FINAL REPORT

PREPARED FOR THE DISTRICT OF HOPE

Asset Management Investment Plan 2016

April 2016 | File: 1329.0001.01

304 - 1353 Ellis Street, Kelowna, BC V1Y 1Z9 | T: 250.762.2517

Table of Contents

List of Tables

List of Figures

Appendices

1 Executive Summary

Communities, like Hope, are turning toward asset management as a process for making informed infrastructure decisions, build financial capacity to renew, operate and maintain existing infrastructure so that the District can continue to provide services, effectively manage risks, and provide tax payers with the best value for money.

In early 2015, the District of Hope (Hope) leaders determined, in alignment with the BC Asset Management Framework (see **Figure 1**), to improve their asset management capacity by undertaking an asset assessment (cost forecast) of the community's future infrastructure renewal investment requirements. This assessment will provide staff with improved information (location, cost and timing) to inform infrastructure investment decision-making. To accomplish this, the District undertook an assignment to develop a long term (integrated) Asset Management Investment Plan (AMIP) and location based inventory using a Geographical Information System (GIS).

The GIS hosts all of the District's asset attribute information (age, material, size, etc.) in a centralized location that can be viewed spatially by staff. Details on the GIS have been provided under separate cover, this report is focused on the AMIP. The AMIP brings together all of the long term costs and timing for a community's major infrastructure categories. This enables decision-makers (e.g. Senior Administration and Council) to see all of their infrastructure's life cycle cost pressures in one place, at a glance. The AMIP is also an ideal tool to engage community residents by showing how infrastructure performance and age is linked to annual investments. The AMIP includes details and summaries of:

- All asset categories and major sub-categories;
- Current replacement value;
- Remaining value;
- Expected life remaining based upon age and materials;
- Infrastructure deficit;
- Looming future costs;
- 20 year renewal costs and timing;
- Total and annual average renewal cost; and
- Average Annual Life Cycle Investment (AALCI) required for the ongoing renewal of public infrastructure.

What is Asset Management?

The process of bringing together the skills and activities of people; with information about the community's physical infrastructure assets and financial resources to ensure long term sustainable service delivery.

Sound asset management practices support Sustainable Service Delivery by considering community priorities, informed by an understanding of the trade-offs between the available resources, risk and the desired services.

Sustainable service delivery ensures that current community services are delivered in a social, economic, and environmentally responsible manner that does not compromise the ability of future generations to meet their own needs.

Figure 1 – Asset Management for Sustainable Service Delivery, A BC Framework

Based on recently tendered projects in the Fraser Valley region, the AMIP estimates (see Table 1.1 below) the full replacement value of the Hope's infrastructure assets is to be approximately **$256 million** (2016). With ongoing use and the passage of time, existing infrastructure will deteriorate; the remaining life of Hope's infrastructure is **30%**. Which means the overall condition of the District's assets is poor. To ensure this infrastructure, that supports the delivery of services, is sustained into the future, significant annual investments into the existing infrastructure must be made.

In order to help decision makers better understand what investment level is right for their community, three investment level indicators in the AMIP can be used to inform decisions.

Average Annual Life Cycle Investment (AALCI): annual investment needed to sustain existing infrastructure over its service life (over the next 20 years and beyond).

20 Year Average Annual Life Cycle Investment (AAI): annual investment needed to pay for expected infrastructure replacements over the next 20 years.

Infrastructure Deficit: is a measure of the amount of infrastructure that has passed its theoretical service life but is still providing service to the community. This infrastructure should be inspected to determine if replacement is necessary for not.

Each of the indicators is a function of the replacement costs and service lives, of which service life presents the most uncertainty. This uncertainty stems from the many factors that can affect an assets service life such as construction technique, existing soil, maintenance, demands and material. Since there is much uncertainty with service life, it's important to understand how the each indicator is affected as the service life changes. Three risk scenarios were analyzed to determine this:

- Risk Level 1: Standard Asset Service Lives (based on best accounting practices)
- Risk Level 2: Service Life Increased by 25%
- Risk Level 3: Service Life Increased by 50%

Table 1.1 below provides a financial summary of each indicator based on the three risk scenarios:

Table 1.1: Investment Level Indicators

Asset Category	Replacement Value	Average Annual Life Cycle Investment (AALCI)	20 Year Average Annual Investment (AAI)	Infrastructure Deficit (Backlog)
Road System	$82 million	$1.2 million – $1.8 million	$500,000 - $1.7 million	$1.4 million - $16.8 million
Sanitary System	$57 million	$674,000 - $1 million	$136,000 - $1.2 million	$636,000 – $3.3 million
Storm System	$28.2 million	$335,000 - $503,000	$328,000 - $638,000	$0 - $6.5 million
Water System	$54.8 million	$708,000 – $1 million	$473,000 - $1.4 million	$2.7 million – $13.4 million
Building System	$25.1 million	$335,000 – $503,000	$124,000 - $275,000	$1.6 million – $3.8 million
Miscellaneous Assets (Fleet)	$8.2 million	$289,000 - $437,000	$294,000 - $495,000	$312,000 - $3.2 million
Parks	$915,000	$25,000 - $38,000	$12,000 - $52,000	$86,000 - $247,000
Total	**$256 million**	**$3.5 million – $5.3 million**	**$1.8 million - $5.9 million**	**$6.8 million – $47.5 million**

The range of values represent risk levels 1 to 3 with the lower value representing risk level 3 (SL increased by 50%) and the larger value representing risk level 1 (Standard SL). Increasing the service life will lower the forecasted average annual investment target and defer the expected timing of renewal, but the expenditure does not disappear. By understanding theses financial indicators, decision makers can begin to understand what investment level is most appropriate for their community as it relates to risk, service, affordability and the ability to generate new revenue.

We recommend that Hope reviews these indicators and develop a strategy for sustainably funding infrastructure renewal. To achieve this, we suggest Hope undertake a series of initiatives to contain costs, increase revenues and improve its infrastructure information to inform decision-making. These initiatives include:

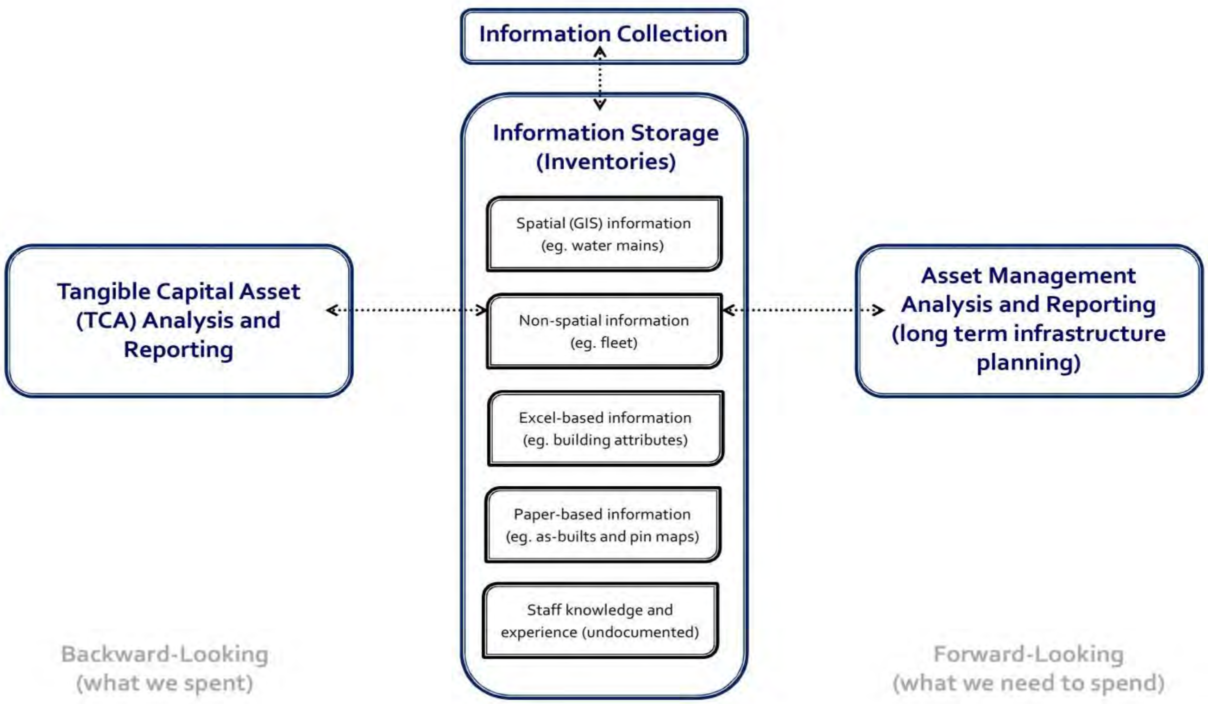
- Consider cost, risk and service in your existing budgeting process;
- Undertaking condition assessments for assets that have passed their service life;
- Complete a risk assessment to determining the likelihood and consequence of failure for each asset;
- Develop maintenance management plans to extend service lives of assets;
- Consider adjusting levels of service to reduce asset replacement costs (i.e. reducing road widths);
- Review rates, taxes and fees to forecast future revenue and determine affordability limits;
- Consider seeking alternative revenue sources and economic development;
- Develop decision-support tools such as policy, budgeting process;
- Build Infrastructure renewal reserves;
- Continually update and refine your infrastructure data over time with consideration of completing an inventory and valuation of your natural assets;
- Update infrastructure master plans and pertinent bylaws (SDS, DCC, Zoning) using asset management principles; and
- Develop a prioritized capital plan that considers all infrastructure and service needs – condition, capacity, and compliance.

2 Introduction

Hope strives to be a sustainable and resilient community, with a diverse, affordable and sustainable infrastructure base to deliver services for its residents.

The key to sustainably delivering services lies in how a community manages its infrastructure. The first step Hope took was the production of a financial report that provided information on its tangible capital assets (TCAs). The TCA exercise looked at what Hope spent on its infrastructure in the past. This exercise is taking that a step further, using the AMIP to look at what it needs to be invested in infrastructure in the future. This relationship can be seen in Figure 2.1.

Figure 2.1: The TCA versus AMIP Relationship



The AMIP is a 20 year cost forecast which includes the renewal costs, remaining life, deficit, renewal costs and timing for its major infrastructure categories, including road, water, storm, sanitary, buildings and fleet. The AMIP also provides a cost profile that shows the revenue requirements needed to manage infrastructure over the long term (life cycle of the assets) and provides investment level indicators to inform decision-making.

3 Methodology

The AMIP is an ideal launching point for a community's asset management program as it involves all of the Hope's decision-makers, includes all infrastructure assets and presents a relatively accurate[1] long term cost outlook. The AMIP can be used to inform decision-making regarding the management of, and investment in, community infrastructure. With the completion of the AMIP, Hope can now identify its long term revenue generation requirements, and then determine affordable infrastructure levels of service, performance and risk.

The two main steps followed to develop the AMIP are detailed below:

Step 1: Inventory Details

Through this project, an asset inventory was developed for the Districts major linear and non-linear assets. Inventory data for each major asset category was compiled using TCA records, operator knowledge and record drawings where available. The water, sanitary, storm and road system assets were compiled in a location based Geographical Information System (GIS) and excel whereas the buildings, park and fleet assets were compiled in excel only (using TCA data). The assets collected in the GIS system are location based and will enable staff, council and the community to:

- Visually identify what infrastructure the District is responsible for. This will help the public, developers, investors, staff and council better understand their infrastructure;
- Provide valuable asset information to potential community investors;
- Provide the location of the assets in the field (help operations staff);
- Provide the ability to complete future asset management phases including asset prioritization models to optimize infrastructure investments;
- Work towards tracking maintenance information digitally which can lead to more effective maintenance programs that extend asset service lives;
- Create mapping (hard and soft copy) for operations and future infrastructure planning;
- Enable staff to retrieve asset information for decision making; and
- Provide the ability to track asset condition and risk.

A copy of the static GIS inventory maps can be found in Appendix D and the interactive GIS maps will be transitioned to the District under a separate memo which will highlight all data gaps and assumptions.

Step 2: Asset Valuation and Renewal Plan

Once the inventory was developed, it was imported into the Asset Management Investment Plan (AMIP) model so each asset could be evaluated. Key information calculated for each asset category includes:

[1] Cost accuracy is based on the most recent and available information provided by Hope, supplemented by estimates where necessary. Accuracy can be enhanced through condition assessments that enable a service life adjustment

Table 3.1: AMIP Attributes

Attributes	Question Addressed
Asset Service Life	How long will the asset last? (Appendix C)
Replacement Value	How much will it cost to replace the asset? (Appendix B)
Remaining Life	When does the asset need to be replaced?
Infrastructure Deficit (backlog)	Which assets have pasted their theoretical service life and need to be inspected for condition?
Total 20 Year Total Investment	How much should theoretically be invested over the next 20 years to renew existing infrastructure?
20 Year Average Annual Investment (20 Year AAI)	How much are we theoretically expected to invest on average per year to address the 20 year total investment
Average Annual Life Cycle Investment (AALCI)	How should we spend annually to sustain infrastructure over the long term
Timing of each infrastructure replacement	When should we be anticipating infrastructure expenditures

The attributes above were used to develop the AMIP level 1 summary (see appendix A) which provides decision makers with key information to make more informed decisions about future infrastructure investment level.

3.1 AMIP Results

The estimated full replacement value of Hope's major infrastructure assets is approximately $256 million (2016).

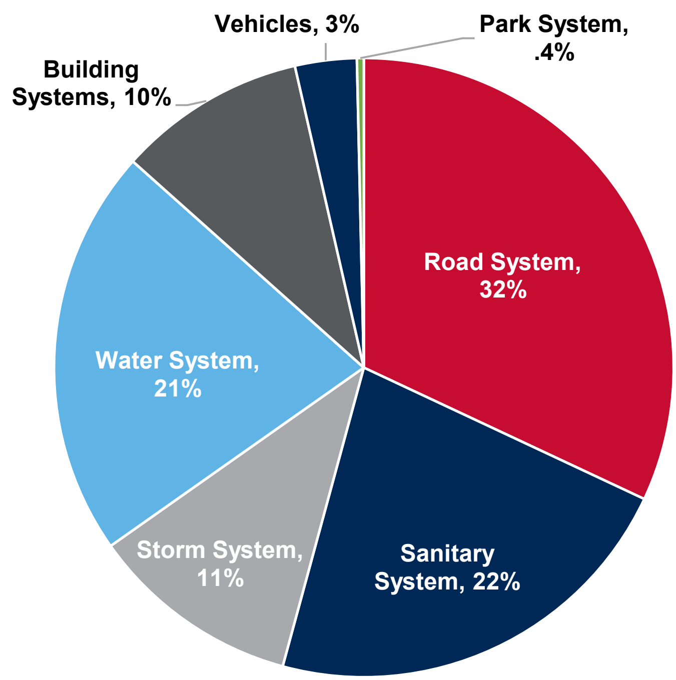
Table 3.2 provides a summary of the replacement value of existing infrastructure only; it does not include on regulatory requirements, growth/expansion, safety improvements, and economic development. These infrastructure needs are identified in infrastructure master plans and other bylaws. The results of the AMIP can be combined with those to develop a long-term priority capital plan.

Table 3.2: Asset Replacement Value Summary

Asset Category	Replacement Value
Road System	$82 million
Sanitary System	$57 million
Storm System	$28.8 million
Water System	$54.8 million
Building System	$25.1 million
Miscellaneous Assets (Fleet)	$8.2 million
Parks	$915,000
Total	**$256 million**

Figure 3.1 illustrates the percent breakdown of Hope's infrastructure value.

Figure 3.1: Infrastructure Value Distribution

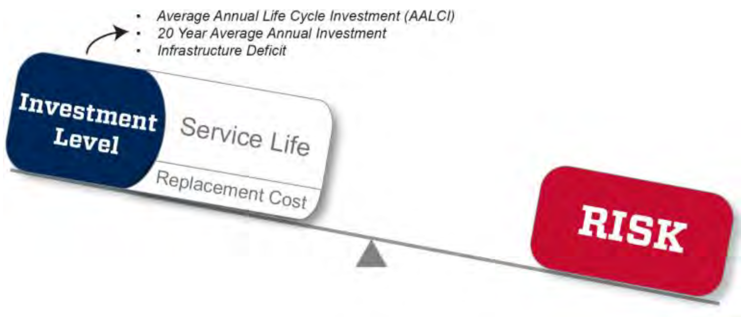


Over 75% of Hope's infrastructure is made of up Road, Water and Sanitary assets which mean majority of the total long term expenditures is likely to be focused on these assets. On average, Hope assets are considered to be in poor condition with an average expected remaining life of only 30%. Some assets have passed their theoretical service life (identified as an infrastructure deficit) which should be inspected in the field to confirm actual remaining life.

4 Risk

There is a direct tradeoff between risk and investment level in existing infrastructure to sustain services at their current level. This relationship is illustrated further in Figure 4.1 below.

Figure 4.1: The relationship between risk and investment level



This trade-off can be better understood by considering three investment level indicators;

Average Annual Life Cycle Investment (AALCI): annual investment needed to sustain existing infrastructure over its service life (over the next 20 years and beyond).

20 Year Average Annual Life Cycle Investment (AAI): annual investment needed to pay for expected infrastructure replacements over the next 20 years (within the 20 year horizon).

Infrastructure Deficit: is a measure of the amount of infrastructure that has passed its theoretical service life but is still providing service to the community. This infrastructure should be inspected to determine if replacement is necessary for not.

Each of these indicators are calculated using replacement costs (Appendix B) and service life's (Appendix C), of which service life presents the greatest uncertainty and is the most sensitivity parameter of the two. This uncertainty stems from factors that affect service life such as construction technique, soil type, maintenance demand and material. Since there is much uncertainty with service life, it's important to understand how the each indicator is affected as the service life changes. Three risk scenarios were analyzed to determine this:

- Risk Level 1: Standard Asset Service Live's (based on accounting best practices)
- Risk Level 2: Service Life Increased by 25%
- Risk Level 3: Service Life Increased by 50%

Each investment indicator will explained in more detail below.

Note: In this context infrastructure investment refers to spending money to renewal existing infrastructure (capital expenditure) or saving funds in a protected reserve for future asset renewal.

Average Annual Life Cycle Investment (AALCI):

The Average Annual Life Cycle Investment (AALCI) is defined as the summation of each asset's annual depreciation which is based on the assets replacement cost and service life.

$$\sum \frac{\textbf{Replacement Cost}}{\textbf{Service Life}}$$

The AALCI is the ideal funding level for sustaining existing infrastructure and should be a long term target for the community. When planned for appropriately, the AALCI can be used in ensuring revenue stability, preventing unnecessary risk, and enabling a community to apply one-time funding to support new asset needs as opposed to addressing emergency situations.

AALCI is sensitive to changes in the service life so it's important to understand how the investment level could change based on how long an asset provides service. Understanding this sensitivity will help decision makers when deciding what investment level is best for the community. Table 4.1 below illustrates the AALCI for risk levels 1 to 3.

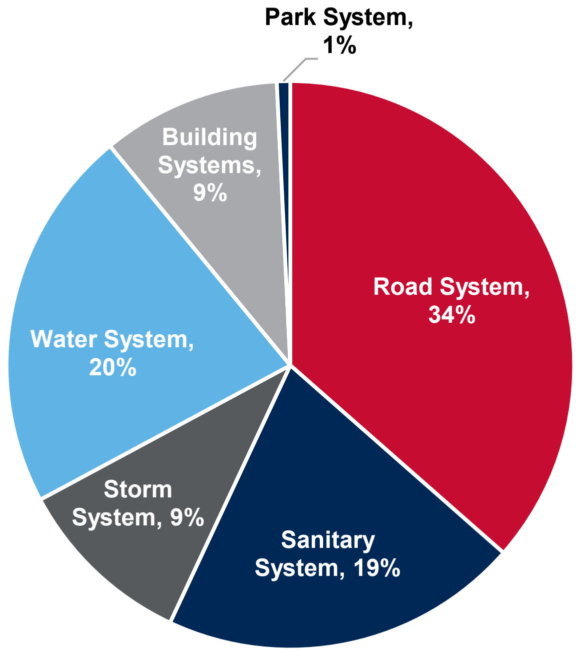
Table 4.1: AALCI – Risk Level

Average Annual Lifecycle Investment (AALCI) Summary			
Asset Category	**Risk Level 1**	**Risk Level 2**	**Risk Level 3**
Description	**Standard Service Life (SL)**	**SL Increased by 25%**	**SL Increased by 50%**
Road System	$1.8 million	$1.3 million	$1.2 million
Sanitary System	$1 million	$809,000	$675,000
Storm System	$503,000	$402,000	$335,000
Water System	$1 million	$863,000	$708,000
Building System	$504,000	$403,000	$336,000
Miscellaneous Assets (fleet)	$437,000	$345,000	$289,000
Parks	$37,000	$30,000	$25,000
Total	**$5.3 million**	**$4.1 million**	**$3.5 million**

It is evident that as the service life of the asset increases (risk level 1 to 3), annual investment can be reduced. Based on the results, the annual investment can be reduced from $5.3 million to $3.5 million if the service life is increased by 50%.

The distribution of the total AALCI between asset categories is summarized in Figure 4.2 below.

Figure 4.2: Total AALCI between Asset Categories



20 Year Average Annual Capital Expenditure

Another indicator that can be used to determine the trade-off between risk and investment level is the 20 Year Average Annual Investment (AAI).

$$\frac{\textbf{20 Year Total Anticipated Capital Expenditure}}{\textbf{20}}$$

This indicator provides an idea of how much should be spent on an annual basis to fund asset replacements anticipated over the next 20 years.

Service life directly affects the 20 year expenditures as it dictates when an asset is scheduled for replacement. For example: If the asset service life is extended, the replacement year might change from 2030 to 2040 which push's the project outside the 20 year planning horizon and reduces 20 Year AAI. It is important to note that this does not make the expenditure disappear but instead it just postpones it. This is why the AALCI is a better financial indicator because it accounts for replacements outside the planning horizon.

Table 4.2 below illustrates the changes in the 20 Year AAI for the three risk scenarios.

Table 4.2: 20 Year Average Annual Investment – Risk Level

20 Year Average Annual Investment (AAI)			
Asset Category	**Risk Level 1**	**Risk Level 2**	**Risk Level 3**
Description	**Standard Service Life (SL)**	**SL Increased by 25%**	**SL Increased by 50%**
Road System	$1.76 million	$1.5 million	$500,000
Sanitary System	$1.23 million	$716,000	$136,000
Storm System	$638,000	$520,000	$328,000
Water System	$1.45 million	$379,000	$473,000
Building System	$276,000	$125,000	$125,000
Miscellaneous Assets	$495,000	$369,000	$294,000
Parks	$52,000	$50,000	$12,000
20 Year AAI	**$5.9 million**	**$3.69 million**	**$1.86 million**

It is important to note that the 20 Year AAI is higher than the AALCI which is an indication that there are large investments within the 20 years planning horizon that Hope will need to start planning for. Before these assets are scheduled for replacement, a condition assessment should be completed to confirm the need to replace the asset. Once the asset is inspected, it can be scheduled for replacement or the service life can be extended which would move the project forward in the planning horizon. Considering there are large investments that are expected in the near future, we would recommend that the District start building a dedicated reserve fund to reduce the need to borrow.

Infrastructure Deficit

Infrastructure deficit is a measure of the amount of infrastructure that has passed its theoretical service life but is still providing service to the community.

Current Year > Year of Asset Replacement

Although the asset is still providing service, it is typically nearing the end of its life and will require field investigation to determine if the asset needs to be replaced or not.

Changes in the asset service life can turn future expenditures to a deficit or vice versa. For example: an asset is scheduled for replacement in 2016 which means the asset has pasted its theoretical service life and will be recorded as a deficit. If that assets service life is extended, the asset is now scheduled in a future year as an asset replacement and not a deficit.

Table 4.3 below illustrates the infrastructure deficit for the three risk scenarios.

Table 4.3: Infrastructure Deficit – Risk Level

Infrastructure Deficit			
Asset Category	**Risk Level 1**	**Risk Level 2**	**Risk Level 3**
Description	**Standard Service Life (SL)**	**SL Increased by 25%**	**SL Increased by 50%**
Road System	$16.89 million	$7 million	$1.47 million
Sanitary System	$3.34 million	$963,000	$637,000
Storm System	$6.56 million	$4.14 million	$0
Water System	$13.47 million	$5 million	$2.72 million
Building System	$3.85 million	$2.49 million	$1.62 million
Miscellaneous Assets	$3.22 million	$477,000	$85,000
Parks	$247,000	$148,000	$86,000
Total	**$47.6 million**	**$20.2 million**	**$6.86 million**

From the figure above, it is apparent that infrastructure deficit can be reduced if the service life is increased which means that less field investigation work will be required to determine if assets actually need replacement or not. We would recommend that the District develop a program to inspect assets that have passed their service life (Identified in Appendix E).

Overall, there is a direct correlation between investment level and risk. There are three indicators that can be used to determine the appropriate investment level; AALCI, 20 Year AAI and Infrastructure deficit. Each of these indicators are directly affected by service life which is a highly uncertain parameter. Decision makers must determine an appropriate level of funding based on risk, service, cost and affordability.

To inform better infrastructure decision making, the District should consider completing initiatives to increase revenues, improve infrastructure information and forecasted cost constraints. For example, delivering projects using a holistic approach which considers all assets in unison can reduce the forecasted costs. For example: consider road age when replacing watermains or consider replacing the storm system while replacing the watermain. Taking this approach requires a coordinate approach from a planning level to ensure projects can be strategically delivered to insure assets generated the most return on investment. Based on a high level analysis, it was approximated that the District would be able to reduce their AALCI by approximately 20% to 30% if projects are delivered using a multi-utility approach.

5 State of Hope's Infrastructure

This section of the report details the AMIP findings by each of Hope's six (6) asset categories.

5.1 Water System

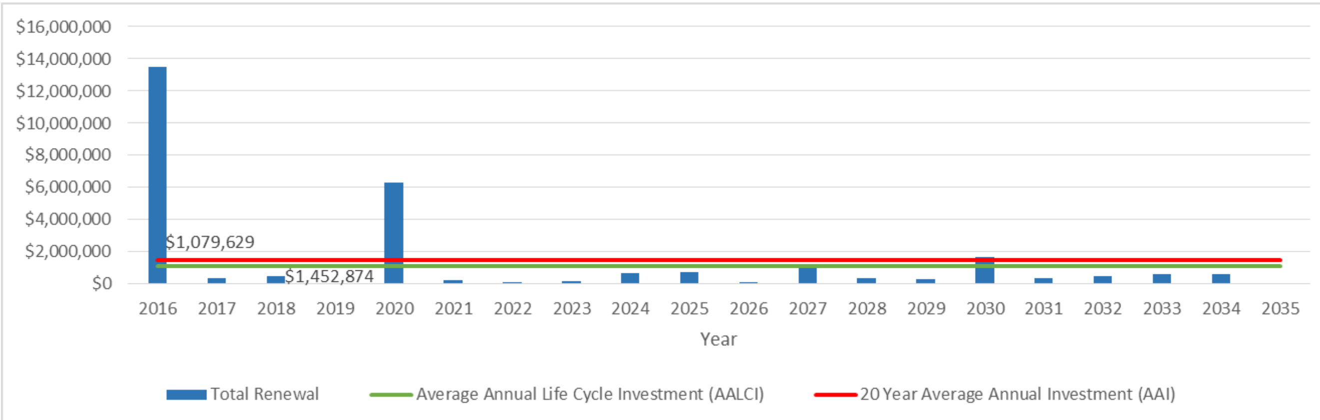
The water system has a total value of approximately $55 million, including 60 km of pipes. The remaining value of the water system is approximately $18 million. It has an expected remaining life of 24%, meaning that the overall condition of the water system is poor. The sum of the infrastructure deficit is $13.4 million and the AALCI is $1 million (see Table 5.1).

Table 5.1: Water System Summary Details

Asset Category	Replacement Value	Average of Expected Remaining Life	Infrastructure Deficit (Backlog)	20 Year Total	20 Year Average Annual Investment	Average Annual Life Cycle Investment
Water System						
Linear						
Main	$35,476,303	28%	$9,451,644	$21,483,581	$1,074,179	$627,129
Casing	$236,497	29%	$0	$156,522	$7,826	$3,942
Total	**$35,709,800**	**28%**	**$9,451,644**	**$21,640,103**	**$1,082,005**	**$631,070**
Non-Linear						
Blowoff	$47,490	27%	$27,398	$38,358	$1,918	$1,900
Hydrant	$1,341,684	47%	$0	$358,668	$17,933	$17,889
Valve	$2,918,797	9%	$2,276,338	$2,840,729	$142,036	$116,752
Air Relief Valve	$149,310	42%	$63,990	$106,650	$5,333	$5,972
Reservoir	$3,562,988	57%	$333,788	$884,925	$44,246	$80,031
Meter	$25,596	5%	$23,036	$25,596	$1,280	$1,280
Services	$6,726,206	30%	$0	$0	$0	$84,078
PRV	$388,125	0%	$388,125	$388,125	$19,406	$15,525
Total	**$15,160,196**	**18%**	**$3,112,675**	**$4,643,051**	**$232,153**	**$323,427**
Facilities						
Well	$3,552,120	39%	$908,213	$2,589,570	$129,479	$111,330
Pumphouse	$412,965	86%	$0	$184,748	$9,237	$13,802
Total	**$3,965,082**	**46%**	**$908,213**	**$2,774,318**	**$138,716**	**$125,132**
Total	**$54,835,081**	**24%**	**$13,472,532**	**$29,057,472**	**$1,452,874**	**$1,079,629**

The water system capital renewal schedule for the next 20 years is shown in Figure 5.1.

Figure 5.1: Water System Capital Renewal Schedule



5.2 Sanitary System

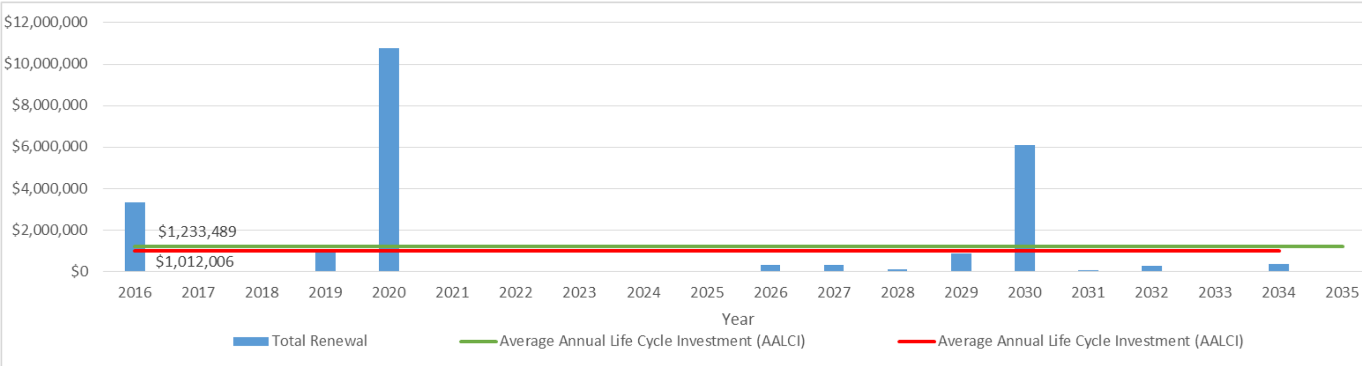
The sanitary system has a total value of approximately $57 million, including 49 km of gravity pipes and 7 km of forcemains. The remaining value of the sanitary system is approximately $22 million. It has an expected remaining life of 30%, meaning that the overall condition of the sanitary system is average. The sum of the infrastructure deficit is $3.3 million and the AALCI is $1 million (see Table 5.2).

Table 5.2: Sanitary System Summary Details

Asset Category	Replacement Value	Average of Expected Remaining Life	Infrastructure Deficit (Backlog)	20 Year Total	20 Year Average Annual Investment	Average Annual Life Cycle Investment
Sanitary System						
Linear						
Main	$32,345,162	33%	$225,360	$15,677,597	$783,880	$507,937
Forcemain	$4,153,258	55%	$236,171	$236,171	$11,809	$61,192
Casing	$838,522	43%	$0	$32,146	$1,607	$13,975
Service	$6,928,031	55%	$0	$0	$0	$86,600
Total	**$44,264,974**	**30%**	**$3,345,272**	**$15,945,914**	**$797,296**	**$669,705**
Non-Linear						
Manhole	$4,144,608	21%	$1,228,548	$3,347,568	$167,378	$82,892
Release Valve	$31,050	67%	$0	$0	$0	$518
Total	**$4,175,658**	**21%**	**$1,228,548**	**$3,347,568**	**$167,378**	**$83,410**
Facility						
Lift Station	$5,710,095	62%	$939,263	$2,550,758	$127,538	$173,657
PCC	$2,901,234	20%	$655,931	$2,825,550	$141,278	$85,235
Total	**$8,611,329**	**54%**	**$1,595,194**	**$5,376,308**	**$268,815**	**$258,892**
Total	**$57,051,961**	**30%**	**$3,345,272**	**$24,669,790**	**$1,233,489**	**$1,012,006**

The sanitary system capital renewal schedule for the next 20 years is shown in Figure 5.2.

Figure 5.2: Sanitary System Investment Profile



5.3 Stormwater System

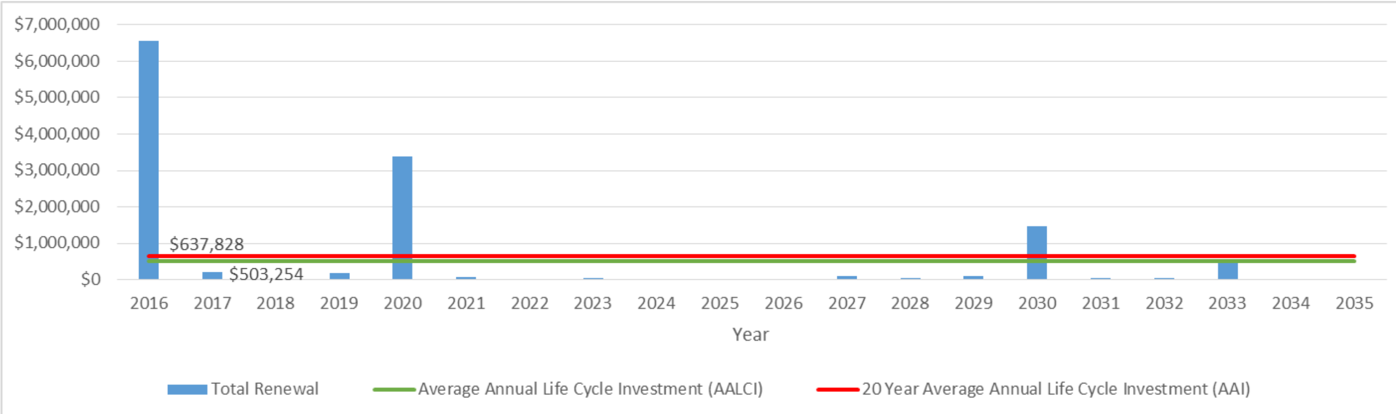
The stormwater system has a total value of approximately $28 million, including 31 km of gravity pipes. The remaining value of the stormwater system is approximately $8.7 million. It has an expected remaining life of 33%, meaning that the overall condition of the stormwater system is average. The sum of the infrastructure deficit is $6.5 million and the AALCI is $503,000 (see Table 5.3).

Table 5.3: Stormwater System Summary Details

Asset Category	Replacement Value - Total	Average of Expected Remaining Life	Infrastructure Deficit (Backlog)	20 Year Total	20 Year Average Annual Investment	Average Annual Life Cycle Investment
Storm System						
Linear						
Culvert	$4,575,185	50%	$0	$748,883	$37,444	$76,253
Main	$17,899,106	24%	$6,044,871	$10,901,786	$545,089	$344,162
Dyke	$1,471,770	82%	$0	$0	$0	$18,397
Total	**$23,946,061**	**31%**	**$6,044,871**	**$11,650,669**	**$582,533**	**$438,812**
Non-Linear						
Manhole	$1,404,783	22%	$518,076	$1,105,893	$55,295	$28,096
Catchbasin	$2,814,548	41%	$0	$0	$0	$35,182
Interceptor	$7,763	60%	$0	$0	$0	$129
Tank	$38,813	77%	$0	$0	$0	$647
Seperator	$15,525	90%	$0	$0	$0	$259
Total	**$4,289,193**	**36%**	**$518,076**	**$1,105,893**	**$55,295**	**$64,442**
Total	**$28,235,254**	**33%**	**$6,562,947**	**$12,756,562**	**$637,828**	**$503,254**

The stormwater system capital renewal schedule for the next 20 years is shown in Figure 5.3.

Figure 5.3: Stormwater System Investment Profile



5.4 Roadway System

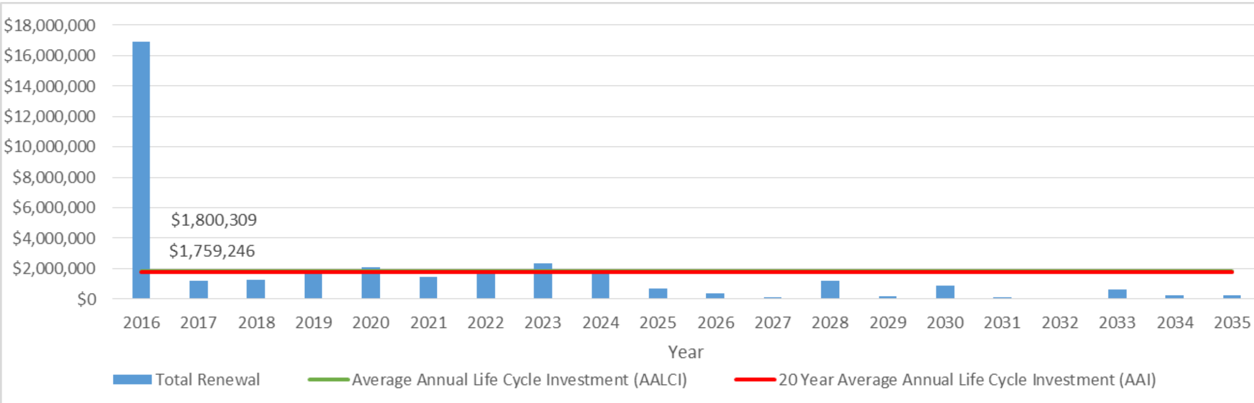
The roadway system has a total value of approximately $82 million, including 82 km of roads and associated assets. The remaining value of the roadway system is approximately $37 million. It has an expected remaining life of 32%, meaning that the overall condition of the roadway system is average. The sum of the infrastructure deficit is $16.9 million and the ALLCI is $1.8 million (see Table 5.4).

Table 5.4: Roadway System Summary Details

Asset Category	Replacement Value	Average of Expected Remaining Life	Infrastructure Deficit (Backlog)	20 Year Total	20 Year Average Annual Investment	Average Annual Life Cycle Investment
Road System						
Linear						
Sidewalk	$3,841,920	22%	$218,255	$2,876,491	$143,824	$81,468
Lane	$225,774	44%	$26,103	$120,093	$6,004	$5,177
Urban Local	$41,432,897	36%	$10,872,486	$22,491,518	$1,124,575	$1,007,331
Urban Collector	$9,966,760	28%	$5,301,468	$5,398,090	$269,904	$239,041
Bridge	$24,479,329	60%	$0	$2,629,935	$131,496	$407,989
Total	**$79,946,681**	**33%**	**$16,418,313**	**$33,516,127**	**$1,675,806**	**$1,741,006**
Non-Linear						
Streetlights	$1,743,525	27%	$476,564	$1,336,703	$66,835	$49,815
Traffic Lights	$332,100	49%	$0	$332,100	$16,605	$9,489
Total	**$2,075,625**	**28%**	**$476,564**	**$1,668,803**	**$83,440**	**$59,304**
Total	**$82,022,306**	**32%**	**$16,894,876**	**$35,184,929**	**$1,759,246**	**$1,800,309**

The roadway system capital renewal schedule for the next 20 years is shown in Figure 5.4.

Figure 5.4: Roadway System Investment Profile



5.5 Fleet

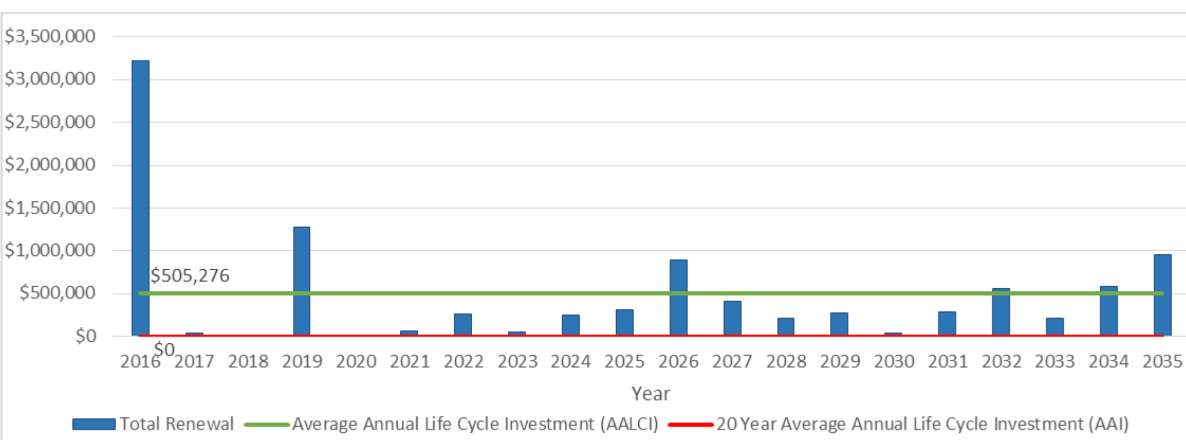
Hope's vehicle fleet has a total value of approximately $8.2 million. The remaining value of the fleet is approximately $2.7 million. It has an expected remaining life of 31%, meaning that the overall condition of the fleet is average. The current infrastructure deficit is $3.2 million and the AALCI is $7,000 (see Table 5.5).

Table 5.5: Fleet Summary Details

Asset Category	Replacement Value	Average of Expected Remaining Life	Infrastructure Deficit (Backlog)	Sum of 20 Year Total	20 Year Average Annual Investment	Average of Average Annual Life Cycle Investment
Miscellaneous Assets						
Fleet						
Light Utility	$3,656,268	32%	$848,810	$4,373,155	$218,658	$5,224
Heavy Utility	$4,600,248	29%	$2,372,490	$5,530,531	$276,527	$10,624
Total	**$8,256,516**	**31%**	**$3,221,300**	**$9,903,686**	**$495,184**	**$6,938**

The fleet capital renewal schedule for the next 20 years is shown in Figure 5.5.

Figure 5.5: Fleet Investment Profile



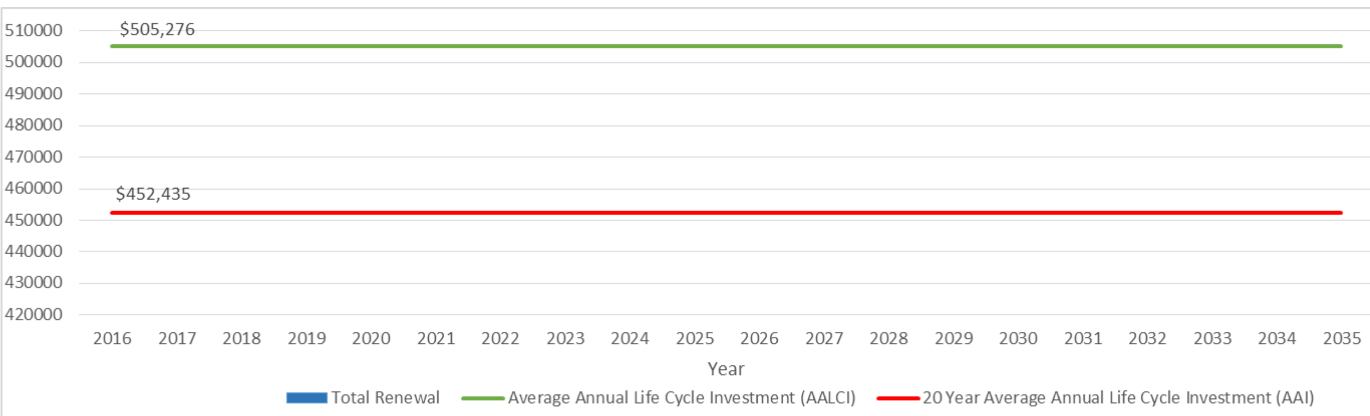
5.6 Buildings

Hope's buildings have a total value of approximately $25 million. The remaining value of the buildings is approximately $14 million. It has an expected remaining life of 68%, meaning that the overall condition of the buildings is good. The sum of the infrastructure deficit is $3.9 million and the AALCI is $505,000 (see Table 5.6).

Table 5.6: Building Summary Details

Asset Category	Sum of Replacement Value - Total	Average of Expected Remaining Life	Sum of Infrastructure Deficit (Backlog)	Sum of 20 Year Total	20 Year Average Annual Investment	Sum of Average Annual Life Cycle Investment
Building System						
Fixtures	$65,211	94%	$0	$0	$0	$1,304
Other Structures	$25,198,564	67%	$3,934,047	$9,048,700	$452,435	$503,971
Total	**$25,263,776**	**68%**	**$3,934,047**	**$9,048,700**	**$452,435**	**$505,276**

Figure 5.6: Building Investment Profile



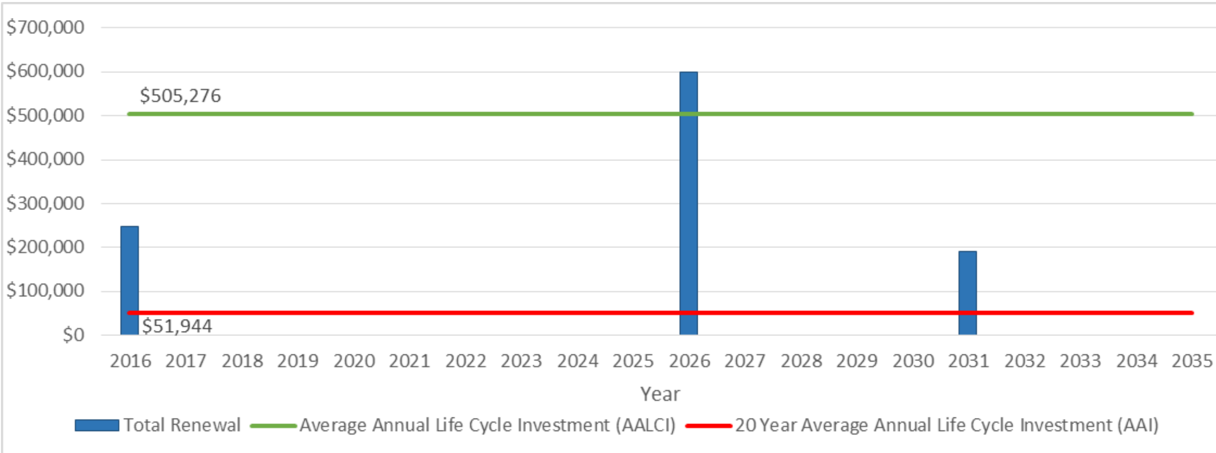
5.7 Parks

Hope's parks have a total value of approximately $916,000. The remaining value of the parks is approximately $244,000. It has an expected remaining life of 17%, meaning that the overall condition of the buildings is poor. The sum of the infrastructure deficit is $247,137 and the AALCI is $769 (see Table 5.7).

Table 5.7: Parks Summary Details

Asset Category	Sum of Replacement Value - Total	Average of Expected Remaining Life	Sum of Infrastructure Deficit (Backlog)	Sum of 20 Year Total	20 Year Average Annual Investment	Sum of Average Annual Life Cycle Investment
Parks						
General	$915,878	17%	$247,137	$1,038,879	$51,944	$37,682
Total	**$915,878**	**17%**	**$247,137**	**$1,038,879**	**$51,944**	**$37,682**

Figure 5.7: Building Investment Profile



6 Summary

Hope owns $256 million in infrastructure that requires significant strategic investment over the next 20 years in order to ensure the infrastructure is sustained. In order to ensure these assets can continue to provide service, decision makers must determine what level of investment is appropriate for their community based on risk, service, cost and affordability. Table 6.1 below summarizes three key investment indicators that will improve information for making infrastructure investment decisions.

Table 6.1: Investment Level Indicators

Asset Category	Replacement Value	Average Annual Life Cycle Investment (AALCI)	20 Year Average Annual Investment (AAI)	Infrastructure Deficit (Backlog)
Road System	$82 million	$1.2 million – $1.8 million	$500,000 - $1.7 million	$1.4 million - $16.8 million
Sanitary System	$57 million	$674,000 - $1 million	$136,000 - $1.2 million	$636,000 – $3.3 million
Storm System	$28.2 million	$335,000 - $503,000	$328,000 - $638,000	$0 - $6.5 million
Water System	$54.8 million	$708,000 – $1 million	$473,000 - $1.4 million	$2.7 million – $13.4 million
Building System	$25.1 million	$335,000 – $503,000	$124,000 - $275,000	$1.6 million – $3.8 million
Miscellaneous Assets (Fleet)	$8.2 million	$289,000 - $437,000	$294,000 - $495,000	$312,000 - $3.2 million
Parks	$915,000	$25,000 - $38,000	$12,000 - $52,000	$86,000 - $247,000
Total	**$256 million**	**$3.5 million – $5.3 million**	**$1.8 million - $5.9 million**	**$6.8 million – $47.5 million**

The range of values represent risk levels 1 to 3 with the lower value representing risk level 3 (SL increased by 50%) and the larger value representing risk level 1 (standard SL).

7 Other Asset Management Considerations

The following sections are included to introduce some additional topics related to asset management implementation to support on-going informed infrastructure decision-making.

7.1 Decision-making through an Understanding of Service, Risk, and Cost

Making good decisions requires that the right people have the right information at the right time. Achieving this requires a process of communication and ongoing information management. Asset management is not about having perfect information, but it's about ensuring decisions are informed by the best information available, and then working to improve information where appropriate.

The collection and use of information about services, risk, and cost can be integrated into Hope's existing budget processes based on the **Figure 7.1**.

Often, the best way of implementing asset management is not through building new and complicated processes – it is through making incremental improvements to your current processes. The collection and use of information about services, risk, and cost can be integrated into the existing budget processes.

Figure 7.1: Typical Budget Process

What to do:

- Include considerations of level of service, risk, and cost at each stage of the budget process.
- Service, risk, and cost cannot be fully understood in isolation – the three need to be brought together to understand connections and trade-offs.
- Use best information is available at the time.
- If there are gaps or updates needed in important information, include actions to fill those data gaps (or update information such as master plans) in your budget.

UNDERSTANDING SERVICE AND RISK

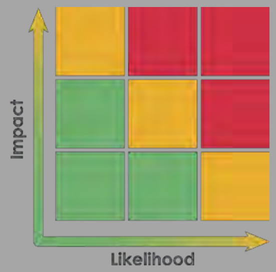
Level of service *is a measure of the quality, quantity, and/or reliability of a service from the perspective of members, businesses, and customers in the community.* Understanding service means having a clear and consistent understanding of:

1. The types of services you provide;
2. The groups of residents, businesses, and institutions that you provide them to;
3. The level of service being delivered currently (your performance); and
4. The level of service you're aiming to provide (your target).

Infrastructure is not inherently valuable; it is only as valuable as the service it provides to the community. Rather than jumping straight to pipe breakage rates or pavement quality index, it's important to start with defining the service in terms that residents and businesses would understand – like water service outages, or driving comfort. This helps to ensure the priorities for limited resources are aligned with what the community values.

Risk(s) are events or occurrences that will have undesired impacts on services (Risk = Impact x Likelihood). Some events that impact delivery of services will have a higher probability or greater impact than others – which make them a bigger risk. Often, with the right planning and actions, the likelihood or impact of these events can be reduced. To understand risk, you need to understand:

1. What your risks are and where they are;
2. The impact and likelihood of these risks;
3. What can be done to control or mitigate them and what resources are required; and
4. Whether they are worth mitigating or if they should be tolerated.



Risks are assessed by identifying the impact and the likelihood of the event, and then finding the corresponding level of risk. Doing this for each risk helps you to figure out which are your biggest risks and which risks are not as important to worry about.

7.2 Information Management

As circumstances change over time, information needs to be updated or improved. Information updates may be done on an ongoing basis, or may be completed as part of an annual process. Updates should reflect new assets, retired assets, refurbished or replaced assets, replacement cost changes, updates to operating costs to repair and maintain and asset condition information.

Figure 5.2 – Information Management Process

Updates may also be made to improve the accuracy of information, such as replacing anecdotal condition information with results from a condition assessment. Collecting more data or more accurate data can be very valuable in decision making, but it can be time consuming and expensive, so it's not worth investing in unless you know it will improve your decision making. When working with vendors or consultants, ask them (at the beginning of the project) to provide you information in a format that makes updating your inventory as easy as possible.

7.3 Communication and Engagement

Communication is considered to be a set of ongoing activities that are applied within each stage of the asset management process. The purpose of communicating is to ensure that people and departments within an organization are aligned, working towards the same goals, and efficiently implementing asset management by applying the information and outputs in decision-making and programming. Communication and engagement is also important in obtaining support for asset management from Council, staff, members, and other ratepayers. Common topics for asset management communication and engagement include:

- The importance of infrastructure in service delivery
- State of assets
- State of finances and funding challenges
- Levels of service
- Service delivery costs and trade-offs
- The organization's approach to asset management
- Staff and community members roles
- The work being done to ensure long-term sustainable service delivery

It is often advisable to develop internal alignment and an understanding of assets, services, and related costs and risks prior to external communication and engagement.

7.4 Policy

Asset management and financial policies guide annual decisions which give the community direction on how investments should be made to achieve Hope's annual and long term infrastructure needs and how much of the AALCI should be budgeted. In particular, policies can guide infrastructure investments with regards to reserves, debt, grants, asset renewal, growth and capital priorities. As part of this exercise, it is recommended that a dedicated infrastructure reserve is developed to support renewal of existing infrastructure. This will help Hope work towards their long term stretch target of funding the suggested AALCI.

7.5 Natural Assets

There is a growing recognition of the pivotal role that all natural areas play in providing services to communities. Natural Capital Assets are defined as the natural assets which provide a value and service to the community over time and are essential to the delivery of services. Examples would include your groundwater aquifer which provides a source of drinking water and the Fraser River which collects the majority of your surface run-off water.

It will be important for Hope to identify and quantify the economic benefits of protecting its natural assets and understand the costs associated with replicating these natural functions in response to the loss or destruction of any components of these 'eco-assets'. Natural Capital Assets do not have a market value so assessing their importance and assigning an economic value will aid in raising awareness of their importance to the community. The substitutes for natural capital can be much more expensive to duplicate and operate than those provided by nature. Also, there are many services only nature can provide.

We suggest that Hope identify all of its significant natural capital assets and the value of they provide. This value could be considered in future infrastructure decision-making, planning and budgeting for the protection of these assets and the services they provide.

8 Recommendations and Next Steps

Based on the results of the AMIP, Hope's information, and the process outlined in the *Asset Management for Sustainable Service Delivery, A BC Framework*, the following section outlines possible next steps (tools) and priorities for consideration to achieve an advanced level of practicing asset management. The steps outlined below are organized deliberately in order to promote successful implementation and improve understanding in the three pillars that inform decisions – Cost, Risk and Service.

We recommend that Hope initially reviews these AMIP indicators (Infrastructure Deficit, AALCI, 20 Year AAI) and scenarios to develop a strategy for sustainably funding infrastructure renewal. The following outlines series of initiatives to contain costs, increase revenues and improve your infrastructure information related to cost, service, risk and affordability.

- Consider cost, risk and service in your existing budgeting process;
- Undertaking condition assessments for assets that have passed their service life;
- Complete infrastructure risk assessment(s) to determining the likelihood and consequence of failure for each asset;
- Develop maintenance management plans to extend service lives of assets;
- Consider adjusting levels of service to reduce asset replacement costs (i.e. reducing road widths);
- Review rates, taxes and fees to forecast future revenue and determine affordability limits;
- Consider seeking alternative revenue sources and economic development;
- Develop decision-support tools such as policy, budgeting process;
- Build Infrastructure renewal reserves over time;
- Continually update and refine your infrastructure data over time with consideration of completing an inventory and valuation of your natural assets;
- Update infrastructure master plans and pertinent bylaws (i.e. SDS, DCC, Zoning) using asset management principles; and
- Develop a prioritized capital plan that considers all infrastructure and service needs – condition, capacity, and compliance.

A more detailed summary of the key recommendations is outlined below.

Table 8.1: Recommendations

Investment Containment Strategically reduce infrastructure investment level	
Condition Assessment	Collect field condition data to better understand actual condition of assets in the field. This condition data feeds directly into the AMIP to update when assets need to be replaced so the AALCI and 20 Year AAI can be adjusted accordingly.
Strategically Consider Risk	Perform infrastructure risk assessments to improve understanding of the consequence and likelihood of failure of each asset to inform investment priorities.
Level of Service	Review existing technical level of services to reduce infrastructure cost pressures. For example: reducing road widths means that less infrastructure needs to be maintained and replaced in the future.
Maintenance Planning	Develop a maintenance management plans to proactively increase asset service lives and return on investments.
Outcome: Understand cost, risk and service	
Revenue Generation Determine if there is an opportunity to generate more revenue	
Review Utility rates	Review utility rate structure to determine if current revenues ensure full cost recovery including funding asset renewal
Review Property Tax's	Consider a dedicated revenue source(i.e. levy, parcel tax) for funding asset renewal
Develop Economic Development opportunities	Determine if there are economic development opportunities that could increase your tax base
Lobby FCM/UBCM	Lobby FCM and UBCM for senior government funding assistance and develop strong businesses case(s) for Grant funding by meeting requirements of UBCM
Seek alternative revenues	Look for new innovative ways of generating new revenues
Outcome: Increase revenue generation possibilities to determine affordability limits	
Policy and Decision Making tools	
Develop financial policy(s)	Policies guide council and staff in their annual decisions which give the community direction on how investments should be made to achieve funding long term infrastructure needs
Infrastructure Master Plans	Update master plans using asset management principles to better understand cost pressures as it relates to capacity and compliance
Bylaw Update	Update key bylaws (i.e. SDS, DCC, Zoning) using asset management and long term financial sustainability principles
Consider cost, service, and budgeting process	Develop an open and transparent process for selecting and prioritizing projects during budgeting cycles (consistent decision making from year to year that takes into account asset management)
Develop Prioritized Capital Plan	Develop a rolling 5 year prioritized capital plan which takes a holistic approach to plan infrastructure upgrades (considers condition, compliance, capacity and council's strategic priorities) based on affordability limits and service goals
Outcome: Develop tools, processes and procedures for decision making, to increase financial capacity and sustainable deliver services.	

APPENDIX A

AMIP Level 1

Asset Category	Replacement Value - Total	Loss in Value	Remaining Value	Average of Expected Remaining Life	Infrastructure Deficit (Backlog)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	20 Year Total	20 Year Average Annual Investment	Average Annual Life Cycle Investment
Road System																												
Linear	$79,946,681	$43,526,575	$36,420,107	33%	$16,418,313	$16,418,313	$1,190,862	$1,218,267	$1,603,325	$2,064,975	$868,230	$1,812,952	$2,255,134	$1,894,336	$682,512	$386,271	$128,187	$1,155,415	$177,182	$832,750	$33,287	$15,934	$309,156	$211,949	$257,091	$33,516,127	$1,675,806	$1,741,006
Non-Linear	$2,075,625	$1,435,431	$640,194	28%	$476,564	$476,564	$0	$23,247	$0	$11,624	$604,422	$0	$69,741	$0	$0	$0	$0	$46,494	$0	$11,624	$92,988	$0	$332,100	$0	$0	$1,668,803	$83,440	$59,304
Total	$82,022,306	$44,962,006	$37,060,301	32%	$16,894,876	$16,894,876	$1,190,862	$1,241,514	$1,603,325	$2,076,599	$1,472,652	$1,812,952	$2,324,875	$1,894,336	$682,512	$386,271	$128,187	$1,201,909	$177,182	$844,373	$126,275	$15,934	$641,256	$211,949	$257,091	$35,184,929	$1,759,246	$1,800,309
Sanitary System																												
Linear	$44,264,974	$27,108,090	$17,156,884	34%	$461,531	$461,531	$0	$0	$0	$9,884,072	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,600,312	$0	$0	$0	$0	$0	$15,945,914	$797,296	$669,705
Non-Linear	$4,175,658	$3,277,948	$897,710	21%	$1,288,548	$1,288,548	$0	$0	$0	$870,102	$0	$0	$0	$0	$0	$0	$285,606	$79,704	$212,544	$431,730	$79,704	$53,136	$13,284	$6,642	$26,568	$3,347,568	$167,378	$83,410
Facility	$8,611,329	$4,683,092	$3,928,238	54%	$1,595,194	$1,595,194	$0	$0	$1,029,308	$0	$0	$31,050	$0	$0	$0	$311,276	$49,680	$15,525	$661,365	$55,890	$9,315	$248,400	$0	$343,103	$1,026,203	$5,376,308	$268,815	$258,892
Total	$57,051,961	$35,069,130	$21,982,831	30%	$3,345,272	$3,345,272	$0	$0	$1,029,308	$10,754,174	$0	$31,050	$0	$0	$0	$311,276	$335,286	$95,229	$873,909	$6,087,932	$89,019	$301,536	$13,284	$349,745	$1,052,771	$24,669,790	$1,233,489	$1,012,006
Storm System																												
Linear	$23,946,061	$16,685,834	$7,260,226	31%	$6,044,871	$6,044,871	$208,377	$0	$193,107	$3,083,654	$67,575	$0	$53,128	$0	$0	$0	$0	$30,113	$0	$1,412,060	$0	$0	$557,784	$0	$0	$11,650,669	$582,533	$438,812
Non-Linear	$4,289,193	$2,766,958	$1,522,235	36%	$518,076	$518,076	$0	$0	$0	$293,909	$0	$0	$0	$0	$0	$0	$84,686	$0	$89,667	$54,797	$29,889	$34,871	$0	$0	$0	$1,105,893	$55,295	$64,442
Total	$28,235,254	$19,452,793	$8,782,461	33%	$6,562,947	$6,562,947	$208,377	$0	$193,107	$3,377,562	$67,575	$0	$53,128	$0	$0	$0	$84,686	$30,113	$89,667	$1,466,856	$29,889	$34,871	$557,784	$0	$0	$12,756,562	$637,828	$503,254
Water System																												
Facilities	$3,965,085	$2,039,571	$1,925,514	46%	$908,213	$908,213	$0	$107,123	$0	$0	$0	$0	$0	$192,510	$0	$0	$0	$0	$0	$55,890	$0	$462,645	$0	$406,755	$641,183	$2,774,318	$138,716	$125,132
Linear	**$35,709,800**	$24,955,714	$10,754,086	28%	$9,451,644	$9,451,644	$228,558	$335,811	$0	$6,265,628	$107,247	$67,844	$155,724	$0	$673,578	$83,480	$979,379	$334,293	$311,559	$1,600,243	$231,345	$0	$439,347	$202,027	$172,395	$21,640,103	$1,082,005	$631,070
Non-Linear	**$15,160,196**	$9,871,608	$5,288,589	18%	$3,112,675	$3,112,675	$93,425	$55,031	$0	$0	$95,981	$16,211	$0	$457,988	$26,996	$8,652	$80,167	$0	$0	$37,541	$131,513	$42,962	$163,044	$18,617	$302,249	$4,643,051	$232,153	$323,427
Total	$54,835,081	$36,866,893	$17,968,188	24%	$13,472,532	$13,472,532	$321,984	$497,965	$0	$6,265,628	$203,228	$84,055	$155,724	$650,498	$700,574	$92,132	$1,059,547	$334,293	$311,559	$1,693,674	$362,858	$505,607	$602,390	$627,399	$1,115,827	$29,057,472	$1,452,874	$1,079,629
Building Systems																												
Building	$25,183,314	$11,906,700	$13,276,613	49%	$3,851,075	$3,851,075	$0	$0	$0	$0	$0	$0	$117,553	$0	$0	$0	$0	$0	$0	$0	$0	$1,541,520	$0	$0	$0	$5,510,147	$275,507	$503,666
Total	$25,183,314	$11,906,700	$13,276,613	49%	$3,851,075	$3,851,075	$0	$0	$0	$0	$0	$0	$117,553	$0	$0	$0	$0	$0	$0	$0	$0	$1,541,520	$0	$0	$0	$5,510,147	$275,507	$503,666
Vehicles																												
Light Utility	$3,656,268	$2,015,267	$1,641,000	32%	$848,810	$848,810	$38,178	$0	$821,856	$0	$63,227	$264,104	$53,728	$33,963	$296,360	$349,525	$219,981	$0	$266,425	$34,088	$107,314	$386,819	$104,990	$209,855	$273,933	$4,373,155	$218,658	$224,613
Heavy Utility	$4,600,248	$3,486,604	$1,113,644	29%	$2,372,490	$2,372,490	$0	$0	$449,955	$0	$0	$0	$0	$220,433	$20,805	$541,935	$185,589	$218,160	$10,000	$0	$176,687	$177,255	$102,263	$379,674	$675,285	$5,530,531	$276,527	$212,479
Total	$8,256,516	$5,501,871	$2,754,645	31%	$3,221,300	$3,221,300	$38,178	$0	$1,271,811	$0	$63,227	$264,104	$53,728	$254,397	$317,165	$891,460	$405,570	$218,160	$276,426	$34,088	$284,001	$564,074	$207,252	$589,529	$949,218	$9,903,686	$495,184	$437,092
Park System																												
General	$915,878	$671,641	$244,237	17%	$247,137	$247,137	$0	$0	$0	$0	$0	$0	$0	$0	$0	$600,086	$0	$0	$0	$0	$191,656	$0	$0	$0	$0	$1,038,879	$51,944	$37,682
Total	$915,878	$671,641	$244,237	17%	$247,137	$247,137	$0	$0	$0	$0	$0	$0	$0	$0	$0	$600,086	$0	$0	$0	$0	$191,656	$0	$0	$0	$0	$1,038,879	$51,944	$37,682
Grand Total	$256,500,310	$154,431,034	$102,069,276	30%	$47,595,139	$47,595,139	$1,759,400	$1,739,478	$4,097,551	$22,473,963	$1,806,682	$2,192,160	$2,705,007	$2,799,230	$1,700,250	$2,281,225	$2,013,276	$1,879,704	$1,728,743	$10,126,923	$1,083,699	$2,963,541	$2,021,966	$1,778,621	$3,374,906	$118,121,465	$5,906,073	$5,373,639

APPENDIX B

Replacement Costs

Linear Water Distribution System Costs											
Description	**Units**	**Diameter**									
		600	**500**	**450**	**400**	**350**	**300**	**250**	**200**	**150**	**100**
Pipe	$/m	$700	$600	$550	$500	$425	$350	$325	$300	$275	$225
Valves	each	$6,500	$4,900	$4,500	$4,000	$3,500	$3,000	$2,500	$2,000	$1,900	$1,800
Services	each	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$2,500
Asphalt	$/m	$204	$187	$187	$170	$170	$170	$75	$68	$68	$68
Gravel	$/m	$110	$103	$98	$96	$94	$91	$43	$42	$41	$40
*** Excludes engineering and contingency**											

Non-Linear Water Distribution System Costs		
Description	**Unit**	**Unit Cost***
Meter	each	$1,000
Hydrant	each	$4,000
Air Relief Valve	each	$10,000
Blowoff	each	$1,100
Check Valve (150mm)	each	$3,000
Pressure Reducing Station	each	$250,000
***Excludes contingency and engineering**		

Storm System Replacement Costs													
Description	**Units**	**Diameter**											
		600	525	450	400	375	350	300	250	200	150	100	75
Pipe	$/m	$450	$350	$196	$196	$156	$136	$116	$105	$105	$105	$105	$105
Manholes	each	$6,000	$6,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
Casing Pipe		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Culvert		$400	$350	$325	$325	$285	$265	$245	$165	$125	$100	$60	$45
Asphalt	$/m	$238	$238	$238	$238	$238	$238	$116	$105	$105	$105	$105	$105
Boulevard	$/m	$139	$136	$134	$134	$132	$132	$130	$71	$70	$69	$69	$69
*** Excludes engineering and contingency**													

Non-Linear Storm System Replacement Costs		
Description	**Unit**	**Unit Cost**
Manhole	each	$ 3,000
Drywell	each	$ 6,000
Catch Basin	each	$ 2,500
***Excludes engineering and contingency**		

Linear Sanitary Sewer System Replacement Costs												
Description	**Units**	**Diameter**										
		525	450	375	350	300	250	200	150	100	75	50
Gravity Pipe	$/m	$500	$400	$375	$350	$325	$300	$250	$200	$175	$130	$130
Forcemain	$/m	$300	$275	$245	$239	$237	$175	$160	$125	$85	$75	$75
*** Excludes engineering and contingency**												

Non-Linear Sanitary Sewer System Replacement Costs		
Description	**Units**	**Unit Cost**
Service	each	$2,000
Air Relief Valve	each	$10,000
Manhole	each	$4,000
***Excludes engineering and contingency**		

Road System Replacement Costs		
Road Surface	**Cost**	**Units**
Asphalt	$25.0	m2
Gravel	$22.0	m2
Base Gravels	$22.0	m2
Curb		
Concrete	$100	l.m.
Asphalt	$100	l.m.
Sidewalks		
Concrete	$120	l.m.
Streetlights	From TCA	
Signs	From TCA	

Fleet and Buildings		
Description	**Units**	**Unit Cost**
Various	each	From TCA

APPENDIX C

Service Lives

Water System	
Main, Casing Pipe & Intake, Service	
AC	60
CI	50
CT	60
Copper	60
DI	60
Galvanized Iron	60
HDPE	80
PVC	80
Steel	60
Hydrant	75
Meter	20
Valve	25
Air Relief Valve	25
Check Valve	30
Tee	25
Blowoff	25
Facilities	
Reservoir - Mechanical	25
Reservoir - Electrical	50
Reservoir - Structural	25
Pressure Reducing Valve- Mechanical	25
Pressure Reducing Valve- Electrical	50
Pressure Reducing Valve- Structural	25

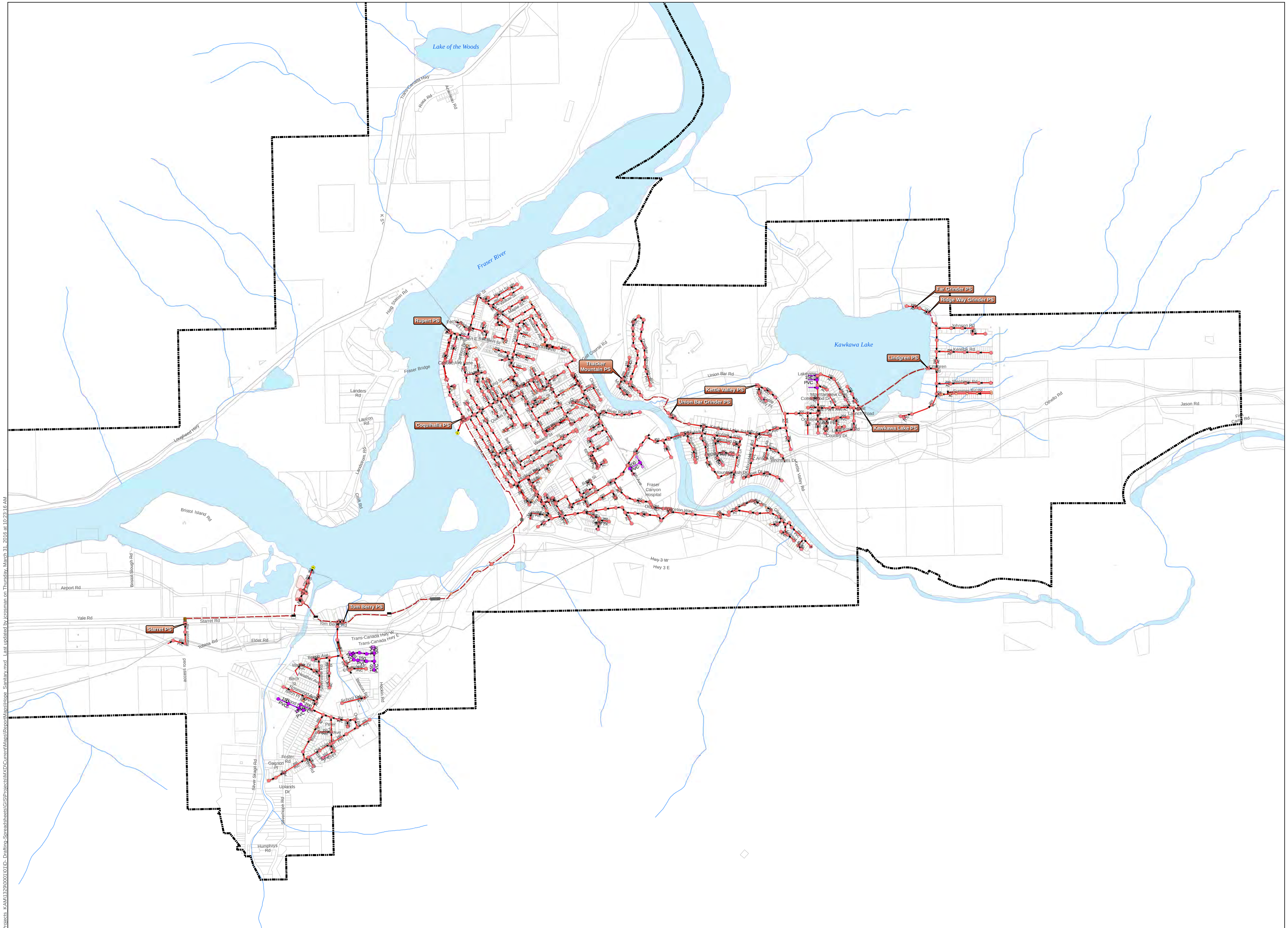
Roads	
Asphalt	20
Gravel	50
Concrete	60
Base	80
Sidewalk - Concrete	50
Curb - Conrete	50
Streetlights	35

Storm System	
Main, Casing Pipe, Service, Culvert, Outfall	
Asbestos Cement	60
Cast Iron	60
Concrete	60
Cooper	60
Ductile Iron	60
Galvanized Iron	60
HDPE	80
PVC	80
CMP	60
Manhole	50
Catch Basin	80
Cleanout	80
Meter	20
Flow Meter	30
Headwall	30

Sanitary System	
Main, Forcemain, Service	
Asbestos Cement	60
Cast Iron	60
VC	60
Cooper	60
Ductile Iron	60
Galvanized Iron	60
HDPE	80
PVC	80
Steel	60
Manhole	50
Cleanout	80
Air Relief Valve	25
Meter	20
Valve	30
Flow Meter	30
Lift Station - Mechanical	25
Lift Station - Structural	50
Lift Station - Electrical	25

APPENDIX D

Linear Infrastructure Summary Maps



DISTRICT OF HOPE

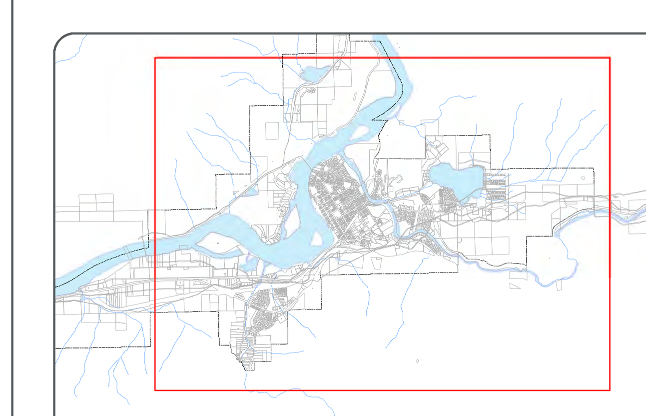
District of Hope

Asset Inventory

Sanitary System

Legend

- Sewer Network Structures
- Sewer Manholes
- Sewer Discharge Points
- Sewer Control Valves
- Sewer Valves
- Sewer Cleanouts
- Sewer Fittings
- Sewer Gravity Mains
- Sewer Gravity Mains - Private
- Sewer Pressure Mains
- Sewer Casings
- Sewer Detention
- Sewer Structures
- Cadastral Parcels
- Waterbodies
- Streams



The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600

Metres

N

Coordinate System:
NAD 1983 UTM Zone 10N

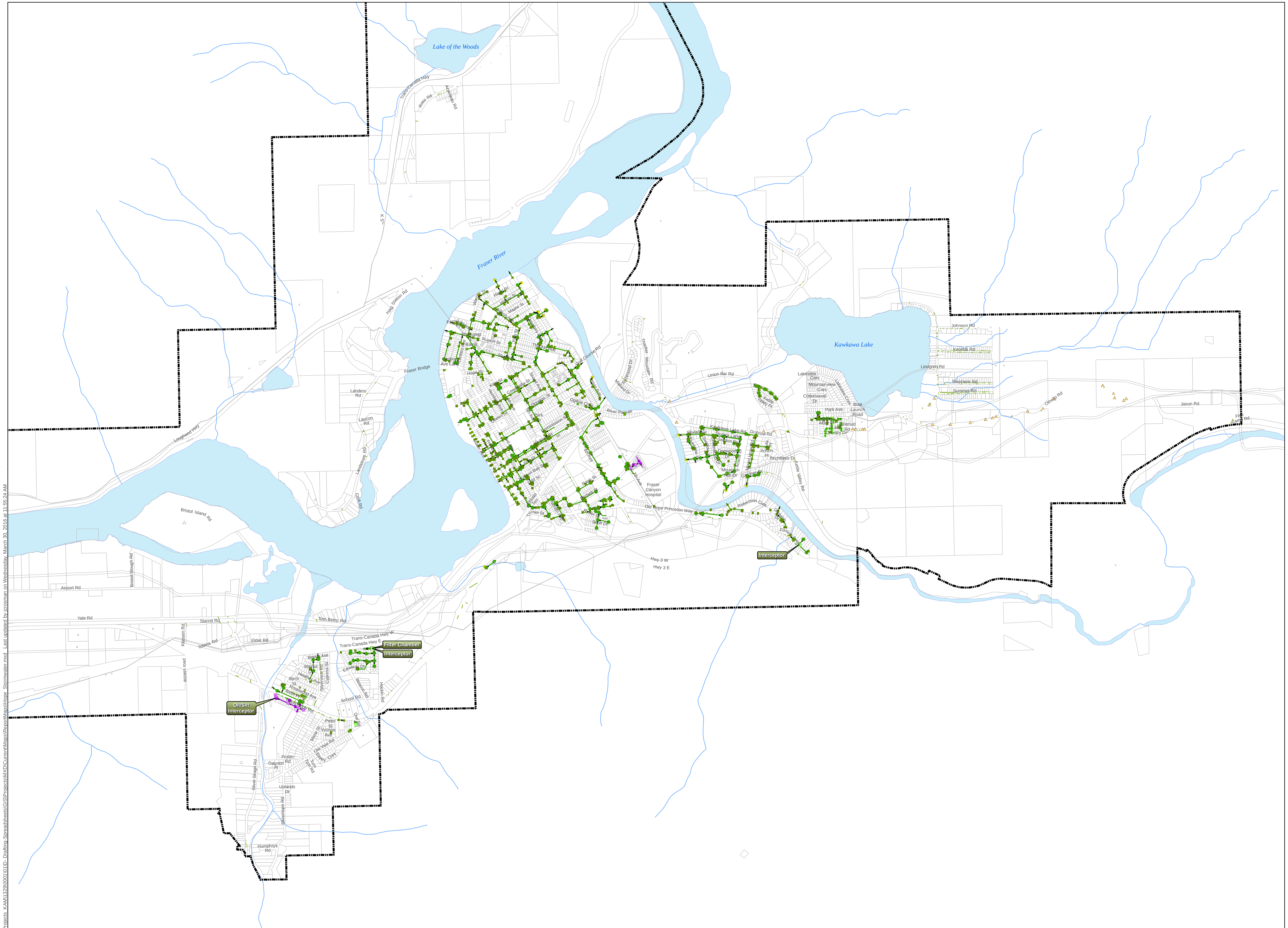
Scale:
1:15,000

Data Sources:
Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 31

URBAN systems

FIGURE 2



DISTRICT OF
HOPE

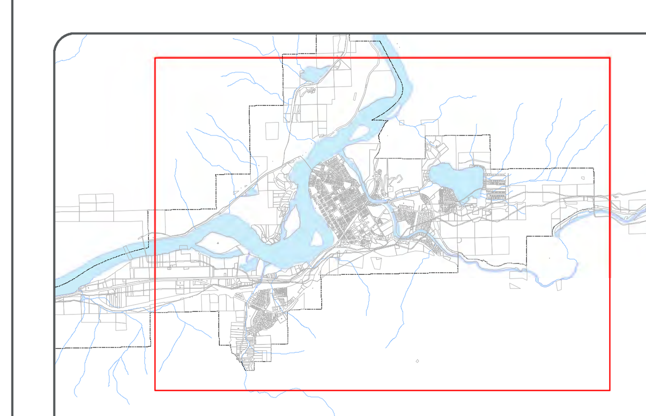
District of Hope
Asset Inventory

Stormwater System

Legend

- Network Structure
- Tank
- Manhole
- Catchbasin
- Rear Yard Inlet
- Rock Pit
- Soak Away
- Cleanout
- Spillway
- Outfall
- Storm Fittings
- Gravity Main
- Gravity Main - Private
- Culvert
- Open Drains
- Cadastral Parcels
- Waterbodies
- Streams

Work in Progress



The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600
Metres

N

Coordinate System:
NAD 1983 UTM Zone 10N

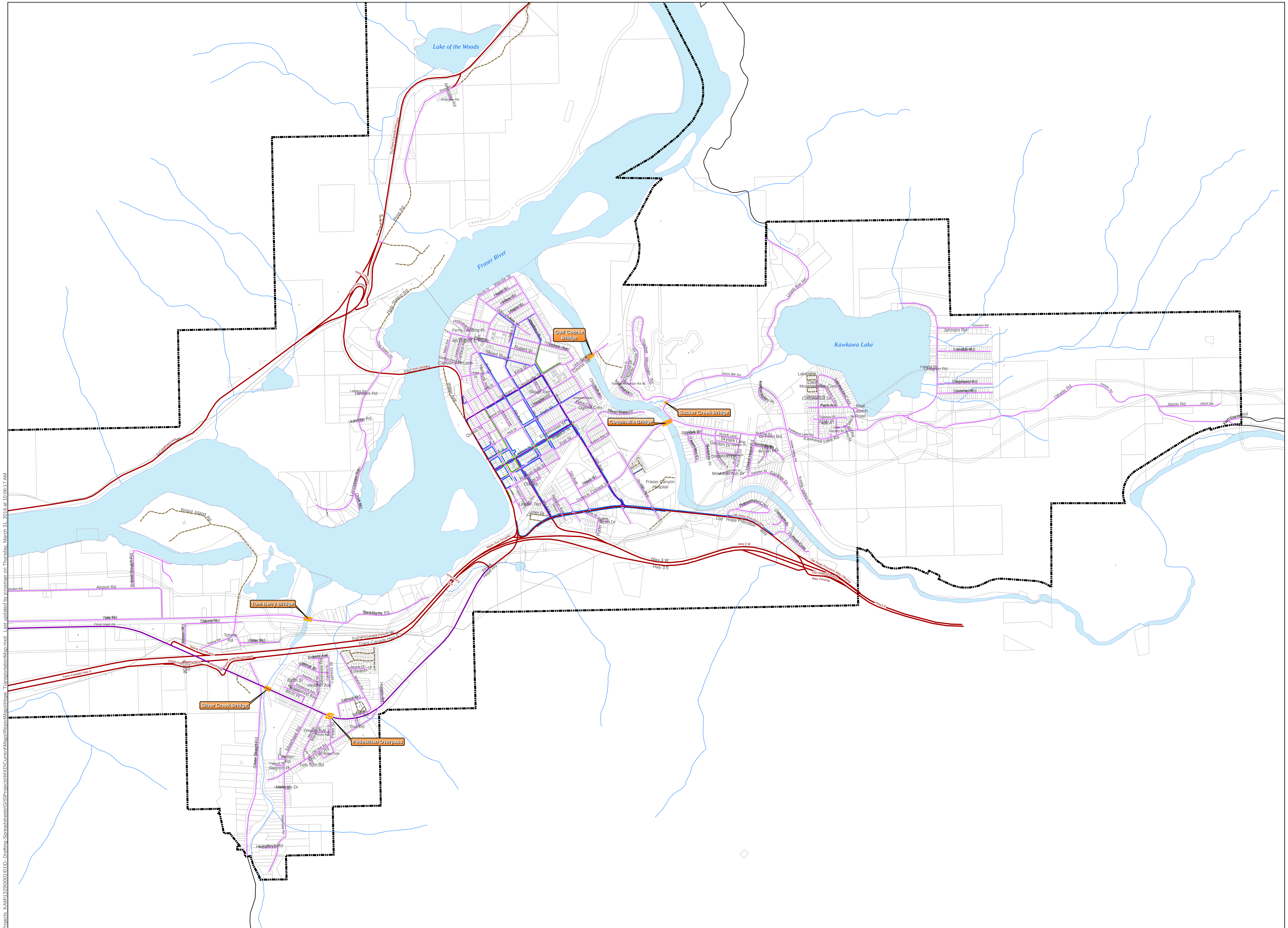
Scale:
1:15,000

Data Sources:
Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 30

URBAN systems

FIGURE 3



DISTRICT OF HOPE

District of Hope

Asset Inventory

Transportation System

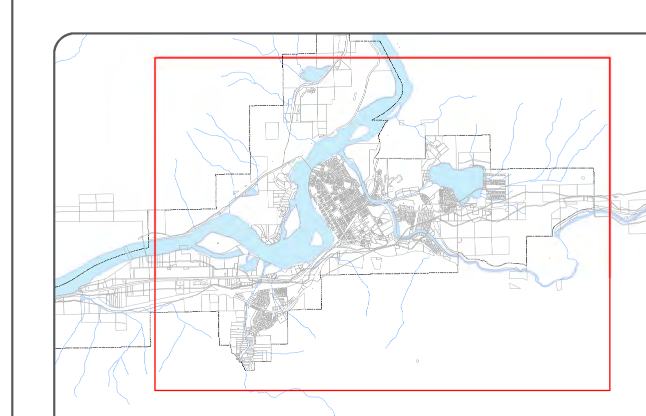
Legend

Roads

- Arterial
- Local
- Lane
- Private Roads
- Highway
- Bridge

Sidewalks

- Brickpaver
- Asphalt
- Concrete
- Cadastral Parcels
- Waterbodies
- Streams



The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600

Metres

N

Coordinate System: NAD 1983 UTM Zone 10N

Scale: 1:15,000

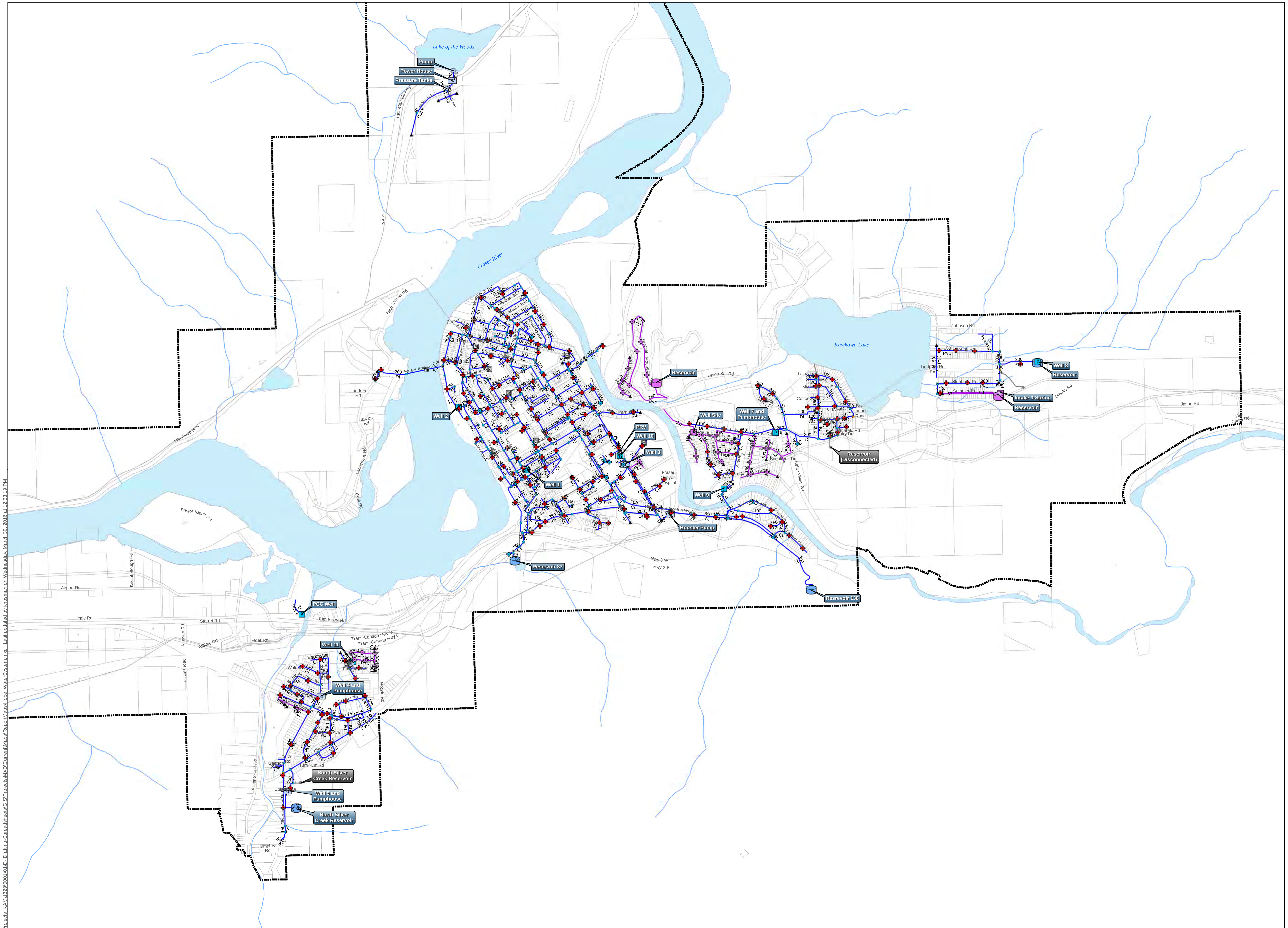
Data Sources:

Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 31

URBAN systems

FIGURE 4



DISTRICT OF HOPE

District of Hope
Asset Inventory
Water System

Legend

- Water Main
- Water Main -Private
- Abandoned Water
- Reservoir
- Pump Station
- Production Well
- Meter
- Structure
- Water Pump
- Hydrant
- Hydrant -Private
- Control Valve
- Air Release
- Blowoff
- Standpipe
- Normally Closed Valve
- System Valve
- Private Valve
- Cap
- Reducer
- Other Fitting
- Water Structure
- Streams
- Cadastral Parcels
- Waterbodies

Work in Progress

The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600
Metres

N

Coordinate System:
NAD 1983 UTM Zone 10N

Scale:
1:15,000

Data Sources:
Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

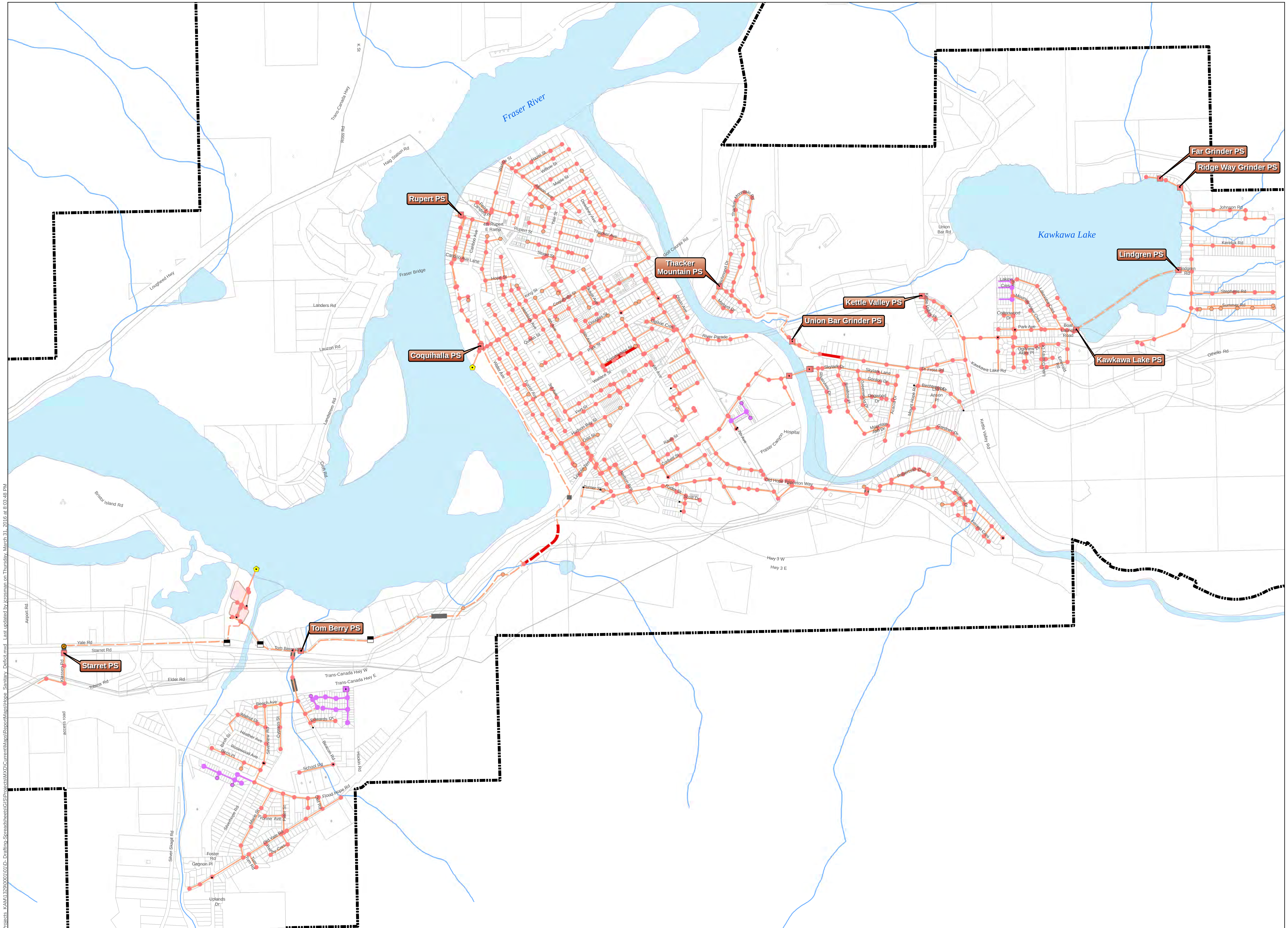
Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 30

URBAN systems

FIGURE 1

APPENDIX E

Linear Infrastructure Deficit Summary Maps

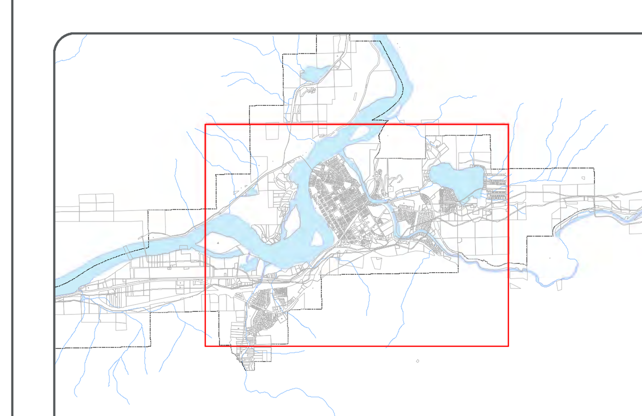


DISTRICT OF HOPE

District of Hope
Asset Inventory

Sanitary System
Pipes in Deficit

Legend
- Gravity Main in Deficit
- Pressure Main in Deficit
- Sewer Network Structures
- Sewer Manholes
- Sewer Discharge Points
- Sewer Control Valves
- Sewer Valves
- Sewer Cleanouts
- Sewer Fittings
- Sewer Gravity Mains
- Sewer Gravity Mains - Private
- Sewer Pressure Mains
- Sewer Casings
- Sewer Detention
- Sewer Structures
- Cadastral Parcels
- Waterbodies
- Streams



The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600
Metres

N

Coordinate System: NAD 1983 UTM Zone 10N

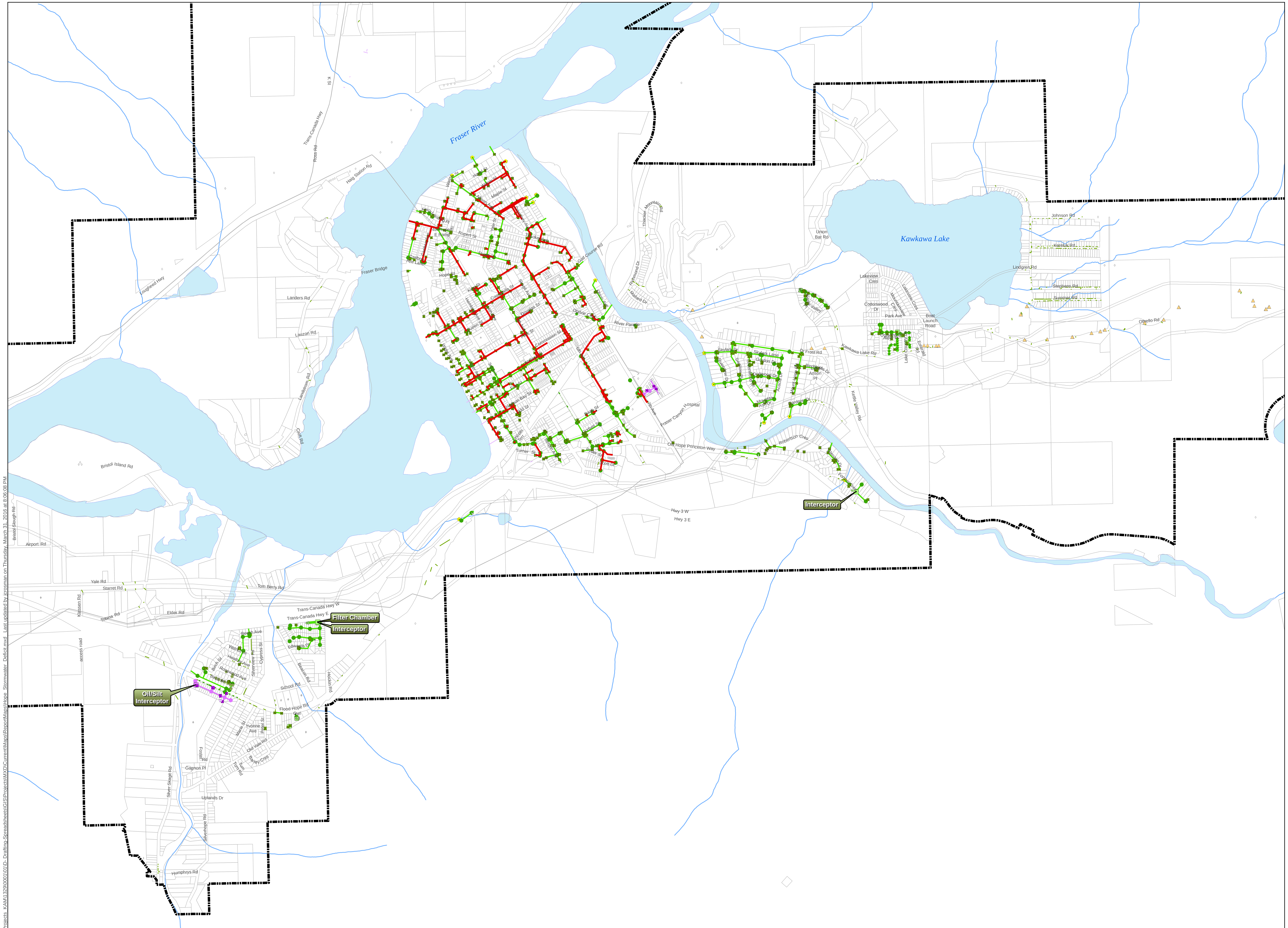
Scale: 1:10,000

Data Sources:
Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 31

URBAN systems

FIGURE 6



DISTRICT OF HOPE

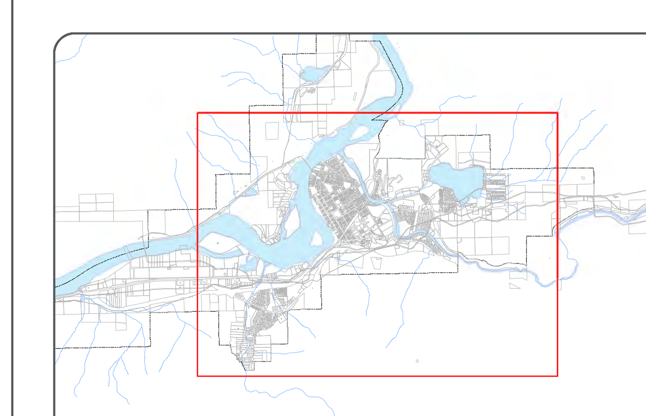
District of Hope
Asset Inventory

Stormwater System Pipes in Deficit

Legend

- Gravity Main in Deficit
- Network Structure
- Tank
- Manhole
- Catchbasin
- Rear Yard Inlet
- Rock Pit
- Soak Away
- Cleanout
- Spillway
- Outfall
- Storm Fittings
- Gravity Main
- Gravity Main - Private
- Culvert
- Open Drains
- Cadastral Parcels
- Waterbodies
- Streams

Work in Progress



The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600
Metres

N

Coordinate System:
NAD 1983 UTM Zone 10N

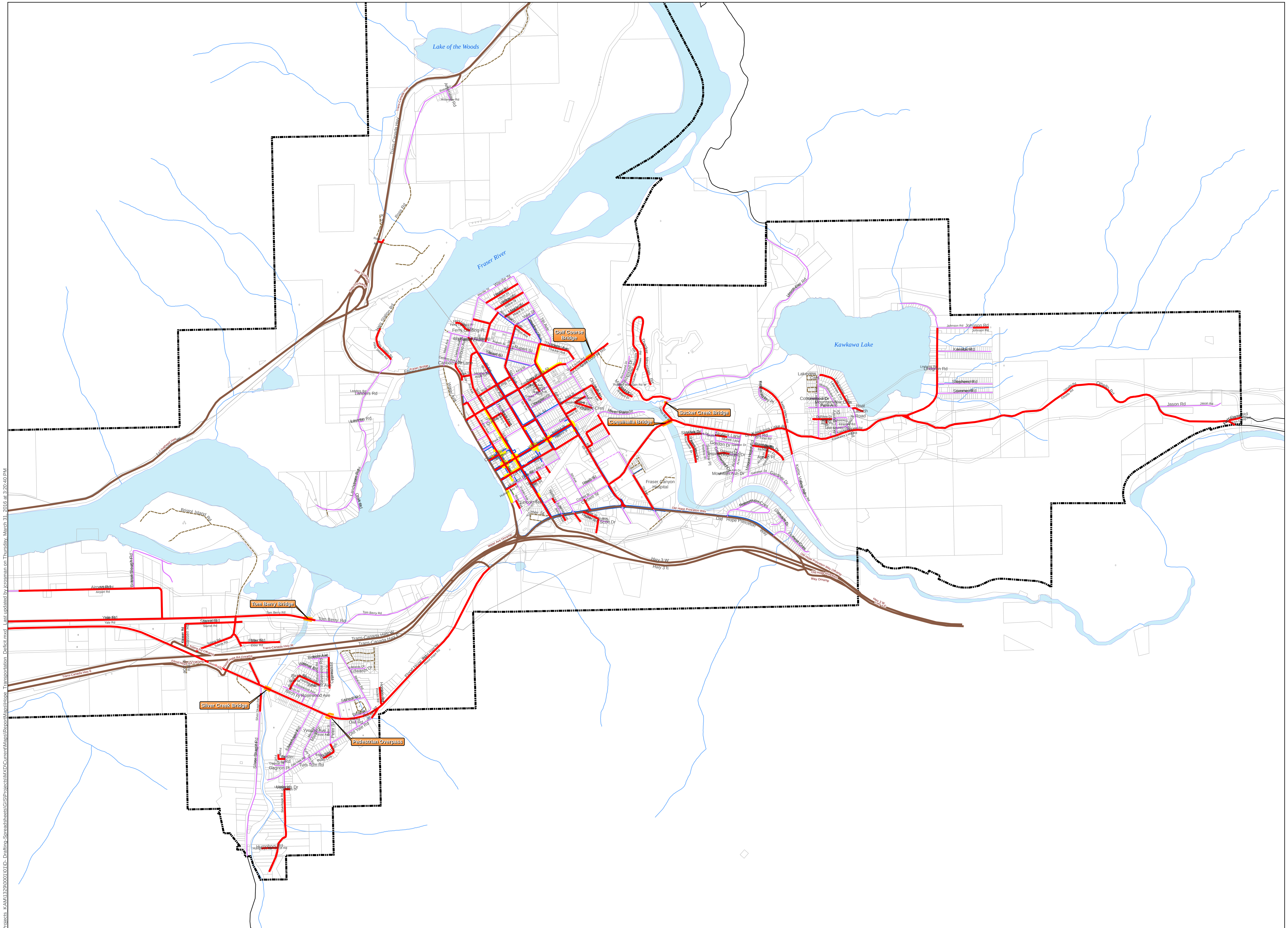
Scale:
1:11,875

Data Sources:
Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 31

URBAN systems

FIGURE 7



DISTRICT OF HOPE

District of Hope
Asset Inventory

Transportation System Assets in Deficit

Legend

- Roads in Deficit
- Sidewalks in Deficit

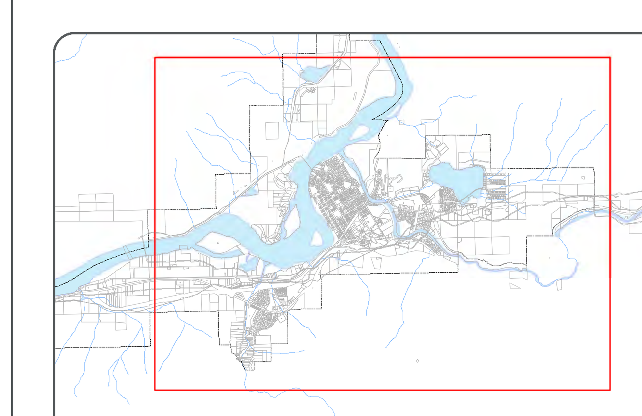
Roads

- Arterial
- Local
- Lane
- Private Roads
- Highway
- Bridge

Sidewalks

- Brickpaver
- Asphalt
- Concrete
- Cadastral Parcels
- Waterbodies
- Streams

Work in Progress



The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600
Metres

N

Coordinate System:
NAD 1983 UTM Zone 10N

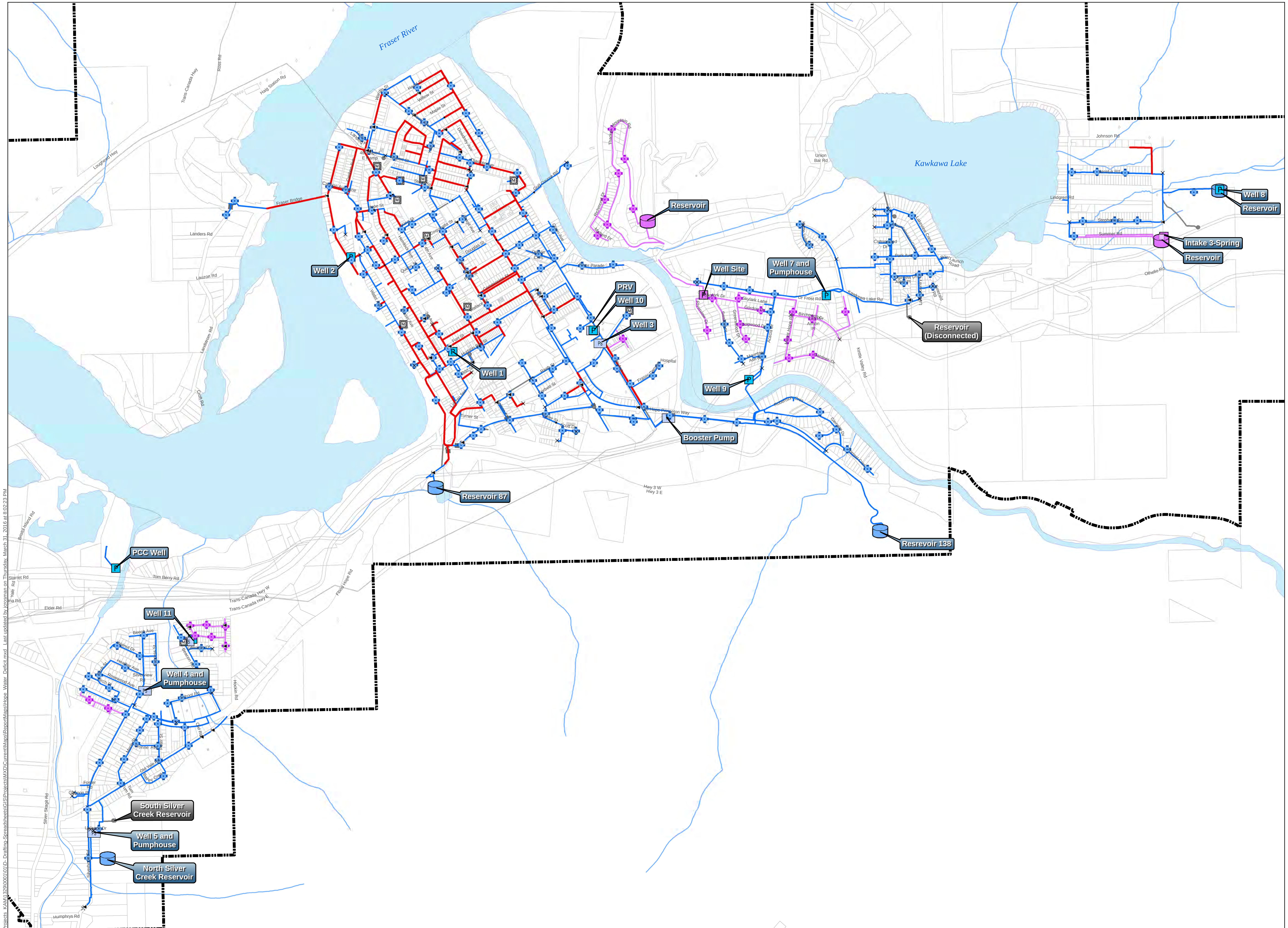
Scale:
1:15,000

Data Sources:
Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 31

URBAN systems

FIGURE 8



DISTRICT OF HOPE

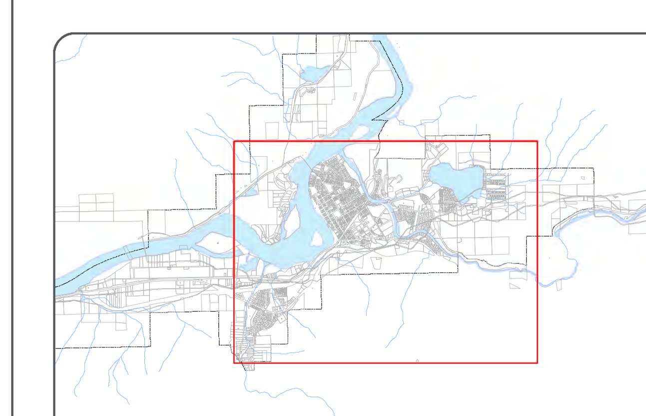
District of Hope
Asset Inventory

Water System Pipes in Deficit

Legend

- Water Main in Deficit
- Water Main
- Water Main -Private
- Abandoned Water
- Reservoir
- Pump Station
- Production Well
- Meter
- Structure
- Water Pump
- Hydrant
- Hydrant -Private
- Control Valve
- Air Release
- Blowoff
- Standpipe
- System Valve; Normally Closed Valve
- Private Valve
- Cap
- Reducer
- Other Fitting
- Water Structure
- Streams
- Cadastral Parcels
- Waterbodies

Work in Progress



The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 100 200 400 600
Metres

N

Coordinate System:
NAD 1983 UTM Zone 10N

Scale:
1:10,000

Data Sources:
Data provided by:
Water Features: FVRD
Cadastral: Integrated Cadastral Information Society
Infrastructure: Various sources provided by the District of Hope

Project #:	1329.0001.01
Author:	JC
Checked:	XX
Status:	~ DRAFT ~
Revision:	A
Date:	2016 / 3 / 31

URBAN systems

FIGURE 5