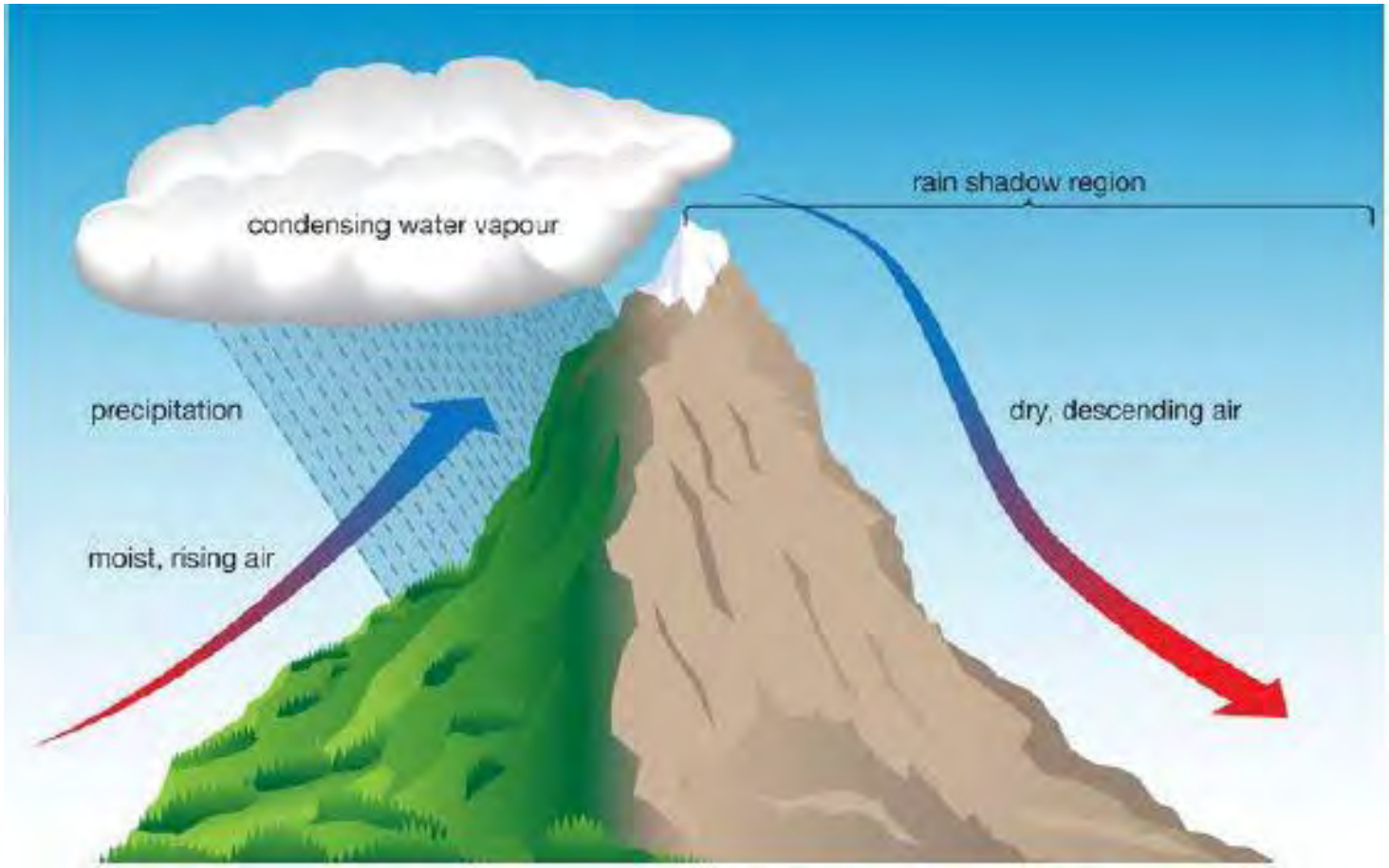
Model Calibration

- Ideal: monitoring of key elements in the network to provide confidence in model outputs
- November 2021 atmospheric river provided unique opportunity to apply anecdotal information to confirm function of system
- Used to produce a design storm
- Model results matched anecdotal records

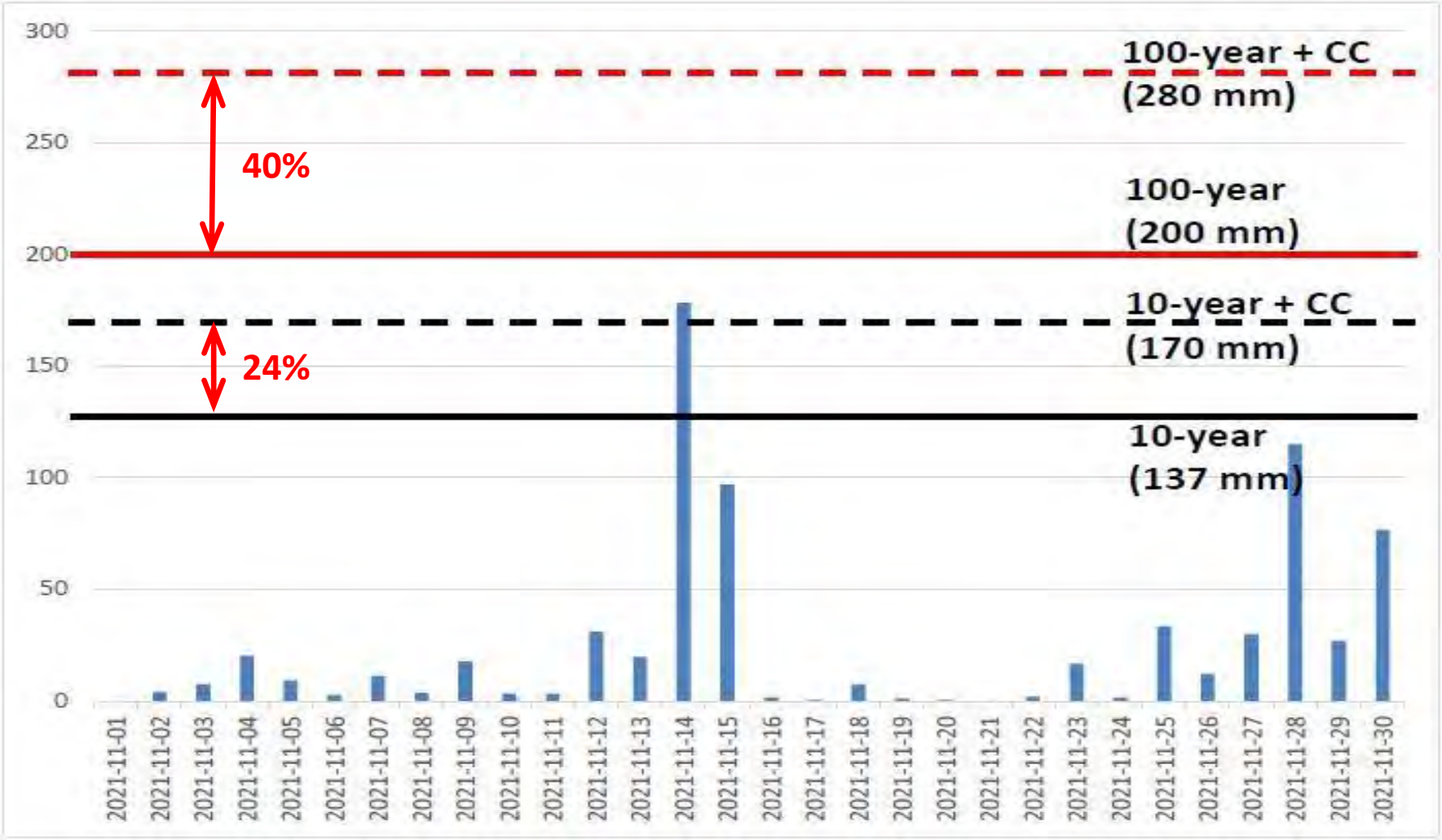
Model Calibration



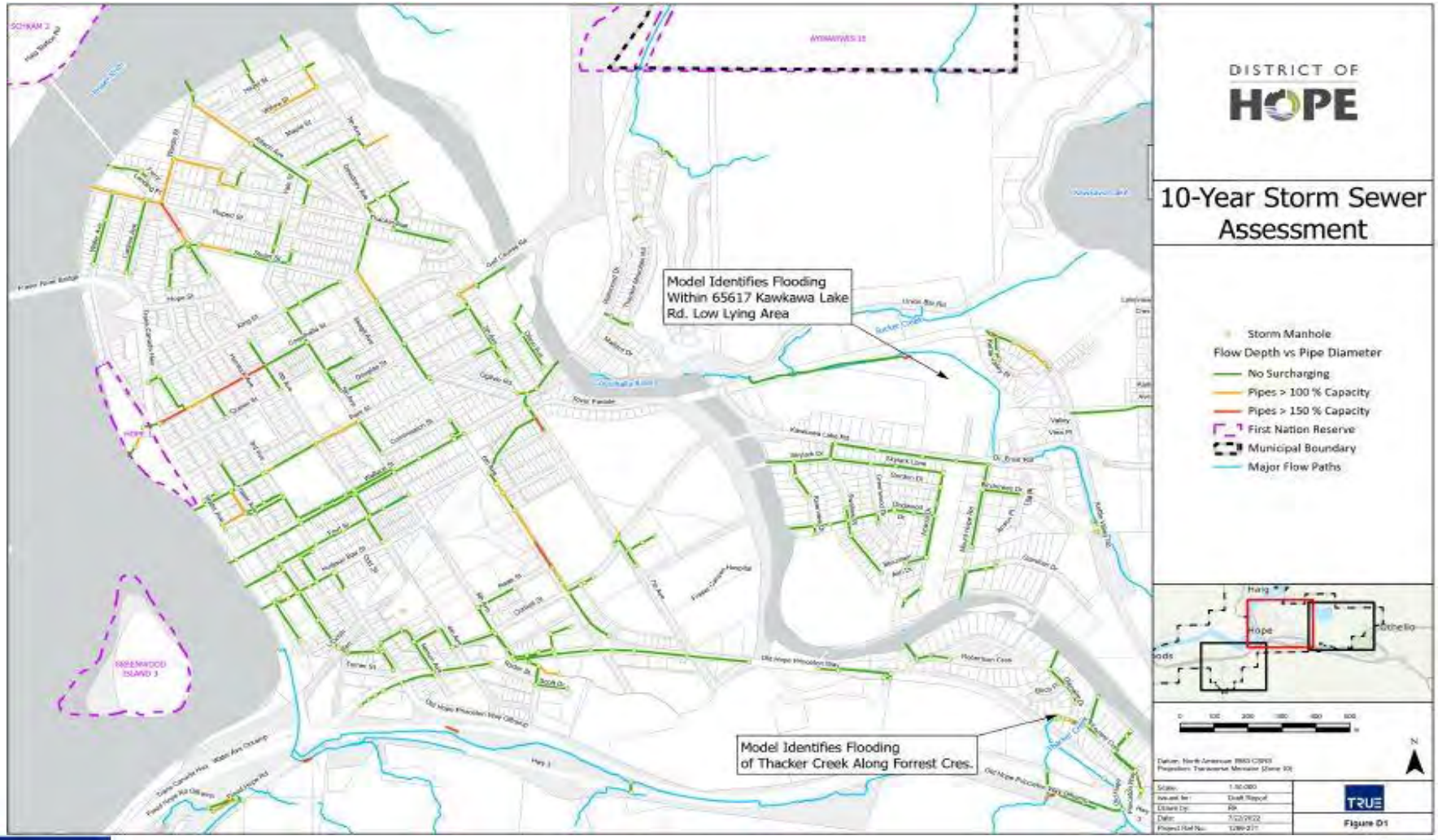
Climate Change



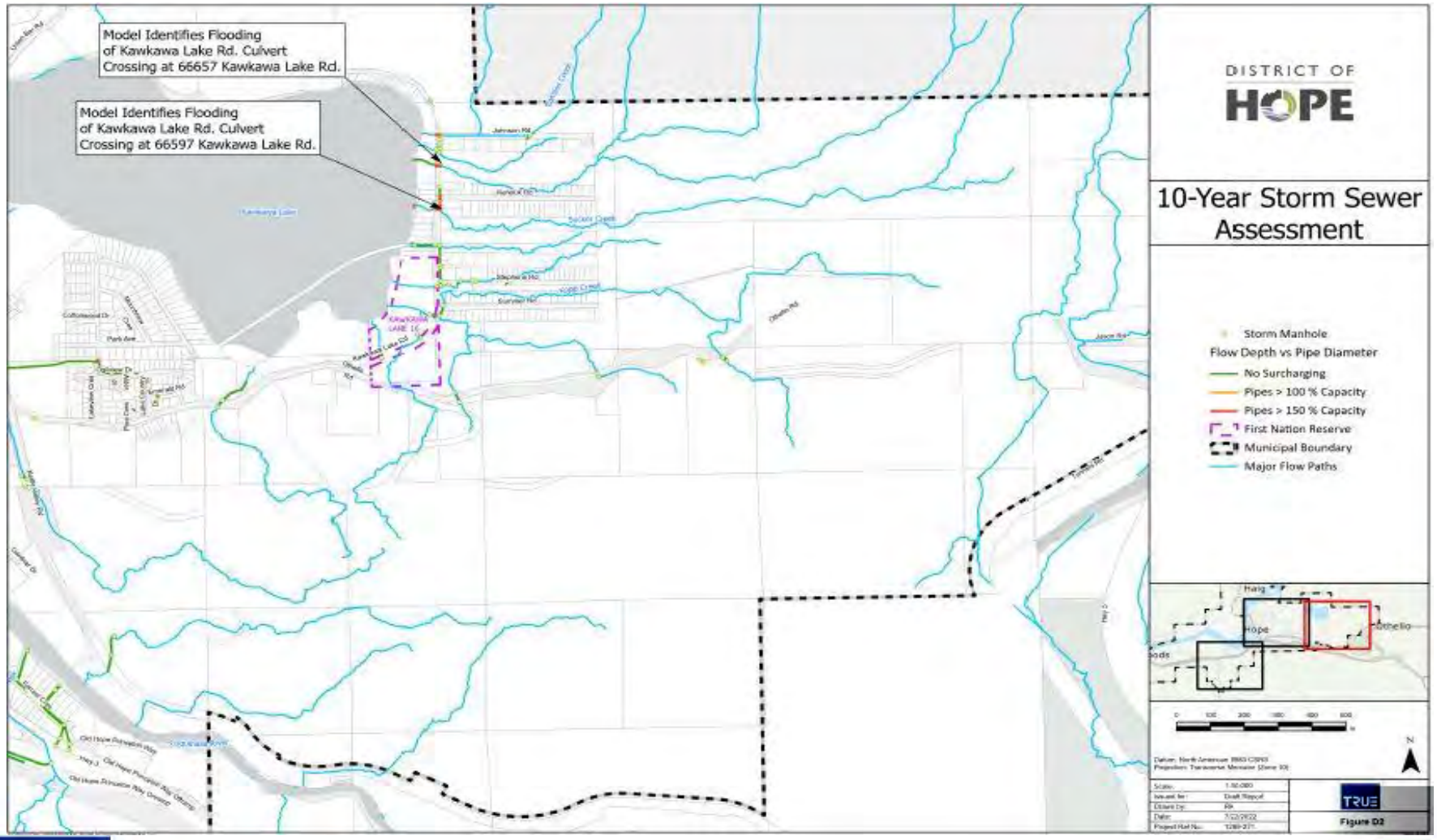
Climate Change



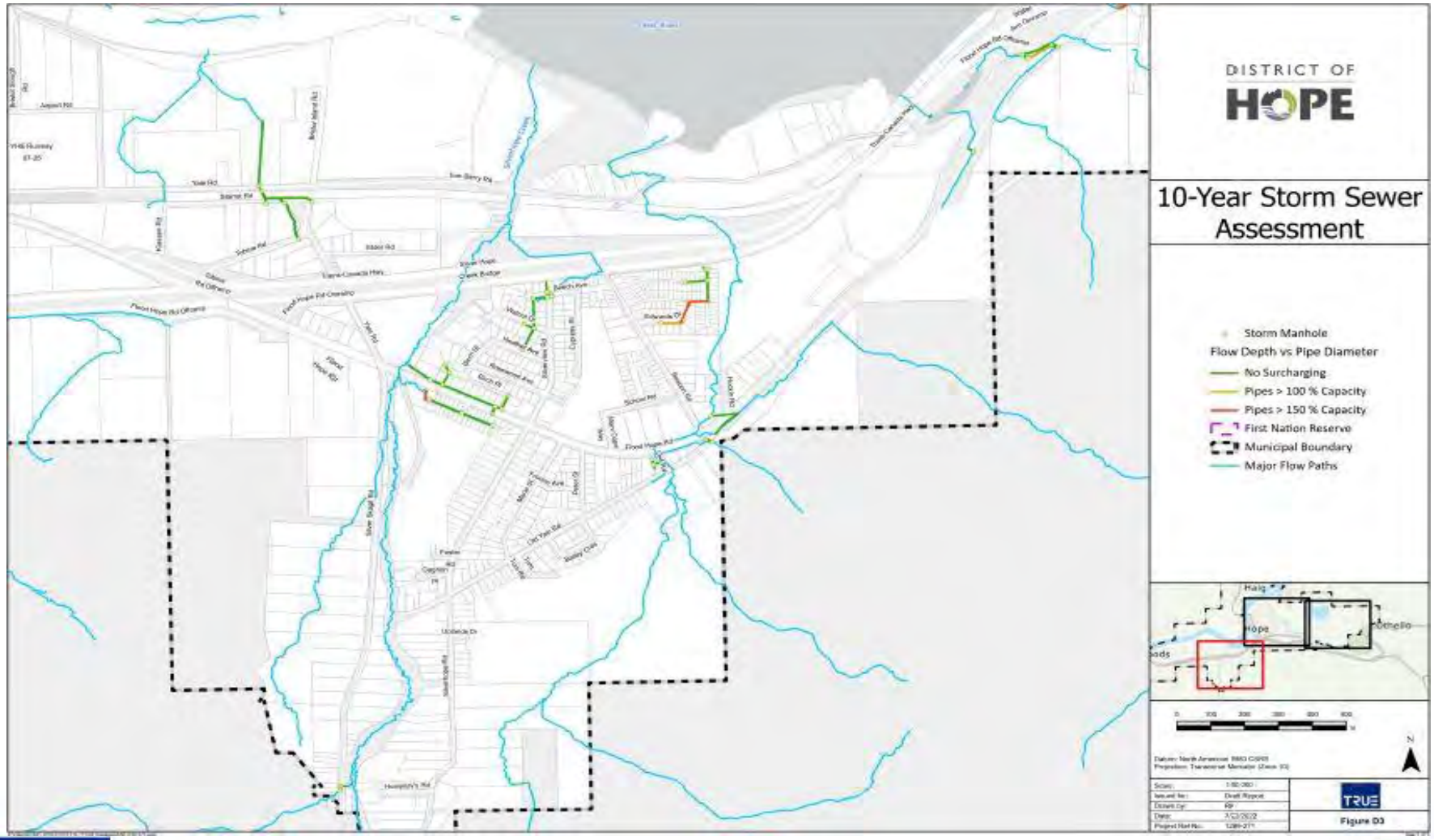
Findings and Conclusions



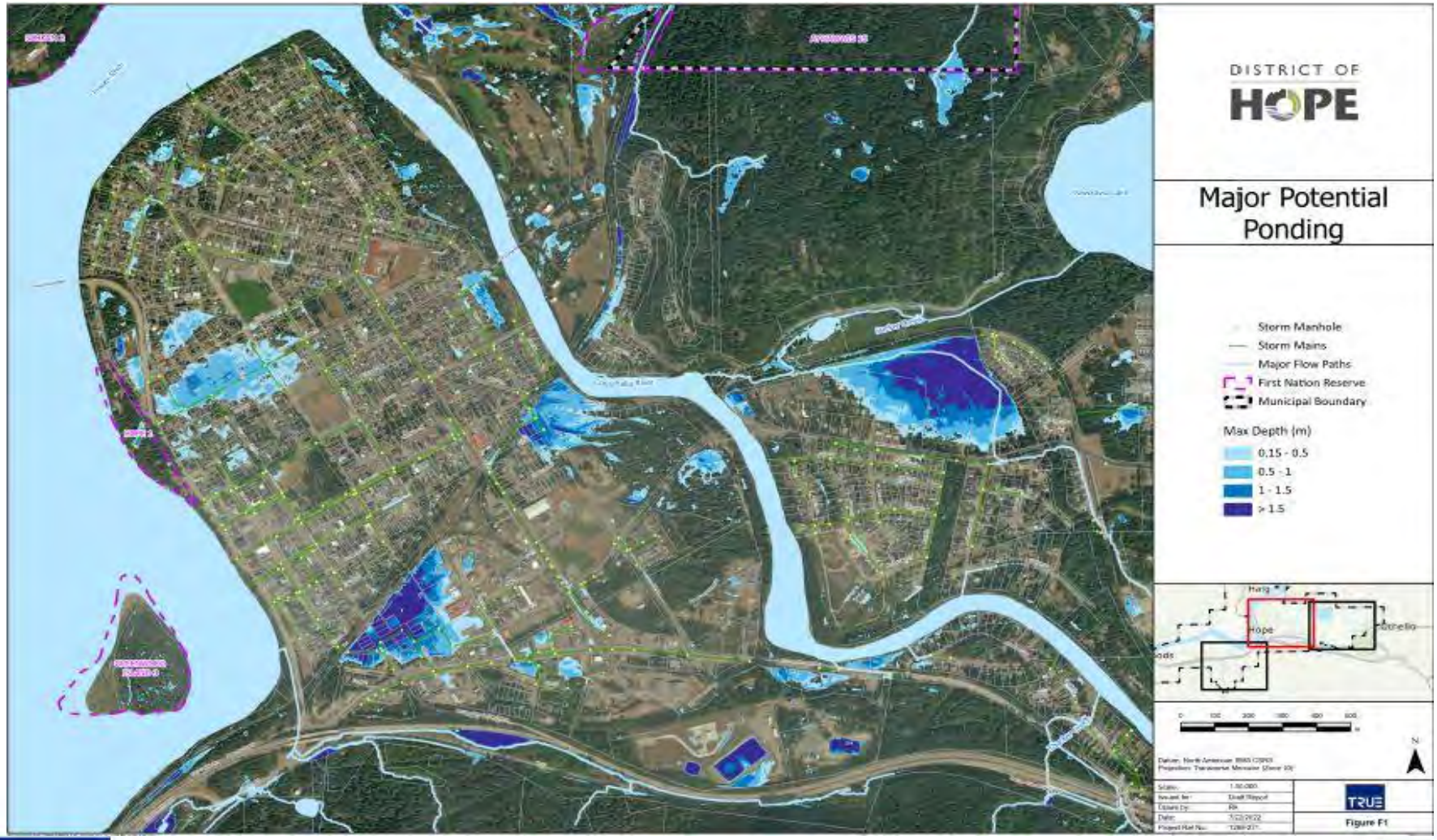
Findings and Conclusions



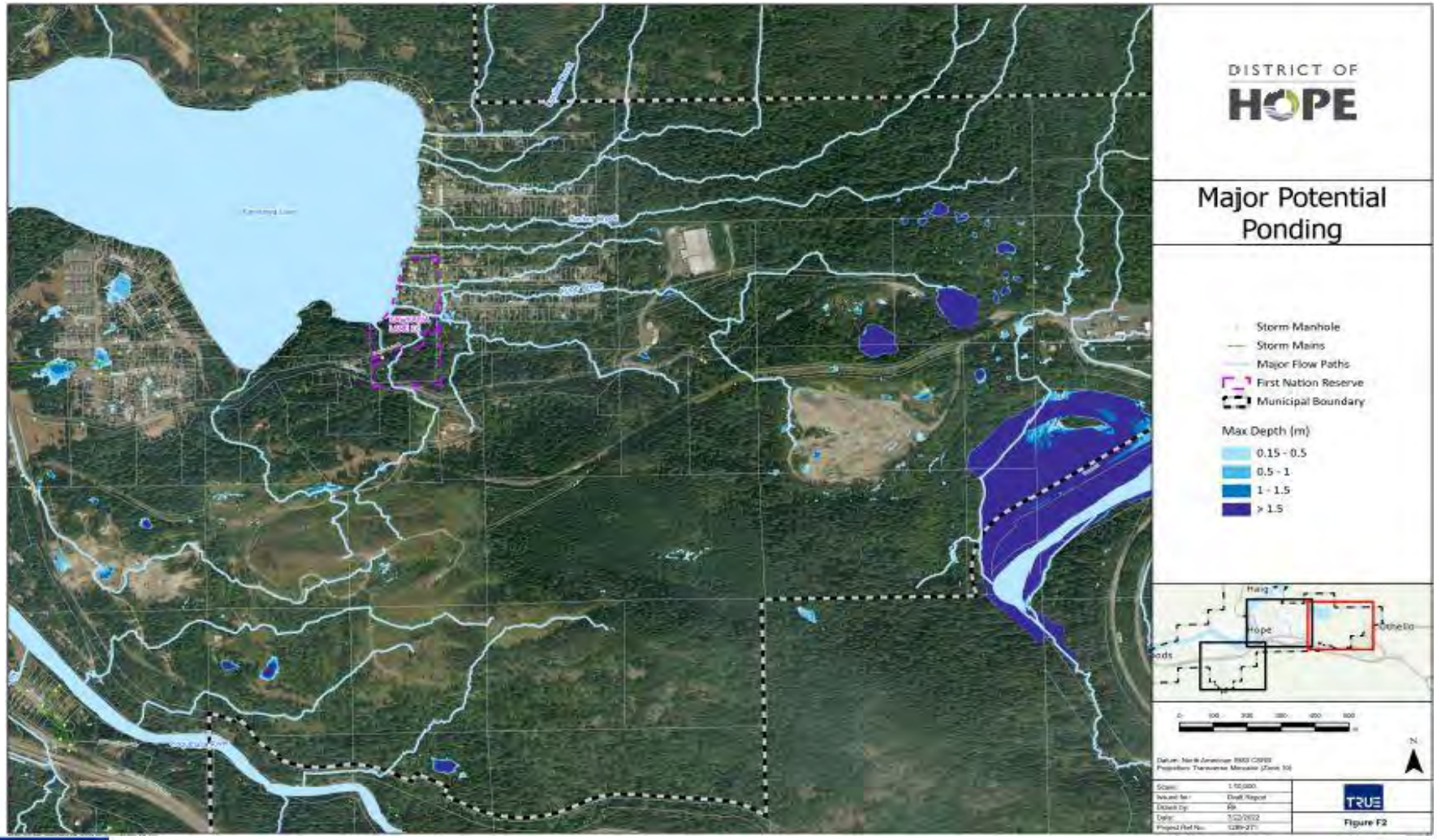
Findings and Conclusions



Findings and Conclusions



Findings and Conclusions



Findings and Conclusions

Recommendations

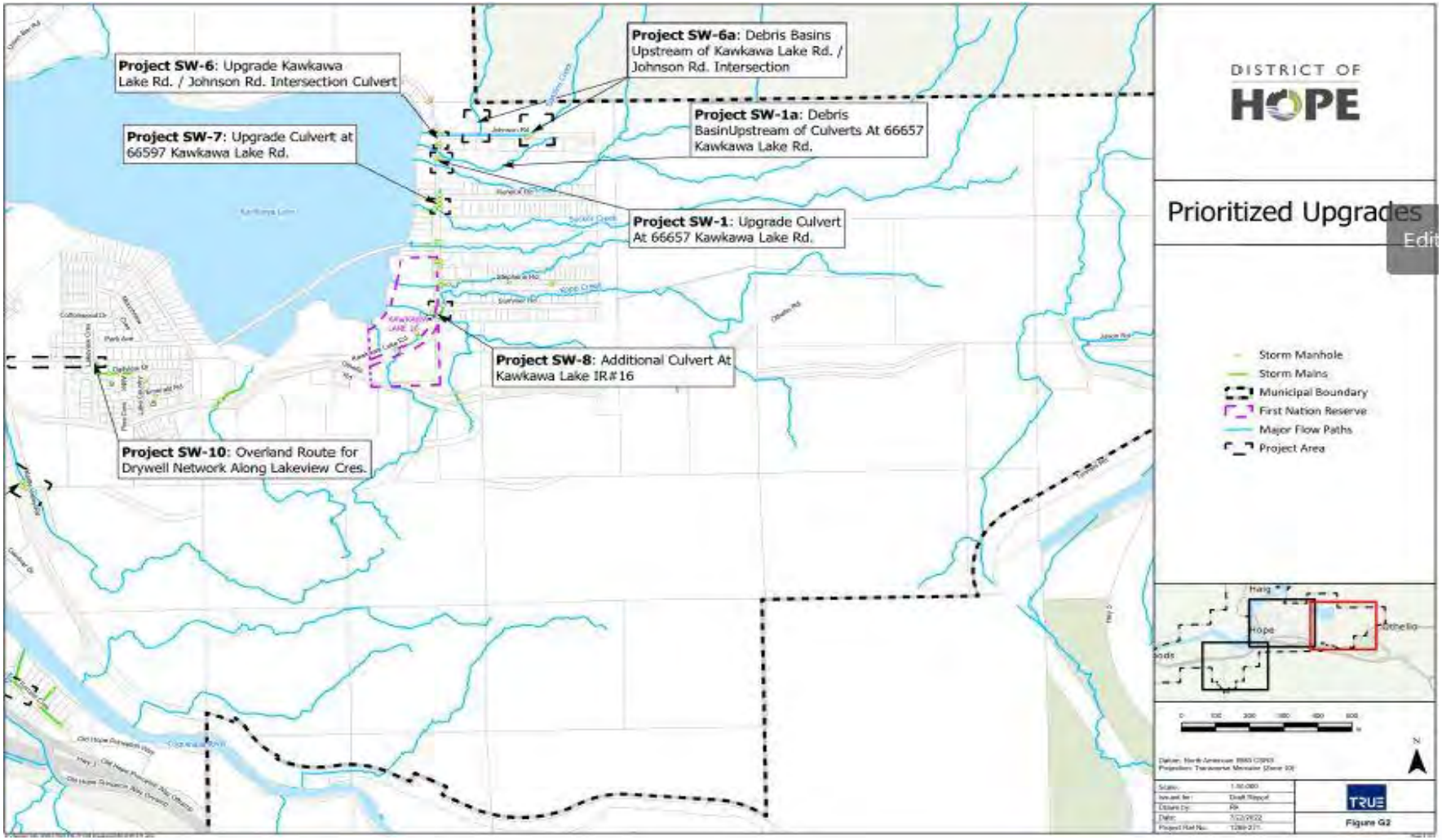
- Non-structural recommendations:
  - Model calibration – flow and rainfall monitoring
  - Continuous upkeep and improvement of asset database and SWMP model – Living Document
  - Update IOCP Flood Hazard Maps
  - Develop watercourse bylaw
  - Update Design Criteria Manual to include climate change and other best practices
  - Increased maintenance of assets
  - Updated DCC Bylaw to include stormwater planning

Recommendations

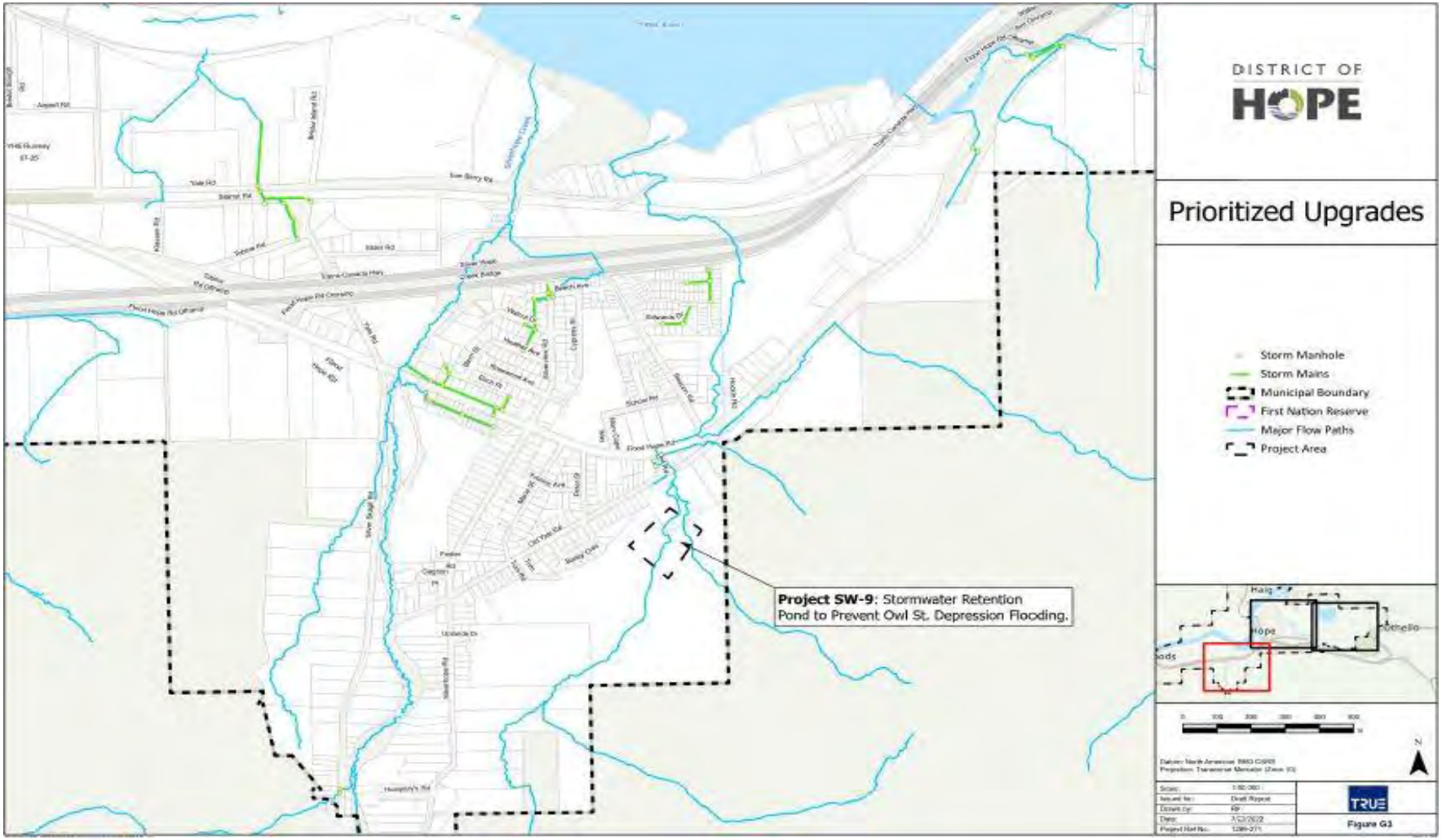
- Structural recommendations:
  - 12 stormwater management improvement projects
  - Priorities assigned: High, Moderate, Low
  - Total cost ~$9.0M

Recommendations

Recommendations



Recommendations



Questions?

Stormwater Master Plan

District of Hope

July 2022

Project No. 1239-271

ENGINEERING ■ PLANNING ■ URBAN DESIGN ■ LAND SURVEYING

2079 Falcon Rd | Kamloops BC | V2C 4J2 | true.ca | tel 250.828.0881 |

Distribution List

# of Hard Copies	PDF Required	Association / Company Name
0	Yes	District of Hope
0	Yes	True Consulting

Revision Log

Revision #	Revised by	Date	Issue / Revision Description

Report Submission

Report Prepared By:

Permit to Practice
No. 1000129

Jonathan Welke, P. Eng.
Project Engineer

Report Reviewed By:

Dave Underwood, P. Eng.
Project Engineer

R:\Clients\1200-1299\1239\1239-271\05 Reports\Storm Water Master Plan\1239-271-Stormwater Master Plan - July 2022.docx

Table of Contents

List of Tables

List of Figures

List of Acronyms

AES	Atmosphere Environmental Service
DEM	Digital Elevation Model
District	District of Hope
GCM	Global Circulation Model
GIS	Geographic Information System
ICI	Industrial, Commercial, and Institutional
IDF	Intensity-Duration-Frequency
IOCP	Integrated Official Community Plan
LiDAR	Light Detection and Ranging
PCIC	Pacific Climate Impacts Consortium
PCSWMM	Personal Computer Stormwater Management Model
SWMP	Stormwater Master Plan
TRUE	TRUE Consulting

Units of Measure

km	kilometre
L/d	Litres per day
L/s	Litres per second
lpcd	Litres per capita per day
m	metre
mg/L	milligrams per Litre
mm	millimetre
NTU	Nephelometric Turbidity Units
psi	pounds per square inch

Executive Summary

The Stormwater Master Plan (SWMP) has been produced by TRUE Consulting (TRUE) at request of the District of Hope (District) to provide description and evaluation of the stormwater conveyance systems within the District's boundaries.

Responsible stormwater planning must be recognized as an on-going and evolving process, instead of a singular static deliverable. This SWMP has been produced as a **living document.**

TRUE has utilized PCSWMM Professional to develop a working model of the District's watershed and conveyance systems. The results of modelled scenarios have been used to lead discussion on existing deficiencies in conveyance infrastructure, recommend areas where future deficiencies may develop with community growth, and identify where future data collection may be useful to expanding the detail and confidence of the model.

In November 2021, an atmospheric river event was experienced by the coast mountains around Hope and caused extensive flooding in the Coquihalla River. The November event was more than a 10-year 24hr rain event and was timely in that it provided a unique opportunity to calibrate the PCSWMM model to actual conditions as experienced during this event. Formal monitoring or recording infrastructure would provide opportunity to further calibrate the computational model.

The 2021 Census of Population data presents that Hope experienced a significant population increase between 2016 and 2021. This is beyond what was anticipated by the District of Hope Integrated Official Community Plan (IOCP) and is presently within the IOCP 2035-2040 range. Inadequate stormwater infrastructure with a growing population has the potential to exacerbate flooding and property damage from major rainstorm events. Several examples of vacant or under-utilized land areas are included in this report. Commentary and guidance is provided for the benefit of the District of Hope as to how to approach these land areas from a high-level stormwater management perspective as prospective development opportunities are brought forward by developers. Section 3.2 of the report will be a valuable resource for District staff when reviewing development applications.

The standard practice of using historical data to predict future events has been shown to be inadequate. As a result, incorporating climate change into predictions is becoming an increasingly important factor in the planning of stormwater management systems. The science of climate change progressed in recent years and there are now tools available to adapt historical rainfall data to account for various scenarios of climate change. By updating its Subdivision and Development Servicing Bylaw Design Criteria Manual to account for climate change, the District can reduce the risk of current development creating future impacts to the overall drainage system, including both public and private property. Additional improvements to the District's Design Criteria Manual are identified for consideration.

The computational model predicts that the municipal stormwater infrastructure generally performs adequately during the 10 year with climate change storm. This is confirmed when compared to anecdotal observations made during the November 2021 atmospheric river event.

As expected, during the 100 year with climate change storm, the minor system is generally overwhelmed by runoff in many areas and the major system is engaged. This typically begins with ponding of stormwater around catch basins and culverts. As the storm peaks, flooding and overland flow occurs. Major stormwater channels where runoff concentrates are overwhelmed, potentially resulting in road washouts, migrating streams, and property damage. Many of Hope's streets allow for the passive drainage of this excessive runoff but some low-lying areas have no overland flow path. These low-lying areas flood until the storm event diminishes and the stormwater infrastructure carries away the excessive runoff or infiltration occurs. It is important that the District recognize these trapped low areas as possible hazards in the review of development applications within the community. Flood hazard maps should be updated to include the findings of this study.

Several structural and non-structural recommendations are provided in this report. Non-structural recommendations include items such as bylaw development, bylaw update, maintenance practices and asset management. Structural recommendations include the identification of twelve prioritized capital projects to address known deficiencies within the District boundaries. Project sheets for each of the capital projects providing description and order of magnitude cost are provided within the report Appendices.

1.0 Introduction

The Stormwater Master Plan (SWMP) has been produced by TRUE Consulting (TRUE) at request of the District of Hope (District) to provide description and evaluation of the stormwater conveyance systems within the District's boundaries.

Responsible stormwater planning must be recognized as an on-going and evolving process, instead of a singular static deliverable. This SWMP has been produced as a **living document**. The purpose of this approach is that the report itself will not require replacement or superseding in the future, but rather, a continual on-going update as goals, resources, inputs, and regulations to it change. The content of this document is not intended to remain static.

TRUE has utilized PCSWMM Professional to develop a working model of the District's watershed and conveyance systems. At the time of writing, TRUE was not aware of any flow monitoring within the study area, as such, the model remains uncalibrated. However, this report will discuss the limitations of the calibration and present recommendations on validating the results.

Utilizing the PCSWMM model, TRUE has produced results for several design storm events in current day conditions and future estimated conditions. Current day conditions were evaluated using a combination of freely available provincial and federal datasets, topographic survey, and orthographic photography.

The results of the modelled scenarios have been used to lead discussion on existing deficiencies in conveyance infrastructure, recommend areas where future deficiencies may develop with community growth, and identify where future data collection may be useful to expanding the detail and confidence of the model.

1.1 Limitations

The scope of this study is limited to the conveyance of storm events through and over the District's developed boundary. This study does not look at the effects of flooding or backwater events related to the major water bodies within and surrounding the District such as the Fraser River, Silverhope Creek and the Coquihalla River. Those water bodies are the subject of various other related studies, some of which are discussed following.

Specific model limitations are noteworthy. These include:

1. The exclusion of minor drainage components of the District's stormwater management system. These minor drainage components are likely to have no impact on the modelling of major storms. Examples of these include residential driveway crossing, catch basins, and minor storm piping.
2. The limited inclusion of MOTI infrastructure impacting the District's watershed. It is assumed this infrastructure conveys flows across MOTI corridors but is not strictly modelled.
3. The exclusions of areas which do not include major stormwater management systems. This includes the Landstrom/Haig area North of the Fraser River, and the Airport/Floods area at the west end of the District.

As with any other computational model, the results are only as good as the inputs. The model and results are based on the District's current GIS database. As part of the work, some of the GIS elements have been updated with survey information and field confirmation. It will be recommended that the District make efforts to maintain the currency of their GIS database and periodically update the PCSWMM model to ensure that information used by community staff and leaders utilizes the most up-to-date information. The base information of any recommendations or projects as a result of this study should be field confirmed early in the implementation stages.

1.2 Background

This study aims to provide District staff with:

- Guidance while reviewing development proposals
- Identification of existing system deficiencies
- Understanding of challenges associated with population growth and climate change
- Illustration of the impact of climate change over time
- Recommendations for long-term upkeep and improvement of the related stormwater model and master plan

1.2.1 Integrated Official Community Plan

The District's Integrated Official Community Plan (IOCP) lays out goals, objectives, and policies for the growth and management of the community. Included in the IOCP are several statements and goals directly related to the development and upkeep of the SWMP. These statements are summarized here:

Goal 9: Hope has a healthy, dependable source of water and a community sanitary sewer and stormwater system that: is responsibly managed; and protects the natural environment

Policy 1.4.2: Where feasible, ensure that Urban/Suburban development provides for paved road access, management of stormwater, potable water supply, sanitary sewage collection and treatment, solid waste collection, street lighting, and underground utilities, in an ecologically responsible manner.

Policy 6.4.2: Encourage, where appropriate, the use of wetlands for stormwater detention or retention purposes.

Objective 9.7: To prevent impacts to water quality in creeks, stream, rivers, and other bodies of water that may receive stormwater discharge.

Policy 9.7.1: Identify drainage basins, necessary infrastructure improvements, capital costs, and environmental protection requirements.

Policy 9.7.2: Encourage new developments to incorporate stormwater management best practices that are appropriate for site conditions.

Policy 9.7.3: Ensure drainage to the ground is maintained at pre-development levels and flow paths are provided for major storm events that cannot be returned to the ground or accommodated by the storm sewer system. The storm sewer system should continue to be upgraded to reduce flooding potential.

Policy 9.7.4: Encourage the use of parks and open space for stormwater detention areas and conveyance corridors where space and programs permit.

Policy 9.7.5: Encourage the use of surface drainage systems as amenities or open space corridors.

Policy 9.7.6: Encourage the use of natural systems like wetlands to capture, slow down, store, filter, and infiltrate stormwater discharge in existing and new developments. Such systems should be design by a Qualified Professional with expertise in this field.

Policy 9.7.7: Encourage new subdivisions to include Integrated Stormwater Management Plans to mitigate the negative impacts of downstream runoff and discharge entering watercourse and streams.

Policy 9.7.8: Prepare a Stormwater Management Master Plan for the community to reduce negative impacts from direct discharge into rivers, creeks, and streams.

1.2.2 Subdivision and Development Servicing Bylaw and Design Criteria Manual

The District's Subdivision and Development Servicing Bylaw and Design Criteria Manual provides a thorough and comprehensive guidance for the handling of stormwater conveyance and detention in new developments within the District's jurisdiction. Analysis and recommendation performed in this SWMP have considered the guidance of the Design Criteria Manual, as well as provides recommended advancements of the same. The overall documentation as it relates to stormwater management is fairly comprehensive and includes most of the major topics considered in industry standard design. Notably missing from the Design Criteria Manual is discussion and inclusion of climate change, specifically in selecting and utilizing design storms for sizing infrastructure.

1.3 Previous Related Studies

The District and other related governing bodies have commissioned various studies related to the District's overall stormwater environment. Key conclusions from these reports are summarized in point form in the following sections.

1.3.1 East Kawkawa Lake

The East Kawkawa Lake Drainage Study was written in 1987 by Stanley Associates Engineering Ltd. for the Regional District of Fraser-Cheam.

The Regional District of Fraser-Cheam was dissolved and incorporated into the Fraser Valley Regional District in 1995.

- The study looked at flooding and erosion from Camilos Creek, east of Kawkawa Lake
- Concluded that "critical weather conditions" causes flooding of the alluvial fan where the residential community is built
- Concluded that culverts and stream channel capacities within lower alluvial fan can accommodate 2-year return flows
- Concluded that >2-year events will create flooding up to 1.5m
- Recommended redirection of Camilos Creek debris flows between Johnson and Kereluk roads (200-year return event)

1.3.2 Silverhope Creek Flood Hazard

The Silverhope Creek Flood Hazard Assessment was written in 1999 by Northwest Hydraulic Consultants for the District of Hope.

- Floods of the creek and surrounding area occurred in 1980, 1984, 1989, 1990, and 1995, all between November and February (winter)
- HEC-RAS model built to study backwater conditions
- Creek was estimated to convey 300cms before breaching its banks

1.3.3 Johnson Road Flood Hazard

The Johnson Road Flood Hazard Assessment was written in 2002 by Northwest Hydraulic Consultants for the District of Hope.

- Written in response to flooding caused by January and February rain-on-snow events
- Floods illustrated deficient capacity of culverts along Johnson Road
- Recommended upgrading the culverts along the road and below Kawkawa Lake Road and adding a sediment trap to reduce sediment accumulation in ditches.

1.3.4 Lower Coquihalla Flood Hazard

An assessment of the flooding hazard for the lower portion of the Coquihalla River through the District was begun in 2017 and reported to council in 2019 by LCI Engineering Consultants. This report discussed the potential impacts of flooding from the river. That report made recommendations on protecting riverbanks with the intention of protecting riverside lots.

An atmospheric river event occurred in Hope in November 2021 (see following section). Following that event that induced extreme flows in area streams and rivers, including the Coquihalla River, the District of Hope retained Ally Emergency Management Inc. to conduct an After Action Report. This report reviewed the timeline of events and actions that took place during the November storm and summarized the pros and cons of how the overall situation was handled. The report makes recommendations on which practices to retain, and which may need to be refined for future potential events.

1.4 2021 Flooding Events

In November 2021, an atmospheric river event was experienced by the coast mountains around Hope and caused extensive flooding in the Coquihalla River as well as the Coldwater and Tulameen Rivers

This event caused extensive damage in those watersheds, which is well covered in the media.

An atmospheric river is a band of warm, moisture-laden air many hundreds of kilometers long and hundreds of kilometers wide. The result of which can be extended periods of heavy rain fall

Specific to the District and this SWMP, the size of the November event and performance of the storm system is of particular interest. This section will review the event in the context of urban drainage rather than the flooding and damage caused by river processes.

The November event was more than a 10-year 24hr rain event. The major event spanned over two days (November 14th and 15th) for a total estimated rainfall of 275 mm. Later in the month (November 28th) another significant event occurred with a total rainfall of 115 mm. Table 1-1 summarizes the events while Figure 1-1 provides a graphical representation of the rainfall for the entire month of November.

TABLE 1-1: SUMMARY OF NOVEMBER 2021 RAINFALL EVENTS

Date	24-hour Rainfall	Return Period
November 14th, 2021	178 mm	50-year
November 15th, 2021	97 mm	2 to 5-year
November 28th, 2021	115 mm	5-year
November 30th, 2021	77 mm	2-year
December 1, 2021	66 mm	1 to 2-year

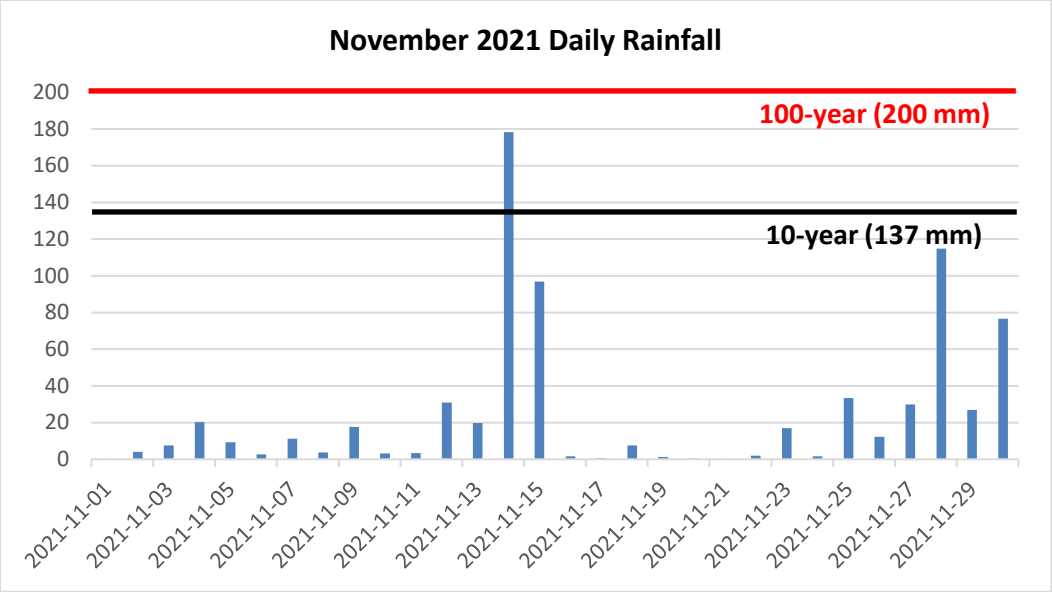


FIGURE 1-1: TOTAL DAILY RAINFALL IN NOVEMBER 2021

Under this significant event, the District's internal drainage system performed relatively well compared to the riverine impacts in the region. Figures A1 and A2 in Appendix A provides a general overview of the impacts and performance of the storm system. The figures also highlight areas of the District which saw minimal impacts with areas of no evidence of flooding or flooding area despite relatively large catchment areas.

The following points summarize the general performance aspects of the District's drainage system:

- The Kawkawa Lake residential area was the worst performing area with overtopping culverts, debris impacts and creek avulsion. The areas most impacted by this 2021 event are effectively the same as those areas reviewed in the *East Kawakawa Lake* Study (see previous section) and the *Jonson Road Flood Hazard* Study (see previous section).
- Kawakawa Lake had elevated water levels inducing minor impacts to property.
- Thacker Creek (Forrest Cres.) was at capacity and is suspected to have slightly overtopped with overland flows travelling down Glenaire Drive.
- Southern portions of Kettle Valley Rd experienced overland flows resulting in a partial road washout.
- Overland flows from Kettle Valley traveled to Dr Frost Rd contaminating a private well
- The Hope Creek Debris Basin filled and overtopped with overland flows travelling north on Highway 1/Water Ave.
- The urban core of Hope, with the most piped infrastructure, experience minimal flooding with no indications of surcharged sewers.
- Old Yale and Owl Rd did not see any signs of flow or flooding despite a large catchment from Hope Mountain.

1.5 Watershed

The District of Hope is located at the eastern end of the Fraser Valley, at the confluence of the Coquihalla and Fraser Rivers, amongst the steep slopes of the Coastal Mountain Range. Development of the District is generally focused to the lower areas adjacent to and south of the rivers, and near Lake Kawkawa, with outer limits boarding the slopes of the mountains. Areas of low development and agriculture exist north of the Fraser River, and at the west and east ends of the District boundaries.

The District is situated within the Pacific Maritime Ecozone, which is described as lying between the Pacific Ocean and the province's western mountain ranges. This bounding between ocean and mountains results in the characteristics of the zone being strongly influenced by the ocean.

The District's rainfall patterns are largely dictated by orographic conditions, in which airflows heavy with moisture from the ocean are forced to higher elevations by air currents, which are driven up by steep mountain slopes (see Figure 1-2). The result is extensive rainfall on the ocean-side of the mountains. At higher elevations, it is common for moisture to manifest as snowfall.

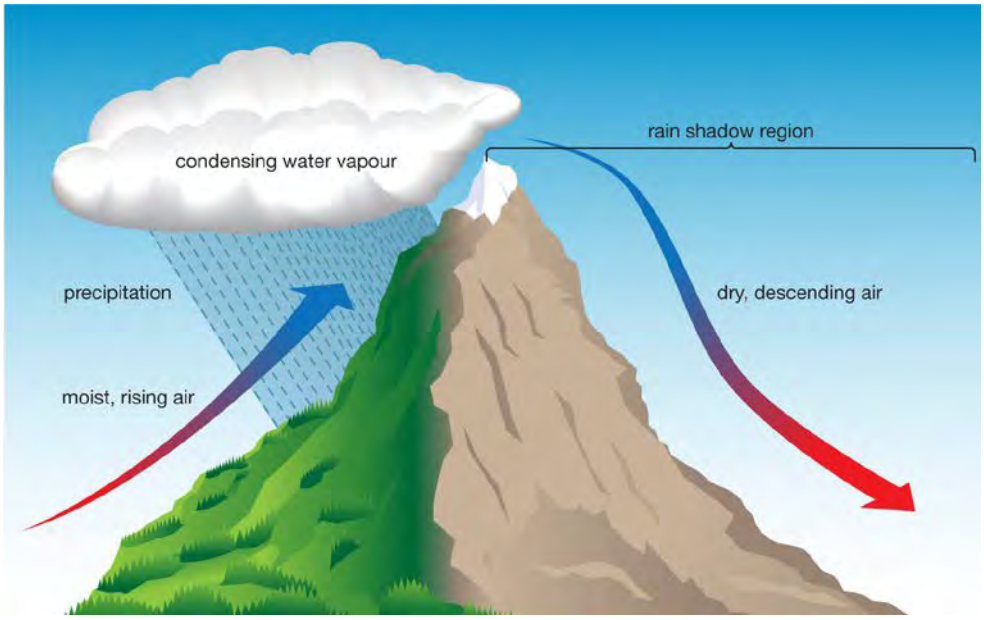


FIGURE 1-2: GRAPHICAL DESCRIPTION OF OROGRAPHIC RAINFALL

The persistent rainfall provided by the ocean and mountain bound conditions results in the District's watershed being occupied by dense vegetation.

The Coquihalla River flows into the Fraser River at the north end of the District's downtown area and continues west to the final terminus at in the Straight of Georgia. Many creeks and streams flow from the mountains, through the District, and terminate in the major rivers.

Stormwater from catchment areas in the mountains south and east of the District generally flow north and west overland until they are either discharged into water bodies or picked up by the District's conveyance infrastructure.

To the south of the District, along BC Highway #1, provincially owned infrastructure conveys flows from the south mountain catchments towards the District's downtown area.

Appendix B contains figures which show the major watercourses and major flow paths within the study area. The watercourse alignments have been updated from Provincial datasets based available LiDAR.

2.0 Hydrologic and Hydrologic Model

The analysis for the SWMP was performed with a computational model, built using PCSWMM Professional.

PCSWMM Professional is an industry-standard GIS-based computational software suite designed to handle all aspects of stormwater modelling, including catchment delineation and description, flow path determination, and design storm development. The “two-dimensional” aspect of the model describes the function of evaluating both overland flow and infiltration (the first dimension) and engineered collection and conveyance infrastructure (the second dimension).

The general development of the model, described herein, involves:

- Selection of calibration records
- Delineation of subcatchments
- Determination of subcatchment parameters
    - Impervious Area / Land use
    - Soil conditions
    - Slope
- Inputting Stormwater infrastructure
- Selection and development of design storms
    - Current and Future (Climate Change)

The model itself has been provided to the District on a USB drive with the original submission of this document.

2.1 Calibration Records

Monitoring of flow in key elements of the storm infrastructure and measurement of real-world storm events are crucial in calibrating a computational model. These measured variables provide a higher level of confidence to model developers and decision makers when reviewing the results of design storms intended to mimic future extreme events (such as 1-in-100 year storms).

The District does not currently have any monitoring or recording infrastructure to provide these variables for calibration. TRUE held discussions with District staff to collect anecdotal evidence of deficiencies (ponding, surcharging, etc) during past storm events. This evidence was used as approximate indicators of calibration during model development. Most notable and recent of these events was the November 2021 Atmospheric River. That event was used to produce a design storm (see later sections) and the results of which were found to be reasonably consistent with the anecdotal records of what occurred along with field review completed by TRUE.

2.2 Subcatchments

The study area for the model has been broken into 2618 subcatchments. Each subcatchment defines a localized area of stormwater collection that discharges to a single point via overland flow. Subcatchments are the basic building blocks of the model, to which attributes such as slope, vegetative cover, infiltration, etc., are applied.

2.2.1 Delineation

Subcatchments and overland flow paths are delineated from a high-resolution digital elevation model (DEM) using GIS software (see Figure 2-1). The DEM used for this study was obtained from the Government of Canada High Resolution Digital Elevation Model – CanElevation Series. This data set has been collected by the federal government over the series of several projects using airborne LiDAR equipment. The dataset provided gives a 1m² resolution for much of the study area. This data can be sourced here:

https://open.canada.ca/data/en/dataset/957782bf-847c-4644-a757-e383c0057995

Once delineated by the software, the resulting mapping of subcatchments was reviewed and manually adjusted to fill in holes and identify missing overland paths.

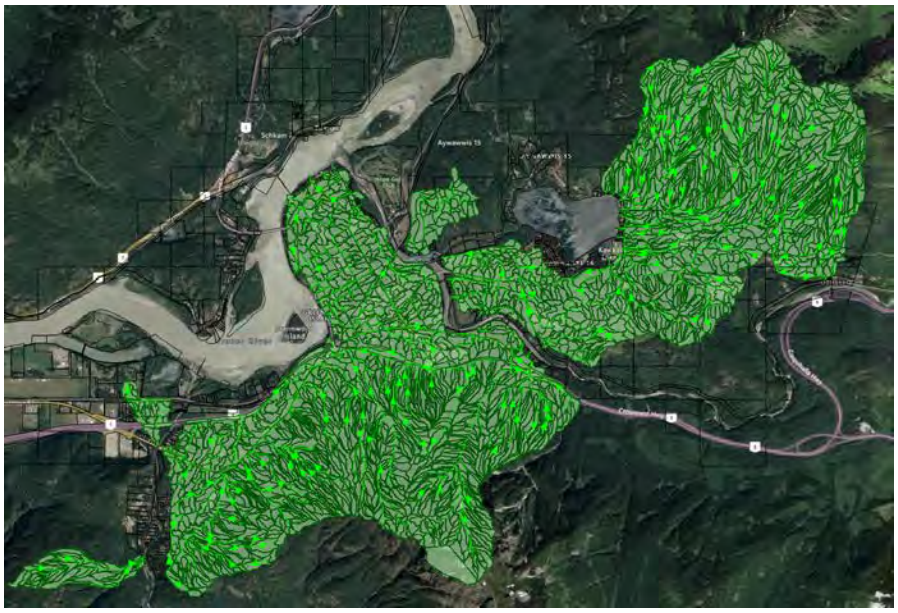


FIGURE 2-1: MODEL CATCHMENT AREA

Two areas are excluded from the model, including the Landstrom/Haig area North of the Fraser River, and the Airport/Floods area at the west end of the District as there is minimal drainage infrastructure in those regions and limited growth potential. The MOTI infrastructure impacting the District's stormwater management is also idealized. These limitations are further discussed in Section 1.1 above.

2.2.2 Soil parameters

Soils parameters are an attribute of subcatchments that defines how pervious areas handle overland flow. This data is typically sourced from the Government of BC Soil Mapping Data Packages. However, most of the Hope area soils have not been mapped by the Government of BC. Data is available for the Hope-Flood area and further westward along the Fraser Valley. This data presents that the valley soils are generally well drained sandy loam until the river begins to widen, 10-15km west of Hope. It is assumed that the soils in the Hope area are generally sandy loam.

2.2.3 Impervious Areas and Vegetative Cover

Determination of the percentage of area covered by impervious surfaces and vegetative cover impacts the nature of overland flow through subcatchments and is used by the model alongside soil parameters to determine properties for overland flow, storage, and infiltration.

A machine learning process was used within GIS software to evaluate high resolution orthographic imagery. This algorithm extracts building outlines, impervious areas (such as pavements), and identifies vegetative cover. A typical output of this algorithm is presented in Figure 2-2.

FIGURE 2-2: TYPICAL OUTPUT OF GIS SOFTWARE IMPERVIOUS AREA ALGORITHM – RED = IMPERVIOUS, GREEN = PERVIOUS

2.2.4 Land uses

Land use is used as an estimate of future subcatchment conditions, given growth of the community. The District's IOCP provides the framework for land use zoning.

Appendix C provides figures which show the Districts current IOCP land use designations.

2.3 Minor System

The minor system describes the built conveyance infrastructure, such as manhole, pipes, catchbasins, culverts, storage, infiltration, outfalls, etc. The entirety of this system was surveyed by TRUE in 2019. That survey aimed to collect the location of all manholes, along with photos, inverts, and pipe sizes. TRUE estimates that the survey was successful in picking up over 98% of existing manholes. District and TRUE construction records, as well as high resolution orthographic photos, were reviewed in comparison to the surveyed information to identify any missed information.

The District's built storm infrastructure consists of several hundred manholes, many hundred catchbasins, approximately 50 discharge locations (outfalls, rockpits, infiltration points), and nearly 37km of pipe of various size, material, and age.

Much of the District's built storm infrastructure was developed before incorporation, development guidelines, or engineering standards were enforced. As such, a large portion of the conveyance assets do not meet any level of industry standard for capacity, design, or materials of construction. Accounting for this, and the overall age of most assets, the District is carrying a considerable infrastructure deficit for the existing storm system. As noted in the 2016 Asset Management Investment Plan, written by Urban Systems Ltd, the District carried up to $6.5 million in storm system infrastructure deficit. TRUE notes that the District should be planning for the regular upkeep and renewal of all asset groups, budgeting for the total lifecycle costs.

Most of the infrastructure listed above is located within the downtown core and the neighborhood immediately to its north. Additional infrastructure is found within the newer neighborhoods bordering Kawkawa Lake Rd, between the Coquihalla River and Kawkawa Lake Park. Some infrastructure is found within the neighborhoods surrounding the Silverhope Rd and Flood Hope Rd intersection. The neighborhoods east of Kawkawa have the least amount of municipal stormwater infrastructure. As expected, the District of Hope's stormwater infrastructure is found where the land is well developed, populated, and flat.

Highways 1 and 3 contain culverts which are maintained by the MOTI. The location and physical properties of these culverts were gathered from the Ministry of Transportation (MOT) Culvert database accessed through BC iMap. This data can also be accessed here:

https://catalogue.data.gov.bc.ca/dataset/89d44ba6-7236-48ed-afab-f25a98c846ef

2.4 Growth Scenarios

The 2021 Census of Population data presents that Hope experienced an 8.2% population increase between 2016 and 2021 (see Figure 2-3). This is beyond what was anticipated by the District of Hope Integrated Official Community Plan (IOCP) and is presently within the IOCP 2035-2040 range. Inadequate stormwater infrastructure with a growing population has the potential to exacerbate flooding and property damage from major rainstorm events.

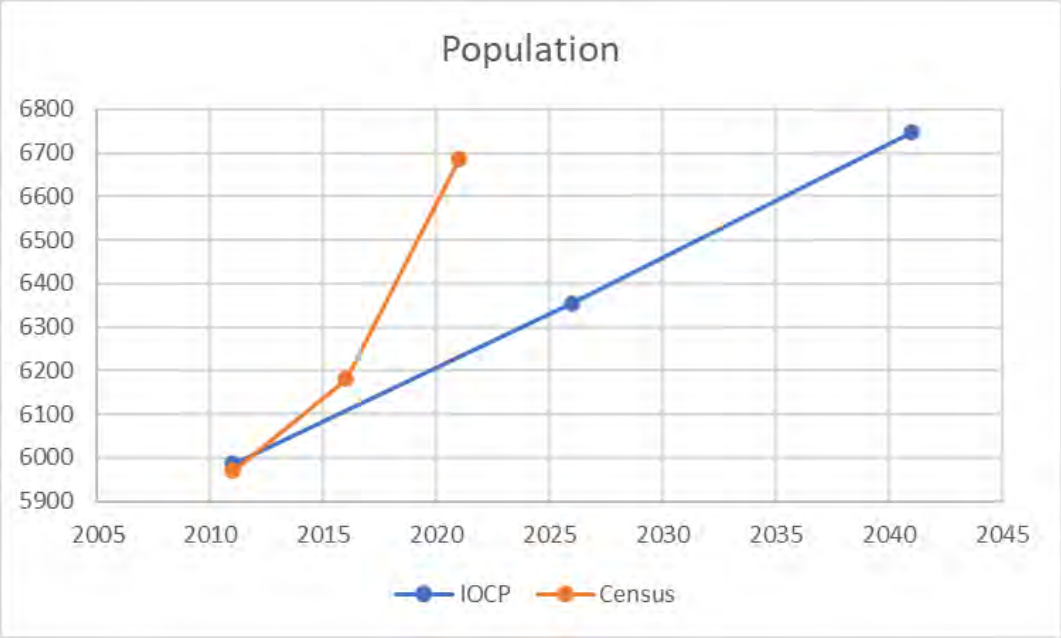


FIGURE 2-3: POPULATION BY GOVERNMENT OF CANADA CENSUS OF POPULATION AND DISTRICT OF HOPE INTEGRATED OFFICIAL COMMUNITY PLAN

2.5 Rainfall

Environment Canada monitors and records climate data throughout the country. This information is used to produce Intensity-Duration-Frequency (IDF) Curves. These curves provide the basis for design storms for return periods of 2, 5, 10, 25, 50, and 100 years.

Environment Canada produces a curve specifically for the District of Hope, as shown in Figure 2-4 below.

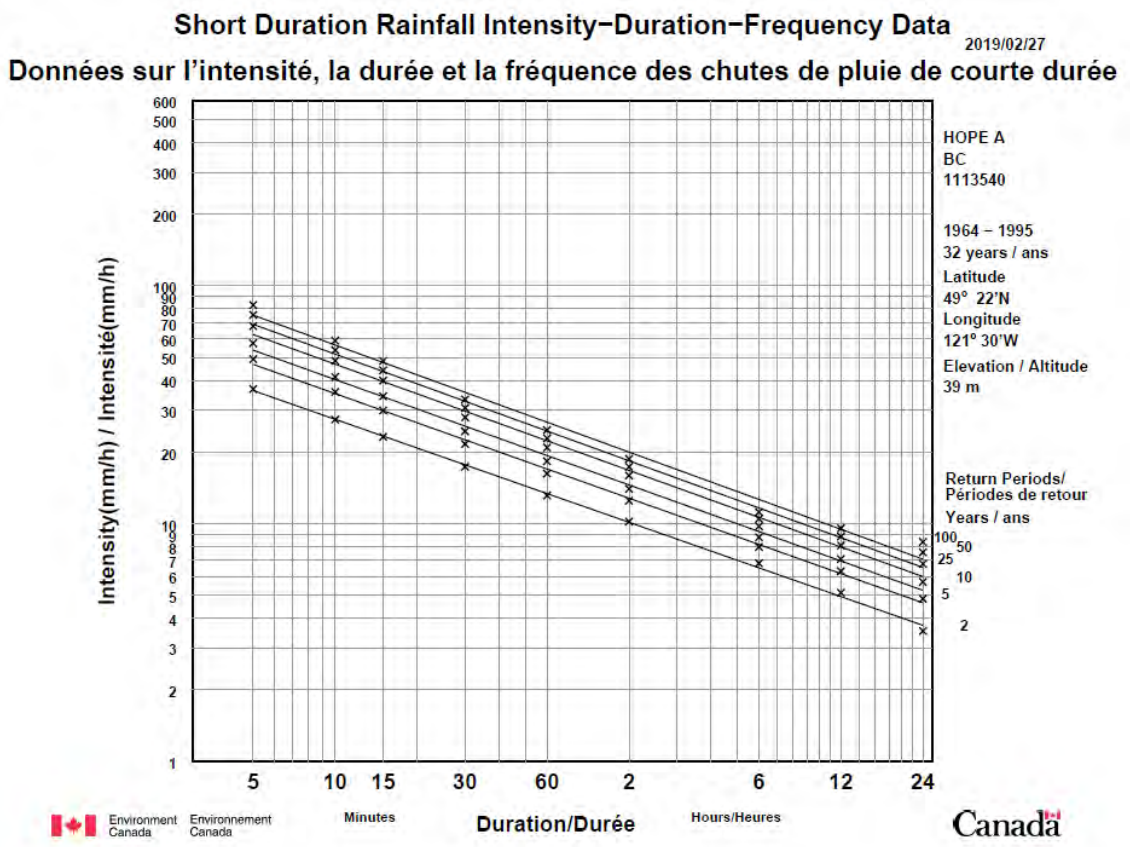


FIGURE 2-4: DISTRICT OF HOPE IDF CURVE FROM ENVIRONMENT CANADA

2.5.1 Climate Change

The natural limitation of IDF Curves is that they are only based on historic data. This use of historic data has been shown to inadequately predict future events, due to the effects of climate change. The science of climate change progressed in recent years and there are now tools available to adapt IDF curves to account for various scenarios of climate change.

For the purposes of this study, the results of two tools have been evaluated and utilized:

- IDF CC Tool: https://www.idf-cc-uwo.ca/
- IDF Temperature Scaling: https://climatedata.ca/resource/idf-curves-and-climate-change/

For both tools the highest emissions scenarios for Global Circulation Models (GCM) have been used generally referred to as SSP5.85 (Shared Socio-Economic Pathway). This climate scenario is characterized by rapid and fossil-fueled development with high socio-economic challenges to mitigation and low socio-economic challenges to adaptation.

The IDF_CC tool is designed as a simple and generic decision support system to generate local IDF curve information that accounts for the possible impacts of climate change. It applies a user-friendly GIS interface and provides precipitation accumulation depths for a variety of return periods (2, 5, 10, 25, 50 and 100 years) and durations (5, 10, 15 and 30 minutes and 1, 2, 6, 12 and 24 hours), and allows users to generate IDF curve information based on historical data, as well as future climate conditions that can inform infrastructure decisions. The tools utilize the outputs of multiple Global Circulation Models, precipitation data, and statistically downscales the data to user selected site.

IDF Temperature scaling provides a simple and robust way to update IDF curves for climate change. The capacity of air to hold moisture is governed by the Clausius-Clapeyron (CC) relation, approximately 7% per 1°C. The scaling method relies on the Clausius-Clapeyron moisture capacity-temperature relationship of air to project rainfall into the future using temperature outputs of climate models. For the Hope area the estimated increase in temperature by the end of the century is 5.2 °C.

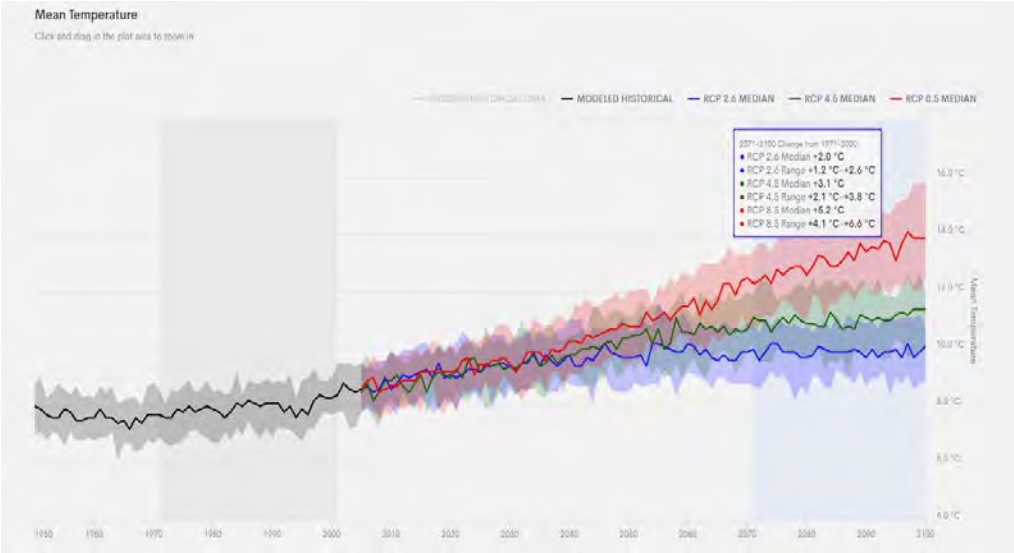


FIGURE 2-5: IDF TEMPERATURE SCALING OUTPUT

TABLE 2-1: SUMMARY OF RAINFALL INCREASES BY CLIMATE CHANGE PREDICTION METHOD

Method	10 – Year Storm		100 – Year Storm	
	Increase	Climate Adjusted 24hr Rainfall	Increase	Climate Adjusted 24hr Rainfall
IDF CC	+24%	170 mm	+40%	280 mm
Temperature Scaling	+42%	193 mm	+42%	284 mm

Table 2-1 summarizes estimate increase in rainfall based on the two tools. The two methods match very well for the 100-year storm while differ on the 10-year storm. The results of the IDF CC Tool were adopted for modelling purposes as this tool is more widely used and adopted in the BC context. The Temperature Scaling is a more simplified method and has been recently introduced but shows uncertainty in climate change modelling as the science continues to evolve.

Figure 2-6 shows the climate adjust values in relation to the November rainfall recorded at Hope airport rain gauge.

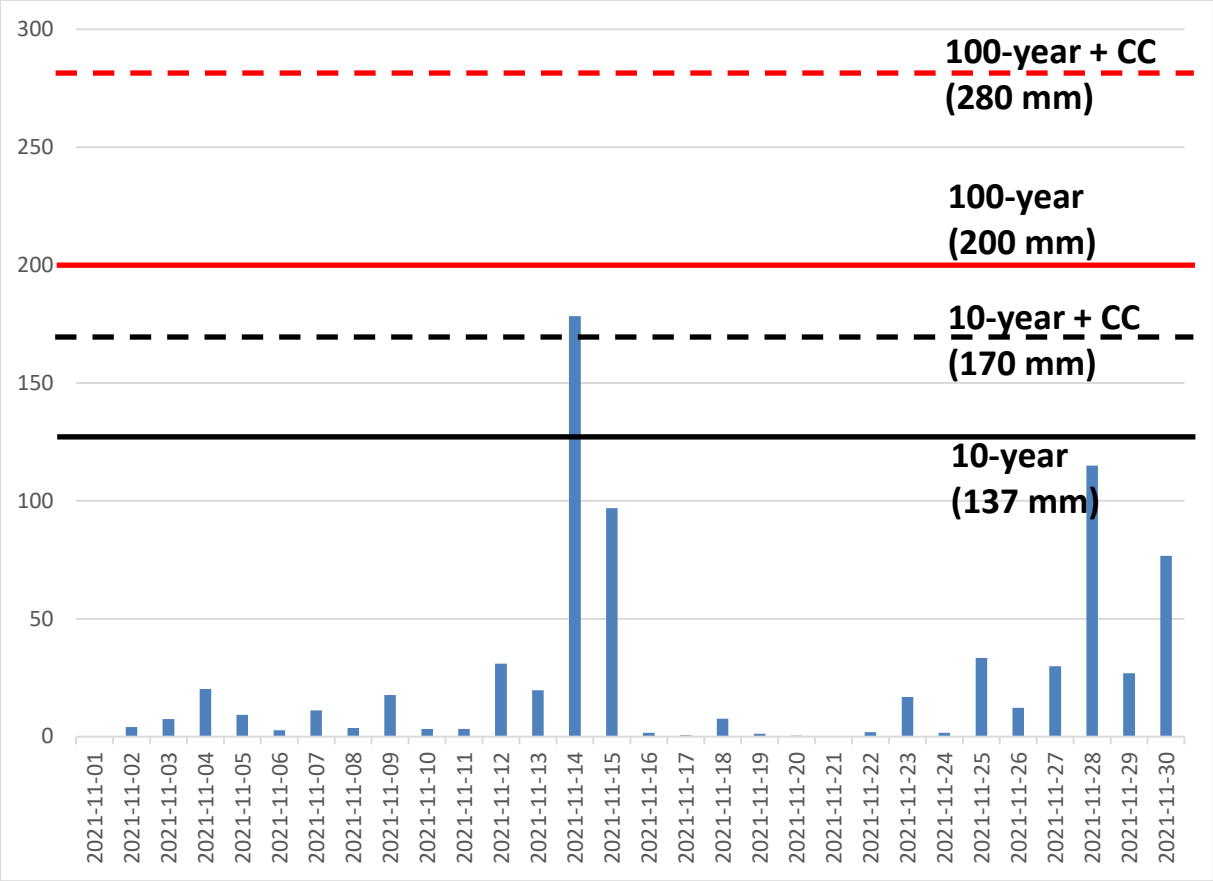


FIGURE 2-6: HOPE AREA NOVEMBER 2021 RAINFALL AND ESTIMATED CLIMATE CHANGE RAINFALL

Climate Change modelling for the region is indicating that both the frequency and magnitude of atmospheric events are going to increase. Essentially, the November event is going to become a relatively common occurrence that the District should expect.

2.5.2 Design Storms

Traditionally, the stormwater modelling in the Lower Mainland would use the SCS Type-IA rainfall distribution, which is primarily used for Northern pacific coastal areas of North America (NRCS, 1986). Other jurisdictions in the Lower Mainland have been finding the peak of the SCS 1A synthetic design storm too conservative and have been modifying/ decreasing the peak intensity.

The project modelling was first completed with the SCS 1A synthetic design storm. However, the preliminary results suggested widespread flooding would occur in areas of the District during a 10-Year Storm Event and the flooding was exacerbated when the impacts of climate change were included. However, during the November event many parts of the District performed relatively well (particularly the urban core) and there has not been a history of surcharged infrastructure except for select locations.

In comparison, the modelling of the recorded November storm, adjusted for climate change, provides a conservative, yet more reasonable result, in the opinion of TRUE. The November atmospheric river was in the order of a 10-year-24hr event (climate adjusted). This storm event had a lower peak than the traditional SCS Type 1A storm and instead prolonged heavy rainfall for longer. This storm event was observed locally, whereas the SCS Type 1A is a regional generalization. It is believed that the November storm rainfall distribution is likely the best available representation of major storm events for the District of Hope and will be used for the basis of this modelling exercise.

A hyetograph is a graphical representation of the distribution of rainfall intensity over time.

For design and analysis purposes, the peak of this recorded local storm hyetograph was increased by 20% to improve the conservativeness of the model. Figure 2-7 presents this modified storm profile applied to the predicted 10-year + climate change storm event alongside the traditional 10-year + climate change SCS Type 1A storm.

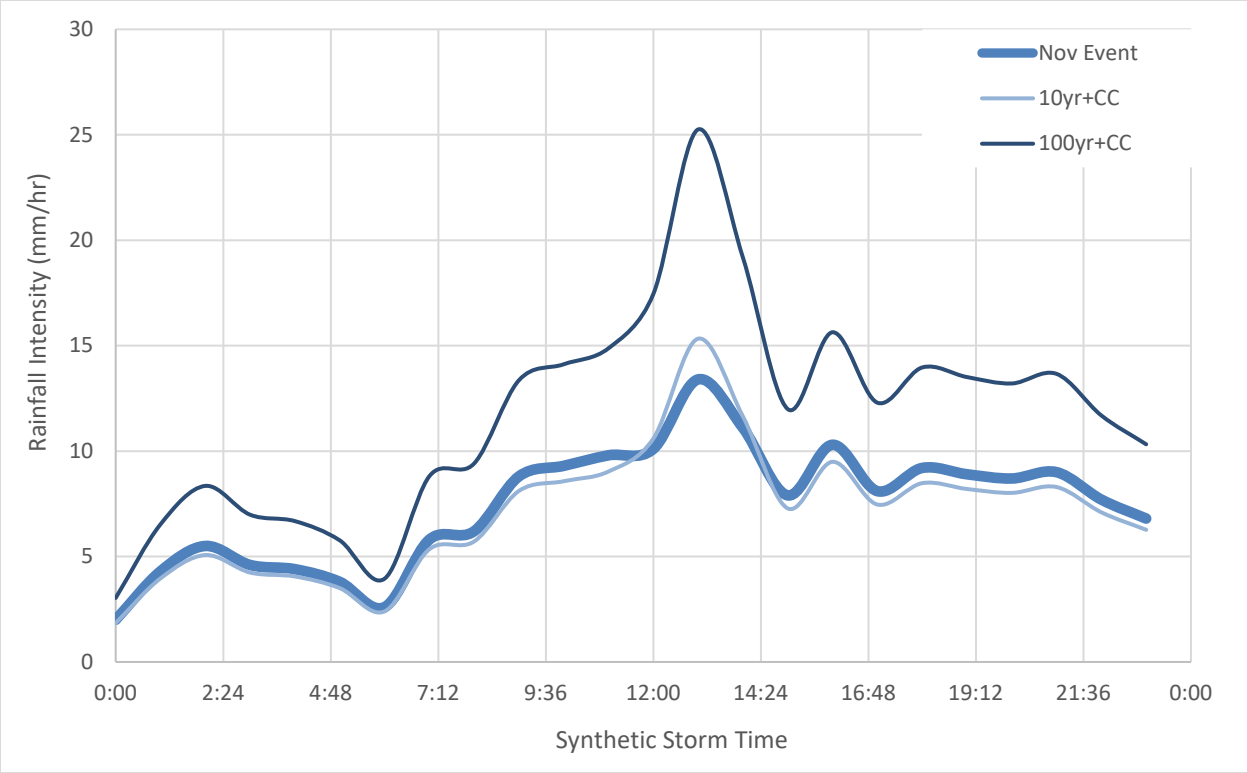


FIGURE 2-7: OBSERVED NOVEMBER 2021 HYETOGRAPH, APPLIED TO 10YEAR + CC STORM, COMPARED WITH 10YR+CC SCS TYPE 1A STORM

The November based design storm provides an overall higher average flowrate over a longer period. The general result of using the November based design storm is a longer period required to overwhelm the drainage systems, followed by a longer period during which those systems are fully utilized. The use of this design storm more closely reflects what TRUE suggests to be a more likely long-term, and practical design event.

The November 2021 storm data is the most current available data. However, as climate change occurs, the impact on future storms will be better understood. Therefore, it would be prudent to re-assess this design storm's validity following major storm events such as the one in November 2021. At the very minimum, this validity must be reassessed during the preliminary or detailed design process of major stormwater infrastructure upgrades.

3.0 Results

The following are presented and discussed within this section:

- Model Results during 10 year and 100 year return events.
- Proposed System Upgrades to Manage 10 year and 100 year return events.
- Future Development Considerations with regional and site specific recommendations.

3.1 Model Scenarios

Existing infrastructure was modelled in PCSWMM and the effects of a 10 year with climate change and 100 year with climate change storm were simulated. All culverts were modelled as clean, although the field review noted culverts with 10 – 50% debris. Results from both modelled storm events are presented with potential mitigation projects and costs within Appendix H Project Sheets.

3.1.1 10 Year Return Event (Including Climate Change)

The municipal stormwater infrastructure generally performs adequately during the 10 year with climate change storm. As the simulated storm applied the modified November 2021 rainfall distribution with a similar total rainfall, model flooding results are consistent with what was observed during the November 2021 storm event. Figures for the10-year scenario can be found in Appendix D.

Notable results include:

1. Flooding of Kawkawa Lake Rd. crossing at 66657 Kawkawa Lake Rd.
2. Flooding of Kawkawa Lake Rd. crossing at 66597 Kawkawa Lake Rd.
3. Flooding of Thacker Creek along Forrest Cres.
4. Flooding at 65617 Kawkawa Lake Rd.

Beyond the areas identified above, the figures present other piped system components that are technically overcapacity. However, the resulting surcharge is not significant which rarely surcharges to surface and generally perform adequately and do not require specific upgrades.

3.1.2 100 Year Return Event (Including Climate Change)

As expected, the minor system (pipes and catchbasins) is generally overwhelmed by runoff in many areas and the major system (overland flow and major culverts) is engaged. This typically begins with ponding of stormwater around catch basins and culverts. As the storm peaks, flooding and overland flow occurs. Figures for the 100-year scenario can be found in Appendix E.

Major stormwater channels where runoff concentrates are overwhelmed, potentially resulting in road washouts, migrating streams, and property damage.

Notable results of overwhelmed stormwater infrastructure during the 100-year event include:

1. Intersection of Kawkawa Lake Rd. and Johnson Rd.
2. Kawkawa Lake Rd. crossing at 66657 Kawkawa Lake Rd.
3. Kawkawa Lake Rd. crossing at 66597 Kawkawa Lake Rd.
4. Thacker Creek along Forrest Cres.
5. Kettle Valley Rd. crossing, 250m South of Kawkawa Lake Rd.

Many of Hope's streets allow for the passive drainage of this excessive runoff but some low-lying areas have no overland flow path. These low-lying areas flood until the storm event diminishes and the stormwater infrastructure carries away the excessive runoff or infiltration occurs.

Notable results of flooding due to insufficient or no defined overland drainage:

1. Flooding at 65617 Kawkawa Lake Rd.
2. Flooding of low lying area along Coquihalla St.
3. Potential flooding flooding of low lying area east of Owl St.

District of Hope infrastructure interfaces with MOTI infrastructure along HWY 1 and HWY 3 in several locations. Notable flooding of these interfaces includes:

1. Storage between HWY 3 eastbound and westbound lanes, 500m east of HWY 1 overpass.
2. Storage south of HWY 3 eastbound lanes, 200m west of HWY 1/Flood Hope Road exit.
3. Intersection of HWY 1/Flood Hope Road Exit and HWY 1/Flood Hope Road.
4. Potential Flooding Of Thacker Creek at HWY3.

3.2 Future Development Considerations

The recent census data suggests the District of Hope is undergoing a rapid growth period. Poor stormwater planning may exacerbate problems already experienced or create new ones. This section identifies large land areas that are presently vacant or under-utilized and for which development may have impact on adjacent lands. Typical impacts on stormwater caused by development along with a discussion of potential mitigation strategies is presented. Several examples are discussed to highlight the site specific or regional stormwater challenges and potential design solutions.

3.2.1 Development Impact on Stormwater

Development typically increases the runoff from the land by adding impervious surfaces. The District's bylaws and design guidelines require developments to match pre- to post- runoff performance by the application of communal and private onsite infiltration structures.

Some areas within the District contain existing depressions which trap and infiltrate stormwater runoff. These areas should be protected by the District and accommodated for during development. Trap low storage designs trap and infiltration water to reduce post-development stormwater runoff. The recently developed service station along Flood Hope Rd. is a good example of applying trap low storage design at site containing existing depressions. This depression flooded following the November/December 2021 events, but the flooded area appears to be limited to the south end of the parking lot, while the site buildings remained safely above the ponding water (see Figure 3-1).

FIGURE 3-1: FLOODED SOUTH END OF FLOOD HOPE RD SERVICE CENTER., DECEMBER 3RD, 2021

Ideal trap low storage can retain and infiltrate runoff from minor and major storm events. However, trap storage generally accommodates minor events well and can be overwhelmed during major storms. This flooding stormwater must be carried away from buildings to prevent damage. Therefore, a safe overland flow route is necessary in the event trap low storage is overwhelmed.

Properly constructed roadways and ditches convey stormwater away from structures even while flooded. This is often not appreciated by the public and privately owned ditches are often undesirable by the homeowner. These unfortunately suffer encroachment by retaining walls, driveways, alleyway, and other private structures. Maintaining privately owned overland flow routes within urban/suburban residential and ICI is made more difficult as the routes may span across two, or several, privately owned properties (see Figure 3-2). This highlights the importance of maintaining overland flow routes within the control of the District.

FIGURE 3-2: SUBURB OVERLAND FLOW THROUGH PRIVATE RESIDENTIAL LOTS ALONG BEECH AVE.

The most sustainable and economical way to maintain overland flow routes within the control of the District is to require the routes be part of roadway rights-of-way or park land/recreationally designated lots. The District's Integrated Official Community Plan Policy 9.7.3 identifies that overland flow paths must be provided for major storms. It is recommended that, at the subdivision stage of development, the District require the proponent to identify the proposed overland flow routes with sufficient capacity for major storm events that are outside private property and within the District control.

3.2.2 Urban/Suburban Residential and Country Residential

This section includes several examples of large vacant land areas that are zoned for residential development in order to highlight the site specific or regional stormwater challenges and discuss potential design solutions. This section should be referenced during design reviews of prospective land development projects and can be communicated to landowners early in the development process. Only examples which are sufficiently large are included. Within the included figures below, the subject area is highlighted in blue, while critical existing depression storage areas are cross hatched and outlined in black.

3.2.2.1 21392 Union Bar Rd, Vacant Lot East of Kettle Valley Rd

The vacant lot east of Kettle Valley Rd. with PID 011-015-446 is identified as Urban/Suburban Residential in the OCP (see Figure 3-3). This area does not receive stormwater from the surrounding lots and presently drains to the north into Kawkawa Lake or Sucker Creek, or west onto Kettle Valley Rd. Available Lidar data presents that there are no large depressions within the lot. Development proponents should be made to prove that overland flow routes exist and have capacity to convey runoff to the existing discharge points during major storm events. Development proponents should also be encouraged to redirect drainage to the north and into Sucker Creek where possible.

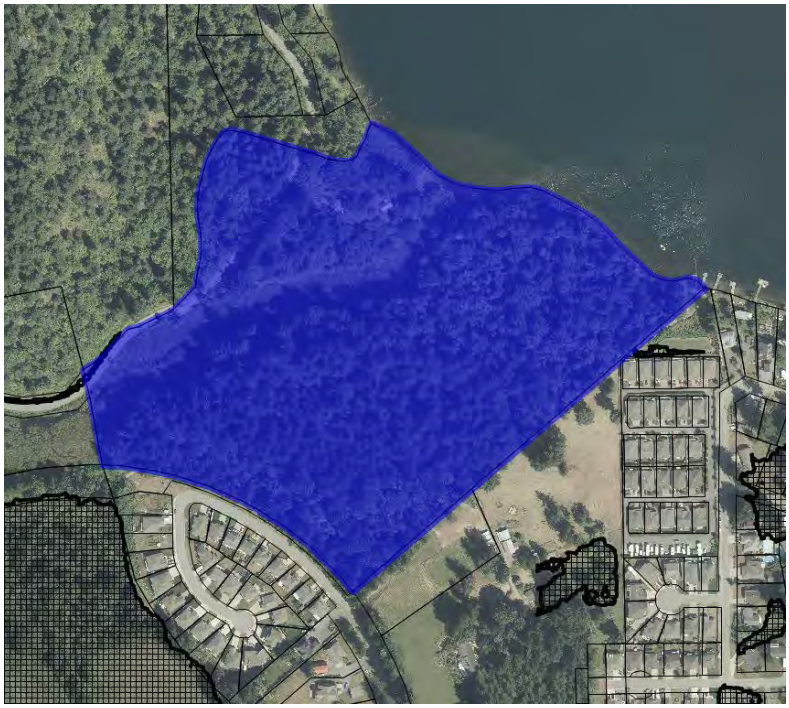


FIGURE 3-3: 21392 UNION BAR RD. (PID 011-015-446)

3.2.2.2 20600 Riverview Dr., Vacant Lot at South end of Riverview Dr

The vacant lot at the south end of Riverview Dr. with PID 001-502-883 is identified as Urban/Suburban Residential in the OCP (see Figure 3-4). This area receives a marginal amount of stormwater from the small lots to it's northeast. It presently drains to the northwest into the Coquihalla River. Available Lidar data presents that there is only a minor depression in this area (0.2 hectares). Appropriate drainage design could likely prevent major storm events from causing damage to structures within this existing depression. Development proponents should be made to prove that overland flow routes exist and have capacity to convey runoff to the existing discharge points during major storm events. The proponents would also need to show how the structures within this depression area would not be affected by flooding.

FIGURE 3-4: 20600 RIVERVIEW DR., (PID 001-502-883)

3.2.2.3 20935 Park St., Vacant Municipal Lot South of Golf Course Rd.

The vacant municipally owned lot south of Golf Course Rd. with PID 023-676-248 is identified as Urban/Suburban Residential in the OCP (see Figure 3-5). This area receives stormwater from 8 hectares of urban/suburban development to the south along 7th Avenue. It presently drains to the northeast into the Coquihalla River. Available Lidar data presents that there is a 1.2 hectare depression in this area which is primarily within this municipal lot. This depression is likely filled during a major storm event. Some of this depressed area is only marginally above the adjacent Coquihalla, and therefore draining the lot by ditching could expose it to flooding during high river water periods. If the District of Hope intends to develop this municipal property, the existing stormwater mains draining 7th Avenue may need to be upgraded. Additional preliminary design would also be needed to fully understand the risks presented by modifying the existing stormwater storage and creating overland drainage to the Coquihalla River.

FIGURE 3-5: 20935 PARK ST., (PID 023-676-248)

3.2.2.4 21176 Kettle Valley Rd., Lot East of Kettle Valley Rd

The lot east of Kettle Valley Rd. with PID 001-643-177, is identified as Urban/Suburban Residential in the OCP (see Figure 3-6). This area receives a marginal amount of stormwater from the small lots to it's northeast. It presently drains to the north towards Kawkawa Lake, or west onto Kettle Valley Rd. Available Lidar data presents that there is small depression in this area (0.3 hectares). Development proponents should be made to prove that overland flow routes exist and have capacity to convey runoff to the existing discharge points during major storm events. The proponent would also need to show how structures within this depression area would not be affected by flooding. The proponent should be encouraged to provide overland drainage northward, through the adjacent lot with the owner's permission, into Kawkawa Lake. This would help reduce the overland flow along Kettle Valley Rd. during major storm events.

FIGURE 3-6: 21176 KETTLE VALLEY RD., (PID 001-643-177)

3.2.2.5 65823 Kawkawa Lake Rd., Municipal Lot East of Kettle Valley Rd

The vacant municipal lot east of Kettle Valley Rd. with PID 010-363-769 is identified as Urban/Suburban Residential and Parks, Recreation and Open Space in the OCP (see Figure 3-7). This area receives stormwater from 3 hectares of urban/suburban development to the east within the Lakeview Cres. area. It presently drains to the northwest along Kettle Valley Rd. and ultimately into the Coquihalla River. Available Lidar data presents that there is a 0.7 hectare depression in this area which is primarily within this municipal lot. If the District of Hope intends to develop this municipal property, the overland drainage from the Lakeview Cres. area will need to be accommodated. Additional preliminary design would also be needed to fully understand the risk presented by modifying the existing stormwater storage.

FIGURE 3-7: 65823 KAWKAWA LAKE RD., (PID 010-363-769)

3.2.2.6 65617 Kawkawa Lake Rd., Vacant Lot North of Kawkawa Lake Rd.

The vacant lot north of Kawkawa Lake Rd. with PID 002-858-959 is identified as Urban/Suburban Residential in the OCP (see Figure 3-8). This area receives stormwater from approximately 55 hectares of land and presently has no clear drainage outlet. Available Lidar data presents that there is a large 13 hectare depression, most of which is located within this lot. This depression likely detains and infiltrates runoff from major storms. Development proponents should be made to prove that overland flow routes exist or establish drainage with capacity to convey runoff to Sucker Creek during major storm events. The proponents would also need to show how structures within this depression area would not be affected by flooding. Potentially some of this lot is undevelopable as a result of this large depression.

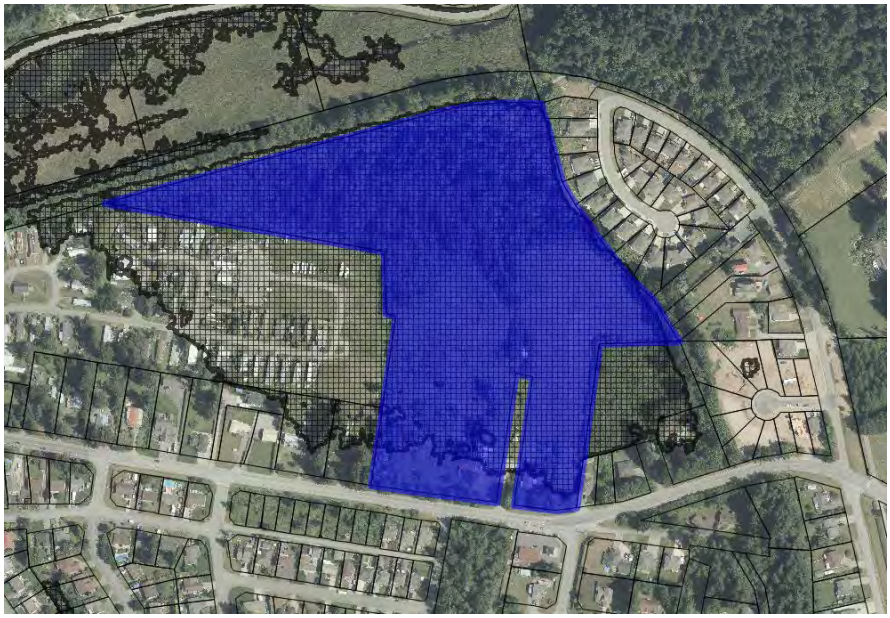


FIGURE 3-8: 65617 KAWKAWA LAKE RD, (PID 002-858-959)

3.2.2.7 66657 Kawkawa Lake Rd., Lot Spanning of Kawkawa Lake Rd

The lot spanning Kawkawa Lake Rd. with PID 010-433-775 is identified as Urban/Suburban Residential in the OCP (see Figure 3-9). This area receives stormwater from over 200 hectares of land to the east and the Camilos Creek flows through it. The lot presently drains eastward through the Kawkawa Lake Rd. by an undersized culvert crossing and then reaches the lakeshore by a private channel. This creek broke it's banks east of Kawkawa Lake Rd. and attempted to realign itself during the November 2021 major storm event. The high flows experienced by this creek have the potential to quickly convey debris, which could result in the creek realigning itself again. Careful attention must be paid to this debris flow hazard and the stormwater capacity of this creek. Development proponents should be made to prove how they will protect this overland flow route and appropriately accommodate drainage through this area. The District should also require any development proponents surrender the creek along with a reasonable setback to allow expansion and prevent encroachment. A section of this lot is assigned the high to severe flood hazard rating caution within the IOCP Hazard Mapping and may be undevelopable.

FIGURE 3-9: 66657 KAWKAWA LAKE RD., (PID 010-433-775)

3.2.2.8 66556 Kawkawa Lake Rd., Lot East of Kawkawa Lake Rd

The lot east of Kawkawa Lake Rd. with PID 030-485-851 is identified as Urban/Suburban Residential in the OCP (see Figure 3-10). This area receives stormwater from over 80 hectares of land to the east and the Sucker Creek flows through it. The lot presently drains eastward through the Kawkawa Lake Rd. at an undersized culvert crossing. Careful attention must be paid to the stormwater capacity of this creek. Development proponents should be made to prove how they will protect this overland flow route and appropriately accommodate drainage through this area. A section of this lot is assigned the moderate to high flood hazard rating caution within the IOCP Hazard Mapping and may be undevelopable.

FIGURE 3-10: 66556 KAWKAWA LAKE RD., (PID 030-485-851)

3.2.2.9 65936 Kawkawa Lake Rd., Lot South of Kawkawa Lake Rd.

The lot south of Kawkawa Lake Rd. with PID 010-353-548 is identifies as Urban/Suburban Residential in the OCP (see Figure 3-11). This lot does not receive stormwater from the surrounding area. Some of the lot drains to the north into the Kawkawa Lakeview Crescent subdivision while some drains into the vacant municipal lot with PID 001-643-117. Available Lidar data presents that there are no large depressions within the lot. Development proponents should be made to prove that downstream overland flow routes can accommodate this lot's runoff.

FIGURE 3-11: 65936 KAWKAWA LAKE RD., (PID 010-363-548)

3.2.2.10 64295 Flood Hope Rd., Vacant Lot North of Flood Hope Rd.

The vacant lot north of Flood Hope Rd. with PID 014-646-986 is identified as Urban/Suburban Residential (see Figure 3-12). This lot does not receive stormwater from the surrounding area. This lot drains in all directions as the highest point is near the center of the lot. Available Lidar data presents that this lot borders a 4.6 hectare depression along HWY 3 to the north. Development proponents should be made to prove how they will protect this depression area from encroachment. They would also need to prove how structures nearby to this depressed area will be protected from flooding. Proponents should be encouraged to redirect drainage northward towards the large existing depression.

FIGURE 3-12: 64295 FLOOD HOPE RD., (PID 014-646-986)

3.2.2.11 20060 Hockin Rd., Vacant Lot North of Flood Hope Rd.

The lot north of Flood Hope Rd. with PID 010-320-512 is identified as Urban/Suburban Residential (see Figure 3-13). This lot receives stormwater from over 90 hectares of land to the south. This lot generally drains northward. Available Lidar data presents that this lot borders a 4.6 hectare depression along HWY 3 to the north, approximately 0.5 hectares of which is within the lot. Development proponents should be made to prove how they will protect the overland flow route for the 90 hectares upstream and this large depression from encroachment. They would also need to prove how structures within the depressed area will be protected from flooding. Proponents should be encouraged to accommodate potential drainage infrastructure across Flood Hope Rd., which would convey runoff northward through the property, and into the large existing depression.

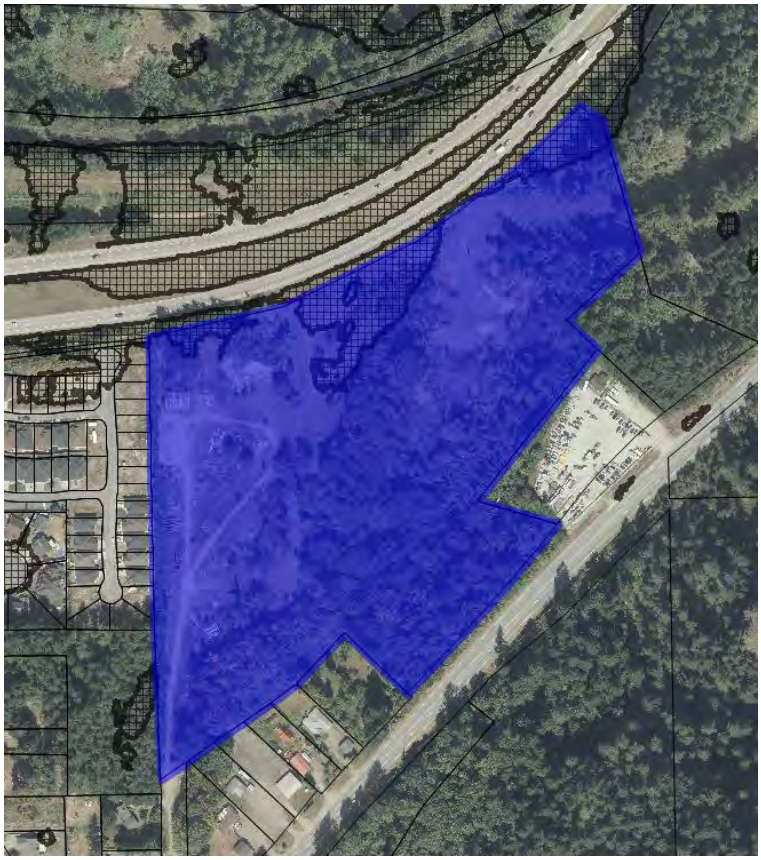


FIGURE 3-13: 20060 HOCKIN RD., (PID 010-320-512)

3.2.2.12 Lots South of Tum Tum Rd.

The lots at the south end of Tum Tum Rd. are identified as Urban/Suburban Residential and Limited Use in the OCP (see Figure 3-14). The southeast corners of these properties are designed as Limited Use and contain a drainage gulley that receive runoff from over 80 hectares of land. This existing gulley will need to be protected from development. Available Lidar data presents that there is also a depression within the lots. These lots generally drain toward the north/northeast or westward. Careful attention must be paid to the stormwater capacity of this gulley. Development proponents should be made to prove how they would protect this gulley from encroachment as well as any structures within the depression area from flooding damage.

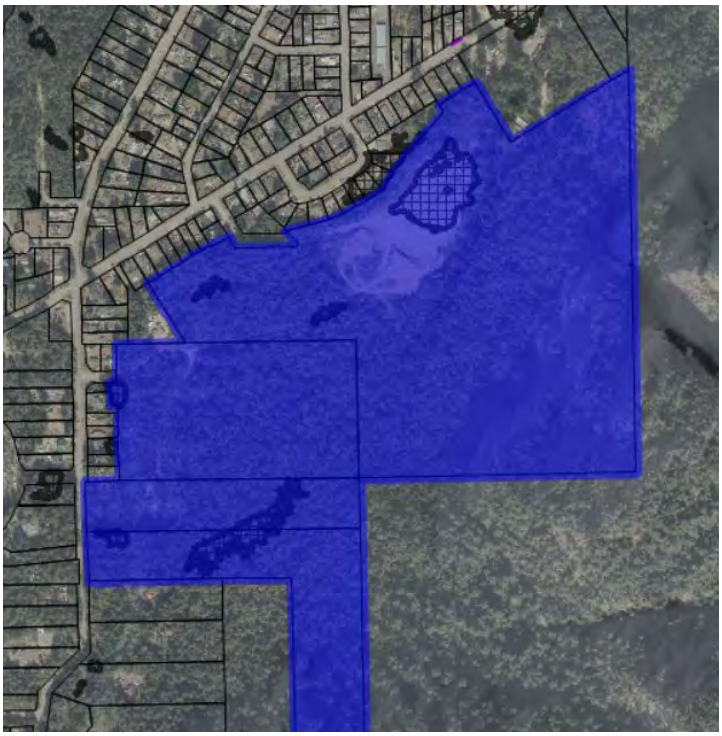


FIGURE 3-14: 4.3.2.12: LOTS SOUTH OF TUM TUM RD.

3.2.2.13 1275 7th Ave., Vacant Lot North of Hospital

The vacant lot east of 7th Ave, with PID 001-891-740 is identified as Urban/Suburban Residential in the OCP (see Figure 3-15). This lot does not receive runoff from adjacent properties and generally drains to 7th Ave or to the northeast towards the Coquihalla through an undeveloped municipal park lot. Available Lidar data presents that there are no large depressions within the lot. The lot is generally flat so the development proponent should be encouraged to apply trap low storage design to eliminate runoff during minor and major storm events. Development proponents should be made to prove that downstream overland flow routes can accommodate any runoff.

FIGURE 3-15: 1275 7TH AVE., (PID 001-891-740)

3.2.2.14 Vacant Lots East of Kettle Valley Rd. and South of Kawkawa Lake Rd.

The vacant lots east of Kettle Valley Rd. and South of Kawkawa Lake Road are identified as Country Residential or Urban/Suburban (see Figure 3-16). These lots generally receive runoff from the lots to their immediate east and drain westward. Lidar data presents that there are no large depressions within the lot but several minor depressions. The District should consider requiring the developer to require a comprehensive neighborhood plan with drainage to the south. This approach would redirect stormwater directly to the Coquihalla River and away from the Kawkawa Lake Rd./Kettle Valley Rd. area. The Development proponents should be made to prove that overland flow routes are provided which can accommodate the existing overland flows. They should also be required to maintain the depressed areas or equivalent to limit the impact of development.

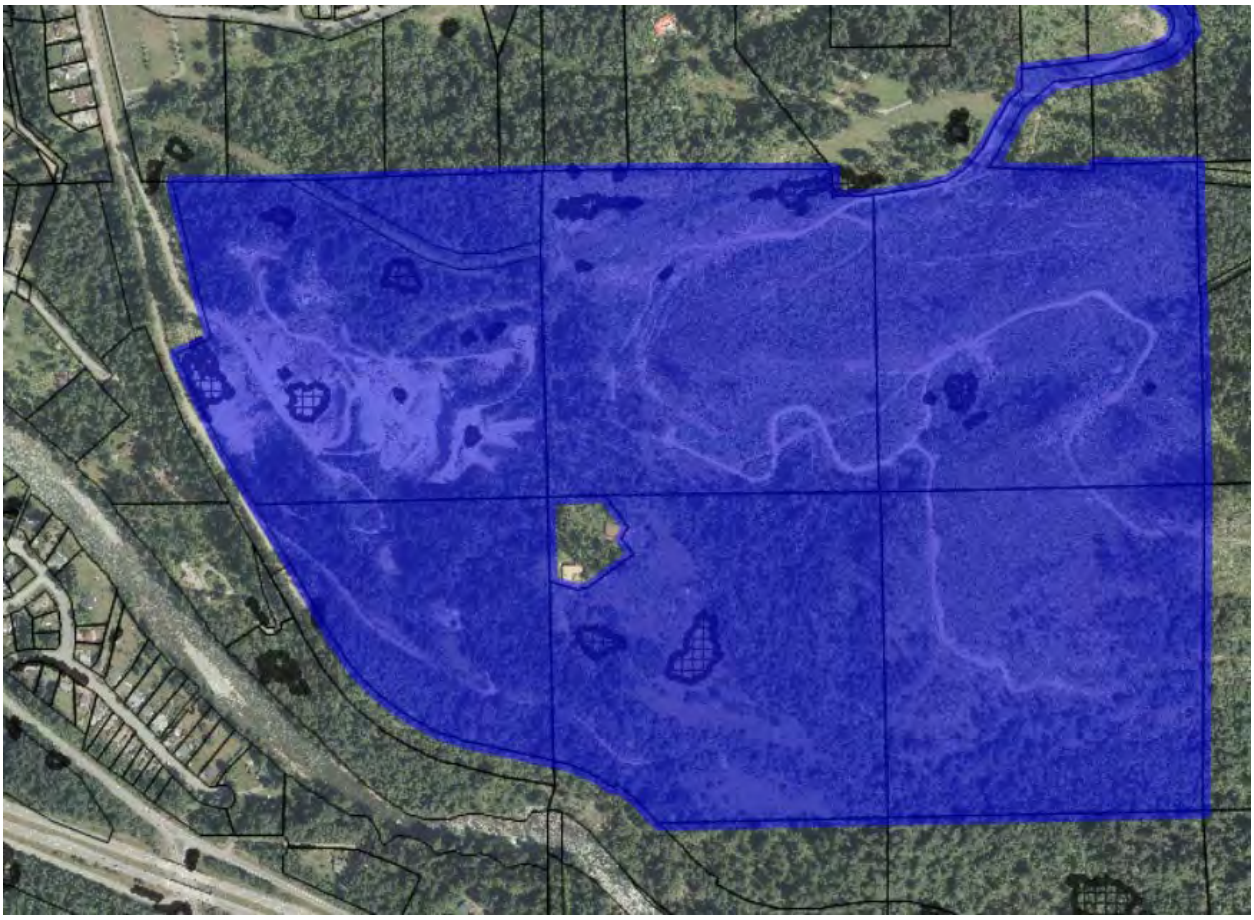


FIGURE 3-16: VACANT LOTS EAST OF KETTLE VALLEY RD. AND SOUTH OF KAWKAWA LAKE RD.

3.2.3 Industrial, Commercial, and Institutional

This section includes several examples of large vacant or under-utilized land areas that are zoned for ICI development in order to highlight the site specific or regional stormwater challenges and discuss potential design solutions. This section should be referenced during design reviews of prospective land development projects and can be communicated to land owners early in the development process. Only examples which are sufficiently large are included. Within the included figures below, the subject area is highlighted in blue, while depression storages are cross hatched and outlined in black.

3.2.3.1 Existing Developed Lots Around Raab St. from 3rd Ave to 5th Ave.

The existing developed commercial lots around Raab St. From 3rd Ave to 5th Ave are identified as Light Service Industry or Highway Commercial within the OCP (see Figure 3-17). This area receives runoff from the east and south and generally drains through an existing storm main system at it's west. Available Lidar data presents that there is a 7.7 hectare depression in this area, which includes most of the existing development. Therefore, these is no overland flow route for most of the development. Stormwater modelling suggests that the existing storm mains are adequate to keep the depression from flooding more than 100mm during the 100-Year storm event. Redevelopment proponents should be made aware of this hazard so they may accommodate it with a suitable building design. The District should also consider adapting the IOCP to add a minor flooding hazard to this area.

FIGURE 3-17: EXISTING RAAB ST. DEPRESSION

3.2.3.2 910 Old Hope Princeton Way, Commercial Lot South of Old Hope Princeton Way

The existing development within the lot south of Old Hope Princeton Way with PID 011-014-971 is identified as Light Service Industry within the OCP (see Figure 3-18). This lot does not receive runoff from the surrounding area, and it generally drains northwards through a culvert across Old Hope Princeton Way, along roadside ditching, and ultimately into the Coquihalla River. Available Lidar data presents that there is small 0.4 hectare depression in this area. The lot is generally flat so the development proponent should be encouraged to apply trap low storage design to eliminate runoff during minor and major storm events. Redevelopment proponents should be made to prove that the existing stormwater infrastructure can support redevelopment or modify it if required. They should also be required to demonstrate how structures within the depression area will be protected.

FIGURE 3-18: 910 OLD HOPE PRINCETON WAY, (PID 011-014-971)

3.2.3.3 19743 Foster Rd., Vacant Lot South of Flood Hope Rd

The vacant lot south of Flood Hope Rd. with PID 031-036-597 is identified as Comprehensive Development in the OCP (see Figure 3-19). This lot receives some runoff from the neighborhood to it's immediate south and generally drains northward into the adjacent Silverhope Creek. Available Lidar data presents that there is a depression storage where the lot borders the adjacent eastern neighbor. Development proponents should be required to maintain overland flow between this depression and the Silverhope Creek, as well as overland flow routes from the south. There are also several small depressions with a combined area of 0.2 hectares. There are potentially more small depressions which are not accurately measured by Lidar through the existing forest canopy. The development proponent should be encouraged to apply trap low storage design to eliminate runoff during minor and major storm events. Note that the IOCP identifies the west side of the lot is floodway, therefore there may be limited development potential.

FIGURE 3-19: 19743 FOSTER RD., (PID 031-036-597)

3.2.3.4 20079 Klassen Rd., Vacant Lot South of Flood Hope Rd

The vacant lot south of Flood Hope Rd. with PID 014-665-387 is identified as Light Service Industry in the OCP (see Figure 3-20). This lot contains a relatively large gulley at it's west end and it receives runoff from approximately 15 hectares of surrounding area. This lot drains to the northwest. Available Lidar data presents that there are no large depressions within the lot but several small depressions with a combined area of 0.4 hectares. There are potentially more small depressions which are not accurate measured by Lidar through the existing forest canopy. The development proponent should be encouraged to apply trap low storage design to eliminate runoff during minor and major storm events. Development proponents should also be made to prove that the development will accommodate the existing overland flow route.

FIGURE 3-20: 20079 KLASSEN RD., (PID 014-665-387)

3.2.3.5 63370 Flood Hope Rd., Commercial Lot South of Flood Hope Rd

The existing commercial lot south of Flood Hope Rd. with PID 018-085-695 is identified as Light Service Industry in the OCP (see Figure 3-21). This lot receives runoff from approximately 9 hectares of surrounding area. This lot drains to the developed lot to it's west which has a large depression at it's south end which floods during large events. Available Lidar data presents that there are no large depressions within the lot but small depressions with a combined area of 0.2 hectares. The redevelopment proponent should be encouraged to apply trap low storage design to eliminate runoff during minor and major storm events and prevent impact on the adjacent low lying lot. Redevelopment proponents should also be made to prove that the development will accommodate the existing overland flow route.

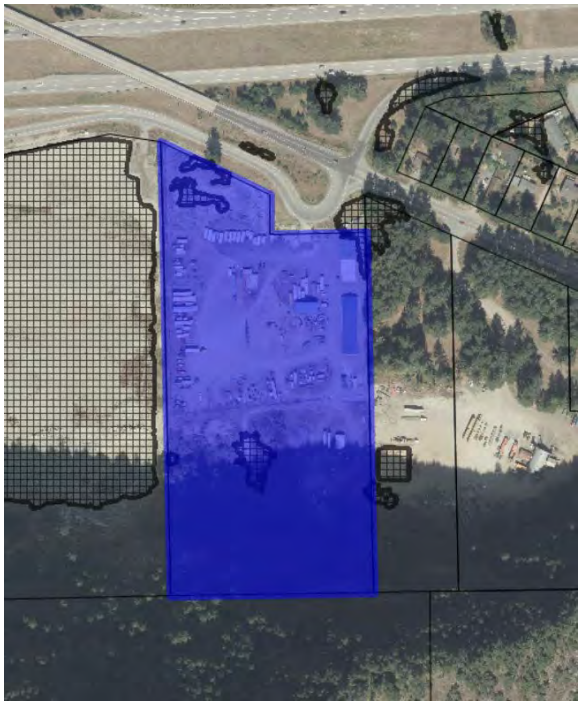


FIGURE 3-21: 63370 FLOOD HOPE RD., (PID 018-085-695)

3.2.3.6 63071 Flood Hope Rd., Mobile Home Park North of Flood Hope Rd, and 63170 Flood Hope Rd., Vacant Lot North of Tobena Rd

The existing mobile home park north of Flood Hope Rd with PID 026-771-306 and adjacent vacant lot with PID 026-771-292, are identified as Light Service Industry in the OCP (see Figure 3-22). These lots do not appear to receive runoff from the surrounding area; however, they contain a 4.8 hectare depression that is at risk of flooding during major storm events. The drainage mechanism for these lots is unclear but it may be through an existing culvert in the railbed along it's north border. The development proponent must confirm sufficient drainage exists for these lots and should be encouraged to apply trap low storage design to eliminate runoff during minor and major storm events

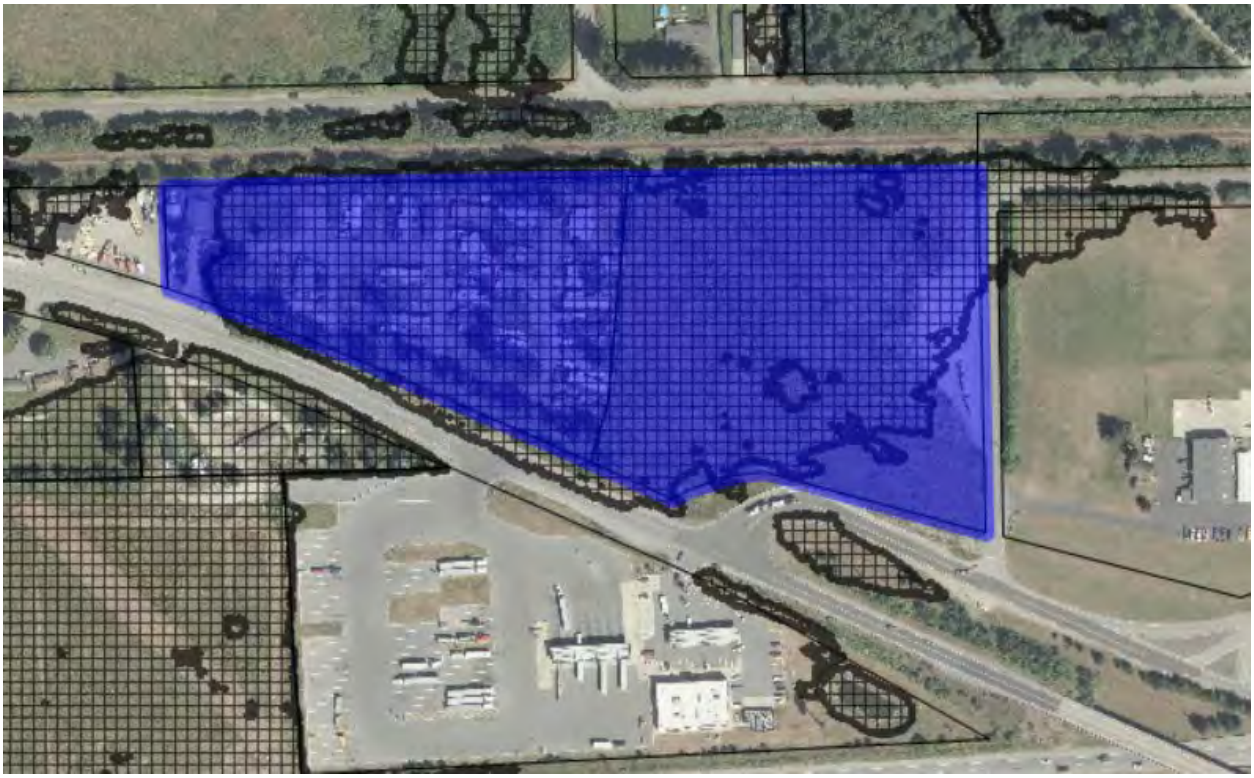


FIGURE 3-22: 63071 FLOOD HOPE RD., (PID 026-771-306), AND 63170 FLOOD HOPE RD., (PID 026-771-292)

3.2.4 Agricultural Land

The land designated as agricultural land in the District generally surrounds the airport. This area is near the river and likely has a relatively high water table. Many of these Rural/Agricultural zoned lots also contain large natural depressions (see Figure 3-23). These depressions likely accumulate stormwater during major events and return regional runoff by retaining and infiltrating it. Stormwater accumulation has even been visible following during past major events (see Figure 3-24). It is recommended that these lots remain zoned as Agricultural/Rural and that these natural infiltration features be protected.

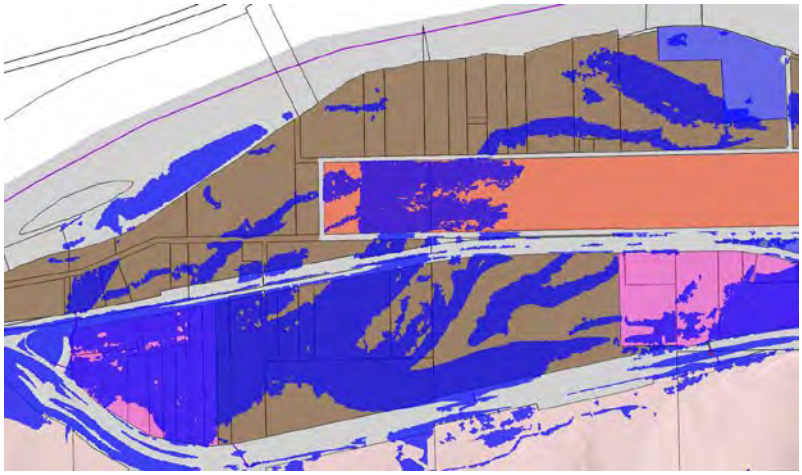


FIGURE 3-23: AGRICULTURAL ZONING (BROWN LOTS) WITH EXISTING LAND DEPRESSIONS (BLUE POLYGONS)

FIGURE 3-24: FLOODED DEPRESSION WITHIN AGRICULTURAL AREA ON DECEMBER 3RD, 2021

4.0 Recommended Improvements

This section builds from the future development discussion in Section 3.2 and provides a greater level of detail in terms of specific recommendations for consideration of the District of Hope.

4.1 Model Improvements

4.1.1 Calibration

As noted in earlier sections of this report, the computational model developed as part of this SWMP is not analytically calibrated due to lack of measured flows and depths during real-world events. Model outputs were compared to anecdotal records of the November 2021 event and found to be reasonably similar. However, this level of comparison does not constitute an accurate calibration.

TRUE recommends that the District consider installing flow and rainfall monitoring in Thacker Creek. A typical installation would include an engineered weir structure with gauge monitoring connected a data collector and power source. An alternative would be to install a system that can connect either to an online server, or the District's existing SCADA. Parallel to the weir and gauge would be a rainfall monitor connected to the same data collector. The data collected by this system can later be used to calibrate and improve or confirm the computational model and provide improved confidence in results.

Gauge height (also known as stage) is the height of the water in the stream above a reference point.

4.1.2 Database and Model Upkeep

Following the concepts of good asset management, the District should continue to upkeep and improve its database of asset information. As previously noted, TRUE is confident that the current database contains over 98% of existing manholes. However, it is generally believed that the inventory of minor items such as culverts is largely incomplete. It is recommended that as drainage system elements are inspected, improved, installed, removed, or abandoned, that the GIS database and the PCSWMM model inputs are updated accordingly. Small updates over time can be made very efficiently, whereas bulk wholesale updates to models and datasets are often more costly and not as accurate.

4.2 Policy and Operational Recommendations

4.2.1 Update IOCP Flood Hazard Map

As noted early in this plan, the District's IOCP contains many Goals, Objectives, and Policies that directly relate to the management of the stormwater conveyance and discharge systems. The District should consider implementing the following the guidance during the creation of development bylaws, and design criteria.

4.2.1.1 Protect Old Yale South Flow Path/Infiltration Area

The Old Yale South Flow Path, as identified in Figure 4-1, is a major conveyance path for a large catchment area along the south end of the District's boundary. Previous mapping based on the topographic data area suggested that there should be an overland flow path/stream to convey flows towards Silver Creek. However, LiDAR analysis determined no such flow path to Silver Creek exists and catchment areas from Hope Mountain are directed to the north to Old Yale and Owl Rd.

Initial, model runs indicated this are had substantial flow in both the 10-year and 100-year events. However, field inspection of the area found no evidence of major overland flow. Instead, field inspection determined this area is dominated by rockfall and talus at the base of the mountain, followed by a gravel/sand upper bench, with a natural gulley in between. This natural gulley directs flow towards the north, instead of towards Silver Creek as previously mapped. The field review also suggests that mountain runoff from minor and medium storms is primarily received by the talus region, where it is then infiltrated to the ground water table. The model was updated to reflect this behaviour.

TRUE recommends that the District protects this overland flow path and associated natural infiltration from development, due to its proximity to the talus (which mostly aligns with the District's existing High Geotechnical Hazard Area identified in the IOCP). While no historic drainage issues have arisen in this area, it is currently not understood if or how climate change may impact this area hydrologically and if the receiving talus will reach carrying capacity. Currently the model is estimating no flows during the 10-year event with substantial flows in the 100-year event with the estimated infiltration capacity being overwhelmed. Consequently, it is recommended this are be protected from development.

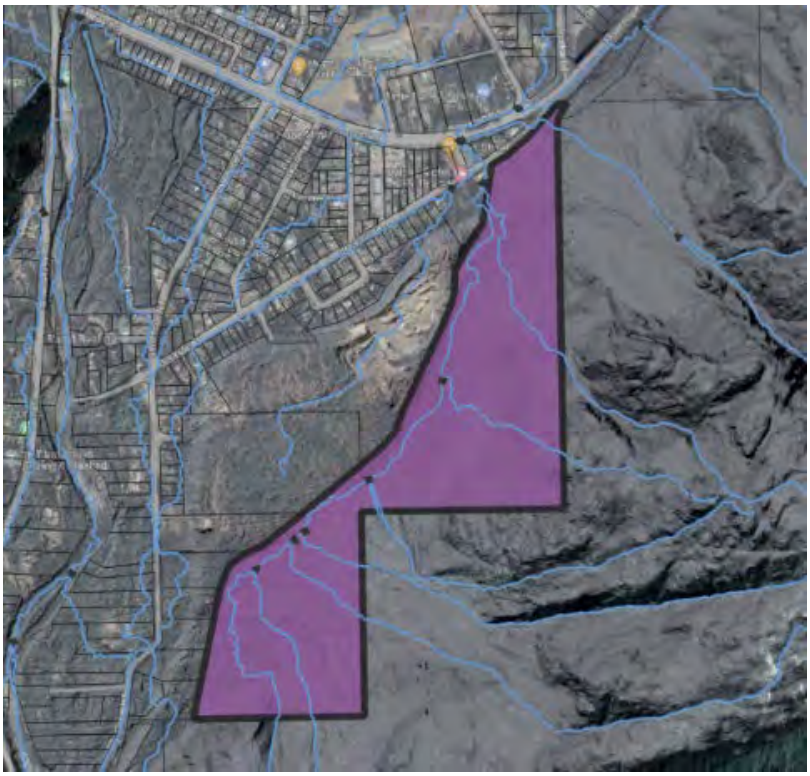


FIGURE 4-1: OLD YALE SOUTH FLOW PATH

4.2.1.2 Update Streams and Associated Flood Ratings From Improved Lidar Data

Developing the model included estimating stream locations from high quality Lidar data using a GIS software watershed delineation tool. This process has identified discrepancies between the creek locations shown on the District's IOCP Hazards Maps and the estimated creek location identified from the Lidar data. This is particularly evident within the east end of the Kawkawa Lake subdivision, shown in Figure 4-2. The District should consider updating these IOCP Hazards Maps based on the Lidar data stream location.

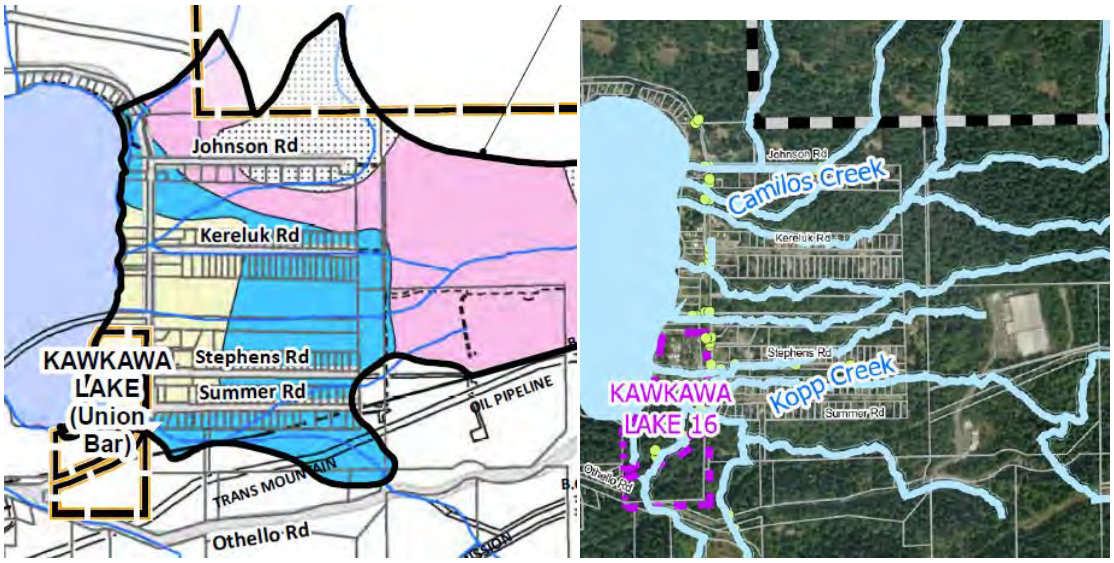


FIGURE 4-2: COMPARISON OF CREEK LOCATION ON DISTRICT IOCP HAZARD MAP (LEFT) AND ESTIMATED CREEK LOCATION FROM LIDAR DATA (RIGHT)

4.2.1.3 Add Sink Areas with Corresponding Flood Ratings

Regional and local low points were identified from the LiDAR data during the model development. Notable low points include the agricultural areas surrounding the airport, the Raab St. commercial area, and 65617 Kawkawa Lake Rd, each of which are discussed in Section 3.2 above. The District should consider updating their IOCP Hazards Maps to include these low points and the surface flow hazard that exists within these areas. Additional low points are presented within the Major Potential Ponding figures found in Appendix F.

4.2.2 Development Review Process

The rapidly growing population of the District suggests that development is going to continue at accelerated rates. It is recommended that the District utilize the SWMP and its recommendations, alongside the computational model while making reviews for development proposals. As outlined in several documents (Subdivision Bylaw, IOCP, etc.), the District's goals and objectives for drainage center around ensuring that development does not create negative impacts to the existing systems.

The District's current process of review of development applications generally only involves a site-wide analysis of the stormwater system, without consideration of impact to adjacent or downstream discharge or conveyance infrastructure. Utilizing this plan and the related model, it is possible, and recommended, to consider a development's overall impact on the entire stormwater system. Notably, it is recommended the District review all downstream impacts to overland flow paths. TRUE encourages the District to engage engineering support familiar with the stormwater model during this process.

4.2.3 Develop a Watercourse Bylaw

During development of the model, and field review of site impacted by the November 2021 event, TRUE made note of several watercourses on private land with historic encroachments. Many of these encroachments into the watercourses restrict the natural capacity of the stream. This capacity issue has been noted several times in the reports and studies listed in Section 1 of this report, and during the November 2021 event. Current climate change modelling suggests that these flows will increase year over year increasing flood risk. In many cases, the observed capacity issues are exacerbated by poor maintenance of infrastructure encroaching on the watercourse (damaged, filled in, obstructed, etc.).

The Local Government Act maintains provisions for municipal governments to assign a watercourse as part of the municipality's drainage system:

LOCAL GOVERNMENT ACT

Part 9 — Regional Districts: Specific Service Powers

Division 3 — Drainage, Sewerage and Related Matters

Watercourse may be included in drainage system

307 A board may, by bylaw, make a watercourse part of the regional district drainage system, whether the watercourse is on private land, on regional district land or on a highway.

Requirements respecting drainage works

312 (1)In this section and section 313, "stream" has the same meaning as in section 1 (1) of the Water Sustainability Act.

(2)A board may, by bylaw,

(a)establish requirements that must be met by owners of dikes, and

(b)establish requirements that must be met by persons undertaking the construction of

(i)dikes,

(ii)works to maintain the proper flow of water in a stream, ditch, drain or sewer in the regional district, or

(iii)works to reclaim or to protect part of the land mass of the regional district from erosion by action of the sea or a stream or from any other cause.

Utilizing the provisions of the act, it is recommended that the District look to develop a bylaw outlining:

- the inclusion of key watercourses as part of the District's drainage system
- definition of requirements and limitations to development and modifications that can be made to watercourses on private property
- District responsibilities to approve development and modifications to watercourses on private property

- Penalties related to unauthorized development and modifications to watercourses on private property

The primary benefits to the proposed bylaw are:

- Public and staff awareness of the critical role played by these watercourses
- Expand the definition of watercourses to include ditches, culverts, other conveyance elements that are not covered under the Water Sustainability Act
- Supports the protection of natural watercourses in conjunction Water Sustainability Act
- Allows the ability of the District to remove unapproved obstructions or changes to watercourses with the ability to recover associated costs.

4.2.4 Update Storm Design Guidelines

As previously stated, TRUE's review of Section D of the Subdivision Bylaw Design Criteria Manual found the content to be thorough and comprehensive. However, upon completion of the SWMP efforts, TRUE has several recommendations for update and expansion of the Manual.

Climate Change

The current version of the manual is consolidated as of October 2005. The manual recommended the use of design storm data as provided by the Atmosphere Environmental Service, which is an industry standard practice. This information is built from historical records of rainfall in a given area and provides an estimated model of storms *as they would have occurred in the past*. Industry standards are now moving towards estimating models of storms *as they may occur in the future*. This practice involves considering the estimated impacts of climate change, which generally intensifies the design storms.

As was done in the analysis for this SWMP, TRUE recommends that the District add requirements and reference to tools for altering design storms for climate change. At this time, TRUE recommends the District adopts the IDF CC Tool (https://www.idf-cc-uwo.ca/). This tool has become widely used in BC and provides a user-friendly GIS based interface. As parameters of the tool, it is recommended the District adopt the following:

- 2070 – 2100 Timeframe
- CMIP6 – Pacific Climate Impacts Consortium (PCIC) Bias Corrected Data Set
- All Model Ensemble
- SSP5.85 Emission Scenario

By including requirements to consider the impact of climate change, the District can reduce the risk of current development creating future impacts to the overall drainage system, including both public and private property.

Infiltration Pre-treatment

Infiltration is an effective and encouraged method of discharging drainage flows to the environment. It is recommended that the District add requirement for pre-treatment prior to infiltration discharge in the design criteria. Pre-treatment requirements should include:

- Settlement of suspended fine materials
  - Extends the service life of infiltration infrastructure
  - Minimizes maintenance needs
- Storm Pollutants Removal
  - Oils and grease can be removed
  - Removal of heavy metals and other pollutants
  - Protects groundwater aquifers to a higher level (over mechanical means)

It is recommended that primary treatment be completed through vegetative processes (swales, rain gardens, bio-retention. These provide the highest level of treatment and are best aligned with the ICOP policies and goals. Discharging to "green" then ground is preferred over mechanical separation devices (oil grit separators, hydrodynamic separators, etc.) as they don't perform to the same level.

Low Impact Design / Best Management Practice

The current ICOP contains policy statements (9.7.2 and 9.7.3) regarding the encouragement of Low Impact and Best Management Design practices for new development. It is recommended the design manual should be expanded to include details and references to the practices that the District desires to be implemented. The District should consider referencing similar design guidelines from the region, such as:

- City of Vancouver's Best Management Practice Toolkit Volume II
  - https://vancouver.ca/files/cov/integrated-stormwater-management-best-practice-toolkit-volume-2.pdf
- Capital Regional District's Green Stormwater Infrastructure Common Design Guidelines
  - https://www.crd.bc.ca/docs/default-source/es-watersheds-pdf/green-stormwater-infrastructure-crd/mainreport-gsi-commondesignguidelines-spring2019-final.pdf?sfvrsn=2c8ed0ca_2
- Low Impact Development Technical Guidance Manual for Puget Sound
  - https://kingcounty.gov/~/media/depts/dnrp/solid-waste/green-building/documents/Low_Impact_Development-manual.ashx?la=en
- Eastern Washington Low Impact Development Guidance Manual
  - https://apps.ecology.wa.gov/publications/documents/1310036.pdf

The District could reference an example manual or could create their own manual to suit the specific needs and desires of the District.

Overland Flow Routes

Overland flow routes represent a large portion of the District's drainage conveyance infrastructure. In low lying areas with little or no grade, the use of buried conveyance systems (pipes and manholes) can be ineffective or prohibitively deep / expensive. The District's design guidelines for the drainage systems should contain guidance for developers to build and maintain suitable overland flow paths with appropriate design storms.

Supplemental Details

The current set of supplemental details for sewer (sanitary and storm), drawings SDS-1 through SDS-24, are dated 1999 and would benefit from adjustment and updating. Apart from an overall review and update to meet modern approaches and construction methods, the District would benefit from making a detailed review of how infiltration galleries are constructed and how many clean-outs they require.

4.2.5 Infiltration Infrastructure Maintenance

Much of the District's discharge of conveyed drainage flows is executed with the use of infiltration infrastructure. The effective implementation of infiltration within the District is critical for minimizing the risk of flooding and ponding during extreme events. The effectiveness of this infrastructure is contingent on execution of good maintenance.

TRUE noted considerable sedimentation in and around much of the District's infiltration infrastructure (see Figure 4-3). The build-up directly impacts and reduces the effective capacity of the systems and creates risk during storm events.

TRUE recommends that the District develop an annual maintenance program for infiltration infrastructure and appurtenances. Items for consideration in such a plan should include

- *Increased maintenance of hydrodynamic separators*
- *Increased maintenance of sumps*
- *Increased flushing/inspection of perforated pipes*
- *Potential installation of additional cleanouts*
- *Considered increased pre-treatment on existing infiltration infrastructure*

FIGURE 4-3: EXAMPLE OF INFRASTRUCTURE REQUIRING MAINTENANCE

4.2.6 Culvert and Ditch Maintenance

Culverts and ditches make up a large portion of the District's conveyance infrastructure. The use of these developments is common in low lying areas with little slope, such as the central developed area of the District. The capacity and overall effectiveness of these flow paths is contingent upon good maintenance practices. The build up of sediment, overgrowth of foliage, and obstruction by debris increases the risk of over-topping of these systems, and potential flooding or ponding on public and private property, including damaging or obstructing roadways.

TRUE's field inspection of the drainage system revealed several areas of considerable deficiency in terms of culvert and ditch maintenance. Notably, most culverts and ditches were found to be no less than 50% filled with sediment, several ditches were overgrown, and many culvert inlets and outlets were obstructed with natural and human generated debris (see Figure 4-4).

TRUE recommends that the District develop an annual inspection and maintenance program for these conveyance systems to ensure that build up and debris do not reach detrimental levels. As part of this program, the District should evaluate what levels of service are and are not acceptable for ditches and culverts and use that evaluation as a benchmark for allocating resources to annual maintenance.

FIGURE 4-4: EXAMPLE OF CULVERT REQUIRING MAINTENANCE TO INCREASE CAPACITY

4.2.7 Protect Boulevard Swales and Ditches

Many of the District's residential neighbourhoods utilize a rural cross-section for road rights-of-way. This cross-section is typically comprised of a paved roadway, with gravel or grassed shoulders, and swales or ditches up to property line. This approach is a very sustainable drainage practice and is directly inline with the IOCP goals, objectives, and policies.

There is a common tendency for the community to fill in the swales or ditches to create additional parking, landscaping, wider driveways and developing urban cross sections of roads (see Figure 4-5 and Figure 4-6). In some cases, individuals have been conscious of the swales purpose and attempted to install culverts or extend existing driveway culverts, in other cases, swales may have simply been backfilled. The general result of this practice is a reduced capacity for drainage conveyance (see Figure 4-7), reduced opportunity for infiltration, and often the installation of disjointed, poorly graded, or undersized culverts. Overall, the result is a negative impact on the drainage conveyance network.

This reduction in capacity and effectiveness of the swales and ditches creates an increased risk for ponding or flooding of private property and roadways during storm events. The impacted conveyance infrastructure also creates risk for roadways, as paved edges exposed to additional standing water decreases the expected service life and level of service for the pavement.

TRUE recommends that the District investigates methods or policies related to enforcing protection of roadway swales and the maintenance of driveway culverts.

TRUE's review of the Subdivision and Development Servicing Design Criteria Manual notes that there is a minimum width for driveways, but no stated maximum. It is recommended that the District look into updating this detail to include an enforceable maximum width to protect frontage drainage.

The replacement of rural to urban cross-sections, involving the replacement of swales and ditches with engineered curb and gutter, and direct discharge to underground infrastructure, is a shift away from the IOCP's goal, policies, and objectives. Removal of swales and ditches reduces the volume of pre-treatment provided to infiltrated flows and will generally result in the shortened lifespan of buried infrastructure, such as rockpits.

TRUE recommends that the District encourage the development of modified urban cross-sections that include "natural assets", such as bioswales or rain gardens, to improve the quality and effectiveness of the stormwater conveyance system.

When considering the enhancement of stormwater collection and treatment, it is best to go green before going underground

FIGURE 4-5: ENCOURAGEMENT OF VEGETATION IN DRAINAGE DITCHES REDUCES VOLUME AND FLOW CAPACITY

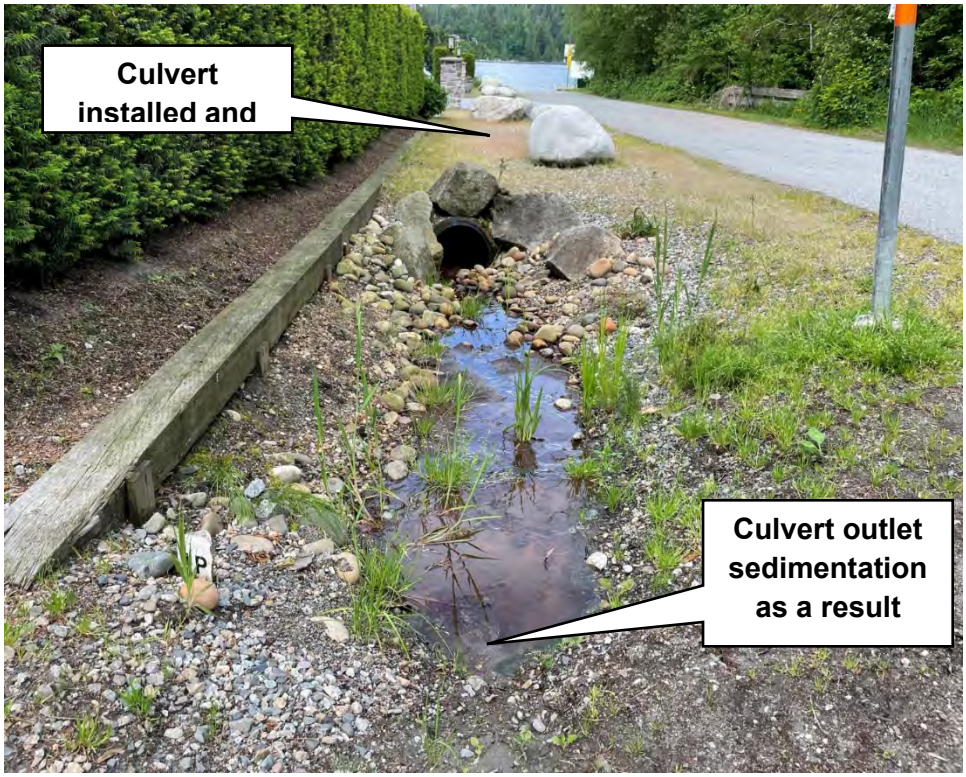


FIGURE 4-6: INFILLED AND LANDSCAPED DITCH/SWALE RESULTING IN SEDIMENTATION AT CULVERT OUTLET

FIGURE 4-7: DITCH HAS BEEN INFILLED OVERTIME WITH SEDIMENT AND ROCK, REDUCING CAPACITY AND INFILTRATION CAPABILITIES

4.2.8 SWMP and Model Upkeep

This document has been produced with the intention of becoming a **living document.** It is to the District's benefit to upkeep this SWMP. Recommended ongoing updates to the document include:

A living document, is not static and is adaptable to changing conditions. It is a document that is continually edited and updated

- Updating the model to include development on a periodic basis
- Reevaluate the impacts of future development as plans and timelines update
- Record when recommendations are completed (infrastructure improved / constructed, bylaws implemented, plans created, etc.)
- Update sections / content impacted by the evolving goals and resources of the District
- Record the impacts of future major storm events, such as the November 2021 event, either as additional sections to this plan, or Appendices

As an absolute minimum, the District should plan to perform a complete review of this document every 5 to 10-years, to ensure current information, current policies, and regulatory changes are reflected in the content.

4.2.9 Update Development Cost Charge Bylaw to include Stormwater Planning

As population growth and development continue within the District, it will be important for the District to budget and plan for stormwater planning accordingly. As previously recommended the SWMP should be updated every 5-10 years. To fund this planning work, the District should consider expanding its Development Cost Charge (DCC) Bylaw to include provision for stormwater planning. A general guideline for the cost breakdown of this planning work may be 75% DCC and 25% taxes, as the planning work will undoubtedly benefit existing users. The District should expect to budget $150,000 to fully update the SWMP.

In addition, other municipalities have utilized stormwater planning DCCs to fund development reviews of the proposed stormwater servicing to ensure individual developments are adhering to the SWMP while also allowing the SWMP to be adapted on a case by case basis while maintain a global perspective.

4.3 Capital and Operational Upgrades

Model results for the 10- and 100-Year storms events were reviewed to provide a list of capital upgrades to mitigate infrastructure surcharging, flooding, and unacceptably high flowrates or velocities. These are summarized by priority in Table 4-1 and further described in the Appendix A Project Sheets.

TABLE 4-1: CAPITAL UPGRADES SUMMARY

Project #	Description	Priority	Order of Magnitude Cost
SW-1	Upgrade Culvert At 66657 Kawkawa Lake Rd.	High	$1.2M
SW-1a	Debris Basin and Channel Upgrades At 66657 Kawkawa Lake Rd.	High	$600K
SW-2	Upgrade Thacker Creek along Forrest Cres.	High	$1.5M
SW-3	Upgrade Coquihalla St. Storm Mains	High	$1.7M
SW-4	Upgrade Drainage South of Kettle Valley Rd. and Kawkawa Lake Rd. Intersection	Moderate	$1.0M
SW-5	Overland Drainage for 65617 Kawkawa Lake Rd. Low Point	Moderate	$300K
SW-6	Upgrade Kawkawa Lake Rd. / Johnson Rd. Intersection Culvert	Moderate	$250K
SW-6a	Debris Basins Upstream of Kawkawa Lake Rd. / Johnson Rd. Intersection	Moderate	$800K
SW-7	Upgrade Culvert at 66597 Kawkawa Lake Rd.	Moderate	$250K
SW-8	Additional Culvert At Kawkawa Lake IR#16	Moderate	$650K
SW-9	Stormwater Retention Pond to Prevent Owl St. Depression Flooding.	Low	$600K
SW-10	Overland Route for Drywell Network Along Lakeview Cres.	Low	$70K

Model results also identified potential flooding of stormwater features within the MOTI highway corridors (see Table 4-2). These areas were not assessed in detail but are areas of concern. This infrastructure is outside the District's jurisdiction but could impact District like some of these areas did during the November event. It is recommended that District open a dialogue with the MOTI to ensure future MOTI projects to mitigate flooding includes collaboration between the District and MOTI.

TABLE 4-2: NOTABLE MODEL RESULTS WITHIN MOTI HIGHWAY CORRIDORS

Project #	Description
MOTI-1	Flooding of storage basin between HWY 3 eastbound and westbound lanes, 500m east of HWY 1 overpass. The outlet of this storage basin is unknown.
MOTI-2	Flooding of storage basin south of HWY 3 eastbound lanes, 200m west of HWY 1/Flood Hope Road exit.
MOTI-3	Flooding of intersection between HWY 1/Flood Hope Road Exit and HWY 1/Flood Hope Road.
MOTI-4	Flooding of Thacker Creek at HWY3, along the Old Hope Princeton Way exit.

5.0 Conclusions

This Stormwater Management Plan has been produced by TRUE Consulting at the request of the District of Hope. This plan, along with the accompanying computations PCSWMM model, is developed with the intention of being a living document that is to be periodically and regularly updated as the process of stormwater management continues and evolves within the District. Key triggers for revisiting the plan and model are:

- As recommendations are completed
- The minimum 5–10 year review timeframe has passed
- Related municipal goals, resources, or directions are changed
- Related or supporting documentation is updated or created (IOCP, similar studies, etc.)
- Major Events occur (similar to the November 2021 event)
- Sufficient calibration data has been collected

The document has been originally provided to the District in pdf and hardcopy format in 2022. The hardcopy format was accompanied with a USB drive containing the PCSWMM computational model. Additional copies of the report or model can be obtained from TRUE at the request of the District. It is the responsibility of the District to keep the PCSWMM model up-to-date, or to retain the services of a modelling professional to do so.

The November 2021 event was an unfortunately well-timed event (occurred while the District was studying its systems) that highlighted the impact and importance of the stormwater discharge and conveyance systems. This document has outlined many projects and recommendations for addressing current and potential future deficiencies to minimize the impact related to future similar events. It is the responsibility of the District to consider their resource availability and the District's acceptable levels of service and risk when considering the recommendations within this plan.

APPENDIX A

November 2021 Storm Overview Figures

DISTRICT OF HOPE

November Flooding Overview

Sediment Depositon

Flooding and Debris at Golf Course

No Known Flooding Issues with Urbanized Core

Flooding resulting in Contamination Private Well

Overland Flow

Bank Erosion and Emergency Protection Works

Overtopping Road and Resulting Washout

Overland Flow

MoTI Debris Basin Flooded and Overtopped

No Evidence of Flowing Water or Flooding Despite Large Catchment Area

SCHKAM 2

AYAWAWIS 15

Fraser River

Kawkawa Lake

Sucker Creek

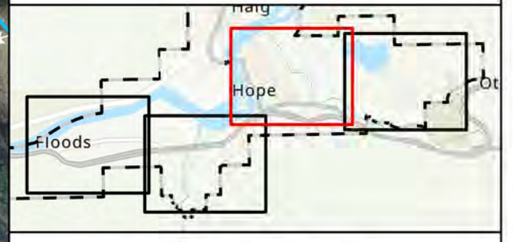
Coquihalla River

HOPE 1

GREENWOOD ISLAND 3

Thacker Creek

- Major Flow Paths
- Flow Direction
- Flooding Areas
- First Nation Reserve
- Municipal Boundary



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure A1

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

Overtopping Flows and Debris

Creek Erosion

Bank Erosion and Overtopping

Flooding and Debris

Ponding and Flooding

Camilla Creek

Kawkawa Lake

Sucker Creek

Kopp Creek

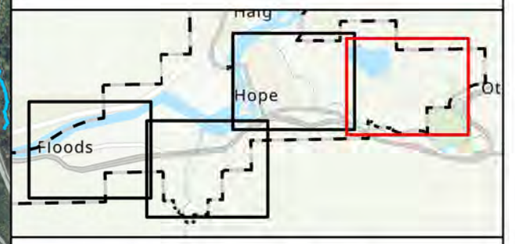
KAWKAWA LAKE 16

Coquihalla River

DISTRICT OF HOPE

November Flooding Overview

- Major Flow Paths
- Flow Direction
- Flooding Areas
- First Nation Reserve
- Municipal Boundary



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure A2

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

November Flooding Overview

Fraser River

Silverhope Creek

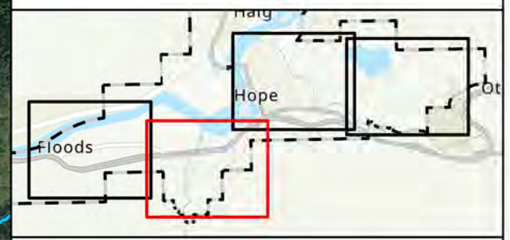
No Known Flooding in Silver Creek Neighbourhood

No Evidence of Flowing Water or Flooding in Ditch Despite Large Catchment Area

Flooding

No Evidence of Flowing Water or Flooding Despite Large Catchment Area

- Major Flow Paths
- Flow Direction
- Flooding Areas
- First Nation Reserve
- Municipal Boundary



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure A3

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

November Flooding Overview

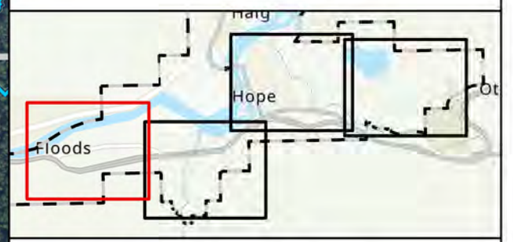
CHAWATHIL 4

Fraser River

Ponding/Flooding in Latent Creek Bed

Chawuthen Creek

- Major Flow Paths
- Flow Direction
- Flooding Areas
- First Nation Reserve
- Municipal Boundary



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure A4

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

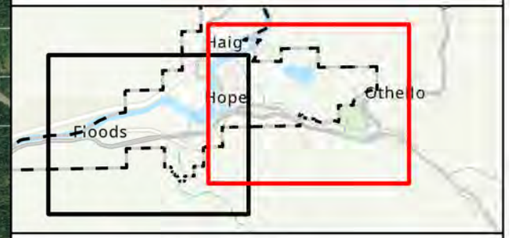
APPENDIX B

Drainage System Overview Figures

DISTRICT OF HOPE

Drainage System Overview

- Storm Manhole
- Storm Mains
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths



0 250 500 750 1,000 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:25,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

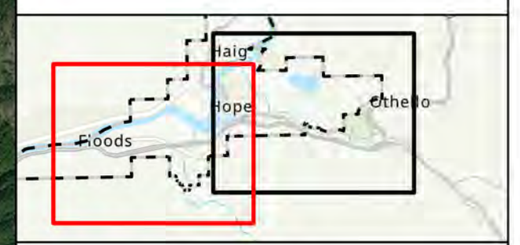
Figure B1

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

Drainage System Overview

- Storm Manhole
- Storm Mains
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths



0 250 500 750 1,000 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:25,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure B2

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

APPENDIX C

IOCP Land Use Figures

DISTRICT OF HOPE

OCP Future Landuse

- Airport
- Comprehensive Development
- Country Residential
- Downtown Hope
- Heavy Industry
- Highway Commercial
- Light Service Industry
- Limited Use
- Parks, Recreation and Open Space
- Rural/Agricultural
- Urban/Suburban Residential
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths

0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

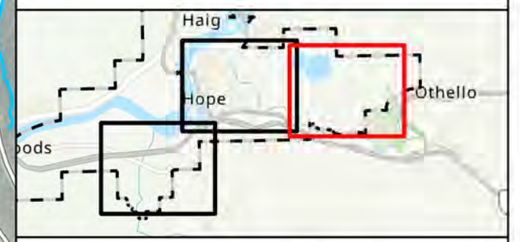
Figure C1

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

OCP Future Landuse

- Airport
- Comprehensive Development
- Country Residential
- Downtown Hope
- Heavy Industry
- Highway Commercial
- Light Service Industry
- Limited Use
- Parks, Recreation and Open Space
- Rural/Agricultural
- Urban/Suburban Residential
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

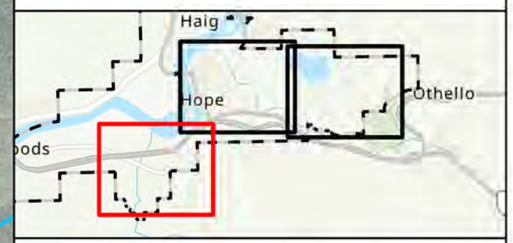
Figure C2

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

OCP Future Landuse

- Airport
- Comprehensive Development
- Country Residential
- Downtown Hope
- Heavy Industry
- Highway Commercial
- Light Service Industry
- Limited Use
- Parks, Recreation and Open Space
- Rural/Agricultural
- Urban/Suburban Residential
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure C3

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

APPENDIX D

10 Year Storm Sewer Assessment Figures

DISTRICT OF HOPE

10-Year Storm Sewer Assessment

Model Identifies Flooding Within 65617 Kawkawa Lake Rd. Low Lying Area

Model Identifies Flooding of Thacker Creek Along Forrest Cres.

- Storm Manhole

Flow Depth vs Pipe Diameter

- No Surcharging
- Pipes > 100 % Capacity
- Pipes > 150 % Capacity
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths

0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure D1

Model Identifies Flooding of Kawkawa Lake Rd. Culvert Crossing at 66657 Kawkawa Lake Rd.

Model Identifies Flooding of Kawkawa Lake Rd. Culvert Crossing at 66597 Kawkawa Lake Rd.

Union Bar Rd
Gamilos Creek
Johnson Rd
Kereluk Rd
Kawkawa Lake
Sucker Creek
Stephens Rd
Kopp Creek
Summer Rd
KAWKAWA LAKE 16
Kawkawa Lake Rd
Othello Rd
Jason Rd
Tunnels Rd
Hwy 5
Cottonwood Dr
Mountview Cres
Park Ave
Ogilview Dr
Lakeview Cres
Alder Pl
Lake Country Dr
Emerald Rd
Pine Cres
Kettle Valley Rd
Gardner Dr
Forrest Cres
Old Hope Princeton Way
Hwy 3
Old Hope Princeton Way Offramp
Old Hope Princeton Way Onramp
Coquihalla River

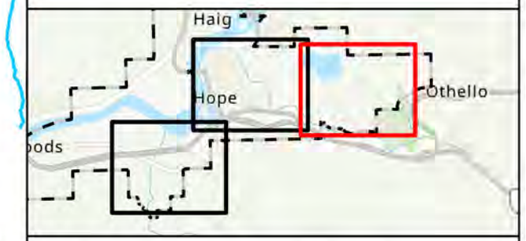
DISTRICT OF HOPE

10-Year Storm Sewer Assessment

- Storm Manhole

Flow Depth vs Pipe Diameter

- No Surcharging
- Pipes > 100 % Capacity
- Pipes > 150 % Capacity
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure D2

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

Page 2 of 3

DISTRICT OF HOPE

10-Year Storm Sewer Assessment

Storm Manhole

Flow Depth vs Pipe Diameter

- No Surcharging
- Pipes > 100 % Capacity
- Pipes > 150 % Capacity
- First Nation Reserve
- Municipal Boundary
- Major Flow Paths

0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure D3

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

APPENDIX E

100 Year Model Results

DISTRICT OF HOPE

100-Year Model Results

Model Identifies Flooding Within 65617 Kawkawa Lake Rd. Low Lying Area

Model Identifies Flooding Within Low Lying Area Along Coquihalla St.

Model Identifies Flooding Within MOTI Storage Between HW3 Eastbound and Westbound Lanes

Model Identifies Flooding of Kettle Valley Rd.

Model Identifies Flooding of Thacker Creek Along Forrest Cres.

Model Identifies Potential Flooding of Thacker Creek at MOTI HWY 3 Exit.

- Storm Manhole

Max Flow (L/s)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0
- First Nation Reserve
- Municipal Boundary

0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure E1

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

Page 1 of 3

Model Identifies Flooding of Kawkawa Lake Rd. and Johnson Rd. Intersection.

Model Identifies Flooding of Kawkawa Lake Rd. Culvert Crossing at 66657 Kawkawa Lake Rd.

Model Identifies Flooding of Kawkawa Lake Rd. Culvert Crossing at 66597 Kawkawa Lake Rd.

Union Bar Rd
Gamilos Creek
Johnson Rd
Kereluk Rd
Sucker Creek
Kawkawa Lake
Stephens Rd
Kopp Creek
Summer Rd
Othello Rd
Jason Rd
KAWKAWA LAKE 16
Kawkawa Lake Rd
Othello Rd
Cottonwood Dr
Mountview Cres
Park Ave
Ogilview Dr
Lakeview Cres
Alder Pl
Lake Country Dr
Emerald Rd
Pine Cres
Kettle Valley Rd
Gardner Dr
Forrest Cres
Old Hope Princeton Way
Coquihalla River
Hwy 3
Old Hope Princeton Way Offramp
Old Hope Princeton Way Onramp
Tunnels Rd
Hwy 5

DISTRICT OF HOPE

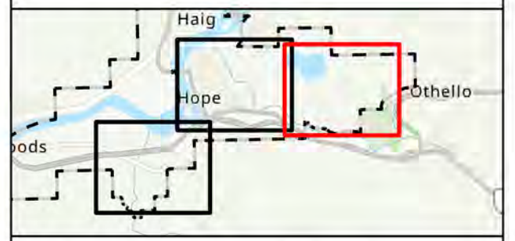
100-Year Model Results

- Storm Manhole

Max Flow (L/s)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0

- First Nation Reserve
- Municipal Boundary



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure E2

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

100-Year Model Results

Model Identifies Flooding at HW1/Flood Hope Rd. Exit and HWY 1/Flood Hope Rd. Intersection.

Model Identifies Flooding Around MOTI Storage South of HWY3 Eastbound Lanes.

Model Identifies Potential Flooding Within Low Lying Area East of Owl St.

Fraser River
Silverhope Creek
Bristol Slough
Rd
Airport Rd
YHE Runway 07-25
Bristol Island Rd
Yale Rd
Starret Rd
Tom Berry Rd
Klassen Rd
Tobina Rd
Elder Rd
Tobina Rd Offramp
Trans-Canada Hwy
Silver Hope Creek Bridge
Flood Hope Rd Onramp
Flood Hope Rd Offramp
Water Ave Onramp
Flood Hope Rd Offramp
Trans-Canada Hwy
Beech Ave
Walnut Dr
Edwards Dr
Cypress St
Heather Ave
Silverview Rd
Birch St
Rosewood Ave
Birch Pl
Yale Rd
Flood Hope Rd
School Rd
Beacon Rd
Hockin Rd
Mary Cope Way
Flood Hope Rd
Owl Rd
Yvonne Ave
Marie St
Peter St
Old Yale Rd
Bailey Cres
Tum Tum Rd
Foster Rd
Gagnon Pl
Uplands Dr
Silver Skagit Rd
Silverhope Rd
Humphry's Rd

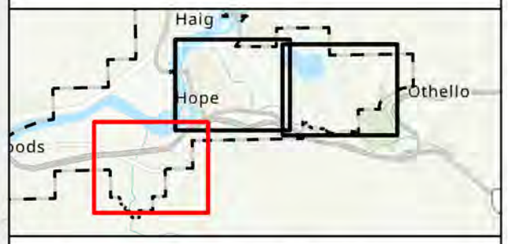
Storm Manhole

Max Flow (L/s)

- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0

First Nation Reserve

Municipal Boundary



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure E3

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

APPENDIX F

Major Potential Ponding Locations Figures

DISTRICT OF HOPE

Major Potential Ponding

SCHKAM 2

AYAWAWIS 15

Fraser River

Kawkawa Lake

Sucker Creek

Coquihalla River

HOPE 1

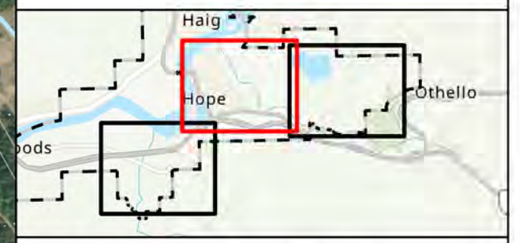
GREENWOOD ISLAND 3

Thacker Creek

- Storm Manhole
- Storm Mains
- Major Flow Paths
- First Nation Reserve
- Municipal Boundary

Max Depth (m)

- 0.15 - 0.5
- 0.5 - 1
- 1 - 1.5
- > 1.5



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure F1

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

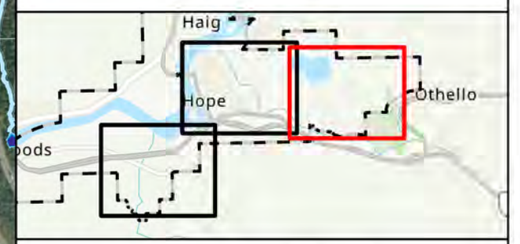
Major Potential Ponding

Kawkawa Lake
Camilles Creek
Sucker Creek
Kopp Creek
KAWKAWA LAKE 16
Coquihalla River

- Storm Manhole
- Storm Mains
- Major Flow Paths
- First Nation Reserve
- Municipal Boundary

Max Depth (m)

- 0.15 - 0.5
- 0.5 - 1
- 1 - 1.5
- > 1.5



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure F2

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

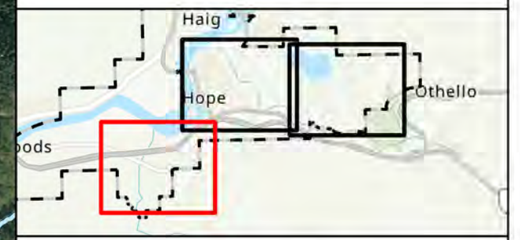
DISTRICT OF HOPE

Major Potential Ponding

- Storm Manhole
- Storm Mains
- Major Flow Paths
- First Nation Reserve
- Municipal Boundary

Max Depth (m)

- 0.15 - 0.5
- 0.5 - 1
- 1 - 1.5
- > 1.5



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure F3

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

APPENDIX G

Prioritized Upgrades Locations Figures

DISTRICT OF HOPE

Prioritized Upgrades

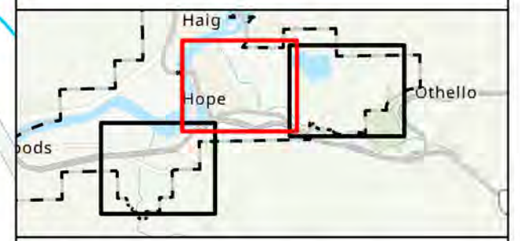
Project SW-5: Overland Drainage for 65617 Kawkawa Lake Rd. Low Point

Project SW-3: Upgrade Coquihalla St. Storm Mains

Project SW-4: Upgrade Drainage South of Kettle Valley Rd. and Kawkawa Lake Rd. Intersection

Project SW-2: Upgrade Thacker Creek along Forrest Cres.

- Storm Manhole
- Storm Mains
- Municipal Boundary
- First Nation Reserve
- Major Flow Paths
- Project Area



0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure G1

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

Project SW-6: Upgrade Kawkawa Lake Rd. / Johnson Rd. Intersection Culvert

Project SW-6a: Debris Basins Upstream of Kawkawa Lake Rd. / Johnson Rd. Intersection

Project SW-1a: Debris BasinUpstream of Culverts At 66657 Kawkawa Lake Rd.

Project SW-7: Upgrade Culvert at 66597 Kawkawa Lake Rd.

Project SW-1: Upgrade Culvert At 66657 Kawkawa Lake Rd.

Project SW-8: Additional Culvert At Kawkawa Lake IR#16

Project SW-10: Overland Route for Drywell Network Along Lakeview Cres.

DISTRICT OF HOPE

Prioritized Upgrades

- Storm Manhole
- Storm Mains
- Municipal Boundary
- First Nation Reserve
- Major Flow Paths
- Project Area

0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure G2

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

DISTRICT OF HOPE

Prioritized Upgrades

Project SW-9: Stormwater Retention Pond to Prevent Owl St. Depression Flooding.

- Storm Manhole
- Storm Mains
- Municipal Boundary
- First Nation Reserve
- Major Flow Paths
- Project Area

0 100 200 300 400 500 m

N

Datum: North American 1983 CSRS
Projection: Transverse Mercator (Zone 10)

Scale:	1:10,000
Issued for:	Draft Report
Drawn by:	RK
Date:	7/22/2022
Project Ref No.	1239-271

TRUE

Figure G3

R:\Clients\1200-1299\1239\1239-271\03 Drawings\GIS\1239-271.aprx

APPENDIX H

Project Sheets

SW-1a Project:

Debris Basin Upstream of Culverts At 66657 Kawkawa Lake Rd.

Priority: High

Trigger: Mitigate Debris Flows and Stream Migration Major Storm Events

Performance During November 2021 Major Storm Event

Debris and stormwater flow overwhelmed creek bed north of Kereluk Rd. Creek breaks banks and realigns to cross Kawkawa Lake Rd. south of existing crossing. Desired creek flow maintained by emergency resources efforts.

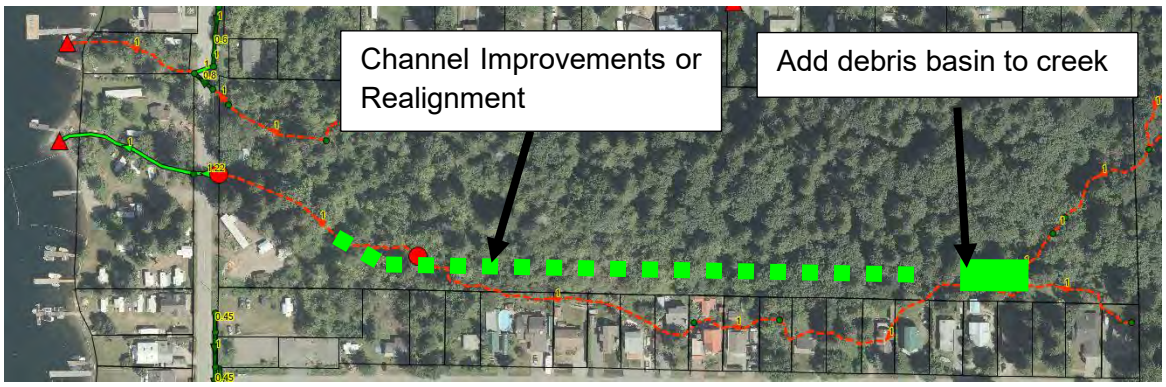
Mitigation Solutions

A debris basin for catching migrating creek debris would help limit the stream avulsion processed migration during major storm events.

The existing creek channel is extremely confined with historic encroachments and has insufficient capacity even the recent areas rebuilt after the November storm. Improvements and even realignment of the channel is warrant to reduce risk to existing residences and potential downstream overtopping toward Kawkawa Lake Rd.

Creek crosses private land which is identified in OCP as Urban/Suburban residential. Negotiation with landowner during future subdivision or development could acquire necessary land for debris basin.

Proposed Solution Figure



Cost Estimate

Estimate Value: $1,200,000

SW-1 Project:

Upgrade Culvert At 66657 Kawkawa Lake Rd.

Priority: High

Trigger: Mitigate Flooding During 10- and 100-Year Events

Performance During 10 Year Return Period Storm with Climate Change

Culvert overwhelmed with notable surcharging leading to flooding of roadway. Very high flows in private channel west of road.

Performance During 100 Year Return Period Storm with Climate Change

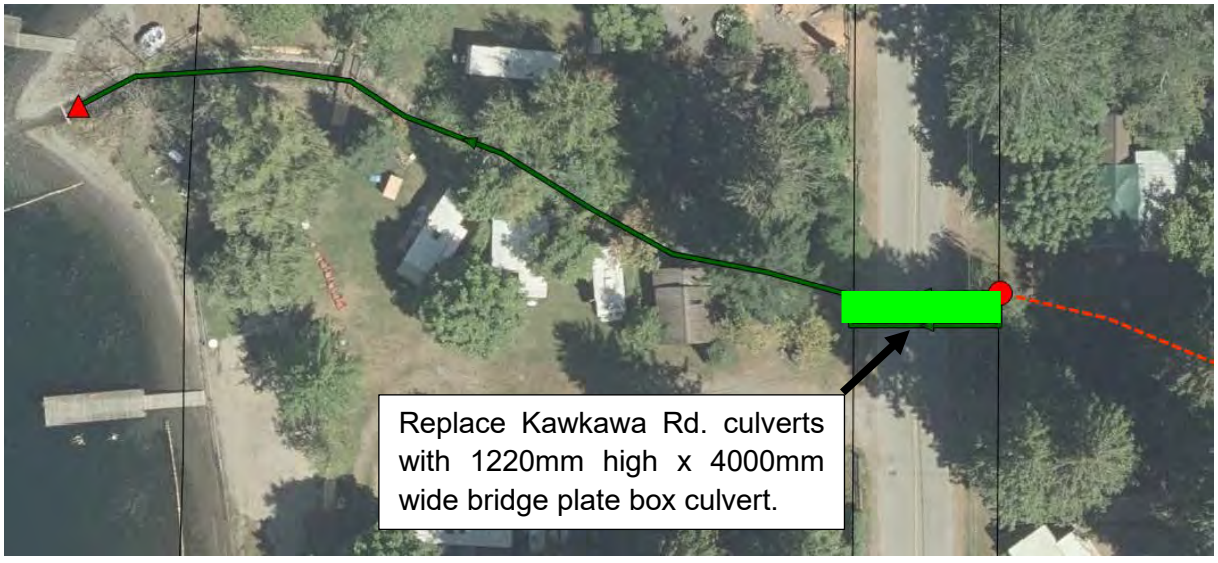
Culvert overwhelmed and roadway flooded.

Mitigation Solutions

Increase culvert capacity by replacing existing culvert with a with 1220mm high x 4000mm wide bridge plate box culvert.

Establish bylaw to protect overland flow paths from encroachment and regrading.

Proposed Solution Figure



Cost Estimate

Estimate Value: $600,000

SW-2 Project:

Upgrade Thacker Creek along Forrest Cres.

Priority: High

Trigger: Mitigate Flooding During 10- and 100-Year Events

Performance During 10 Year Return Period Storm with Climate Change

High flows overwhelm south side ditching and culverts. Overland flow occurs, likely to spill down Glenaire Dr.

Performance During 100 Year Return Period Storm with Climate Change

Very high flows overwhelm south side ditching and culverts. Overland flow occurs, likely to spill down Glenaire Dr.

Existing Driveway Crossing 1

Existing Driveway Crossing 2

Existing Driveway Crossing 3

Existing RoadwayCrossing 2

Mitigation Solutions

Confirm major storm event stormwater flows in existing channel by monitoring.

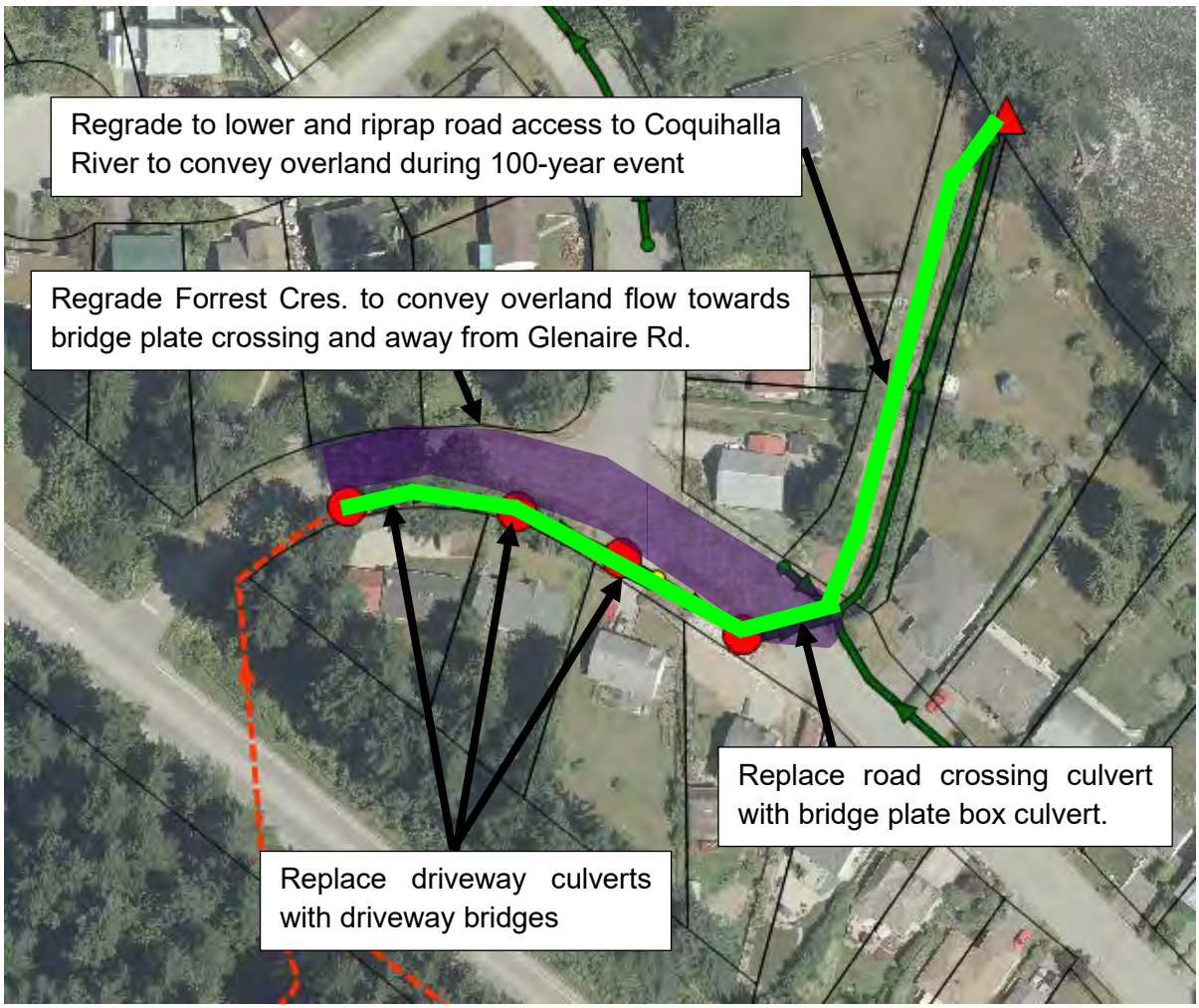
Replace driveway culverts with driveway bridges to maintain wide ditch channel along south side of Forrest Cres.

Replace road crossing culvert with 1400mm high x 4500mm wide bridge plate box culvert.

Regrade to lower and riprap gravel road access to Coquihalla River to convey overland flow.

Regrade Forrest Cres. to convey flooding water towards bridge plate box culvert. Superelevate road to prevent flood from spilling onto Glenaire.

Proposed Solution Figure



Cost Estimate

Estimate Value: $1,500,000

SW-3 Project:

Upgrade Coquihalla St. Storm Mains

Priority: High

Trigger: Mitigate Flooding During 10- and 100-Year Events

Performance During 10 Year Return Period Storm with Climate Change

Underground piping at capacity from runoff. Minor surface ponding.

Performance During 100 Year Return Period Storm with Climate Change

Storm sewers overwhelmed. Low lying area has no outlet. Flooding to occur.

Mitigation Solutions

Replace existing 600mm clay and corrugated steel pipe storm mains with 900mm.

Add high capacity inlet at low points and connect to upgraded storm mains.

Proposed Solution Figure

Cost Estimate

Estimate Value: $1,700,000

SW-4 Project:

Upgrade Drainage South of Kettle Valley Rd. and Kawkawa Lake Rd. Intersection

Priority: Moderate

Trigger: Mitigate Roadway Washout Risk and 100-Year Storm Event Flooding.

Background

High side ditching along Kettle Valley Rd. has filled in with sediment, resulting in overtopping and washout of roadway.

Performance During 100 Year Return Period Storm with Climate Change

Very high flows through road crossing, likely to result in overtopping and flooding of roadway. Very high flows through undefined overland routes at base of steep slope.

Mitigation Solutions

Monitor and confirm flows from industrial lot to east and through culverts.

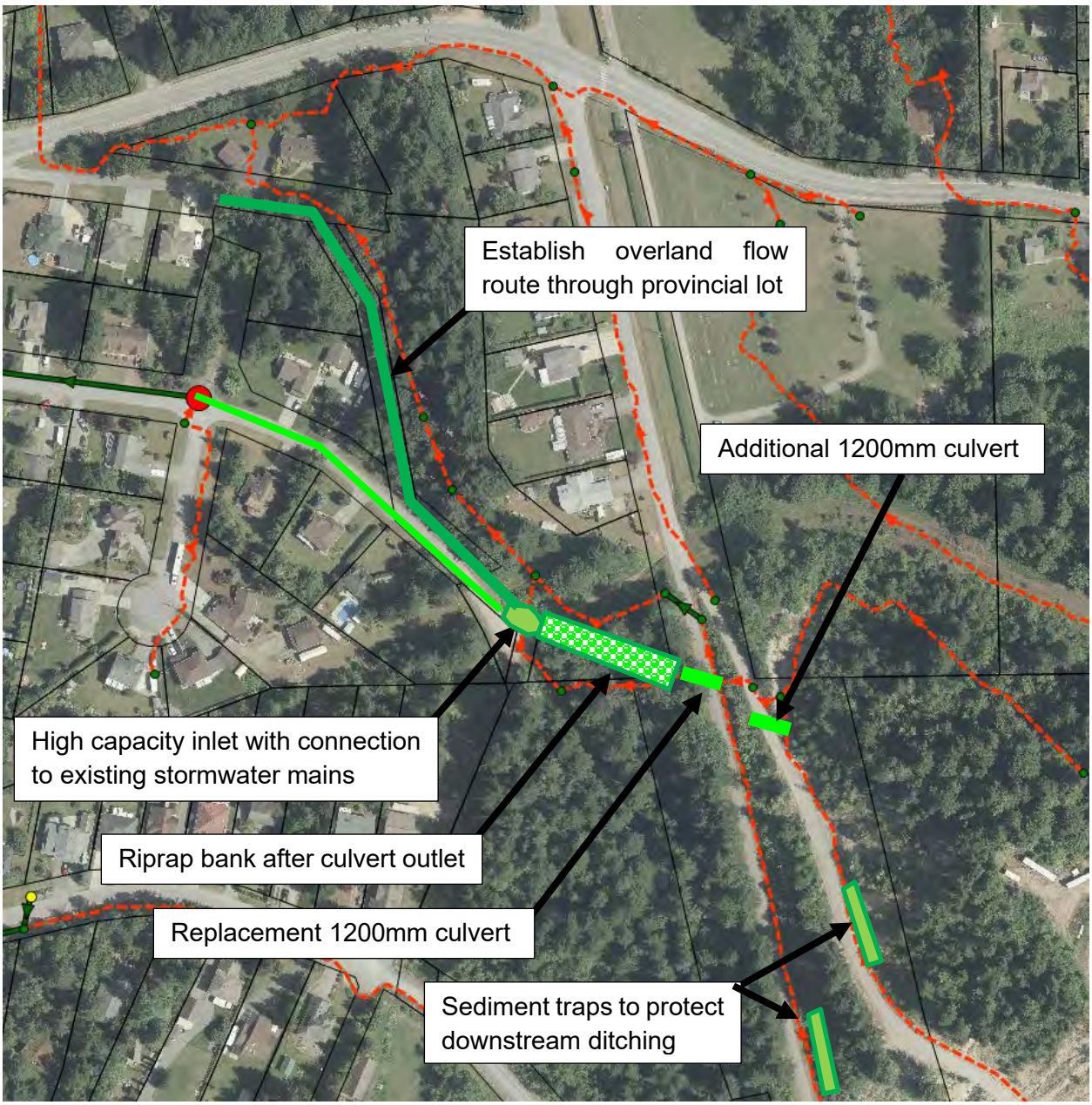
Protect ditching from upstream sediment by adding sediment trap along stormwater ditching from industrial lot to east.

Replace culvert crossing to prevent overtopping of road. Riprap culvert outlet to safely convey runoff down slope. This proposed riprap is on land which is currently privately owned but likely undevelopable.

High capacity inlet at base of riprap into 200m of stormwater main leading to existing stormwater main beneath Birchtrees Dr.

Stormwater ditching along provincial lot to convey overland major storm event runoff toward Dr. Frost Rd.

Proposed Solution Figure



Cost Estimate

Estimate Value: $1,000,000

SW-5 Project:

Overland Drainage for 65617 Kawkawa Lake Rd. Low Point

Priority: Moderate

Trigger: Subdivision Application or Building Permit for 65617 Kawkawa Lake Rd

Performance During 10 Year Return Period Storm with Climate Change

Low lying area overwhelmed by incoming runoff. Area is without overland drainage path and volume is infiltrated.

Performance During 100 Year Return Period Storm with Climate Change

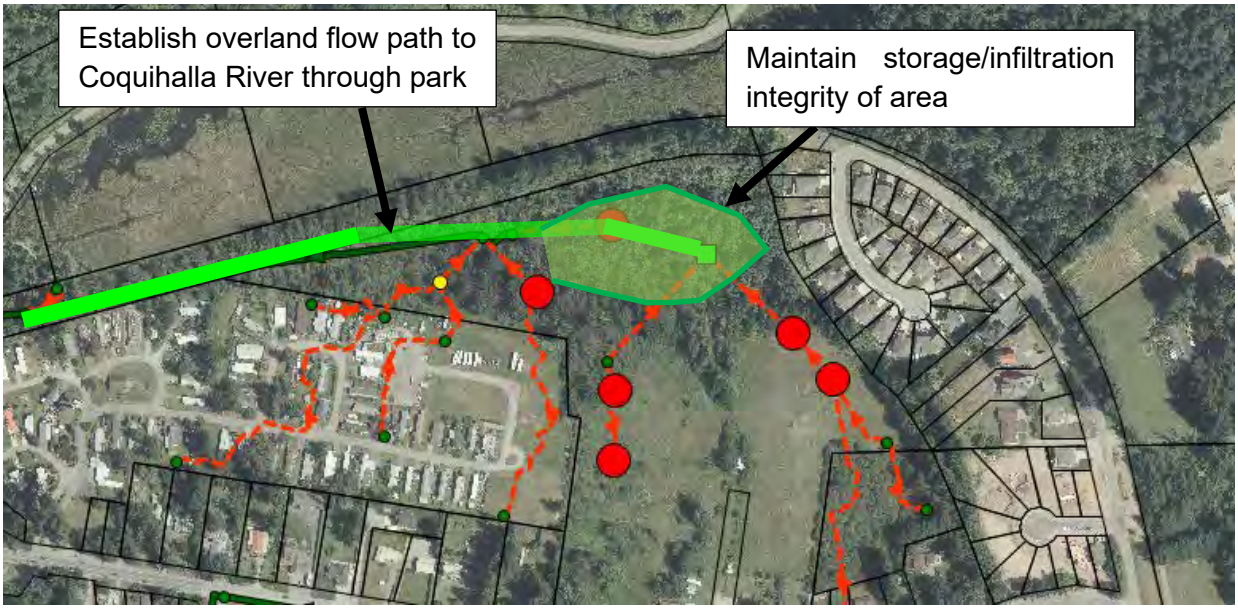
Low lying area floods until overland flow path to northwest begins to flow. Remaining volume is infiltrated.

Mitigation Solutions

Establish drainage to Coquihalla through park area.

Significant runoff storage offered by this low point. Must be retained regardless of development.

Proposed Solution Figure



Cost Estimate

Estimate Value: $300,000

SW-6a Project:

Debris Basins Upstream of Kawkawa Lake Rd. / Johnson Rd. Intersection

Priority: Moderate

Trigger: Mitigate Debris Flows and Stream Migration Major Storm Events

Background

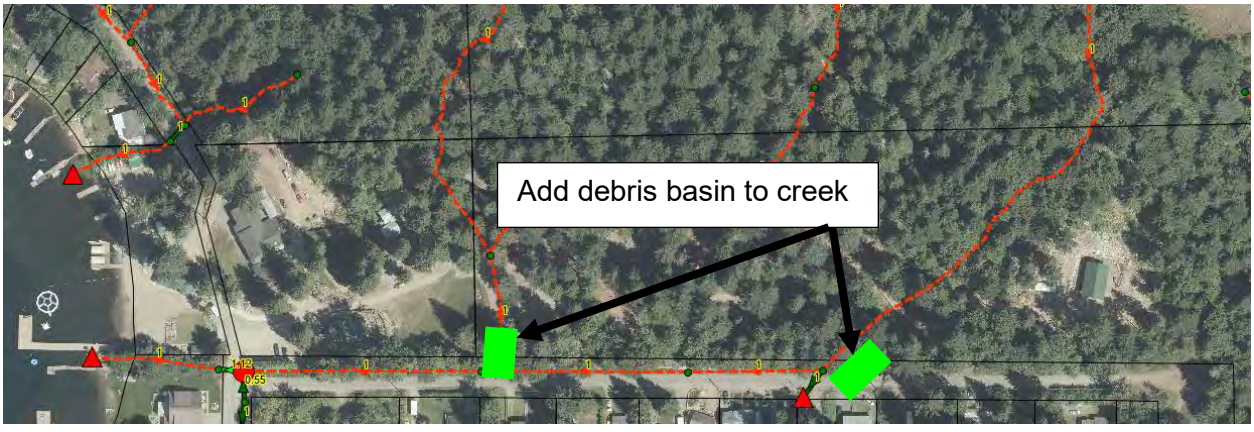
Creek leading to Kawkawa Lake Rd./Johnson Rd. intersection carries debris from the nearby mountainside. Northwest Hydraulics Consultants (nhc) reported in their April 25, 2002 Johnson Road Flood Hazard Assessment report that an estimated 2000m3 of debris was trucked away following the January 6 – 8, 2002 rain on snow event. This previous nhc work recommended a sediment trap to capture stream sediment before it is deposited in roadside ditches.

Mitigation Solutions

Add debris basins for catching migrating sediment and debris to help limit ditch infill and stream migration during major storm events.

The contributing creeks cross private land which is identified in OCP as Urban/Suburban residential. Negotiation with landowner during future subdivision or development could acquire necessary land for debris basin.

Proposed Solution Figure



Cost Estimate

Estimate Value: $800,000

SW-6 Project:

Upgrade Kawkawa Lake Rd. / Johnson Rd. Intersection Culvert

Priority: Moderate

Trigger: Mitigate Flooding During 10- and 100-Year Events

Performance During 10 Year Return Period Storm with Climate Change

Surcharging present at intersection northwest corner, resulting in some flooding of intersection. High flows in private channel west of road

Performance During 100 Year Return Period Storm with Climate Change

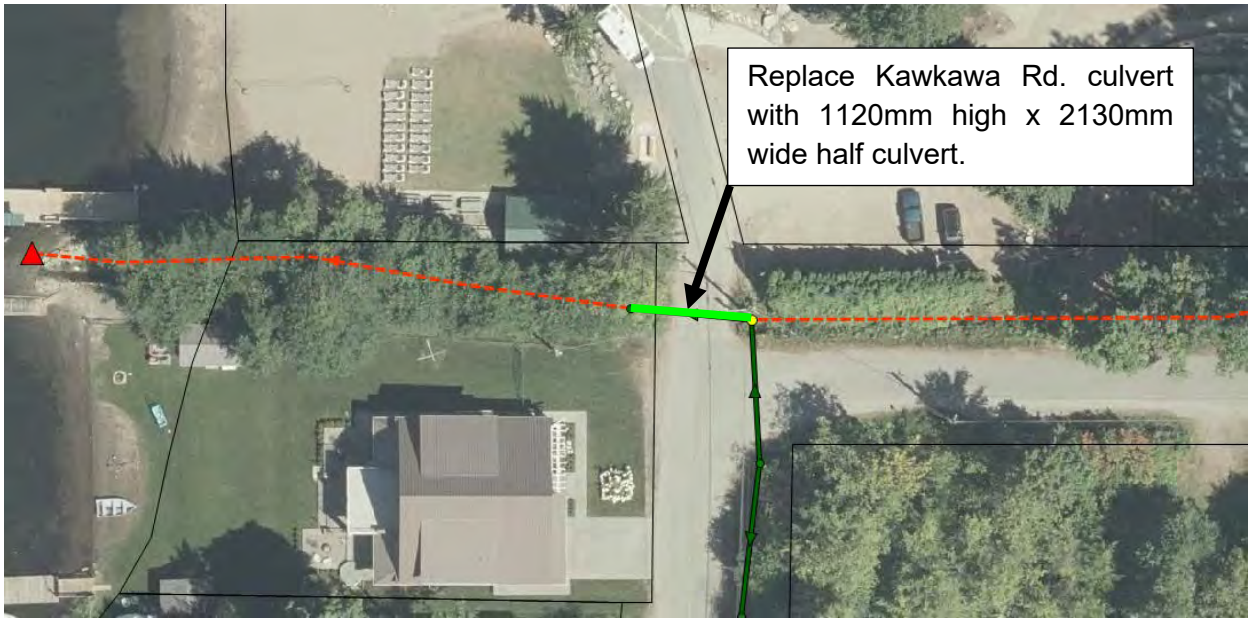
Intersection flooded by flow from east. Very high flows in private channel west of road.

Mitigation Solutions

Increase culvert capacity by replacing existing culvert with 1120mm high x 2130mm wide half culvert.

Establish bylaw to protect overland flow paths from encroachment and regrading.

Proposed Solution Figure



Cost Estimate

Estimate Value: $250,000

SW-7 Project:

Upgrade Culvert At 66597 Kawkawa Lake Rd.

Priority: Moderate

Trigger: Mitigate Flooding During 10- and 100-Year Events

Performance During 10 Year Return Period Storm with Climate Change

Flow from east causing surcharging and overflowing of road. High flows in private channel west of road.

Performance During 100 Year Return Period Storm with Climate Change

Culvert overwhelmed and roadway flooded. Very high flows in private channel west of road.

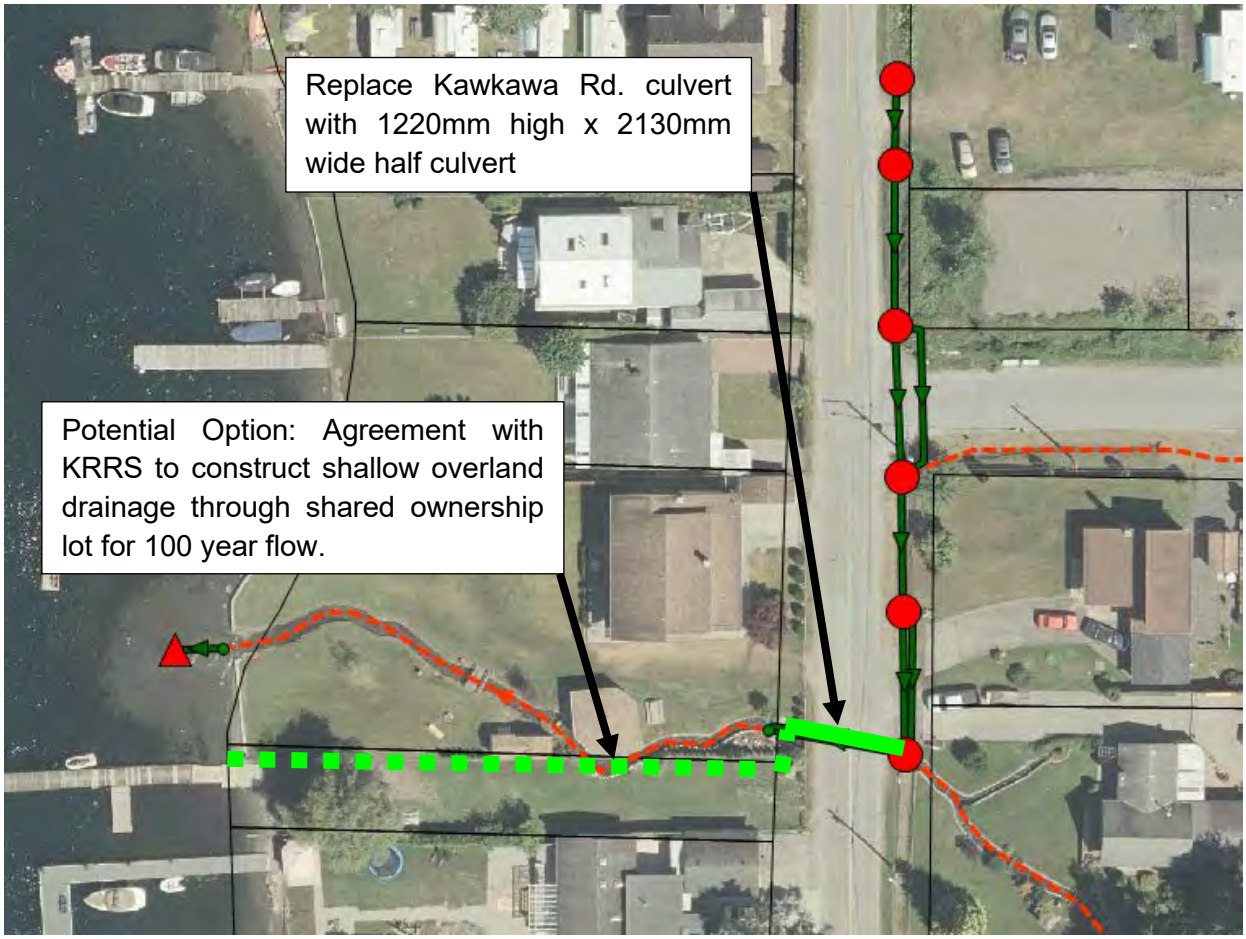
Mitigation Solutions

Increase culvert capacity by replacing existing culverts with 1220mm high x 2130mm wide half culvert.

Establish bylaw to protect overland flow paths from encroachment and regrading.

Potential option to reroute 100 year flow through KRRS shared ownership lot if agreement can be made with KRRS.

Proposed Solution Figure



Cost Estimate

Estimate Value: $250,000

SW-8 Project:

Additional Culvert At Kawkawa Lake IR#16

Priority: Moderate

Trigger: Mitigate Flooding during 100-Year Event

Performance During 10 Year Return Period Storm with Climate Change

Flow from east causing surcharging and ponding back towards Summer road intersection. High flows in channel west of road within Kawkawa Lake IR#16.

Performance During 100 Year Return Period Storm with Climate Change

Culvert overwhelmed. Additional ponding at Summer Road intersection and potential overtopping at IR entrance. Very high flows in the downstream channel within Kawkawa Lake IR#16.

Mitigation Solutions

Add additional 1800mm culvert to road crossing.

Highlight importance of overland flow route to Kawkawa Lake IR#16

Proposed Solution Figure

Cost Estimate

Estimate Value: $650,000

SW-9 Project:

Stormwater Retention Pond to Prevent Owl St. Depression Flooding

Priority: Low

Trigger: Subdivision and Development of PID 014-665-336

Performance During 10 Year Return Period Storm with Climate Change

Concentrated runoff from south and east collect in depression east of Owl St. Some flooding to occur. No overland outlet identified.

Performance During 100 Year Return Period Storm with Climate Change

Increased runoff from south and east collect in depression east of Owl St. Flooding to occur.

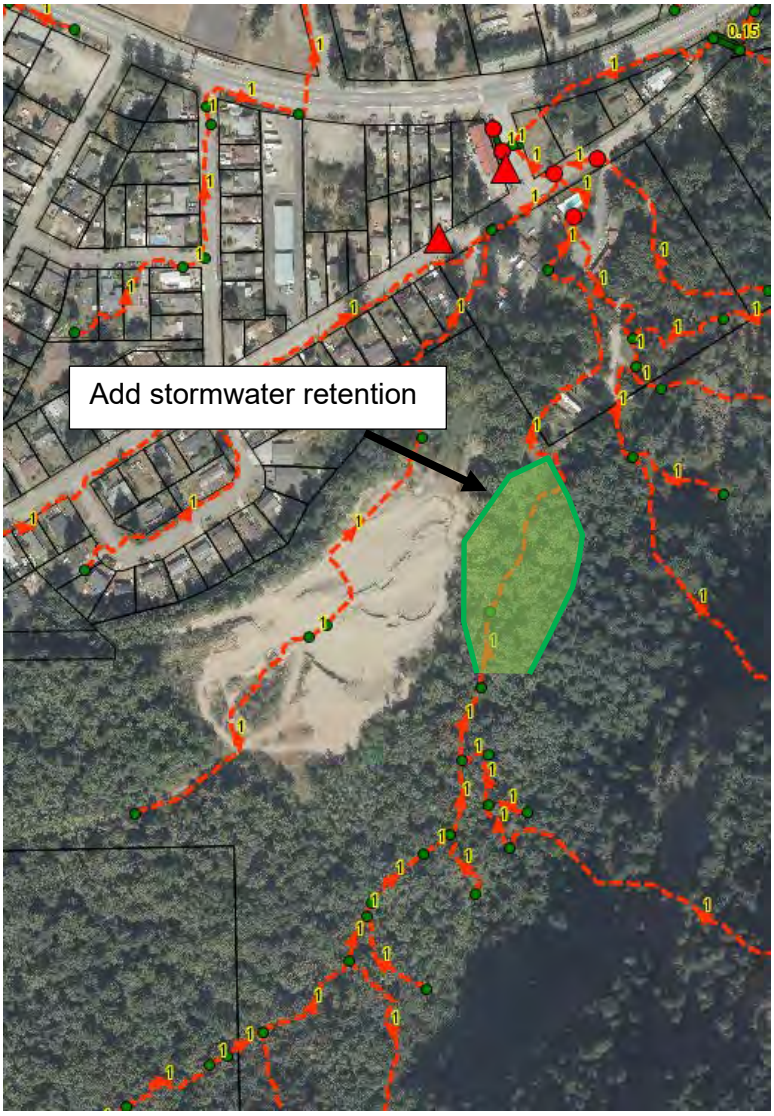
Mitigation Solutions

Confirm major storm event stormwater flows in existing channel by monitoring.

Construct pond for stormwater detention.

Creek crosses private land in area identified in OCP as Limited Use. Private land also designated Urban/Suburban Residential. Negotiation with landowner during future subdivision or development could acquire necessary land for debris basin with.

Proposed Figure



Cost Estimate

Estimate Value: $600,000

SW-10 Project:

Overland Route for Drywell Network Along Lakeview Cres.

Priority: Low

Trigger: Mitigate Flooding During 100-Year Event

Performance During 10 Year Return Period Storm with Climate Change

Underground infiltration basins managing and infiltrating runoff. Some ponding to occur at storm peak.

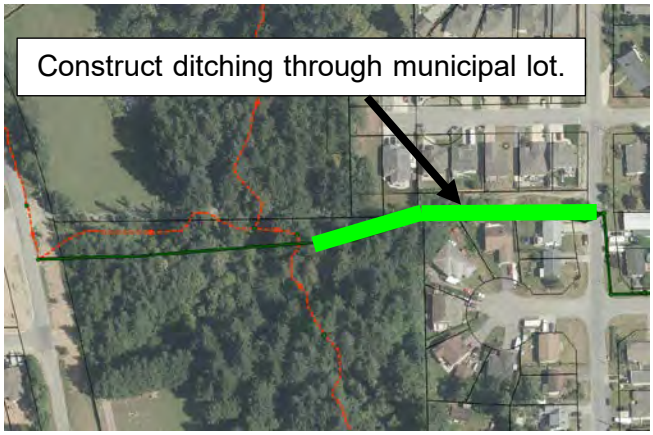
Performance During 100 Year Return Period Storm with Climate Change

Underground infiltration basins overwhelmed. Ponding to occur with overland flow westward through private property.

Mitigation Solutions

Establish ditching through municipal lot.

Proposed Solution Figure



Cost Estimate

Estimate Value: $70,000

DISTRICT OF HOPE

REPORT/RECOMMENDATION TO COUNCIL

REPORT DATE: October 5, 2022 **FILE:** LDP 27/22

SUBMITTED BY: Jas Gill, Director of Community Development

MEETING DATE: October 11, 2022

SUBJECT: **RETAIL SALE OF CANNABIS LICENCE UNIT "C" - 821 SIXTH AVENUE 1359815 B.C. LTD. (KERR/LOHNES)**

PURPOSE:

To obtain Council's authorization to approve a cannabis store at Unit C – 821 Sixth Avenue and to provide an official recommendation of Council to the Liquor & Cannabis Regulation Branch (LCRB) for the approval of the licence.

RECOMMENDATION

BE IT RESOLVED THAT Council of the District of Hope (**recommends/does not recommend**) a licence to be issued to the applicant for a cannabis store Unit C – 821 Sixth Avenue;

FURTHER THAT Council comments on the prescribed considerations of the potential impact on the community if the application is approved;

FURTHER THAT Council, at the Regular Meeting of September 26, 2022, authorized staff to gather views of residents/businesses in a 50 metre radius from the subject property which was fulfilled by mail and hand delivery of public notice, advertisement in one issue of the local newspaper, and by signage posted on the subject property; and

FURTHER THAT Council held a Public Hearing on October 11, 2022 to gather the views of the residents/businesses of which are contained in the Record of Public Hearing.

ANALYSIS:

A. Rationale:

Proposal – The applicant would like to establish a cannabis retail store at Unit C-821 Sixth Ave. The "C" refers to the unit address of the commercial unit within the Uptown Mall between the restaurant and bakery.

Public Consultation – On September 27 & 28, 2022 notices were mailed out to the registered property owners and hand delivered to the tenants and businesses within 50 metre radius of the subject property. Signage, an ad in one issue of the

local newspaper, and the Public Hearing requirement was conducted in accordance with the Cannabis & Liquor Licencing Policy 2022-05-09. As of the date of this report, the District of Hope received one concern. District staff continues to support the approval of this licence.

Zoning Bylaw Compliance – The subject property is zoned Downtown Commercial (CBD). The CBD zone permits the retail sale of cannabis. The site has ample parking to the rear of the building which is accessible both from Wallace Street and Sixth Avenue.

According to the Retail Sale of Cannabis, Section 8.12.1 Conditions of Use from the District of Hope Zoning Bylaw:

"The retail sale of cannabis must meet the following property to property proximity setbacks:

- *100 metres from both the Parks and Recreation (P-1) Zone and Institutional (P-2) zone;*
- *100 metres from a Day Care holding a valid District of Hope Business Licence; and*
- *400 metres from an existing cannabis retailer."*

Staff have conducted a review of the proximity setback provisions as it applies to this site. The proposed location meets the proximity setbacks, meaning the location is compliant. If this application is successful, it would be the second cannabis retail store for the community.

B. Official Community Plan (OCP) Bylaw 1378

As per the Official Community Plan, the three questions to be consistently asked in all levels and types of decision are:

1. Does the development move Hope toward our vision and goals for success and sustainability? Is it aligned with our OCP objectives and policies?

   This development on a micro-level moves Hope towards our vision and goals for success and sustainability.

   This development could net out two Commercial Land goals:

   - *Create jobs that contribute to the diversity and strength of the local economy; and*
   - *Help to attract visitors to the community.*

2. Is it a flexible platform for future steps towards our vision, goals and objectives?

   This platform is rigid but a must do as it requires following the LCRB Regulations and the District of Hope Cannabis & Liquor Licencing Policy 2022-05-09.

3. Will it provide a good return on investment?

   The proposal provides opportunity to introduce a new industry into the District of Hope. Further, if established, the store would provide employment opportunity within the community.

C. Attachments:

- Zoning & Location Map Excerpt
- OCP Map Excerpt
- Site Plan

D. Property Information:

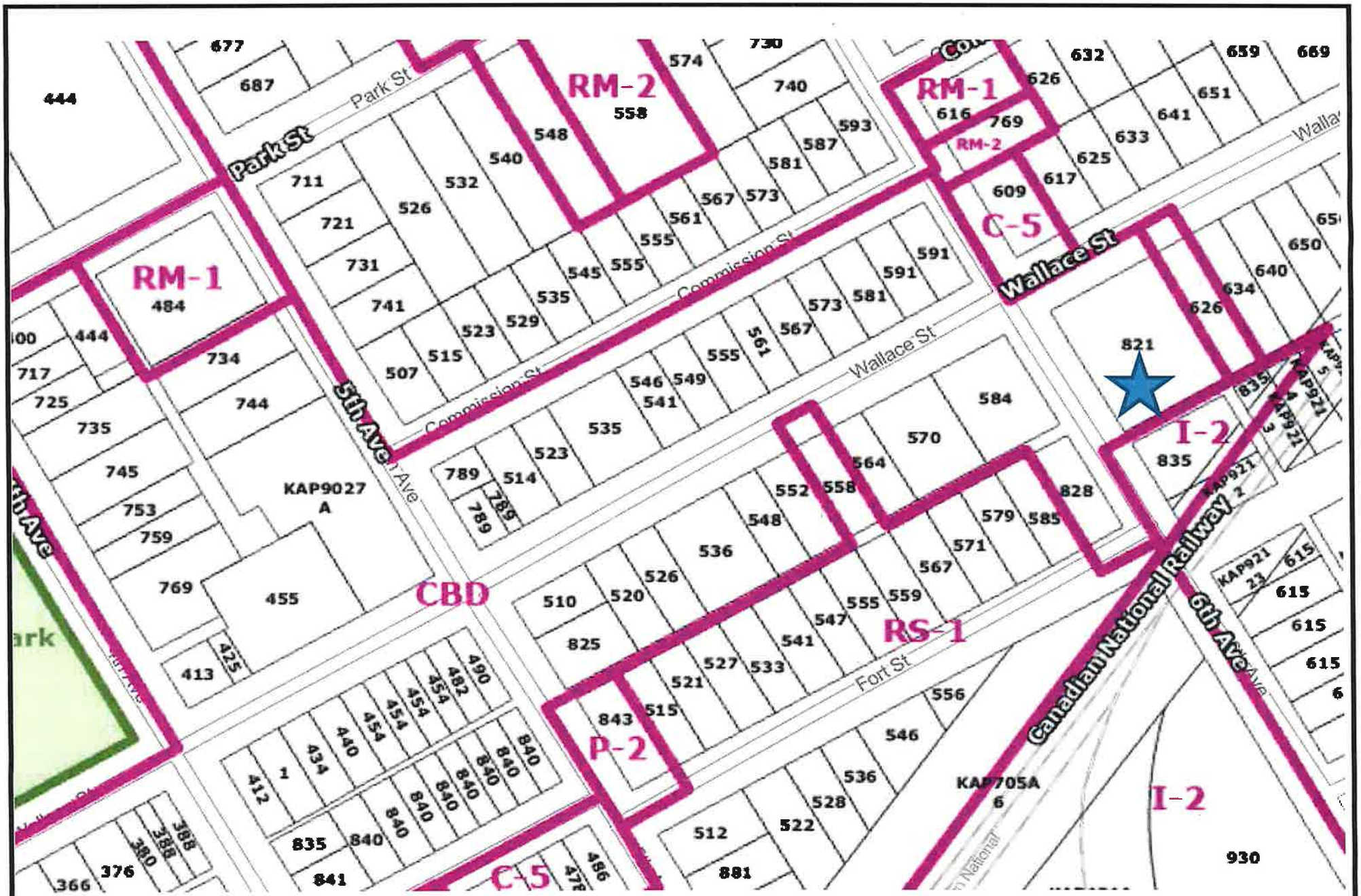
1) Civic Address:	Unit C – 821 Sixth Avenue
2) Legal Description:	Strata Lot 1 Section 10 TWP 5 RGE 26 W6M YDYD Strata Plan KAS1195
3) PID Number:	018-073-026
4) Current Zoning:	Downtown Commercial (CBD)
5) Current OCP Designation:	Downtown Hope

Prepared by:

Original Signed by Jas Gill
Director of Community Development

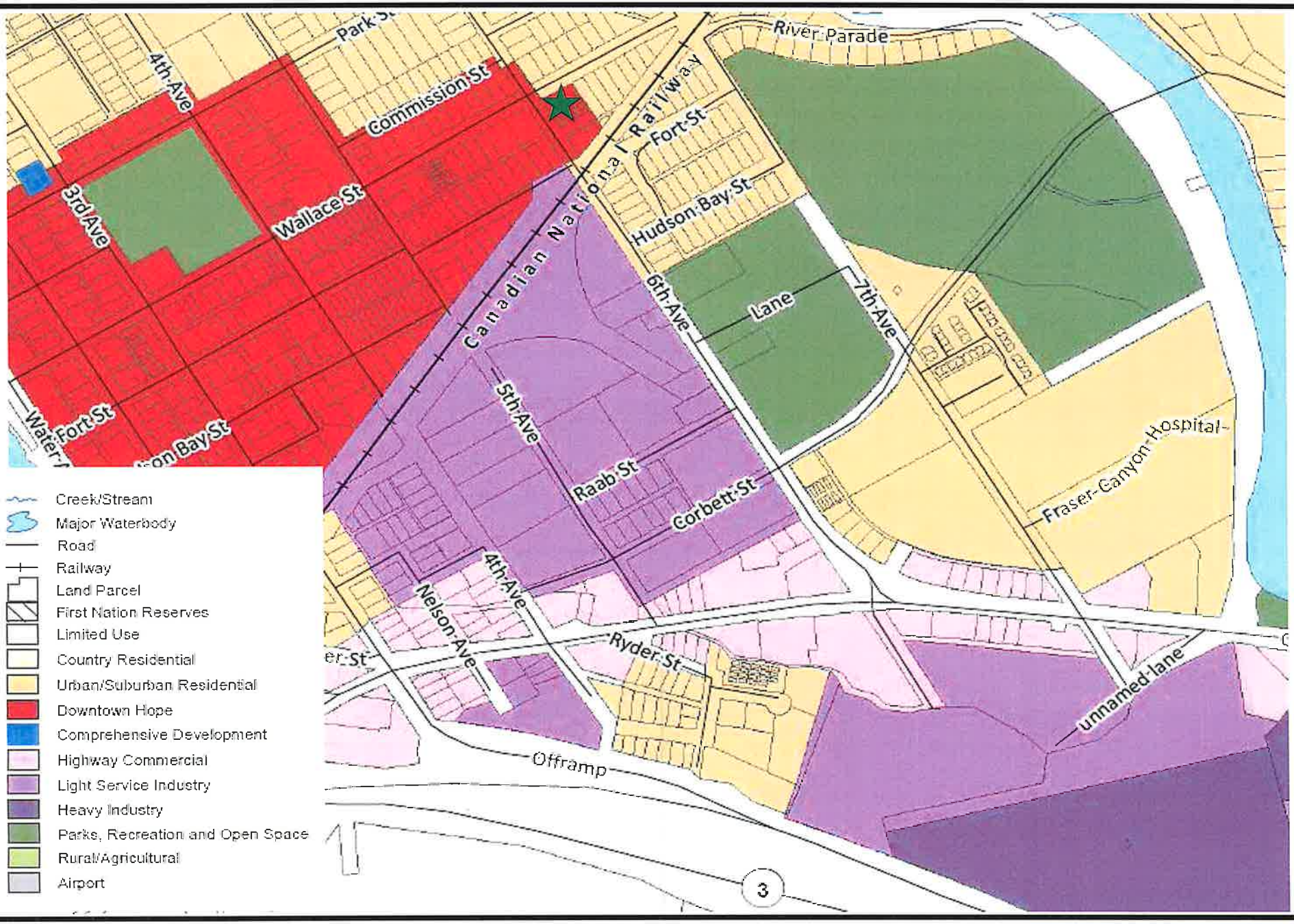
Approved for submission to Council:

Original Signed by Mike Olson
Acting Chief Administrative Officer



Unit C - 821 Sixth Avenue
1359815 BC Ltd (Kerr/Lohnes)

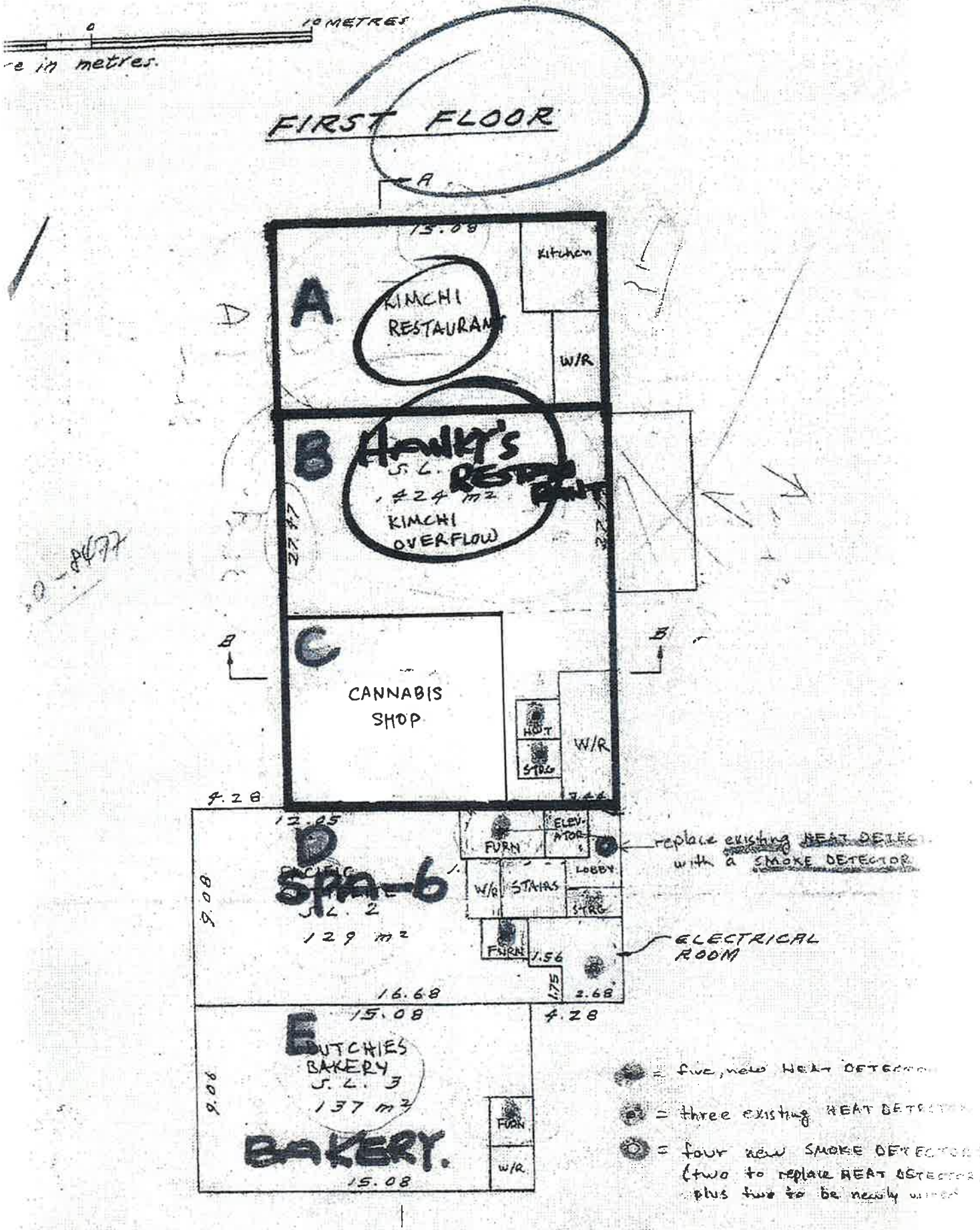
Location & Zoning Map Excerpt



157

Unit C - 821 Sixth Avenue
1359815 BC Ltd (Kerr/Lohnes)

OCP Land Use Map Excerpt


0
10 METRES
re in metres.
FIRST FLOOR
A
13.08
Kitchen
A
KIMCHI RESTAURANT
W/R
B
Howlt's RESTAURANT
S.L. 1
424 m2
KIMCHI OVERFLOW
27.47
B
B
C
CANNABIS SHOP
HOT
STOR
W/R
4.28
12.85
D
SPA-6
S.L. 2
129 m2
9.08
FURN
ELEV. ATOR
LOBBY
W/R
STAIRS
STRG
FURN
1.56
1.75
2.68
16.68
15.08
4.28
replace existing HEAT DETEC with a SMOKE DETECTOR
ELECTRICAL ROOM
E
BUTCHIES BAKERY
S.L. 3
137 m2
BAKERY.
9.08
FURN
W/R
15.08
= five, new HEAT DETECTO
= three existing HEAT DETECTO
= four new SMOKE DETECTO
(two to replace HEAT DETECTO
plus two to be newly

DISTRICT OF HOPE

BYLAW NO. 1530

A bylaw to amend the District of Hope Official Community Plan Bylaw No. 1378, 2016

Whereas the Council of the District of Hope deems it appropriate to amend Official Community Plan Bylaw No. 1378, 2016 by amending the Table of Concordance to include a new Comprehensive Development (CD-10) zone;

Now therefore the Council of the District of Hope, in open meeting assembled, enacts as follows:

CITATION

1. This bylaw may be cited for all purposes as the ***"District of Hope Official Community Plan Amendment Bylaw No.1530, 2022".***

ENACTMENT

2. That the Table of Concordance be amended to add Comprehensive Development (CD-10) as a Compatible Zoning category under the Urban/Suburban Residential Land Use Designation.

Read a first time this 11th day of July, 2022

Read a second time this 11th day of July, 2022

Advertised in the Hope Standard Newspaper the 19th and 26th day of August, 2022

Public Hearing was held on the 29th day of August, 2022

Read a third time this 26th day of September, 2022

Received Ministry of Transportation & Infrastructure approval this 27th day of September, 2022

Adopted this XX day of XXXXX, 2022

Mayor

Director of Corporate Services

DISTRICT OF HOPE
BYLAW NO. 1531

A bylaw to amend the District of Hope Zoning Bylaw No. 1324

Whereas the Council of the District of Hope deems it appropriate to amend Zoning Bylaw No. 1324 by rezoning a specific parcel of land to a site-specific comprehensive use;

Now therefore the Council of the District of Hope, in open meeting assembled, enacts as follows:

CITATION

1. This bylaw may be cited for all purposes as the ***"District of Hope Zoning Amendment Bylaw No. 1531, 2022".***

ENACTMENT

2. That only the southwestern 0.79 hectare (1.95 acre) portion of certain parcel of land situated in the District of Hope, British Columbia, and described as:

   Lot 5A Block 3 Townsite of Hope Suburban, PID 001-891-740, 1275 Seventh Avenue

   as shown on Schedule "A" attached to and forming part of this bylaw will hereby be re-zoned from Institutional (P-2) zone to a Comprehensive Development (CD-10) zone and the Zoning Map Schedule "B" of the District of Hope Zoning Bylaw 1324 is hereby amended to reflect this rezoning.

3. That the following new section to be added to the District of Hope Zoning Bylaw 1324:

15.10 COMPREHENSIVE DEVELOPMENT (CD-10) ZONE (1275 SEVENTH AVENUE)

15.10.1 PURPOSE

.1 This Comprehensive Development (CD-10) zone is site specific and applies only to the 0.79 hectare (1.95 acre) southwestern portion of Lot 5A Block 3 Townsite of Hope Suburban, PID 001-891-740.

.2 The purpose of this *zone* is to designate the southwestern corner of the property at 1275 Seventh Avenue to a Government Subsidized Supportive Housing and Shelter zone. This will allow for Shelter and Supportive Housing to be operated within a single building.

Shelter includes essential services to meet a client's immediate needs for short stay accommodation, nutritious meals, security and basic hygiene and gateway services to help clients break the cycle of homelessness by connecting them to appropriate housing and community services.

Supportive Housing provides a home with access to on-site supports to ensure people can achieve and maintain housing stability. Support services include a meal program, laundry services, referral to services in the community including access to health care services, counselling, employment and life skills programs as well as educational opportunities.

15.10.2 PERMITTED USES

.1 The following *principal uses* and no others shall be permitted:

a) Shelter – Immediate, short stay housing for people at risk up to a maximum of 15 beds;

b) Supportive Housing – Support and services to individuals who cannot live independently up to a maximum of 56 support units; and

c) Medical Offices.

.2 The following *accessory uses* and no other use shall be permitted:

a) *Interior amenity areas;*

b) *Exterior amenity spaces;*

c) Accessory building or structures;

d) Administration and office space for use by program staff.

15.10.3 CONDITIONS OF USE

.1 All accessory buildings or structures shall be subject to the Accessory Buildings and Structures General Regulations of this Bylaw.

.2 All units must be for the purpose of non-market housing.

.3 The site can support up to one principal building.

.4 There is no limit on the number of accessory buildings the site can support.

15.10.4 REQUIREMENTS FOR SUBDIVISION

.1 The 0.79 hectare southwest section of the parcel cannot be subdivided with the exception of a lease subdivision.

15.10.5 SITE COVERAGE, BUILDING HEIGHT AND SETBACKS

.1 *Site coverage*, *building height* and *setback*s shall be provided in accordance with the following table:

Site Coverage, Building Height and Setbacks for Comprehensive Development (CD-10) Zone – 1275 Seventh Avenue

	Housing Unit	Accessory Building or Structure
Maximum Site Coverage	Total 50% of Leased Area	Included in Total
Maximum Building Height	12.5 metres (~40 feet)	3 metres (~8 feet)
Setback Required from:		
Front Lot Line	7.5 metres (~25 feet)	2 metres (~7 feet)
Rear Lease Boundary	6 metres (~3 feet)	1 metre (~3 feet)
Side Lease Boundary	14 metres (~46 feet)	1.2 metres (~4 feet)

15.10.6 OTHER REQUIREMENTS

.1 With the exception of 6.19 Off Street Parking Requirements Minimum Number of Off Street Parking Spaces, all *off-street parking areas* and *off-street loading spaces* shall be provided in accordance with the Off-Street Parking and Loading Regulations of this Bylaw.

15.10.7 SPECIAL REGULATIONS

.1 The site shall comprise of the following Off Street Parking Spaces:

Type of Parking Stall	Number of Parking Stalls
Standard Parking Stall	25
Parking Stall Reserved for Disabled Persons	3
TOTAL PARKING STALLS	28
Loading Stall	1

Read a first time this 11th day of July, 2022

Read a second time this 11th day of July, 2022

Advertised in the Hope Standard Newspaper the 19th and 26th day of August, 2022

Public Hearing was held on the 29th day of August, 2022

Read a third time this 26th day of September, 2022

Received Ministry of Transportation & Infrastructure approval this 28th day of September, 2022

Adopted this XX day of XXXXX, 2022

Mayor

Corporate Officer

DISTRICT OF HOPE BYLAW NO. 1531
ZONING AMENDMENT MAP

PORTION OF THE SUBJECT PROPERTY:

FROM: INSTITUTIONAL (P-2)

TO: COMPREHENSIVE DEVELOPMENT (CD-10)

This is Schedule "A" attached to and forming part of the "*District of Hope Zoning Amendment Bylaw No. 1531, 2022*"

Mayor

Director of Corporate Services

THE DISTRICT OF HOPE

BYLAW NO. 1536

A bylaw to amend the District of Hope Zoning Bylaw 1324

WHEREAS pursuant to Section 479 of the *Local Government Act*, a local government may adopt a Zoning Bylaw;

AND WHEREAS the Council of the District of Hope deems it appropriate to amend Zoning Bylaw 1324, 2012 by making amendments;

NOW THEREFORE the Council of the District of Hope, in open meeting assembled, enacts as follows:

CITATION

1. This bylaw may be cited for all purposes as the **"District of Hope Zoning Amendment Bylaw No. 1536, 2022"**.

ENACTMENT

2. That **SECTION 5.6 STORAGE OF VEHICLES IN RESIDENTIAL AREAS**, be amended as follows:

5.6.1

a) In Residential Zones and Comprehensive Development Zones, on parcels where a one family residence exists, the storage or parking of a maximum of six vehicles is permitted, including recreational vehicle; camper or trailer; utility trailer; and a pleasure boat not kept for gain or sale.

b) In Residential Zones and Comprehensive Development Zones, on parcels where a secondary dwelling or secondary suite exists, the storage or parking of a maximum of eight vehicles is permitted, including recreational vehicle; camper or trailer; utility trailer; and a pleasure boat not kept for gain or sale.

5.6.2

Notwithstanding Section 5.6.1, the parking of a commercial vehicle on a residential parcel occupied by the driver of that commercial vehicle is permitted.

Read a first time this 8th day of August, 2022.

Read a second time this 8th day of August, 2022.

Advertised in the Hope Standard Newspaper on the 16th and 23rd days of September, 2022.

Public Hearing held on the 26th day of September, 2022.

Read a third time this 26th day of September, 2022.

Received Ministry of Transportation & Infrastructure approval this 28th day of September, 2022.

Adopted this XX day of XXXXX 2022.

Mayor

Corporate Officer

DISTRICT OF HOPE

BYLAW NO. 1537

A Bylaw to amend the District of Hope Zoning Bylaw No. 1324

WHEREAS pursuant to Section 479 of the *Local Government Act*, a local government may adopt a Zoning Bylaw;

AND WHEREAS the Council of the District of Hope deems it appropriate to amend Zoning Bylaw 1324, 2012 by rezoning a specific parcel of land;

NOW THEREFORE the Council of the District of Hope, in open meeting assembled, enacts as follows:

CITATION

1. This Bylaw may be cited for all purposes as the "***District of Hope Zoning Amendment Bylaw No. 1537, 2022".***

ENACTMENT

2. That certain parcels of land situated in the District of Hope, British Columbia, and described as:

   The consolidation of Lots 15, 16, & 17 Section 9 TWP 5 RGE 26 W6M Plan 879, PID 011-998-369; 011-998-385; 011-998-393; Locally recognized as 477 Hudson Bay Street

   as shown on Schedule "A" attached to and forming part of this bylaw is hereby rezoned from Single Family Residential (RS-1) to Institutional (P-2) and the Zoning Map Schedule "B" of the District of Hope, Zoning Bylaw 1324, 2012 is hereby amended to reflect this rezoning.

Read a first time this 8th day of August, 2022.

Read a second time this 8th day of August, 2022.

Advertised in the Hope Standard Newspaper 16th and 23rd day of September, 2022.

Public Hearing was held this 26th day of September, 2022.

Read a third time this 26th day of September, 2022.

Received Ministry of Transportation & Infrastructure approval this 28th day of September, 2022.

Adopted this XX day of XXXXX, 2022.

Mayor **Director of Corporate Services**

DISTRICT OF HOPE
BYLAW NO. 1537
SCHEDULE "A"

ZONING AMENDMENT MAP

SUBJECT PROPERTIES: ★

REZONED FROM: SINGLE FAMILY RESIDENTIAL (RS-1)

TO: INSTITUTIONAL (P-2)

This is Schedule "A" attached to and forming part of the "District of Hope Zoning Amendment Bylaw No. 1537, 2022"

Mayor

Director of Corporate Services

DISTRICT OF HOPE

BYLAW NO. 1477

A bylaw to borrow monies for a water utility amalgamation

WHEREAS it is deemed desirable and expedient to perform upgrades to the District of Hope water utility with the amalgamation of the 753 Water System into the District of Hope's water system;

AND WHEREAS the estimated cost of the upgrades to the water utility system, including expenses incidental thereto is the sum of $1.8 million, which is the amount of debt intended to be borrowed by this bylaw;

NOW THEREFORE, the Council of the District of Hope, in open meeting assembled, enacts as follows:

1. The Council is hereby empowered and authorized to undertake and carry out or cause to be carried out the improvements to the water utility generally in accordance with general plans on file in the municipal office and to do all things necessary in connection therewith and without limiting the generality of the foregoing:

   a) to borrow upon the credit of the Municipality a sum not exceeding $1.8 million.

   b) to acquire all such real property, easements, rights-of-way, licenses, rights or authorities as may be requisite or desirable for or in connection with the amalgamation of the said upgrades to the water utility.

2. That maximum term for which debentures may be issued to secure the debt created by this bylaw is fifteen (15) years.

3. This bylaw may be cited as **"District of Hope Water Utility Amalgamation Project Loan Authorization *Bylaw No. 1477, 2020"*.**

Read a first, second and third time this 24th day of February, 2020.

RECEIVED the approval of the Inspector of Municipalities this 5th day of February, 2021.

RECEIVED the assent of the electors of the District of Hope on the 28th day of September, 2020.

Adopted this day of , 2020

_____ _____

Mayor **Director of Corporate Services**

DISTRICT OF HOPE

FOR INFORMATION CORRESPONDENCE

October 11, 2022 Regular Council Meeting

1. News Release dated September 26, 2022 from the Ministry of Tourism, Arts, Culture and Sport re: Programs support families, make sport more accessible. **(1)**
2. Information Bulletin released September 28, 2022 from the Ministry of Health re: Province prepares for fall respiratory viruses, encourages people to get vaccinated. **(3)**
3. Information Bulletin dated September 29, 2022 from the Ministry of Forests re: Drought, water scarcity conditions affect B.C. **(7)**
4. News Release dated September 29, 2022 from the Ministry of Finance re: Hidden B.C. land ownership getting harder as registry deadline approaches. **(9)**
5. News Release dated September 29, 2022 from the Ministry of Education and Child Care and the Ministry of Advanced Education and Skills Training re: Early childhood education program enrolment rises in B.C. **(13)**
6. News Release dated September 29, 2022 from the Ministry of Health and the Ministry of Advanced Education and Skills Training re: New health workforce strategy improves access to health care, put people first. **(17)**
7. Information Bulletin dated October 1, 2022 from the Ministry of Attorney General and the Ministry of Public Safety and Solicitor General re: B.C. releases full expert investigation into repeat offending. **(29)**
8. News Release dated October 3, 2022 from the Ministry of Finance re: Potential tax relief on the way for B.C. small businesses, non-profits. **(31)**
9. News Release dated October 4, 2022 from the Ministry of Public Safety and Solicitor General re: B.C. enables farm-to-gate sales of cannabis products. **(33)**
10. Presentation dated July 14, 2022 from the Build Back Better Collaborative re: Flood Recovery, Resilience and Reconciliation in the Lower Fraser. **(36)**

Flood Recovery, Resilience and Reconciliation in the Lower Fraser

REPORTING BACK: BUILD BACK BETTER, TOGETHER – JULY 14 2022 FORUM

This report was prepared by the Build Back Better Collaborative. Facilitation and related support for the July 14, 2022 Forum was provided by Erica Crawford at SHIFT Collaborative, and Brock Endean, Red Pier Consulting. Special thanks to the volunteer notetakers from UBC and SFU and West Coast Environmental Law summer intern program who made it possible to document the valuable reflections of Forum participants. Photos from the Forum were taken by Dianne Garner, EPS Capacity Coordinator. Emergency Management BC and Indigenous Services Canada provided funding for the Forum. Report design by Hanna Araza.


Photo: Tamsin Lyle

Table of Contents

Executive Summary

The November 2021 flooding events brought home hard realities in the Lower Fraser floodplain. As water spread across the landscape, forcing evacuations, closing highways for days, stranding salmon, inundating fields and causing hundreds of millions of dollars of damage, it became obvious that **the 'system' we have to manage our relationships with water in the Lower Fraser is broken**. Siloed decisionmaking, short-term priorities, red tape, inequities in capacity, disregard for salmon and other species, and the persistent, harmful legacies of colonialism—all the flaws were plain to see.

Communities are now under pressure to rapidly develop recovery plans and compete for federal and provincial funding, but they are stuck with outdated funding policies, varying levels of capacity and resources, and little to no opportunity for collaboration with neighbours, much less across the region. **Before we retrench existing problems, we need to reset and move forward in a better way** that builds respectful relationships, long term resilience for communities and other species, like salmon, and **advances reconciliation**.

Responding to this need, the Emergency Planning Secretariat, with technical support from the Build Back Better Together Collaborative, secured direction from federal and provincial ministers to **host a regional forum to find common ground to inform a strategic approach** to flood recovery and long-term resilience in the Lower Fraser. Leadership and staff from **16 First Nations and 14 local governments** in the region gathered territories in Abbotsford, BC on Coast Salish territories, on July 14, 2022, along with **BC Minister of Public Safety, Mike Farnworth, and Secretary-Treasurer of the Union of BC Indian Chiefs, Kukpi7 Judy Wilson**, plus senior staff from a dozen federal and provincial agencies. 108 people were in the room, and 50 people attended online.

The Forum guests supported five principles as a foundation for flood recovery and resilience in the Lower Fraser, to "Build Back Better, Together" and provided valuable insights for further development of the approach:

1. **Understanding and reducing risk** and adapting to climate change in accordance with the Sendai Framework on Disaster Risk Reduction;
2. **Advancing reconciliation**, with particular attention to Articles 18, 19, 29, 32 of UNDRIP;
3. Ensuring that **salmon and the coastal and freshwater ecosystems they depend on are thriving**;
4. **Everyone is part of the solution** – there are many siloes in planning, decision-making and actions on the ground in the lower Fraser, and a more holistic and collaborative approach to managing flood risks is needed;
5. **Sustainable economies and resilient communities for the long term** – we need a shared vision for the future and a plan to measure progress and ensure accountability.

Specific objectives identified by participants at the July 14 Forum include:

- **Proactive planning and risk reduction** – Responding to emergencies is not sufficient to meet the needs of the Lower Fraser region and protect our communities and ecosystems. *"We need timelines and milestones, without this there is no progress – we need a roadmap of where we are going."*
- **Collaboration and regional-scale approaches** – Local leaders are prepared to invest not only in their communities, but in relationships with their neighbours and across the region. *"Water doesn't respect municipal boundaries. All must work together so that all can flourish together."*
- **Modernized funding mechanisms and programs to support resilience and reconciliation on the ground** – First Nations need to be involved in decisionmaking at the earliest stages. Resilience through multi-benefit and nature-based solutions must be supported. Funding needs to address legacy problems, not perpetuate them.

The Build Back Better, Together Collaborative committed to prepare this report documenting the vision and advice of Forum participants, along with a briefing note directed to provincial and federal government ministries, recommending actions, and **to convene the next forum in Fall 2022 to continue advancing this work together.**

Introduction: Coming Together

The November 2021 flooding events brought home hard realities in the Lower Fraser floodplain. As water spread across the landscape, forcing evacuations, closing highways for days, stranding salmon, inundating fields and causing hundreds of millions of dollars of damage, it became obvious that the 'system' we have to manage our relationships with water in the Lower Fraser is broken. Siloed decisionmaking, short-term priorities, red tape, inequities in capacity, disregard for salmon and other species, and the persistent, harmful legacies of colonialism—all the flaws were plain to see.

Communities are now under pressure to rapidly develop recovery plans and compete for federal and provincial funding, but they are stuck with outdated funding policies, varying levels of capacity and resources, and little to no opportunity for collaboration with neighbours, much less across for the region. Before we retrench existing problems, we need to reset and move forward in a better way that builds respectful relationships, long term resilience for communities and other species, like salmon, and advances reconciliation.

Responding to this need, the Emergency Planning Secretariat, with technical support from the Build Back Better Together Collaborative, secured direction from federal and provincial ministers to host a regional forum to find common ground to inform a strategic approach to flood recovery and long-term resilience in the Lower Fraser. Leadership and staff from 16 First Nations and 14 local governments in the region gathered territories in Abbotsford, BC on Coast Salish territories, on July 14, 2022, along with BC Minister of Public Safety and Solicitor General, Mike Farnworth, and Secretary-Treasurer of the Union of BC Indian Chiefs, Kukpi7 Judy Wilson, plus senior staff from a dozen federal and provincial agencies. 108 people were in the room, and 50 people attended online.

WHO WAS AT THE FORUM?

- 16 First Nations
- Union of BC Indian Chiefs
- 14 Local Governments
- 7 Provincial Ministries
- 6 Federal Departments

Photo: Roxanna Froese

Setting the Table for Dialogue

The Forum began with an opening and welcome from Semá:th Councillor Chris Silver, followed by remarks from Co-Chairs of the event, Tyrone McNeil (Emergency Planning Secretariat Chair and Sto:lo Tribal Chief), and Jason Lum (Chair of the Fraser Valley Regional District Board and Councillor for the City of Chilliwack).

Tribal Chief McNeil observed that the November 2021 atmospheric rivers and flooding events make it clear that a proactive and predictive regional plan of action is needed. The current practice of funding communities in a piecemeal fashion and to rebuild to the same standard is ineffective, and there is a need for a regional approach to resilience and climate adaptation. Further, The *UN Declaration on the Rights of Indigenous Peoples* has now been adopted by both the federal and provincial governments. Articles 18, 19, 29, and 32, in particular, describe how First Nations must be a part of decisionmaking affecting their territories, and their rights to free, prior and informed consent. The goal of the Forum is to allow First Nations and local governments to come together to let the federal and provincial governments know what is needed in the Lower Fraser region–to set the table and develop a shared vision together, which can in turn fuel a regional plan for resilience. Federal and provincial governments can then adjust funding criteria and policy to support this collaboration, and we can build back better, together.

"The goal is to set the table and develop a shared vision together."

Tyrone McNeil, Emergency Planning Secretariat Chair and Sto:lo Tribal Chief

FVRD Chair Jason Lum emphasized the impor-

tance and urgency of building relationships between local governments and First Nations, noting that there is common ground but not enough opportunities to explore it and work through challenges. Local governments need to be proactive about beginning this dialogue. This Forum should help send a signal to Ministers at the provincial and federal levels that when First Nations and local governments work together and get to agreement about particular projects, funding should be available without delay.

"We agree on many more things than we disagree, but we don't have enough opportunities to sit down…to build that foundation of a relationship so we can begin to discuss the difficult things."

Jason Lum, Fraser Valley Regional District Chair and Chilliwack Councillor

BC Minister Farnworth spoke on behalf of the Province, stating his support for regional dialogue, planning and action to prepare for future flooding events and climate change. He emphasized the need to work together. He noted that approaches that include salmon and reconciliation align well with his government's priorities.

"We are in this together."

Mike Farnworth, BC Minister of Public Safety and Solicitor General

The room then heard from First Nations and local government leaders who shared reflections on their experiences of flooding, current shortcomings in flood recovery and resilience planning (and action) in the Lower Fraser, and opportunities for collaboration and improvement. Speakers included Mayor Paul Horn, City of Mission, Councillor Eddie Gardner T'it'elem Spath, Skwah First Nation, Mayor Sylvia Pranger, District of Kent, and Steven Harris, Kwantlen First Nation.

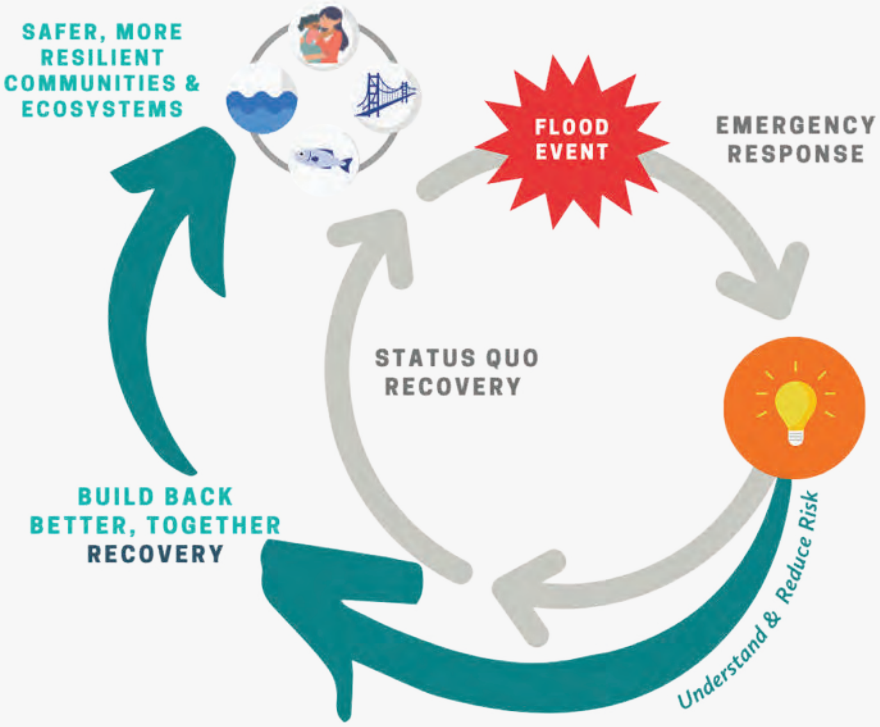

Hearing from Communities
Conference Centre


EXIT

WHAT IS BUILD BACK BETTER, TOGETHER?

The forum organizing team made a short technical presentation about "Build Back Better, Together," proposed as a principled way forward for the Lower Fraser region, to inform funding criteria in the short term, and planning for the longer term.

The simple, but powerful idea behind "Build Back Better, Together," is to learn from our experience with events like the floods of November 2021. Instead of rushing to build back exactly what we had before, we can use this window of opportunity to address vulnerabilities and inequities so that we are better prepared for the future. We can take advantage of significant investments in recovery, and work collaboratively to build safer, more resilient communities grounded in respectful relationships with each other and the ecosystems we depend on.



The idea of "Building Back Better" is from the international framework on disaster risk reduction, the "Sendai Framework," which has been adopted in principle by the federal and provincial governments. It means taking a pro-active approach to risk reduction – planning and adapting, not just responding, to events like the November 2021 floods.

At the Forum, five principles were proposed to guide the implementation of Build Back Better, Together (BBBT) in the Lower Fraser. These principles are intended to guide funding criteria in the short term, as well as the development of longer term, regional planning. All of the principles are interconnected:

1. Reducing risk and adapting to climate change: In the Lower Fraser this means taking a thoughtful, proactive approach to living in the floodplain: understanding the risks we face, including the impacts of a changing climate, and taking actions that address the root causes of our vulnerabilities so that we are better prepared for short and long term challenges;

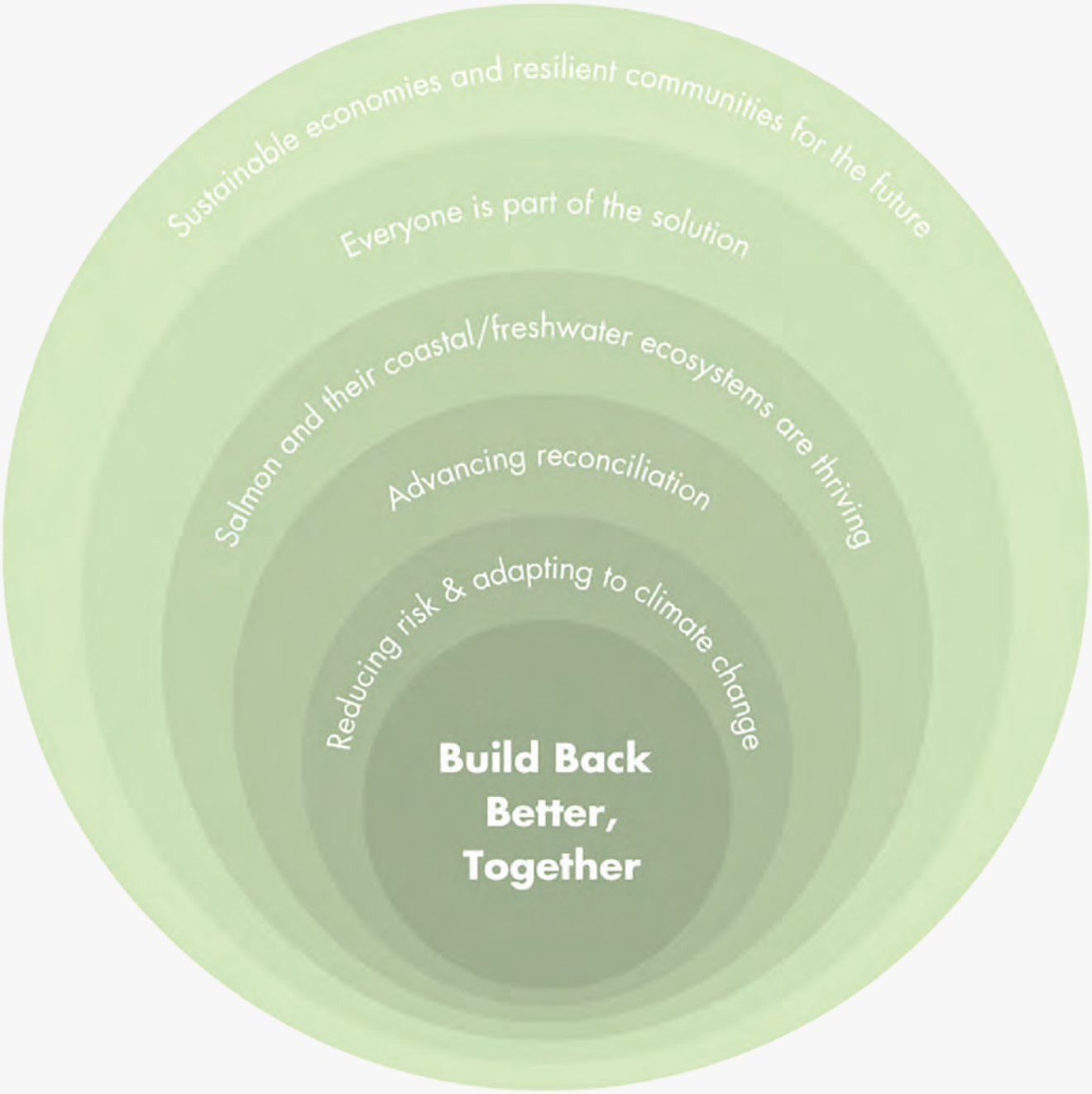
2. Advancing reconciliation: To move forward we need to acknowledge the colonial legacy in the Lower Fraser, which has left First Nations communities excluded from decisionmaking about their territories, and physically displaced to reserve lands that are often highly vulnerable to flood hazards. Advancing reconciliation means First Nations are at decisionmaking tables for funding and planning affecting their territories, beginning at the earliest stages, and First Nations' own capacity to respond and plan in their communities is also supported. The United Nations Declaration on the Rights of Indigenous Peoples, adopted in legislation by both the Province of BC and the Government of Canada, provides a framework for building new relationships between the federal, provincial and local governments and First Nations, starting from the foundation that title and rights are recognized and will be upheld, on a proactive basis. Articles 18, 19, 29 and 32 are particularly relevant for this work, describing how First Nations must be involved in decisionmaking about their territories, and their rights to free, prior and informed consent. Federal and provincial governments are responsible to ensure that funding and policy instruments for flood recovery meet these requirements. Dialogue and relationship building between First Nations and local governments are also an important foundation for this work in the landscape of the Lower Fraser;

3. Salmon, and the coastal and freshwater ecosystems where they live, are thriving: Salmon are a keystone species in the Lower Fraser, integral to the cultural security of Lower Fraser First Nations, and contribute significantly to the region's economy. Yet salmon and the ecosystems where they live and travel across their life cycles in the floodplain have not been part of colonial flood management decisions in the Lower Fraser, with devastating effects including habitat loss and fragmentation, pollution, and barriers to connectivity that affect not just salmon but many other species as well. Funding and decisionmaking about our activities in the floodplain need to include salmon and the ecological health of Lower Fraser ecosystems as a priority. At a practical level this means fish-friendly infrastructure, improvements in riparian protection, and consideration of opportunities for setback dikes and dike realignment, as well as linkages to fish habitat protection and restoration planning, strategies and funding;

4. Everyone is part of the solution: At present there are many siloes in planning and decisionmaking in the Lower Fraser. Communities are divided by lines drawn on the map, and government agencies are also fragmented across ministries and departments. Key actors like infrastructure operators and farmers are not directly engaged. A more holistic and successful approach to managing flood risks is needed. In the short term, funding needs to support relationship building and collaborative approaches to projects. Programs like Farmland Advantage and Floodplains by Design (from the State of Washington) offer real-life examples of collaboration with multiple benefits. Existing and emerging examples of collaboration in the Lower Fraser, particularly among First Nations and local governments, need targeted and streamlined funding and approvals, instead of red tape.. Over the longer term relationship building and collaboration needs to be supported by redesigning funding programs and regulatory adjustment and alignment so that barriers are removed and we are all supported in working together as a region; and,

5. Sustainable economies and resilient communities for the future: In a changing climate, and a time of reconciliation, a longer term vision for the shared landscape of the Lower Fraser is needed, in order to develop a roadmap and milestones for the changes that are required. With short election cycles this longer term lens

is often lacking. Planning farther into the future allows us to broaden the scope of actions that are possible. It also helps us more realistically assess the resources that are needed, and compare options for action. And it is a way to connect with community members, to build trust and understanding about the challenges we face in the floodplain. Some communities have already undertaken engagement processes with their members, and there is support for a vision where our children, grandchildren and so on can continue to live in this region, safely, respectfully and sustainably. A long term vision for the Lower Fraser floodplain, for 50, 100 years or longer, will guide shorter term objectives, and help us measure progress in getting there.



Build Back Better Together Forum, July 14, 2022

Michelle Buchholz | CASSYE CONSULTING

After the description of the proposed five principles for Build Back Better, Together, the collaborative 'work' of the Forum then began. The invited guests, gathered in smaller groups around 10 tables, engaged in dialogue about the principles, discussing what these principles could mean for their communities and the region, and what might be missing.

In the afternoon, staff from EMBC and ISC gave an overview of existing arrangements for federal and provincial disaster recovery funding. Kat Morgan (Associate Director for The Nature Conservancy) also introduced the Floodplains by Design program from the State of Washington as an inspiring example of collaboration and nature-based approaches to risk reduction.

Guests of the gathering then resumed dialogue at the tables, sharing ideas about practical solutions and changes to funding policies and programs needed to advance BBBT in their communities and across the region.

The final part of the Forum included the graphic artist, Michelle Buchholz, sharing her summary of the day's work, and remarks from Kukpi7 Judy Wilson, Secretary-Treasurer of the Union of BC Indian Chiefs the Co-chairs. Semá:th Councillor Chris Silver formally closed the gathering.

Themes from the Forum: Morning and Afternoon Dialogues

Following the morning presentations, guests at the BBBT Forum engaged in dialogue about flood recovery and resilience in the Lower Fraser region. They discussed "Build Back Better, Together" in the context of their work, and their communities. This dialogue, gathered from ten tables at the forum, is described below.

WORKING TOGETHER: DIALOGUE ON THE PRINCIPLES OF BBBT

Overall the five principles for BBBT resonated with forum guests, and they shared many ideas about what the principles could mean for their communities and the Lower Fraser as a region. The inter-connectedness of the principles was also discussed, e.g., "salmon is a foundation of our being and should be factored into all 5 principles." "The five principles must be accepted together."

At the same time it was observed that people in the region had had similar conversations in the past, in some cases over decades, without seeing anything translated to useful actions. In particular there was uncertainty about the level of commitment of the federal and provincial governments to listening, doing things differently, and making the necessary funding available. It was suggested that "teeth" are needed for the five principles. Building resilient relationships was also a common theme, and it was not clear to guests whether this was included in the principles.

There was some tension about the overarching frame of "Build Back Better, Together." In particular there were questions about the meanings of "Build Back" and "Better." For example, it was noted that "Building Back" can justify the status quo, and be a constraint to improving resilience. In some cases "Building Back" in any form will not ensure future resilience if planned relocation is what is needed. Similarly, there were questions about "Better," and what it would mean, in practice—better for whom, or what? Would it mean moving away from what we have now, away from gray infrastructure? It would be important to strongly ground Build Back Better, Together with the five principles.

Overall the principles resonated around the tables, but there was a strong and broadly shared sentiment about the need to move from talk to action, including measurable outcomes and greater accountability for federal and provincial governments in supporting recovery and long term resilience.

Discussion about the Five Principles

Key themes heard from participants at the ten tables in relation to each principle are gathered together below.

1. Understanding and reducing risk, and preparing for climate change. Although not everyone was familiar with the Sendai Framework, there was alignment with a Sendai-based approach. The region needs proactive planning, a "roadmap"; we shouldn't just be responding to disasters. We need to focus on understanding risk, and planning for the longer term. The need for a plan, with tangible, measurable targets, and appropriate short-term actions was a clear and recurring theme around all the tables.

Currently we are taking short-term actions without looking at longer term consequences. There was a strong desire for accountability around improving resilience—having goals and meeting them, and learning from past mistakes. There was also agreement that this type of plan needed to be developed at a larger scale, that it should be regional ("water doesn't respect municipal boundaries") and watershed-based. It was also noted that provincial ministries needed to be aligned with a regional plan, so that their decision making would be consistent and supportive. There also needs to be reliable, multi-year funding.

"We need timelines and milestones, without this there is no progress–we need a roadmap of where we are going."

2. Advancing reconciliation. One way of beginning is acknowledging the colonial legacy that got us here. Not acknowledging that colonial lens leads to funding to maintain current measures, and entrenchment of the status quo. First Nations communities are neglected, and not recognized in the broader economy. It is hard to trust, from a First Nations perspective, when previous commitments have rarely been upheld. Not all flood mitigation systems are functional for First Nations communities, and must assist these communities. Planning and response (and funding) should include Indigenous lenses, and oral histories, and ensure that different ways of knowing are valued. Spiritual values and attention to what sustains life should be part of planning for the region. Cultural awareness is important. More communication between First Nations and federal, provincial and local governments is needed. Direct communication and "breaking bread" is important. Addressing First Nations capacity needs is a critical part of moving forward. Everyone needs to be good neighbours and better human beings.

"All must work together so that all can flourish together."

"First Nations need to be part of decisions from the beginning."

3. Salmon, and the coastal and freshwater ecosystems where they live, are thriving. Salmon is a foundation of being, and should be factored into all five BBBT principles. Salmon protection needs to be looked at holistically. Connectivity affects fish habitat, but with current practices we also lose important habitat variations that provide spawning, resting pools, and other things we don't understand. Protection of all life systems is needed. We could also include other traditional foods. The relationship of salmon and flooding should be considered. From a local government perspective, the value of salmon needs to be factored in before development through natural asset management and inventories. Sometimes green, nature-based, fish friendly approaches face resistance because they are seen as experimental. We need an improved understanding of the importance of salmon and making sure there is a way of life for everything.

"Salmon is our economy."

"Salmon is a foundation of being and should be factored into all five BBBT principles."

4. Everyone is part of the solution.
Discussion about this principle focussed on "Together" – roles and responsibilities, and the ways that everyone should work together. There was very strong support for working together at the local and regional scales, across First Nations and local governments, and maintaining connectedness post-recovery, or even better, building and maintaining strong relationships before disaster events strike. There was a strong feeling that working together needs to be a long term commitment, and there should be time and space (with funding) for First Nations and local governments to build relationships, including more gatherings like the Forum.

"Together" should also include youth voices, and non-human beings, like salmon, as well. Working together doesn't mean the same solutions apply to every community. It is critical that the provincial and federal governments and their agencies fully commit to being at the table, across agencies, to ensure that solutions are funded and that implementation doesn't get stuck in red tape. There is a strong feeling that the provincial and federal governments are not in touch with the realities and needs of the region. International cooperation is also important in some places. Private land issues, farmers and transportation corridors all need to be factored in, including responsible agencies.

"We need to meet and build relationships prior to crises."

"Ask communities what they need!"

5.Sustainable economies and livelihoods.
There was less direct discussion about this principle, but general consensus that the region would not be sustainable and resilient in the long term without strategic planning and adequate funding for implementing actions. There was talk of a "full suite of objectives" that included both conventional/colonial economic objectives as well as ecosystem health and First Nations priorities including cultural/economic security. Working together in the region can help with managing trade-offs, and lessening competition.

"Change our perspectives on investment and stewardship to 25, 100, 400 years."

"Take a regional approach to funding, with a formula to ensure equity across differently resourced communities."


EXIT


EXIT
EXIT

KEY TAKEWAYS: BBBT AND FIVE PRINCIPLES

- There was overall support for a Build Back Better Together approach to funding and planning for the Lower Fraser region, if this approach is clearly anchored in the five principles;
- The need to build resilient relationships across governments and communities is very important, with First Nations included at decision-making tables;
- There is a need for a "roadmap" for the region that includes a pro-active approach to reducing risk, measurable outcomes, and greater accountability for federal and provincial governments in supporting recovery and resilience;
- Protecting the way of life of salmon and other species is essential;
- There are differences in the values held by First Nations and other governments, but a shared common ground for action can be discussed and agreed upon.

WORKING TOGETHER: DIALOGUE ON IMPLEMENTING BBBT IN FLOOD RECOVERY

Participants were invited to share their ideas for how a BBBT approach could be implemented in current flood recovery efforts, with a focus on funding allocations and programs. There was a clear desire around the tables to have funding programs more closely aligned with Lower Fraser needs and realities, and to meaningfully address capacity issues, particularly in First Nations communities. This requires deeper listening and more direct engagement from federal and provincial policymakers. Biases and historical disparities in funding needed to be openly identified and addressed. Indigenous knowledge of history and the land is important in planning for resilience. The need for better communications across all governments, and better transparency from provincial and federal governments regarding funding and recovery policies was also consistently emphasized. Continued dialogue, developing relationships and actions centred on reconciliation, and bringing in additional actors including railways and farmers will be important.

Funding

A more accurate understanding/acknowledgement of the funding needed for the region to be resilient is necessary. Funding for communities needs to be ongoing, predictable, accessible, and provided in a timely manner. Funding needs to visibly address historical disparities, not perpetuate them or promote competition. There also needs to be funding for proactive/adaptive measures, and a funding process that helps First Nations and local governments develop pro-active plans. The needs and realities of communities should be at the centre of funding objectives and program design. Indigenous communities need a bigger seat at the table; currently decision-making power is biased towards the conventional/colonial economic sector. Support for preparing funding applications is needed, especially for First Nations governments. Long term thinking needs to shape investments in the region: stewardship for 25, 100, 400 years. There needs to be transparency about where funding is going.

Capacity

Equity in capacity is a foundational step; in particular First Nations capacity needs improvement. First Nations emergency housing and reception centres are needed, as well as technical capacity. There needs to be a long-term commitment to improve capacity. We need to be honest about where capacity is needed, and build it up. This also applies to some smaller local governments.

Dialogue

There have been many technical studies about flooding, but not enough dialogue among leadership. More dialogue is welcome, if it leads to action and appropriate funding. It is good to have First Nations and local governments coming together, and it would be even better if more provincial and federal representatives attended so they could learn about regional needs and priorities.

Communications

Less jargon and more clarity in government communications should be the goal, especially about funding. The Province is not communicating well on how to advance projects; feedback is only what is wrong, not how to fix it. More site visits from provincial government officials are needed to understand local realities, and have two-way communication. Siloes in communication across and within governments need to be addressed. The UBCM meetings in October can be a way to publicize a new way of working and planning.

Summary of suggested actions

Integrate BBBT into programs and policy

- Look at floodplain recovery, not flood recovery.
- Articulate policies and actions based on five principles.
- Secure provincial and federal mandates for BBBT

Developing processes that centre on reconciliation

- Advising municipalities of their role in guiding the process for including First Nations
- Historical learning sessions of Indigenous knowledge
- More incorporation of Indigenous cutures, how climate change is colonial
- Building back better, together implies better for **all**. Together is **all** (animals, plants, fish, etc.)

Invest in coordination and collaboration

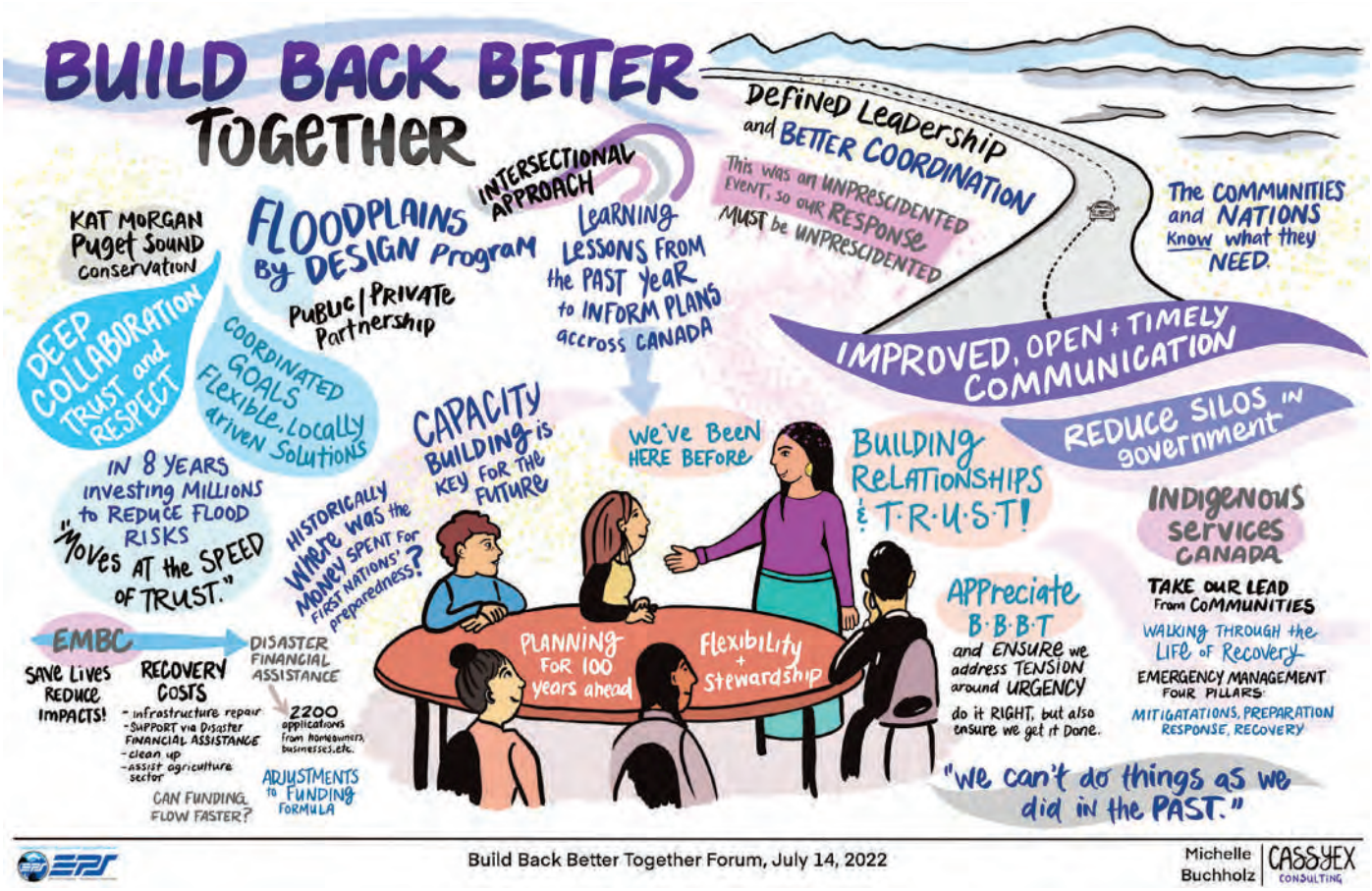
- Have a point person or organization to carry on five principle work
- Establish roundtable for planning and direction to achieve BBBT objectives
- Have coordination within Province (coordinating body or person)
- Someone to work with local governments and Nations on developing applications that will support multiple jurisdictions/ territories
- Funding programs to include non-physical, non-structural measures like community engagement for long term changes

Take a more integrated approach

- Implement a Floodplains by Design-type program in BC
- Revise ALR to respect floodplains/fisheries
- Get away from just building bigger dikes
- Include climate change adaptation in DFA
- Cumulative study of Lower Fraser – what habitat is left

Support ongoing dialogue

- More forums like this one – quarterly
- Dialogue session between farmers and First Nations
- Robust reporting-out, so we know we are being heard



KEY TAKEWAYS: DIALOGUE IMPLEMENTING BBBT IN FLOOD RECOVERY

- Dialogue is important and has been missing – we need to continue to gather to advance this work
- Ideas need to be grounded in the needs and realities of communities and Nations on the ground, translate into action, and be more coordinated across the region
- There is a need for greater federal and provincial government understanding, alignment and clear communication
- The colonial legacy underpinning the current situation must be recognized, placing reconciliation at the centre of efforts
- Underfunding and capacity needs for First Nations and small local governments need to be addressed
- Funding needs to take a long-term perspective to be addressed

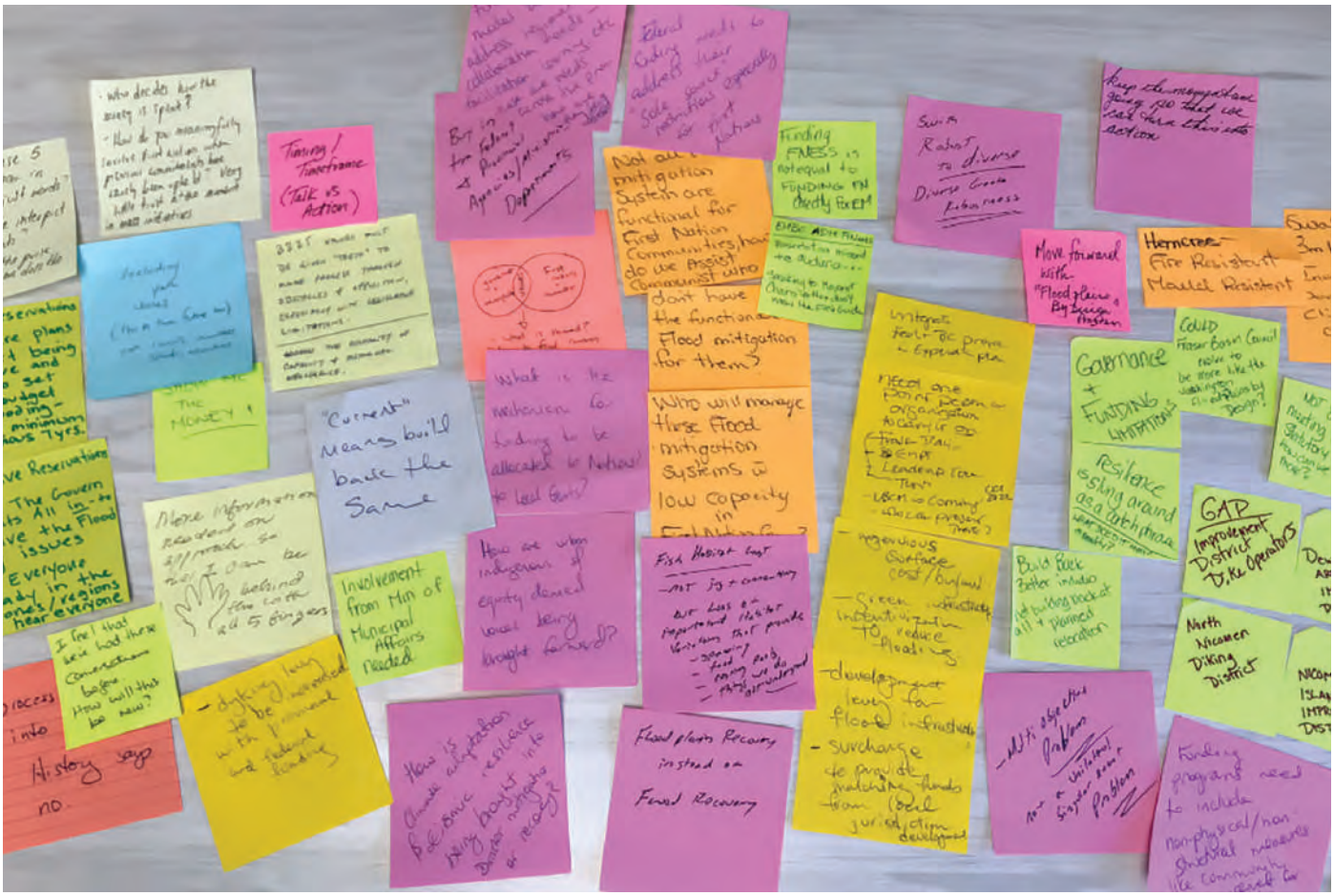

Timing / Timeframe (Talk vs Action)
"Current" Means build back the Same
What is the rationale for funding to be allocated to Natives for Land Title?
Who will manage these Flood mitigation systems in low capacity
Involvement from Min of Municipal Affairs needed
History says no.
Flood plains Recovery instead of Flood Recovery
Governance + Funding Limitations
Resilience is sling around as a catchphrase
GAP Improvement District Dike Operators
North Nicomen Diking District
Funding programs need to include non-physical/non structural measures like community


Table #2

Next Steps

The Build Back Better Together Collaborative and Emergency Planning Secretariat committed to the following actions to build on the ideas and energy of the forum:

1. Preparing this report and sharing with participants along with all local governments and First Nations in the Lower Fraser region along with provincial and federal government agencies;
2. Preparing a briefing note directed to provincial and federal government ministries, outlining the outcomes of the forum and recommendations for action; and
3. Convening the next forum in Fall 2022 to continue advancing this work together.

BBBT Collaborative Members

We are a collaborative group of BC-based organizations and experts with the shared goal of helping BC's upcoming flood recovery and management efforts achieve the best possible outcomes. We offer support from a diverse range of interests, experience and networks, including Indigenous groups, conservationists, farmers, environmental legal specialists, researchers and natural resource professionals. We hope to see BC move towards a more holistic, collaborative approach to flood management that benefits people and other species, like salmon.

Includes: Emergency Planning Secretariat (Indigenous-led); UBC Coastal Adaptation Lab, School of Architecture and Landscape Architecture; West Coast Environmental Law; Ebbwater Consulting; Sto:lo Tribal Council; Watershed Watch Salmon Society; Resilient Waters Project; Farmland Advantage; and Kerr Wood Leidal.

The Build Back Better, Together Collaborative is a group of BC-based organizations and experts with the shared goal of helping BC's upcoming flood recovery and management efforts achieve the best possible outcomes.

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
027650	01/09/2022	AMAZON.COM.CA INC.	CA2RQJSLC2I	foam mouse pad	$16.88	$190.33
			CA2H946MEO0SI	Standing desk w/monitor riser	$173.45	
027651	01/09/2022	BROWN, Jordie R	2022 Tax Refund	2022 Tax overpayment refund-643621073	$570.00	$570.00
027652	01/09/2022	CANYON CABLE 1988 LTD.	599418	bar wrench/file handle/raker file	$13.40	$795.54
			599530	bow rake x 2/drain spade	$66.62	
			599542	3/8" NC nuts/stainless washers	$32.17	
			599676	2"x30' cargo strap J hook x 4	$178.98	
			599753	flex time gloves	$11.29	
			599868	fuel paddle/zipcut	$364.30	
			C5000039	21NX12FT lift sling	$128.78	
027653	01/09/2022	CUPE LOCAL #458	PP#17-2022	PP#17 August 8-21, 2022	$1,684.49	$1,684.49
027654	01/09/2022	DESIGN-CRETE	651703	form grade, compact & let down	$1,050.00	$1,050.00
027655	01/09/2022	DOUGNESS HOLDINGS LTD.	9007	unplug sewer at 333 Rupert St	$1,131.90	$1,131.90
027656	01/09/2022	ERICA PUBLISHING INC.	26130	Business cards-GILL,SKORO,JOHNSTON	$188.16	$958.72
			26188	5000 #10 Window env. w/return address	$770.56	
027657	01/09/2022	FORD CHILLIWACK	109393	seal for unit 129	$66.07	$320.50
			109490	bracket	$254.43	
027658	01/09/2022	FVBS HOPE RONA	36065	cabinest cup pull bn	$11.58	$80.72
			36115	bosch sds & bit 1/2x6"	$22.17	
			36175	handrail bracket	$8.96	
			36238	pruning set 2pk	$20.15	
			36356	strap tie	$4.01	
			36373	corner brace 3x3/4"	$13.85	
027659	01/09/2022	FRASER VALLEY REGIONAL DISTRICT	9060	MFA issue 68 Bylaw 996-interest	$9,937.50	$9,937.50
027660	01/09/2022	GAUVIN, Dan	Sep/22 reimburs	bylaw shirts/patch application	$163.54	$163.54
027661	01/09/2022	GENTIS WATER COMPANY LTD.	22-3116	UPS Ver, Line-Int 700VA 600W 120v	$297.37	$1,106.73
			22-3118	4-20/Modus Board Addon GD31	$809.36	
027662	01/09/2022	GREGG DISTRIBUTORS LP	005-088137	2 x padlocks	$43.64	$43.64
027663	01/09/2022	HOPE COMMUNITY SERVICES	PP#17-2022	PP#17 August 8-21, 2022	$69.00	$69.00
027664	01/09/2022	KROPPSHOP LTD	19824	alum.sign "public toilets"	$110.88	$110.88
027665	01/09/2022	IMAGE GROUP INC.	20393	Fabrixio Jr portfolio-DOH debossed x 45	$1,279.42	$1,279.42
027666	01/09/2022	LANGE, Martin	2022 Tax Refund	2022 Tax ovperpayment refund-639120146	$570.00	$570.00
027667	01/09/2022	LEECH, Troy	Aug/22 Reimburs	Aug/22 reimburse Fuel unit#8 LEECH, T	$271.13	$5,734.63
			Aug/22 Advance	Aug/22 payroll adv.$49/hr LEECH, Troy	$5,463.50	
027668	01/09/2022	LOTHIAN, Nolan	Aug/22 Advance	Aug 31/22 payroll adv.$49/hr-LOTHIAN, N	$7,815.50	$7,815.50
027669	01/09/2022	MTS MAINTENANCE TRACKING SYSTEMS INC.	8840	Water Dist.level 1-2-MCMILLAN, D	$1,192.64	$1,192.64
027670	01/09/2022	PITNEY BOWES LEASING	3202042658	Sept-Dec/22 postage meter lease	$200.22	$200.22
027671	01/09/2022	COASTAL MOUNTAIN FUELS	65935	Aug 25/22 2749.8L Diesel Clear	$5,676.42	$10,412.91
			65936	Aug 25/22 2679.5L Regular Gasoline	$4,736.49	
027672	01/09/2022	PHOENIX BENEFITS SOLUTIONS INC.	1072022	VFIS Accident insurance-on duty coverage	$3,032.00	$3,032.00
027673	01/09/2022	ROCKY MOUNTAIN PHOENIX	IN0136548	bail handle w/pins	$100.80	$100.80

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
027674	01/09/2022	UNIFIRST CANADA LTD	4366781	Aug 4/22 Unifirst uniform & mat cleaning	$147.34	$311.93
			4366778	Aug 4/22 Unifirst mat cleaning	$17.25	
			4369008	Aug 11/22 Unifirst uniform & mat cleanin	$147.34	
027675	01/09/2022	SOUTHERN IRRIGATION LP	S-INV443159	PVC male insert 1/2" / red bushing	$76.66	$504.25
			S-INV443890	little giant pond pump 115V 3000GPH	$427.59	
027676	01/09/2022	STAPLES PROFESSIONAL	60411210	markers/steno books/batteries/webcam	$174.17	$174.17
027677	01/09/2022	SWING TIME DISTRIBUTORS	5670	playground equipment/supp/install	$54,080.88	$54,080.88
027678	01/09/2022	TRUE CONSULTING LTD	1239-0722-172	Jul/22 Richmond Hill Multi-use pathway	$2,121.00	$31,022.57
			1239-0722-173	Jul/22 Development review-444 TCH	$283.50	
			1239-0722-175	Jul/22 Yale St. Rehabilitation	$28,618.07	
027679	01/09/2022	VALLEY WATER	12152021	purified water 18.9L	$9.00	$9.00
027680	01/09/2022	Wishlow Crane Service	0864	crane serv-relocate 20' C-can	$554.40	$554.40
027681	01/09/2022	WURTH CANADA LIMITED	24997175	receptacle 14-18 AWG DT04-2P x 100	$20.79	$20.79
027682	01/09/2022	ADAMS, Shona	2022 Tax Refund	Refund tax overpayment-21235 Kettle Vlly	$289.24	$289.24
027683	01/09/2022	ROPER GREYELL LLP	1791569	Jul/22 services re: file#2009-1	$416.64	$416.64
027684	01/09/2022	PARKLAND CORPORATION (108)	31543	Aug/22 fuel for unit#8	$295.82	$295.82
Aug/22 TelusLnd	01/09/2022	TELUS	August 2022	Aug/22 Telus land line services	$1,152.73	$1,152.73
Sep/22Shaw0584	01/09/2022	SHAW CABLESYSTEMS GP	Sept/22-0584	Sept/22 Shaw-0584 internet services	$89.60	$89.60
Sept/22Shaw2710	01/09/2022	SHAW CABLESYSTEMS GP	Sept/22-2710	Sept/22 Shaw-2710 cable & internet	$160.72	$160.72
027685	02/09/2022	BELL MOBILITY INC.	June 2022	Jun/22 Bell mobility services	$1,740.14	$5,691.87
			July 2022	Jul/22 Bell Mobility services	$2,187.61	
			August 2022	Aug/22 Bell Mobility Services	$1,764.12	
027686	02/09/2022	CANADIAN NATIONAL RAILWAY	91647977	Sept/22 signal w & w/o gate-maintenance	$1,276.00	$1,276.00
027687	02/09/2022	EMPYRION TECHNOLOGIES INC.	182885	Office 365 migration/setup	$4,677.75	$4,677.75
027688	02/09/2022	HOPE & DISTRICT CHAMBER OF COMMERCE	Refund Deposit	Refund camping security deposit	$500.00	$500.00
027689	02/09/2022	LACAS CONSULTANTS INC.	2878	Jul/22 Low.Coq.River/exp.Glenhalla Dike	$24,284.61	$24,284.61
400003658002	07/09/2022	BC HYDRO	400003658002	Aug/22 BC Hydro Services	$41,192.43	$41,192.43
PP#17/22RP0001	07/09/2022	RECEIVER GENERAL FOR CANADA	PP#17-2022	PP#17 August 8-21, 2022	$3,713.90	$3,713.90
PP#17/22RP0002	07/09/2022	RECEIVER GENERAL FOR CANADA	PP#17-2022	PP#17 August 8-21, 2022	$36,764.43	$36,764.43
027690	15/09/2022	AMATO, Frank	Jul/22 expense	Jul/22 mileage/training/supplies-AMATO,F	$2,954.63	$2,954.63
027691	15/09/2022	AMAZON.COM.CA INC.	CA23UJE110YI	4 X anti-fatigue rubber matting 36x36	$205.40	$669.48
			CA22857QVA8I	Wind speed gauge meter BT-100	$40.98	
			CA2205JZ0ACII	rechargeable focusing LED penlight	$117.94	
			CA220K1J5ACII	425 4-gallon piston backpack sprayer	$178.74	
			CA26TLOLZSI	card stock sheets paper	$126.42	
027692	15/09/2022	ATCO STRUCTURES & LOGISTICS LTD	VAN-SR 4553625	Sept/22 12x60 office rent	$876.02	$876.02
027693	15/09/2022	AWC PROCESS SOLUTIONS LTD	34822	brush strip/double holder/assembly	$840.68	$840.68
027694	15/09/2022	BLACK PRESS GROUP LTD.	34302001	Aug/22 Black press advertising	$4,171.21	$4,171.21
027695	15/09/2022	BRENNTAG CANADA INC	46564267	Calcium chloride 60 x 20kg bags	$1,416.58	$1,416.58
027696	15/09/2022	CANYON CABLE 1988 LTD.	599037	Aug 18/22 freight from Sanderson to Hope	$99.75	$2,227.87
			599708	flou.tubes for library (18)	$430.42	

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
			600139	3/4 banding/clips	$474.10	
			C5000296	100ml 2 stroke oil/chain oil	$15.74	
			C5000365	foaming glass cleaner	$6.05	
			C5000524	duct tape	$11.19	
			C5000756	rotary turbo nozzle	$64.95	
			C5000783	hydraulic oil/bug wash/red HD Conc 3.78L	$594.36	
			C5000826	jerry can/double harness	$98.39	
			C5000937	banding tool	$190.35	
			C5001004	square gator line	$91.67	
			C5001015	fluid film	$150.90	
027697	15/09/2022	CANYON CABLE 1988 LTD.	C5001178	glove/tape measure	$17.18	$265.73
			C5001250	nitrile gloves/rose thorn/XL nitrile glv	$156.81	
			C5001342	utility saw/flag tape/barricade tape	$62.05	
			C5001378	tape measure	$9.62	
			C5001383	pliers	$9.42	
			C5001503	foaming glass cleaner	$6.22	
			C5001523	interstate 1.5V battery	$4.43	
027698	15/09/2022	COMTEL INTEGRATED TECHNOLOGIES INC.	22712	Comtel warranty agreement (phone line)	$784.00	$1,326.03
			441738	Sep/22 Comtel phone line services	$542.03	
027699	15/09/2022	CUPE LOCAL #458	PP#18-2022	PP#18 Aug 22-Sep 4, 2022	$1,772.15	$1,772.15
027700	15/09/2022	DYCK, Reg	Aug 29-Sep 8/22	Aug 29-Sep 8/22 Recovery Manager 3hrs	$150.00	$550.00
			Aug 17-26/22	Aug 17-26, 2022 Recovery Manager(8hrs)	$400.00	
027701	15/09/2022	EMPYRION TECHNOLOGIES INC.	183160	Aug/22 manage backup/anti-virus/spam	$2,292.89	$6,040.47
			183570	set up adobe for all users	$1,183.88	
			183916	Office 365 migration services	$433.13	
			183752	Sep/22 backup/anti-virus/spam	$2,130.57	
027702	15/09/2022	FDR YOUNG HOLDINGS LTD.	August 2022	Aug/22 Fuel	$319.94	$319.94
027703	15/09/2022	FIRST TRUCK CENTRE VANCOUVER INC.	X005107441:01	fuel filters	$339.32	$806.29
			X005107446:01	sensor-fill level urea tank 6G	$466.97	
027704	15/09/2022	FLEXHAUG, David	2022 Boot Allow	2022 Bpot Allowance-FLEXHAUG, D	$175.00	$175.00
027705	15/09/2022	KELLTON CONTRACTING LTD.	647/22	BP#647/22 Municipal Deposit Refund	$500.00	$500.00
027706	15/09/2022	FVBS HOPE RONA	36496	strap tie	$8.02	$729.26
			36501	weiser belmont keyed lever SC	$65.41	
			36534	fluor tubes x 7	$99.33	
			36536	edge safety glasses	$22.17	
			36550	bathroom faucet chrome	$55.42	
			36667	lumber 1/2 Std ply-fir	$169.30	
			36717	hanger for storage/bracket utility	$23.25	
			36724	bit set/bolt/hex nut	$46.34	
			36742	lid for bucket/3 gallon bucket	$7.32	
			36764	degil dust mask w/valve 10pk	$166.21	

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
			36776	degil dust mask w/valve 10pk x 2	$66.49	
027707	15/09/2022	GILDERDALE, Jennifer	Aug/22 Expense	Aug 25/22 Lunch-GILDERDALE, J	$14.02	$189.02
			2022 Boot Allow	2022 Boot Allowance-GILDERDALE, J	$175.00	
027708	15/09/2022	HOPE COMMUNITY SERVICES	PP#18-2022	PP#18 Aug 22-Sep 4, 2022	$69.00	$69.00
027709	15/09/2022	HARBOUR INTERNATIONAL TRUCKS	355688H	tank air QC West/Seco/ cable ASM air	$1,201.08	$1,201.08
027710	15/09/2022	HOPE MOUNTAIN CENTRE FOR OUTDOOR	0067	HMC trail crew for summer 2022	$37,500.00	$37,500.00
027711	15/09/2022	KELLY RIDLEY CONSULTING	4-2022	Aug 30-Sep 9/22 milage-nomination period	$1,004.30	$1,004.30
027712	15/09/2022	KHRONOS SECURITY SERVICES	1988	Sep/22 Commercial patrol/lock washrooms	$2,943.12	$2,943.12
027713	15/09/2022	KAL TIRE	067170887	215/85R16 x 2/stabilizer bar link kit	$1,335.00	$1,407.52
			067171060	tire repair/radial patch/insert	$72.52	
027714	15/09/2022	LORDCO AUTO PARTS	7NV016345	2 x impact sockets-6 point	$34.46	$634.24
			48NV035482	1000 CCA 12	$554.38	
			48CR004064	credit re:inv#48NV035482	-$554.38	
			7NV014053	dot log books (14)	$176.65	
			7CR000850	return dot log books (14)	-$176.65	
			7NV014135	dot log books (11)	$138.80	
			7CR000853	return dot log books (11)	-$138.81	
			7NV017078	CCA 770 Top/locking fuel	$287.70	
			7NV017080	pretrip books (25)	$205.22	
			7NV017212	poly-air hose assembly	$106.87	
027715	15/09/2022	MECHANICAL ADVANTAGE INDUSTRIES LTD	1398	install 2 new sandfilter head & displays	$2,997.75	$6,625.50
			1410	additional supplied UV to LOTW	$3,627.75	
027716	15/09/2022	METAL SUPERMARKETS LANGLEY	1294194	hot rolled flat bar 0.250x1.250	$125.62	$125.62
027717	15/09/2022	LIDSTONE & COMPANY	43768-1	Aug/22 service re:file#4273	$2,393.58	$8,551.74
			43769	Sep/22 service re:file#10111-035	$800.61	
			43770	Sep/22 service re:file# 10111-040	$415.52	
			43771	Aug/22 service re:file#10111-060	$1,462.72	
			43772	Aug/22 service re:file# 10111-106	$455.84	
			43773	Aug/22 service re:file# 10111-111	$522.49	
			43774	Aug/22 service re:file#10111-112	$1,575.84	
			43775	Aug/22 service re:file#10111-113	$687.70	
			43776	Aug/22 service re:file#10111-114	$237.44	
027718	15/09/2022	MCAP SERVICE CORPORATION	Refund Tx Ovrpy	Mort#9134604.1 MASLYK, K-865-6th Ave	$845.00	$845.00
027719	15/09/2022	MORFCO SUPPLIES LTD.	627624	60 x gutterbroom segment-elgin	$2,486.40	$2,486.40
027720	15/09/2022	NUTECH FACILITY SERVICES LTD	10144	Sep/22 Janitorial contract services	$3,218.51	$3,218.51
027721	15/09/2022	PITNEY BOWES CANADA	1021455182	Red ink ctg. 1 box x 2	$291.18	$291.18
027722	15/09/2022	PERSONAL TOUCH ANSWERING SERVICE	220800122101	Sep/22 Personal touch answer service	$115.25	$115.25
027723	15/09/2022	ROYAL CANADIAN LEGION	RCLB228 10/5/22	hall rental for advanced poll Oct 5/22	$315.00	$315.00
027724	15/09/2022	SPERLING HANSEN ASSOCIATES	22570	Jul/22 Landfill monitoring	$845.90	$845.90
027725	15/09/2022	STAPLES PROFESSIONAL	60427687	AP folders/pens/personal-Mike	$109.18	$468.75
			60463442	binders/paper/personal	$54.01	

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
			60555608	envelopes/mouse pads/paper/thermal rolls	$305.56	
027726	15/09/2022	TAP AND TANK	966406	replace 2 sets of metering faucets/maint	$858.10	$858.10
027727	15/09/2022	VALLEY WASTE & RECYCLING INC	0000356082	Aug 23/22 1225 Nelson Ave-comm.roll off	$263.18	$1,348.76
			0000000928	Aug/22 Transfer Station Services	$826.88	
			0000356247	Aug 25/22 portable toilet service	$258.70	
PP#12-18EHB	15/09/2022	EMPLOYER HEALTH TAX	PP#12-18/2022	PP#12-18-2022 EHT installment payment	$19,564.92	$19,564.92
027728	15/09/2022	VALLEY WATER	12153735	purified water 18.9L	$9.00	$22.44
			12153760	Sep/22 hot/cold monthly cooler rent	$13.44	
Aug/22FortisBC	16/09/2022	FORTIS BC-NATURAL GAS	August 2022	Aug/22 Fortis BC Services	$565.09	$565.09
Aug/22MC0863	16/09/2022	MASTERCARD - COLLABRIA	August 2022	Aug/22 Mastercard payment	$13,895.37	$13,895.37
Aug/22Wex	16/09/2022	WEX CANADA LTD.	83525693	Aug/22 Fire Dept. Fuel-unit#008	$820.03	$820.03
PP#18/22MPP251	16/09/2022	MUNICIPAL PENSION PLAN	PP#18-2022-251	PP#18 Aug 22-Sep 4, 2022	$20,384.18	$20,384.18
PP#18/22MPP5025	16/09/2022	MUNICIPAL PENSION PLAN	PP#18-2022-5025	PP#18 Aug 22-Sep 4, 2022	$1,871.87	$1,871.87
PP#18/22RP0002	16/09/2022	RECEIVER GENERAL FOR CANADA	PP#18-2022	PP#18 Aug 22-Sep 4, 2022	$36,314.68	$36,314.68
PP#18/RP0001	16/09/2022	RECEIVER GENERAL FOR CANADA	PP#18-2022	PP#18 Aug 22-Sep 4, 2022	$3,819.01	$3,819.01
Sep/22Shaw0613	16/09/2022	SHAW CABLESYSTEMS GP	Sept/22-0613	Sept/22 Shaw-0613 internet & cable serv.	$160.72	$160.72
Sep/22Shaw0663	16/09/2022	SHAW CABLESYSTEMS GP	Sept/22-0663	Sept/22 Shaw-0663 internet & cable serv.	$233.52	$233.52
Sep/22Telus	21/09/2022	TELUS	September 2022	Sep/22 Telus phone/internet services	$1,484.02	$1,484.02
Sep/22TelusGov.	21/09/2022	TELUS	Sep/22 Gov.List	Sep/22 Gov.List-Office/Fire/Bylaw	$22.68	$22.68
027729	22/09/2022	ALS CANADA LTD	3311231633	Aug 26/22 monthly effluent monitoring	$747.81	$747.81
027730	22/09/2022	AMAZON.COM.CA INC.	CA2GYQ8OUI	free chlorine reagent powder pillows	$146.97	$206.65
			CA21ZVMIUACII	sprayer drift guard with flat nozzle	$36.16	
			CA2229DSVACII	3 pk of office scissors	$23.52	
027731	22/09/2022	AUTOMATION ONE BUSINESS SYSTEMS INC	AR396198	Aug/22 copier L119 B&W & Color copies	$285.58	$360.90
			AR396201	Aug/22 copier L012-color & B&W copies	$75.32	
027732	22/09/2022	BELL MOBILITY INC.	September 2022	Sep/22 Bell mobility services	$2,066.97	$2,066.97
027733	22/09/2022	BDI A DIVISION OF BELL MOBILITY INC.	1302075879	Sonim XP8 work alone 869-1105 replcmnt	$15.68	$15.68
027734	22/09/2022	BRUECKERT, MARIANNE	Jul/22 Expense	Jul/22 mileage/meals/supplies-BRUECKERT,	$507.87	$683.66
			Aug/22 Expense	Aug/22 mileage/meals-BRUECKERT, M	$175.79	
027735	22/09/2022	CAMERON, THOMAS	Sep/22 Expense	Sep 9-15/22 meals CAMERON, T	$290.00	$290.00
027736	22/09/2022	CANYON AUTOMOTIVE LTD.	47708	batteries/air filter/oil filter/electric	$1,991.09	$1,991.09
027737	22/09/2022	CANYON CABLE 1988 LTD.	C5002140	water pump wrench	$20.73	$457.66
			H5002889	yellow caution (1000F)	$32.46	
			C5002089	stealth transformer	$7.56	
			H5002877	pink aerosol paint	$24.62	
			H5002887	HD gear lubricant	$19.58	
			H5002888	pole saw repair/labour	$78.40	
			599958	Aug 25/22 freight from Xylem to Hope	$78.75	
			600134	Aug 26/22 freight from Hope to ALS	$26.25	
			600132	Aug 26/22 freight from Southern Drip	$99.75	
			C5001221	squeege	$10.07	

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
			C5001548	1/2" x 15' double SI	$17.75	
			C5001976	Def 9.46L/ antifreeze 3.78L	$41.74	
027738	22/09/2022	DEKRA-LITE	DLIO2021133	pole mount bracket/2pc stainless steel	$1,079.81	$1,079.81
027739	22/09/2022	DESORCY, Tom	Sep/22 Expense	Sep/22 airfare/mileage/meals-DESORCY,T	$1,289.24	$1,289.24
027740	22/09/2022	EMCO CORPORATION	805223003748	serv tube/meter setter/PVC primer/lifter	$2,712.41	$2,712.41
027741	22/09/2022	EMPYRION TECHNOLOGIES INC.	184084	exported backup/file access issue	$490.88	$490.88
027742	22/09/2022	EXCEED ELECTRICAL ENGINEERING LTD	10900-0006	May/22 service-controls/Win911 trblshoot	$368.81	$893.81
			10903-0006	Apr/22 serv-SCADA comm.upgrade	$525.00	
027743	22/09/2022	FINNING CANADA	948531808	pin split	$27.55	$27.55
027744	22/09/2022	FVBS HOPE RONA	36795	blank key	$6.65	$211.50
			36677	2x4 spruce/clear sealant	$20.81	
			36951	2 x 2pk smoke alarms	$110.86	
			36989	aerosol paint/deck screws	$50.52	
			36991	mini tube cutter/push fit test cap 1/2"	$22.66	
027745	22/09/2022	FRASER VALLEY REGIONAL DISTRICT	9061	MFA issue 112 Bylaw 1288-princ.& int.	$129,485.17	$129,485.17
027746	22/09/2022	GARDNER CHEVROLET PONTIAC BUICK GMC	301006	cylinder	$116.47	$116.47
027747	22/09/2022	HOPE READY MIX LIMITED	703727	32 mpa-C32B07Cu/trucking/fuel chrg	$514.64	$514.64
027748	22/09/2022	JAKES CONSTRUCTION LTD.	114155	Yale Street Rehabilitation	$147,336.73	$147,336.73
027749	22/09/2022	KMS TOOLS & EQUIPMENT	10967488	Cart.Hydraulic lift 600lb capacity	$638.39	$638.39
027750	22/09/2022	KAL TIRE	067170812	tire change over/o-ring valves	$172.57	$172.57
027751	22/09/2022	LORDCO AUTO PARTS	7NV016087	floor dry x 4	$73.72	$210.41
			7NV017356	2 x mirror over door-convex	$99.84	
			7NV017257	plast razor/razor blades/ext.screws	$36.85	
027752	22/09/2022	MCMILLAN, Dan	Sept/22 expense	Sept 12-16/22 meals-water train-MCMILLAN	$150.00	$150.00
027753	22/09/2022	MINISTER OF FINANCE	95086830	Aug/22 purolator shipments	$19.53	$19.53
027754	22/09/2022	WSP CANADA INC	1141962	Hope arena-bldg envelope consult serv.	$3,457.90	$3,457.90
027755	22/09/2022	MICHELIN NORTH AMERICA (CANADA) INC.	DA0008956256	3 x 225/70R19.5 XDS	$1,643.71	$1,643.71
027756	22/09/2022	MCLAREN, Tammy	September 2022	Aug/22 public hearing-1275-7th Ave	$1,365.68	$1,365.68
027757	22/09/2022	ORGANIZED CRIME AGENCY OF BC	2022-14	2022/2023 DNA Analysis Serv.RCMP	$5,773.18	$5,773.18
027758	22/09/2022	PRAIRIECOAST EQUIPMENT	P47305	washer/shoe	$294.07	$294.07
027759	22/09/2022	THE GEO. H. HEWITT CO. LIMITED	2204688	450 tags of #104 Green Alum. pet tags	$315.59	$315.59
027760	22/09/2022	UNITED RENTALS OF CANADA INC	209566609-001	manual operators-forklift	$184.16	$184.16
027761	22/09/2022	VALLEY WASTE & RECYCLING INC	0000358446	Aug 10-Sep 2/22 Visitor Cntr0Spcl event	$689.85	$174,668.52
			0000356726	Aug 1-25/22 K/Lake Rd-restroom service	$321.93	
			0000358716	Sep 7/22 1225 Nelson Ave-comm.roll off	$636.35	
			0000358931	Aug/22 Valley Waste services	$172,680.77	
			0000359229	Sep 13/22 1225 Nelson-comm. roll off	$339.62	
027762	22/09/2022	VERTEC TRANSPORT LTD	0000007022	Aug 31 & Sep 1/22 Nelson Ave-Comm.roll	$4,001.13	$4,001.13
027763	22/09/2022	VALLEY TRAFFIC SYSTEMS	347586	school crosswalk/school ahead/playgrnd	$1,571.58	$1,571.58
027764	22/09/2022	ALUMICHEM CANADA INC	23146	2x1364kg isopac 80/2x204kg Wes-Floc	$13,280.47	$13,280.47
027765	22/09/2022	WESTERN EQUIPMENT LTD.	CWK-03058386	tape-grey-anti-corrosion/auto paint	$325.43	$739.35

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
			CWK-03059502	bottom hook assy.complete 1 ton	$413.92	
PP#19/22MPP251	28/09/2022	MUNICIPAL PENSION PLAN	PP#19-2022-251	PP#19 Sept 5-18, 2022	$21,033.90	$21,033.90
PP#19/22MPP5025	28/09/2022	MUNICIPAL PENSION PLAN	PP#19-2022-5025	PP#19 Sept 5-18, 2022	$1,924.09	$1,924.09
PP#19/22RP0001	28/09/2022	RECEIVER GENERAL FOR CANADA	PP#19-2022	PP#19 Sept 5-18, 2022	$4,047.07	$4,047.07
PP#19/22RP0002	28/09/2022	RECEIVER GENERAL FOR CANADA	PP#19-2022	PP#19 Sept 5-18, 2022	$36,247.77	$36,247.77
Sep/22BCHydro	28/09/2022	BC HYDRO	400003671903	Sep/22 BC Hydro services	$28,358.96	$28,358.96
Sep/22Telus179	28/09/2022	TELUS	Sep/22 838179	Sep/22 Internet service-1225 Nelson	$108.64	$108.64
Sep/22Telus677	28/09/2022	TELUS	Sep/22 821677	Sep/22 Internet service-865-3rd Ave	$78.40	$78.40
027766	29/09/2022	CANYON CABLE 1988 LTD.	H5002917	96 x 100ml 2 stroke oil	$215.04	$886.06
			H5002921	megaflex hose/couplings/adapt.	$208.15	
			H5002990	restraint lanyard	$123.19	
			H5002992	male NPT/JLC x 3	$20.10	
			H5003013	male NPT female NP	$13.30	
			H5003014	contractor harness x 2	$215.06	
			H5003019	hatchet	$16.63	
			H5003369	foaming glass cleaner	$74.59	
027767	29/09/2022	FRASER CANYON GLASS LTD.	29688	windshield replacement	$235.05	$235.05
027768	29/09/2022	CUPE LOCAL #458	PP#19-2022	PP#19 September 5-18, 2022	$1,772.26	$1,772.26
027769	29/09/2022	ECOWISE TREE CARE	0005444	tree, debris, stump removal	$3,381.00	$3,381.00
027770	29/09/2022	FAST TRACK TIRE	1990	11R22.5 tires/tire change over	$2,237.54	$2,301.95
			1991	medium truck tire repair	$64.41	
027771	29/09/2022	FORTUNE MIDTOWN REAL ESTATE LTD	681/22	BP#681/22 Municipal Deposit Refund	$500.00	$500.00
027772	29/09/2022	FRASER VALLEY REGIONAL LIBRARY	PSINV-001161	Oct-Dec/22 4thQ member assessment	$97,210.50	$97,210.50
027773	29/09/2022	HOPE COMMUNITY SERVICES	PP#19-2022	PP#19 September 5-18, 2022	$67.00	$67.00
027774	29/09/2022	HOPE GOLF & COUNTRY CLUB	11-75	release of balance of funds held in escr	$14,592.37	$14,592.37
027775	29/09/2022	HUMANACARE	19671	Sep-Nov, 2022 EFAP Clinical services	$342.25	$342.25
027776	29/09/2022	IRWIN AIR LTD	1731	purifier cart/sample kit/seperator elmnt	$1,073.67	$1,073.67
027777	29/09/2022	JAKES CONSTRUCTION LTD.	114161	Kawkawa Lake Rd Slope Failure	$30,798.81	$30,798.81
027778	29/09/2022	KEARNS, Gordon Kevin	2022 Tax Refund	Refund tax overpay-roll#647023735	$570.00	$570.00
027779	29/09/2022	KELLY RIDLEY CONSULTING	5-2022	Sept 13-27, 2022 Election prep-mileage	$1,004.30	$1,004.30
027780	29/09/2022	KHRONOS SECURITY SERVICES	2002	Dangerous atmosphere-3 guards needed	$151.20	$151.20
027781	29/09/2022	KAL TIRE	067171642	2 x flat repairs	$148.06	$148.06
027782	29/09/2022	MAMELE'AWT QWEESOME HOUSING SOCIETY	Refund LDP 7/19	Refund LDP 7/19 Security-MAMELE'AWT	$116,250.00	$116,250.00
027783	29/09/2022	PROTECH TRAFFIC CONTROL LTD	4563	Traffic contrl-Othello & Kawkawa Lk Rd	$614.25	$614.25
027784	29/09/2022	PURPOSE DEVELOPMENTS CORP.	LDP 37/19.3	16 lot sub at 20200 Cypress-Sec.reductio	$145,462.85	$145,462.85
027785	29/09/2022	DECKER, Diana	457410	Oct/22 Kennel contract services	$1,782.83	$1,782.83
027786	29/09/2022	ROPER GREYELL LLP	1792054	Aug/22 service re:file# 2009-1	$208.32	$208.32
027787	29/09/2022	UNIFIRST CANADA LTD	4380105	Sep 15/22 Unifirst mat cleaning	$17.25	$513.86
			4380108	Sep 15/22 Unifirst uniform & mat cleanin	$214.65	
			4382345	Sep 22/22 Unifirst uniform & mat cleanin	$281.96	
027788	29/09/2022	SEED & STONE	696/22	BP#696/22 Municipal Deposit Refund	$500.00	$1,000.00

DISTRICT OF HOPE
A/P Cheque Listing
September 1-30, 2022

Cheque #	Pay Date	Vendor Name	Invoice #	Description	Invoice Amount	Paid Amount
			701/22	BP#701/22 Municipal Deposit Refund	$500.00	
027789	29/09/2022	SILVER SKAGIT MECHANICAL	12207	2 axle truck inspection/ABS light/suppli	$2,215.88	$2,215.88
027790	29/09/2022	STEWIN, Heather	UBCM Expense	Sep 12-15/22 UBCM-mileage/meals/per diem	$981.84	$981.84
027791	29/09/2022	STAPLES PROFESSIONAL	60611779	personal-Crystal/Denise	$2.83	$328.31
			60617304	personal-Densie pd on rcpt#03-28351	$0.34	
			60635760	pop up sticky notes	$2.83	
			60645729	blue paper	$6.81	
			60688278	label laser x 2	$141.10	
			60526778	red dry erase-fine point	$6.34	
			60698410	Laminating pouch/paper/duct tape	$155.21	
			60712999	personal purchase-Denise/Crystal	$2.46	
			60713001	floor marking tape	$8.73	
			60713002	note pads	$1.66	
027792	29/09/2022	SMITH, Victor	UBCM Expense	UBCM travel and per diem-SMITH, V	$670.00	$670.00
027793	29/09/2022	TRUE CONSULTING LTD	1239-0822-176	Aug/22 lightship & asset mgmnt services	$294.00	$31,717.37
			1239-0822-177	Aug/22 service re:Richmond Hill pathway	$661.50	
			1239-0822-178	Aug/22 serv.re:Silver Creek Reservoir	$304.50	
			1239-0822-180	Aug/22 serv.re:Yale St.Rehabilitation	$30,457.37	
027794	29/09/2022	XYLEM CANADA COMPANY	3558376445	pump work order/supplies/labour	$1,056.44	$1,056.44
				Total September 2022 Payments	**$1,500,679.33**	**$1,500,679.33**