



CITY OF KAMLOOPS

SOUTHWEST SECTOR INDUSTRIAL LAND STRATEGY



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URBAN
systems

Suite 200 – 286 St. Paul Street,
Kamloops, BC V2C 6G4

Contact: John Dumbrell, MCIP, RPP
T: | 250.374.8311
jdumbrell@urbansystems.ca

urbansystems.ca

Table of Contents

1.0 INTRODUCTION	1
2.0 INDUSTRIAL LAND DEMAND	4
3.0 INDUSTRIAL LAND SUPPLY	6
3.1 INTRODUCTION	6
3.2 SUPPLY OF VACANT INDUSTRIAL LAND IN KAMLOOPS.....	7
3.3 FOCUS ON VACANT INDUSTRIAL LAND IN THE SOUTHWEST SECTOR	8
4.0 INTEGRATION OF INDUSTRIAL LAND DEMAND AND SUPPLY IN SOUTHWEST SECTOR.....	10
5.0 MAJOR INFRASTRUCTURE SERVICE REQUIREMENTS	11
5.1 INTRODUCTION	11
5.2 WATER SUPPLY	11
5.3 SANITARY SEWER	12
5.4 TRANSPORTATION.....	13
6.0 COST RECOVERY FOR MAJOR INFRASTRUCTURE SERVICE IMPROVEMENTS.....	14
6.1 INTRODUCTION	14
6.2 LATECOMER CHARGES FOR EXCESS OR EXTENDED SERVICES.....	14
6.3 DEVELOPMENT WORKS AGREEMENT	15
6.4 DEVELOPMENT COST CHARGE (DCC) BYLAW	16
6.5 PROPOSED COST RECOVERY APPROACH FOR MAJOR INFRASTRUCTURE IMPROVEMENTS.....	18

Appendices

Appendix A	Future Industrial Development Areas – Excerpt from KAMPLAN
Appendix B	Industrial Land Needs Assessment – Urban Systems, May 2018
Appendix C	Vacant Industrial Land Summary by Sector and Location, 2018
Appendix D	Additional Details on Caledonia Business Park, Iron Mask West and Iron Mask North (Domtar) Lands
Appendix E	Addendum to Kamloops SW Industrial Lands Corridor Access Study – Urban Systems, October 2018
Appendix F	Water and Sewer Servicing Phasing Strategy – City of Kamloops Interdepartmental Memo, February 2018
Appendix G	Current KAMPLAN, Zoning and Agricultural Land Reserve Designations in the Iron Mask Area

1.0 INTRODUCTION

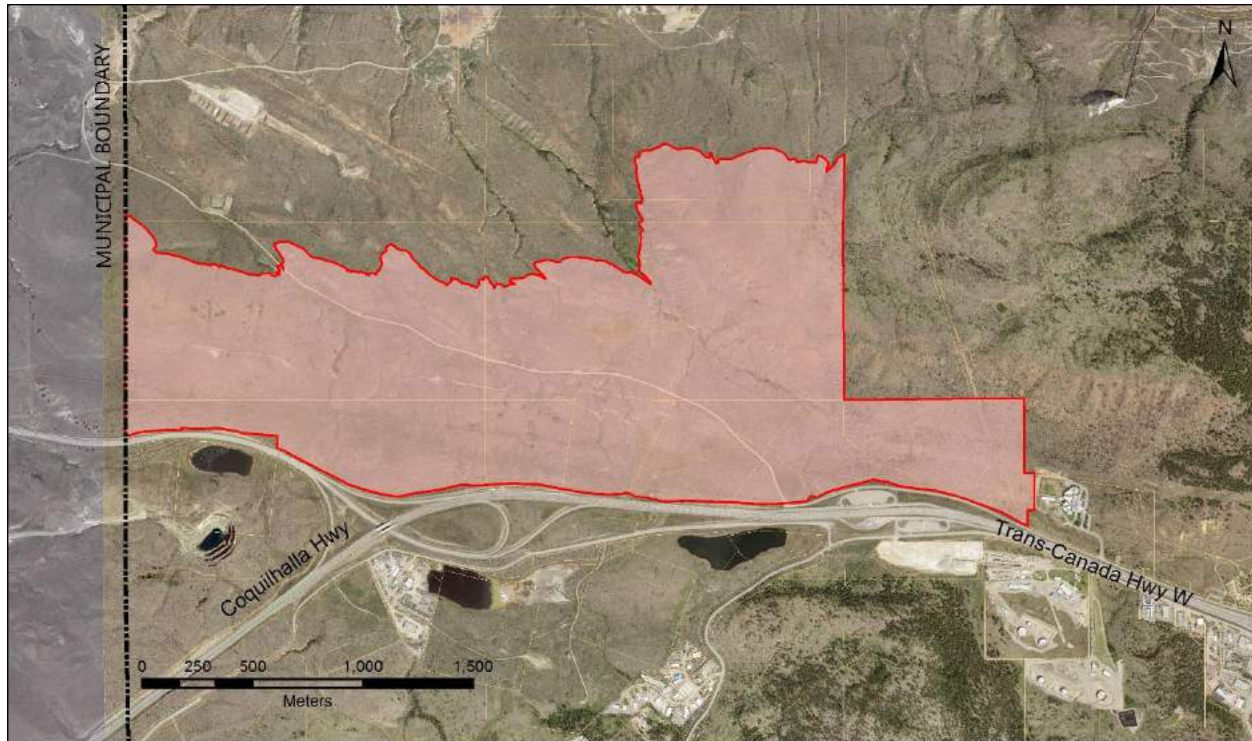
Industrial land and the activities it supports continue to be important components of Kamloops' economy. This fact is recognized in the City's recently-adopted Official Community Plan (KAMPLAN) and the initiatives taken by City Council, staff and Venture Kamloops to retain and expand this foundational dimension of the community.

KAMPLAN identifies various lands within the City's boundaries for industrial use. Among these are lands referred to as 'Future Industrial Development Areas (FIDAs)'. The intent of FIDAs is to *'facilitate future industrial growth in the city by reserving lands in various locations that are suitable for development.'* The FIDAs include two sites located in the southwest sector. These are referred to as the 'Iron Mask West' and 'Iron Mask North' Expansion Areas, and are depicted in the following figures. It is envisioned that development in these areas will be largely light industrial in nature.

Figure 1: Iron Mask West Future Industrial Development Area



Figure 2: Iron Mask North Future Industrial Development Area



Excerpts from KAMPLAN which provide additional direction with respect to the FIDAs are provided in Appendix A.

Council's 2015 - 2018 Strategic Plan contemplated the future of industrial lands in the City's southwest sector, and set in motion a course of action which is described in the following excerpt from that Plan:

'In collaboration with Venture Kamloops, research costs and benefits and prepare an options report regarding servicing additional industrial land in the southwest sector for Council consideration.'

The Corporate Strategic Plan set out two specific actions to fulfil Council's Plan – *'Identify demand and acceptable land uses, and develop an infrastructure funding strategy.'*

For the purposes of this report, the southwest sector industrial area comprises lands located in the Mission Flats, Southgate, Versatile and Iron Mask areas. These are shown generally on Figure 3.

Figure 3: Kamloops Southwest Industrial Area



The purpose of this document is to address this request of Council. It contains the following sections:

- Section 2 – projects industrial land demand within the City of Kamloops, with special focus on the southwest sector
- Section 3 – documents the current industrial land supply within the City, with particular attention paid to the southwest sector
- Section 4 – integrates industrial land demand and supply considerations
- Section 5 – provides a summary of major off-site water, sanitary sewer and transportation requirements, and associated costs, to service the Iron Mask West and North FIDAs
- Section 6 – sets out cost recovery considerations to address the capital costs of providing major off-site utility and transportation services.

There are a number of appendices attached to the main body of this document which delve into greater detail for the topics covered in Sections 2 through 6.

2.0 INDUSTRIAL LAND DEMAND

An important component of the City's industrial land strategy is the projection of industrial land demands. The focus of these projections is light industrial activity, similar to that currently located in the Southgate and Versatile areas. A time horizon of 25 years was selected for this projection. Three approaches were utilized to prepare the demand projection:

- Employment forecasts for sectors that are the most prominent users of industrial land, and the conversion of these employment forecasts into land requirements
- Trend-based forecasts using historic industrial building data, and typical site coverage by industrial buildings
- Interviews with prominent industrial land brokers in Kamloops, along with staff from Venture Kamloops.

The employment forecast approach yielded industrial land demands in the range of 50 hectares over the next 25 years. The trend forecast was similar, revealing demands of 45 hectares over that same period. These values can be pro-rated for a 10 year time horizon. The results for both time horizons are summarized in Table 1.

Table 1 – City of Kamloops Industrial Land Demand Projection

Projection Period	Industrial Land Demand
Years 1 to 10	20 hectares
Years 11 to 25	30 hectares
Total	50 hectares

Interviews with industrial land brokers elaborated upon these quantitative demand forecasts:

- There is a need for well-located, accessible industrial land parcels of 0.4 to 0.8 hectares (strongest demand), 1.2 to 2 hectares (second strongest demand) and 4+ hectares (third strongest demand)
- Lands in Kamloops southwest sector are much more attractive from a locational standpoint than the southeast or northwest (airport) lands given their relative proximity to the City centre
- Industrial businesses that have sought locations in Kamloops have in some instances been unsuccessful in finding appropriate land and/or buildings. Kelowna has been the most popular alternative

- If additional industrial lands can be brought online in the City's southwest sector, this will help meet medium to long-term demand, and allow the City to capture some of the businesses which are currently bypassing Kamloops due to lack of available well-suited and serviced light industrial land.
- 80% to 90% of industrial land demand in Kamloops would focus on the southwest sector as the first choice.

A summary of anticipated industrial land demand in Kamloops southwest sector over 10 and 25 year timeframes is provided in Table 2.

Table 2 – Industrial Land Demand Projection in Kamloops Southwest (SW) Sector

Projection Period	Industrial Land Demand
Years 1 to 10	16 hectares
Years 11 to 25	27 hectares
Total	43 hectares

* 80% of total City demand in Years 1 to 10, 90% in Years 11 to 25, assumed to occur in SW Sector. This assumption based on information from Industrial Land Brokers.

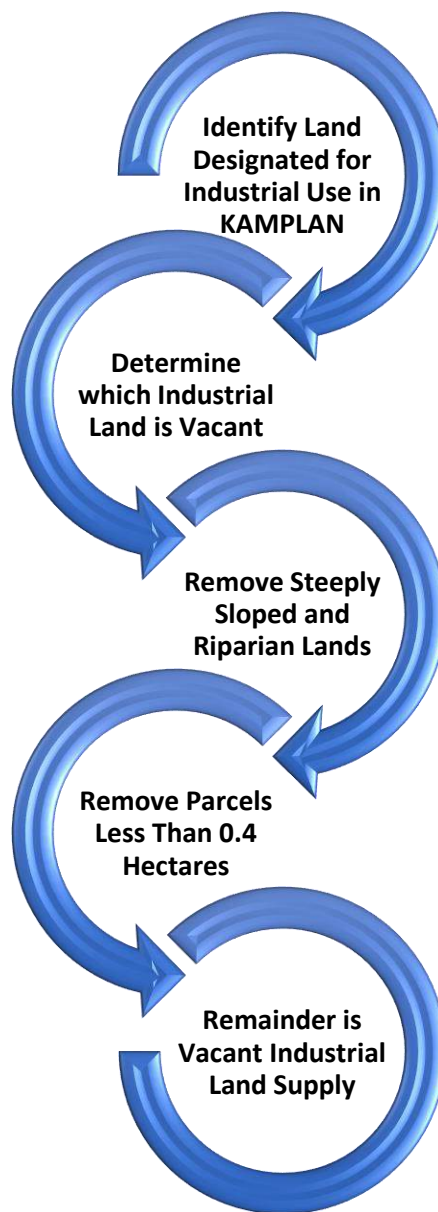
Further details regarding these industrial land demand projections are set out in Appendix B.

3.0 INDUSTRIAL LAND SUPPLY

3.1 Introduction

In 2011, City staff completed a document entitled '*Industrial Land Review 2010-2015*'. It was decided that this work should be updated as part of this Southwest Sector Industrial Land Strategy. The approach to completing this update is illustrated in the following graphic.

Figure 4 – Approach to Identifying Vacant Industrial Land Supply



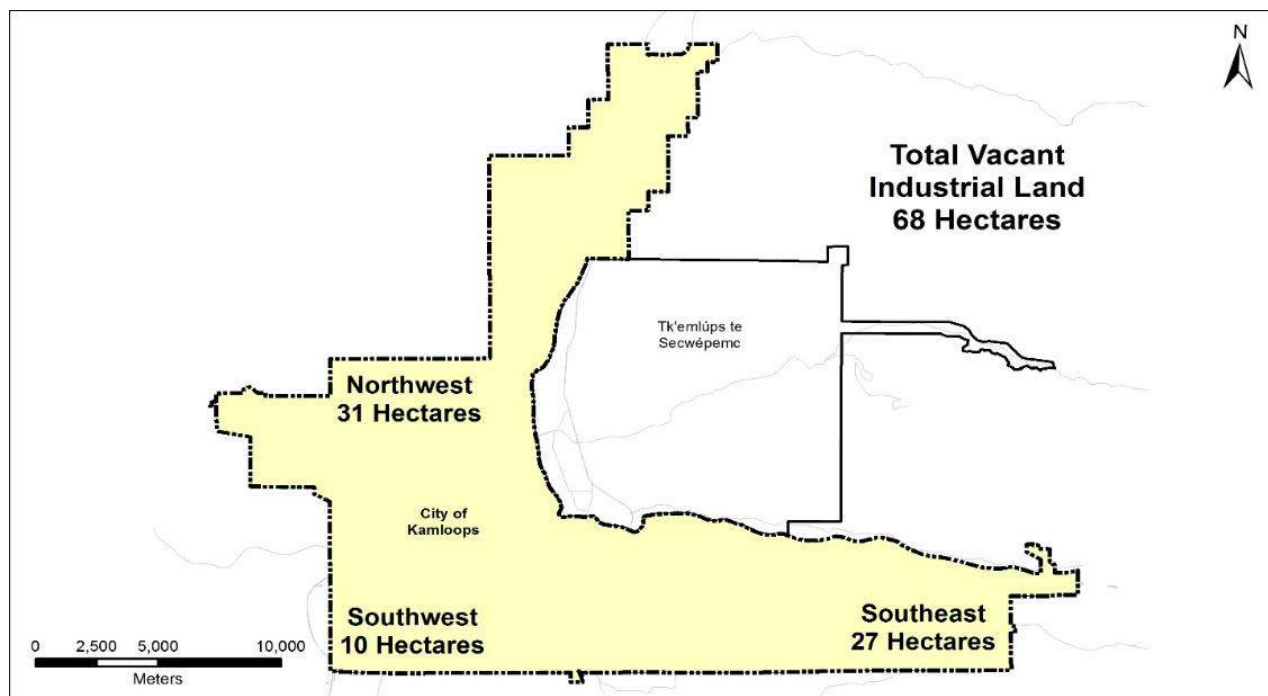
Additional details regarding this approach are provided below.

- Step 1 – identify all land within the City that is designated for industrial use within KAMPLAN (excluding Future Industrial Development Areas), the City's Official Community Plan
- Step 2 – earmark all industrial lands which were vacant as of January 2018. The term 'vacant' can be interpreted to mean void of any building within the legal parcel, or absence of extensive storage with apparent connection to adjacent industrial activity (such as log storage yard next to forest products manufacturing facility)
- Step 3 – analyze slopes and riparian areas on those lands classified as 'vacant'; net out those portions containing slopes in excess of 15%, and/or located within riparian areas
- Step 4 – on the vacant lands remaining after Steps 2 and 3, remove those parcels which are smaller than 0.4 hectares in size. This threshold was determined by reviewing the current pattern of industrial land development in the City (including light industrial areas such as those located in Southgate, Campbell Creek West and Kelly Douglas Road)
- Step 5 – remaining lands after Steps 1 through 4 are considered to be the City's current vacant industrial land supply.

3.2 Supply of Vacant Industrial Land in Kamloops

The approach described in Section 3.1 above resulted in the inventory of vacant industrial land within the City shown on Figure 5.

Figure 5: Inventory of Vacant Industrial Land in the City of Kamloops



Further details regarding the location (including street address) and size of parcels which comprise this inventory are provided in Appendix C.

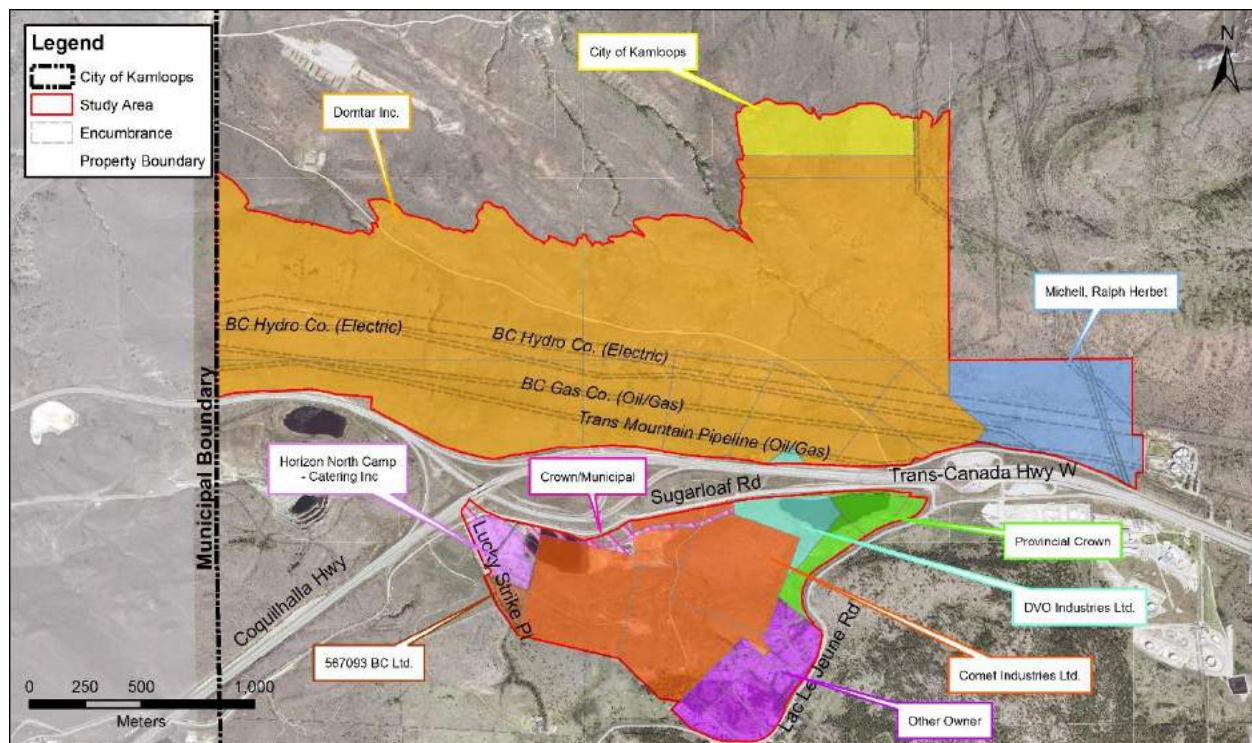
3.3 Focus on Vacant Industrial Land in the Southwest Sector

There is currently a limited amount of vacant zoned industrial land in the City's southwest sector, comprising approximately 10 hectares. This inventory is detailed in Appendix C, and includes:

- 3 parcels on Mission Flats Road
- 2 parcels on McGill Road (Southgate)
- 2 parcels in the Iron Mask area (including the Caledonia Business Park west of the Kinder Morgan Trans Mountain Pipeline facility)
- 1 parcel on Versatile Drive.

There is also an extensive proposed industrial land base within the Iron Mask West and North 'Future Industrial Development Areas' shown earlier on Figures 1 and 2 in Section 1 of this report. The lands are held by a variety of owners, as shown on Figure 6.

Figure 6: Land Ownership in the Iron Mask Area



Work has been undertaken by owners of several of the vacant industrial parcels in the southwest sector to determine their development potential. Specifically, these include:

- Caledonia Business Park adjacent to Iron Mask West
- Iron Mask West lands held currently by Comet Industries Ltd. and DVO Industries Ltd.
- Iron Mask North lands held currently by Domtar Inc.
- Michell property, which was approved for exclusion from the Agricultural Land Reserve in 2016. The allowance of 25 hectares of developable area for this property shown in Table 3 is based upon a high-level analysis which took into account topography, steep slopes, and major utility corridor rights-of-way.

A summary of vacant industrial land in any location within the southwest sector is provided in the following table, and classified by current land use designation. Additional details on the Caledonia Business Park, Iron Mask West (Comet and DVO) and Iron Mask North (Domtar) plans are provided in Appendix D.

Table 3 – Vacant Industrial Land in Kamloops Southwest Sector

Current Land Use	Locations	Vacant Developable Land
Zoned for Industrial Use	Mission Flats, Southgate, Versatile and Iron Mask (Bowers Pl. and Caledonia Business Park)	10 hectares
Designated as Future Industrial Development Expansion Area in KAMPLAN	Iron Mask West (Comet and DVO Industries Ltd.)	60 hectares
	Domtar	90 hectares
	Michell	25 hectares
Total		185 hectares

4.0 INTEGRATION OF INDUSTRIAL LAND DEMAND AND SUPPLY IN SOUTHWEST SECTOR

The prior Sections of this report have described both the demand for land in Kamloops southwest sector, as well as the available supply. The key findings from these Sections are summarized in the following table.

Table 4 – Vacant Industrial Land in Kamloops Southwest Sector

Projection Period	SW Sector Industrial Land Demand	Supply of Vacant Developable Land in SW Sector		Absorption of Vacant Developable Land Over Projection Period		Remaining Vacant Developable Land at End of Projection Period	
		Zoned	Designated in KAMPLAN as FIDA*	Zoned	Designated in KAMPLAN As FIDA*	Zoned	Designated in KAMPLAN as FIDA*
Years 1 to 10	16 ha	10 ha	175 ha	10 ha	6 ha	0 ha	169 ha
Years 11 to 25	27 ha	0 ha	169 ha	0 ha	27 ha	0 ha	142 ha

* **FIDA – Future Industrial Development Area**

The values shown in Table 4 point to the following conclusions:

- There is insufficient vacant zoned land to accommodate new industrial development in Kamloops southwest sector over the next 10 and 25 year periods
- Over the next 10 years, it is estimated that Kamloops southwest sector will require an additional 6 hectares of zoned industrial land for development
- Over the next 25 years, it is forecast that Kamloops southwest sector will require a further 27 hectares of zoned industrial land, bringing the 25 year total to 33 hectares
- At the conclusion of the 25 year period, there will remain a large area of future industrial development area (142 hectares) which has potential for industrial expansion, and is designated for this in KAMPLAN.

With respect to location, it is apparent that these forecast demands over the next 10 and 25 year periods can all be accommodated south of Highway #1 in the Iron Mask West area.

5.0 MAJOR INFRASTRUCTURE SERVICE REQUIREMENTS

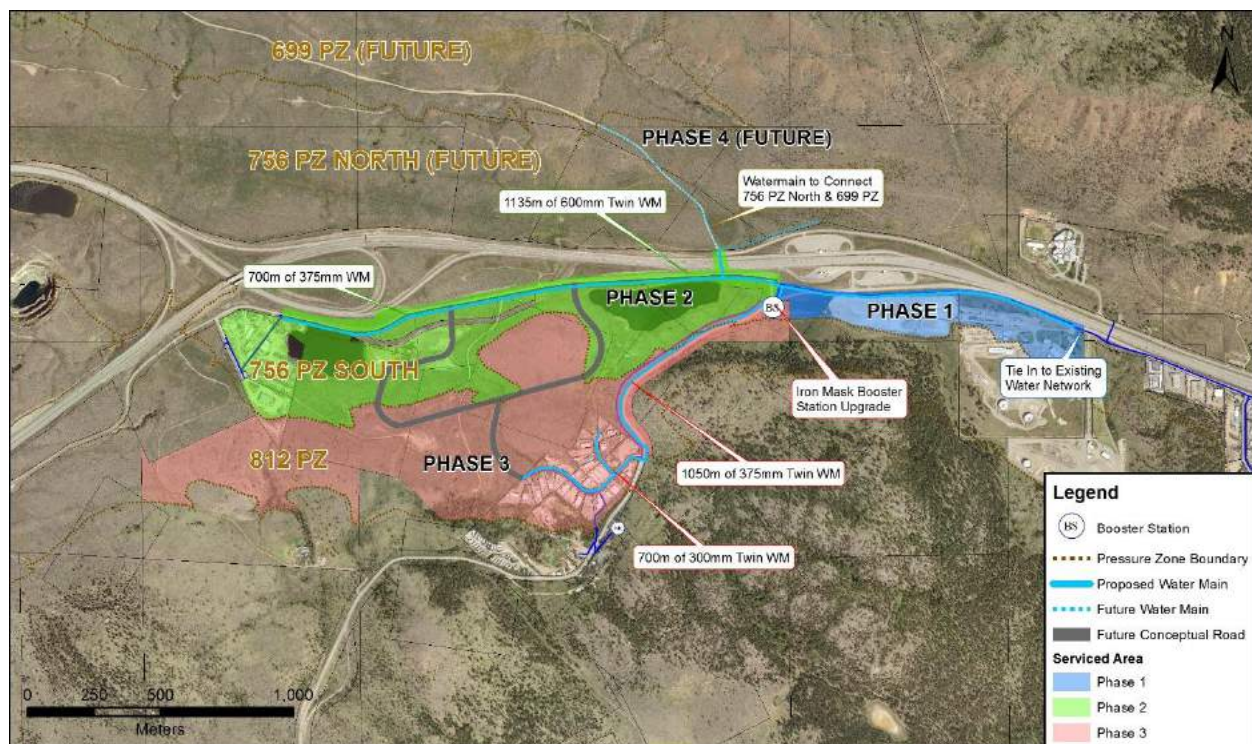
5.1 Introduction

The expansion of existing industrial development in the Iron Mask West area will require enhancement of existing major water, sanitary sewer and transportation infrastructure services currently available to the area. In addition, smaller-scale water distribution lines, sanitary sewer collection networks and local roads will be required within individual subdivisions and development sites. The following discussion deals only with major infrastructure works. Appendices E and F provide further details to supplement the summary discussions presented below.

5.2 Water Supply

The water supply system which services Iron Mask West requires upgrading to allow further industrial development. Alternatives to system upgrade, including sprinklering of industrial buildings, were explored and discussed with development interests. It was determined that system expansion to accommodate everyday demands (average and peak flows) as well as fire flows was the preferred approach. The system can be upgraded in a number of phases. These are shown in Figure 7, along with the approximate additional service areas for each phase.

Figure 7: Proposed Water System Upgrading

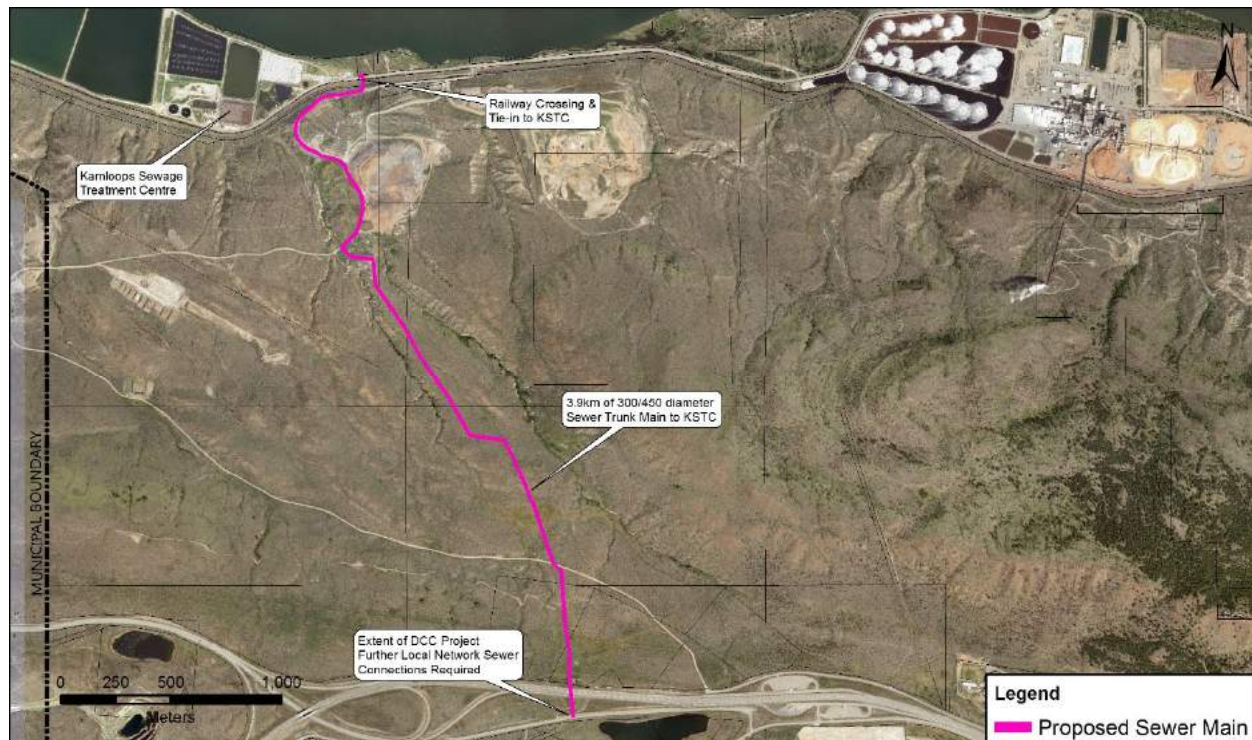


Given the projection of 6 hectares of new industrial land demand for Iron Mask West over the next 10 years, and 33 hectares total over the next 25 years, not all of the phases will require completion. Phases 1 and 2 will together service in excess of 50 hectares of industrial land, more than sufficient to accommodate forecast demands over the next 25 years. The capital cost of Phases 1 and 2 are estimated at \$5.31 million.

5.3 Sanitary Sewer

Community sanitary sewer services will be required to accommodate the type and scale of development contemplated for the Iron Mask West area. Following review of alternative means of providing these services, it was determined that the preferred approach would be a new sanitary trunk alignment which directly connected the Iron Mask West area to the Kamloops Sewage Treatment Centre on Mission Flats Road, as shown on Figure 8.

Figure 8: Proposed Sanitary Sewer System Trunk Main



The cost of this new trunk main is \$3.35 million. Once constructed, it will have the capacity to serve future development which may occur in both the Iron Mask West and Iron Mask North Future Industrial Development Areas.

5.4 Transportation

The primary transportation network which services the Iron Mask West area comprises Lac Le Jeune and Sugarloaf Roads, as well as highway access via the Copperhead Interchange. An analysis was conducted to determine network improvements which may be required over the 10 and 25 year time horizons in order to accommodate additional traffic generated from development in this area. This analysis accounted for the following:

- Infill on 6 hectares of currently vacant industrial land on Lac Le Jeune Road and Versatile Drive
- 6 hectares of newly-developed industrial land in Iron Mask West over the next 10 years
- An additional 27 hectares of newly-developed industrial land in Iron Mask West over the 11 to 25 year period
- Background traffic growth.

This analysis revealed that no improvements to the transportation network would be required over the 10 year period, that only slightly degraded performance to some traffic movements would be experienced, and that acceptable levels of service (LOS) would be maintained. For the 25 year time horizon, the analysis of the Copperhead Drive corridor suggests degrading performance. Those traffic movements which show signs of performance challenges could be avoided by implementing minor improvements, notably intersection traffic controls at the Copperhead intersections with Versatile Drive and Hillside Drive.

6.0 COST RECOVERY FOR MAJOR INFRASTRUCTURE SERVICE IMPROVEMENTS

6.1 Introduction

The City of Kamloops adheres to a number of principles when considering cost recovery programs for major infrastructure improvements. These principles include:

- **Benefitter Pays** – those who receive the benefits of infrastructure should be required to pay for them
- **Fairness and Equity** – the costs of infrastructure should be distributed fairly and equitably, based upon the extent of benefit received
- **Limitation of Risk to City** – the City wishes to limit risk faced by property tax and utility ratepayers by ensuring that any public funds expended to build new infrastructure are available when required, and/or recouped fully and as quickly as possible.

These principles can be translated into more specific comments for development of the Iron Mask West Future Industrial Development Area. Developers of industrial property and the businesses located here will certainly benefit from major new infrastructure. So too will the City as a whole, due to job creation and other economic and fiscal spin-offs from industrial development. Infrastructure costs can be fairly and equitably shared through use of mechanisms such as per area (based on parcel size, building area or other metric) charges which are surrogates for water consumption, sewage flow and vehicle trip generation. With respect to limitation of risks to the City, this could be assured through having the developer(s) fund the construction of the infrastructure. If this is not practical the City may wish to fund the construction, and use a combination of previously amassed funds and those collected after the infrastructure is built to cover the costs. Three options for recovering costs are discussed further below.

6.2 Latecomer Charges for Excess or Extended Services

Local governments in B.C. can require that the owner of lands being subdivided or developed construct major water, sewer, transportation and/or drainage infrastructure which is beyond their needs. These could include, for example, a bigger water distribution main or longer collector road than is required specifically for their subdivision or development. Where this is the case, that original owner is entitled to compensation from later developers who benefit from the excess or extended services constructed by the original developer. This compensation is known as a 'latecomer charge' which is collected by the local government and forwarded to the original developer. Any later development occurring 15 years or more after the original developer installed the excess or extended services is not required to pay the latecomer charge.

This approach may have applicability for providing major water, sanitary sewer and transportation network facilities to future development in the Iron Mask area. Factors to be considered in this context are set out below.

- Water system improvements are proposed to be separated into four (4) phases, with the initial 2 phases proceeding initially. The work done under Phases 1 and 2 would be of benefit to lands served beyond Phases 1 and 2 (i.e. lands serviced once Phases 3 and 4 were completed). This phasing approach would require 2 or more latecomer agreements over the long term, and may present challenges with respect to accurately defining and charging all beneficiaries of the various latecomer agreement phases. This potential layering of latecomer charges may become quite complex.
- The entire sanitary sewer trunk project must be completed at one time, and is required to serve new industrial development in the Iron Mask area from its onset.
- The time lines for substantial new industrial development in the Iron Mask West and North Future Industrial Development Areas are very long, with only 6 hectares being forecast for absorption over the next 10 year period, and 33 hectares over 25 years. This also means that limited new industrial development (~10 hectares) will occur within the 15 year timeframe within which latecomer charges could be collected for the entire cost of the sanitary sewer trunk main project, and the initial phases of the water system improvement projects. This would have significant negative financial implications for the original developer who was required to advance the costs to construct the excess and extended services, as most of the subsequent benefitting development would take place beyond 15 years.

6.3 Development Works Agreement

The *Local Government Act* provides for municipalities to enter into a 'Development Works Agreement' with a developer for the provision of major water, sewer, transportation and other infrastructure. The legislation intends that the initial developer fund the works as a condition of approval, and that subsequent property owners within the area benefitting from the infrastructure repay these costs (with interest) as a condition of their future approvals. The approach to establishing the benefitting area is similar to that for a local area service under the *Local Government Act* and *Community Charter*, wherein it can be established via petition from property owners, or Council initiative. There is no time limit for the collection of charges from those subsequent property owners who follow the initial developer, in contrast to the 15 year time limit for latecomer charges.

This option has potential applicability to the recovery of major infrastructure costs for the Iron Mask industrial area. Some considerations in this regard are noted below.

- This approach would capture all industrial development benefitting from the proposed water and sanitary sewer system improvements. If the boundaries of the benefitting areas were drawn to include all of the Iron Mask West and North Future Industrial Development Areas, then later stages of development beyond those forecast over the next 10 to 25 years could assist in defraying costs.
- With respect to the benefitting areas noted in the above point, some may not seek to develop their lands for many years (and may not be able to due to their location within the Agricultural Land Reserve). They are therefore not likely to participate in a petition to advance the utility system improvements, or support a Council initiative.

- Water system improvements are proposed to be separated into four (4) phases, which would necessitate a future additional Development Works Agreement to capture works and their costs beyond Phases 1 and 2, which are proposed in the near-term. In addition, there may be long-term and substantial transportation network improvements which would have to be embedded in a future Development Works Agreement. This potential layering of Agreements may become quite complex.
- The time lines for substantial new industrial development in the Iron Mask West and North Future Industrial Development Areas are very long, with only 6 hectares of an estimated total potential 33 hectares being forecast for absorption over the next 10 year period (the remaining 27 hectares are projected to be needed between years 11 and 25). This means that Phases 3 and 4 of the water system upgrade may be many years away.
- The need to complete the entire new trunk sewer project at one time does pose a challenge with respect to equitable cost distribution. There may be potential beneficiaries (such as those in Iron Mask North Future Industrial Development Area) who could connect to the sewer trunk at some point in the future. The use of a Development Works Agreement could be used to gather funding from them at the time of development approval. However, two preconditions would need to be met. First, this form of Agreement would need to be advanced as the preferred method of cost recovery. Second, and as noted in the second point above, a sufficient number of beneficiaries would need to either petition for, or agree to, this initiative.

6.4 Development Cost Charge (DCC) Bylaw

The *Local Government Act* provides for development cost charges (DCCs) to be levied on new development which imposes a cost burden on local governments who fund growth-related water, sewer and other major infrastructure. DCCs are a one-time charge payable at the time of building permit approval, and are structured to reflect different levels of impact on servicing arising from different types and densities of development. The City of Kamloops has a well-established DCC program. Different types of infrastructure are bundled into service categories for water, sewer, transportation, storm drainage and parks. Individual projects are added to a service category in advance of the time when they are required, and remain in that service category until sufficient monies have been collected to fund them in their entirety. In this way DCCs provide revenue in advance of individual projects being required, as well as ongoing revenues as necessary after the project is constructed. The bundling approach also provides flexibility with respect to the timing of individual projects, as they are contained within a broader service category.

There are two geographic scales of reference for the City's DCC program – sector-specific, and City-wide. From the 1980s through the early 1990s, several sector-specific DCC Bylaws were developed in recognition of major growth-related infrastructure which benefitted a number of development projects being added to City neighbourhoods and sectors. These sector-specific DCCs were layered on top of a City-wide DCC program. Two of these sector-specific DCC levies remain for the Westside and Southeast Sector sanitary sewer projects. The remainder were eventually merged into the City-wide DCC program. An advantage of sector-specific DCCs is that only those development projects which benefit from the installation of growth-

related infrastructure within an area are required to contribute toward the costs of that infrastructure. This respects the principles of fairness and equity. There are, however, a number of challenges with sector-specific DCC programs. Difficulty in projecting the pace of development within a sector, and therefore timing of cost recovery through DCCs, is one such challenge. An example of this is the fact that the costs for the Westsyde and Southeast Sector sanitary sewer projects have not been fully recovered in a time period spanning over 25 years. Administrative efficiency is another potential challenge, particularly if a local government has multiple layers of sector-specific DCC levies overlying a City-wide DCC levy.

The second geographic scale of reference for the City's DCC program is City-wide. Major growth-related infrastructure projects which serve the needs of new development regardless of its location within City boundaries are embedded within this City-wide program. These City-wide benefit projects comprise the bulk of the DCC program. In addition, some projects (principally water and sanitary sewer) which benefit specific areas of the City have been included in the City-wide program as the City trended away from sector-specific DCCs in the 1990s. The distribution of these projects which benefit specific areas of the City has been relatively balanced among different geographic sectors.

Either of the DCC program approaches described above has potential for application to major infrastructure requirements for the Iron Mask area. Some general considerations in this regard are noted below.

- The City uses a revolving 10 year time frame for its DCC program. Required projects that would fit within this time frame include Phases 1 and 2 of water system improvements (\$5.3 million), as well as the sanitary trunk line (\$3.4 million). No transportation improvements are anticipated within this time frame.
- There is anticipated to be 12 hectares of industrial development in the Iron Mask West area over the next 10 years. This would equate to the construction of approximately 30,000 square metres of industrial building space. This represents the majority of the 50,000 square metres of industrial building space projected in the City's most recent (2017) DCC Bylaw update, which is reasonable given the preference for the southwest sector as described by those brokers most familiar with Kamloops industrial land situation (see Section 2 for a more thorough description).

Inclusion of the water system improvements and the sanitary trunk line within the City-wide DCC program is felt to be the preferred approach in comparison to establishing a sector-specific DCC. The following points provide the rationale for this recommendation.

- The water supply upgrades and sanitary sewer trunk main would represent projects focussed in one sector of the City – the southwest. Traditionally, and as noted above, the bulk of the City's DCC-funded infrastructure projects would bring benefits to new development regardless of its location within the City, while the remainder would bolster services (primarily water and sewer) in the City's geographically-specific sectors. This distribution would not be anticipated to change markedly in the next DCC Bylaw update if this \$8.7 million in water and sanitary sewer projects were added in the southwest sector. On a related note in terms of growth distribution, the southwest sector is targeted for 43% of future residential growth in KAMPLAN.

- Inclusion of the water and sanitary sewer infrastructure projects in the City-wide DCC program would provide for more predictable and timely cost recovery, and reduce administrative complexity.
- Industrial development brings benefits to the whole City in terms of employment generation and other fiscal and economic benefits.

6.5 Proposed Cost Recovery Approach for Major Infrastructure Improvements

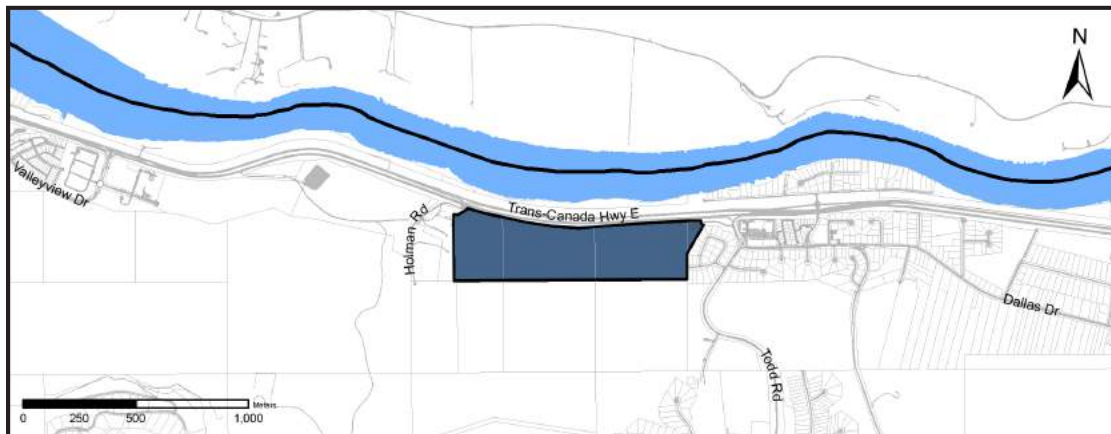
Taking all of the above into consideration, it is proposed that Phases 1 and 2 of the Iron Mask water supply upgrades (\$5.3 million), and the sanitary sewer trunk main (\$3.4 million) be considered for inclusion in the City-wide DCC program when the Bylaw is next updated.



Appendix A

Future Industrial Development Areas – Excerpt from KAMPLAN

Figure C9: Pineridge Golf Course FDA Map



FUTURE INDUSTRIAL DEVELOPMENT AREAS

The City's Industrial Land Review 2010-2015 (2011) determined that, while the city contains vacant industrial land, the existing inventory is fragmented and some of it is not considered to be prime land for industrial development due to location, lack of access to a highway, topographical constraints, tenure issues, and other factors such as inadequate servicing and power supply.

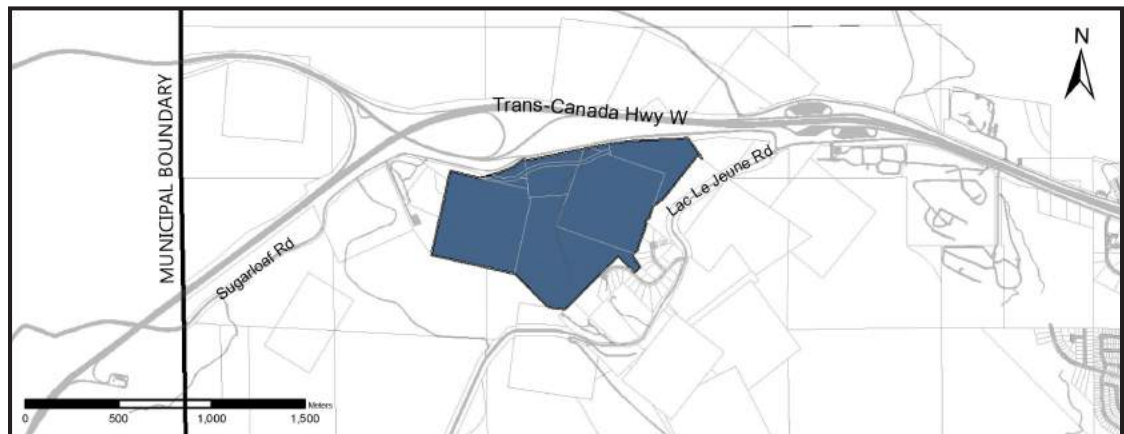
Future Industrial Development Areas (FIDAs) facilitate future industrial growth in the city by reserving lands in various locations that are suitable for development. As these areas are not yet zoned for industrial development, rezonings, OCP amendments, and comprehensive development reviews are required prior to development approvals. These areas will be evaluated individually on the basis of consistency with the policies contained in the OCP. A range of light, medium, and heavy industrial uses may be considered, subject to evaluation.

Where these areas are located within an entrance corridor to the city, careful consideration on the potential impact to visual quality, as well as factors such as noise, dust, and traffic, must be considered. Specific DPA Guidelines may be established to control the form and character of development. The following are identified as FIDAs:

Iron Mask West Expansion Area

The Iron Mask West Expansion Area is located adjacent to the Bowers Place Industrial Area, the existing Iron Mask West Industrial Area, Lac Le Jeune Road, and the Trans Canada Highway, with highway access via Sugarloaf Road and the Trans Canada Highway Frontage Road. Development of this area will need to address environmental constraints, including the presence of two small salt ponds, topographic constraints, and subsurface mineral rights registered against title. The need for improved access to the Trans Canada Highway will require coordination with the Province.

Figure C10: Iron Mask West Expansion Area FIDA Map

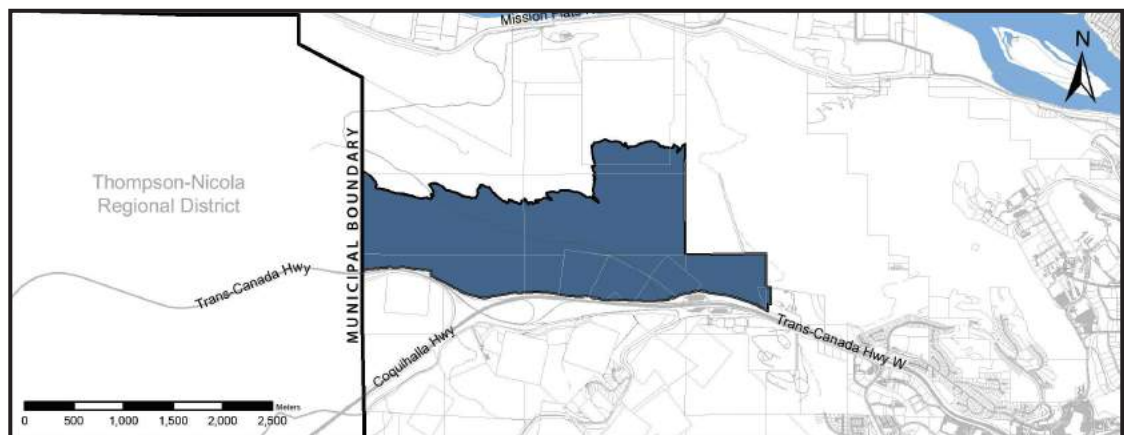


Iron Mask North Expansion Area

Note: The use of ALR land is subject to the Agricultural Land Commission Act (ALCA) and Regulation and any provincial Orders of the ALC. The ALC has not endorsed the re-designation of ALR lands for industrial purposes within Iron Mask North Expansion Area Future Industrial Development Area nor does the establishment of this area within the OCP denote ALC support for the non-agricultural use of these lands. The non-agricultural designation of ALR land without endorsement of the ALC is considered to be inconsistent with the ALCA and Regulation and is, to the extent of the inconsistency, of no force or effect as per s. 46(4) of the ALCA.

The Iron Mask North Expansion Area, located north of the Iron Mask West Expansion Area and south of the City's solid waste landfill and sewage treatment plant along Mission Flats Road, comprises an extensive area abutting the City's westernmost boundary. It is composed of Crown land, privately-held parcels, and land within the ALR. Development of this area must address a number of constraints, including *environmentally sensitive areas*, steep slopes, a lack of City utility services, and an ALR exclusion from the ALC. A rail line to the north and the Trans Canada Highway to the south could facilitate access to transportation corridors; however, improved access will require coordination with the applicable rail company and the Province.

Figure C11: Iron Mask North Expansion Area FIDA Map





Appendix B

Industrial Land Needs Assessment – Urban Systems, May 2018

MEMORANDUM

Date: May 30, 2018
To: John Dumbrell
From: Justin Barer and J.P. Raulot-Lapointe
File: 0368.0594.01
Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy

1. Introduction

In support of the broader Industrial Land Strategy for Kamloops' southwest sector, Urban Systems has prepared an assessment of the industrial market demand in the City over the next 25 years. This lands strategy is part of the City's assessment of the need and scope of off-site infrastructure investment to prepare these lands for industrial development.

The forecasts of market demand have been prepared using the following approaches:

- Employment forecasts for sectors that are the most prominent users of industrial land, and conversion of employment projections to industrial land need using both employment density ratios and a range of land coverage scenarios
- Trend-based forecast of industrial land need, using historic industrial building data and site coverage data from 2008 to 2017
- Interviews with prominent industrial brokers in Kamloops, along with staff from Venture Kamloops.

This demand assessment is the second phase of the industrial land market assessment for Kamloops. Phase 1 consisted of a comprehensive analysis of industrial land supply across the City. That analysis found approximately 68 hectares (168 acres) of relatively unconstrained vacant industrial land City-wide. However, of that availability, 40% is in the Southeast sector which is considered by many businesses to be too far from the City centre. A further 45% is in the Northwest, in areas too far removed from major highway infrastructure. This leaves approximately 15% (10 hectares) in the Southwest.

The demand analysis is intended to be paired with the assessment of land availability to paint an overall picture of industrial supply and demand, setting the stage for bringing additional land supply to market.

Date: May 30, 2018
File: 0368.0594.01
Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
Page: 2 of 11

2. Industrial Land Needs Approach

Three approaches have been taken to examine the future industrial land needs in Kamloops:

- The first takes an employment-by-sector growth approach (focusing on sectors that use industrial land), and converts future employment growth to industrial land utilization
- The second takes an extrapolative approach based on the City of Kamloops' historic averages of industrial building construction
- The third is a supplementary approach to the above two, involving interviews with prominent industrial brokers, and staff from Venture Kamloops.

3. Employment History by Sector – 2006 to 2016

As of 2016 there were 34,920 people working in the City of Kamloops at a usual place of work, not at home. Of those, 30,985 or 88.7% also live in Kamloops. By comparison, 2016 labour force data for Kamloops indicates that there were 36,125 Kamloops residents employed with a usual place of work. This indicates that, in 2016, approximately 5,140 people with a usual workplace who live in Kamloops commute to work outside of Kamloops, while 3,950 people living outside of Kamloops commute in to Kamloops for work. Nearly 86% of the Kamloops labour force with a usual place of work are employed within the City.

Table 1 below presents the employment picture, by industry sector (categorized at the 2-digit NAICS level), for the City of Kamloops in both 2006 and 2016.¹ Note that the figures presented *do not* include those working from home or those working with no usual workplace. This data filtering is more significant for those sectors where most people do not have usual workplaces (e.g. construction, agriculture, fishing).

Overall, Kamloops saw a net gain of 1,405 usual workplace jobs over a 10-year period. The sectors with the most significant usual workplace job gains were:

- Health care and social assistance (+1,590)
- Public administration (+560)
- Professional, scientific and technical services (+460)
- Accommodation & food services (+255).

The sectors that saw the most significant loss of usual workplace jobs were:

- Administrative & support, waste management & remediation services (-855)
- Manufacturing (-680)
- Wholesale trade (-395)
- Retail trade (-55).

¹ NAICS = North American Industry Classification System

MEMORANDUM

Date: May 30, 2018
 File: 0368.0594.01
 Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
 Page: 3 of 11



Table 1: Usual Workplace Employment Change in City of Kamloops, by Industry Sector (NAICS): 2006 to 2016

Employment in City of Kamloops at Usual Place of Work, by Sector					
Industry Sector	2006	2016	Change (06-16)	% of Emp. 2006	% of Emp. 2016
11 Agriculture, forestry, fishing and hunting	335	285	-50	1.0%	0.8%
21 Mining and oil and gas extraction	100	130	30	0.3%	0.4%
22 Utilities	145	140	-5	0.4%	0.4%
23 Construction	1,200	1,200	0	3.6%	3.4%
31-33 Manufacturing	2,330	1,650	-680	7.0%	4.7%
41 Wholesale trade	1,285	890	-395	3.8%	2.5%
44-45 Retail trade	5,435	5,380	-55	16.2%	15.4%
48-49 Transportation and warehousing	1,360	1,385	25	4.1%	4.0%
51 Information and cultural industries	535	530	-5	1.6%	1.5%
52 Finance and insurance	1,065	1,180	115	3.2%	3.4%
53 Real estate and rental and leasing	590	560	-30	1.8%	1.6%
54 Professional, scientific and technical services	1,630	2,090	460	4.9%	6.0%
55 Management of companies and enterprises	35	20	-15	0.1%	0.1%
56 Administrative and support, waste management and remediation services	1,695	840	-855	5.1%	2.4%
61 Educational services	2,540	2,820	280	7.6%	8.1%
62 Health care and social assistance	4,705	6,295	1,590	14.0%	18.0%
71 Arts, entertainment and recreation	1,040	1,015	-25	3.1%	2.9%
72 Accommodation and food services	3,790	4,045	255	11.3%	11.6%
81 Other services (except public administration)	1,645	1,850	205	4.9%	5.3%
91 Public administration	2,055	2,615	560	6.1%	7.5%
Grand Total	33,515	34,920	1,405		

MEMORANDUM

Date: May 30, 2018
 File: 0368.0594.01
 Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
 Page: 4 of 11



As the focus of this analysis is the future of industrial land needs in the City of Kamloops, the balance of this analysis focuses exclusively on those sectors that typically use industrial land. Where necessary, sectors have been further sub-categorized into their component sub-sectors (i.e. 3 and 4-digit NAICS codes).

The sectors that are the subject of forecasting work to follow are presented in Table 2 below:

Table 2: Employment at Usual Place of Work in Kamloops for sectors using Industrial Land

Employment at Usual Place of Work in Kamloops - sectors on industrial land			
Industry Sector	2006	2016	Change
31-33 Manufacturing	2,330	1,650	-680
41 Wholesale trade	1,285	890	-395
48-49 Transportation and warehousing	1,360	1,385	25
811 Repair and maintenance	565	670	105
8111 Automotive repair and maintenance	375	445	70
8112 Electronic and precision equipment repair and maintenance	40	55	15
8113 Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	70	105	35
8114 Personal and household goods repair and maintenance	80	70	-10
Total	5,540	4,595	-945
Total as % of All Usual Place Employment	17%	13%	

The employment sectors operating on industrial lands saw a net usual workplace job loss of 945 between 2006 and 2016. This includes nearly 700 lost jobs in the Manufacturing sector, nearly 400 jobs lost in Wholesale Trade, and 25 jobs lost in Transportation and Warehousing. There were modest gains within the Repair & Maintenance sector (+105).

4. Employment Forecast – 2016 to 2041

4.1 Approach

As noted above, the 2006 to 2016 period saw significant declines in the number of usual place jobs in two key sectors that operate on industrial land: Manufacturing and Wholesale Trade. However, that time period

MEMORANDUM

Date: May 30, 2018
File: 0368.0594.01
Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
Page: 5 of 11



also encompassed the 2008-2009 recession and post-recession recovery. Provincial GDP declined by 2.4% in 2009 (after tepid sub-1% growth in 2008), and only returned to pre-recession levels in late 2010. Therefore, while the loss in these sectors is significant, the 10-year gap between data sets likely masks some post-recession recovery, particularly since 2011/12.

In the Kamloops context, there is reason for optimism on the longer-term growth prospects for the Manufacturing and Wholesale Trade sectors:

- Manufacturing:
 - The City is home to a sizeable base of small and large manufacturing companies, and Venture Kamloops reports a strong business climate and growth in the last 3 to 5 years
 - Most manufacturers, particularly those serving the forestry, mining and health sectors have been expanding and are looking to continue to expand their operations
 - Steel and wood fabrication has been a solid growth sub-sector, and is likely to increase in importance in the coming years
 - Approximately 75% of Kamloops' manufacturing companies export to international markets, many of which are growing rapidly.
- Wholesale Trade:
 - Many sub-sectors within the wholesale trade area are closely tied to business investment and growth in manufacturing, construction, logistics and warehousing. Growth in any of these other sectors would lead to growth in wholesale trade jobs
 - Service Canada has projected wholesale trade sector employment growth of 3.4% in Southern Interior B.C. (including Thompson – Okanagan & Kootenay Region) in the next 3 years, equal to the growth expected in the Lower Mainland
 - The top 4 sub-sectors for wholesale trade in BC are: building materials & supplies, food & beverage; machinery, equipment and supplies; and motor vehicles and parts.

Given this relative optimism for both manufacturing and wholesale trade, we have taken the following approach to growth forecasts for these sectors:

- Manufacturing: assume modest gain as a proportion of overall employment, from 4.7% in 2016 to 5% by 2041
- Wholesale trade: assume modest gain as a proportion of overall employment, from 2.5% in 2016 to 3% by 2041.

Transportation and logistics experienced modest growth in the 2006-2016 period. For the purposes of this forecast, its proportion of overall employment is held constant at 4.0%.

The Repair and Maintenance sub-sector is primarily local population-serving. It accounted for 1.7% of the overall usual place employment in 2006 and 1.9% in 2016. Growth projections for this sub-sector are produced based on projected population growth.

MEMORANDUM

Date: May 30, 2018
File: 0368.0594.01
Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
Page: 6 of 11

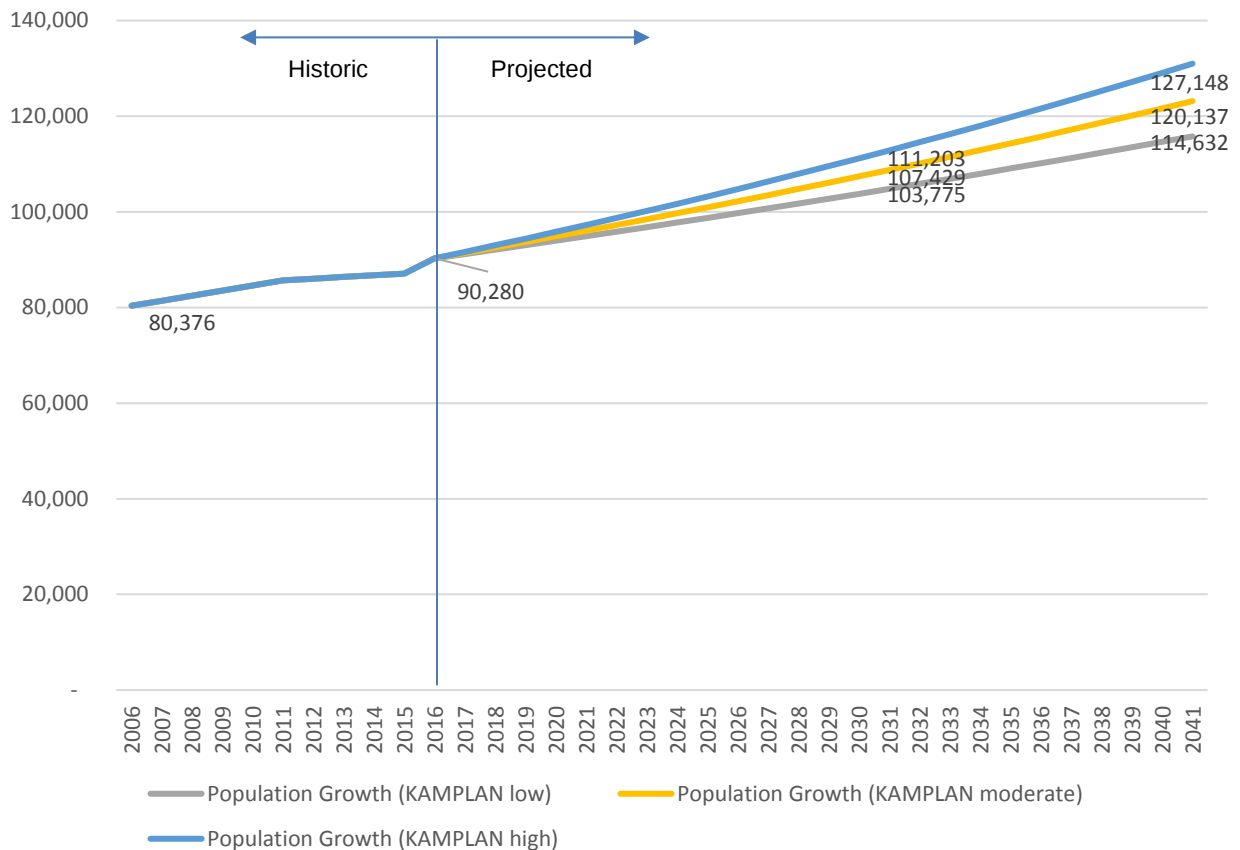


4.2 Forecasts

4.2.1 Population Forecasts

Four population growth scenarios for the City of Kamloops are presented in Figure 1 below. Each begins from a base population of 90,280 in 2016 (as per Statistics Canada), and grows at the rates utilized in KAMPLAN – the City’s Official Community Plan.

Figure 1: City of Kamloops Population Growth, Historic and Projected²



² Employment refers to those employed at businesses in the City of Kamloops with a usual place of work. It does not include those working from home, or those working with no fixed workplace. It considers the total number of people working in Kamloops, regardless of where they live.

Date: May 30, 2018
 File: 0368.0594.01
 Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
 Page: 7 of 11

4.2.2 Employment Forecasts for Sectors on Industrial Land

1. Manufacturing

- Projected based on proportion of total employment increasing from 4.73% in 2016 to 5% by 2041
- Projected to grow from 1,650 usual place of work employees in 2016 to 1,862 by 2031 and 2,005 by 2041. This is below the 2,330 employees in sectors on industrial land recorded in 2006

2. Wholesale Trade

- Projected based on proportion of total employment increasing from 2.55% in 2016 to 3.0% by 2041
- Projected to grow from 890 usual place of work employees in 2016 to 1,071 by 2031 and 1,203 by 2041. This compares to 1,285 in 2006.

3. Transportation and Warehousing

- Projected based on maintaining its share of total employment at 4%
- Projected to grow from 1,385 usual place of work employees in 2016 to 1,511 by 2031 and 1,591 by 2041. This compares to 1,360 in 2006.

4. Repair & Maintenance Services

- Projected based on population growth forecast, using the KAMPLAN moderate growth scenario
- Projected to grow from 675 in 2016 to 740 by 2031 and 779 by 204. This compares to 670 in 2006.

Across all of the above sectors, the net job growth over 25 years (2016 to 2041) is projected to be +979.

Table 3: Employment Projections for sectors on industrial land

Employment at Usual Place of Work Projections - Select Sectors - 2016 to 2041				
Industry	2016	2031	2041	25-Year Growth
31-33 Manufacturing	1,650	1,862	2,005	355
41 Wholesale trade	890	1,071	1,203	313
48-49 Transportation and warehousing	1,385	1,511	1,591	206
811 Repair and maintenance	675	740	779	104
Total	4,600	5,184	5,579	979

MEMORANDUM

Date: May 30, 2018
 File: 0368.0594.01
 Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
 Page: 8 of 11

4.3 Implied Industrial Land Needs

Employment growth is converted to industrial land requirements in two steps:

- First, converting number of employees to gross floor area (GFA) through employment density ratios (by industry);
- Second, converting GFA to land area by applying average site coverage metrics

Employment densities by industry have been derived by averaging data sets compiled for other jurisdictions in BC's lower mainland. Site coverage has been calculated using a range, from a low of 22% to a high of 30%.

The implied industrial land needs are as follows:

Table 4: Industrial Land Needs, City of Kamloops, 25-Years

Industrial Land Needs						
Sectors	Net New Employees, 2016-2041	GFA (sq.ft.) per Employee	Implied Land Demand (Acres)		Implied Land Demand (Hectares)	
			22% site coverage	30% site coverage	22% site coverage	30% site coverage
31-33 Manufacturing	355	929	34.5	25.3	13.9	10.2
41 Wholesale trade	313	2,100	68.6	50.3	27.8	20.4
48-49 Transportation and warehousing	206	1,500	32.2	23.6	13.0	9.6
811 Repair and maintenance	104	1,139	12.4	9.1	5.0	3.7
Total	979		147.7	108.3	59.8	43.8

Over a 25-year period, the above forecast suggests a need for approximately 44 to 60 hectares (108 to 148 acres) of industrial land in the City of Kamloops.

This forecast should be considered as an assessment of what is possible in Kamloops, under a reasonable, relatively conservative set of employment growth assumptions, under conditions of both (1) sustained, modest economic growth and (2) the ability for industries that see opportunity in Kamloops to locate suitable land parcels that meet their requirements. The interviews conducted with industrial brokers as part of this research suggest that, currently, the latter condition is not being met.

5. Trend-Based Industrial Land Demand

A high-level trend-based industrial land projection was also prepared for the City of Kamloops through an extrapolation of key metrics over the 2008 to 2017 period. Over this eight-year period, Kamloops observed:

- Average annual industrial building construction of 4,000 square metres (43,055 square feet)
- Average site coverage by industrial buildings of 22%

Date: May 30, 2018
File: 0368.0594.01
Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
Page: 9 of 11

Extrapolating the above over the next 10, 20 and 25 years, the demand for industrial land would be:

- 18.2 hectares (44.9 acres) over 10 years
- 36.4 hectares (89.9 acres) over 20 years
- 45.5 hectares (112.3 acres) over 25 years.

6. Broker & Economic Development Interviews

Multiple telephone interviews were conducted with three notable industrial brokers in the Kamloops area in late 2017 and early 2018. This was supplemented by an in-person discussion with the staff of Venture Kamloops.

The goal of these interviews was to develop a more nuanced understanding of potential demand for industrial land, the extent of existing industrial land constraints, the competitive context within which Kamloops operates, and the opportunities for future growth. Key findings from these interviews are summarized in the sub-sections below.

6.1 Sector Demand and Land Needs

- All interviewees feel that Kamloops requires a new industrial park, or significant expansion of existing parks in a highway-accessible, visible area, within relative proximity of the City centre
- Businesses want to locate on the west side of the city, closer to the City centre; most have less interest in industrial parks located in the southeast sector of the city. This has slowed absorption of lands in the southeast sector
- There is a need for more serviced industrial lands, ideally serviced in phases
- Airport lands are not a desirable location due to the distance from the City core and the lack of highway access, along with the need for truck traffic to move through residential areas
- It was estimated that if the Southwest Sector were serviced, **80-90% of City-wide industrial demand would be absorbed in this location**
- Sectors that are actively interested in coming to, or expanding in, Kamloops are:
 - Manufacturing, including manufactured homes and food & beverage processors
 - Distribution
 - Construction
 - Light industrial service companies
 - Logging / forestry services.

Date: May 30, 2018
File: 0368.0594.01
Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
Page: 10 of 11

6.2 Parcel Size and Built Space Considerations

- Strongest demand is for serviced parcels of 0.4 to 0.8 hectares (1-2 acres)
- Second most common inquiry is for serviced parcels of 1.2 to 2.0 hectares (3 to 5 acres)
- In terms of building size, most businesses are looking for buildings that are between 280 and 460 square metres (3,000 to 5,000 square feet), with surrounding land for parking and storage. *This is estimated to account for 80% of demand*
- The next level of demand is looking for buildings between 930 and 1,400 square metres (10,000 to 15,000 square feet). This is estimated to account for 15% of demand. There is virtually no supply of this kind in Kamloops
- There has been interest from multiple groups looking for larger tracts of land – 8 to 40 hectares, or 20 to 100 acres – but appropriate sites of this size are not available in an attractive location
- Industrial lands along Mt. Paul Way (on Tk'emlups te Secwepemc land) are considered to have excellent potential for redevelopment and intensification

6.3 Competitive Climate

- Many businesses are reportedly unable to find suitable locations in Kamloops and are instead locating in Kelowna. This is particularly common amongst businesses looking for 4+ hectares (10+ acres)
- Most of the businesses that looked to Kamloops and went to Kelowna are companies that reportedly “could have gone anywhere” as they were tied primarily to export markets. Had Kamloops been able to present an appealing land selection, it is likely those businesses could have been captured locally.

7. Industrial Land Demand Synopsis

Bringing together the trend-based forecast, the employment-based forecast, and the interviews with the brokerage community and Venture Kamloops staff, Urban Systems offers the following findings:

- The employment forecast suggests an industrial land need of 44 to 60 hectares (108 to 148 acres) over a 25-year period
- The trend-based forecast suggests an industrial land need of approximately 45.5 hectares (112 acres) over a 25-year period
- Interviews with brokers and economic development professionals in Kamloops suggest:
 - Strongest demand for well located, accessible industrial land parcels of 0.4 to 0.8 hectares (1 to 2 acres)
 - Second strongest demand for 1.2 to 2.0-hectare parcels (3 to 5 acres)

MEMORANDUM

Date: May 30, 2018
File: 0368.0594.01
Subject: Industrial Land Needs Assessment in Support of SW Industrial Land Strategy
Page: 11 of 11



- Third-strongest demand for 4+ hectare (10+ acre) parcels, with appropriate levels of servicing, accessibility, grading and building/outdoor storage potential
 - Lands in the southwest are much more attractive from a locational standpoint than the southeast or airport lands for many companies given relative proximity to the City centre
 - Many businesses have sought locations in Kamloops and have been unsuccessful in finding appropriate land and/or buildings. Kelowna has been the most popular alternative
- If additional industrial lands can be brought online in the southwest sector of the City, this will help to meet both the long-term demand for industrial lands suggested by both trend and employment-driven analysis, and allow the City to begin capturing some of the businesses that are currently bypassing Kamloops due to lack of available product.
- It was indicated that **80% to 90% of industrial demand in Kamloops would likely go to the southwest as their first choice.**



Appendix C

Vacant Industrial Land Summary by Sector & Location, 2018

ADDRESS	SECTOR	PARCEL AREA (ha)	CONSTRAINT AREA (ha)	NET AREA (ha)
2925 TRANQUILLE RD	NORTHWEST	7.88	0.06	7.82
3035 AIRPORT RD	NORTHWEST	23.15	0.49	22.66
NORTHWEST TOTAL		31.03	0.55	30.48

211 ANDOVER CRES	SOUTHEAST	1.09	0.16	0.93
255 ANDOVER CRES	SOUTHEAST	0.58	0.00	0.58
275 ANDOVER CRES	SOUTHEAST	8.60	0.90	7.70
325 SILVER STREAM RD	SOUTHEAST	4.05	1.24	2.81
328 SILVER STREAM RD	SOUTHEAST	0.89	0.19	0.70
350 SILVER STREAM RD	SOUTHEAST	6.53	2.59	3.93
7900 DALLAS DR	SOUTHEAST	1.31	0.17	1.15
7950 DALLAS DR	SOUTHEAST	2.02	0.31	1.71
8110 DALLAS DR	SOUTHEAST	2.43	0.63	1.80
8209 DALLAS DR	SOUTHEAST	1.73	0.40	1.32
8265 DALLAS DR	SOUTHEAST	5.15	0.52	4.63
SOUTHEAST TOTAL		34.37	7.12	27.25

1050 MISSION FLATS RD	SOUTHWEST	1.45	0.61	0.85
1225 LAC LE JEUNE RD	SOUTHWEST	2.13	1.05	1.08
1391 MISSION FLATS RD	SOUTHWEST	1.04	0.12	0.91
1453 MCGILL RD	SOUTHWEST	0.61	0.13	0.47
1800 MISSION FLATS RD	SOUTHWEST	1.80	0.08	1.72
1802 VERSATILE DR	SOUTHWEST	0.55	0.05	0.50
2505 TRANS-CANADA HWY W	SOUTHWEST	7.95	3.57	4.38
905 MCGILL PL	SOUTHWEST	0.47	0.06	0.41
SOUTHWEST TOTAL		15.99	5.67	10.32



Appendix D

Additional Details on Caledonia Business Park, Iron Mask West and Iron Mask North (Domtar) Lands

Caledonia Business Park Details



2505 TRANS CANADA HIGHWAY W - 19.64 Acres of light industrial land located in the City Limits, Highway frontage right across from the truck weigh scales past Aberdeen. Zoning is I-1S (Industrial Park) approx 16.32 acres of flat building area: this site has had lots of prep work done and is shovel ready for your projects. The site has been named, Caledonia Business Park. (id:405)

Property Details

ID: 138886	Style: Other	Status: Active
Storeys: 0	New Construction: No	Lot Area: 19.64 Acres
County: Canada		

Features

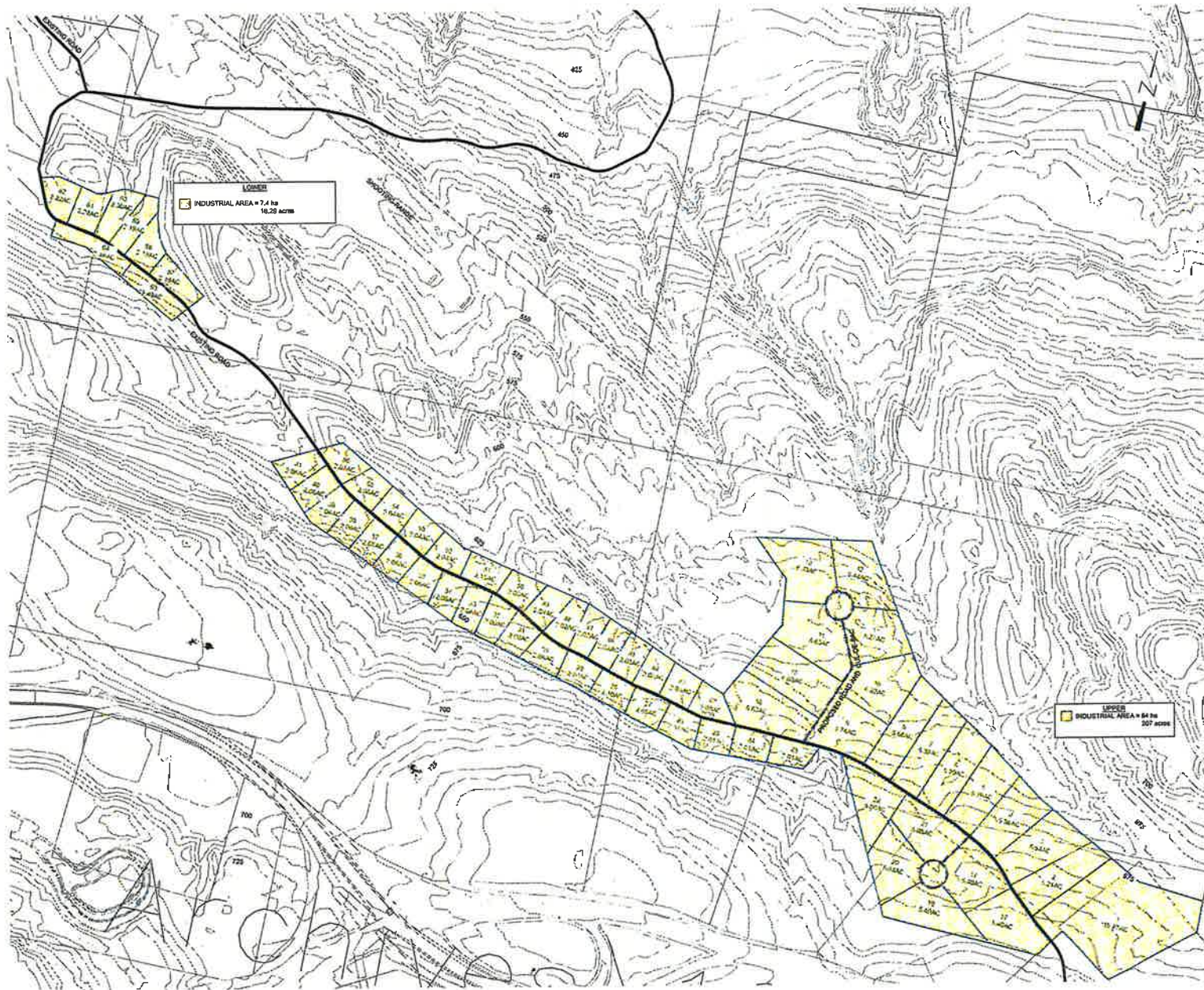
Features	Level lot, Visual exposure
Other	Fireplace Present - False
Transaction Type	For sale

Iron Mask West Development Site

(From City of Kamloops & Concert Properties Ltd. – Southwest Kamloops Industrial Master Plan Final Report, 2013)



Domtar Inc. Lands



OpenSpace Vision

REDUCED 50%
PRELIMINARY

acEagle

No.	Revision/Notes	Date

Drawn by	Checked by
3000	3000
1000	1000
2000	2000
3000	3000

DOMTAR

BASE PLAN

Job Number: 2011-05-02
Date: 2011-05-02
Scale: 1:15,000

Sheet: **101**



Appendix E

*Addendum to Kamloops SW Industrial Lands Corridor Access
Study – Urban Systems, October 2018*

October 9, 2018

File: 0368.0594.01

City of Kamloops
105 Seymour Street
Kamloops, BC
V2C 2C6

Attention: Marvin Kwiatkowski, P.Eng., Development, Engineering and Sustainability Director

RE: Addendum to Kamloops SW Industrial Lands Corridor Access Study

Urban Systems was retained by the City of Kamloops to update the traffic analysis and recommendations for the southwest industrial area based on the Ministry of Transportation (MoTI) and Infrastructure's Corridor Access Study report (July, 2015). The Corridor Access Study report identified and evaluated highway access opportunities within the southwest industrial area of Kamloops, BC based on significant development assumptions for the Iron Mask and Domtar lands. This addendum provides the results of a revised traffic analysis which is based on an updated projection of industrial land development for the Iron Mask and Domtar lands in the City's southwest sector.

Background

The traffic forecasts and analysis completed in Sections 7.0 and 8.0 of the Corridor Access Study report included significant land use assumptions for the Domtar site located north of Highway 1 and the Iron Mask site located south of the Highway 1. The City of Kamloops has updated these assumptions based on revised development needs in the area. Thus, this addendum documents the mobility performance with revised land use assumptions for the Domtar and Iron Mask development areas. Further, the mobility analysis undertaken was focused on understanding how much development can occur without any improvements to the network; and, if acceptable mobility performance (such as level of service) cannot be maintained, what minor improvements (such as traffic signal timing, signage or approach configuration) could be implemented to support the additional development.

Revised Proposed Development Land Use

It was noted by the City of Kamloops – Urban Systems project team that the following revisions could be made to the proposed development land use for the 10- and 25-year planning horizons.

10-Year (2028) Planning Horizon Revisions:

- Omit all development on the Domtar lands north of Highway 1
- Omit all development on the AJAX Mine Project
- Omit heavy industrial development on the Iron Mask lands
- Reduce undeveloped light industrial land from 141 to 30 Gross Acres on the Iron Mask lands

25-Year (2043) Planning Horizon Revisions:

- Omit all development on the Domtar lands north of Highway 1
- Omit all development on the AJAX Mine Project
- Omit heavy industrial development on the Iron Mask lands
- Reduce undeveloped light industrial land from 141 to 96 Gross Acres on the Iron Mask lands

Tables 1 and 2 summarize the detailed revisions to the proposed development for the 10-year and 25-year planning horizons. These areas are used to revise the trip generation calculations discussed in the following section.

Table 1: Revised Proposed Development Land Use - 10 Year Horizon

Proposed Development	Parcel Land Use	Status	Gross Parcel Area (Ha)	Gross Parcel Area (Acres)	Roadway Easement Reduction Factor	Net Parcel Area (Acres)
Iron Mask	Light Industrial	Undeveloped	12	30	30%	21
	Light Industrial	Developed	22.54	55.7	30%	39.0
	Trailer Park	Developed	3.66	9.0	30%	6.3
	Total Undeveloped		12	30		21
	Total Developed		26.2	64.7		45.3

Table 2: Revised Proposed Development Land Use - 25 Year Horizon

Proposed Development	Parcel Land Use	Status	Gross Parcel Area (Ha)	Gross Parcel Area (Acres)	Roadway Easement Reduction Factor	Net Parcel Area (Acres)
Iron Mask	Light Industrial	Undeveloped	39	96	30%	67
	Light Industrial	Developed	22.54	55.7	30%	39.0
	Trailer Park	Developed	3.66	9.0	30%	6.3
	Total Undeveloped		39	96		67
	Total Developed		26.2	64.7		45.3

Trip Generation and Distribution

As the trips generated on the network were based on the area of developed land, reductions in area and changes in proposed land use resulted in a lower number of trips generated on the road network. All trip distribution and assignment assumptions were kept the same as the 2015 Corridor Access Study.

For this analysis update, trips generated from the assumed development intensities were forecast at the 10-year planning horizon (2028) and 25-year horizon (2043). The purpose of running these two horizon-year modelling scenarios was to measure the reduction in network performance as development increases; and therefore, to measure the level of land development that can be achieved before significant improvements to the study network are required to ease congestion.

Intersection Performance for Revised Development Land Use

The following tables show the results of the traffic analysis for the following two scenarios:

- 2028 Horizon Year with Revised Land Use Assumptions
- 2043 Horizon Year with Revised Land Use Assumptions

Table 3: Performance of Intersections at the Copperhead I/C (Synchro): 2028 Horizon Year

Copperhead Interchange		AM PEAK					PM PEAK				
		Vol	v/c	Delay	LOS	95% Queue	Vol	v/c	Delay	LOS	95% Queue
Copperhead Drive & Westbound On/Off-Ramps	WBL	398	0.80	27.7	C	68.1	330	0.72	22.5	C	45.2
	WBR	121	0.23	3.8	A	7.9	104	0.22	4.0	A	7.3
	NBL	258	0.67	20.8	C	50.0	308	0.68	20.2	C	58.9
	NBT	239	0.16	5.9	A	10.8	222	0.14	6.7	A	10.2
	SBT	363	0.28	6.9	A	16.7	280	0.20	6.2	A	12.8
	SBR	48	-	-	-	-	30	-	-	-	-
Copperhead Drive & Eastbound On/Off-Ramps	EBL	16	0.42	16.4	C	16.5	35	0.48	16.9	C	21.3
	EBR	240	0.42	16.4	C	16.5	290	0.48	16.9	C	21.3
	NBT	479	0.15	0.0	A	0.0	503	0.16	0.0	A	0.0
	NBR	323	0.21	0.0	A	0.0	591	0.38	0.0	A	0.0
	SBL	117	0.13	9.2	A	3.5	18	0.02	8.8	A	0.5
	SBT	639	0.20	0.0	A	0.0	591	0.19	0.0	A	0.0
Copperhead Drive & Hillside Drive	EBL	6	0.00	7.4	A	0.1	6	0.00	7.3	A	0.1
	EBT	9	0.02	0.0	A	0.0	41	0.07	0.0	A	0.0
	EBR	25	0.02	0.0	A	0.0	68	0.07	0.0	A	0.0
	WBL	290	0.21	8.0	A	6.2	175	0.13	7.9	A	3.7
	WBT	41	0.03	0.0	A	0.0	9	0.01	0.0	A	0.0
	WBR	5	0.03	0.0	A	0.0	5	0.01	0.0	A	0.0
	NBL	52	0.33	36.2	E	10.9	35	0.11	16.6	C	2.9
	NBT	56	0.31	17.4	C	10.6	60	0.32	13.7	B	10.9
	NBR	223	0.31	11.1	B	10.6	230	0.32	11.1	B	10.9
	SBL	9	0.08	37.9	E	2.2	7	0.04	24.9	C	1.1
	SBT	106	0.43	27.4	D	16.7	60	0.18	15.6	B	5.0
	SBR	6	0.43	27.4	D	16.7	6	0.18	15.6	B	5.0
Copperhead Drive & Versatile Drive – Frontage Road	EBL	144	0.79	45.8	D	36.3	213	0.88	49.7	D	44.4
	EBT	32	0.10	11.0	B	7.6	49	0.30	4.6	A	10.7
	EBR	8	-	-	-	-	128	-	-	-	-
	WBL	97	-	-	-	-	65	-	-	-	-
	WBT	42	0.76	20.4	C	42.8	41	0.80	21.0	C	61.1
	WBR	197	-	-	-	-	336	-	-	-	-
	NBL	160	0.62	22.9	C	39.9	7	0.04	8.1	A	2.1
	NBT	481	0.31	6.3	A	22.2	611	0.48	9.9	A	29.2
	NBR	55	-	-	-	-	19	-	-	-	-
	SBL	123	0.31	9.3	A	16.7	105	0.43	15.2	B	18.2
	SBT	509	0.46	5.0	A	24.7	462	0.56	6.8	A	24.3
	SBR	308	-	-	-	-	334	-	-	-	-

At the 10-year horizon (2028), the analysis of the Copperhead Drive corridor suggests acceptable performance throughout the study network. Isolated turning movements show early signs of marginal delays and queueing issues in the morning peak with the intersection of Copperhead Drive / Hillside Drive having

the most degraded turning movement performance. During this scenario, the study network is able to accept additional traffic from background growth and development.

Table 8.3: Performance of Intersections at the Copperhead I/C (Synchro): 2043 Horizon Year

Copperhead Interchange		AM PEAK					PM PEAK				
		Vol	v/c	Delay	LOS	95% Queue	Vol	v/c	Delay	LOS	95% Queue
Copperhead Drive & Westbound On/Off-Ramps	WBL	645	1.01	60.4	E	162.8	413	0.88	41.3	D	95.0
	WBR	145	0.23	4.7	A	12.1	124	0.24	4.8	A	10.4
	NBL	345	1.04	80.1	F	106.3	401	0.82	27.5	C	92.8
	NBT	335	0.21	10.1	B	21.1	273	0.15	6.3	A	12.5
	SBT	488	0.34	10.7	B	33.4	376	0.22	6.2	A	17.6
	SBR	57	-	-	-	-	38	-	-	-	-
Copperhead Drive & Eastbound On/Off-Ramps	EBL	20	0.70	28.3	D	45.0	42	0.66	23.5	C	40.0
	EBR	380	0.70	28.3	D	45.0	380	0.66	23.5	C	40.0
	NBT	632	0.20	0.0	A	0.0	637	0.20	0.0	A	0.0
	NBR	381	0.24	0.0	A	0.0	907	0.58	0.0	A	0.0
	SBL	143	0.17	9.8	A	4.9	23	0.03	9.1	A	0.7
	SBT	972	0.31	0.0	A	0.0	763	0.24	0.0	A	0.0
Copperhead Drive & Hillside Drive	EBL	7	0.01	7.3	A	0.1	7	0.01	7.3	A	0.1
	EBT	11	0.03	0.0	A	0.0	48	0.09	0.0	A	0.0
	EBR	30	0.03	0.0	A	0.0	86	0.09	0.0	A	0.0
	WBL	377	0.26	8.1	A	8.5	238	0.18	8.1	A	5.3
	WBT	49	0.04	0.0	A	0.0	10	0.01	0.0	A	0.0
	WBR	6	0.04	0.0	A	0.0	10	0.01	0.0	A	0.0
	NBL	73	1.48	>400	F	58.3	42	0.20	24.3	C	5.7
	NBT	78	0.47	24.8	C	20.3	78	0.33	16.6	C	11.7
	NBR	315	0.47	13.6	B	20.3	214	0.33	11.9	B	11.7
	SBL	14	0.29	103.0	F	8.2	6	0.05	32.3	D	1.3
	SBT	150	0.85	77.9	F	50.5	85	0.32	21.6	C	10.6
	SBR	7	0.85	77.9	F	50.5	7	0.32	21.6	C	10.6
Copperhead Drive & Versatile Drive – Frontage Road	EBL	211	0.82	38.5	D	41.5	378	1.04	74.2	E	87.4
	EBT	47	0.10	6.9	A	6.9	135	0.53	9.4	A	9.4
	EBR	12	-	-	-	-	307	-	-	-	-
	WBL	116	-	-	-	-	68	-	-	-	-
	WBT	70	0.80	20.5	C	60.4	57	0.74	16.8	B	88.8
	WBR	270	-	-	-	-	418	-	-	-	-
	NBL	279	1.63	327.5	F	61.7	9	0.07	13.3	B	3.4
	NBT	613	0.47	8.8	A	30.2	806	0.80	22.4	C	67.0
	NBR	68	-	-	-	-	23	-	-	-	-
	SBL	147	0.58	23.6	C	31.9	125	0.91	79.6	E	39.8
	SBT	710	0.77	9.9	A	62.4	607	0.86	19.6	B	70.4
	SBR	573	-	-	-	-	445	-	-	-	-

At the 25-year horizon (2043), the analysis of the Copperhead Drive corridor suggests degrading performance, with a few movements experiencing failing performance levels across the study network in the morning peak and the afternoon peak showing early signs of degraded performance. These failing movements can be avoided by implementing minor improvements.

Suggested Improvement Options

As the corridor approaches capacity, the following minor improvements can be implemented to the study intersections following the 10-year (2028) horizon that will postpone the undesirable movements up to and including the 25-year (2043) horizon.

- NBL Protected + Permissive Phase at Copperhead Drive and Versatile Drive
- EBL Protected + Permissive Phase at Copperhead Drive and Versatile Drive
- 4-Way Stop Control at Copperhead Drive and Hillside Drive
- Re-timing and coordination of signalized intersections as development traffic increases

These improvement options are relatively low-cost capital investments and do not require significant changes to the road geometry.

Intersection Performance with Suggested Improvement Options

The following tables show the results of the traffic analysis for the following two scenarios:

- 2028 Horizon Year with Revised Land Use Assumptions [with Minor Improvements](#)
- 2043 Horizon Year with Revised Land Use Assumptions [with Minor Improvements](#)

Table 5: Performance of Intersections at the Copperhead I/C: 2028 Horizon Year with Improvements

Copperhead Interchange		AM PEAK					PM PEAK				
		Vol	v/c	Delay	LOS	95% Queue	Vol	v/c	Delay	LOS	95% Queue
Copperhead Drive & Westbound On/Off-Ramps	WBL	398	0.80	27.7	C	68.1	330	0.72	22.5	C	45.2
	WBR	121	0.23	3.8	A	7.9	104	0.22	4.0	A	7.3
	NBL	258	0.67	20.8	C	50.0	308	0.68	20.2	C	58.9
	NBT	239	0.16	5.9	A	10.8	222	0.14	6.7	A	10.2
	SBT	363	0.28	6.9	A	16.7	280	0.20	6.2	A	12.8
	SBR	48	-	-	-	-	30	-	-	-	-
Copperhead Drive & Eastbound On/Off-Ramps	EBL	16	0.42	16.4	C	16.5	35	0.48	16.9	C	21.3
	EBR	240	0.42	16.4	C	16.5	290	0.48	16.9	C	21.3
	NBT	479	0.15	0.0	A	0.0	503	0.16	0.0	A	0.0
	NBR	323	0.21	0.0	A	0.0	591	0.38	0.0	A	0.0
	SBL	117	0.13	9.2	A	3.5	18	0.02	8.8	A	0.5
	SBT	639	0.20	0.0	A	0.0	591	0.19	0.0	A	0.0
Copperhead Drive & Hillside Drive	EBL	6	0.02	10.7	B	0.0	6	0.01	9.9	A	0.0
	EBT	9	0.07	10.0	A	1.6	41	0.20	10.4	B	5.6
	EBR	25	0.07	10.0	A	1.6	68	0.20	10.4	B	5.6
	WBL	290	0.60	19.6	C	31.2	175	0.36	13.3	B	12.8
	WBT	41	0.08	9.6	A	2.4	9	0.03	8.9	A	0.8
	WBR	5	0.08	9.6	A	2.4	5	0.03	8.9	A	0.8
	NBL	52	0.11	10.7	B	3.2	35	0.07	9.8	A	1.6
	NBT	56	0.08	9.8	A	1.6	60	0.07	9.3	A	1.6
	NBR	223	0.43	13.1	B	1.6	230	0.41	11.9	B	16.0
	SBL	9	0.02	10.5	B	0.8	7	0.02	10.0	A	0.0
	SBT	106	0.02	10.5	B	7.2	60	0.13	10.3	A	3.2
	SBR	6	0.24	12.0	B	7.2	6	0.13	10.3	B	3.2
Copperhead Drive & Versatile Drive – Frontage Road	EBL	144	0.79	45.8	D	36.3	213	0.88	49.7	D	44.4
	EBT	32	0.10	11.0	B	7.6	49	0.30	4.6	A	10.7
	EBR	8	-	-	-	-	128	-	-	-	-
	WBL	97	-	-	-	-	65	-	-	-	-
	WBT	42	0.76	20.4	C	42.8	41	0.80	21.0	C	61.1
	WBR	197	-	-	-	-	336	-	-	-	-
	NBL	160	0.62	22.9	C	39.9	7	0.04	8.1	A	2.1
	NBT	481	0.31	6.3	A	22.2	611	0.48	9.9	A	29.2
	NBR	55	-	-	-	-	19	-	-	-	-
	SBL	123	0.31	9.3	A	16.7	105	0.43	15.2	B	18.2
	SBT	509	0.46	5.0	A	24.7	462	0.56	6.8	A	24.3
	SBR	308	-	-	-	-	334	-	-	-	-

Table 6: Performance of Intersections at the Copperhead I/C: 2043 Horizon Year with Improvements

Copperhead Interchange		AM PEAK					PM PEAK				
		Vol	v/c	Delay	LOS	95% Queue	Vol	v/c	Delay	LOS	95% Queue
Copperhead Drive & Westbound On/Off-Ramps	WBL	631	1.00	61.6	E	162.8	413	0.88	41.3	D	95.0
	WBR	145	0.23	6.1	A	12.1	124	0.24	4.8	A	10.4
	NBL	345	1.02	72.6	E	106.3	401	0.82	27.5	C	92.8
	NBT	335	0.20	11.0	B	21.1	273	0.15	6.3	A	12.5
	SBT	488	0.33	11.6	B	33.4	376	0.22	6.2	A	17.6
	SBR	57	-	-	-	-	38	-	-	-	-
Copperhead Drive & Eastbound On/Off-Ramps	EBL	20	0.70	28.3	D	45.0	42	0.66	23.5	C	40.0
	EBR	380	0.70	28.3	D	45.0	380	0.66	23.5	C	40.0
	NBT	632	0.20	0.0	A	0.0	637	0.20	0.0	A	0.0
	NBR	381	0.24	0.0	A	0.0	907	0.58	0.0	A	0.0
	SBL	143	0.17	9.8	A	4.9	23	0.03	9.1	A	0.7
	SBT	972	0.31	0.0	A	0.0	763	0.24	0.0	A	0.0
Copperhead Drive & Hillside Drive	EBL	7	0.02	11.9	B	0.8	7	0.02	10.2	B	0.0
	EBT	11	0.1	11.6	B	2.4	48	0.26	11.3	B	8.0
	EBR	30	0.1	11.6	B	2.4	86	0.26	11.3	B	8.0
	WBL	377	0.86	42.6	E	72.0	238	0.50	16.4	C	21.6
	WBT	49	0.12	10.7	B	3.2	10	0.04	9.1	A	0.8
	WBR	6	0.12	10.7	B	3.2	10	0.04	9.1	A	0.8
	NBL	73	0.17	12.2	B	4.8	42	0.09	10.4	B	2.4
	NBT	78	0.12	11.0	B	3.2	78	0.10	9.9	A	2.4
	NBR	315	0.68	22.5	C	41.6	214	0.42	12.7	B	16.8
	SBL	14	0.04	11.6	B	0.8	6	0.02	10.4	B	0.0
	SBT	150	0.38	15.5	C	13.6	85	0.19	11.4	B	5.6
	SBR	7	0.38	15.5	C	13.6	7	0.19	11.4	B	5.6
Copperhead Drive & Versatile Drive – Frontage Road	EBL	211	0.82	38.5	D	41.5	378	0.94	47.4	D	99.0
	EBT	47	0.10	6.9	A	6.9	135	0.51	12.4	B	66.4
	EBR	12	-	-	-	-	307	0.51	-	-	-
	WBL	116	-	-	-	-	68	1.00	-	-	-
	WBT	70	0.80	20.5	C	60.4	57	-	61.6	E	159.2
	WBR	270	-	-	-	-	418	-	-	-	-
	NBL	279	1.63	327.5	F	61.7	9	0.12	28.2	C	5.8
	NBT	613	0.47	8.8	A	30.2	806	0.88	42.3	D	117.2
	NBR	68	-	-	-	-	23	-	-	-	-
	SBL	147	0.58	23.6	C	31.9	125	0.84	64.2	E	43.9
	SBT	710	0.77	9.9	A	62.4	607	0.82	25.6	C	106.6
	SBR	573	-	-	-	-	445	-	-	-	-

At the 25-year (2043) horizon with the minor improvements incorporated into the model, the analysis of the Copperhead Drive corridor indicated only a few select turning movements will experience undesirable performance. Most noticeably, the all-way stop control improvement at Hillside Drive alleviates most of the delays that were previously observed at this intersection as a two-way stop control.

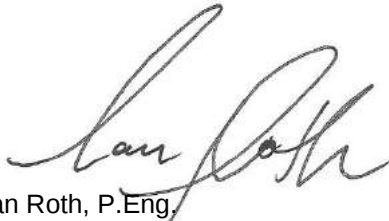
Beyond the 2043 horizon, more substantial improvements (such as intersection controls, intersection geometry, laning) may need to be considered to address future declining performance levels as additional development traffic is added to the network. While these improvements are outlined in the 2015 *Corridor Access Study*, revised configuration options may be required to reflect the adjustments to land use plans and assumptions as the southwest industrial area of Kamloops develops.

Conclusion

This addendum has documented the traffic analysis and performance of intersections near the Copperhead Interchange, which are based on revised land development assumptions stated herein for two traffic analysis scenarios. With minimal improvements to the study network, the existing network will support the stated development growth up to the ultimate horizon year in 2043. While the proposed development areas may be permitted with or without these minor improvements, it is recommended that the City continue to work towards a long-term solution for the study area as development occurs.

Sincerely,

URBAN SYSTEMS LTD.



Ian Roth, P.Eng.
Transportation Engineer

/SB

Enclosure

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Appendix F

*Water and Sewer Servicing Phasing Strategy – City of Kamloops
Interdepartmental Memo, February 2018*

INTERDEPARTMENTAL MEMO

Date: February 12th, 2018

From: Engineering

RE: Southwest Sector Industrial Lands
Water and Sewer Servicing Phasing Strategy

The Southwest Sector (SWS) Industrial Lands requires upgrades and extensions to the existing City water network to service anticipated industrial growth. Urban Systems Ltd. previously completed the Southwest Kamloops Industrial Master Plan, which considered water and sanitary sewer servicing needs, as well as transportation and access requirements. The water servicing options were further refined in January of 2018, as outlined in the *SWS Water Demand and Infrastructure Needs Review* memo.

This phasing strategy follows the recommendations of the infrastructure needs memo to further develop an implementation plan for the water network upgrading. The sewer servicing costs and timing are also presented.

Option Review and Phasing

Four alternative water servicing options were presented in the infrastructure needs review memo, with a combination of reduced Max Day Demand design criteria, two different fire flow criteria, and provision of fire servicing via either a fire pump or reservoir. Option 1a is recommended, with the following criteria:

- Max Day Demand Criteria 15 m³/ha/day
- Available Fire Flow 225 L/s
- Fire Servicing Provision Fire Pump

This option is recommended as it provides a balance between flexibility in industrial land development and overall capital cost. The total cost for the recommended option as presented in the needs memo is estimated as \$9.5 million in 2018 dollars. Servicing of the SWS industrial lands can be further revised in scope and reduced to four phases, as presented below.

Table 1. SWS Water Servicing Phases

Phase	Description	Estimated Cost	Funding Source	Additional Serviced Area (ha) ¹
1	600mm diameter watermain on Frontage Road/TCH West to Iron Mask Booster	\$2,370,000	DCC	7.95 ²
2	600mm diameter watermain on Sugarloaf Road, highway crossing, and smaller diameter extension to the western 756 PZ.	\$2,940,000	DCC	47.54 ³
3	New Iron Mask booster station, new 375 diameter main to Bowers Place, twin 300mm main through 812 PZ subdivision	\$3,450,000	TBD	74.05 ⁴
4	375mm diameter watermain extension to the Michell property in 756 PZ North, and through Domtar Lands to 699 PZ.	\$740,000	TBD	N/A ⁵

¹ Raw land area – does not include reductions on account of steep slopes, ponds/marsh areas.

² Consists of servicing improvements to 2505 Trans Canada Hwy West only.

³ Includes developed properties such as 3355 Sugarloaf, 1625 and 1655 Lucky Strike.

⁴ Includes developed properties within the Bowers / Roper subdivision.

⁵ Further future study required to delineate extent of PZ and serviceable properties, as well as limitations due to overhead utility ROW.

Timing for water servicing will be according to market demand and desire to develop certain areas. Phases 2 and 3 can be completed in either order, however must be completed after Phase 1. The phases are shown on the attached figure, and described further below.

Phase 1

Phase 1 consists of upgrading of the trunk main on Frontage Road / TCH West feeding the entire southwest industrial area, and will serve to provide increased available fire flow to the 756 pressure zone and suction pressure for the future upgraded Iron Mask booster station and 812 pressure zone. The phase 1 works will immediately improve water service to only a limited number of properties located along the frontage road, however improves overall water service to the SWS for future phases.

Phase 2

Phase 2 will further extend the 600mm diameter trunk main along Sugarloaf Road and to the southwestern extents of the 756 PZ, servicing a future subdivision on Sugarloaf Road and the existing properties towards the west. Phase 2 also includes a 375mm watermain extension across the Trans-Canada Highway, however no further extensions to areas further to the north.

Phase 3

Phase 3 will upgrade the Iron Mask booster station for future 812 PZ demands, including the 225 L/s fire pump. Watermain capacity upgrades on Lac Le Jeune Road and in the Bowers / Roper subdivision will also be completed. The original 2013 servicing strategy included a reservoir upgrade, which would occur in phase 3, however with the reduced MDD design criteria, the reservoir upgrade is no longer needed.

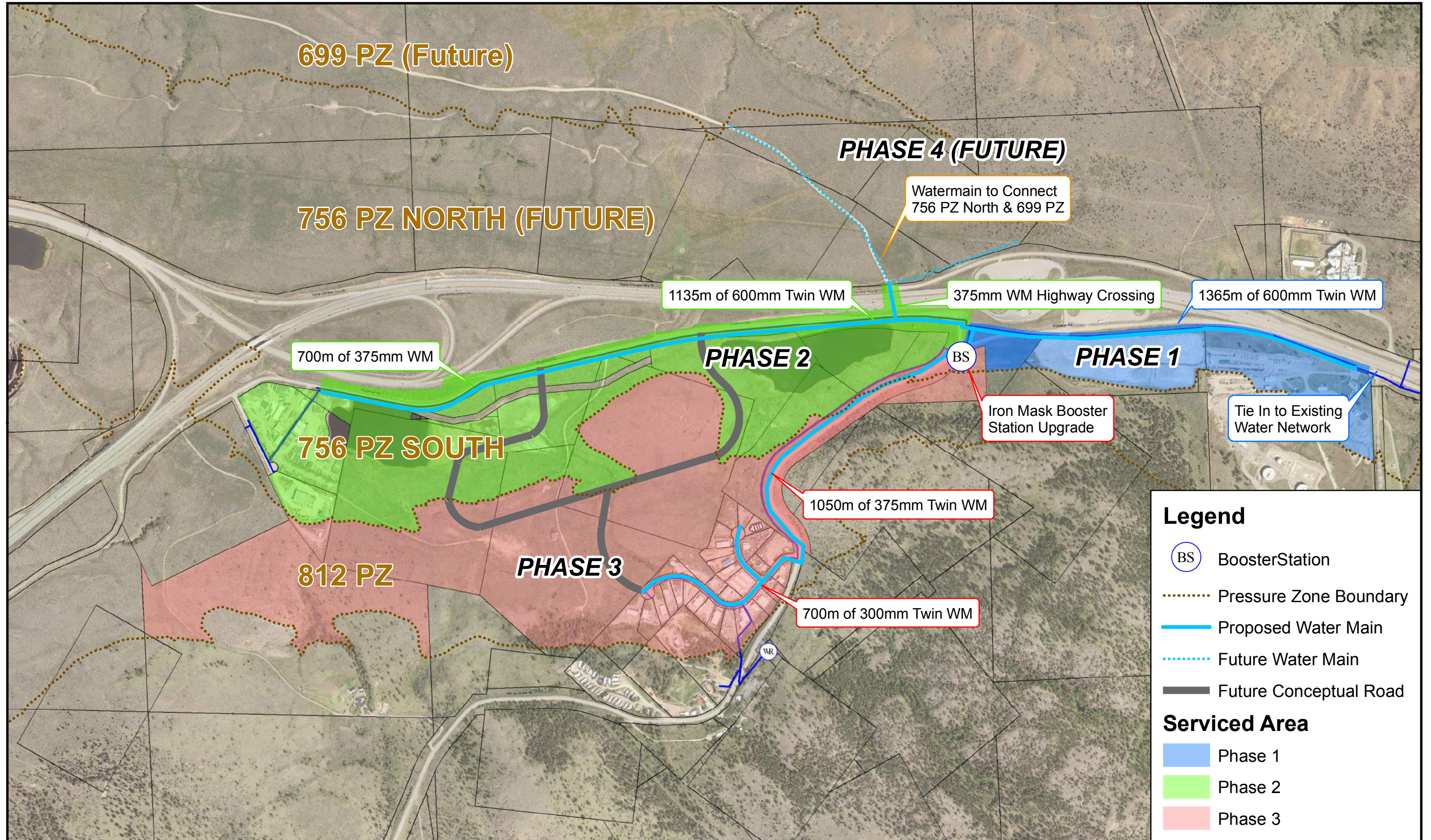
Phase 4

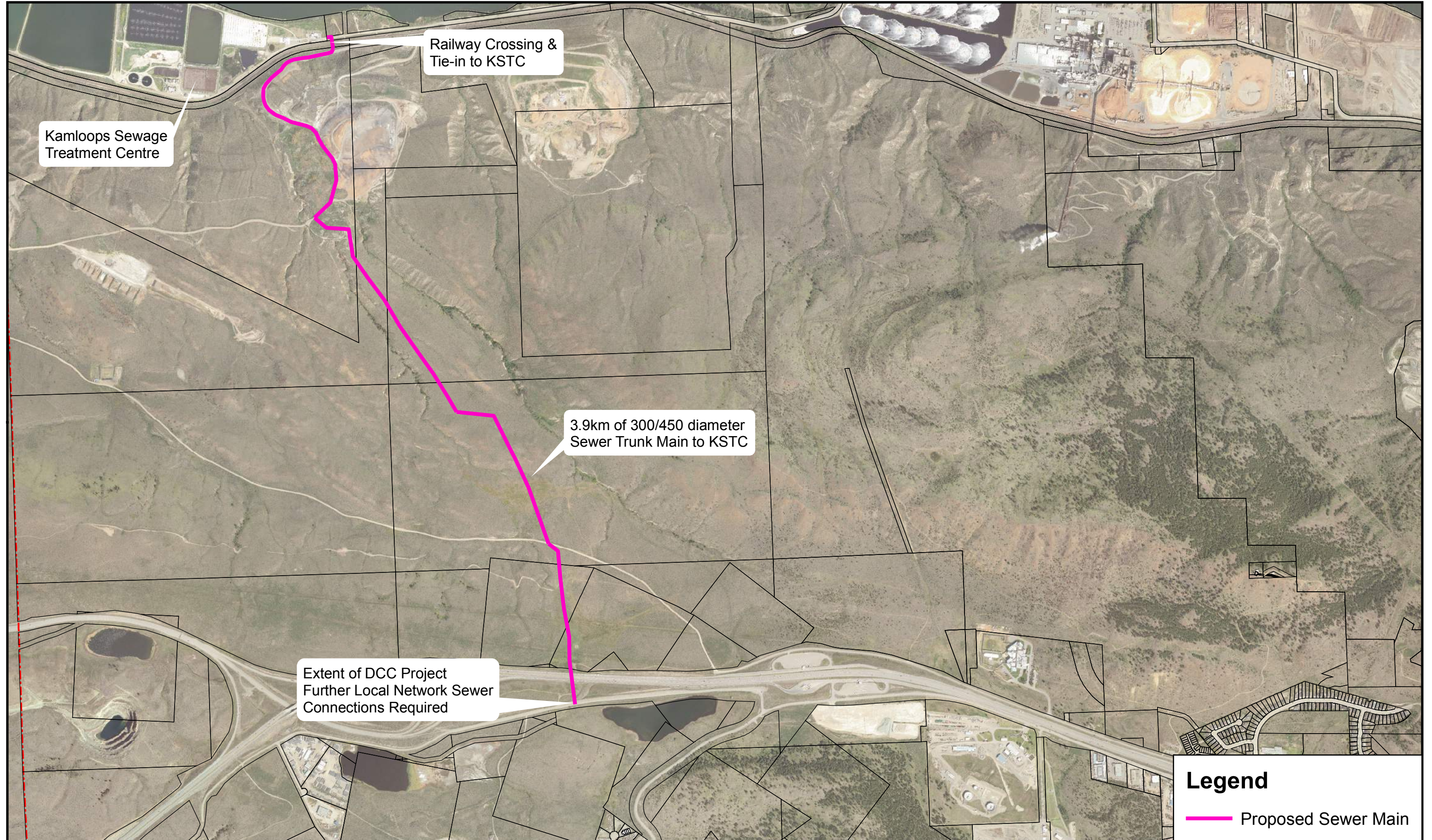
Phase 4 will extend servicing to the Michell property and Domtar lands in the northern 756 PZ, and to the upper extent of the 699 PZ. This phase does not include local water network connections, or future PRV to the 699 / lower Domtar pressure zone. Further scoping and timing for phase 4 is required, with development of the lands expected to follow phases 1 through 3.

Sewer Servicing

Sewer servicing to the southwest sector area is proposed to connect from Sugarloaf Road, via gravity across the Trans-Canada Highway, through the Domtar properties to the north, and to the City's sewage treatment centre on Mission Flats Road. The connection will require 3.9km of 300mm/450mm diameter main, and is estimated to cost \$3.35 million (2018 dollars). The cost is only for the trunk main, and does not include local sewermain extensions or improvements.

Sewer servicing will be required prior to substantial industrial lands development, and should therefore be completed in conjunction with Phase 1 of the water servicing strategy. This will have the added benefit of allowing for servicing of the existing industrial park on Frontage Road (assuming a local sewer extension is completed by the property owner) which is currently serviced via septic fields. Approximate trunk main alignment is shown on the attached figure.





INTERDEPARTMENTAL MEMO

Date: January 21st, 2018
From: Engineering
RE: Southwest Sector Industrial Lands
Water Demand and Infrastructure Needs Review

The City is currently completing a review of the Southwest Sector (SWS) Industrial Lands servicing strategy. The previous study was completed in 2013 by Urban Systems Ltd., as a joint project between the City and the primary land owner, Concert Properties Ltd. The study considered water and sanitary sewer servicing needs, as well as transportation and access requirements. This review is focused on a water system option analysis and updating of costs associated with the options for water servicing of the lands.

This review aims to confirm maximum day demand (MDD) design criteria for industrial properties by comparing similar facilities in Kamloops, and to evaluate fire protection options by evaluating industrial facility needs from the 2012 FUS audit. The options for both reduction in MDD design criteria, and for varying levels of fire protection are presented herein with associated probable cost estimates.

Existing Industrial Building Properties

Industrial Water Demand Review

The 2013 servicing strategy identifies an industrial land MDD design criteria of 30 m³/ha/day, which is in line with the City's updated design criteria manual. With several years of water metering in place, a review of existing industrial land water demands using 2016/2017 data has been completed. The areas reviewed include Campbell Creek, Versatile, Kelly Douglas, Dallas, and Southgate (McGill, Dalhousie, Laval, Camosun, and Notre Dame), for a total of 116 properties.

Water meters are read on average 3 to 4 times annually, and therefore don't record individual property MDD. Average day demand (ADD) city-wide, after accounting for property size, was found to be 4.95 m³/ha/d. Demand varies according to facility type, however overall Southgate ADD averages 5.2 m³/ha/d, with other areas averaging 4.37 m³/ha/d. Typical MDD to ADD ratios of 3:1 are used for growth planning. Booster station records for areas that predominantly service industrial areas indicate that the design ratio is current and applicable. The city-wide design MDD, based on available ADD rates, would therefore be **15 m³/ha/d**. Further detail with respect to ADD broken down by facility type are presented below.

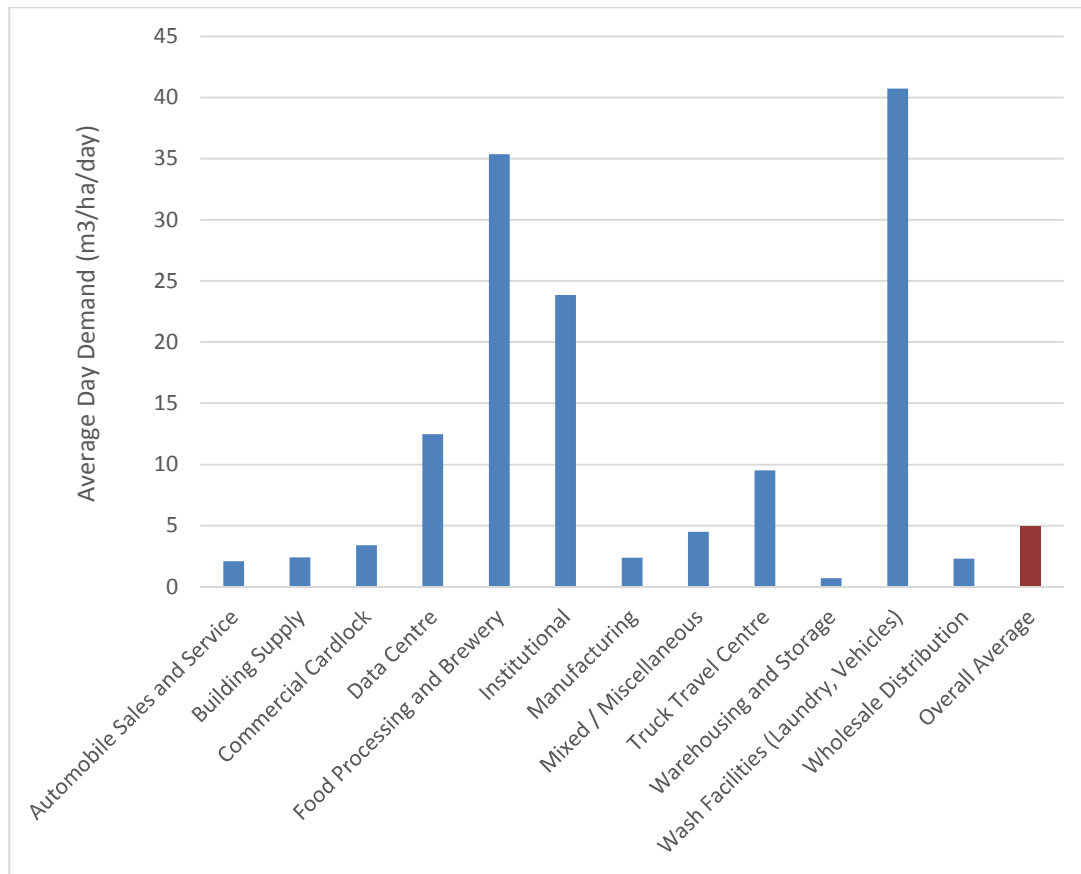


Figure 1. Industrial Water Demand by Facility Type

It should be noted that the 30 m³/ha/d MDD criteria was selected to allow for flexibility should one, or several, higher water use facilities seek to develop (data centre, food processing/brewery, wash facilities). For the purposes of this analysis, the 15 m³/ha/d will be used, assuming that the future water system will be expected to service a commensurate (and limited) number of high demand facilities.

FUS Audit Inventory and Existing Industrial Building Fire Flow Requirements

USL's 2013 report includes water servicing costs based on an the City's design criteria which requires industrial areas not serviced by automatic sprinkler systems to provide 225L/s of fire flow during MDD conditions. The report presents two options: servicing for fire flow via a reservoir, or using a dedicated fire pump. This review outlines fire flow needs for existing industrial areas of the city, compared to the standards as set in the Fire Underwriter's Survey (FUS) *Water Supply for Public Fire Protection*, and discusses options and costs for SWS servicing for reduced levels of fire protection.

The City's most recent Fire Underwriter's Survey (FUS) audit was completed in 2012, and includes required fire flow (RFF) for industrial buildings within the city, along with industrial building size, and FUS criteria leading to RFF. A total sample of 207 buildings was used, covering all industrial facilities at the time of the audit. The inventory results are presented in the figures and tables below.

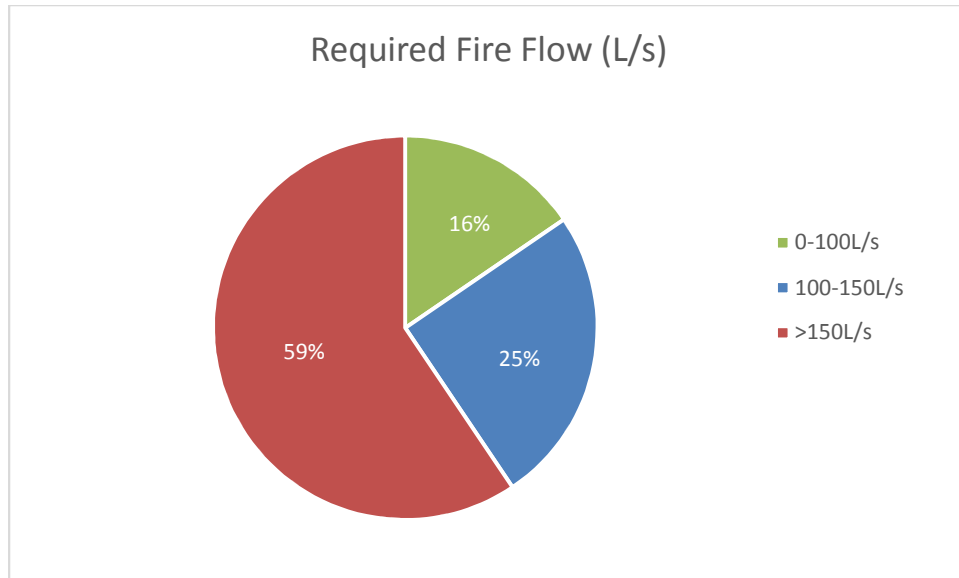


Figure 2. City of Kamloops Industrial Building Required Fire Flow (207 Buildings Total)

The majority of existing industrial buildings within the city require fire flow of greater than 150 L/s. The table below further breaks down the inventory. 20% of the industrial buildings in the city require 225 L/s or more.

Table 1. Building RFF Summary

	Required Fire Flow
Range:	63 L/s – 380 L/s
10 th Percentile	88 L/s
Average:	169 L/s
80 th Percentile	225 L/s
90 th Percentile	243 L/s

Building construction and criteria leading to the above RFF are summarized for existing industrial buildings as below.

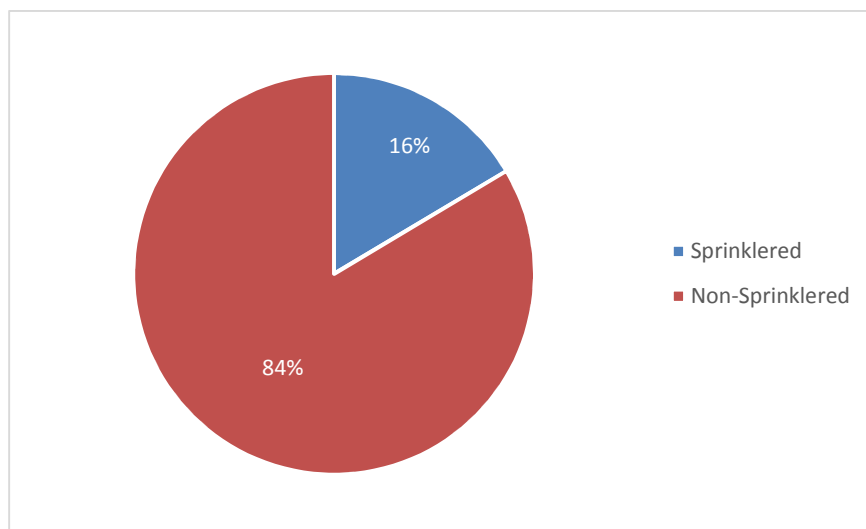


Figure 3. Industrial Building Sprinkler Breakdown

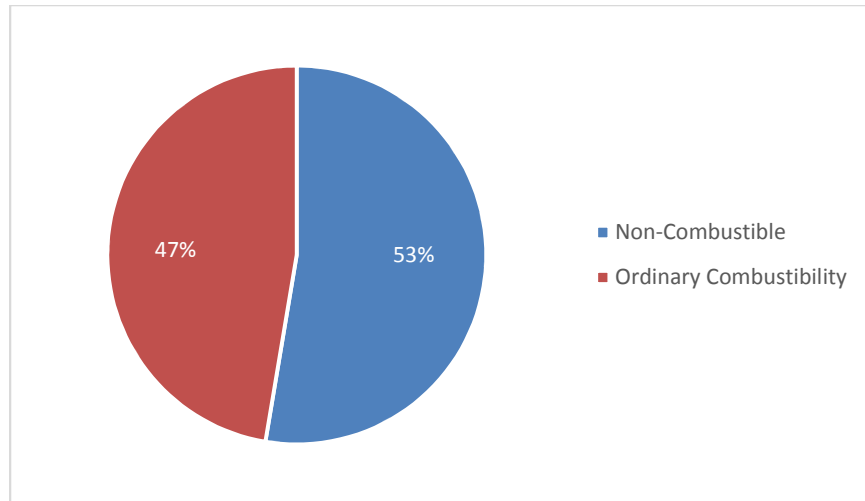


Figure 4. Industrial Building Construction Breakdown

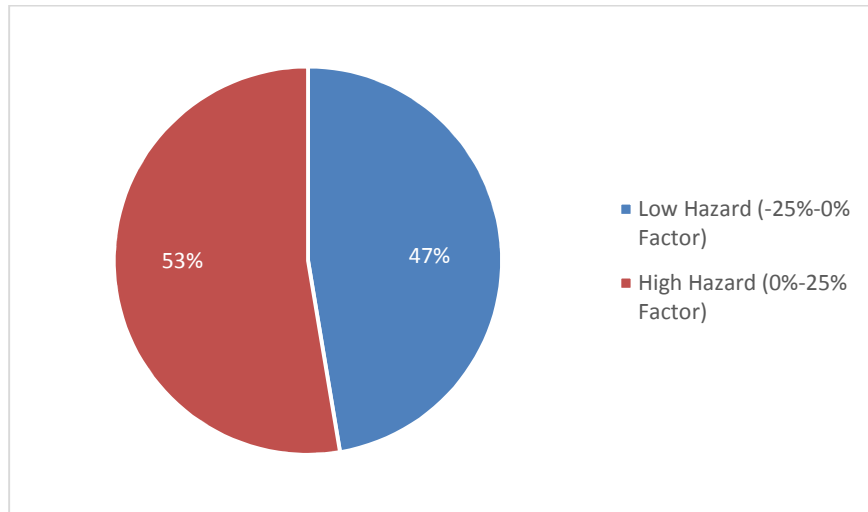


Figure 5. Industrial Building Occupancy Hazard Breakdown

The inventory included building area, as summarized in the following table. The building area summary will be used as a comparison to the FUS guidelines for RFF.

Table 2. Industrial Building Area Summary

	Existing Industrial Inventory Building Area
10 th Percentile	750 m ²
Average:	2,526 m ²
80 th Percentile	3,518 m ²
90 th Percentile	4,756 m ²

FUS Recommended Fire Flow Sensitivity Analysis

The above building inventory information can be compared to the FUS recommendations for required fire flow, and associated impacts to maximum building area to develop AFF provision options. The following table illustrates FUS recommended maximum building area.

Table 3. FUS Building Area and RFF Sensitivity Analysis

Occupancy	Constuction	Maximum Building Area in m ²							
		80 L/s AFF		100 L/s AFF		150 L/s AFF		225 L/s AFF	
		No Sprinklers	Max Sprinkler Credit	No Sprinklers	Max Sprinkler Credit	No Sprinklers	Max Sprinkler Credit	No Sprinklers	Max Sprinkler Credit
Low Hazard	Combustible				5289		11800	6694	N/A
	Non-Combustible		5289		8264	4680	N/A	10460	N/A
High Hazard	Combustible						4360		9640
	Non-Combustible						6820	3766	15062

Cells that are shaded represent a maximum building area that is less than the city's existing inventory 80th percentile, and are therefore omitted. The sensitivity analysis illustrates that, if the City plans to accommodate the majority of industrial building area or larger within the SWS area, there are two options for fire flow servicing: 150 L/s target AFF where buildings require sprinkler systems, or the provision of 225 L/s AFF.

Servicing Option Cost Estimates

The review of the existing industrial buildings within the City of Kamloops and their water demands, and with the RFF sensitivity analysis, offer the following four revised servicing options:

- 1a: Reduced MDD, 225L/s AFF, Fire Pump
- 1b: Reduced MDD, 225L/s AFF, Reservoir Fire Storage
- 2a: Reduced MDD, 150L/s AFF + Sprinklers, Fire Pump
- 2b: Reduced MDD, 150L/s AFF + Sprinklers, Reservoir Fire Storage

The estimate of probable costs for the above options, as well as the original cost estimates from the 2013 USL report, are presented in the table below.

Table 4. Option Cost Estimates

Option	MDD Criteria (m ³ /ha/d)	AFF	Fire Servicing	Cost Estimate
Original Option 1	30	225 L/s	Pump	\$ 10,022,000.00
Original Option 2	30	225 L/s	Reservoir	\$ 11,950,000.00
1a	15	225 L/s	Pump	\$ 9,497,000.00
1b	15	225 L/s	Reservoir	\$ 11,447,000.00
2a	15	150 L/s + Sprinklers	Pump	\$ 8,738,000.00
2b	15	150 L/s + Sprinklers	Reservoir	\$ 9,133,000.00

*All cost estimates are in 2018 dollars. Original estimates inflated at 5%/year.

Options 1a and 1b both realize modest cost reductions due to MDD reservoir storage additions no longer being required and slightly smaller booster station requirements. Options 2a and 2b achieve greater cost reductions due to overall reduction in capacity of the pump stations, and in

the case of option 2b, a large reduction in required reservoir storage. Both options 2a and 2b also require slightly reduced watermain sizing.

Industrial Building Sprinkler Installation Costs

A method of allowing for development while planning for lower AFF provision is to require any new buildings within the pressure zones with lower AFF to have sprinkler systems. Costs for installing sprinkler systems would be borne by the developer. Order-of-magnitude sprinkler installation costs are \$2/square foot, or \$22/square meter. Assuming an average building area as per the city's inventory of 2,500 square meters, the average cost for installing sprinklers in a new building is estimated as \$55,000.

The 2013 USL report shows conceptual layout of 70 properties within the 812PZ and 756PZ south of the Trans-Canada Highway. The total estimated cost for installing sprinklers in all new buildings is \$3.85 million.

Recommendations

The water servicing strategy for the SWS industrial area must balance many considerations, including:

- Market demand for different industrial building sizes, occupancies, and construction;
- The provision of adequate fire protection for the intended property use;
- The provision of adequate domestic water demand for a variety of facilities;
- Costs borne by, or impact to, the developers for additional measures such as sprinkler installation or building use restrictions;
- Overall costs for water system upgrades.

Reducing the MDD design criteria has a modest impact on overall capital cost for the revised servicing strategies. Reducing the fire protection service level, and requiring buildings to have automatic sprinkler systems has the potential to reduce servicing capital costs to a greater extent. Reducing the fire protection service level will also likely impact the ability for development of the properties, particularly for larger industrial buildings, and those with high hazard occupancies. The requirement for buildings to be sprinklered has the potential to increase development costs substantially, which will outweigh capital cost savings.

Revised servicing option 1a is recommended, as it will maintain a high level of fire protection, avoid shifting of sprinkler installation costs to developers and enables flexibility during development. It is also characterised by a lower capital cost estimate, at \$9.5 million, and carries the recommendations for fire pump installation from the 2013 USL report. Option 1b would also provide suitable protection and servicing, should the City wish to re-consider the reservoir fire servicing option.



Appendix G

*Current KAMPLAN, Zoning and Agricultural Land Reserve
Designations in the Iron Mask Area*



Municipal Boundary

Agricultural

Future Industrial Development Area

Land Use

- Agricultural
- Future Industrial Development Area
- Light Industrial
- Medium and Heavy Industrial
- Parks and Open Space
- Rural

Parks and Open Space

Subject Properties

Future Industrial Development Area

Light Industrial

Heavy and Medium Industrial

Agricultural

Rural

Heavy and Medium Industrial

Light Industrial

Heavy and Medium Industrial

LAND USE - OCP MAP



Development, Engineering & Sustainability
1:17,500 09/10/2018



Municipal Boundary

Legend

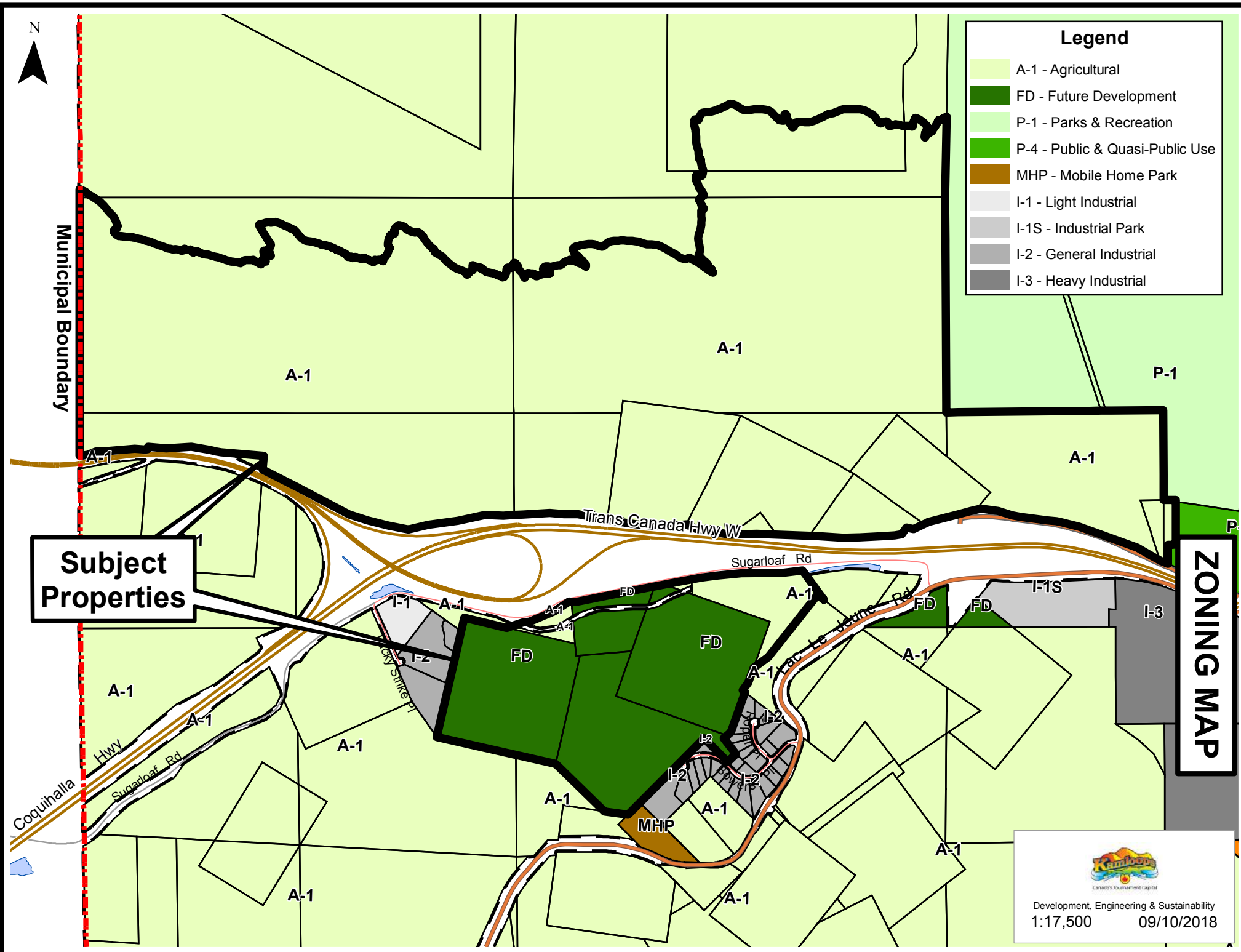
- A-1 - Agricultural
- FD - Future Development
- P-1 - Parks & Recreation
- P-4 - Public & Quasi-Public Use
- MHP - Mobile Home Park
- I-1 - Light Industrial
- I-1S - Industrial Park
- I-2 - General Industrial
- I-3 - Heavy Industrial

Subject Properties

ZONING MAP



Development, Engineering & Sustainability
1:17,500 09/10/2018





Municipal Boundary

Subject Properties

ALR MAP



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 Agricultural Land Reserve

