East Trunk Development Cost Charge Review

Report

Prepared For:
Regional District of Central Okanagan

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

URBAN systems

May 2019 | File: 1179.0093.01

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report summarizes the Regional District's analysis for an East Trunk Development Cost Charge (DCC) to apply in the City of West Kelowna and Westbank First Nation Reserves #9 and #10 area. This report presents proposed updates to DCCs that reflect the increase in capacity required to the East Trunk in order to serve new growth.

The report consists of the following parts:

- **Part 1:** Outlines the purpose of the East Trunk Development Cost Charge (DCC) review and includes information on the legislation enabling DCCs and the use of the DCC Best Practices Guide.
- **Part 2**: Outlines the guiding principles used to develop the East Trunk DCC program and identifies DCC recoverable costs. This section discusses the time frame for the DCC program, the allocation of costs between existing and new development, the municipal assist factor, grant assistance, interim financing, and the basis for charging DCCs.
- **Part 3**: Based on the growth projections for the area, this section presents growth forecasts.
- **Part 4:** Summarizes the cost of the East Trunk DCC program. Part 4 also shows how the East Trunk DCC rates are calculated using the information from Parts 2 and 3.
- **Part 5:** Summarizes the proposed DCCs, provides information on implementation issues such as exemptions to the bylaw, grace periods, DCC rebates and credits, and outlines suggestions for monitoring and accounting related to the DCC bylaw.
- **Part 6:** Reviews the public consultation process, once the consultation process is completed (to be completed).

The proposed East Trunk DCC resulting from the calculations are set out in **Table ES-1** below.

Table ES-1: East Trunk DCC Rate Summary

Use	Unit charged	Existing Charge Per Unit	Proposed Charge Per unit	% Change
Single Detached Residential	For Each parcel Created at Subdivision	$564	$2,353	317%
Duplex or Triplex	For each unit permitted on the parcel at time of subdivision	$564	$2,353	317%
Multiple Housing Residential	For Each Dwelling Unit	$395	$1,569	297%
Commercial	For each 100 sq.m. of gross floor area	$233	$1,020	338%
Industrial	For each 100 sq.m. of gross floor area	$260	$1,020	292%
Institutional	For each 100 sq.m. of gross floor area	$233	$863	270%

1.0 BACKGROUND

1.1 Purpose of this Analysis

The purpose of this analysis is to calculate East Trunk DCCs for the area comprised of the City of West Kelowna and the Westbank First Nation Reserves #9 and #10. Potential growth in the area will trigger upgrades to the East Trunk line that can be paid for through DCCs. The current DCC rates have been applicable since 2004 and this review accounts for the significant changes in growth since that last review. In addition to the past growth, the area served by the East Trunk is expected to continue growing, creating requirements for significant upgrades to the trunk line and lift stations.

The proposed East Trunk DCC program itemizes the upgrades that are necessary to support new growth on the Westside. The proposed program ensures that the people who will use and benefit from the services provided pay their share of the costs in a fair and equitable manner. The proposed East Trunk DCC program creates certainty by providing stable charges to the development industry and by allowing the orderly and timely construction of infrastructure.

It should be noted that the material provided in the background report is meant to provide information only. The East Trunk Development Cost Charge Bylaw is the only source for the proposed East Trunk Sewer DCC rates. Reference should be made to the bylaw for the specific East Trunk DCC rate for all development within the Westside area.

1.2 Guiding Principles

Guiding principles have been established and they form an integral part of the report. These guiding principles are also set out in the Provincial DCC Best Practices Guide. The guiding principles are set out below:

- **Integration –** The East Trunk DCC program fits within the many broader goals of a community. Other initiatives such as the goals in the *Local Government Act*, other provincial legislation, Regional Growth Strategies, and Official Community Plans should also be reflected. In dealing with land efficiency, housing affordability, and community sustainability, the Regional District uses DCCs as one of the ways to handle these issues. Community plans, land use plans, and corporate financial and capital infrastructure strategies must be taken into consideration when developing DCCs.

- **Benefiter Pays** – Those who benefit from the new infrastructure should pay for the installation of such systems.

- **Fairness and Equity** – Since DCCs should be shared amongst the benefitting parties, there should be mechanisms put in place to ensure fair cost distribution between existing users and new development. For those costs allocated to new development, DCCs should be used to ensure equitable distribution of the costs between the various land uses and different development projects.

- **Accountability** – To promote accountability, all information used for the development of DCCs should be accessible and understandable by the stakeholders.

- **Certainty** – The DCC program should be designed to ensure stable charges and timely construction of infrastructure. The development industry relies on the stability of DCC rates when planning their projects. Certainty in DCC revenue helps ensure that infrastructure is constructed in a timely manner, and helps avoid deferring or cancelling development.

- **Consultative Input** – Opportunities for input must be provided to the public and other interested parties when developing DCCs.

1.3 Legislative and Regulatory Background

Development cost charges are special charges collected by local governments to help pay for infrastructure expenditures required to service growth. The *Local Government Act* provides the authority for Regional Districts to levy DCCs. The purpose of a DCC is to assist the Regional District with accommodating development by providing a dedicated source of funding for the capital costs for expansion and upgrades.

Regional Districts wanting to collect DCCs for Sewer must adopt a Sewer DCC bylaw that specifies the amount of the DCCs that will be collected. The charges may vary with respect to:

- different zones or different defined or specific areas;
- different uses;
- different capital costs as they relate to different classes of development; and
- different sizes or different numbers of lots or units in a development.

Funds collected through Sewer DCCs must be deposited in a separate reserve account. These funds may only be used to pay for the capital costs of the works and short-term financing costs of a debt incurred for capital works identified in the DCC program. The costs for capital works include not only the actual construction of the works but also the planning, engineering and legal costs which are directly related to the works.

1.4 Use of DCC Best Practices Guide

The Ministry of Community, Sport and Cultural Development (the "Ministry") has prepared a Development Cost Charge Best Practices Guide (the "Best Practices Guide"). The purpose of this document is to outline an accepted process for the development of a DCC program. Regional Districts and Municipalities that follow this recommended process qualify for streamlined Ministry review of their DCC program.

This report was developed in consideration of the Best Practices Guide, which was followed where it was appropriate to do so.

2.0 DEVELOPING THE DCC PROGRAM AND COSTS – GUIDING PRINCIPLES

2.1 Relationship to Other Documents

This DCC program has been developed to be consistent with the following legislation, plans, and policy guides:

- *Local Government Act*
- Development Cost Charges Best Practices Guide
- Regional Growth Strategy (RGS)
- Official Community Plan for West Kelowna
- Development Cost Charge population and unit projections for West Kelowna
- Westbank First Nation draft infrastructure Master Plans
- Westbank First Nation IR 9 and IR 10 mapping of Population Growth Areas 2016 - 2066

2.2 DCC Time Frame

The first step in determining DCC costs is to set a time frame for the DCC program. For all DCC programs, the DCC time frame is based on projections for population and capital expenditures. The capital expenditure forecast for this program will include all of the upgrades to the East Trunk that need to occur over the next 20 years, which extends to 2038.

2.3 Area-specific DCC Charges

The Regional District will levy East Trunk DCCs specific to the area served by the East Trunk or connected to the system through expansion. This includes portions of:

- The City of West Kelowna and;
- The Westbank First Nation IR #9 and #10.

2.4 DCC Recoverable Costs

As specified by the *LGA*, DCC recoverable costs for projects include construction costs, contingency, engineering, administration and net GST. The capital costs included in this report do not include charges for interim financing or interest on long-term debt financing.

While interest on long-term debt has not been included in the capital costs presented in this report, it should be noted that the definition of “capital costs” (Section 558 of the *LGA*) was amended in 2004 to

include interest in exceptional circumstances where borrowing is required. The Inspector of Municipalities will only allow interest costs in exceptional circumstances that necessitate the construction of specific infrastructure projects in advance of sufficient DCC cash flows (e.g., fixed-capacity infrastructure, out-of-sequence projects, or greenfield developments). In these cases, local governments or developers are required to front-end the cost of the growth-related infrastructure, and recover their costs through DCCs as growth occurs. However, the Ministry continues to encourage local governments to adopt DCC programs that limit the need for borrowing to exceptional cases.

2.5 Grants and Cost Sharing

It is assumed that no grants will be applied to the capital cost of increasing the capacity of the East Trunk.

2.6 Interim Financing

The capital costs shown in the report do not include interim financing.

2.7 Allocation of Costs

For each proposed East Trunk upgrade component, costs are allocated between existing development and new growth. To determine the proper allocation for each project, individual projects can be divided into two broad categories:

1. Level of service upgrades or resolving existing deficiencies; and

2. Accommodation of new growth.

Projects in the first category provide some benefit to existing development, but they also benefit new growth. In order to allocate the degree of benefit equitably between the existing population and the new growth, the new growth is often expressed as a percentage factor such as the amount of new growth divided by total future population or equivalents, or the amount of additional capacity compared to the existing capacity.

Projects in the second category are a benefit to new growth only. In other words, they would not be contemplated if no new growth was forecast. One hundred percent (100%) of the benefit and cost of a project in this category can be allocated to new growth.

This report focusses on one option, which allocates 100% of the project upgrade costs to new development. The logic behind this option is that these projects would not be required if growth was not occurring. The only reason to complete the upgrades are to accommodate growth so 100% of the costs are allocated to growth. This method is referred to as the 'Rule of Thumb' method in the DCC Best Practices Guide.

Table 2.1 sets out the results and indicates the percentage of the costs that are attributable to new growth according to the project. 100% of the upgrade costs are allocated to new growth.

Table 2.1: Allocation of Costs Attributable to New Growth

Project No	Location	Percentage Allocation to New Growth
ET1	East Trunk Lift Station	100%
ET2	East Trunk Force Main	100%
ET3	East Gravity Collection System - Boucherie to Empire	100%
ET4	East Gravity Collection System - Empire to Apple Way	100%
ET5	East Gravity Collection System - LS to Boucherie	100%

2.8 Municipal Assist Factor

The *LGA* recognizes that it would be unfair to impose on new development all of the costs that are attributable to new development. As such, the *LGA* stipulates that an assist factor will be included as part of the calculation of the DCCs. An assist factor represents the Regional District's contribution towards the capital costs for the projects that are attributed to new development. This contribution is in addition to the costs that were allocated in the calculations to the existing population and that are to be paid by the Regional District. The portion of the costs that the Regional District will have to cover because of the assist factor will have to be financed through other means available to the Regional District.

The actual level of the assist factor is determined by the Regional District. While the Regional District can have a different assist factor for *each type of capital works*, i.e. sanitary, parks and roads, the Regional District cannot have a municipal assist factor that varies for *different land uses* within the Regional District, i.e. single family residential, townhouse residential, commercial, etc.

According to the *LGA*, the Regional District should consider the following factors when setting DCC rates:

- future land use patterns and development;
- the phasing of works and services;
- whether the charges are excessive in relation to the capital costs of prevailing standards of service;
- whether the costs will deter development; or
- whether the charges will discourage the construction of reasonably priced housing or the provision of reasonably priced serviced land.

In consideration of all of the above matters, the assist factor has been set at the following rates for the East Trunk DCC:

Table 2.2: Municipal Assist Factor by DCC Type

Infrastructure	Municipal Assist Factor
East Trunk	1%

2.9 Comparison of Assist Factors

In order to provide some comparative figures for assist factors, Table 2.3 below identifies assist factors used in a range of communities. In general the most common assist factor is 1%. Of the 11 communities shown, only two have a higher assist factor for sewer, but all of the local communities in the Okanagan valley have an assist factor of 1%. While each community sets the assist factor at a level appropriate for their circumstances, the existing assist factor for the Wastewater Treatment Plant DCC is 1%, and nearby communities use 1%, so it is reasonable to retain the 1% assist.

Table 2.3: Municipal Assist Factor by Municipality

Community	Municipal Assist Factor (%)				
	Transportation	Water	Sewer	Drainage	Parks
Kelowna	15%	1%	1%	N/A	8%
Surrey	5%	10%	10%	10%	5%
Chilliwack	10%	10%	10%	10%	10%
Richmond	1%	1%	1%	1%	1%
Kamloops	10%	1%	1%	1%	1%
Langley	1%	1%	1%	1%	1%
Abbotsford	10%	1%	1%	10%	5%
Vernon	1%	N/A	1%	1%	N/A
Peachland	1%	1%	1%	n/a	1%
Lake Country	1%	1%	1%	1%	1%
West Kelowna	1%	1%	1%	1%	25%

2.10 Units of Charge

The type of residential development determines the timing of the collection of DCCs. For single detached dwellings DCCs are collected at the subdivision stage based on the number of parcels because it is possible to determine the number of parcels at this time. For duplexes or triplexes the charge is based on the number of units permitted on the parcel at the time of subdivision. For multiple unit dwellings DCCs are collected based on the number of multi unit dwellings at the time of building permit approval because the number of units can be determined at this time.

Industrial, institutional and commercial DCCs are levied at the time of building permit on the basis of square metre of gross floor area, because the building size and floor area can be determined at the time of building permit.

3.0 GROWTH PROJECTIONS

3.1 Current Development and Growth Projections

This section outlines the growth projections and related planning assumptions used as inputs for the DCC calculations described in section 4.0 of this report. The amounts of past and current development relate to the entire City of West Kelowna and Westbank First Nation. The projection used for growth account for only those areas of the City of West Kelowna and Westbank First Nation that utilize the East Trunk.

3.2 Past and Current Development

Population

Table 3.0 shows the historical population data for the two jurisdictions. Since 2001, the population of each jurisdiction has seen significant growth. The population growth for each jurisdiction within this time period is as follows:

- The City of West Kelowna = 5.7% (2011-2016)
- The Westbank First Nation = 53.6% (2001-2016)

Table 3.0
Historic Population and Percentage Growth

	West Kelowna Population	West Kelowna % Growth 5yr (Annual)*	WFN Population	WFN % Growth 5yr (Annual)*
2001			5,878	
2006			6,207	5.6% (1.1%)
2011	30,892		7,068	13.9% (2.6%)
2016	32,655	5.7% (1.1%)	9,028	27.7% (5.0%)
2001- 2016 growth			3150	53.6% (2.9%)

*Annual growth rate is calculated based in the 5 or 15 year growth rate annualized as single year average growth

Dwelling Units

Table 3.1 displays the historical residential unit growth for the two jurisdictions. Since 2001, both jurisdictions have seen growth in new residential units that exceed the population growth. The dwelling unit growth break down for each jurisdiction is as follows:

- The City of West Kelowna = 11.7%, or 1,385 units (2011-2016). This translates to about 277 units per year and an average annual growth rate in units from 2011 to 2016 of 2.2%.
- The Westbank First Nation = 69.2% or 1,825 units. The growth from 2011 to 2016 was 36% or 1181 units which translates into an average annual growth rate in dwelling units from 2011 to 2016 of 6.3% or about 236 units per year.

Table 3.1
Historic Residential Unit and Percentage Growth

	West Kelowna Units	West Kelowna % Growth 5yr (Annual)*	WFN Units	WFN % Growth 5yr (Annual)*
2001			2,636	
2006			2,784	5.6% (1.1%)
2011	11,805		3,280	17.8% (3.3%)
2016	13,190	11.7% (2.2%)	4,461	36.0% (6.3%)
2001- 2016 growth			1825	69.2% (3.6%)

*Annual growth rate is calculated based in the 5 or 15 year growth rate annualized as single year average growth

Table 3.2 shows the estimated 2016 Census dwelling units and population. The estimated residential population of the area in 2016 was 41,683. The share of this total broken down by the two jurisdictions is as follows:

- The City of West Kelowna = 78.3%, or 32,655 persons.
- The Westbank First Nation = 21.7%, or 9,028 persons.

The estimated number of dwelling units in West Kelowna and Westbank First Nation, in the 2016 Census, was 17,651. The share of this total broken down by the two jurisdictions is as follows:

- The City of West Kelowna = 74.7%, or 13,190 dwelling units.
- The Westbank First Nation = 25.3% or 4,461 dwelling units.

Table 3.2: Current Development

Existing 2016 Population			
	City of West Kelowna	Westbank First Nation	Total
Total Population	32,655	9,028	41,683
Total Dwelling Units	13,190	4,461	17,651
Dwelling Unit size (person per unit)	2.5	2.0	

Commercial, Industrial, and Institutional

Accurate and consistent figures are not available for the amount of past or existing Commercial, Industrial, and Institutional floor area for West Kelowna or Westbank First Nation. However data does exist for the construction value of Commercial, Industrial, and Institutional development in West Kelowna for years 2011 to 2016. Based on assumptions of average construction cost per square metre, those figures can be translated into estimates of square meters of building area.

The amount of development in West Kelowna over the 6 years from 2011 to 2016 inclusive is estimated as follows:

- Commercial = 33,000 sq.m.
- Industrial = 34,000 sq.m
- Institutional = 15,000 sq.m

Past construction figures are not available for Westbank First Nation, but an estimate of the existing amount of combined Commercial, Industrial, and Institutional development from the Wastewater Master Servicing Plan is as follows:

- IR #9 = 140,265 sq. m.
- IR #10 = 15,271 sq. m.

3.3 Growth Assumptions

The estimation of growth used in this Study is based on a variety of information sources. These information sources are described below.

City of West Kelowna, Residential & Non-Residential

The City of West Kelowna provided growth projections for population and dwelling numbers for residential and non-residential units to the year 2035. This information was calculated during the process of their 2015 Development Cost Charges Bylaw review. Urban Systems also reviewed the West Kelowna OCP, and communicated with the City of West Kelowna regarding potential future development within areas that will connect to the East Trunk. The City provided mapping showing proposed future development on various parcels within the service area, including information on the numbers of single family and multi family units, as well as square meters of commercial and industrial development. Some development was identified as occurring beyond the 20 year time frame, and these were excluded from the projections. Based on a review of this mapping and confirmation with the City, Urban Systems calculated the amount of potential development within the East Trunk service area of the City.

Westbank First Nations, Residential & Non-residential

The projected growth on the Westbank First Nation Tsinstikeptum 9 and 10 is based on information provided by Westbank First Nation for work done by Urban Systems Ltd. for the Wastewater Master Servicing Plan, completed in October 2016. It is based on units forecast by Westbank First Nation for individual development cells within the East Trunk catchment area as set out on Land Use Maps.

Variability in Growth Projections

Growth projections of various jurisdictions can vary in terms of how conservative or how aggressive they can be. The level of projected growth depends on a number of assumptions and can relate to the amount of growth currently experienced and the amount of capacity in the community to accommodate growth. The information used in this report is based on the information provided or available for the various jurisdictions. Rather than question the growth projections, this report uses the projections made by the documents from each jurisdiction. As future projections are uncertain, some of the growth, and the system capacity, could be absorbed by development in a range of locations: some might be located in Westbank First Nation, and some might be in the City of West Kelowna, and the location of growth may shift over time. Projected growth may not match actual growth and it is important to re-evaluate growth projections and resulting DCC calculations every 3-5 years in order to keep on track with actual growth. If

actual growth is higher than projected, the infrastructure will be needed more quickly, but there will also be more DCC revenues available to pay for the costs. If growth is slower than projected, the DCC revenues will build more slowly, but the infrastructure needs will also arrive more slowly.

3.4 Residential Growth

Dwelling Units

Over the next 20 years, the number of dwelling units is estimated to increase by 5,235 units. The growth within the two jurisdictions is as follows:

- The City of West Kelowna = 1613 dwelling units, with 270 single detached and 1343 multifamily units, based on an analysis of the potential development in West Kelowna that could connect to the East Trunk over the next 20 years. The resulting amount of development is approximately 81 units per year over a 20 year period, or about 0.61% growth per year, although this includes only the portion of the City serviced by the East Trunk. While the figure will likely fluctuate significantly over the years, this volume of development should be possible given that the entire City of West Kelowna saw development of about 277 units per year from 2011 to 2016.

- The Westbank First Nation = 3,622 dwelling units, with 372 single detached and 3250 multifamily units, based on units forecast by Westbank First Nation for individual development cells within the East Trunk catchment area as set out on Land Use Maps. The subject area of Westbank First Nation currently has a total of 4461 residential units. The growth of 3622 units from 4461 to 8083 is an increase of approximately 3.0% per year over the 20 year projection period, which is less than the annual growth rate of 6.3% from 2011 to 2016, but is more comparable to the annualized growth rate of 3.6% over the 15 year period from 2001 to 2016, and is likely more reasonable over a 20 year period. This is also a rate of about 181 units per year over the 20 year period compared to about 236 units per year from 2011 to 2016.

3.5 Non-Residential Growth

Over the next 20 years, an anticipated 228,773 square metres of commercial, industrial and institutional space combined will be connected to the sewer lines flowing into the East Trunk. The growth is based on information set out in the West Kelowna DCC projections and Westbank First Nation Sewer Master Plan projections. The projected growth within the two jurisdictions is as follows:

- **The City of West Kelowna**
  - The West Kelowna DCC analysis projects the following amount of growth for the entire city:
    - Commercial = 25,000 sq.m.
    - Industrial = 45,000 sq.m.
    - Institutional = 15,000 sq.m. and 300 institutional care beds
  - The analysis is based on an assumption that the following percentages of various forms of development will be connected to the East Trunk:

- 60% of the Commercial development,
- 100% of the Industrial development, and
- 30% of the Institutional development.

- The resulting amount of development assumed to be connected to the East Trunk is as follows:
  - Commercial = 15,000 sq.m.
  - Industrial = 45,000 sq.m.
  - Institutional = 11,700 sq.m.

- The Commercial and Industrial figures were checked against known potential development within the projection period, and the known amount of development is somewhat less than the projected amounts, which leaves some projection room for unanticipated Commercial and Industrial development over the 20 year projection period.

- The institutional figure is based on a combination of Institutional floor area projected plus the projected number of Institutional care beds. Care facilities are anticipated to have a growth of 300 beds in the identified growth period. The institutional growth includes 30% of the 15,000 sq.m. projected = 4,500 sq.m., plus 300 bed units x 80 sq.m. per unit = 24,000 sq.m. at 30% = 7,200 sq.m. The 4,500 sq.m.+7,200 sq.m.= 11,700 sq.m.

The Westbank First Nation

- Figures for Commercial, Industrial and Institutional growth on Westbank First Nation were provided as one combined figure (79,131 sq.m. on IR9 and 77,942 sq.m. on IR 10 for a total of 157,073 sq.m. for all combined Commercial, Industrial, and Institutional growth) so this analysis assumes a distribution of new development amongst the different types.
- Based on an assumption of 60% Commercial, 30% Industrial, and 10% Institutional, the distribution will be:
  - Commercial = 94,244 sq.m.
  - Industrial = 47,122 sq.m.
  - Institutional = 15,707 sq.m.
  - Total = 157,073 sq.m.

The residential and non- residential growth is summarized in **Table 3.3**.

Table 3.3: Residential and Non-Residential Growth

Growth 20 years (2018 – 2038)			
	City of West Kelowna	Westbank First Nation	Total
Projected New Development (units)	1,613	3,622	5,235
Single-Detached Units	270	372	642
Multi-Family Units	1,343	3,250	4,593
Non Residential Floor Area (sq. m)			
Commercial	15,000	94,244	109,244
Industrial	45,000	47,122	92,122
Institutional	11,700	15,707	27,407

3.6 Calculation of equivalent population

Equivalency in units is used to represent new population growth and the demands that new growth places on infrastructure. Each type of development will place a different pressure on the services, and equivalent units are used to compare the impacts.

Through the DCC analysis, growth has been projected in terms of both residential and non-residential development, and various equivalent unit values have been used to relate the impacts of different land uses. For residential demand, occupancy rates - or persons per dwelling unit - can be used to project demands. For non-residential land uses, an equivalency is used. **Table 3.4** outlines the equivalent population assumptions for sanitary sewer, by land use type:

Table 3.4: Equivalent Population Assumptions

Single Family Residential	3.00	persons per dwelling unit
Multiple Unit Residential	2.00	persons per dwelling unit
Commercial	0.0130	persons per square meter
Industrial	0.0130	persons per square meter
Institutional	0.0110	persons per square meter

With the exception of industrial land use, these equivalency factors are based on the values presented in the Provincial DCC Best Practices Guide. It is expected that the majority of new industrial development would be small in scale or of a light industrial variety, with primarily indoor use, as opposed to heavy industrial uses such as sawmills. Therefore, the equivalency factor for industrial uses is based on gross floor area of development - rather than total site area. A floor area ratio assumption of 0.3 for the industrial density was used and the equivalency factor has been set at the same rate as commercial land uses.

Furthermore, the equivalency factors used in the DCC analysis for Institutional, Commercial and Industrial are the same as the factors used by the Regional District in the Regional Sewer System model, and in the Wastewater Treatment Plant DCC calculations. This point further justifies the use of these equivalency factors. The Regional Sewer System model uses these equivalency factors to project the flows generated by residential, commercial, industrial and institutional uses, so it makes sense to use these equivalency factors in calculating the development cost charges. The equivalency factors used in this update to the East Trunk DCC are slightly different from the equivalency factors used in the 2004 East Trunk DCC calculations. The difference is because back in 2004 the sewer system modelling was based on somewhat different data, and this analysis uses the most recent data and model.

4.0 EAST TRUNK DCCS

4.1 East Trunk DCC

Cost estimates and growth projections drive the East Trunk DCC calculations. The projects included in the East Trunk upgrade were identified through sewer modelling work.

Future sewer flows were modelled to determine the capacity levels of the existing East Trunk and Casa Loma gravity collection systems. The results are set out in the report set out in Appendix B.

Table 4.1 below outline the DCC projects including upgrades to the East Trunk Lift Station, Forcemain and Gravity Pipe and the Casa Loma Pump Station. Full details on the East Trunk capacity and upgrades required are outlined in the report found in Appendix B.

Table 4.1: East Trunk Lift Station, Forcemain and Gravity Pipe Upgrades

Time Frame	Description of Upgrade	Class D Estimated Cost
2018-2020	Replace East Trunk Lift Station	$3,000,000
2018-2020	Twin East Trunk Forcemain	$1,600,000
2020-2021	Upsize Gravity Trunk Boucherie Road to Empire Place	$500,000
2021-2024	Upgrade Casa Loma Pump Station	$3,600,000
2024-2026	Upgrade Gravity Trunk Empire Place to Apple Way Boulevard	$600,000
2026-2036	Upgrade Gravity Trunk Gellatly Road (LS to Boucherie Road)	$3,800,000
	Total	**$13,100,000**

The following **Table 4.2** summarizes the cost of the East Trunk DCC Program in terms of the total project cost and the amount recovered through DCCs.

Table 4.2: East Trunk DCC Program Costs

	Sewer DCC Costs
Total Cost of Project Work	$13,100,000
DCC Recoverable	$12,969,000
Regional District Responsibility (Total Cost minus DCC Recoverable)	**$131,000**

The total cost of the improvements is $13,100,000, of which $12,969,000 is DCC recoverable and the remaining $131,000 needs to be financed through other methods.

4.2 Sanitary Sewer DCC Calculation

The East Trunk DCC rates have been calculated according to the various principles and assumptions discussed earlier in this report. In order to calculate the East Trunk DCC levy, it is necessary to determine the total number of residential dwelling units required over the next 20 years. **Table 3.1** outlines the projected growth in units for the Westside area. This information serves as the basis for the East Trunk Development Cost Charge calculation. The basic calculation is shown in **Equation 4.1**.

Equation 4.1: Sanitary Sewer DCC Calculation

1. Total New Growth (by unit or sq. m.) x Equivalent Population (per unit or sq. m.) = Total Equivalent Population.

2. DCC Recoverable Costs / Total Equivalent Population = DCC Costs per Equivalent Population.

3. DCC Costs per Equivalent Population x Equivalent Population (per unit or sq. m.) = DCC Costs per Unit or Square Meter.

Table 4.4 titled "DCC Program Costs" provides a detailed overview of:

- The estimated cost for each upgrade;
- The percentage of the cost allocated to new growth;
- The assist factor;
- The total DCC recoverable; and,
- The total Regional District responsibility.

The allocations of part of the project costs to new growth are set out as the benefit factor in **Table 4.4**. The projects or proportion of projects benefitting new growth are set out in the Regional District's capital plan and are included in this program to be funded by Development Cost Charge revenues.

The resulting East Trunk DCC rates are shown in Table 4.3.

Table 4.3 Proposed Sewer DCC Rates

Use	Unit charged	Existing Charge Per Unit	Proposed Charge Per unit	% Change
Single Detached Residential	For Each parcel Created at Subdivision	$564	$2,353	317%
Duplex or Triplex	For each unit permitted on the parcel at time of subdivision	$564	$2,353	317%
Multiple Housing Residential	For Each Dwelling Unit	$395	$1,569	297%
Commercial	For each 100 sq.m. of gross floor area	$233	$1,020	338%
Industrial	For each 100 sq.m. of gross floor area	$260	$1,020	292%
Institutional	For each 100 sq.m. of gross floor area	$233	$863	270%

The detailed East Trunk DCC calculations for Regional District are included in the following Tables 4.4 and 4.5.

Table 4.4: Sewer DCC Program Costs

SANITARY DCC PROGRAM							
Project No	**Description**	**Cost plus E&C per component**	**Percentage Allocation to New Growth**	**Benefit to New Dev.**	**Assist Factor 1%**	**DCC Recoverable**	**Total RDCO Responsibility**
ET1	East Trunk Lift Station	$3,000,000	100.0%	$3,000,000	$30,000	$2,970,000	$30,000
ET2	East Trunk Force Main	$1,600,000	100.0%	$1,600,000	$16,000	$1,584,000	$16,000
ET3	East Gravity Collection System - Boucherie to Empire	$500,000	100.0%	$500,000	$5,000	$495,000	$5,000
ET4	East Gravity Collection System - Empire to Apple Way	$600,000	100.0%	$600,000	$6,000	$594,000	$6,000
ET5	East Gravity Collection System - LS to Boucherie	$3,800,000	100.0%	$3,800,000	$38,000	$3,762,000	$38,000
ET6	Casa Loma Trunk Lift Station and Forcemain	$3,600,000	100.0%	$3,600,000	$36,000	$3,564,000	$36,000
	Total	**$13,100,000**		**$13,100,000**	**$131,000**	**$12,969,000**	**$131,000**

Table 4.5: Sewer DCC Rate Calculation

A: Sanitary Calculation				
Land Use	Col.(1) Total Adjusted Estimated Development	Col.(2) Unit of Measure	Col.(3) Equivalency per Unit of Measure	Col.(4) = Col.(1) x Col.(3) Equivalent Population
Single Family Residential	642	dwelling units	3.00	1,926
Multiple Unit Residential	4,593	dwelling units	2.00	9,186
Commercial	109,244	square meters	0.0130	1,420
Industrial	92,122	square meters	0.0130	1,198
Institutional	27,407	square meters	0.0110	301
			Total Equiv. Pop	(a) 14,031
B: Unit Sanitary DCC Calculation				
Net Sanitary DCC Program Recoverable		$12,969,000.00	(b)	
Existing DCC Reserve Monies		$1,962,847.00	(c)	
Net Amount to be Paid by DCCs		$11,006,153.00	(d)=(b)-(c)	
DCC per Equivalent Population		$784.40	(e) = (d)/(a)	
C: Resulting Sanitary DCCs				
Land Use	**Equivalent**	**DCC per Unit**		
Single Detached Residential, duplex, triplex	3.00	$2,353.21	per lot or unit	(e) x Col.(1)
Multiple Unit Residential	2.00	$1,568.81	per unit	(e) x Col.(1)
Commercial	0.0130	$10.20	per square meter	(e) x Col.(1)
Industrial	0.0130	$10.20	per square meter	(e) x Col.(1)
Institutional	0.0110	$8.63	per square meter	(e) x Col.(1)

5.0 DCC RATES SUMMARY AND IMPLEMENTATION

5.1 Summary of Proposed DCC Rates

Table 5.1 summarizes the East Trunk DCC rate for the area served by the East Trunk.

Table 5.1: DCC Rate Summary

Use	Unit charged	Existing Charge Per Unit	Proposed Charge Per unit	% Change
Single Detached Residential	For Each parcel Created at Subdivision	$564	$2,353	317%
Duplex or Triplex	For each unit permitted on the parcel at time of subdivision	$564	$2,353	317%
Multiple Housing Residential	For Each Dwelling Unit	$395	$1,569	297%
Commercial	For each 100 sq.m. of gross floor area	$233	$1,020	338%
Industrial	For each 100 sq.m. of gross floor area	$260	$1,020	292%
Institutional	For each 100 sq.m. of gross floor area	$233	$863	270%

5.2 Bylaw Exemptions

The Local Government Act (LGA) is quite clear that a DCC cannot be levied if the proposed development does not impose new capital cost burdens on the Regional District, or if a DCC has already been paid in regard to the same development. However, if additional further expansion for the same development creates new capital cost burdens or uses up capacity, the DCCs can be levied for the additional costs.

The LGA further restricts the levying of the DCC at the time of application for a building permit if:

- the building permit is for a church or place of worship; and
- the value of the work authorized by the building permit does not exceed $50,000 or a greater amount as prescribed by bylaw.

The legislation allows local governments to charge DCCs on residential developments of four units or less, as long as such a charge is provided for in the local government's DCC bylaw. To enact this approach the DCC bylaw must include a specific provision, as enabled under section 561(6) of the Local Government Act.

5.3 Collection of Charges – Building Permit and Subdivision

Regional Districts can choose to collect DCCs at subdivision approval or building permit issuance. The Regional District will collect the East Trunk DCCs for single detached residential developments at subdivision approval. For parcels that allow Duplexes or Triplexes, the DCC will be collected based on the number of units permitted at the time of subdivision. Of the two possible collection times, subdivision approval occurs earlier in the process. Collecting DCCs early will allow the Regional District to ensure timely provision of infrastructure and services.

For multiple unit dwellings DCCs are collected based on the number of multi unit dwellings at the time of building permit approval because the number of units can be determined at this time.

Industrial, institutional and commercial DCCs are levied at the time of building permit on the basis of square metre of gross floor area, because the building size and floor area can be determined at the time of building permit.

5.4 In-Stream Applications and Grace Periods

The LGA requires that subdivision applications be provided a one-year protection from the proposed DCC rates, as long as the application is complete and application fees have been paid before the bylaw is adopted. These in-stream active subdivision applications will be exempted from any increase in DCCs for one year from the date of implementation of the new DCC bylaw.

Building permits are also given the same in-stream exemptions as subdivision applications under the LGA. Complete building permit applications received before the bylaw is adopted will also be exempt from any increase in DCCs for one year from the date of implementation of the new DCC bylaw. The same in-stream exemptions provided for building permits and subdivision applications under the LGA have been extended further to include development permits and zoning bylaw amendments associated with building permits.

A grace period is a length of time offered as notification that new DCCs will be in effect. For example, the DCC bylaw may state that the effective date will be a time period (e.g. up to a year) from the date that the DCC bylaw is adopted. In order to have the changes to the East Trunk DCCs come into effect immediately, the Regional District proposes to have the DCCs come into effect the same day the bylaw is adopted.

5.5 DCC Rebates and Credits

The LGA stipulates that should an owner pay for specific services outside of the boundaries of the land being subdivided or developed and these services are included in the calculation to determine the DCC, then the amount paid must be deducted from the class of DCC that is applicable to the service.

5.6 DCC Monitoring and Accounting

The Regional District currently has a DCC tracking system in place. The Regional District should continue to use this system and update the amount of DCC fees collected and other relevant information on an ongoing basis relevant to this East Trunk DCC.

5.7 DCC Reviews

To keep the DCC program as current as possible, the Regional District could conduct simple cost updates to account for inflation, with no changes to projects or any other assumptions, every couple of years. The Ministry considers this a minor amendment and the approval process is quite straight forward. A minor amendment requires significantly less time and resources than a major amendment.

Major amendments of the DCC program and rates will occur when significant land use changes are made, rapid growth occurs, new technology is available, when new servicing plans are prepared or when the information upon which the DCCs are calculated has become significantly outdated or requires significant revision. Based on experience, a major amendment to the DCC program and rates is needed approximately every 3-5 years.

6.0 CONSULTATION

6.1 Public Consultation

Although the *LGA* does not require a public participation process, the Best Practices Guide does suggest that an opportunity for public participation be included as part of the development of the East Trunk DCC. The purpose of such a process is to allow those who are interested in or affected by the proposed East Trunk DCCs to offer comments and input. The Best Practices Guide does not set a recommended format to be followed for public participation; instead, the type of public participation to be used is decided by the Regional District itself. The Best Practices Guide does recommend that the development of a DCC Bylaw should include a meaningful public process to obtain input from stakeholders.

A summary of the public consultation process will be included once this step has been completed.

APPENDIX A

Proposed East Trunk DCC Bylaw

(to be completed after consultation)

APPENDIX B

East Trunk Regional Sewer Capacity Memo

MEMORANDUM

URBAN systems

Date:	November 21, 2018
To:	Clarke Kruiswyk, Regional District of Central Okanagan
cc:	Jeremy Clowes, Joel Short, Urban Systems
From:	Jason Barta
File:	1179.0093.01
Subject:	East Trunk Regional Sewer Capacity_Rev.2

This memo summarizes our findings with respect to the capacity of the existing East Trunk Regional Sewer collection system and the need to complete upgrades to accommodate anticipated growth. The improvements suggested in this memorandum will be used to update the current DCC program for the East Trunk.

Existing System Overview

The East Trunk sewer collection system is comprised of the following infrastructure elements and is also shown on **Figure 1**:

- The East Trunk lift station;
- The East Trunk forcemain;
- The East Trunk gravity collection sewer;
- The Casa Loma lift station;
- The Casa Loma forcemain; and
- The Casa Loma (also referred to as the Campbell Road) gravity collection sewer.

Analysis Overview

The East Trunk sewer collection system was reviewed to determine the extent of capacity based upgrades that will be required to accommodate anticipated growth over a 50 year planning horizon. This included reviewing the following scenarios:

- Existing Conditions (2016);
- 20 year growth (2036); and,
- 50 year growth (2066).

Design Criteria

For the purposes of the analysis, peak design flow is defined as the peak wet weather flow (PWWF). PWWF is equal to the peak dry weather flow plus an allowance for inflow and infiltration (I/I).

The dry weather flow is calculated by a per-capita sewer loading for existing development of 350 L/capita/day and 280 L/capita/day for future development. The peaking factor applied to each sub-catchment is equal to 70% of the Harmon equation.

IR10

IR9

WFN Boundary
Start of regional trunk

Casa Loma Sanitary
Sewer Lift Station

East Trunk Sanitary
Sewer Lift Station

Okanagan Lake

PS

WTP

U:\Projects\KEL\1179\0093\01\D-Drafting-Design-Spreadsheets\GIS\Projects\MXD\Current\East Trunk Report - Figure 1.mxd Last updated by jbarta on Wednesday April 19, 2017 at 14:03:19 PM

REGIONAL DISTRICT of CENTRAL OKANAGAN

Regional District of Central Okanagan

East Trunk Sanitary Sewer

Existing Sewer System

Legend

- Streams
- Lakes
- Cadastral
- CWK Lift Station
- Regional Lift Station
- WWTP
- Dosing Chamber
- Sewer Mains

East Trunk Components

- Casa Loma Forcemain
- Casa Loma Gravity Sewer
- East Trunk Forcemain
- East Trunk Gravity Sewer

0 190 380 760 1,140

Metres

N

Coordinate System:
NAD 1983 UTM Zone 11N

Scale:
1:30,000

Data Sources:
Data provided by -

Project #:	1179.0093.01
Author:	JB
Checked:	JC
Status:	~ DRAFT ~
Revision:	A
Date:	2017 / 4 / 19

URBAN systems

FIGURE 1

An I/I allowance of 5,000 L/Ha/day was applied to the system.

Existing mains shall not be considered for replacement unless the peak flow depth meets or exceeds the pipe diameter. Proposed replacement pipes shall be sized to ensure that the sewer flows no more than 75% at peak design flow.

The maximum velocity for sewage forcemains shall not exceed 3 m/s. Minimum flushing velocity shall not be less than 0.9 m/s.

Pipe upgrades that are triggered within the next years (or the 2036 scenario) will be sized based on the build-out (2066) population expected within the catchment boundary. The rationale for designing to a longer development horizon is that the design life of sewer piping is approximately 75 years. Facility upgrades will be based on the 20-year development horizon.

The table below summarizes the design criteria.

Table 1 – Design Criteria

Item	**Comments**
Design flow	Size for PWWF based on the following: • Existing development = 350 l/d/c • Future development = 280 l/d/c • 70% of Harmon equation • I/I allowance = 5,000 L/d/ha
ICI Equivalent Populations	• Commercial 0.013 people/building m^2 • Industrial 0.013 people/building m^2 • Institutional 0.011 people/building m^2
Existing Gravity Pipes	Replace when depth/diameter (d/D) ratio =>0.9
Existing Forcemains	Replace when velocity > 3 m/s (or pumping head is excessively high)
Proposed Gravity Pipes	Sized to ensure d/D <=0.75 at 2066 PWWF, min velocity >0.6 m/s and install at same grade as existing
Proposed Forcemains	Sized to maintain velocity between 0.9 m/s and 3 m/s
Lift Station Upgrades	Sized to accommodate 2036 growth scenario

Capacity of Existing System

A hydraulic model was created to dynamically model the anticipated flows in the East Trunk system. The contributing sewer sub-catchments are shown in **Figure 2** and the model was initialized with sewer loads. Sewer loads were based on the design criteria listed in the previous section and the equivalent populations counted in each sub-catchment. The existing capacity of each key component of the East Trunk sewer collection is summarized in the table below.

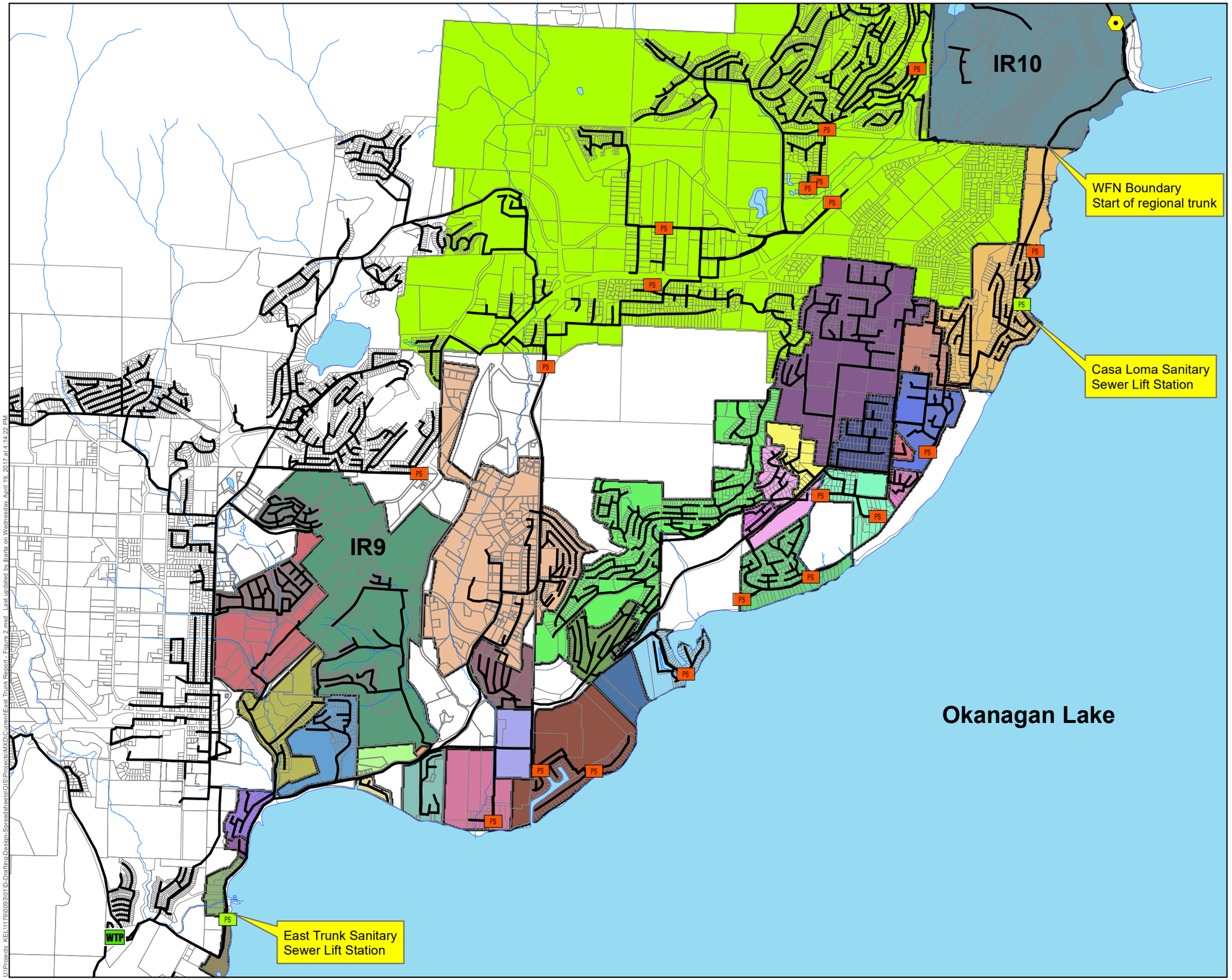
Table 2 – Existing PWWF vs. Existing Capacity

Component	Existing PWWF (l/s)	Existing Capacity (l/s)
East Trunk Lift Station	142 (1)	155
East Trunk Forcemain	312 (2)	377
East Trunk Gravity Collection System	115 (1) (5)	120 (4)
Casa Loma Lift Station	47 (1)	74
Casa Loma Forcemain	70	212 (3)
Casa Loma Gravity Collection System	32 (1) (5)	103 (4)

(1) Peak wet weather flow estimate from flow meter data which recorded a maximum day flow of approx. 9,200 m^3/d and applying a peaking factor of 1.33 (based on multipliers included in the 2010 Westside Regional WWTP Stage 3 Upgrades report prepared by AECOM).
(2) Based on all three pumps operating
(3) Based on 3 m/s velocity. Capacity expected to be much lower if pumping head is restricted to common wastewater range (i.e., ideally 40 m or less for single pump and 120 m for pumping in series)
(4) Theoretical pipe capacity flowing 90% full in pipe with lowest residual capacity.
(5) Trunk main pipe with lowest residual capacity.

East Trunk Lift Station

The East Trunk lift station is equipped with three (3) 40 HP sewage pumps (2 duty and 1 standby) and has a capacity of 155 L/s with two of three pumps operating. The existing peak flow into the station is estimated at 142 L/s, leaving a residual capacity of 13 L/s.



Regional District of Central Okanagan

East Trunk Sanitary Sewer

Existing Sewer Sub-catchments

Legend

- Streams
- Lakes
- Cadastral
- CWK Lift Station
- Regional Lift Station
- WWTP
- Dosing Chamber
- Sewer Mains

0 190 380 760 1,140

Metres

N

Coordinate System:
NAD 1983 UTM Zone 11N

Scale:
1:30,000

Data Sources:
Data provided by -

Project #:	1179.0093.01
Author:	JB
Checked:	JC
Status:	~ DRAFT ~
Revision:	A
Date:	2017 / 4 / 19

URBAN systems

FIGURE 2

East Trunk Forcemain

The East Trunk forcemain is 400 mm in diameter. The capacity of the forcemain, using the maximum velocity constraint of three meters per second, is 377 L/s.

East Trunk Gravity Collection System

The gravity pipe collection system consists of the following assets:

- 115 meters of 300 mm diameter pipe;
- 3,400 meters of 375 mm diameter pipe;
- 1,025 meters of 450 mm diameter pipe;
- 1,660 meters of 600 mm diameter pipe;
- 1,640 meters of 675 mm diameter pipe; and
- 5 meters of 750 mm diameter pipe.

The model estimates that the entire sewer flows at a depth of 75% full or less, with the exception of four (4) pipe segments as shown in **Figure 3**. The maximum depth of flow in these segments is 83% which leaves a residual capacity of 5 L/s (1) (development of an equivalent population of 615 persons).

(1) Peak flow divided by a peaking factor of 2.5 to calculate an average flow. The average flow is then divided by the future unit sewer loading of 280 L/c/day to develop an equivalent population. Infiltration and Inflow allowance has been ignored (assumed most growth would be infill, requiring very little new piping)

Casa Loma Lift Station

The existing Casa Loma station is equipped with four (4) 150 HP duty pumps which are configured to operate with two sets of pumps in series. The capacity of each set of pumps in series is 74 L/s @ 131 m. The existing conditions hydraulic model estimates the peak flow into the station at 47 L/s, which can be accommodated with either set of pumps.

Casa Loma Forcemain

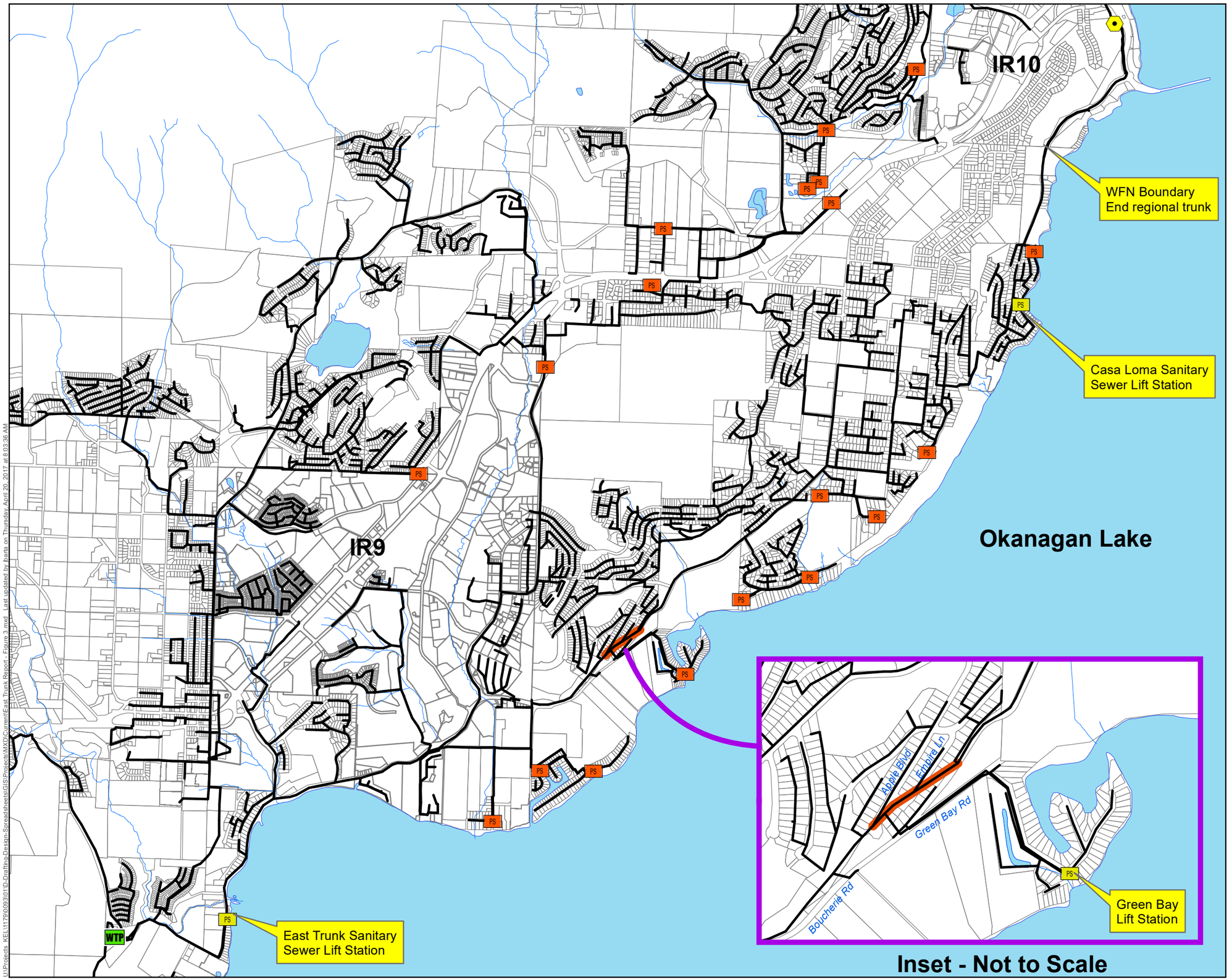
The Casa Loma sewage forcemain is 300 mm in diameter. The capacity of the forcemain, using the maximum velocity constraint of three meters per second, is 212 L/s. It is noted that friction losses become excessive at this flow rate and it is likely not practical to increase the pumping head much higher than 131 m (existing TDH of pumps at a flow of approx. 74 l/s).

Casa Loma Gravity Collection System

The gravity pipe collection system consists of the following assets:

- 1,340 meters of 300 mm diameter pipe; and
- 10 meters of 375 mm diameter pipe;

There are no capacity issues within this trunk sewer based on the estimated peak flows of the existing conditions hydraulic model. The lowest residual capacity of the existing collection system is 71 L/s (development of an equivalent population of 8,700 persons)



Regional District of Central Okanagan

East Trunk Sanitary Sewer

Existing Capacity Issues

Legend

- Streams
- Lakes
- Cadastral
- CWK Lift Stations
- Regional Lift Stations
- WWTP
- Dosing Chamber
- Sewer Mains
- Pipes flowing > 75% full

Under existing conditions, there are no pipes that flow completely full (d/D >=1)

0 190 380 760 1,140

Metres

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:30,000

Data Sources: Data provided by -

Project #:	1179.0093.01
Author:	JB
Checked:	JC
Status:	~ DRAFT ~
Revision:	A
Date:	2017 / 4 / 20

URBAN systems

FIGURE 3

Anticipated Growth – City of West Kelowna

Urban recently worked with the City of West Kelowna (CWK) to identify the amount of growth within the next twenty years. A mix of residential units was identified along with new Institutional, Commercial and Industrial (ICI) growth as shown in **Table 3** below.

Table 3 – Anticipated ICI Growth within CWK

Land Use	Gross Floor Area (m^2)	Population Density	Equivalent Population
Commercial	25,000	0.013	325
Industrial	45,000	0.013	585
Institutional [(1)]	300	1.25	375
Institutional	15,000	0.011	165
		Total	**1,450**

[(1)] 300 bed facility

We have assumed the following percentages of each ICI development type to be ultimately allocated to the East Trunk sewer (the remainder shall be collected by the Glenrosa and Shannon Lake trunk sewers):

- 100% of the industrial development;
- 60% of the commercial development; and
- 30% of the institutional development

The result is an ICI equivalent population of 942 persons and was allocated to the East Boundary lift station, which ultimately flows into the East Trunk collection system at the bottom of Ridge Estates Drive.

Residential growth within the CWK was based on parcel size and density assumptions (based on neighbouring developments**). Table 4** gives the densities used for each development type.

Table 4 – Residential Density

Development Type	Density (persons/unit)
Medium Density Multi-Family	2.0
Low Density Multi-Family	2.25
Single Family Development	2.8

The analysis suggests a residential growth of 2,242 persons to be allocated to the East Trunk. Of this, 680 persons are allocated to the Mission Hill winery area (discharge point at Apple Way Boulevard), 1,506 are allocated to the catchment upstream of the East Boundary lift station, and 56 persons are assigned to the Casa Loma catchment.

The table below summarizes anticipated increase in sanitary flows from City of West Kelowna over the next 20 years. Note that CWK does not have residential growth projections to 2066 readily available. This

is not expected to have a significant impact on the gravity main and forcemain sizing as CWKs land within the East Trunk catchment will be near full build out in 2036.

Table 5 – 2036 CWK Estimated East Trunk Flow from Growth (L/s)

Growth Type	Equivalent Population	Average Dry Weather Flow (l/s)	Peak Dry Weather Flow (l/s)(1)	I/I Allowance (l/s)	PWWF (l/s)
ICI	942	3.1	7.6	2.5	10.1
Residential	2,242	7.3	18.3	5.6	23.9
				Total	**34.0**

(1) Based on a peaking factor of 2.5. Actual peaking factor in model will vary based on allocation of population to various catchments.

Anticipated Growth – Westbank First Nation

Westbank First Nation (WFN) recently identified their growth projections, which were incorporated into the Draft Sanitary Sewer Master Plan (2016). The design criteria for the master plan document are the same as those included in this report, with the exception of the ICI equivalent population densities. **Table 6** lists the projected peak flows anticipated from each reserve over the 20-year (2036) and build-out (2066) development horizons. Note that **Table 6** includes residential growth to 2066 and ICI growth to 2036.

Table 6 – Projected WFN PWWF (L/s)

Year	IR#9	IR#10
2016	109	38.2
2036	142	91.2
2066	165	134.2

For IR#9, the locations of proposed development and the existing sewer collection trunks suggests that the peak flows due to growth be allocated as such:

- 50% to the Two Eagles trunk main,
- 25% to the Carrington trunk main; and
- 25% to the Boucherie (East Boundary) trunk main.

For IR#10, all the flow from future growth will be discharged through the Campbell Road siphon to the Campbell Road regional gravity collection trunk.

Note that the IR10 peak flows in **Table 6** and the hydraulic model include the Shelter Bay development lands. There is an agreement in place for these lands which allows for a discharge of up to 11.2 L/s from that property. The 11.2 L/s from the Shelter Bay lands has been included in all modeling scenarios.

Required Future Capacities and Recommended Improvements

Future condition hydraulic models (growth to 2036 and 2066) were created by copying the existing conditions model and adding the future CWK and WFN sewer loading as identified in the preceding sections.

The future sewer flows caused flooding on both the existing East Trunk and Casa Loma gravity collection systems. Sewer mains sizes were increased in the 2066 hydraulic model to ensure that all flow reached the next manhole downstream and that the maximum depth of flow adhered to the design criteria.

Pump station capacities in the 2036 model were adjusted such that the proposed pump rate matched the peak inflow to the station (ideal pump). **Figure 4** highlights the overall system upgrades required.

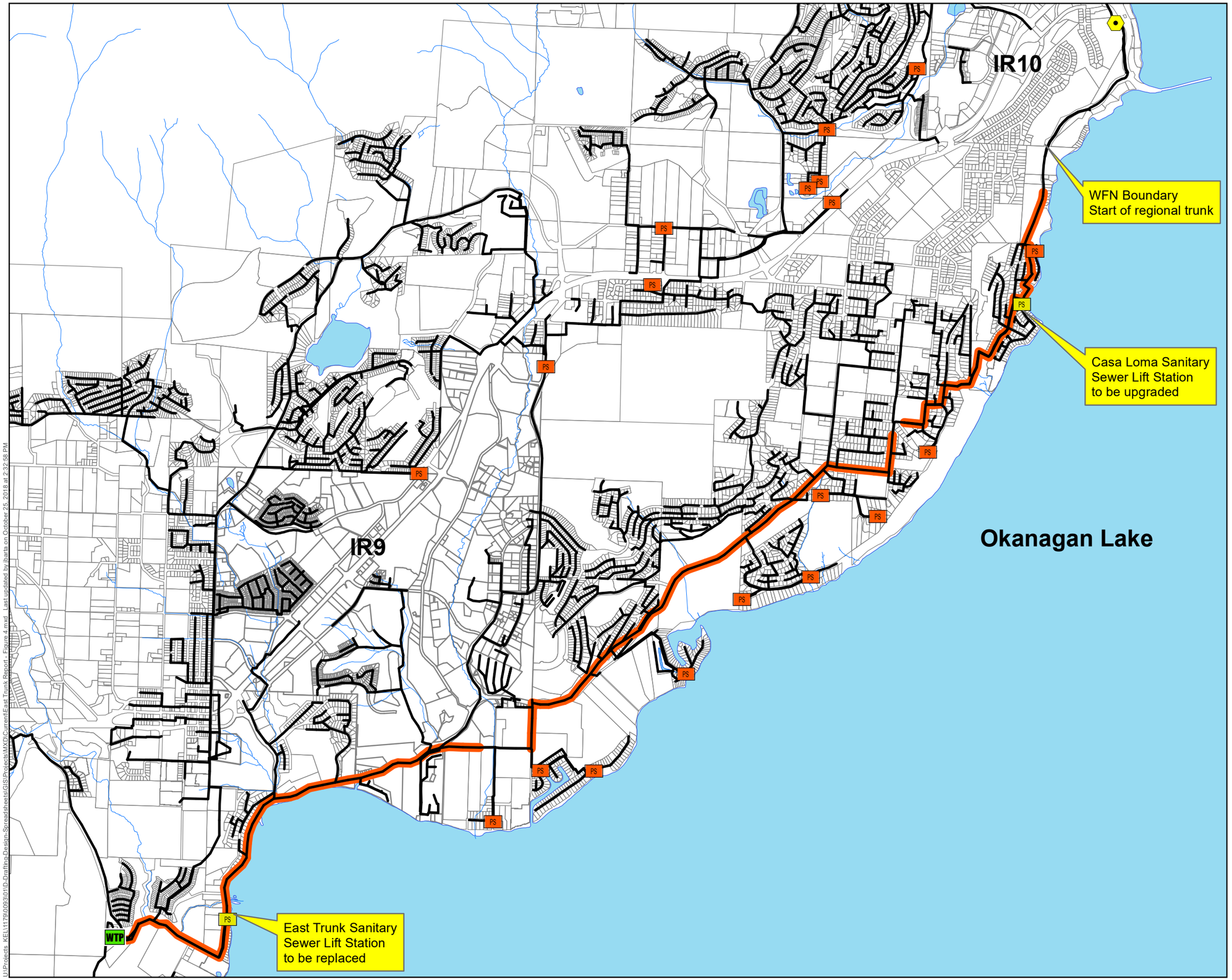
The cost estimates provided in this section are Class 'D' due to limited site information and lack of geotechnical investigation. The estimates include a 15% engineering allowance and a 35% contingency allowance.

The existing capacity of each key component of the East Trunk sewer collection is summarized in the table below along with the future design PWWF.

Table 7 – Future PWWF vs. Existing Capacity

Component	Future PWWF (l/s)	Existing Capacity (l/s)
East Trunk Lift Station	458 (1) (2)	155
East Trunk Forcemain	504 (1) (3)	377
East Trunk Gravity Collection System	243 (1) (6)	120 (5)
Casa Loma Lift Station	116 (1) (2)	74
Casa Loma Forcemain	181 (1) (3)	212 (4)
Casa Loma Gravity Collection System	163 (6)	103 (5)

(1) Peak flow estimate from hydraulic model.
(2) Lift station capacity compared against 2036 PWWF.
(3) Forcemain and gravity sewer capacity compared against 2066 PWWF.
(4) Based on 3 m/s velocity. Capacity expected to be much lower if pumping head is restricted to common wastewater range (i.e., ideally 40 m or less for single pump and 120 m for pumping in series)
(5) Theoretical pipe capacity flowing 90% full in pipe with lowest existing residual capacity.
(6) Trunk main peak flow in pipe with lowest existing residual capacity.



U:\Projects\KEL\1179\0093\01\D-Drafting-Design-Spreadsheets\GIS\Projects\MXD\Current\East Trunk Report_Figure 4.mxd Last updated by jbarta on October 25, 2018 at 2:32:58 PM

Regional District of Central Okanagan

East Trunk Sanitary Sewer

East Trunk Sewer Required Upgrades

Legend

- CWK Lift Stations
- Regional Lift Stations
- WWTP
- Dosing Chamber
- Sewer Mains

2066 Pipe Upgrades

- Streams
- Lakes
- Cadastral

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

0 190 380 760 1,140

Metres

N

Coordinate System:
NAD 1983 UTM Zone 11N

Scale:
1:30,000

Data Sources:
Data provided by -

Project #:	1179.0093.01
Author:	JB
Checked:	JC
Status:	~ DRAFT ~
Revision:	A
Date:	2018 / 10 / 25

URBAN systems

FIGURE 4

East Trunk Lift Station and Forcemain

The station was constructed in 1990 and the pumps were last upgraded in 2005. The current capacity of the station is approx. 155 L/s with two of the three identical 40 HP pumps operating with estimated maximum speed of 1050 rpm. The hydraulic model predicts the future peak flows into the station of 458 L/s (2036 scenario) and 504 L/s (2066 scenario).

The station will require a significant upgrade or replacement to convey these future peak flows. For the purposes of this review, it has been assumed that the lift station will be replaced and will be located in the same general area as the existing lift station (i.e. west across Gellatly Road from the existing lift station). The new lift station will be sized to handle 458 L/s (2036 PWWF).

The existing 400 mm forcemain will also require upgrading to convey the future peak flows and keep velocities below 3 m/s. The existing forcemain was installed in 1990 and is estimated to have a service life of seventy-five (75) years or to 2065. In order to accommodate the expected flows from the growth to 2066, the forcemain could either be replaced with a 500 mm diameter pipe, or a parallel 300 mm forcemain could be constructed. For the purposes of this review, it has been assumed that the existing forcemain will be twinned with a 300 mm pipe based on the age of the existing forcemain. It is recommended that the forcemain be upsized when the lift station is upgraded—this can be confirmed in the design stage.

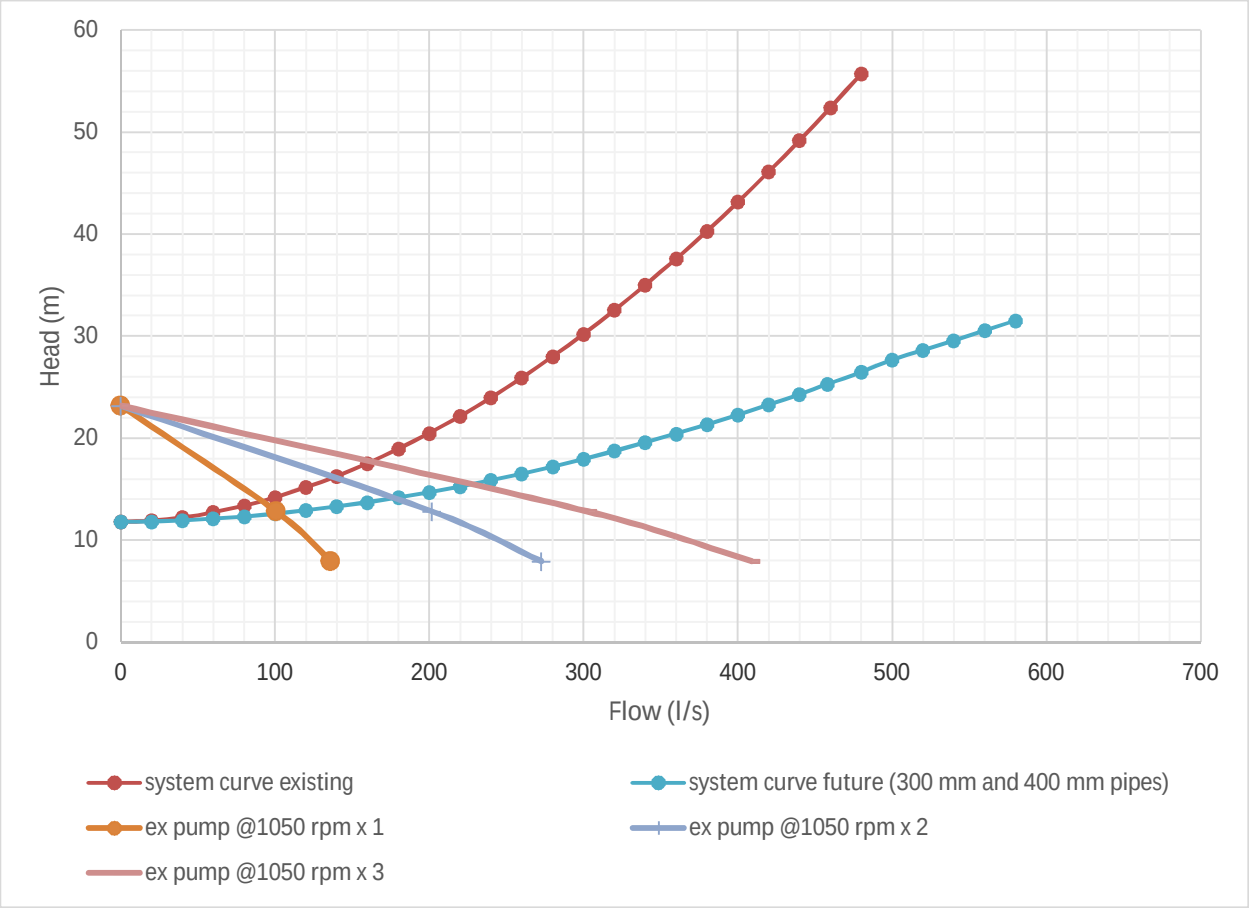
Figure 8 shows the system curve for the existing East Trunk Lift Station and the future system curve based on installing the twin 300 mm forcemain.

For the purposes of this review, it is assumed that the RDCO will:

- Construct a new lift station with a cast-in-place concrete wet well,
- Utilize four pumps (3 duty and 1 standby) in the new station,
- Provide backup power (pad mounted genset in an enclosure),
- Twin the existing forcemain with a 300 mm pipe, and,
- Decommission the existing lift station.

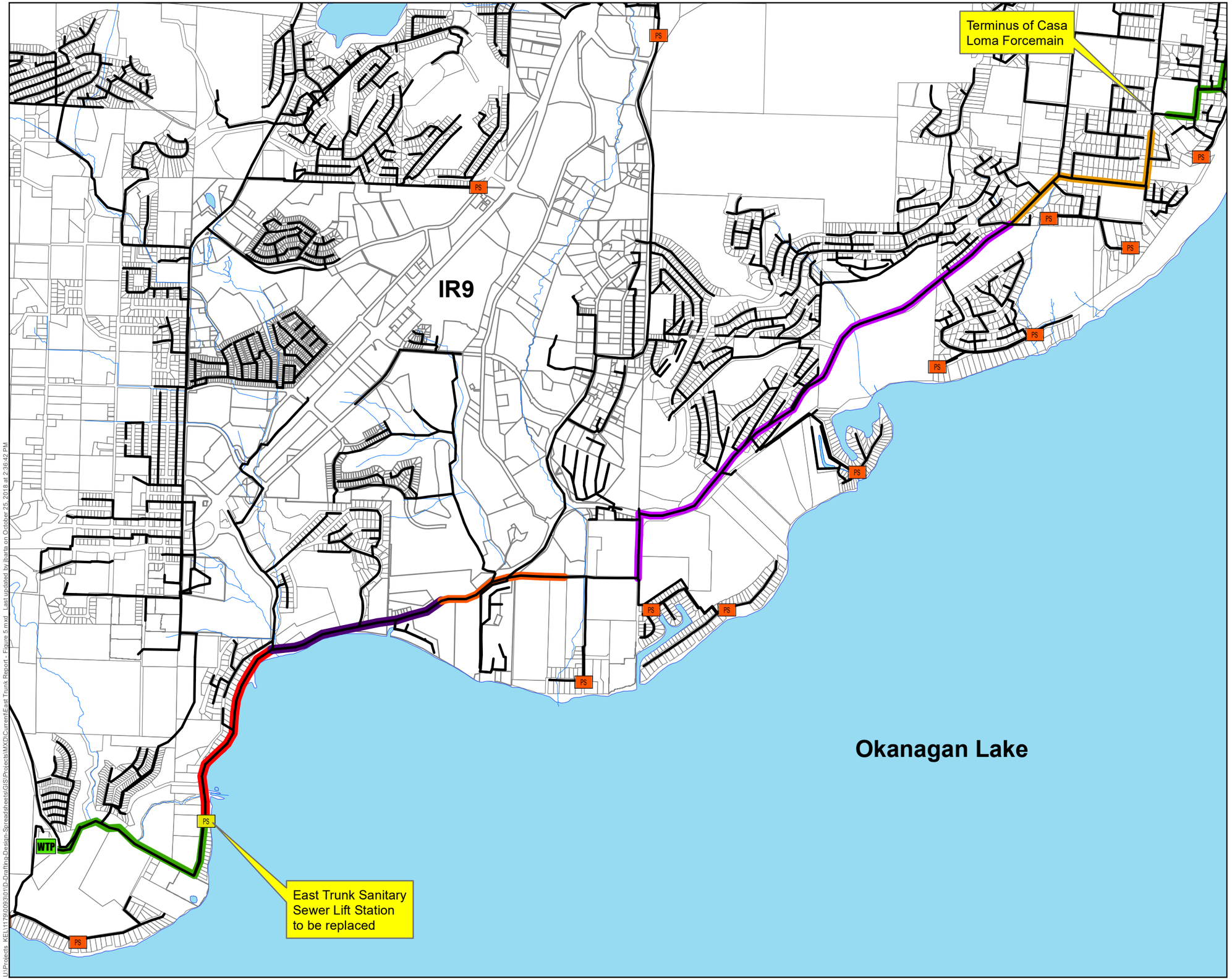
Refer to **Table 9** for estimated upgrade costs. Note that the cost estimate allows for a wet well that is 25% larger than the existing wet well which will provide additional balancing storage under lower flows and limit pump starts to a maximum of six per hour under the worst case.

Figure 8 – Existing East Trunk Lift Station System Curve



East Trunk Gravity Collection System

Three sections of the East Trunkmain will need to be upsized to accommodate the 2036 growth scenario as shown on **Figure 7** (refer to phases 1 to 3). In addition, **Figures 5** and **7** and **Table 8** identify upgrades required to accommodate the 2066 growth scenario. Refer to **Table 9** for estimated upgrade costs.



U:\Projects\KEL\1179\0093\01\D-Drafting-Design-Spreadsheets\GIS\Projects\MXD\Current\East Trunk Report - Figure 5.mxd - Last updated by jbarta on October 25, 2018 at 2:36:42 PM

REGIONAL DISTRICT of CENTRAL OKANAGAN

Regional District of Central Okanagan

East Trunk Sanitary Sewer

Ultimate System Upgrades
Gellatly Road to Lakeview Heights

Legend

- Streams
- Lakes
- Cadastral
- CWK Lift Stations
- Regional Lift Stations
- WWTP
- Dosing Chamber
- Sewer Mains

2066 Pipe Upgrades

- Proposed 300mm Forcemain (to twin existing 400mm forcemain)
- Proposed 450mm Main Replacement
- Proposed 525mm Main Replacement
- Proposed 675mm Main Replacement
- Proposed 750mm Main Replacement
- Proposed 900mm Main Replacement

0 137.5 275 550 825

Metres

N

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:21,112

Data Sources:

Data provided by -

Project #:	1179.0093.01
Author:	JB
Checked:	JC
Status:	~ DRAFT ~
Revision:	A
Date:	2018 / 10 / 25

URBAN systems

FIGURE 5

Table 8 – East Trunk Pipe Upgrades

Replacement Pipe Diameter (mm)	Length of Sewer Main (m)	Growth Scenario Triggering Upgrade
450	1,193	2066
525	250	2021
525	300	2026
525	2594	2066
675	727	2066
750	1,019	2066
900	1,120	2036
	7,203	

Table 9 – East Trunk Lift Station, Forcemain and Gravity Pipe Upgrades

Component	Description of Upgrade	Class D Estimated Cost (1)	Trigger for Upgrade(3)
East Trunk Lift Station and Forcemain	Replace existing lift station Twin existing 400 mm forcemain with 300 mm pipe to increase lift station capacity and accommodate growth	$4.6M	Aging infrastructure Adding 13 l/s of flow, approx. 1600 people or year 2018
East Gravity Collection System	Phase 1 Upsize trunk main as shown on Figure 7. Boucherie Road to Empire Place	$0.5M (2)	Adding 5 l/s, approx. 615 people or year 2018 based on linear growth
East Gravity Collection System	Phase 2 Upsize trunk main as shown on Figure 7. Empire Place to Apple Way Boulevard	$0.6M (2)	Adding 40 L/s, approx. 5,500 people or year 2026 based on linear growth
East Gravity Collection System	Phase 3 Upsize trunk main as shown on Figure 7. East Trunk Lift Station to Boucherie Road/Gellatly Road intersection	$3.8M (2)	Adding 81 L/s, approx. 12,500 people or year 2029 based on linear growth
	Total	$9.5M	

(1) Includes 50% allowance for contingency and engineering. Does not include land acquisition and legal fees.
(2) The estimate includes allowances for both trench rock removal and dewatering.
(3) Timing for upgrades should be verified by flow monitoring

Casa Loma Lift Station and Forcemain

The existing lift station was constructed in 2004 and has a pump capacity of 74 L/s. The hydraulic model estimates the peak flow into to the station to be 116 L/s in 2036 and 181 L/s by 2066.

The existing conditions model estimates the peak flow into the station at 47 L/s, leaving a residual capacity of 27 L/s, or an approximate equivalent population of 1,600 people [(1)]. Station capacity is anticipated to be reached by 2024, assuming a linear rate of growth over the next twenty years.

The station will require significant upgrades to convey a future peak flow rate of 116 l/s. As noted previously, the upgrade needs for a lift station and forcemain should be reviewed together.

To deliver the estimated 2036 PWWF of 116 l/s, the four existing 150 HP pumps will need to be replaced with 200 HP pumps. The estimated operating point for each set of two pumps configured in series is 116 l/s at 143 m TDH. Cornell is one pump manufacturer that offers a high head dry pit sewage pump capable of operating at the 2036 design flow (as shown in the system curve below). The forcemain will not require an upgrade to convey the 2036 design flow but this could be considered in the preliminary design stage to lower pumping costs.

For future upgrade considerations (not required during the DCC 20 year period), we note that the existing 300 mm diameter forcemain has a theoretical capacity of 212 L/s based on a maximum velocity of 3 m/s but it would not be practical to operate the forcemain at this flow given the required pumping head which is extremely high (approx. 185 m at 212 L/s). As such, it is expected that the forcemain will ultimately need to be upgraded to convey the future peak flows and limit friction losses. Replacing the existing forcemain with a 400 mm pipe would accommodate the 2066 growth scenario and keep friction losses low. In addition, the output from the proposed future pumps will increase to approx. 155 l/s.

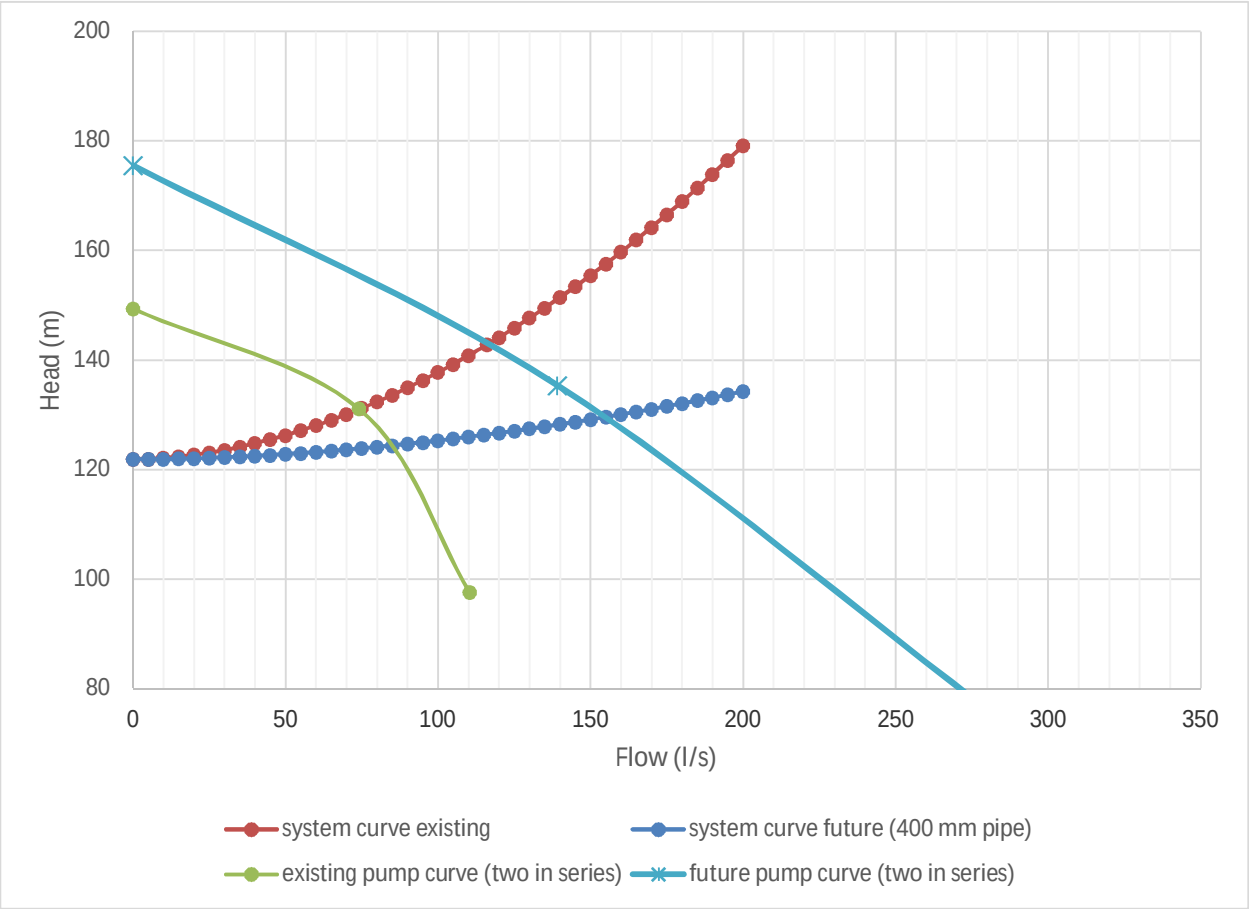
Figure 9 shows the system curve for the existing Casa Loma Lift Station and the future system curve based on replacing the existing 300 mm forcemain with a 400 mm pipe.

For the purposes of this review, it is assumed that the RDCO will:

- Replace the existing pumps with larger pumps,
- Upsize pump suction and discharge piping (requires bypass for suction piping), and,
- Expand the pump station to accommodate larger discharge piping.

Refer to **Table 12** for estimated upgrade costs.

Figure 9 – Existing Casa Loma Lift Station System Curve

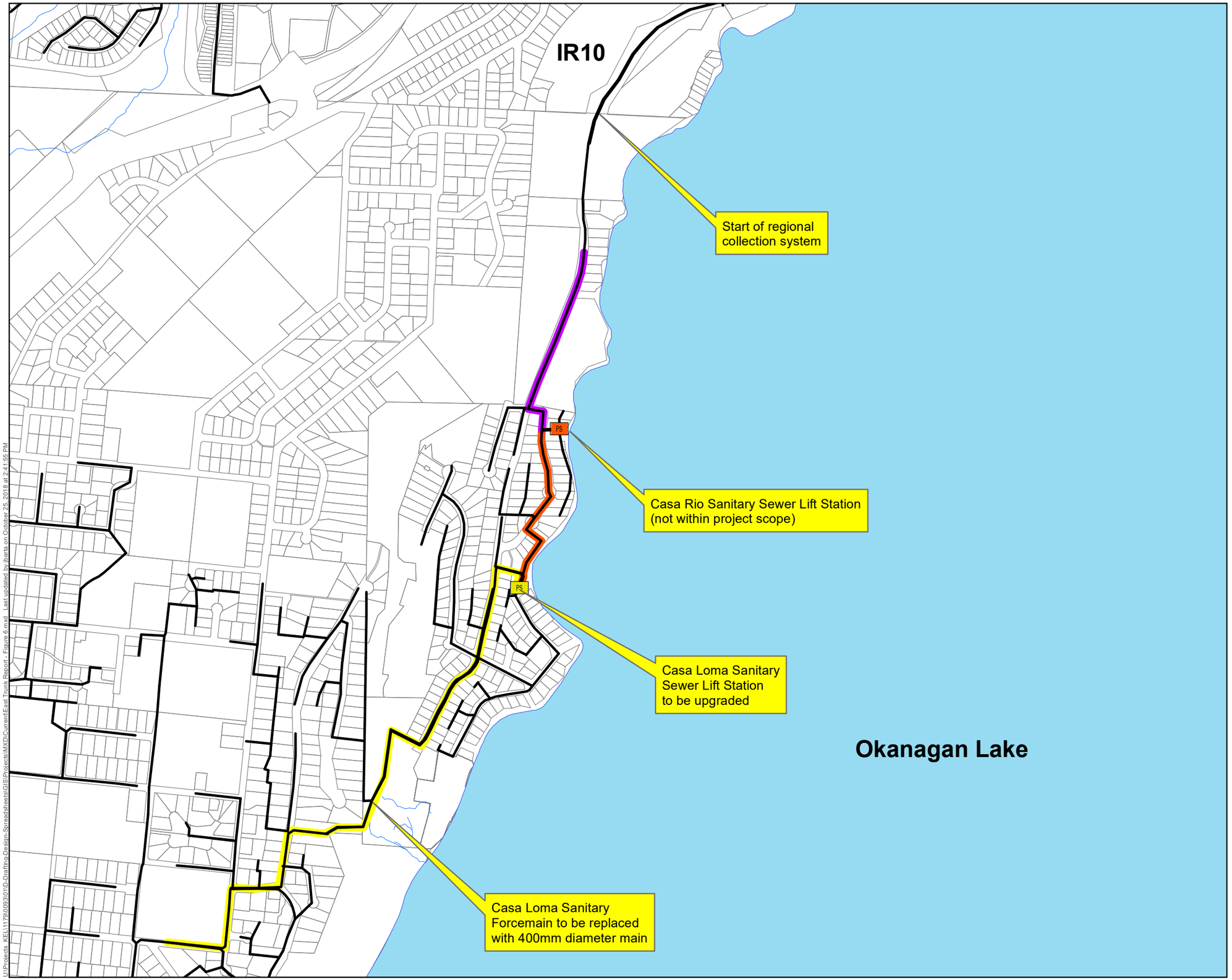


Casa Loma Gravity Collection System

No piping upgrades are required to accommodate the 2036 growth scenario. **Figure 6** and **7** and **Table 11** illustrate the pipe upgrades required to accommodate the 2066 growth scenario. Note that some of the existing sewer mains have sufficient capacity, but were upgraded to match the minimum diameter of pipes upstream. Refer to **Table 12** for estimated upgrade costs.

Table 11 – Casa Loma Trunk Upgrades

Replacement Pipe Diameter (mm)	Length of Sewer Main (m)	Growth Scenario Triggering Upgrade
375	546	2066
450	504	2066
	1,050	



Regional District of Central Okanagan

East Trunk Sanitary Sewer

Ultimate System Upgrades
Casa Loma Area

Legend

- Streams
- Lakes
- Cadastral
- CWK Lift Stations
- Regional Lift Stations
- WWTP
- Dosing Chamber
- Sewer Mains

2066 Pipe Upgrades

- Proposed 375mm Main Replacement
- Proposed 450mm Main Replacement
- Casa Loma Forcemain Replacement

0 65 130 260 390

Metres

N

Coordinate System: NAD 1983 UTM Zone 11N

Scale: 1:10,000

Data Sources:

Data provided by -

Project #:	1179.0093.01
Author:	JB
Checked:	JC
Status:	~ DRAFT ~
Revision:	A
Date:	2018 / 10 / 25

URBAN systems

FIGURE 6

Table 12 – Casa Loma Lift Station, Forcemain and Gravity Pipe Upgrades

Component	Description of Upgrade	Class D Estimated Cost (1)	Trigger for Upgrade(3)
Casa Loma Trunk Lift Station and Forcemain	Upsize pumps and internal piping Expand lift station to accommodate larger discharge piping	$3.6M	Adding 27 l/s, approx. 3,500 people or year 2024 based on linear growth
Casa Loma Gravity Collection System	Upsize majority of trunk main as shown on Figure 6	n/a (triggered outside of DCC period)	Adding 71 l/s, approx. 10,700 people or year 2044 based on linear growth
	Total	$3.6M	

(1) Includes 50% allowance for contingency and engineering. Does not include land acquisition and legal fees.
(2) The estimate includes allowances for both trench rock removal and dewatering.
(3) Timing for upgrades should be verified by flow monitoring

Upgrade Phasing

Separate hydraulic models for the 5-year (2021) and 10-year (2026) growth horizons were created to determine a phasing strategy for the trunk main upgrades. The proposed upgrades (pipe diameters) for the short-term growth horizons were set to the same diameter as the ultimate (2066) upgrades since the service life of the trunk sewer is expected to be 70 to 100 years in length. The proposed phasing plan is shown on **Figure 7**.

IR10

IR9

Okanagan Lake

WFN Boundary
Start of regional trunk

Casa Loma Sanitary Sewer Lift Station Pump capacity exceeded by 2024

Phase 4 (2066) Gravity Upgrades
Length required 8,470 meters

Phase 1 (2018) Gravity Upgrades
Length required 250 meters

Phase 2 (2026) Gravity Upgrades
Length required 300 meters

Phase 3 (2029) Gravity Upgrades
Length required 1,120 meters

East Trunk Sanitary Sewer Lift Station
Pump Capacity exceeded by 2018

East Trunk Forcemain upgrade at same time as lift station upgrade (2018)

J:\Projects_KEL\1179\0093\01\D-Drafting\Design-Spreadsheets\GIS\Projects\[East Trunk Report - Figure 7.mxd]Last updated by jbarnes on 2021.2018 at 2:32:57 PM

REGIONAL DISTRICT of CENTRAL OKANAGAN

Regional District of Central Okanagan

East Trunk Sanitary Sewer

East Trunk Sewer Phasing of Upgrades

Legend

- CWK Lift Stations
- Regional Lift Stations
- WWTP
- Dosing Chamber
- Sewer Mains

Pipe Upgrade Phasing

- 2018
- 2026
- 2029
- 2066
- Streams
- Lakes
- Cadastral

0 190 380 760 1,140

Metres

N

Coordinate System:
NAD 1983 UTM Zone 11N

Scale:
1:30,000

Data Sources:
Data provided by -

Project #:	1179.0093.01
Author:	JB
Checked:	JC
Status:	~ DRAFT ~
Revision:	A
Date:	2018 / 11 / 21

URBAN systems

FIGURE 7

Table 13 – Trigger Point Analysis (Upgrade Phasing)

Priority	Description of Upgrade	Class D Estimated Cost
1	Replace East Trunk Lift Station and Upgrade (twin) East Trunk Forcemain	$4.6M
2	Upsize Gravity Trunk Boucherie Road to Empire Place	$0.5M
3	Upgrade Casa Loma Pump Station	$3.6M
4	Upgrade Gravity Trunk Empire Place to Apple Way Boulevard	$0.6M
5	Upgrade Gravity Trunk Gellatly Road (LS to Boucherie Road)	$3.8M
6	Upgrade Casa Loma Gravity Trunk (1) Upgrade Casa Loma Forcemain (1) Upgrade Gravity Trunk (Gellatly to Lakeview Heights) (2)	n/a (triggered outside of DCC period)

(1) Not included in East Trunk DCC as required only after 20-year development horizon

(2) Phased project costs exceed value in Table 9 due to segmenting and rounding

Summary

The upgrade requirements to accommodate the 2036 growth scenario for the East Trunk Regional sewer components are summarized in Tables 9 and 12. The total cost for the upgrades is estimated to be $13.1M (Class D).

Should you have any questions, please contact the undersigned.

URBAN SYSTEMS LTD.

Reviewed by:

Jason Barta, B.Sc.
Municipal Infrastructure Analyst
/jb

Jeremy Clowes, P.Eng.
Project Engineer

\\usl.urban-systems.com\projects\Projects_KEL\1179\0098\01\R-Reports-Studies-Documents\R1-Reports\Revised East Trunk Regional Sewer Capacity Memo\2018-10-30 East Trunk Sewer Capacity-DRAFT.docx

East Trunk Sewer DCC

East Trunk Gravity Collection System - Class D Estimate

2021 Upgrades (Boucherie Road to Empire Place)

Project Description

Assumed half road (4m wide) restoration.

Assumed curb and gutter restoration from lift station to Red Could Way

Assumed rock to be encountered for 20% of project length

Assumed dewatering needed where pipe invert lower than 343 meters

Existing sanitary sewer to be abandoned

Job No: **1179.0093.01**

Date: **29-Oct-18**

Prepared by: J.Barta

Checked by: J. Clowes

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
	Mobilization & Demobilization	1	LS	$20,000	$20,000
	Insurance and Bonding	1	LS	$5,000	$5,000
	Remove and dispose existing asphalt	1,000	sq.m	$6	$6,000
	75mm asphalt restoration	1,000	sq.m	$75	$75,000
	100mm base course gravel restoration	1,000	sq.m	$20	$20,000
	350mm subbase course gravel restoration	1,000	sq.m	$20	$20,000
	Concrete barrier curb and gutter	0	lm	$75	$0
	Rock removal allowance	50	lm	$150	$7,500
	Utility conflict allowance	1	ls	$20,000	$20,000
	Creek Crossing	0	ea	$200,000	$0
	Dewatering	0	m	$100	$0
	Abandon Sanitary Sewer (cap ends)	1	LS	$10,000	$10,000
	Reconnect existing service to new sewer	1	ea	$1,500	$1,500
	450mm PVC sanitary main		lm	$450	$0
	525mm PVC sanitary main	250	lm	$500	$125,000
	675mm PVC sanitary main		lm	$700	$0
	750mm PVC sanitary main		lm	$900	$0
	900mm PVC sanitary main		lm	$1,000	$0
	1050mm ø manhole base, casting and lid	0	ea	$4,000	$0
	1050mm ø riser section	0	vm	$650	$0
	1200mm ø manhole base, casting and lid	4	ea	$4,500	$18,000
	1200mm ø riser section	10	vm	$700	$7,000
	1350mm ø manhole base, casting and lid	0	ea	$5,000	$0
	1350mm ø riser section	0	vm	$950	$0
	1500mm ø manhole base, casting and lid	0	ea	$6,000	$0
	1500mm ø riser section	0	vm	$1,000	$0
	Tie-in existing lateral main	3	ea	$5,000	$15,000
				subtotal	$350,000
				Engineering and Contingency (50%)	$175,000
				total	$525,000
				rounded total	$500,000

Notes *Estimates do not include land acquisition costs.*

Cost estimate prepared without geotech or survey. Complete field investigations to refine estimate.

East Trunk Sewer DCC

East Trunk Gravity Collection System - Class D Estimate

2026 Upgrades (Empire Place to Apple Way Boulevard)

Project Description

Assumed half road (4m wide) restoration.

Assumed curb and gutter restoration from lift station to Red Could Way

Assumed rock to be encountered for 20% of project length

Assumed dewatering needed where pipe invert lower than 343 meters

Existing sanitary sewer to be abandoned

Job No: **1179.0093.01**

Date: **29-Oct-18**

Prepared by: J.Barta

Checked by: J. Clowes

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
	Mobilization & Demobilization	1	LS	$20,000	$20,000
	Insurance and Bonding	1	LS	$6,000	$6,000
	Remove and dispose existing asphalt	1,200	sq.m	$6	$7,200
	75mm asphalt restoration	1,200	sq.m	$75	$90,000
	100mm base course gravel restoration	1,200	sq.m	$20	$24,000
	350mm subbase course gravel restoration	1,200	sq.m	$20	$24,000
	Concrete barrier curb and gutter	0	lm	$75	$0
	Rock removal allowance	60	lm	$150	$9,000
	Utility conflict allowance	1	ls	$20,000	$20,000
	Creek Crossing	0	ea	$200,000	$0
	Dewatering	0	m	$100	$0
	Abandon Sanitary Sewer (cap ends)	1	LS	$10,000	$10,000
	Reconnect existing service to new sewer	1	ea	$1,500	$1,500
	450mm PVC sanitary main		lm	$450	$0
	525mm PVC sanitary main	300	lm	$500	$150,000
	675mm PVC sanitary main		lm	$700	$0
	750mm PVC sanitary main		lm	$900	$0
	900mm PVC sanitary main		lm	$1,000	$0
	1050mm ø manhole base, casting and lid	0	ea	$4,000	$0
	1050mm ø riser section	0	vm	$650	$0
	1200mm ø manhole base, casting and lid	5	ea	$4,500	$22,500
	1200mm ø riser section	12	vm	$700	$8,400
	1350mm ø manhole base, casting and lid	0	ea	$5,000	$0
	1350mm ø riser section	0	vm	$950	$0
	1500mm ø manhole base, casting and lid	0	ea	$6,000	$0
	1500mm ø riser section	0	vm	$1,000	$0
	Tie-in existing lateral main	1	ea	$5,000	$5,000
				subtotal	$397,600
				Engineering and Contingency (50%)	$198,800
				total	$596,400
				rounded total	$600,000

Notes *Estimates do not include land acquisition costs.*

Cost estimate prepared without geotech or survey. Complete field investigations to refine estimate.

East Trunk Sewer DCC
East Trunk Gravity Collection System - Class D Estimate

2036 Upgrades (East Trunk Lift Station to Boucherie Road)

Project Description

Assumed half road (4m wide) restoration.
Assumed curb and gutter restoration from lift station to Red Could Way
Assumed rock to be encountered for 20% of project length
Assumed dewatering needed where pipe invert lower than 343 meters
Existing sanitary sewer to be abandoned

Job No: **1179.0093.01**
Date: **29-Oct-18**
Prepared by: J.Barta
Checked by: J. Clowes

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
	Mobilization & Demobilization	1	LS	$55,000	$55,000
	Insurance and Bonding	1	LS	$15,000	$15,000
	Remove and dispose existing asphalt	4,480	sq.m	$6	$26,880
	75mm asphalt restoration	4,480	sq.m	$75	$336,000
	100mm base course gravel restoration	4,480	sq.m	$20	$89,600
	350mm subbase course gravel restoration	4,480	sq.m	$20	$89,600
	Concrete barrier curb and gutter	1,120	lm	$75	$84,000
	Rock removal allowance	224	lm	$150	$33,600
	Utility conflict allowance	1	ls	$20,000	$20,000
	Creek Crossing	2	ea	$200,000	$400,000
	Dewatering	1,120	m	$100	$112,000
	Abandon Sanitary Sewer (cap ends)	1	LS	$10,000	$10,000
	Reconnect existing service to new sewer	1	ea	$1,500	$1,500
	450mm PVC sanitary main		lm	$450	$0
	525mm PVC sanitary main		lm	$500	$0
	675mm PVC sanitary main		lm	$700	$0
	750mm PVC sanitary main		lm	$900	$0
	900mm PVC sanitary main	1,120	lm	$1,000	$1,120,000
	1050mm ø manhole base, casting and lid	0	ea	$4,000	$0
	1050mm ø riser section	0	vm	$650	$0
	1200mm ø manhole base, casting and lid	0	ea	$4,500	$0
	1200mm ø riser section	0	vm	$700	$0
	1350mm ø manhole base, casting and lid	0	ea	$5,000	$0
	1350mm ø riser section	0	vm	$950	$0
	1500mm ø manhole base, casting and lid	14	ea	$6,000	$84,000
	1500mm ø riser section	44	vm	$1,000	$44,000
	Tie-in existing lateral main	1	ea	$5,000	$5,000
				subtotal	$2,526,180
				Engineering and Contingency (50%)	$1,263,090
				total	$3,789,270
				rounded total	$3,800,000

Notes *Estimates do not include land acquisition costs.*
Cost estimate prepared without geotech or survey. Complete field investigations to refine estimate.

East Trunk Sewer DCC
East Trunk Gravity Collection System - Class D Estimate

2066 Upgrades (Remainder of Identified Upgrades)

Project Description

Assumed half road (4m wide) restoration.
Assumed curb and gutter restoration from lift station to Red Could Way
Assumed rock to be encountered for 20% of project length
Assumed dewatering needed where pipe invert lower than 343 meters
Existing sanitary sewer to be abandoned

Job No: **1179.0093.01**
Date: **29-Oct-18**
Prepared by: J.Barta
Checked by: J. Clowes

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
	Mobilization & Demobilization	1	LS	$340,000	$340,000
	Insurance and Bonding	1	LS	$100,000	$100,000
	Remove and dispose existing asphalt	22,132	sq.m	$6	$132,792
	75mm asphalt restoration	22,132	sq.m	$75	$1,659,900
	100mm base course gravel restoration	22,132	sq.m	$20	$442,640
	350mm subbase course gravel restoration	22,132	sq.m	$20	$442,640
	Concrete barrier curb and gutter	880	lm	$75	$66,000
	Rock removal allowance	1,107	lm	$150	$165,990
	Utility conflict allowance	1	ls	$20,000	$20,000
	Creek Crossing	0	ea	$200,000	$0
	Dewatering	525	m	$100	$52,500
	Abandon Sanitary Sewer (cap ends)	1	LS	$10,000	$10,000
	Reconnect existing service to new sewer	47	ea	$1,500	$70,500
	450mm PVC sanitary main	1,193	lm	$450	$536,850
	525mm PVC sanitary main	2,594	lm	$500	$1,297,000
	675mm PVC sanitary main	727	lm	$700	$508,900
	750mm PVC sanitary main	1,019	lm	$900	$917,100
	900mm PVC sanitary main		lm	$1,000	$0
	1050mm ø manhole base, casting and lid	15	ea	$4,000	$60,000
	1050mm ø riser section	51	vm	$650	$33,150
	1200mm ø manhole base, casting and lid	28	ea	$4,500	$126,000
	1200mm ø riser section	64	vm	$700	$44,800
	1350mm ø manhole base, casting and lid	19	ea	$5,000	$95,000
	1350mm ø riser section	64	vm	$950	$60,800
	1500mm ø manhole base, casting and lid		ea	$6,000	$0
	1500mm ø riser section		vm	$1,000	$0
	Tie-in existing lateral main	18	ea	$5,000	$90,000
				subtotal	$7,272,562
				Engineering and Contingency (50%)	$3,636,281
				total	$10,908,843
				rounded total	$10,900,000

Notes *Estimates do not include land acquisition costs.*
Cost estimate prepared without geotech or survey. Complete field investigations to refine estimate.

East Trunk Sewer DCC
East Trunk Lift Station - Class D Estimate

Job No: **1179.0093.01**
Date: **29-Oct-18**

Prepared by: R. Stewart
Checked by: J. Clowes

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
1.0	**General**				
	Mobilization/Demobilization	1	LS	$138,000	$138,000
	Insurance and Bonding	1	LS	$42,000	$42,000
	Bypass Pumping	1	LS	$20,000	$20,000
	SUBTOTAL				***$200,000***
2.0	**Removals**				
	Existing pumps, suction piping, discharge piping	1	LS	$20,000	$20,000
	Genset	1	LS	$10,000	$10,000
	Concrete	1	LS	$30,000	$30,000
	SUBTOTAL				***$60,000***
3.0	**Site Works - Including Forcemain**				
	Rock removal	1	LS	$100,000	$100,000
	Air valve chamber allowance	5	ea	$30,000	$150,000
	Tie-in to existing gravity main	1	LS	$20,000	$20,000
	Tie-in to existing forcemain	1	LS	$20,000	$20,000
	Drain and cap existing forcemain	1	LS	$25,000	$25,000
	Drain and cap existing gravity main	1	LS	$25,000	$25,000
	1500mm MH base, casting and lid	2	ea	$6,000	$12,000
	1500mm riser section	2	ea	$1,000	$2,000
	Site restoration	1	LS	$50,000	$50,000
	Utility conflict allowance	1	LS	$10,000	$10,000
	Forcemain dewatering	465	lm	$100	$46,500
	675mm PVC sanitary main	60	lm	$700	$42,000
	500 mm C900 PVC forcemain	20	lm	$500	$10,000
	400 mm C900 PVC forcemain	40	lm	$375	$15,000
	300 mm C900 PVC forcemain	930	lm	$350	$325,500
	400mm plug valve	1	ea	$12,000	$12,000
	300 mm plug valve	4	ea	$10,000	$40,000
	chamber c/w 300 mm flow meter	1	ls	$30,000	$30,000
	75mm asphalt restoration	3,720	sq.m	$75	$279,000
	100mm base course gravel restoration	3,720	sq.m	$20	$74,400
	350mm subbase course gravel restoration	3,720	sq.m	$20	$74,400
	SUBTOTAL				***$1,362,800***
4.0	**Lift Station**				
	Building	100	sq.m	$3,000	$300,000

	Wet well	140	cu.m	$1,000	$140,000
	80 HP solids handling pump (158 l/s at 26 m)	4	ea	$100,000	$400,000
	500 mm ss sch316 type 304 piping	50	lm	$2,200	$110,000
	300 mm ss sch316 type 304 piping	50	lm	$1,500	$75,000
	300 mm plug valve	4	ea	$5,000	$20,000
	300 mm check valve	4	ea	$5,000	$20,000
	500 mm flow meter	1	ea	$25,000	$25,000
	Pressure gauge	4	ea	$500	$2,000
	Air valves	4	ea	$1,500	$6,000
	Genset	1	LS	$100,000	$100,000
	Electrical and Instrumentation	1	LS	$200,000	$200,000
	Electrical Service	1	LS	$30,000	$30,000
	SUBTOTAL				***$1,428,000***
				subtotal	$3,050,800
				Engineering and Contingency (50%)	$1,525,400
				total	$4,576,200
				rounded total	$4,600,000