EAST TRUNK DEVELOPMENT COST CHARGE REVIEW

REGIONAL DISTRICT OF CENTRAL OKANAGAN

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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 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 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
Low Density Residential Parcel	For Each parcel Created at Subdivision	$2,684	$2,825	5.2%
Duplex, Triplex, Fourplex, Mobile Home, Modular Home, Manufactured Home	For Each Dwelling Unit	$2,684	$2,825	5.2%
Townhouse, Apartment, Secondary suite, Carriage Home	For Each Dwelling Unit	$1,790	$1,883	5.2%
Commercial	For each 100 sq.m. of gross floor area	$1,163	$1,224	5.3%
Industrial	For each 100 sq.m. of gross floor area	$1,163	$1,224	5.3%
Institutional	For each 100 sq.m. of gross floor area	$984	$1,036	5.3%

1.0 BACKGROUND

1.1 PURPOSE OF THIS ANALYSIS

The purpose of this analysis is to update and 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 were calculated in 2019 and have been updated based on inflation. This review accounts for changes in capital projects and updated growth figures 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 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 service 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 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 Housing and Municipal Affairs (the "Ministry") has prepared a Development Cost Charge Best Practices Guide (the "Best Practices Guide"). The purpose of the Best Practices Guide is to outline an accepted process for the development of a DCC program. This DCC Background 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

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
- Development Cost Charge population and unit projections for Westbank First Nation

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 2045.

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 Westbank First Nation IR #9 and #10 and portions of the City of West Kelowna.

A map setting out the portion of the City of West Kelowna that flows into the East Trunk is set out in **Appendix B**. Properties in this area that are connected to sewer will be charged the East Trunk DCCs. Westbank First Nations IR#9 and IR#10 flow into the East Trunk, and developments in these areas also pay the East Trunk DCCs as administered by Westbank First Nation based on an agreement with the RDCO.

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" includes 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.

For the East Trunk DCC projects 100% of the project upgrade costs are allocated 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 & Twin Forcemain	100%
ET2	Casa Loma Lift Station Upgrades	100%
ET3	Casa Loma Secondary Lift Station	100%
ET4	Land Acquisition for Secondary Lift Station	100%

2.8 MUNICIPAL ASSIST FACTOR

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, or discourage development designed to result in a low environmental impact.

The current East Trunk DCC uses an assist factor of 1% and in consideration of all of the above matters, the assist factor has been kept the same at 1% for the East Trunk DCC.

2.9 UNITS OF CHARGE

The units of charge have been revised in this update to consider provincial legislation and revised zoning regulations that permit up to 4 units on many low density residential lots to encourage Small Scale Multi Unit Housing (SSMUH) types of residential development.

Low density residential lots will be charged for one unit at subdivision. This accounts for construction of one dwelling unit on the lot. If more than one unit is constructed, either initially or in the future, DCCs will be charged for the additional units. This could include an extra charge for a duplex unit. If a duplex is constructed the charge for the first unit would have been covered by the charge at subdivision that covers one unit, and the charge for the second unit of the duplex would be paid at building permit. Similarly, if a triplex or fourplex is constructed, then the first unit is covered by the charge paid at subdivision and the charges for the additional 2 or 3 units are paid at building permit.

Townhouses will pay DCCs based on the number of townhouse units at building permit. Mobile Homes, Modular Homes, and Manufactured Homes will pay based on the number of dwelling units at building permit.

Apartment buildings will pay DCCs based on the number of apartment units at building permit because the number of units can be determined at this time. Secondary suites and Carriage homes will pay a charge per unit at building permit.

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 3.1 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 = 16.8% (2011-2021)
- The Westbank First Nation = 59.3% (2011-2021)

Table 3.1: Historic Population and Percentage Growth

	West Kelowna Population	West Kelowna % Growth (Annual)*	WFN Population	WFN % Growth (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%)
2021	36,078	10.5% (2.0%)	11,260	24.7% (4.5%)
2011- 2021 Growth	5,186	16.8% (1.6%)	4,192	59.3% (4.8%)
2001- 2021 Growth	-	-	5,382	91.6% (3.3%)

*Annual growth rate is calculated based in the 5, 10, or 20 year growth rate annualized as single year average growth

CWK Stats – OCP & Census Data,
WFN – Rennie Report

Dwelling Units

Table 3.2 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 breakdown for each jurisdiction is as follows:

- The City of West Kelowna = 22.6%, or 2,671 units (2011-2021). This translates to about 267 units per year and an average annual growth rate in units from 2011 to 2021 of 2.3%.
- Westbank First Nation = 77.5% or 2,542 units over 10 years (2011-2021). The growth from 2011 to 2021 translates into an average annual growth rate in dwelling units of 5.9%.

Table 3.2: Historic Residential Unit and Percentage Growth

	West Kelowna Residential Units	West Kelowna % Growth (Annual)*	WFN Residential Units	WFN % Growth (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%)
2021	14,476	9.7% (1.9%)	5,822	30.5% (5.5%)
2011- 2021 Growth	2,671	22.6% (2.1%)	2,542	77.5% (5.9%)
2001- 2021 growth	-	-	3186	120.9% (4.0%)

*Annual growth rate is calculated based in the 5, 10 or 20 year growth rate annualized as single year average growth

Table 3.3 shows the estimated 2021 Census dwelling units and population. The estimated residential population of the area in 2021 was 47,338. The share of this total broken down by the two jurisdictions is as follows:

- The City of West Kelowna = 76.3%, or 36,078 persons.
- The Westbank First Nation = 23.7%, or 11,260 persons.

The estimated number of dwelling units in West Kelowna and Westbank First Nation, in the 2021 Census, was 19,811. The share of this total broken down by the two jurisdictions is as follows:

- The City of West Kelowna = 73.1%, or 14,476 dwelling units.
- The Westbank First Nation = 26.9% or 5,335 dwelling units.

Table 3.3: Current Development

Existing 2021 Population and Units			
	City of West Kelowna	Westbank First Nation	Total
Total Population	36,078	11,260	47,338
Total Dwelling Units	14,476	5,335	19,811
Dwelling Unit size (person per unit)	2.5	2.1	2.4

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 7 years from 2017 to 2024 inclusive is estimated as follows:

- Commercial = 33,000 sq.m.
- Industrial = 37,000 sq.m
- Institutional = 20,000 sq.m

Information on the floor area of Commercial, Industrial and Institutional buildings constructed from 2017 to 2024 was not readily available for Westbank First Nation, but these figures are not necessary since WFN does have projections from their DCC background report for these units going forward for use in this report.

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 information on development applications and potential developments that could occur within the next 20 years within the East Trunk sewer catchment area. The information included a spreadsheet listing the number and type of potential units and maps showing the location of each application. Urban Systems collated the raw information and categorized the potential units into the categories that fit with the DCC units of charge for DCC calculations. The results include the number and type of dwelling units that will connect to the East Trunk. It also provided information used to calibrate the projected floor area of Commercial, Industrial and Institutional construction within areas that will connect to the East Trunk.

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 5,865 units. The growth within the two jurisdictions is as follows:

- The City of West Kelowna = 1270 dwelling units, with 295 low density residential lots and associated dwelling units including single detached dwellings, duplexes, triplexes and manufactured homes, along with 975 small scale multifamily units, townhouses and apartments, 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 64 units per year over a 20 year period, 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 267 units per year from 2011 to 2021, and much of the growth in the next 20 years will be in Smith Creek, Goats Peak and the Westbank Town Centre, so a smaller portion will be in the East Trunk catchment area .
- The Westbank First Nation = 4,012 dwelling units based on a review of potential and planned development on IR 9 and IR 10 provided by Westbank First Nation as background for a memo prepared by Urban Systems for Westbank First Nation dated August 9, 2024 on Regional Sanitary Sewer Model and Ferry Wharf LS Routing Analysis. The result was 184 low density residential lots and associated dwelling units and 3828 multi family and other forms of dwelling units over the next 20 years. The subject area of Westbank First Nation had a 2021 total of 5822 residential units. The growth of 4012 units from 5822 to 9834 over 20 years is an increase of approximately 2.7% per year over a 20 year projection period, which is less than the 20-year

annual growth rate of 4.0% from 2001 to 2021. The projected growth represents a relatively conservative and realistic amount of growth over the next 20 years considering the growth that has occurred in the past.

3.5 NON-RESIDENTIAL GROWTH

Over the next 20 years, an anticipated 293,773 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 Background Report projections and Westbank First Nation DCC background Report projections. The projected growth within the two jurisdictions is as follows:

- **The City of West Kelowna**
  - The West Kelowna DCC Background report analysis projects the following amount of growth for the entire city:
    - Commercial = 83,000 sq. m.
    - Industrial = 94,000 sq. m.
    - Institutional = 25,000 sq. m. plus 300 institutional care facility units at 80 sq. m. per unit for 24,000 sq. m., adding to a total of 49,000 sq. m.
  - The East Trunk DCC analysis is based on an assumption that the following percentages of various forms of development will be connected to the East Trunk:
    - 40% of the Commercial development,
    - 95% 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 = 33,000 sq. m.
    - Industrial = 89,000 sq. m.
    - Institutional = 14,700 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 which adds to 49,000 sq. m. With 30% of this amount projected to occur inside the East Trunk Sewer catchment area, the result is 14,700 sq. m. of institutional floor area over the 20 year projection period.

- **Westbank First Nation**
  - Figures for Commercial, Industrial and Institutional growth on Westbank First Nation were based on the projections provided in the Westbank First Nation DCC background report. The figures for IR 9 and IR 10 were combined to generate the total amounts projected in both IR 9 and IR 10 which are connected to the East Trunk.
  - the combined projections for WFN are as follows:
    - Commercial = 129,437 sq. m.
    - Industrial = 13,184 sq. m.
    - Institutional = 14,184 sq. m.

3.6 COMBINED RESIDENTIAL AND NON RESIDENTIAL GROWTH

The combined residential and non-residential growth is summarized in **Table 3.4**.

Table 3.4: Residential and Non-Residential Growth

Growth 20 years (2025 – 2045)			
	City of West Kelowna	Westbank First Nation	Total
Projected New Development (units)	1,270	4,012	5,282
Low Density residential lots and associated dwelling units	295	184	479
Multi-Family Units including townhouses and apartments	975	3,828	4,803
Non Residential Floor Area (sq. m)			
Commercial	33,000	129,437	162,437
Industrial	89,000	13,452	102,452
Institutional	14,700	14,184	28,884

3.7 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 3.5** outlines the equivalent population assumptions for sanitary sewer, by land use type:

Table 3.5: Equivalent Population Assumptions

Low Density Residential	3.00	persons per dwelling unit
Multiple Unit Residential, Secondary suite, Carriage Home	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, as well as the previous East Trunk 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.

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.

Table 4.1 below outline the DCC projects including expanding the capacity of the East Trunk Lift Station and twinning the force main, and upgrading the Casa Loma Trunk Lift Station and Secondary Lift Station. Details on the East Trunk capacity upgrades required and costs are outlined in the report found in **Appendix A** which includes the Casa Loma Lift Station Retro-Fit and Secondary Lift Station Cost Estimate Summary. Information on the preliminary costs calculated for expanding the capacity of the East Trunk Lift Station and twinning the force main are set out in **Appendix C** which includes the Regional Sanitary Sewer Model and Ferry Wharf Routing Analysis.

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

Time Frame	Description of Upgrade	Class D Estimated Cost
2026 - 2028	Expand capacity of East Trunk Lift Station & Twin Forcemain	$13,300,000
2026 - 2030	Casa Loma Trunk Lift Station Upgrade Existing Wet Well-Dry Well	$2,710,000
2026 - 2030	Casa Loma Installing New Secondary Lift Station	$3,470,000
2026	Land Acquisition for Secondary Lift Station	$500,000
	Total	**$19,980,000**

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	$19,980,000
DCC Recoverable	$19,780,200
Regional District Responsibility (Total Cost minus DCC Recoverable)	**$199,800**

The total cost of the improvements is $19,980,000, of which $19,780,200 is DCC recoverable and the remaining $199,800 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 **Table 4.3**.

Table 4.3: 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 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 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 & Twin Forcemain	$13,300,000	100.0%	$13,300,000	$133,000	$13,167,000	$133,000
ET2	Casa Loma Trunk Lift Station upgrades	$2,710,000	100.0%	$2,710,000	$27,100	$2,682,900	$27,100
ET3	Casa Loma Secondary Lift Station	$3,470,000	100.0%	$3,470,000	$34,700	$3,435,300	$34,700
ET4	Land Acquisition for Secondary Lift Station	$500,000	100.0%	$500,000	$5,000	$495,000	$5,000
	Total	**$19,980,000**		**$19,980,000**	**$199,800**	**$19,780,200**	**$199,800**

Table 4.5: Sewer DCC Rate Calculation

A: SANITARY COLLECTION				
Land Use	Col.(1)	Col.(2)	Col.(3)	Col.(4) =Col.(1) x Col.(3)
	Estimated Development	Unit of Measure	Equivalency per Unit of Measure	Equivalent Population
Low Density residential lots and associated dwelling units	479	dwelling units	3.00	1,437
Multi-Family Units including townhouses and apartments	4,803	dwelling units	2.00	9,606
Commercial	162,437	square meters	0.0130	2,112
Industrial	102,452	square meters	0.0130	1,332
Institutional	28,884	square meters	0.0110	318
			Total Equiv. Pop	(a) 14,804
B: UNIT SANITARY DCC CALCULATION				
Net Sanitary DCC Program Recoverable		$19,780,200.00	(b)	
Existing DCC Reserve Monies		$5,840,237.67	(c)	
Net Amount to be Paid by DCCs		$13,939,962.33	(d)=(b)-(c)	
DCC per Equivalent Population		$941.62	(e) = (d)/(a)	
C: RESULTING SANITARY DCCS				
Land Use	**Equivalent**	**DCC per Unit**		
Low Density residential lots and associated dwelling units	3.00	$2,824.85	per lot or unit	(e) x Col.(1)
Multi-Family Units including townhouses and apartments	2.00	$1,883.23	per unit	(e) x Col.(1)
Commercial	0.0130	$12.24	per square meter	(e) x Col.(1)
Industrial	0.0130	$12.24	per square meter	(e) x Col.(1)
Institutional	0.0110	$10.36	per square meter	(e) x Col.(1)

The existing and proposed East Trunk DCC rates and the percentage changes are shown in **Table 4.6**.

Table 4.6: Proposed Sewer DCC Rates

Use	Unit charged	Existing Charge Per Unit	Proposed Charge Per unit	% Change
Low Density Residential Parcel	For Each parcel Created at Subdivision	$2,684	$2,825	5.2%
Duplex, Triplex, Fourplex, Mobile Home, Modular Home, Manufactured Home	For Each Dwelling Unit	$2,684	$2,825	5.2%
Townhouse, Apartment, Secondary suite, Carriage Home	For Each Dwelling Unit	$1,790	$1,883	5.2%
Commercial	For each 100 sq.m. of gross floor area	$1,163	$1,224	5.3%
Industrial	For each 100 sq.m. of gross floor area	$1,163	$1,224	5.3%
Institutional	For each 100 sq.m. of gross floor area	$984	$1,036	5.3%

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
Low Density Residential Parcel	For Each parcel Created at Subdivision	$2,684	$2,825	5.2%
Duplex, Triplex, Fourplex, Mobile Home, Modular Home, Manufactured Home	For Each Dwelling Unit	$2,684	$2,825	5.2%
Townhouse, Apartment, Secondary suite, Carriage Home	For Each Dwelling Unit	$1,790	$1,883	5.2%
Commercial	For each 100 sq.m. of gross floor area	$1,163	$1,224	5.3%
Industrial	For each 100 sq.m. of gross floor area	$1,163	$1,224	5.3%
Institutional	For each 100 sq.m. of gross floor area	$984	$1,036	5.3%

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 low density residential parcels at subdivision approval. All other forms of residential development including duplexes, triplexes, fourplexes, townhouses, apartments, secondary suites, and carriage homes will be collected at building permit 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, as long as the subdivision is approved within one year of the DCC bylaw adoption.

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, as long as the building permit is approved within one year of the DCC bylaw adoption. 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. six months) 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

In order to allow for more frequent increases in DCCs, the Regional District should undertake a three-part program of regular DCC reviews:

- Annual Consumer Price Index increases;
- Minor DCC updates every 2 years; and
- Major DCC updates every 5 years.

The first part is to undertake annual Consumer Price Index increases. The process is relatively straight forward and can be done by having the Board adopt an amendment to the DCC bylaw. Further details on the Consumer Price Index approach are as follows:

- Needs to be adopted by bylaw.
- The bylaw is enabled under Development Cost Charge Amendment Bylaw Approval Exemption Regulation, (B.C. Reg. 130/2010) under the Community Charter and it allows a Local Government to increase their DCCs by the BC Consumer Price index.
- The bylaw does not require approval by the Inspector of Municipalities, but a copy of a DCC amendment bylaw must be filed as soon as is reasonable with the Inspector of Municipalities after the bylaw has been adopted.
- The CPI increase can only be done for up to 4 years from the date of the adoption of a new DCC bylaw approved by the Inspector.
- Can only be done once per year.
- The rate of inflation that can be included is the BC Consumer Price Index for the year preceding the bylaw. The Regional District cannot, for example, wait 2 years and then adopt a CPI increase that covers 2 years of inflation; it can only cover the inflation that has occurred during the one year before the bylaw. So it is important to update annually or else the Regional District will lose out on the opportunity to capture some of the inflationary increases.

The second part is to undertake regular Minor DCC updates approximately every two years. The characteristics of a Minor DCC update are as follows:

- Includes an update to project costs, often based on up-to-date construction cost information and unit prices for materials and labour.
- Does not allow for any changes to projects, growth projections, or other aspects of the DCC calculations. It simply takes the original DCC projects and updates the costs.
- Often takes about 3-4 months of work by the Regional District and it requires some engagement with stakeholders such as the development community.
- Needs to be adopted by bylaw and it requires approval by the Inspector of Municipalities under an expedited process which takes about another month after receiving the bylaw.

The third part is to conduct a major DCC update approximately every 5 years. The characteristics of a Major DCC update are as follows:

- Includes a complete review of growth projections, projects required to serve growth, capital costs, equivalency factors, assist factors, and updated rates.
- The process is quite extensive and often takes over a year or more.
- Generally requires more extensive stakeholder engagement than a minor DCC update.
- Needs to be adopted by bylaw and it requires approval by the Inspector of Municipalities which takes about 2-3 months after receiving the bylaw.
- Could also be done after significant changes to the information that impacts infrastructure such as updates to infrastructure plans.

6.0 CONSULTATION

6.1 PUBLIC CONSULTATION

Although the *LGA* does not require a public participation process, the Best Practices Guide states that meaningful consultation is a key expectation of the Inspector of Municipalities when reviewing a DCC bylaw for approval. 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. It notes that notifying affected parties about consultation meetings before passing the DCC bylaw, as well as informing them of the decision to adopt the bylaw, is critical for meaningful consultation.

Under Phase 1 of engagement the Regional District sent letters to impacted parties (Municipal partners and development community) in late November 2025. As of January 6, 2026, the Regional District had received no comments from Phase 1 of the engagement with the development community and impacted parties.

A second phase of engagement is planned, and a summary of the public consultation process will be included once this phase has been completed.

APPENDIX A:

CASA LOMA LIFT STATION RETRO-FIT AND SECONDARY LIFT STATION COST ESTIMATE SUMMARY

MEMORANDUM

DATE: October 10, 2025
TO: Xavier Semmelink
CC: Clarke Kruiswyk
FROM: Jeremy Clowes, P.Eng and Carly Tremblay, EIT
FILE: 1179.0120.02
SUBJECT: Casa Loma Lift Station Retro-fit and Secondary Lift Station Cost Estimate Summary_Rev.1

1.0 INTRODUCTION

The Casa Loma lift station's capacity was reviewed and a cost estimate was prepared to upgrade the station as needed to accommodate projected 20-year flows. This work was completed to support the 2025 East Trunk Development Cost Charge (DCC) Update. From recent work (i.e., 2024 IR10 Ferry Wharf Routing memo), the Regional District of the Central Okanagan (RDCO) was aware that the Casa Loma lift station (LS) would require upgrades to convey the 20 year peak wet weather flow (PWWF) and identified their preference to eliminate the need for the existing high head sewage pumps and instead utilize a solution with two lift stations that are equipped with conventional non-clog sewage pumps. The existing Casa Loma LS has two sets of high head sewage pumps, and each set consists of two 150 HP pumps that are coupled together to pump in series. RDCO would like to eliminate the need for the high head sewage pumps as they have under-performed since installation (approximately 17 L/s less flow than design), are less reliable than conventional non-clog sewage pumps and have a limited number of suppliers that can provide replacement pumps.

2.0 DESIGN FLOWS

The Casa Loma LS has a maximum pumping capacity of 57 L/s with one set of pumps operating based on SCADA data from 2024 and the sanitary model indicates that the existing PWWF has slightly exceeded this capacity by 1 l/s as shown in the table below. We recommend that RDCO install a flow meter on the station's inlet to confirm the existing PWWF. The proposed upgrades will be sized to accommodate the projected 20-year flows.

Table 2.0 – Peak Hour Flows

Year	Scenario	Peak Wet Weather Flow (L/s)
2024	Existing	58
2044	Current Upgrade	75
2099	Buildout Upgrade	125

3.0 CURRENT UPGRADE DESCRIPTION

The upgrades necessary to adequately achieve the 75 L/s duty point are comprised of three elements.

1. Replace the pumps in the Casa Loma LS

The Casa Loma LS will retrofit two conventional non-clog pumps on the lower level of the existing structure. For the purposes of the estimate, we have assumed the pumps will be installed in a horizontal dry configuration using a Z - stand and cart as offered by Xylem as shown in Figure 3.0. This configuration will simplify routine maintenance by making the impeller and pump internals easier to access and eliminate the need to remove the pumps from the station for servicing. The cart must be placed on flat ground. The existing floor slopes towards a sump pump. Placement of the carts will require approximately 2.25 m² (0.5 m x 4.5 m) to be leveled. The chosen pumps can converted into a submersible configuration for the buildout Casa Loma LS upgrade discussed in Section 4.0.

The retro-fit work would as a minimum include:

- Bypassing the station to facilitate the upgrade after the secondary lift station is installed and operational
- Remove and replace existing pumps, suction piping, and discharge piping
- Replace PLC, MCC and instrumentation (flow meter, level sensors and pressure transmitter)
- Modify equipment hatches as required to suit proposed equipment
- Concrete rehabilitation as needed within the wet well (e.g., pressure wash and epoxy coat)

Figure 3.0: Xylem Z Installation Configuration

The proposed piping would be sized as follows:

- Pump suction pipe – increase from 150 mm to 350 mm pipe to comply with Hydraulic Institute (HI) Standards Section 9.8. HI calls for a maximum suction pipe velocity of 0.9 m/s. The existing suction piping operates at a velocity of 3.1 m/s under current flows, and this could have contributed to the lower-than-expected performance.
- Pump discharge pipe – increase from 150 mm to 200 mm to keep velocity below 3 m/s which is a good practice to minimize potential for water hammer issues. Note that higher velocities can be tolerated on the pump discharge versus the suction side of the pump.

Refer to Section 5.0 for details on the proposed pumps. Please note the following as the project advances:

- Active Wet Well Storage - The wet well appears to have adequate active storage for the proposed pumps and an increase in active storage is expected to be required. This should be confirmed once layout drawings are prepared, and the pump intake depth is verified.
- Vertical vs Horizontal Dry Pit Pump Install – There appears to be adequate space to accommodate the Z-installation configuration (horizontal), but this should be confirmed once layout drawings are prepared. A vertical installation method can be considered if space constraints prevent the Z-installation method from being utilized.

2. Install a Secondary LS

The secondary LS is to include a fibreglass reinforced plastic (FRP) wet well with a 3.66 m diameter with an estimated 5.5 m depth and assumed maximum water level of 399 m. A site has not been selected for the proposed Secondary LS and the maximum water level should be reviewed after a site is secured. The 3.66 m diameter will allow the lift station to have capacity for a triplex system at the ultimate upgrade discussed in Section 4.0. The lift station will initially be installed with two conventional non-clog pumps.

Xylem can offer the same pump model for replacement at the Casa Loma LS and for the secondary LS which will help provide ease of maintenance and operational consistency. The pumps installed within the Casa Loma LS would have a different lower bearing installed to suit the Z-installation configuration. Refer to Section 5.0 for details on the proposed pumps.

We have assumed that the station would include a process and electrical building vs kiosks. The building footprint includes space for odour control chemical storage as well. This can be adjusted to suit RDCOs preferences as the design advances but should be the most conservative assumption for budget planning.

3. Forcemain

The existing 300 mm PVC forcemain will not require an increase in size to accommodate flows from the upgraded Casa Loma LS and the proposed Secondary LS. The forcemain will be modified to suit the dual LS configuration by removing a section near the secondary lift station, connecting the upstream pipe section to the Secondary LSs wet well and connecting the downstream end to Secondary LSs discharge pipe. The proposed tie-in to the Secondary LSs wet well may have to be made with a 400 mm to decrease the velocity below 0.9 m/s per HI Standards but this can be reviewed in preliminary design. For the purposes of the cost estimate, we have assumed that a 400 mm pipe will be used to be conservative.

4.0 BUILDOUT UPGRADE DESCRIPTION

Ultimate upgrades will occur only once the upgrades in Section 3 are completed. These upgrades are to increase the capacity to 125 L/s, and they include two components.

1. Replace the Casa Loma LS and Convert to Triplex Station

The existing building will be removed and replaced with a triplex caisson style wet well that includes a building to house discharge piping and electrical controls within two separated rooms. Casa Loma LSs wet well will have a 3.66 m diameter and an 8.5 m depth.

To convey 125 L/s, two pumps will operate in parallel with one standby unit. The two conventional non-clog pumps selected in the Section 3 upgrades will be transferred to the proposed wet well and an additional pump matching the existing units will be installed.

2. Upgrade the Forcemain

The existing forcemain will need to be upsized from 300 mm to 400 mm pipe. The forcemain extends 1.9 km from the Casa Loma LS to a manhole (ID LV-11) on Thacker Drive.

5.0 EXISTING CASA LOMA LIFT STATION'S PROPOSED PUMPS

The proposed pumps for replacement in the Casa Loma LS and use in the Secondary LS are Xylem, model 3315.185 HT that come with the 457 impeller (377 mm) and a 130 HP, 600 V, 3 phase motor. Refer to Appendix A for a copy of the pump curve. The system curve is shown below for each station. The secondary lift station is expected to have a longer forcemain and as such has slightly higher friction losses. The pump selection should be revisited after a site is selected for the proposed Secondary LS.

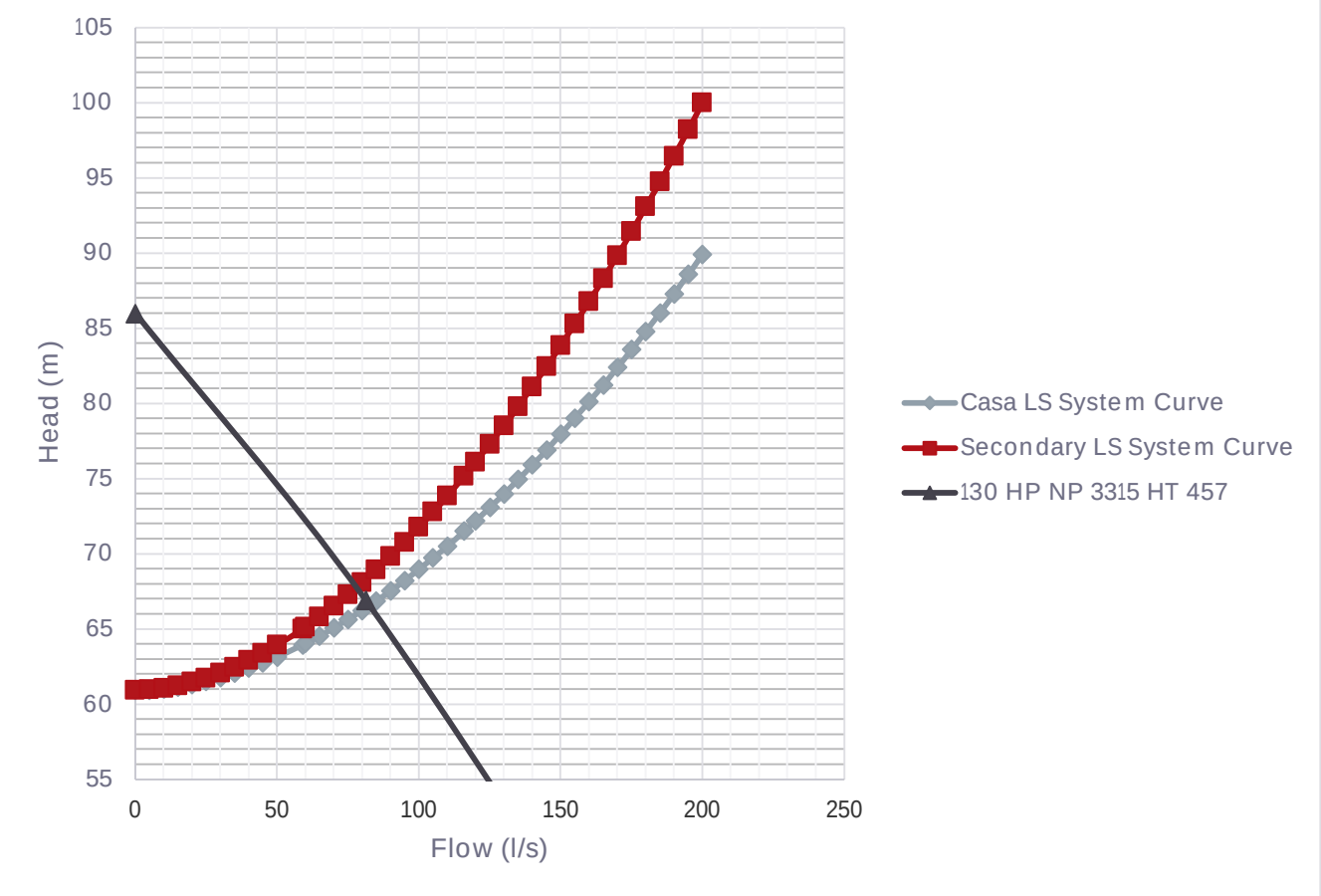

Figure 5.0: System Curve for the Current Upgrade

6.0 TRIGGERS FOR THE CURRENT UPGRADE

An upgrade will be required when the influent peak hour flow exceeds 57 L/s. The 2024 modeling showed that the existing peak hour flow is at or close to this limit under existing conditions. We recommend monitoring flow on the station's inlet line to verify the model results. The design of the upgrade should be advanced in 2026 if the flow data verifies the existing peak hour flow of 57 l/s. RDCO should consider project delivery models to suit the construction timing needs. We'd recommend construction management at risk given the project complexity and estimated value.

7.0 COST ESTIMATE

See Table 8.0 that summarizes the Class D cost estimate for the proposed works to accommodate the 20-year peak hour flow. See Appendix B for the breakdown. The estimate is in 2025 Canadian dollars, includes PST, 15% engineering allowance and 35% contingency and excludes escalation costs.

Table 8.0: Phase 1 of the Casa Loma Lift Station Upgrades

Scope of Work	Class D Cost Estimate
Casa Loma Lift Station Upgrades	$2.71M
Secondary Lift Station	$3.47M
Land Acquisition Allowance for Secondary Lift Station	$0.5M
Total	$6.68M

8.0 CONCLUSION AND RECOMMENDATIONS

The 2025 DCC Upgrade can utilize a cost of $6.68M for upgrading the Casa Loma LS and constructing a secondary lift station. This cost excludes escalation and land acquisition costs.

As next steps for planning for the Casa Loma LS upgrade, we recommend the following:

1. Verify influent flows to confirm required timing for the proposed works,
2. Secure land for the proposed Secondary LS,
3. Confirm the preferred project delivery model to advance the works,
4. Verify the pump configuration for the Casa Loma LS (Z-install configuration or vertical), and,
5. Update the estimated costs and pump selections after a suitable site is secured for the proposed Secondary LS site.

Thank you for the opportunity to assess the lift station capacity. Please reach out to the undersigned below if there are any questions regarding the information provided.

Sincerely,
URBAN SYSTEMS LTD.

Jeremy Clowes, P. Eng
Water and Wastewater Engineer

cc: Joel Short, RPP, MCIP, Greg Smith, BBA

/ct
Enclosure

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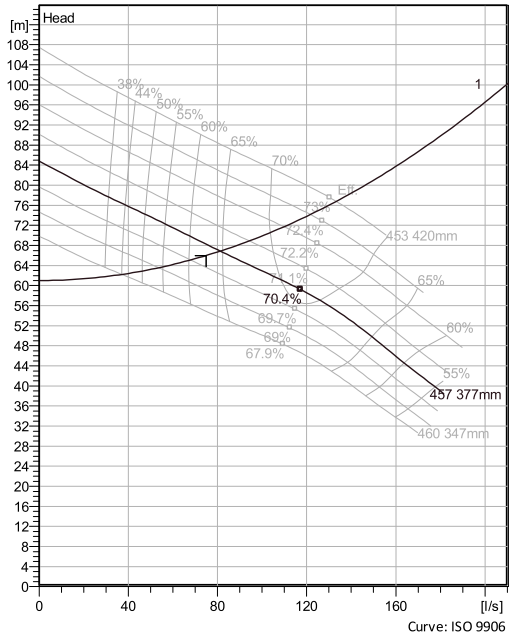
APPENDIX A – FLYGT PUMP CURVE

NP 3315 HT 3~ 457

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%],4 °C,999.9 kg/m³,1.5702 mm²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3315.185 35-35-4AA-W 130hp

Installation type
P - Semi permanent, Wet

Impeller diameter
377 mm

Discharge diameter
150 mm

Pump information

Impeller diameter
377 mm

Discharge diameter
150 mm

Inlet diameter
200 mm

Maximum operating speed
1780 rpm

Number of blades
3

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

Technical specification

Motor - General

Motor number N3315.185 35-35-4AA-W 130hp	**Phases** 3~	**Rated speed** 1780 rpm	**Rated power** 130 hp
ATEX approved No	**Number of poles** 4	**Rated current** 121 A	**Stator variant** 4
Frequency 60 Hz	**Rated voltage** 600 V	**Insulation class** H	**Type of Duty** S1
Version code 185			

Motor - Technical

Power factor - 1/1 Load 0.82	**Motor efficiency - 1/1 Load** 93.8 %	**Total moment of inertia** 1.13 kg m²	**Starts per hour max.** 15
Power factor - 3/4 Load 0.78	**Motor efficiency - 3/4 Load** 94.5 %	**Starting current, direct starting** 584 A	
Power factor - 1/2 Load 0.68	**Motor efficiency - 1/2 Load** 94.6 %	**Starting current, star-delta** 195 A	

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

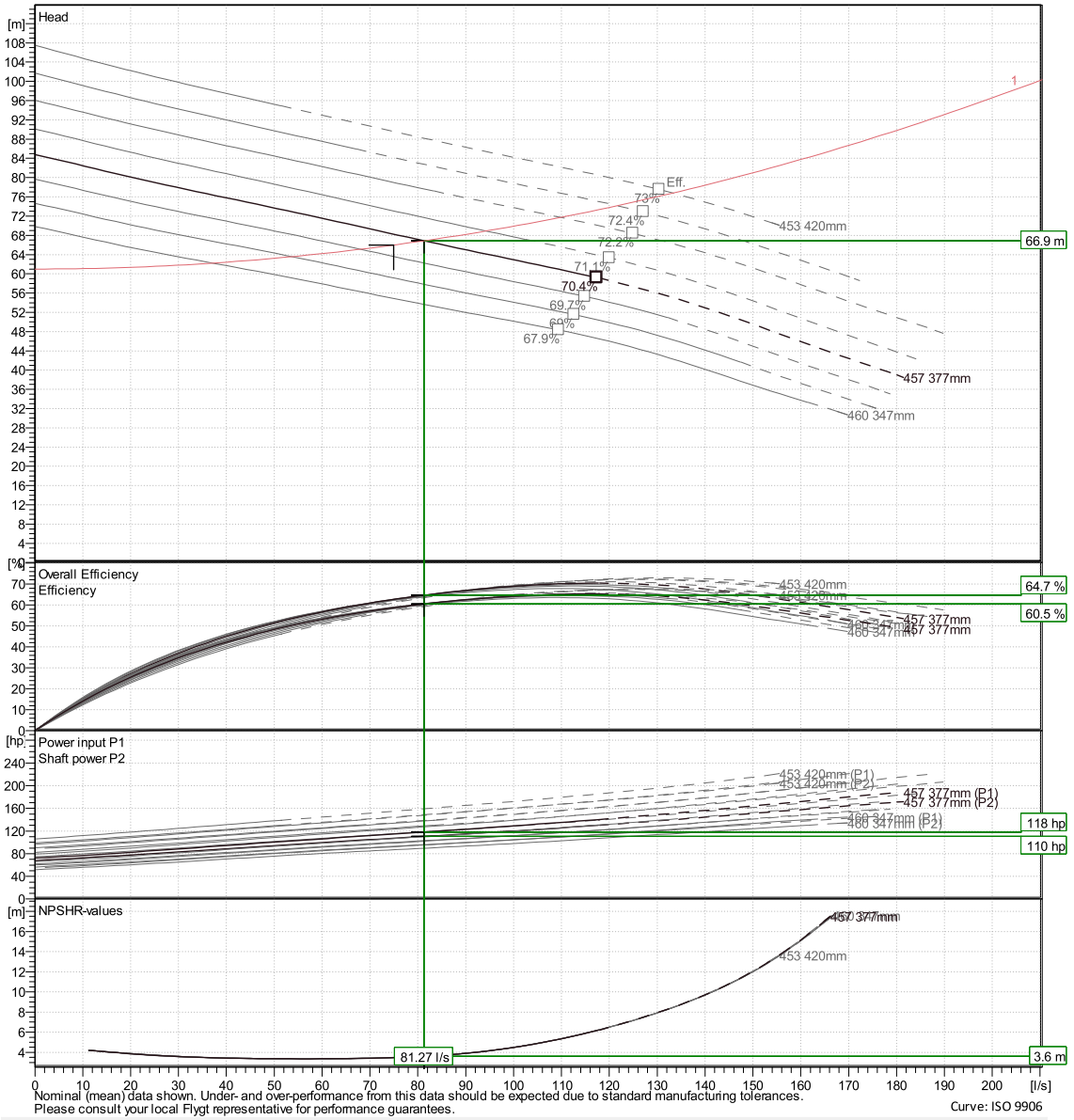
NP 3315 HT 3~ 457

Performance curve

Duty point

Flow	Head
81.3 l/s	66.9 m

Curves according to: Water, pure Water, pure [100%],4 °C,999.9 kg/m³,1.5702 mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

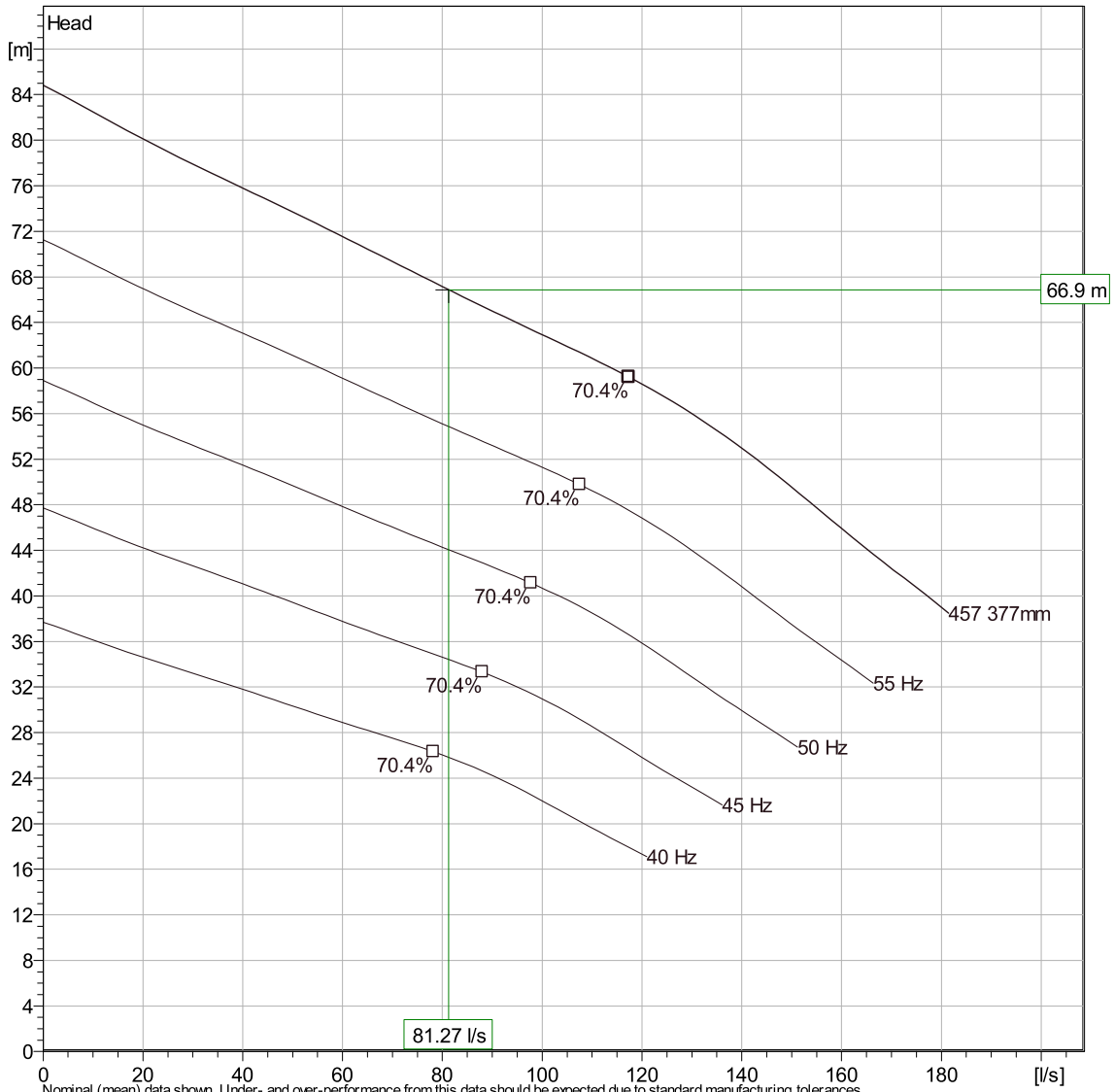
Curve: ISO 9906

Xylect-20443144		Marius Bocu	
	Created on	8/8/2024	**Last update** 8/8/2024

NP 3315 HT 3~ 457

Duty Analysis

Curves according to: Water, pure [100%] ; 4°C; 999.9kg/m³; 1.569mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Operating characteristics

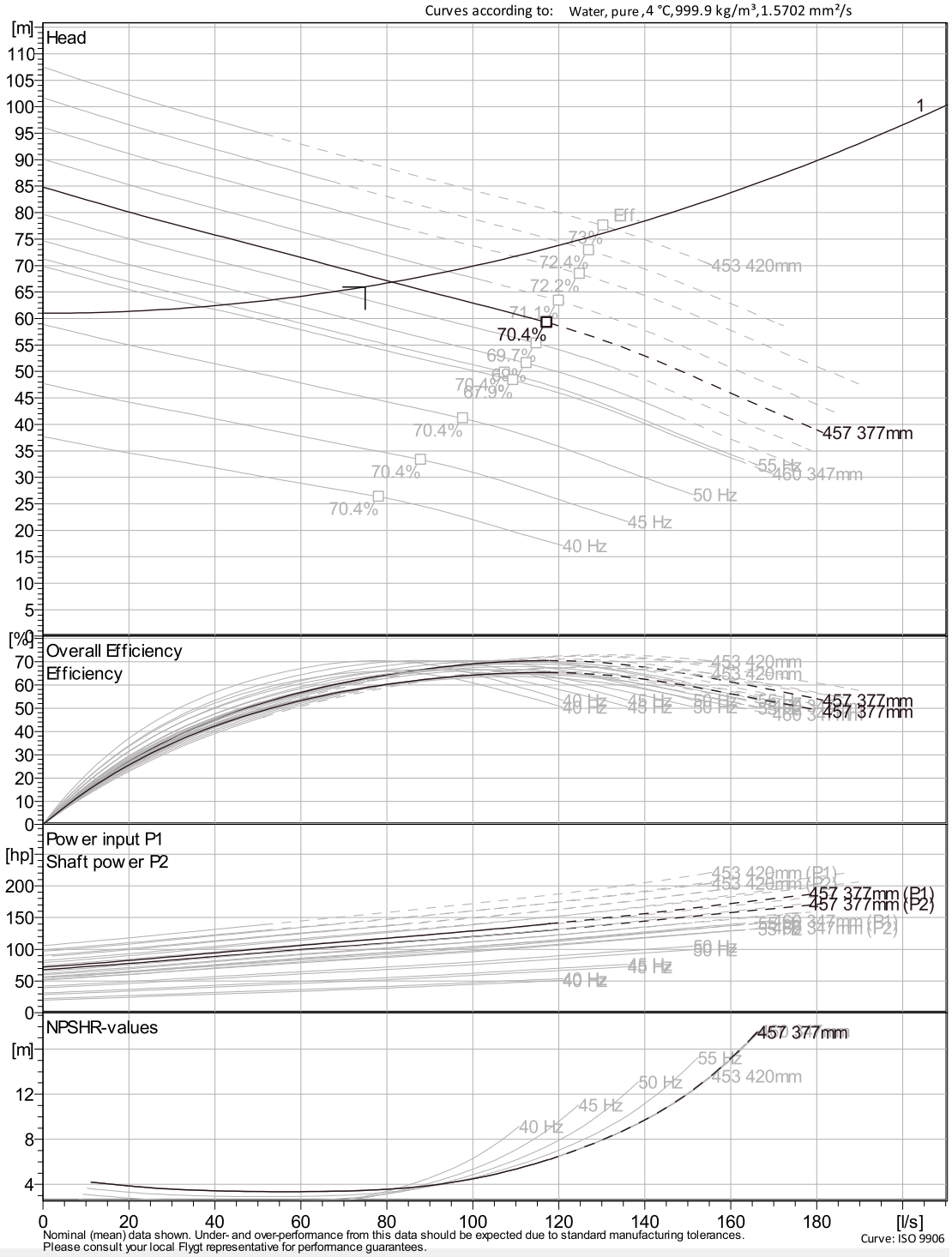
Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	l/s	m	hp	l/s	m	hp		kWh/m³	m
1	81.3	66.9	110	81.3	66.9	110	64.7 %	0.301	3.6

Project		**Created by**	Marius Bocu		
Block	Xylect-20443144	**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

VFD Curve

Curves according to: Water, pure ,4 °C,999.9 kg/m³,1.5702 mm²/s



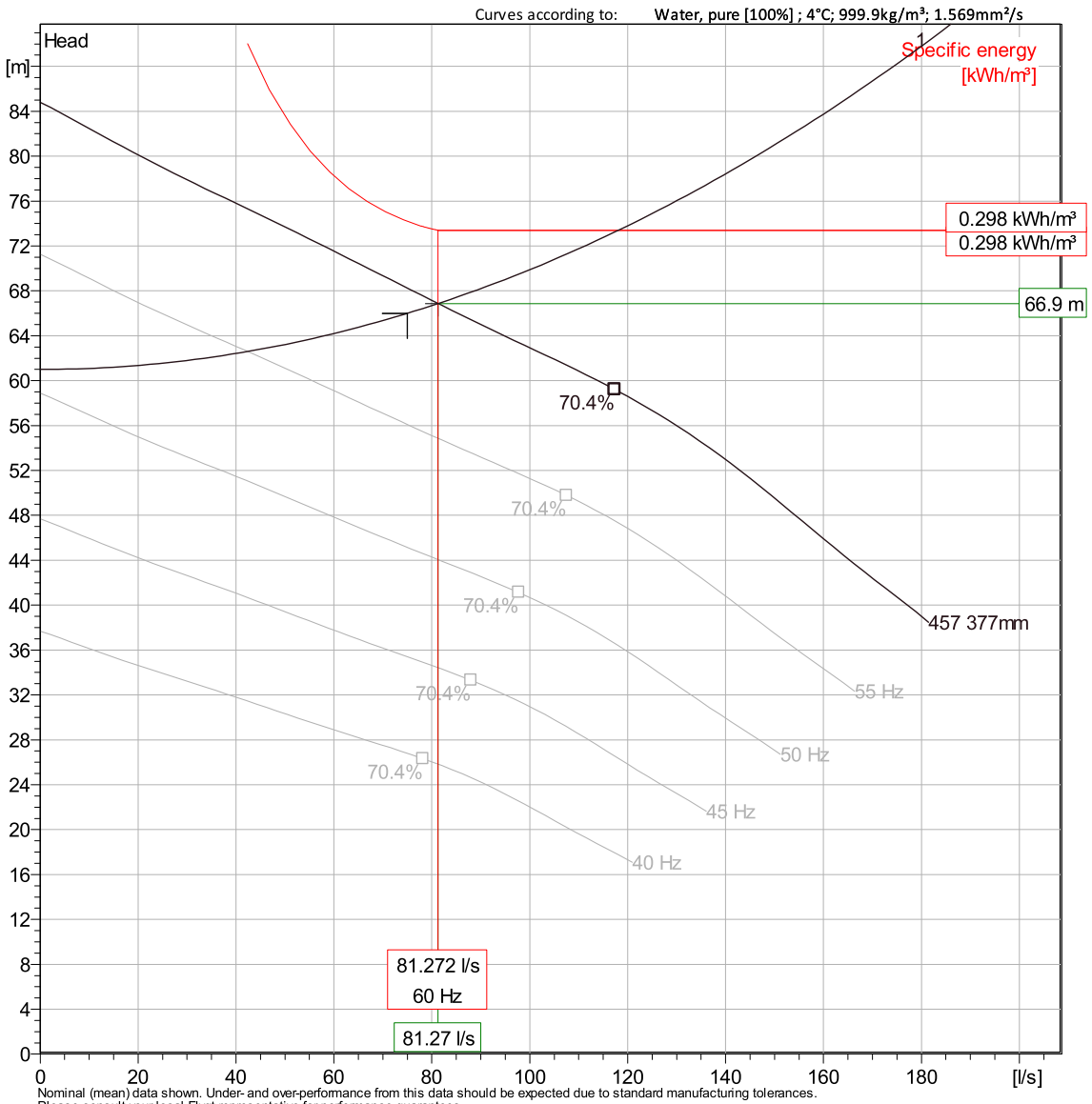
Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Curve: ISO 9906

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

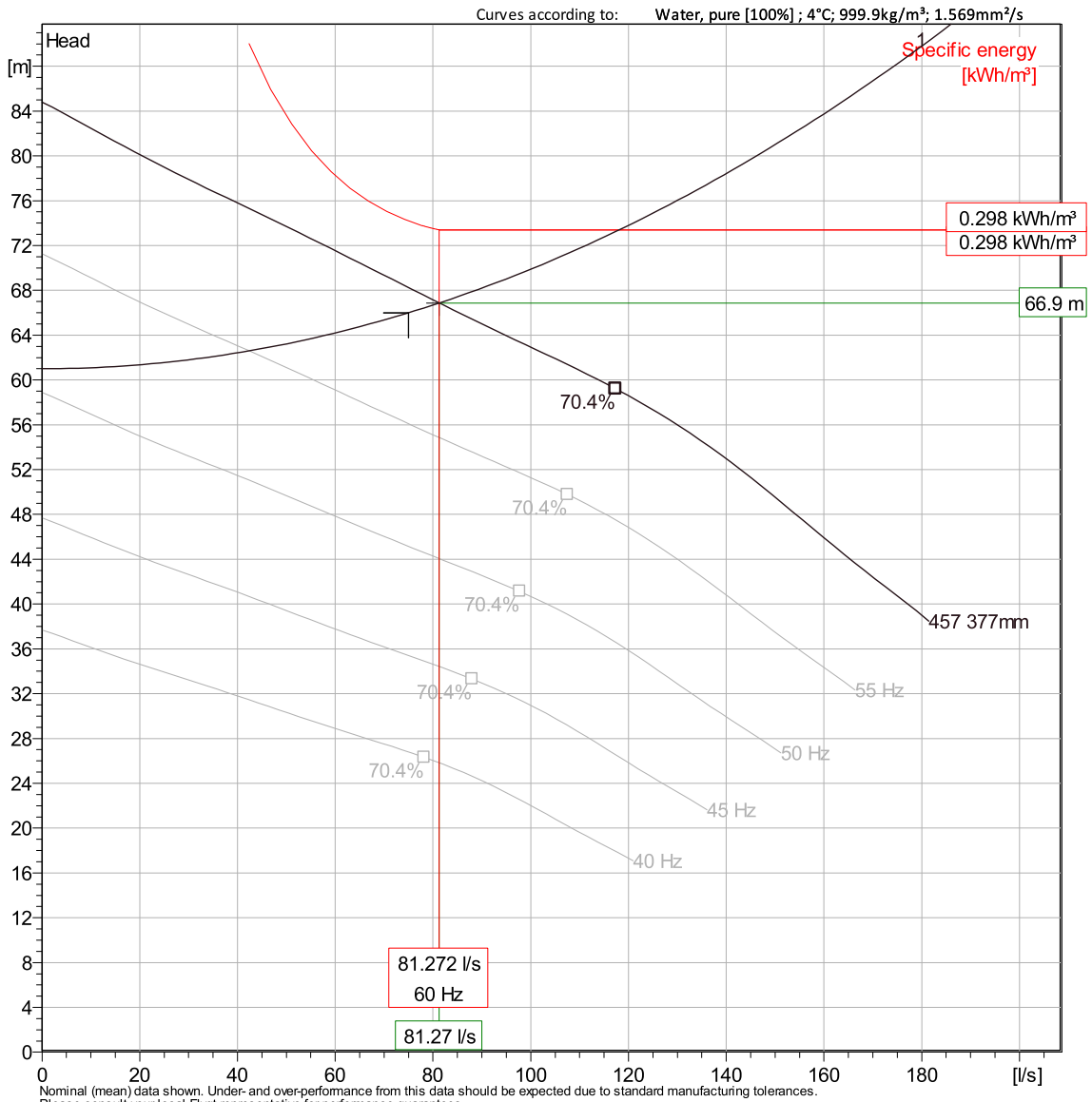
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
1	60 Hz	81.3	66.9	110	81.3	66.9	110	64.7 %	0.301	3.6
1	55 Hz	42.4	62.6	70.9	42.4	62.6	70.9	49.2 %	0.366	2.94
1	50 Hz									
1	45 Hz									

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

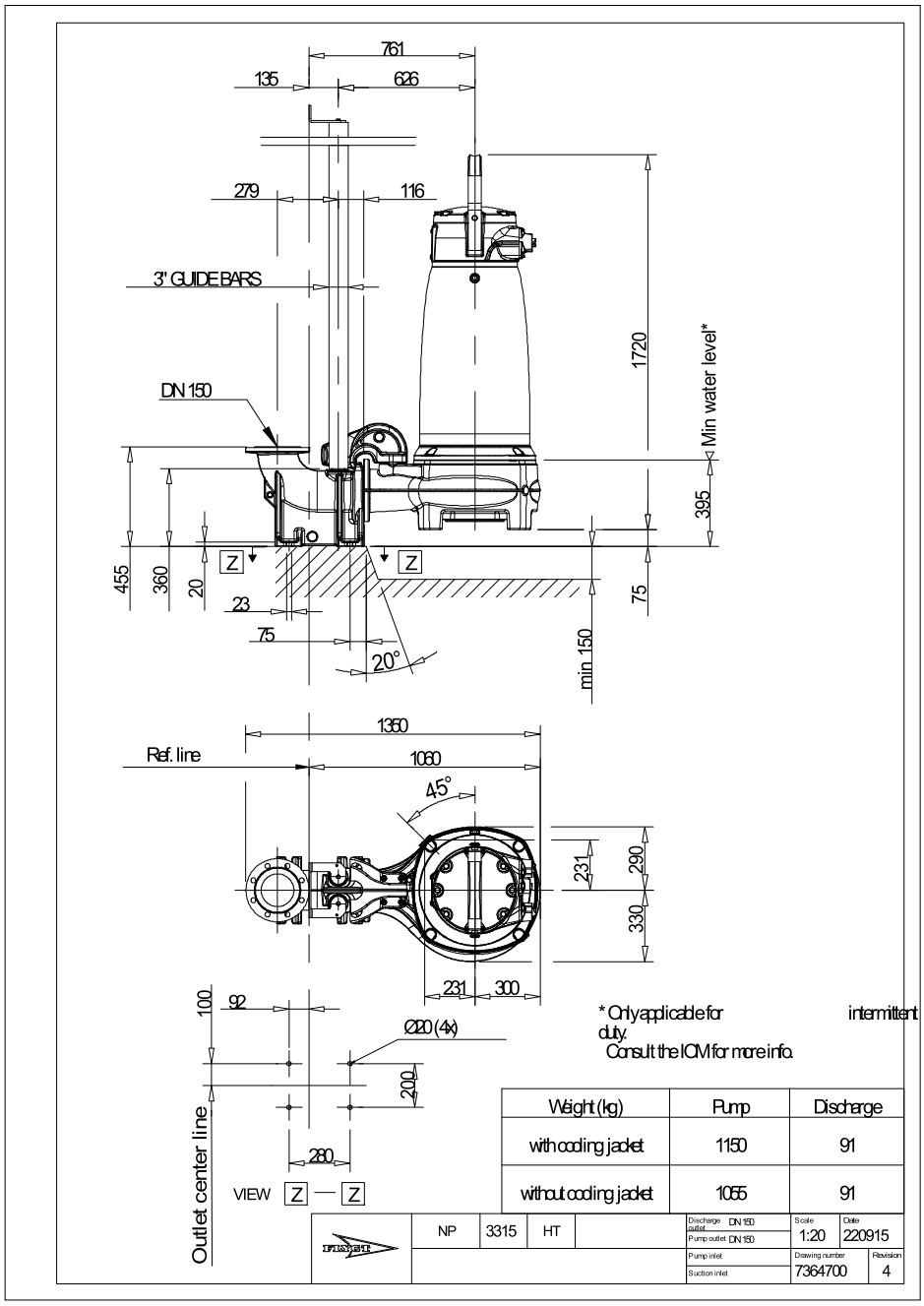
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
1	40 Hz									

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

Dimensional drawing



Project	Xylect-20443144	**Created by**	Marius Bocu
Block		**Created on**	8/8/2024 **Last update** 8/8/2024

APPENDIX B – COST ESTIMATES

DCC
Casa Loma Lift Station - Class D Estimate

Casa Loma Lift Station - Upgrade Existing Wet Well-Dry Well

Job No: **1179.0120.01**
Date: **18-Jul-25**
Prepared by: Carly Tremblay
Checked by: J.Clowes

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
1.0	**General**				
	Mobilization/Demobilization	1	LS	$35,000	$35,000
	Insurance and Bonding	1	LS	$20,000	$20,000
	Commissioning	1	LS	$25,000	$25,000
	Bypass Pumping	1	LS	$400,000	$400,000
	SUBTOTAL				***$480,000***
2.0	**Removals**				
	Existing pumps, MCC, PLC, suction pipes, discharge pipes	1	LS	$50,000	$50,000
	SUBTOTAL				***$50,000***
4.0	**Casa Loma Lift Station - Upgrade Existing Wet Well-Dry Well**				
	Install New Pump - NZ3315.185 457 impeller 130 HP 600V 3 phase on VFD	2	each	$212,500	$425,000
	Z-Stand Steel PN 785 25 35 with service cart and rail unit	2	each	$44,416	$88,831
	Proposed 350 mm Suction Pipes x 2 (includes knife gate and inlet bell)	2	ea	$80,000	$160,000
	Proposed 200 mm Discharge Pipes (includes check valve and plug valve)	2	ea	$50,000	$100,000
	Electrical and Controls Upgrades (excludes generator)	1	LS	$350,000	$350,000
	Concrete Placement	1	m^3	$2,500	$2,500
	Epoxy coat wet well	1	LS	$150,000	$150,000
	SUBTOTAL				***$1,276,331***
				subtotal	$1,806,331
				Engineering and Contingency (50%)	$903,166
				total	$2,709,497
				rounded total	$2,710,000

DCC
Secondary Lift Station - Class D Estimate

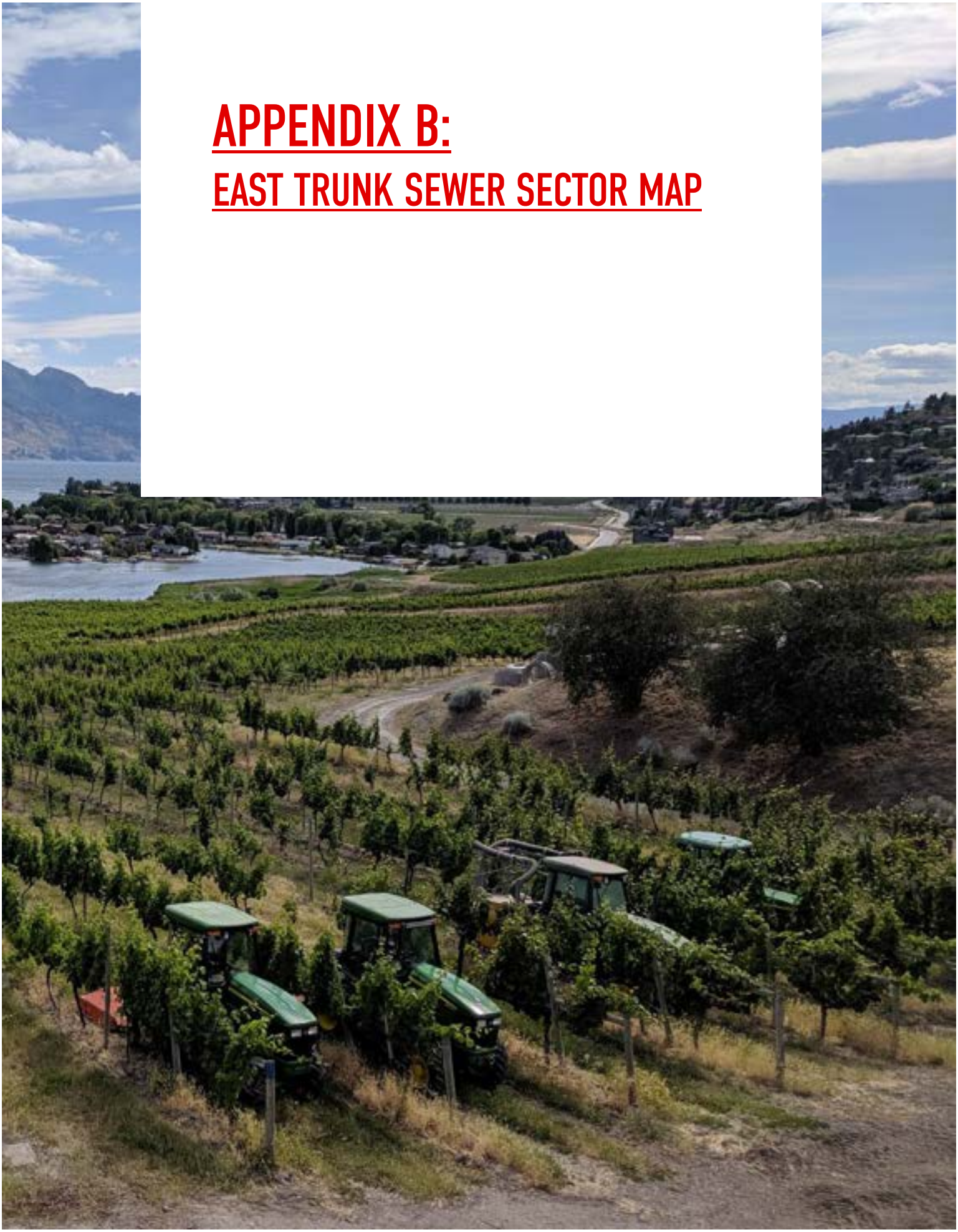
Install New Lift Station Above Campbell Road

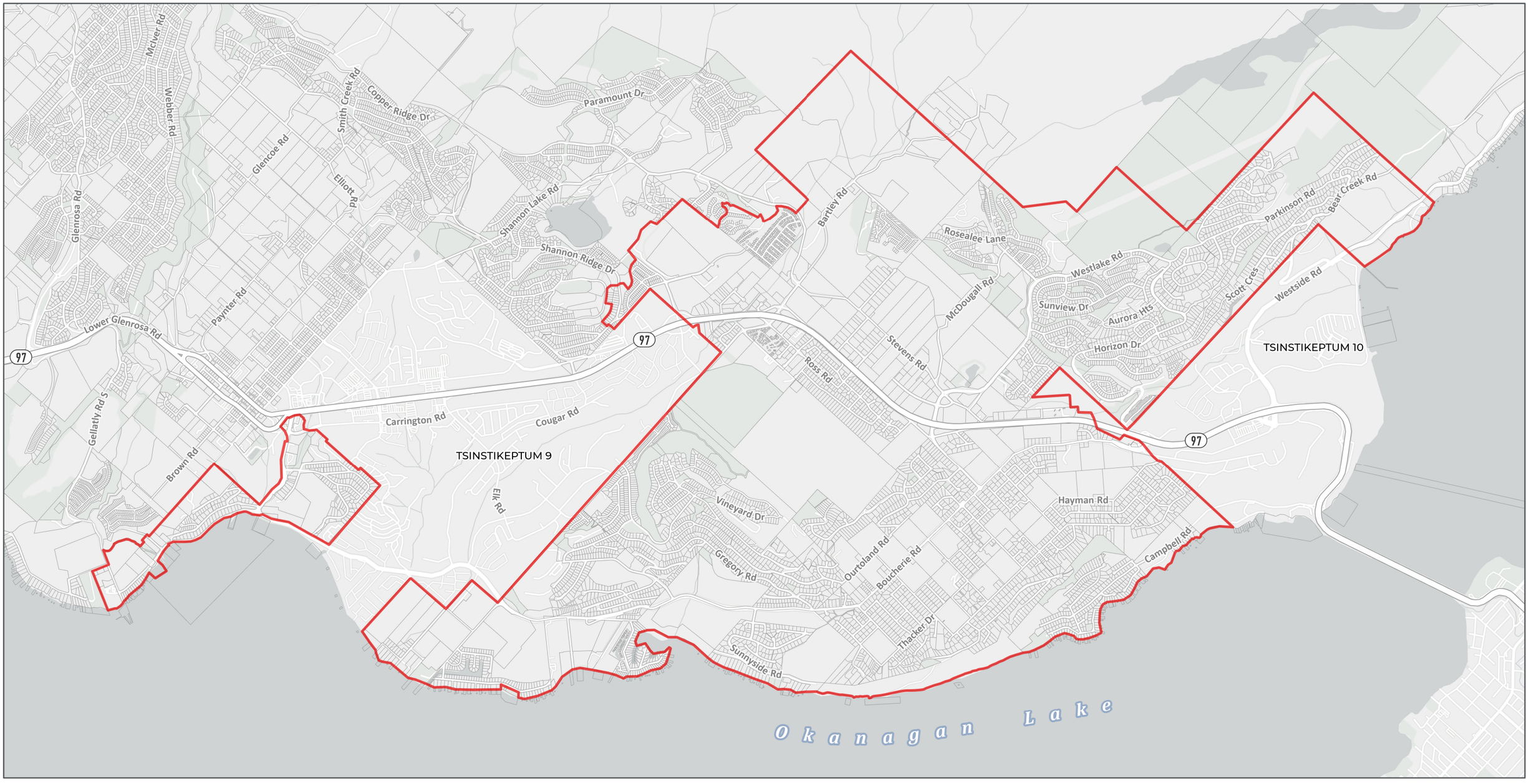
Job No: 1179.0120.01
Date: 15-Jul-25
Prepared by: Carly Tremblay
Checked by: J.Clowes

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
1.0	**General**				
	Mobilization/Demobilization	1	LS	$60,000	$60,000
	Insurance and Bonding	1	LS	$30,000	$30,000
	Commissioning	1	LS	$40,000	$40,000
	Bypass Pumping	1	LS	$0	$0
	SUBTOTAL				***$130,000***
2.0	**Site Works**				
	Rock removal	1	LS	$50,000	$50,000
	Access Road	1	LS	$50,000	$50,000
	Retaining wall	1	LS	$30,000	$30,000
	Drainage - Allow for culvert with headwalls + ditching	1	LS	$50,000	$50,000
	Hot Tap Tie-in to 300 mm Forcemain	2	ea	$30,000	$60,000
	Line Stop and Cap Pipe	1	ea	$50,000	$50,000
	400 mm DR18 PVC Inlet Pipe	20	lm	$900	$18,000
	300 mm DR18 PVC Discharge Pipe	30	lm	$500	$15,000
	Hydroseeding	2000	m^2	$8	$15,000
	2.4 m height chain link fencing	60	LM	$200	$12,000
	Double swing gate	1	ea	$2,500	$2,500
	SUBTOTAL				***$352,500***
3.0	**Campbell Rd Lift Station**				
	Install New Pump - NP3315.185 457 impeller 130 HP 600V 3 phase on VFD	2	each	$212,500	$425,000
	Guide rails for two pumps	1	LS	$12,000	$12,000
	3.66 m x 5.43 m deep FRP Wet Well Triplex Installation	1	LS	$400,000	$400,000
	Process and Electrical Building	48	sq.m	$6,000	$288,000
	Odour Control Metering Pumps and Chemical Piping	1	LS	$20,000	$20,000
	200 mm Stainless Steel Pipe (with 3 - 90 degree bend)	1	LS	$48,000	$48,000
	200 mm Plug Valve	3	ea	$10,000	$30,000
	200 mm Check Valve	2	ea	$15,000	$30,000
	Flowmeter	1	ea	$15,000	$15,000
	75 mm Air Valve	1	ea	$6,000	$6,000
	Pressure Gauge & 50 mm Ball Valve	4	ea	$500	$2,000
	Electrical Service	1	LS	$50,000	$50,000
	Electrical and Controls (includes generator with enclosure)	1	LS	$500,000	$500,000
	SUBTOTAL				***$1,826,000***
				Subtotal	$2,308,500
				Engineering and Contingency (50%)	$1,154,250
				Total	$3,462,750
				Rounded Total	$3,470,000

APPENDIX B:

EAST TRUNK SEWER SECTOR MAP





URBAN SYSTEMS

Project #:	1179.0120.01
Author:	JL
Checked:	JS
Status:	-
Revision:	C
Date:	2025 / 10 / 9

0 0.5 1 Kilometers

Coordinate System:
NAD 1983 UTM Zone 11N

Scale: 1:32,000
(When plotted at 11"x17")

Data Sources:
- Data provided by Regional District of Central Okanagan, and Government of BC

Legend

- East Trunk Sewer Sector Boundary
- City of West Kelowna Parcels

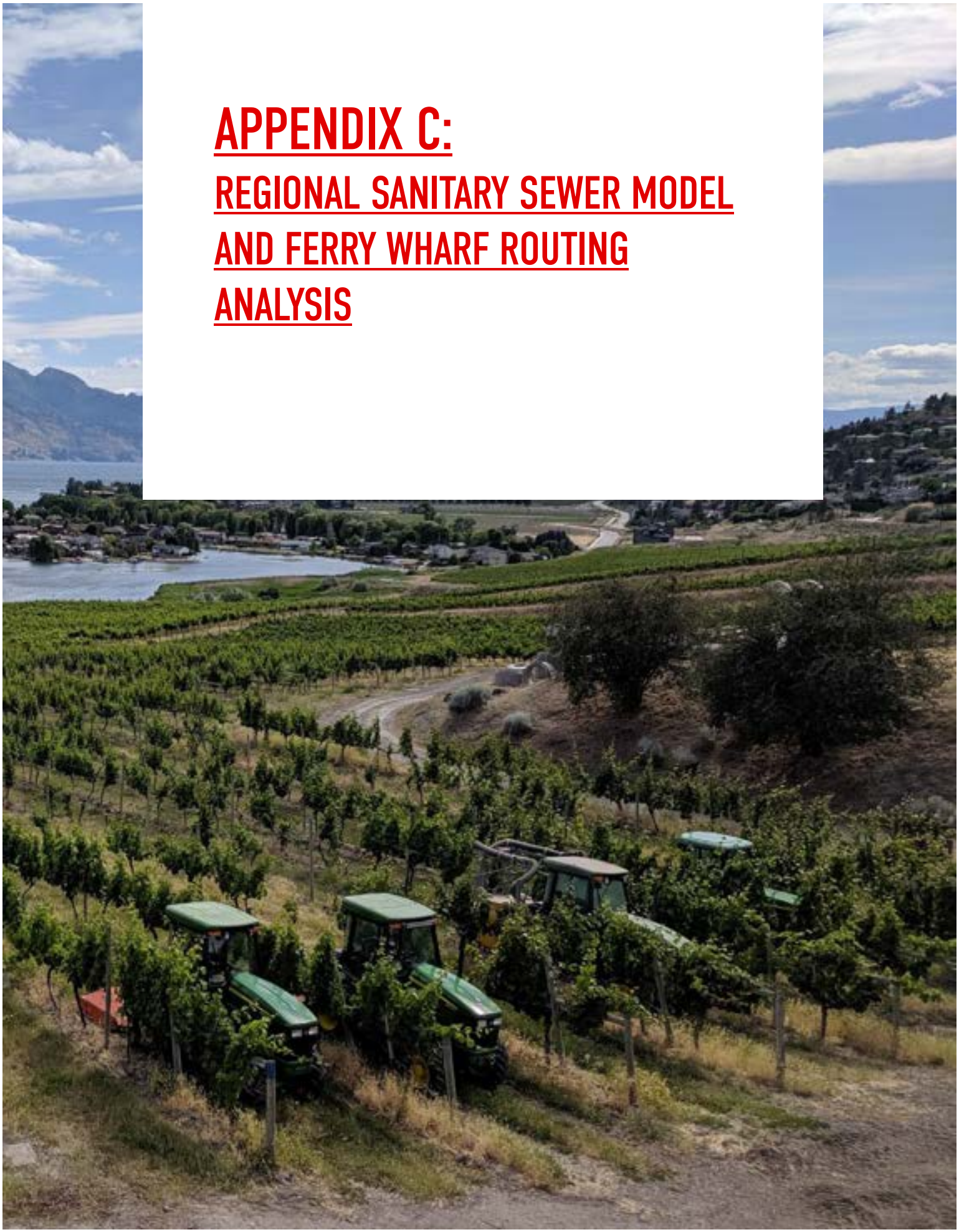
Regional District of Central Okanagan

Development Cost Charge
Bylaw No. _____
Schedule "B"

East Trunk Sewer Sector Map

APPENDIX C:

REGIONAL SANITARY SEWER MODEL AND FERRY WHARF ROUTING ANALYSIS



This memorandum summarizes the population and flows developed for this modeling exercise, the model development and calibration process, the modeling results, cost estimates for each option, comparison of all options and closes with a recommended option and suggested next steps.

2.0 POPULATION AND FLOW ESTIMATES

The populations and sanitary flows were reviewed for the existing conditions, a 20-year growth scenario and a buildout scenario that allows for 75 years of growth.

2.1 Population Estimates

The summary of existing and projected populations is outlined in Table 2.0 and includes equivalent populations for institutional, commercial, and industrial lands (ICI). Refer to Appendix A for growth projections for IR9 and IR10.

Table 2.0 - Population Assumptions

	Existing Conditions (2024)	20 Year Growth (2044)	Buildout Growth (2099)
District of Peachland	5,139	8,733[1]	13,741
City of West Kelowna	37,609	61,313[1]	179,241
Westbank First Nation	11,655	34,004	58,893
Total	54,403	104,050	251,875

Notes:
1) Population estimate taken from Province of BC, BC Stats (bcstats.shinyapps.io/popApp)

The above population projections were estimated using the base population and growth rates summarized in Table 2.1.

Table 2.1 – Base Population and Applied Growth Rates

	Census Year Used	Population from Census	Growth Rate Applied from Census Year to 2024	Average Growth Rate Over 20 years	Average Growth Rate over 75 years
District of Peachland	2021	5,006	1.32%	2.7%	1.32%
City of West Kelowna	2021	36,078	2.1%	2.5%	2.1%
Westbank First Nation	2016	8,780	4.13%	4.13%	2.1%

Notes:
1) Review existing populations and ensure alignment with the latest census data in any future updates of the regional model.
2) In addition to local government planning documents, consider the latest BC Stats estimates of future populations for the District of Peachland and the City of West Kelowna in any future updates of the regional model.
3) Current BC Stats population estimates do not consider the small-scale, multi-unit housing legislation.

2.2 Flow Estimates

The following key parameters, based on the WFN Subdivision, Development and Servicing Law, were used along with the estimated equivalent populations to generate flows in the sanitary model:

- An Average Dry Weather Design Flow (ADWF) of 350 L/capita/day was applied,
- An Infiltration & Inflow (I&I) rate of 5000 L/ha/day was applied to areas where the sanitary system would be extended, and,
- 70% of the Harmon peaking factor was applied to the ADWF and combined with the I&I flows to estimate Peak Wet Weather Flow (PWWF).

The model also applies diurnal curves to help estimate the PWWF values.

The flows at the WRWTP were estimated using the following:

- Peak hour flow = Modelled PWWF
- Peak hour flow to average daily flow verified as equal to 2.6 for existing conditions per below:

  350 L/s peak hour flow divided by average recorded daily flow of 11,620 m3/d (134.5 L/s) equals 2.60
- Max day flow = PWWF divided by 2.0 per below:

  As previously estimated at the WRWTP and most recently referenced in the 2010 Westside Regional WWTP Stage Upgrades Pre-Design Report that was prepared by AECOM.
- Average day flow = PWWF divided by 2.60 or Max Day Flow divided by 1.30

3.0 SANITARY MODEL DEVELOPMENT

PCSWMM, which stands for "PC Storm Water Management Model," is a comprehensive software tool used for modeling and analyzing stormwater and wastewater systems. PCSWMM was used in the current Ferry Wharf Lift Station routing analysis for the simulation and assessment of the four routing options. The regional model was developed by combining and calibrating existing models from CWK and another from WFN & RDCO.

The East Trunk (WFN & RDCO) sewer model was created by Urban Systems in 2018. Our work from 2018 for RDCO included detailed work to understand East Trunk main flow contributions from CWK and WFN. An extensive update to the sanitary GIS base maps was completed at the onset of the project. The update involved adding pipes that were constructed since the base map was last updated and adding pipe invert elevations.

We utilized the CWKs existing sanitary model that was developed as part of their 2014 Sanitary Sewer Utility Master Plan using InfoSWMM to further refine and understand the incoming flows from CWK into the RDCO infrastructure. The files received from City of West Kelowna in January 2024 for the development of this model were converted to EPA SWMM 5 (PCSWMM) for all scenarios including 10-year (2024), 20-year (2044) and ultimate build-out that were included in the 2014 model. The 10-year scenario (2024) was used as a baseline loading scenario for the CWK jurisdiction.

3.1 CALIBRATION

To ensure model accuracy, flow monitoring information was checked at various locations throughout the regional model including Empire Place (Apple Way), Boucherie, Two Eagles and Carrington Flow monitors. The calibrations were made for highest flow day, building some conservative values into the model as peak flows at each location may not have occurred on the same day or time. Additional flow monitoring locations include East Boundary, Sonoma Pines, and Louie Drive, which provide checks on the flows from Boucherie, Two Eagles and Carrington flow monitors. The peak flows used for calibration are noted below in Table 3.0 along with the modeled values demonstrating +/- 1% accuracy.

Table 3.0 – Existing Conditions Calibration

Calibration Location	Flow Monitoring – Peak Flow (L/s)	Existing Conditions Model Result PWWF (l/s)
Empire Place (Apple Way)	96.0	96.5
Boucherie flow monitor	60.0	59.8
Two Eagles	29.0	28.7
Carrington flow monitor	15.0	15.0

The modeled generated peak hour flow at the WRWTP was compared to the existing peak hour flow to help validate the existing conditions model calibration as shown in Table 3.1. The existing worst case peak hour flow at the WRWTP was estimated to be 394 l/s and allows for the following:

- Peachland's main lift station is operating at 82 L/s,
- East Trunk Lift Station is operating at 155 L/s,
- Powers Creek Siphon is operating at 79 l/s, and,
- The Glenrosa Trunk is operating at 81 l/s.

The Powers Creek siphon is the only flow contribution that cannot be directly measured from flow meters and could be verified by field measurements to refine this estimate.

The modeled peak hour flow at the WRWTP is within 12% of the estimated existing peak hour flow. We normally strive to have the models within +/- 10% for modeled peak flow versus the existing peak flow. We are estimating a portion of the peak hour flow for the existing conditions so there is some uncertainty in the above comparison. Measuring the flow on the Powers Creek siphon would allow for verifying the existing peak hour flow and improved model calibration. For the purposes of this study, the modeled PWWF will be used to establish peaking factors for the WRWTP review. The peaking factors are used to convert the PWWF into estimated Max Day and Average Day Flows. Using the modeled PWWF to estimate peaking factors will provide a more conservative estimate of Max Day and Average Day Flows which is prudent when considering impacts to the WRWTP.

Table 3.1 – WRWTP Peak Hour Flow Check

Calibration Location	Estimated Existing Peak Hour Flow (l/s)	Model Result Existing PWWF (l/s)
WRWTP	394	350

3.2 MODEL FLOW ALLOCATION FOR GROWTH SCENARIOS

Flows for IR9 and CWK were distributed evenly across the collection system. Flows for IR10 were allocated to the closest node for known development areas as listed in Table 3.2.

Table 3.2 – IR10 Demand Allocation

Allocation Point (Model Node)	20-Year Growth (2044)	Buildout/75 Year Growth (2099)
Old Ferry Wharf lift station (Old_Ferry_LS)	Ariva West Harbour Phase 4 19 Greens Westrich Pacific	Infill development The Bluffs
Westside Road lift station (WR001)	High Street Nancee Way Village Spland Rd Townhomes	Infill development
Campbell Road at Shelter Bay lands (easttrunk_CL30)	Shelter Bay single family MF Phases 1, 2 and 3	Infill development
Highway 97 trunk upstream of dosing chamber (HY001)	19 Greens Tomat Road Lakeridge Phase 4	Infill development

3.3 FUTURE UGPRADING METHODOLOGY

Infrastructure upgrades in the model required an iterative approach to assure that peak flows were conveyed to the WRWTP. To determine the upgrades required for each scenario, the following criteria was utilized:

- Lift stations pumps were adjusted to ideal pump curves for future conditions to account for growth in the system (i.e., flow in = flow out). This ensured that the pump station capacity did not negatively influence the gravity collection system upstream of the station.
- Lift stations are to be able convey PWWF with at least one redundant pump.
- Gravity pipes were considered deficient if flowing full (depth of flow the same as pipe diameter, d/D =1).
- Any pipe upgrades were sized such that the depth of flow (d/D) was no more than 0.8 under peak wet weather flow conditions.
- Forcemain upgrades were reviewed in tandem with lift station upgrades. Forcemains were upgraded to keep velocities below 3 m/s, but also to reduce pump horsepower requirements.
- Pump performance can decline over time due to wear and tear. Routine inspection and maintenance are required to maintain the pump's performance over its service life. An allowance for maintenance costs were included in the cost estimates.

4.0 MODELLING RESULTS

4.1 PIPING DEFICIENCIES

Piping deficiencies are graphically represented in Appendix B for each routing option in each given scenario for 2024, 2044 and 2099. The results for each scenario are discussed below. Please note that there are proposed forcemains which are required to implement Options 2 and 3A that are included in cost estimates but are not described below as a deficiency.

4.1.1 Existing 2024 Conditions

No piping deficiencies were noted.

4.1.2 Future 2044 Conditions

Piping deficiencies were minimal for the 2044 scenarios and only triggered on option 3A where the proposed forcemain connects to the existing collection system. The cost for the deficient pipe is included in the estimates and allows for installing 135 m of 375 mm pipe.

4.1.3 Future 2099 Conditions

Piping deficiencies throughout the system are prominent in future 2099 conditions as shown in Figure 4.0. East trunk upgrades are significant for all options from Old Boucherie road to East Trunk lift station. Option 2 shows additional upgrades around the Faulkner lift station.

Table 4.0 – 2099 Pipe Upgrades

Option	1	2	3A	3B
Total Length of Deficient Pipe (km)	3.7	5.5	3.9	3.7
Size Range for Proposed Pipes (mm)	300 to 1050	300 to 1050	300 to 1050	300 to 1050

4.2 LIFT STATION DEFICIENCIES

The lift station deficiencies discovered through this modelling exercise are noted in the following table. Deficiencies are noted as incoming flow values are greater than the listed capacity. The ‘x’ mark indicates that the station has inadequate capacity.

Table 4.1 - Summary of Lift Station inflows greater than listed capacity

			Existing 2024				20 Year Growth 2044				75 Year Growth 2099			
Lift Station	Jurisdiction	Existing Capacity (L/s)	1	2	3A	3B	1	2	3A	3B	1	2	3A	3B
Old Ferry Wharf	WFN	12.5					x	x	x	x	x	x	x	x
Gravity Main into Dosing Chamber	WFN	55-62									x		x	x
Horizon Drive/Faulkner	CWK	30						x				x		
East Boundary	CWK	198.5												x
Casa Loma	RDCO	59					x	x		x	x	x		x
East Trunk	RDCO	155					x	x	x	x	x	x	x	x
Treatment Plant Headworks	RDCO	417					x	x	x	x	x	x	x	x

In addition to the deficiencies noted above, a proposed lift station is required to implement Option 2 and pumps must be added to WFNs dosing chamber to implement Option 3A and ultimately for Option 3B as well. A proposed lift station is required to implement Option 3A which is in addition to the proposed pumps being added at the dosing chamber. The cost for these works were included in the estimates under the applicable option.

4.2.1 Ferry Wharf

The Ferry Wharf Lift Station is a WFN duplex station (1 duty pump and 1 standby) equipped with 50 HP Gorman-Rupp VS3A-B-1 pumps that were selected with an operating point of 20 l/s at 60.7 m, 229 mm diameter impeller and operating speed of 2,100 rpm. However, after on-site confirmation by RDCO in April 2024, the lift station is currently operating at a flow rate of 12.5 L/s. We reviewed the manufacturer's pump curve and expected that the existing pumps should be capable of producing 18 L/s under existing conditions which is lower than the original design point but higher than the observed flow rate. We recommend reviewing the start-up report for the station to determine if the performance has declined over time, if available. WFN was unable to locate the start-up report when this memorandum was prepared and we recommend contacting the pump supplier to review further.

According to population projections provided by WFN in 2024, approved/Instream developments include Ariva (equivalent population of 600) and West Harbour Phase 4 (Equivalent population of 99). Future developments proposed include Westrich Pacific Phase 1 and Phase 2, with equivalent populations of 668 and 660, respectively. Additionally, the Bluffs, a potential future development has an equivalent population pending approval of 4,000. Based on our modelling exercise, the anticipated peak flows into Ferry Wharf lift station are outlined in Table 4.2.

For all options, we have allowed for upgrading the station by replacing both existing pumps which are not performing at the expected flow rate and adding a third 50 HP pump (Gorman Rupp VS3A-B-1) which will allow for operating two 50 HP pumps in parallel with a redundant pump. The upgrade also allows for replacing the forcemain with a 250 mm pipe. The station will be able to convey up to 40 L/s using two pumps in parallel. This upgrade is common to all options.

Table 4.2 - Anticipated Peak Flows into Ferry Wharf lift Station

Year	Anticipated Peak Flows into Ferry Wharf Lift Station (Common across all options)
2024	7 L/s
2044	27 L/s
2099	66 L/s

4.2.2 Faulkner + Proposed WFN Lift Station

The Faulkner Lift Station is owned and operated by CWK. If the option 2 alignment is selected, an upgrade would be required. The existing pump capacity is listed (as per the CWK operations report) at 30 L/s but testing of this operation point is recommended to verify if there is an existing deficiency or if Option 2 is pursued. The estimated peak flows into the Faulkner lift station are listed below in Table 4.3.

We have assumed the station would be replaced with a larger lift station that is capable of pumping at a rate of 66 L/s per the projected 20-year flow noted in Table 4.3. WFN will need to construct a lift station mid-way between the Ferry Wharf Lift Station and the Faulkner Lift Station to limit the pumping head to a reasonable value for non-clog sewage pumps (60 m TDH or less preferred). We have proposed extending a 250 mm forcemain from the Ferry Wharf Lift Station to the Faulkner Lift Station. The forcemain can utilize existing rights-of-way but will require a trenchless crossing of Keefe Creek.

Table 4.3 – Faulkner Lift Station Peak Flows

Year	Anticipated Peak Flows into Faulkner/Horizon Drive Lift Station (Option 2 Only)
2024 – Option 2	42 L/s
2044 – Option 2	66 L/s
2099 – Option 2	154 L/s

4.2.3 Casa Loma

The Casa Loma lift station is operated by RDCO and was constructed in 2004. The 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 was identified as 74 L/s @ 131 m in past reporting. However, RDCO testing as of April 2024 indicated that each set of pumps are operating at 59 L/s. Table 4.4 outlines the anticipated peak flows into Casa Loma for each given routing option.

Casa Loma Lift Station will require an upgrade to implement Options 1, 2 and 3B. The station should be upgraded to convey the 2044 PWWF of up to 71 L/s. In Option 1, 2 and 3B, we considered two upgrade options for the Casa Loma Lift Station including:

- Option 1 – Upgrade the Existing Casa Loma Lift Station

  This upgrade allows for replacing the existing 150 HP pump sets with a 200 HP pump sets that are manufactured by Cornell or equivalent, replacing all process piping, replacing all electrical and standby generator, and upgrading the electrical service. The Cornell pump that was reviewed includes two 200HP pumps (model 6NHTB) in series, each with a 408 mm diameter impeller. The station's expected capacity using the upgraded pumps will increase to 116 L/s prior to upgrading the existing 300 mm forcemain. In the future, the forcemain can be upsized to 400 mm which will increase the station's capacity to 155 L/s. The proposed pump would operate with 72.5% efficiency as shown in Appendix D. The pumps would operate at approximately 77% efficiency with the larger 400 mm forcemain. RDCO noted that an

electrical service size increase may not be feasible at this site. The proposed pump is a solids handling pump and does not require screening upstream.

- Option 2 – Upgrade the Existing Casa Loma Lift Station and Add a Second Lift Station

  This upgrade allows for adding a second lift station mid-way between the existing lift station and manhole LV11 that existing station discharges into on Thacker Drive. The second lift station would be located such that the wet well has an upper operating level of approximately 399 m, geodetic. This station could be located approximately 260 m south-west of the cul-de-sac at the south end of Campbell Road. This option could be pursued to eliminate the high head pumps at the Casa Loma Lift Station. For costing, we have allowed for replacing the pumps at Casa Loma with a more typical dry pit non-clog pump that would operate in a duty/standby configuration. The same size pumps would be utilized at the mid-point lift station. The duty point is estimated to be 75 L/s at 66 m and the pumps are estimated to require a 130 HP motor. In the future, the forcemain can be upsized to 400 mm to accommodate buildout flows—the estimated future operating point with the larger forcemain is 125 L/s at 66 m. A triplex pump configuration would be preferrable to accommodate the future flow range and the wet well installed initially would allow for adding a third pump in the future. The existing Casa Loma lift station could be replaced with triplex concrete or fiberglass wet well and an above ground valve kiosk or building in the buildout scenario. Refer to Appendix D for pump options provided by Xylem.

From the above options, the cost estimate allows for Option 2 which is expected to be more expensive than Option 1 but preferrable from a long-term operations and maintenance perspective as it eliminates high head sewage pumps and avoids the need for upgrading the electrical service at the existing station.

Table 4.4 – Casa Loma Peak Incoming Flows

Year	Option	Anticipated Peak Flows into Casa Loma Lift Station
2024	1	58 L/s
	2	57 L/s
	3A	13 L/s
	3B	20 L/s*
2044	1	67 L/s
	2	65 L/s
	3A	16 L/s
	3B	71 L/s
2099	1	115 L/s
	2	74 L/s
	3A	28 L/s
	3B	122 L/s

*Option 3B has a lower estimated flow as it assumes an ideal pump is installed to match the inflow which more evenly distributes flow over the day when compared the dosing chamber cycling on/off and creating higher peak flows as it would in Option 1 and 2.

4.2.4 East Boundary

The East Boundary lift station was recently upgraded and has a capacity of 198.5 L/s. The East Boundary lift station was only triggered for an upgrade under buildout scenario 2. Refer to estimated flows below in Table 4.5.

Table 4.5 – East Boundary Anticipated Peak Inflows

Year	Option	Anticipated Peak Flows into East Boundary Lift Station (Option 2 Only)
2024	1	50 L/s
	2	63 L/s
2044	1	71 L/s
	2	82 L/s
2099	1	177 L/s
	2	197 L/s

4.2.5 East Trunk Lift Station

The East Trunk lift station is equipped with three 40 HP sewage pumps (2 duty and 1 standby) resulting in a capacity of 155 L/s. In the 2024 regional models, all scenarios indicate a peak flow to be higher than the current pump capacity. However, the peak flows noted represent an instantaneous flow that does not cause flooding or surcharging at the station, and therefore we have not flagged a deficiency in 2024. Table 4.6 outlines the anticipated peak flows into East Trunk Lift station for each scenario.

We have allowed for replacing the East Trunk Lift Station under all options. Per RDCO preference, we have considered the replacement station to be a trench style wet well that can be equipped with submersible pumps or solids handling vertical turbine pumps that can convey up to 350 L/s. The forcemain will need to be twinned and we recommend that it be twinned with another 400 mm pipe. The twin 400 mm forcemains will be capable of accommodating buildout flows at a velocity of 2.98 m/s which would result in a total dynamic head of approximately 31 m for the future pumps. The preferred method for upgrading the forcemain can be determined in preliminary design. We have allowed for twining with a 400 mm pipe in the cost estimates. We recommend upgrading the lift station and the forcemain at the same time so the proposed pump selection can be based on the larger pipe capacity and power requirements are minimized.

Table 4.6 - Anticipated Peak Flows into East Trunk Lift Station

Year	Option	Anticipated Peak Flows into East Trunk Lift Station
2024	1	205 L/s
	2	170 L/s
	3A	180 L/s
	3B	171 L/s
2044	1	322 L/s
	2	346 L/s
	3A	342 L/s
	3B	341 L/s
2099	1	700 L/s
	2	730 L/s
	3A	720 L/s
	3B	690 L/s

The allowable growth that can be accommodated by the east trunk gravity sewer was estimated and included in Appendix E.

4.2.6 Wastewater Treatment Plant Upgrades

All 2044 options provided in this memorandum will trigger Stage 4 upgrades or equivalent alternate upgrade at the Westside Regional Wastewater Treatment Plant. Table 4.7 outlines the anticipated peak flows into the WWTP as per the modelling exercises. We have provided estimates for future max day and average day flows for reference as well.

Please note that the stage 4 upgrade is expected to require the following key components:

- Headworks – Add a third screen,
- Primary Treatment – Add three primary clarifiers,
- Secondary Treatment – Add two bioreactors and two secondary clarifiers,
- Tertiary Treatment – Upgrade UV disinfection system,
- Outfall Upgrade – Add Tideflex valves on port 3, 4 and 5, and,
- Solids/Residuals Treatment – Add one DAF thickener, centrifuge, cake pump and expand odour bed.

Table 4.7 - Wastewater Treatment Plant Anticipated In-flows.

Year	Option	Anticipated Peak Flows into WWTP	Estimated Max Day Flow (m^3/d)	Estimated Average Day Flow (m^3/d)
2024	1	350 L/s	15,120	11,620
	2	346 L/s	14,947	11,487
	3A	350 L/s	15,120	11,620
	3B	349 L/s	15,077	11,587
2044	1	551 L/s	23,803	18,293
	2	558 L/s	24,106	18,526
	3A	556 L/s	24,019	18,459
	3B	551 L/s	23,803	18,293
2099	1	1326 L/s	57,283	44,023
	2	1332 L/s	57,542	44,222
	3A	1325 L/s	57,240	43,990
	3B	1298 L/s	56,074	43,094

4.3 COST ESTIMATES

All cost estimates were completed for the required 2044 upgrades. The cost estimates exclude land acquisition and financing costs. A full breakdown of the cost estimates can be found in Appendix C in addition to the values outlined in Table 4.8.

Table 4.8 – 20 Year (2044) Upgrades Cost Review Summary

Option	Capital Cost Estimate	Annual O&M Estimate	Annual Asset Renewal Estimate	20 Year NPV
1	$65M	$600k	$630k	$75M
2	$70M	$900k	$620k	$90M
3A	$73M	$1.1M	$570k	$90M
3B	$65M	$600k	$630k	$75M

Notes:

1. Net Present Value (NPV) analysis is based on a 20-year period, 2.0% inflation rate and 4.97% interest rate.
2. Annual O&M and Asset Renewal cost excludes WRWTP components.

5.0 EVALUATION PARAMETERS

When considering options for re-routing, evaluation of various parameters will help ensure the chosen option aligns with all stakeholders' priorities. In this analysis, regulatory requirements, environmental impacts, disruptions to the public during construction, and ownership considerations were all considered.

5.1 REGULATORY TRIGGERS

Regulatory triggers serve as fundamental guidelines, dictating permissible actions and standards for the re-routing options. Regulatory triggers are minimized through Option 1 or 3B and summarized in Table 5.0.

Table 5.0 – Regulatory Triggers

Option 1	MOTi Utility and Road Use Permit for Upgrading Highway 97 forcemain crossing
Option 2	MOTi Utility and Road Use Permit for Westside Road works BC Water Sustainability Act Section 11 application for Keefe Creek crossing Archeological Overview Assessment (AOA) and review of forcemain alignment by WFN
Option 3A	MOTi Utility and Road Use Permit for Upgrading Highway 97 forcemain crossing Archeological Overview Assessment (AOA) and review of forcemain alignment by WFN
Option 3B	MOTi Utility and Road Use Permit for Upgrading Highway 97 forcemain crossing

5.2 ENVIRONMENTAL IMPACTS

Environmental impacts from the construction of each option were considered below in Table 5.1. Option 1 and 3B are expected to have the lowest environmental impact from construction activities.

Table 5.1 - Environmental Impacts

Option 1	No additional disturbances
Option 2	Greenfield construction and Keefe Creek crossing
Option 3A	Greenfield construction through a small section of IR10 near Bayview Crescent
Option 3B	No additional disturbances

5.3 DISRUPTION TO PUBLIC DURING CONSTRUCTION

Options that cause fewer disturbances to the public are preferred as they minimise the potential for issues to arise during construction activities. The Table 5.2 below provides commentary on potential impacts to the public from construction.

Table 5.2 – Disruption to Public During Construction

Option 1	No additional disturbances expected
Option 2	The alignment of the proposed forcemain would generate disturbances across Westside Road, Nancee Way, Spland Road and Horizon Drive.
Option 3A	The alignment of the proposed forcemain would generate disturbances along Bayview Cresent, Tomat Ave, Manual Ave, Michelle Cresent, Essen Road, Thacker Drive and Anders Road.
Option 3B	No additional disturbances expected

5.4 OWNERSHIP OF INFRASTRUCTURE

RDCO owns and operates the East Trunk Sewer and the WRWTP. WFN and CWK each have their collection system that connect to the RDCO trunk mains and are then conveyed to the WRWTP. CWK operates their collection system with their own staff. WFN contracts operation of their collection system to RDCO. RDCO generally operates any portions of the sewer system that have flow contributions from CWK and WFN. Some of the options we have considered in this study may result in infrastructure ownership and operations responsibility transferring between RDCO, CWK and WFN. We considered this and provided commentary in Table 5.3 below.

Table 5.3 – Ownership Considerations

Option 1	No change.
Option 2	Expected that Faulkner and East Boundary lift station would transfer to RDCO.
Option 3A	The Thacker drive gravity main at Anders Rd to the East Trunk would become a regional gravity main.
Option 3B	No change.

6.0 CONCLUSION AND RECOMMENDATIONS

Four possible routing options were evaluated for the Ferry Wharf Lift Station. We recommend implementing Option 1 as the most practical option for increasing capacity of the Ferry Wharf Lift Station. Option 1 is recommended as it minimizes disruption to the existing system and provides the best value for investment. WFN, RDCO and CWK all agreed that Option 1 is the most suitable solution for handling the additional flow generated within IR10.

We recommend that the following be completed:

1. Update Population and Flows
    - The census data we relayed on to the prepare this memorandum is older (2021 for CWK and Peachland and 2016 for WFN). We recommend updating the analysis after the 2026 census is completed.
    - Monitor flow immediately upstream of the East Trunk Lift Station to verify the existing peak hour flow at the station.
    - Verify existing peak hour flow for overall system by completing additional monitoring of the Powers Creek siphon.
2. WFN Ferry Wharf Lift Station
    - Review deficient flow with pump supplier to determine root cause
3. CWK Faulkner Lift Station
    - Review flow capacity and check if two pumps ever operate at the same time to determine if there is a capacity issue.
4. RDCO Casa Loma Lift Station
    - Verify that RDCO prefers upgrade option 2 which involves adding a second lift station to avoid the need for using high head sewage pumps. If so, secure land for a second lift station site.

7.0 REFERENCES

East Trunk Regional Sewer Capacity_Rev.2, November 2018, Urban Systems

Wastewater Master Servicing Plan, 2017, Westbank First Nations

Official Community Plan, 2020 – 2040, City of West Kelowna

Casa Loma Capacity Technical Memorandum, May 3, 2023, Regional District of Central Okanagan

East Trunk Pre-Design Report – AECOM, May 17, 2021, Regional District of Central Okanagan

Wastewater Treatment Plant Reports – Pre-Design, February 19, 2010, Regional District of Central Okanagan

Regional District of Central Okanagan, Westside Regional WWTP Stage 3 Upgrades Pre-Design Report, February 19 2010, AECOM

Westside Regional Wastewater Treatment Plan (2022 Annual Report), 2022, Regional District of Central Okanagan

East Boundary and Casa Rio Lift Station Upgrades, March 2018, City of West Kelowna

Old Ferry Wharf Operations and Maintenance Manual, April 2003, Westbank First Nation

Sanitary Sewer Utility Master Plan, March 2014, The District of West Kelowna

Sincerely,
URBAN SYSTEMS LTD.

Jeremy Clowes, P.Eng.
Principal, Water & Wastewater Engineer

cc: Jason Barta, B.SC.

/LB/JC
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Enclosure
Appendix A – WFN IR9 and IR10 Development Projections
Appendix B – Sanitary Modeling Figures
Appendix C – Cost Estimates
Appendix D – Casa Loma Pump Selections for Option 1 and Option 2
Appendix E – East trunk gravity main trigger point analysis

APPENDIX A
WFN Development Projections

IR9 - Sanitary Sewer Projections

Existing Developments	Units	Density ppl/unit	Equivalent Population	Loading (L/cap/d)	Peaking Factor	ADWF (l/s)	PDWF (L/s)	Area (Ha)	I&I Rate (L/Ha/day)	I&I (L/s)	PWWF (L/s)
Bayview Reservoir pressure zone	2832	2	5664	350	2.24	22.94	51.3	624	5000	36.1	87.4
Bayview Reservoir pressure zone	1067	3	3201	350	2.39	12.97	31.0	0	5000	0.0	31.0
Bayview Reservoir pressure zone	186800	0.011	2054.8	350	2.50	8.32	20.8	0	5000	0.0	20.8
Bayview boosted zone	575	2	1150	350	2.63	4.66	12.3	23	5000	1.3	13.6
Bayview boosted zone	28	3	84	350	2.98	0.34	1.0	0	5000	0.0	1.0
Shannon Lake boosted zone	86	2	172	350	2.92	0.70	2.0	13	5000	0.8	2.8
Shannon Lake boosted zone	0	3	0	350	3.15	0.00	0.0	0	5000	0.0	0.0

Approved/In-stream	Units or Sq ft	Density ppl/unit	Equivalent Population	Loading (L/cap/d)	Peaking Factor	ADWF (l/s)	PDWF (L/s)	Area (Ha)	I&I Rate (L/Ha/day)	I&I (L/s)	PWWF (L/s)
Copper Sky Townhomes	168	2	336	350	2.84	1.36	3.9	3.5	5000	0.2	4.1
Trasolini - business industrial	11200	0.011	123.2	350	2.95	0.50	1.5	1.6	5000	0.1	1.6
District	720	2	1440	350	2.58	5.83	15.1	7.8	5000	0.5	15.5
Bering Road - business park	63180	0.011	694.98	350	2.73	2.82	7.7	0.6	5000	0.0	7.7
2440B Old Okanagan Highway	13	2	26	350	3.06	0.11	0.3	0.5	5000	0.0	0.4
Cougar/Elk Member housing	8	2	16	350	3.07	0.06	0.2	1.1	5000	0.1	0.3
Cougar/Elk Member housing	14	3	42	350	3.03	0.17	0.5	0	5000	0.0	0.5
2026B Boucherie Road (Sage Creek)	97	3	291	350	2.86	1.18	3.4	3.2	5000	0.2	3.6
2345 Butt Road (Adobe)	86	2	172	350	2.92	0.70	2.0	0.5	5000	0.0	2.1
3235 Shannon Lake Road	6	2	12	350	3.08	0.05	0.1	0.4	5000	0.0	0.2

Future Development	Units or Sq ft	Density ppl/unit	Equivalent Population	Loading (L/cap/d)	Peaking Factor	ADWF (l/s)	PDWF (L/s)	Area (Ha)	I&I Rate (L/Ha/day)	I&I (L/s)	PWWF (L/s)
Bering and Carrington Lot	338	2	676	350	2.73	2.74	7.5	1.2	5000	0.1	7.6
Lot 359 - Old Ok Hwy (below Copper Sky)	67	2	134	350	2.94	0.54	1.6	0.1	5000	0.0	1.6
Lot 346 - Bayview	4	2	8	350	3.10	0.03	0.1	1.1	5000	0.1	0.2

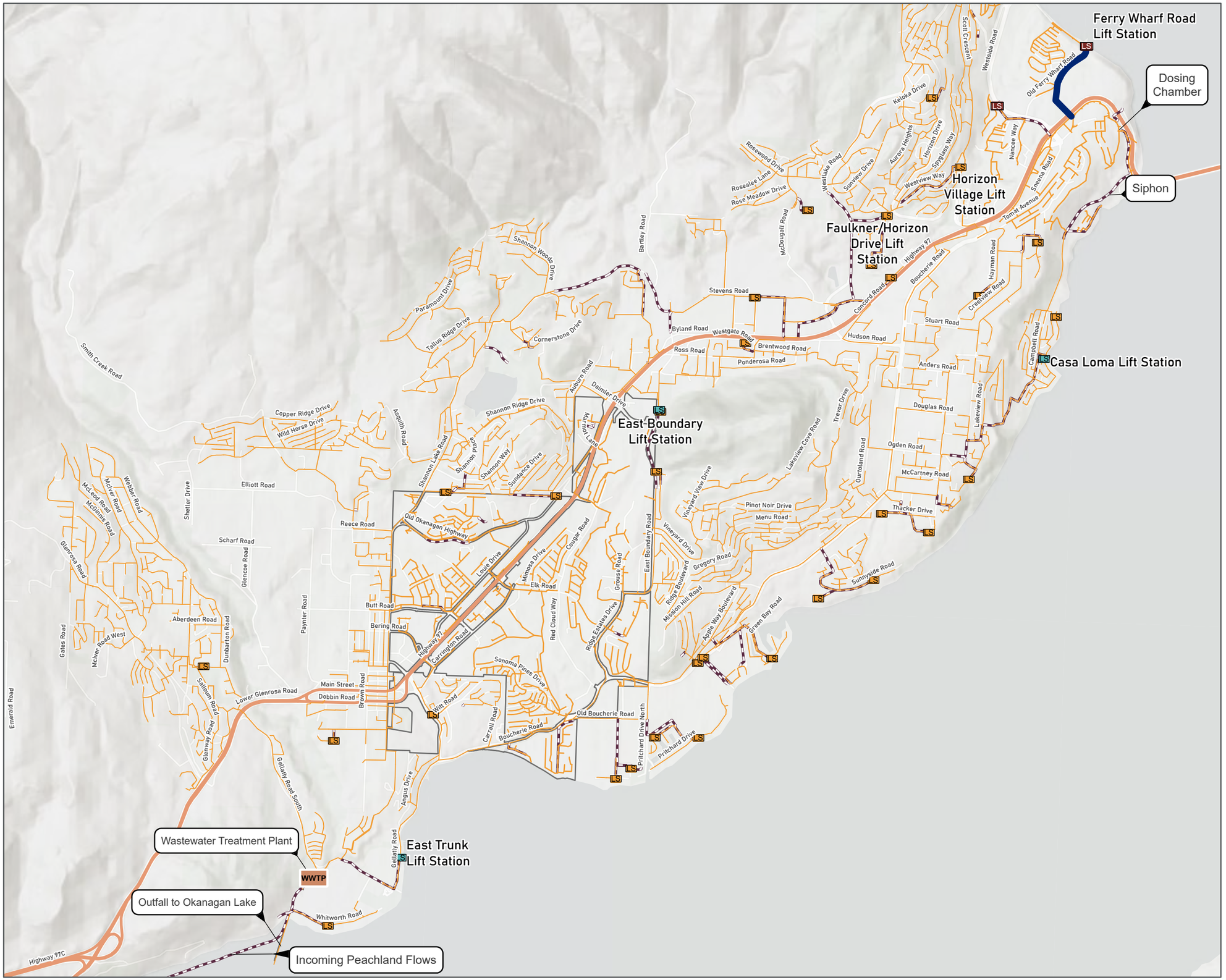
IR10 - Sanitary Sewer Projections

Existing Developments	Sewer Catchment	Units	Density ppl/unit	Equivalent Population	Loading (L/cap/d)	Peaking Factor	ADWF (l/s)	PDWF (L/s)	Area (Ha)	I&I Rate (L/Ha/day)	I&I (L/s)	PWWF (L/s)
West Harbour - Phases 1 to 3	Old Ferry	170	3	510	350	2.78	2.07	5.7	13	5000	0.8	6.5
West Harbour - Apartments	Old Ferry	121	2	242	350	2.88	0.98	2.8	1	5000	0.1	2.9
West Point	Westside Rd	91	2	182	350	2.91	0.74	2.1	5	5000	0.3	2.4
Nancee Way Village	Westside Rd	88	2	176	350	2.92	0.71	2.1	6	5000	0.3	2.4
Katherine Estates	Westside Rd	85	2	170	350	2.92	0.69	2.0	6	5000	0.3	2.4
Lindley Drive	Old Ferry	11	3	33	350	3.04	0.13	0.4	1	5000	0.1	0.5
Bayview	Highway 97	40	3	120	350	2.95	0.49	1.4	6	5000	0.3	1.8
Lakeridge Estates	Highway 97	135	3	405	350	2.81	1.64	4.6	27	5000	1.6	6.2
Scenic MHP	Westside Rd	20	3	60	350	3.01	0.24	0.7	2	5000	0.1	0.8
Mall	Highway 97	4	70	280	350	2.86	1.13	3.2	4	5000	0.2	3.5
Wine Facility	Westside Rd	1	70	70	350	3.00	0.28	0.9	3	5000	0.2	1.0
Winery	Westside Rd	1	70	70	350	3.00	0.28	0.9	4	5000	0.2	1.1

Approved/In-stream	Sewer Catchment	Units	Density ppl/unit	Equivalent Population	Loading (L/cap/d)	Peaking Factor	ADWF (l/s)	PDWF (L/s)	Area (Ha)	I&I Rate (L/Ha/day)	I&I (L/s)	PWWF (L/s)
Ariva	Old Ferry	300	2	600	350	2.75	2.43	6.7	5	5000	0.3	7.0
High Street	Westside Rd	600	2	1200	350	2.62	4.86	12.8	4	5000	0.2	13.0
West Harbour - Phase 4 (SF)	Old Ferry	33	3	99	350	2.97	0.40	1.2	0	5000	0.0	1.2
Spland Road Townhomes	Westside Rd	69	2	138	350	2.94	0.56	1.6	2	5000	0.1	1.8
Shelter Bay - Single Family	RDCO trunk	11	3	33	350	3.04	0.13	0.4	1	5000	0.1	0.5
Shelter Bay - Multi family - Phas	RDCO trunk	20	2	40	350	3.03	0.16	0.5	4	5000	0.2	0.7
Shelter Bay - Multi family - Phas	RDCO trunk	88	2	176	350	2.92	0.71	2.1	4	5000	0.2	2.3
Shelter Bay - Multi family - Phas	RDCO trunk	227	2	454	350	2.80	1.84	5.1	5	5000	0.3	5.4

Future Development	Sewer Catchment	Units	Density ppl/unit	Equivalent Population	Loading (L/cap/d)	Peaking Factor	ADWF (l/s)	PDWF (L/s)	Area (Ha)	I&I Rate (L/Ha/day)	I&I (L/s)	PWWF (L/s)
19 Greens	Highway 97	450	2	900	350	2.68	3.65	9.8	3	5000	0.2	9.9
Westrich Pacific - Phase 1	Old Ferry	334	2	668	350	2.73	2.71	7.4	2	5000	0.1	7.5
Westrich Pacific - Phase 2	Old Ferry	330	2	660	350	2.74	2.67	7.3	3	5000	0.2	7.5
The Bluffs (1500-2000 units)	Old Ferry	2000	2	4000	350	2.33	16.20	37.8	20	5000	1.2	39.0
Nancee Way Village	Highway 97	3	3	9	350	3.09	0.04	0.1	0	5000	0.0	0.1
Tomat Road	Highway 97	3	3	9	350	3.09	0.04	0.1	0	5000	0.0	0.1
Lakeridge Phase 4	Highway 97	23	3	69	350	3.00	0.28	0.8	3	5000	0.2	1.0

APPENDIX B
Sanitary Modeling Figures



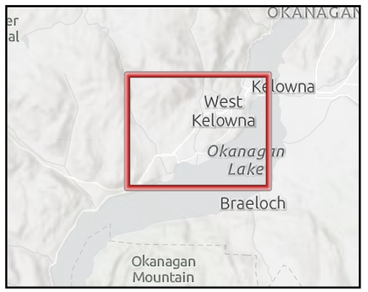
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

2024 Existing Option 1 DEFICIENCIES & UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — WFN Lift Station
- LS — West Kelowna Lift Station
- LS — RDCO/Regional Lift Station
- Forcemain
- Gravity
- Option 1

Notes:



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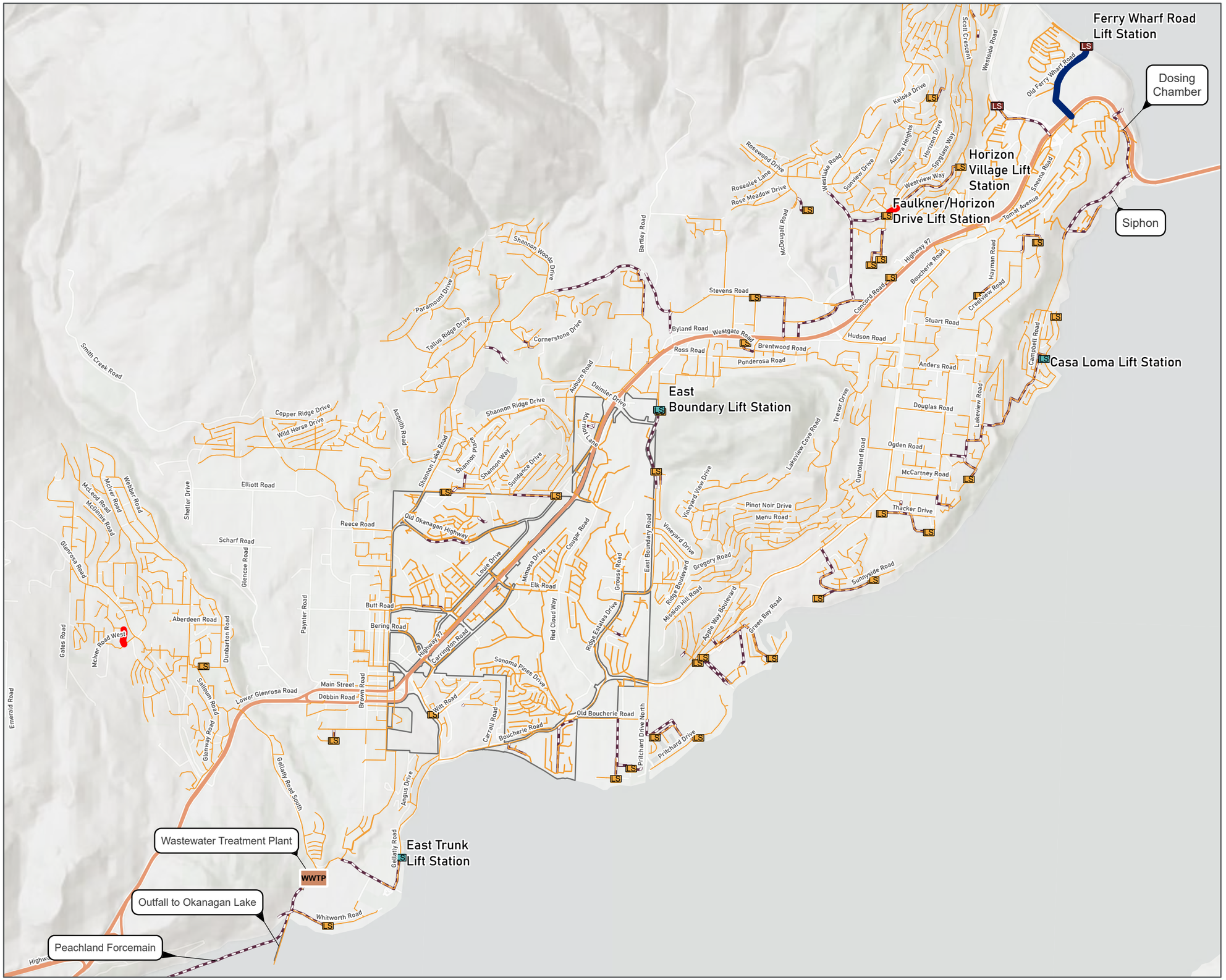
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

Figure 1 - 2024



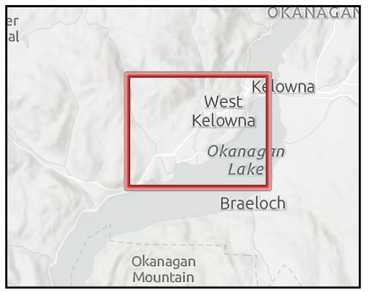
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

20-Year 2044 Existing Option 1 DEFICIENCIES & UPGRADES

Legend

- WWTP Wastewater Treatment Plant
- LS WFN Lift Station
- LS West Kelowna Lift Station
- LS RDCO/Regional Lift Station
- Forcemain
- Gravity
- Option 1
- 2044 Deficiencies Option 1 (where d/D>=1)

Notes:



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- Urban Systems

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Revision:	A
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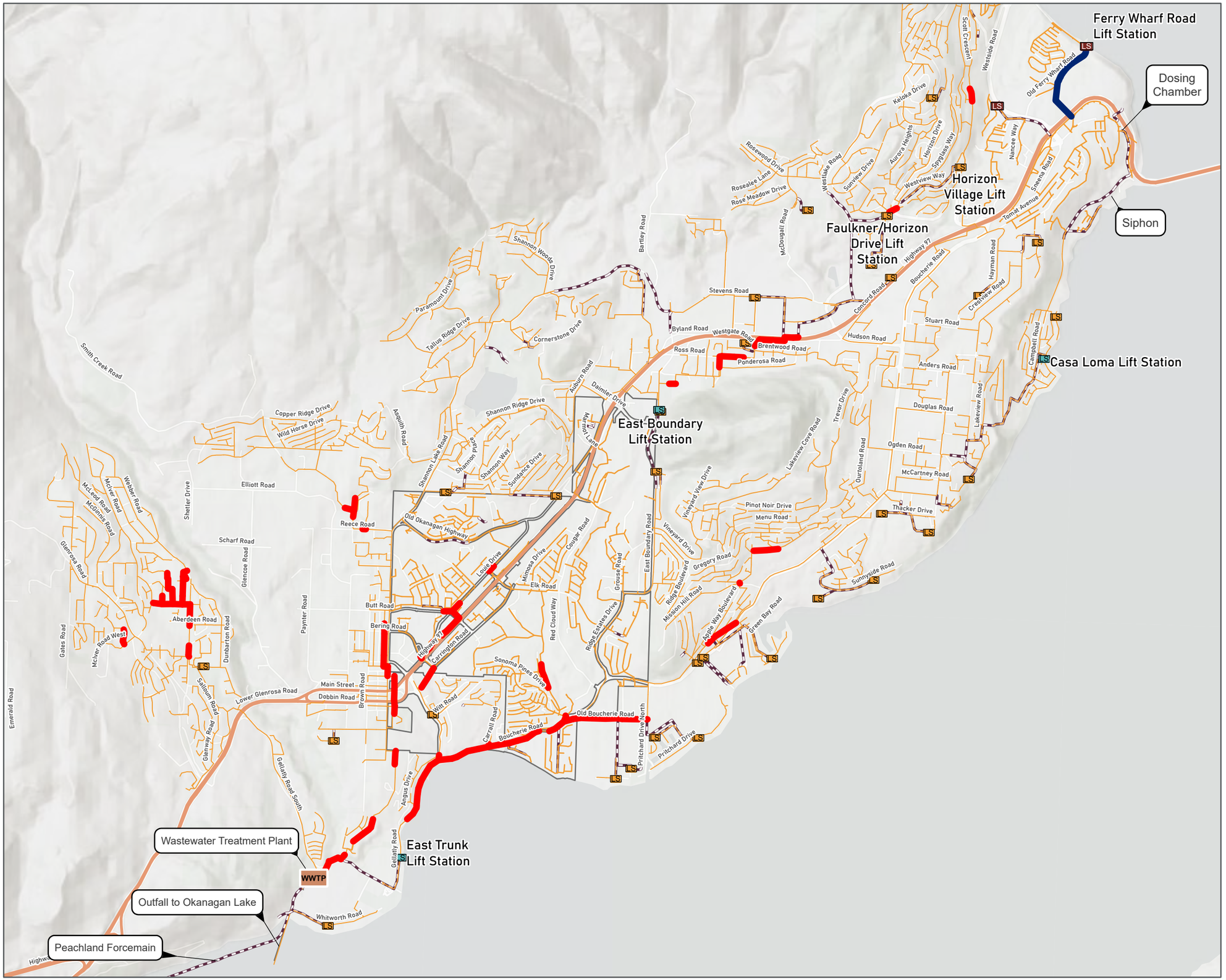
URBAN SYSTEMS

FIGURE 1 - 2044



WESTBANK FIRST NATION

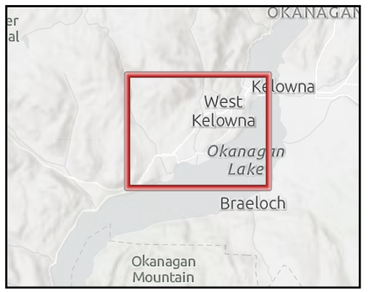
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 1 DEFICIENCIES

Legend

- WWTP Wastewater Treatment Plant
- LS WFN Lift Station
- LS West Kelowna Lift Station
- LS RDCO/Regional Lift Station
- Forcemain
- Gravity
- Option 1
- 2099 Deficiencies Option 1 (where d/D>=1)

Notes:



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Data Sources:

- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
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Status:	
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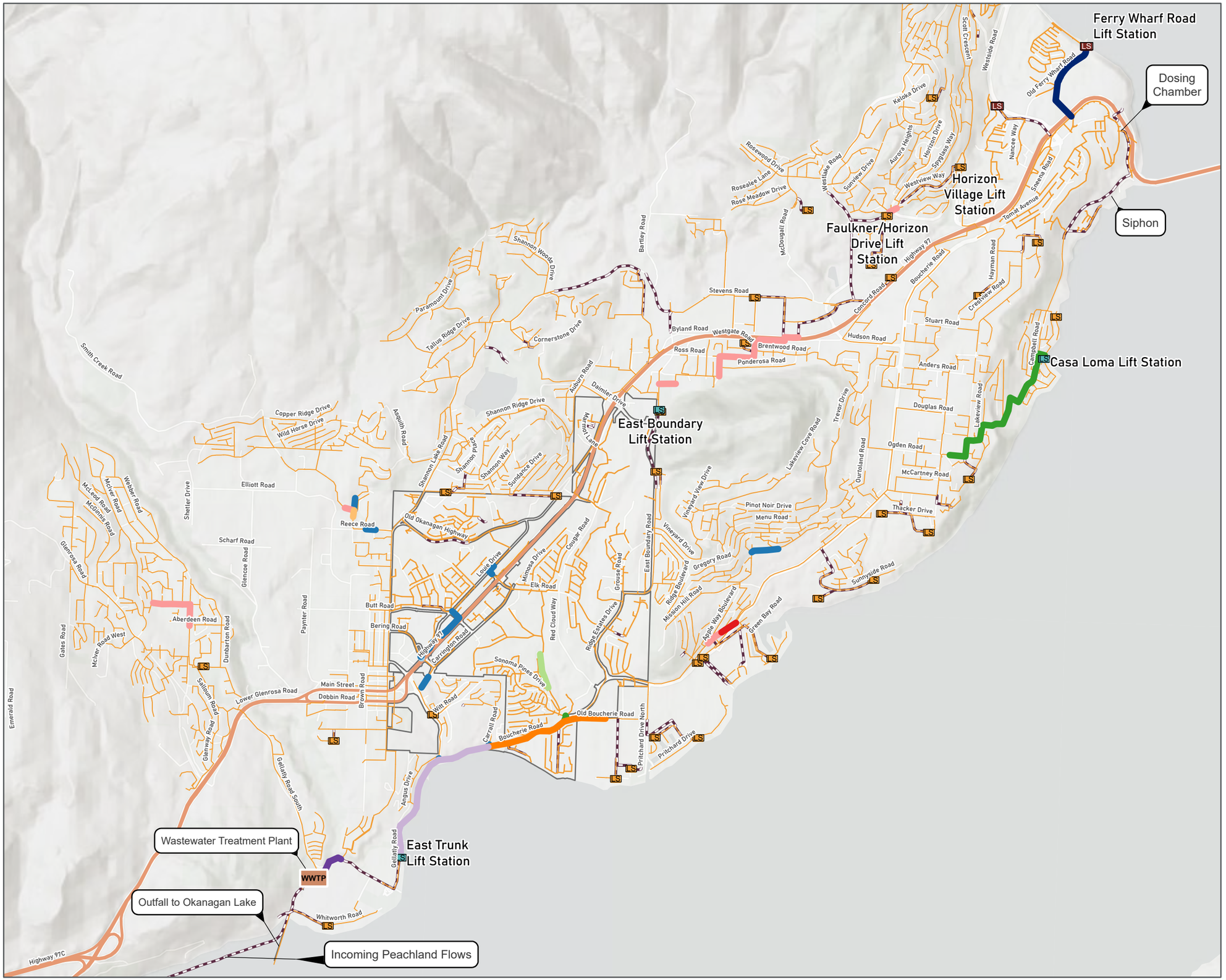
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 1 - 2099



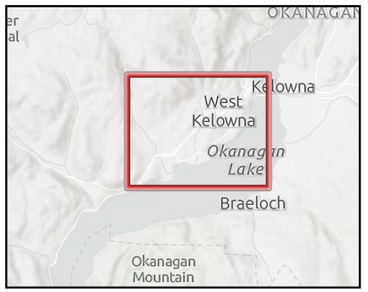
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 1 UPGRADES

Legend

- WWTP Wastewater Treatment Plant
- LS WFN Lift Station
- LS West Kelowna Lift Station
- LS RDCO/Regional Lift Station
- Forcemain
- Gravity
- Option 1
- 250mm
- 300mm
- 375mm
- 400mm
- 450mm
- 525mm
- 600mm
- 750mm
- 900mm
- 1050mm

Notes:



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Coordinate System:
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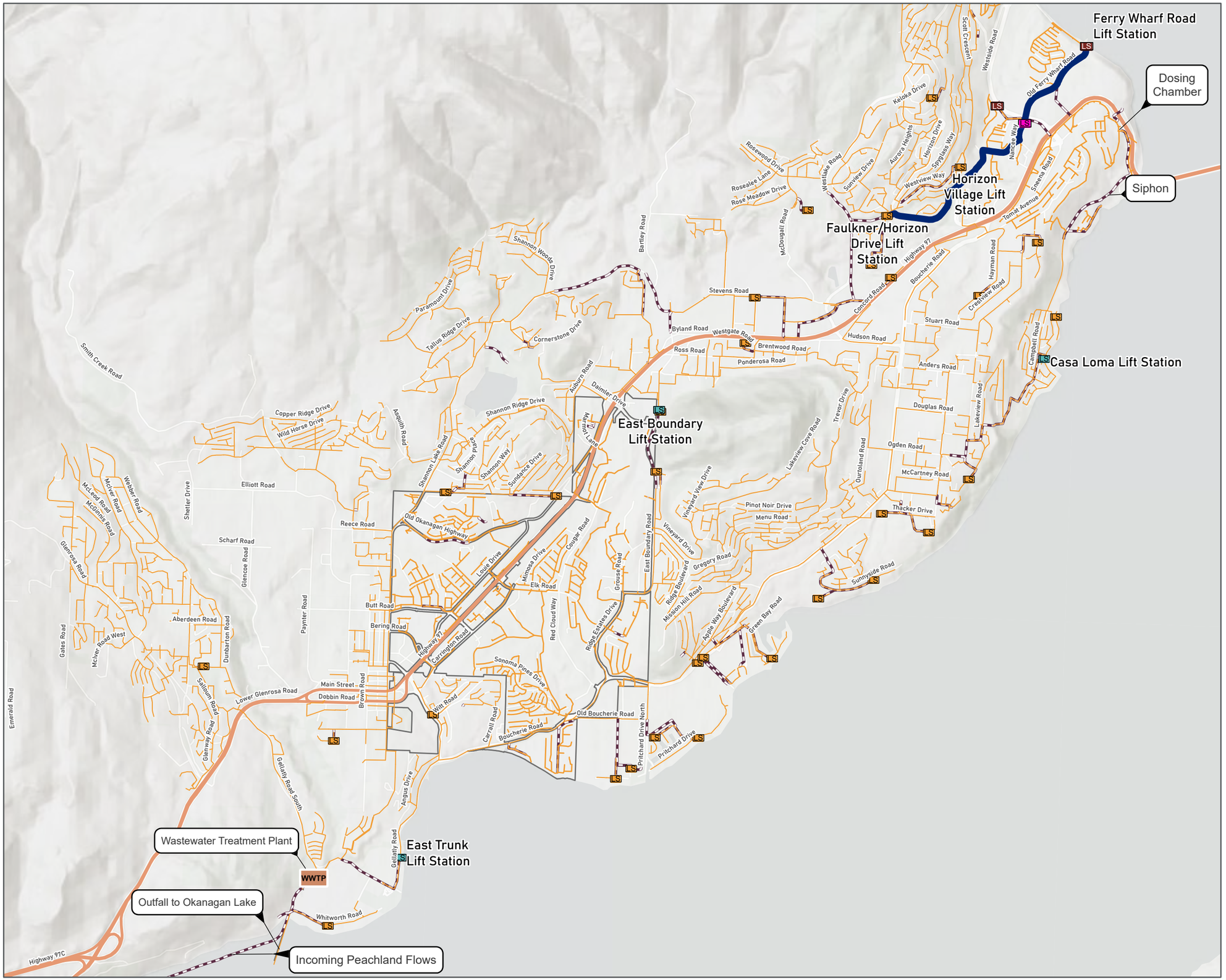
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 1 - 2099



Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

2024 Existing Option 2 DEFICIENCIES & UPGRADES

Legend

- WWTP Wastewater Treatment Plant
- LS RDCO/Regional Lift Station
- LS West Kelowna Lift Station
- LS WFN Lift Station
- LS Proposed Lift Station
- Forcemain
- Gravity
- Option 2

Notes:

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.

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Meters

Coordinate System:
NAD 1983 UTM Zone 11N

Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
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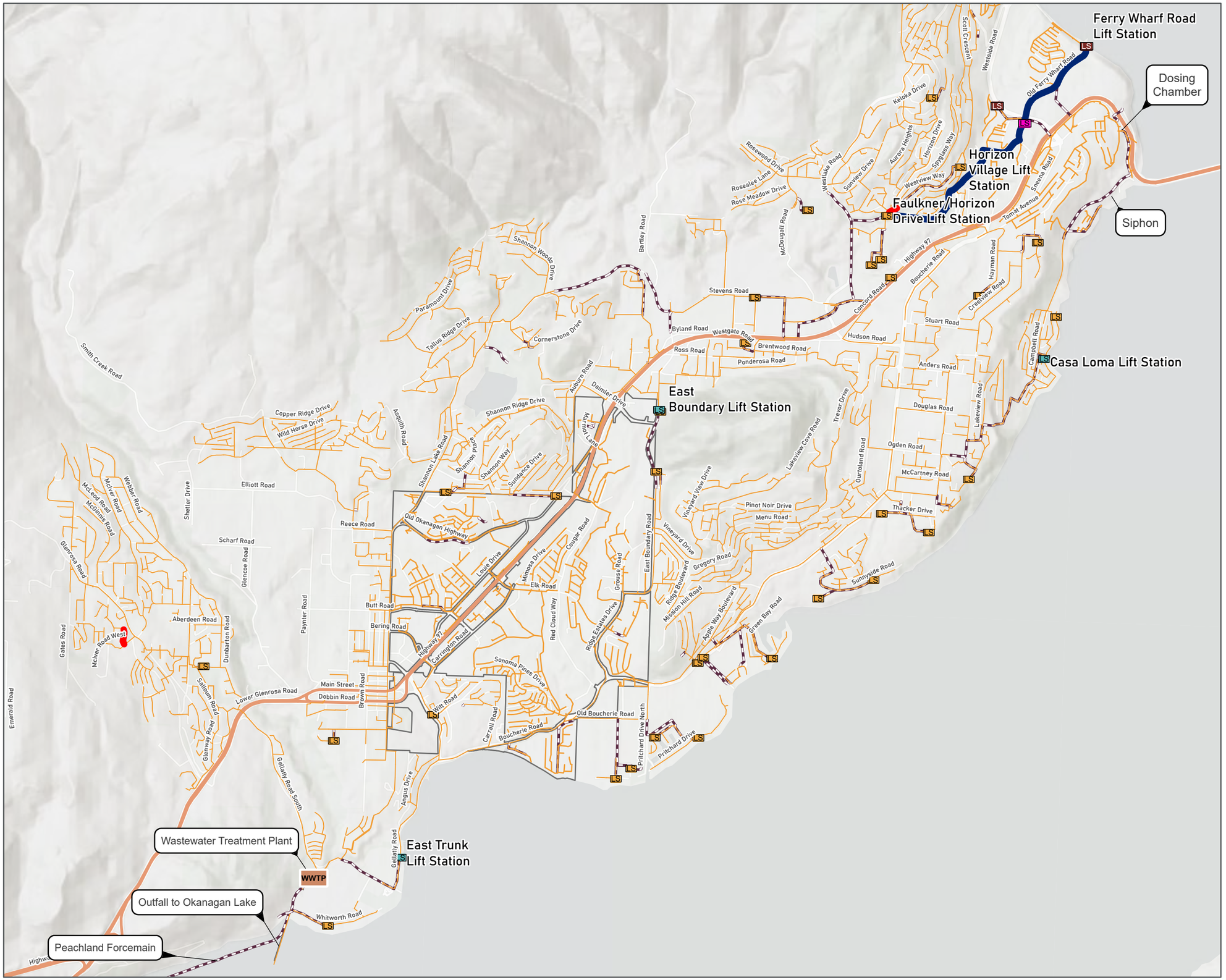
Status:	**Status**
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 2 - 2024



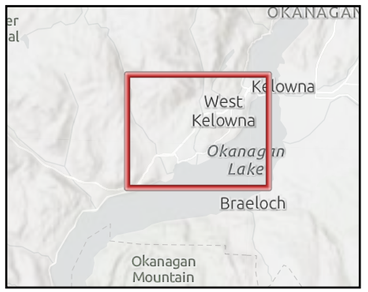
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

20-Year 2044 Existing Option 2 DEFICIENCIES & UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — WFN Lift Station
- LS — West Kelowna Lift Station
- LS — RDCO/Regional Lift Station
- LS — Proposed Lift Station
- Forcemain
- Gravity
- Option 2
- 2044 Deficiencies Option 2 (where d/D>=1)

Notes:



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(When plotted at 11"x17")

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- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
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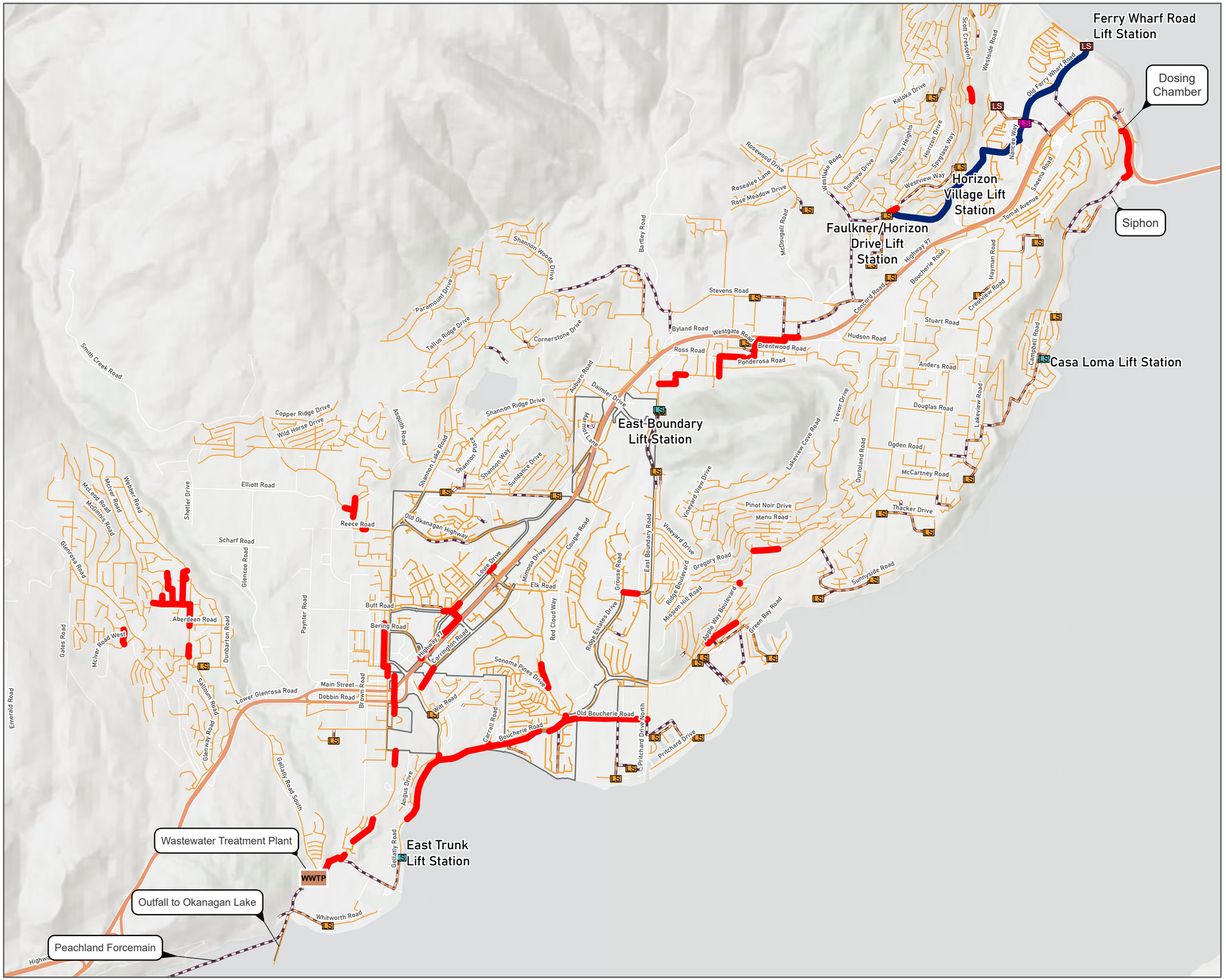
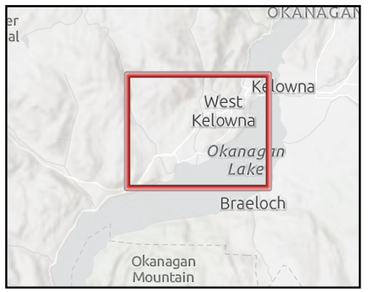
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 2 - 2044





WESTBANK FIRST NATION

Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 2 DEFICIENCIES

Legend

- WWTP — Wastewater Treatment Plant
- LS — WFN Lift Station
- LS — West Kelowna Lift Station
- LS — RDCO/Regional Lift Station
- LS — Proposed Lift Station
- Forcemain
- Gravity
- Option 2
- 2099 Deficiencies Option 2 (where d/D>=1)

Notes:

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.

0 200 400 600
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

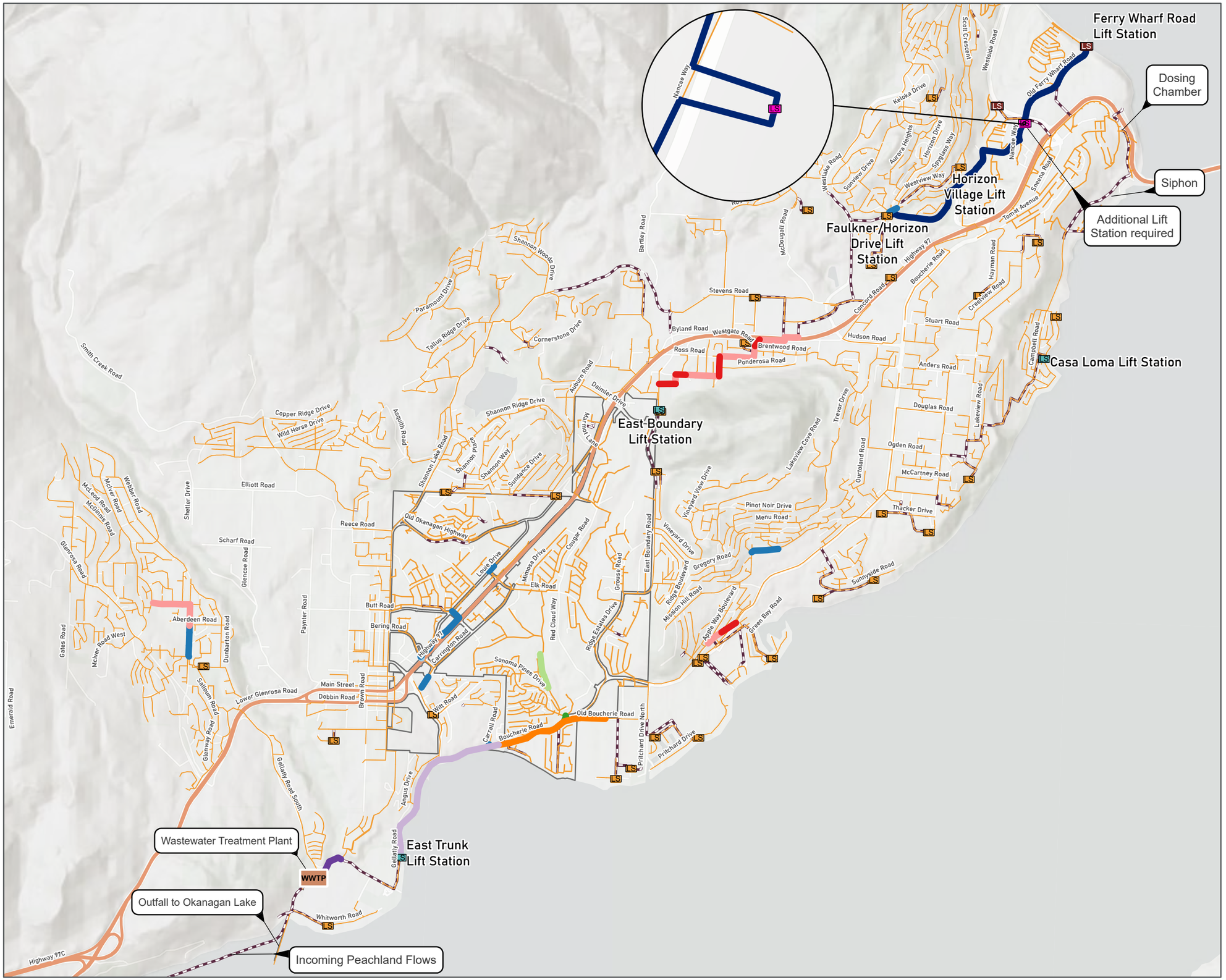
Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 2 - 2099



Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 2 UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — West Kelowna Lift Station
- LS — WFN Lift Station
- LS — RDCO/Regional Lift Station
- LS — Proposed Lift Station
- Forcemain
- Gravity
- Option 2
- 250mm
- 300mm
- 375mm
- 400mm
- 450mm
- 525mm
- 600mm
- 750mm
- 900mm
- 1050mm

Notes:

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Meters

Coordinate System:
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Scale: 1:37,000
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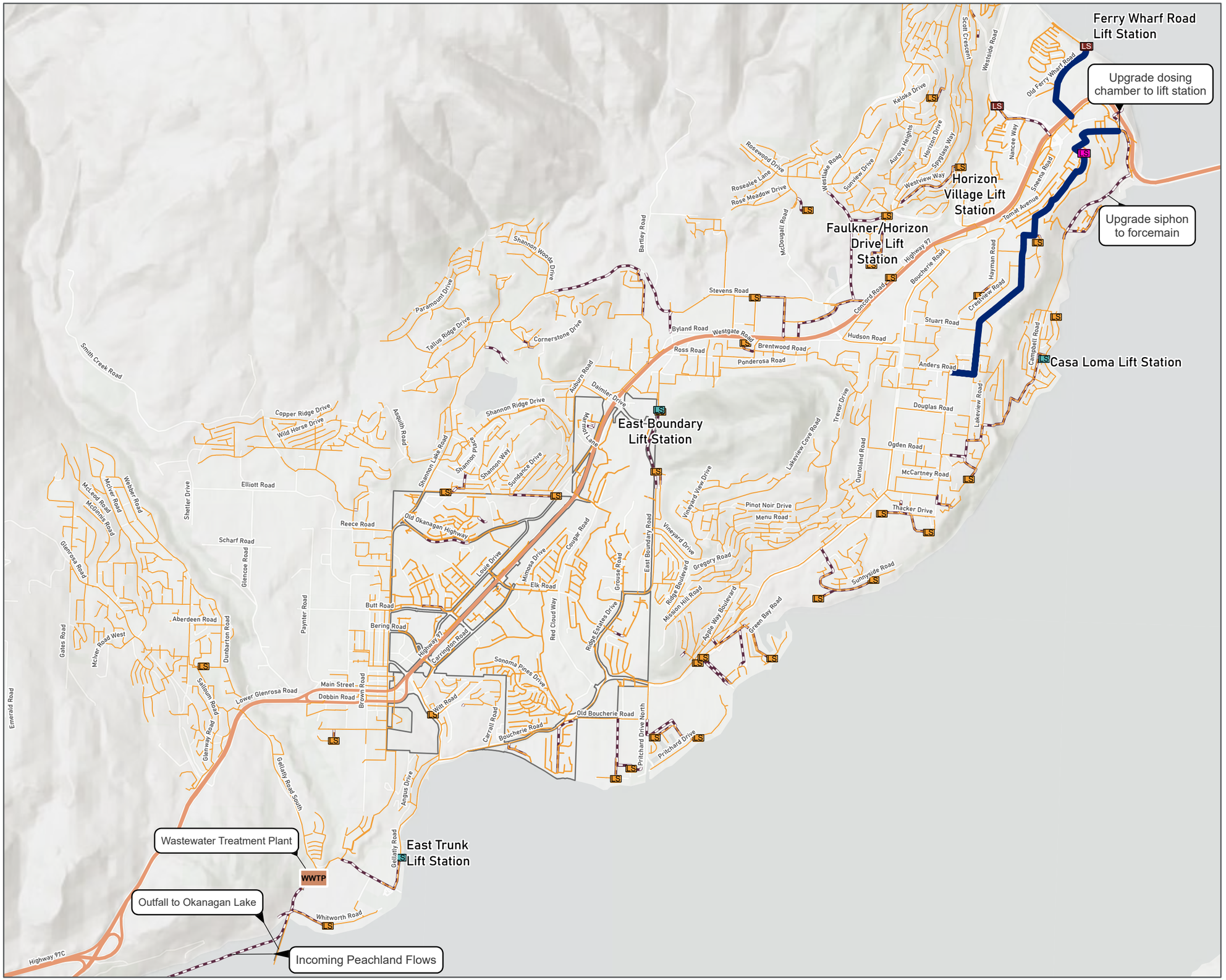
URBAN SYSTEMS

FIGURE 2 - 2099



WESTBANK FIRST NATION

Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

2024 Existing Option 3A DEFICIENCIES & UPGRADES

Legend

- WWTP Wastewater Treatment Plant
- LS RDCO/Regional Lift Station
- LS West Kelowna Lift Station
- LS WFN Lift Station
- LS Proposed Lift Station
- Forcemain
- Gravity
- Option 3A

Notes:

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.

0 200 400 600
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

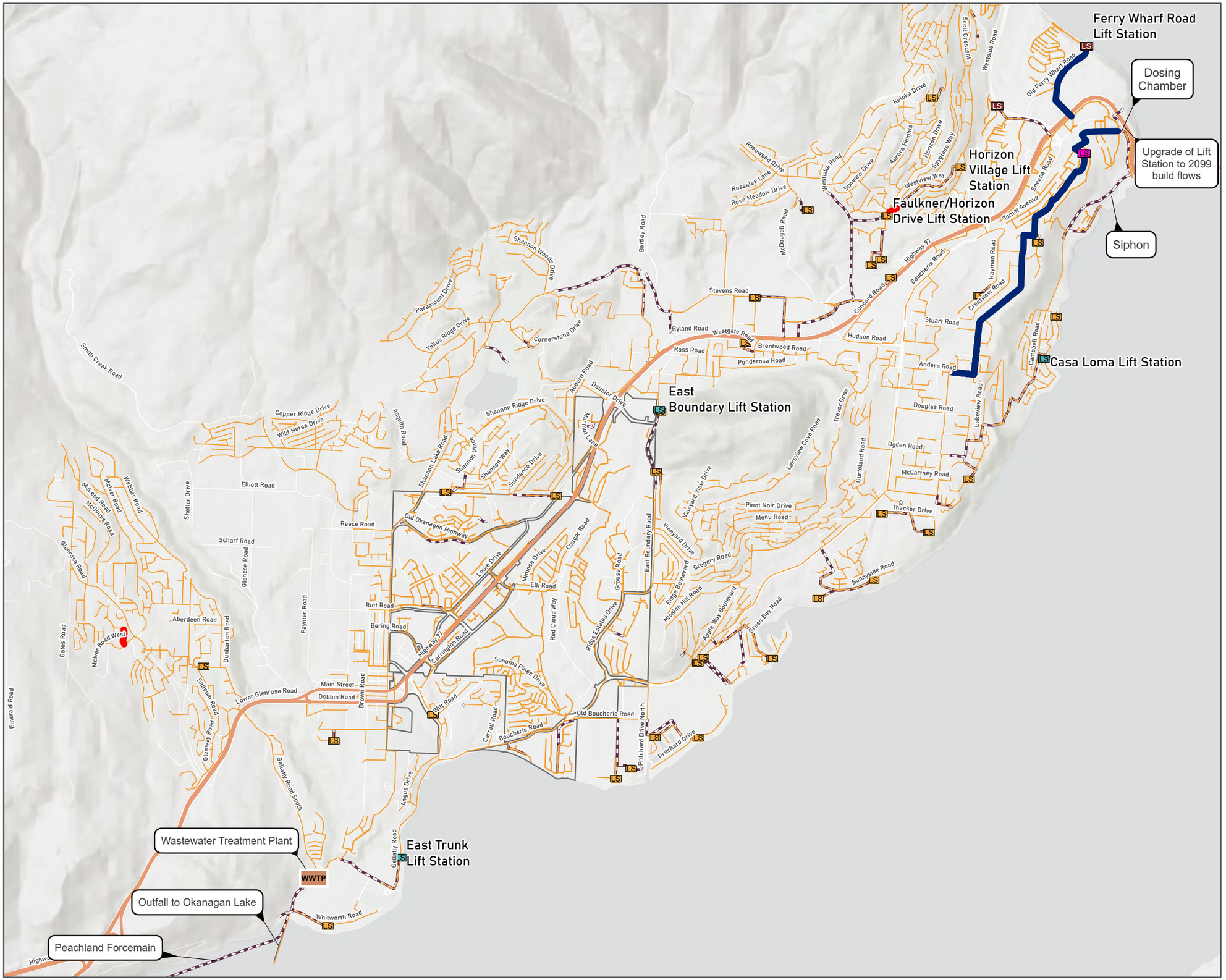
Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3A - 2024



WESTBANK FIRST NATION

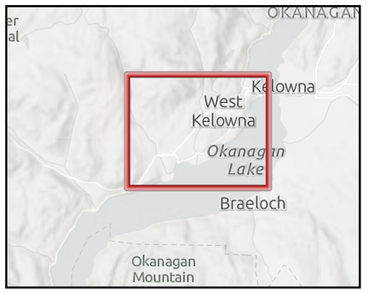
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

20-Year 2044 Existing Option 3A DEFICIENCIES & UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — WFN Lift Station
- LS — West Kelowna Lift Station
- LS — RDCO/Regional Lift Station
- LS — Proposed Lift Station
- Forcemain
- Gravity
- Option 3A
- 2044 Deficiencies Option 3A (where d/D>=1)

Notes:



0 200 400 600
Meters

N

Coordinate System:
NAD 1983 UTM Zone 11N

Scale: 1:37,000
(When plotted at 11"x17")

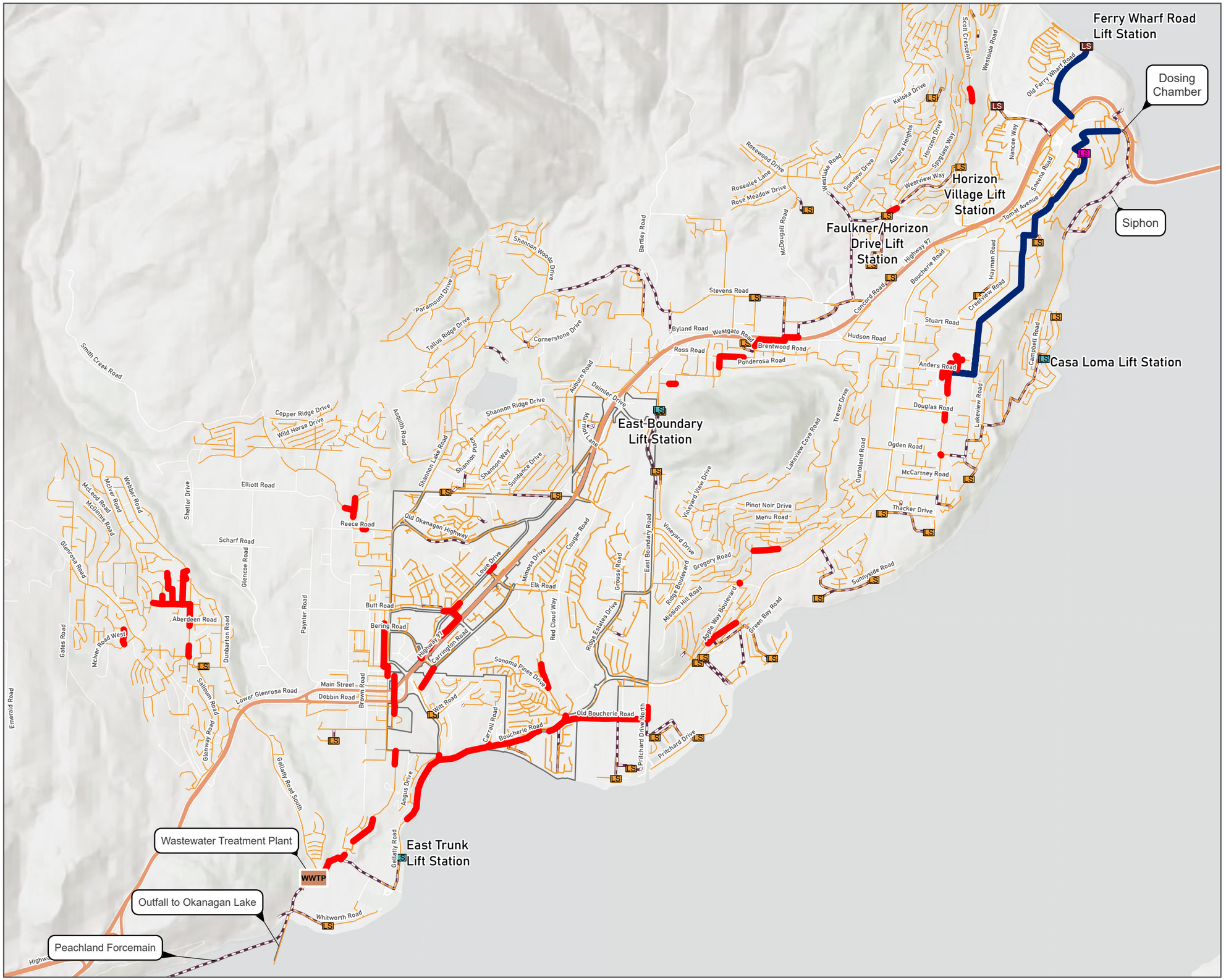
Data Sources:

- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3A - 2044



Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 3A DEFICIENCIES

Legend

- WWTP — Wastewater Treatment Plant
- LS — RDCO/Regional Lift Station
- LS — West Kelowna Lift Station
- LS — WFN Lift Station
- LS — Proposed Lift Station
- Forcemain
- Gravity
- Option 3A
- 2099 Deficiencies Option 3A (where d/D>=1)

Notes:

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0 200 400 600
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

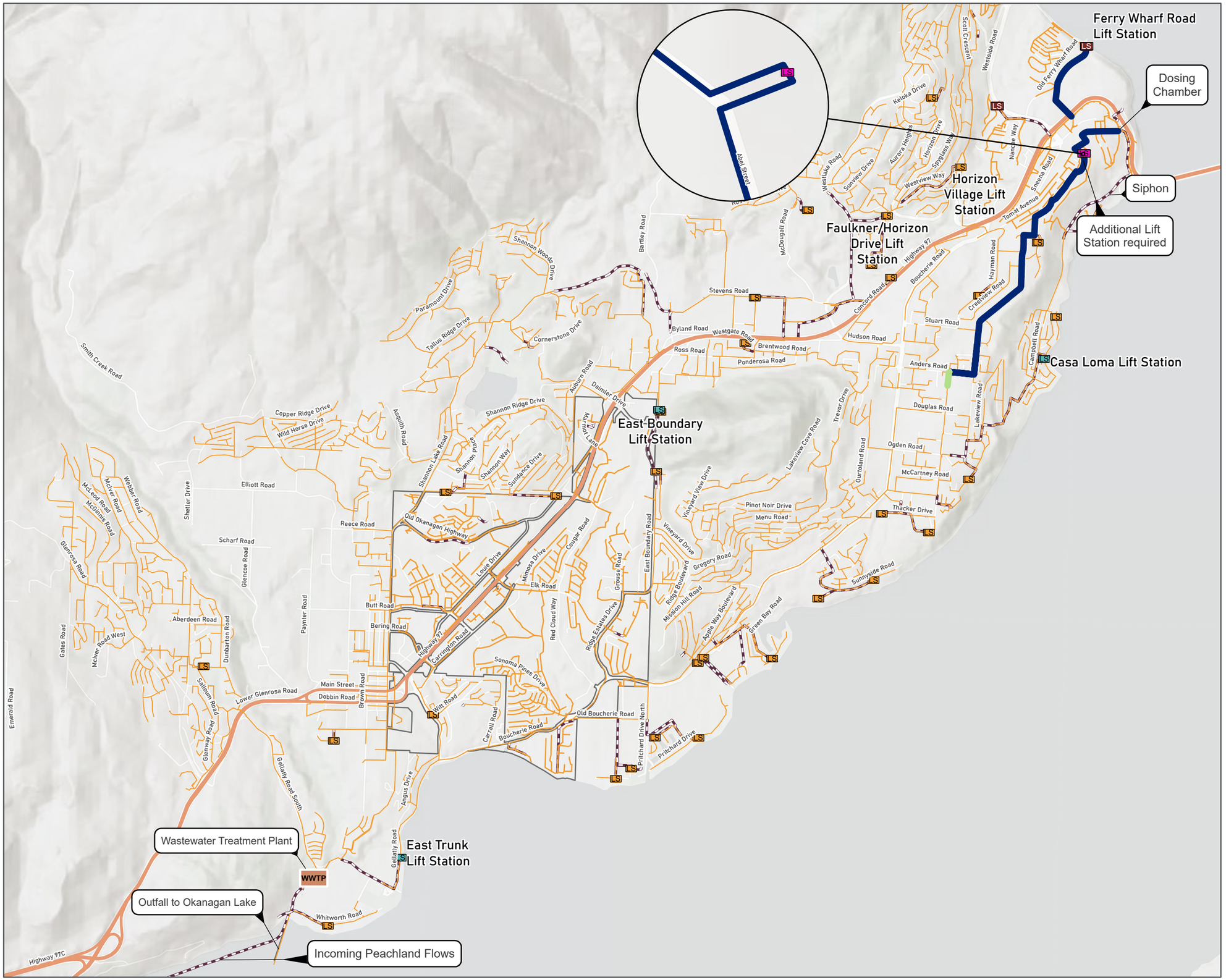
Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3A - 2099



WESTBANK FIRST NATION

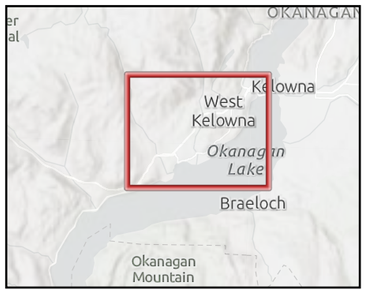
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

20-Year 2044 Existing Option 3A UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — West Kelowna Lift Station
- LS — RDCO/Regional Lift Station
- LS — WFN Lift Station
- LS — Proposed Lift Station
- Forcemain
- Gravity
- Option 3A
- 375mm

Notes:



0 200 400 600
Meters

N

Coordinate System:
NAD 1983 UTM Zone 11N

Scale: 1:37,000
(When plotted at 11"x17")

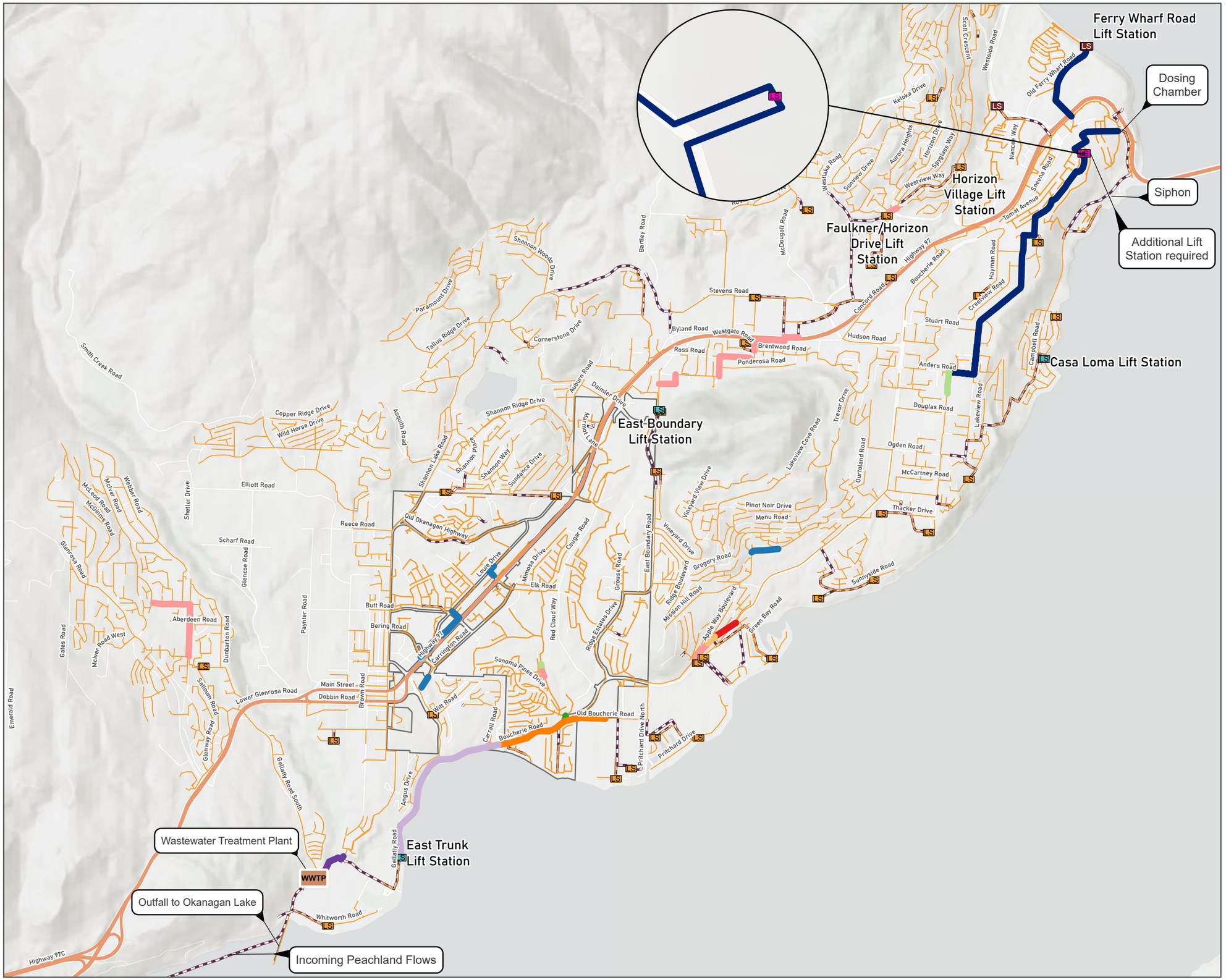
Data Sources:

- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3A - 2044



WESTBANK FIRST NATION

Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 3A UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — WFN Lift Station
- LS — West Kelowna Lift Station
- LS — RDCO/Regional Lift Station
- LS — Proposed Lift Station
- Forcemain
- Gravity
- Option 3A
- 250mm
- 300mm
- 375mm
- 400mm
- 450mm
- 525mm
- 600mm
- 750mm
- 900mm
- 1050mm

Notes:

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0 200 400 600
Meters

Coordinate System:
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Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
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- Urban Systems

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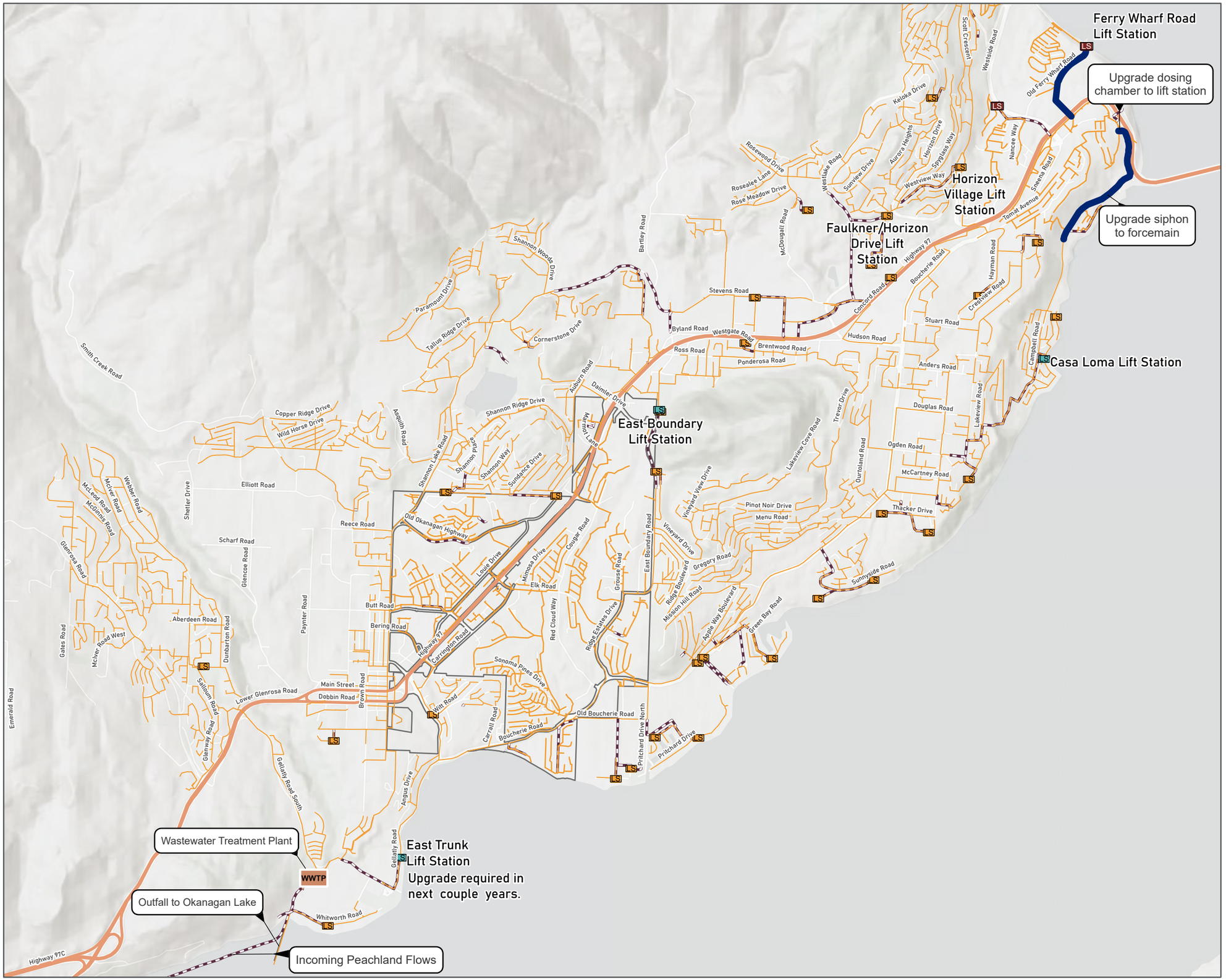
URBAN SYSTEMS

FIGURE 3A - 2099



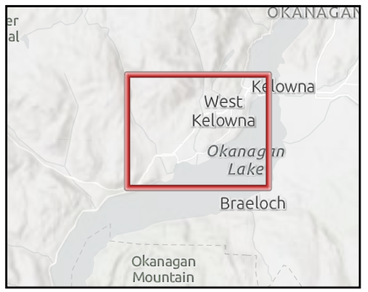
Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

2024 Existing Option 3B DEFICIENCIES & UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — West Kelowna Lift Station
- LS — WFN Lift Station
- LS — RDCO/Regional Lift Station
- Forcemain
- Gravity
- Option 3B

Notes:



0 200 400 600
Meters

N

Coordinate System:
NAD 1983 UTM Zone 11N

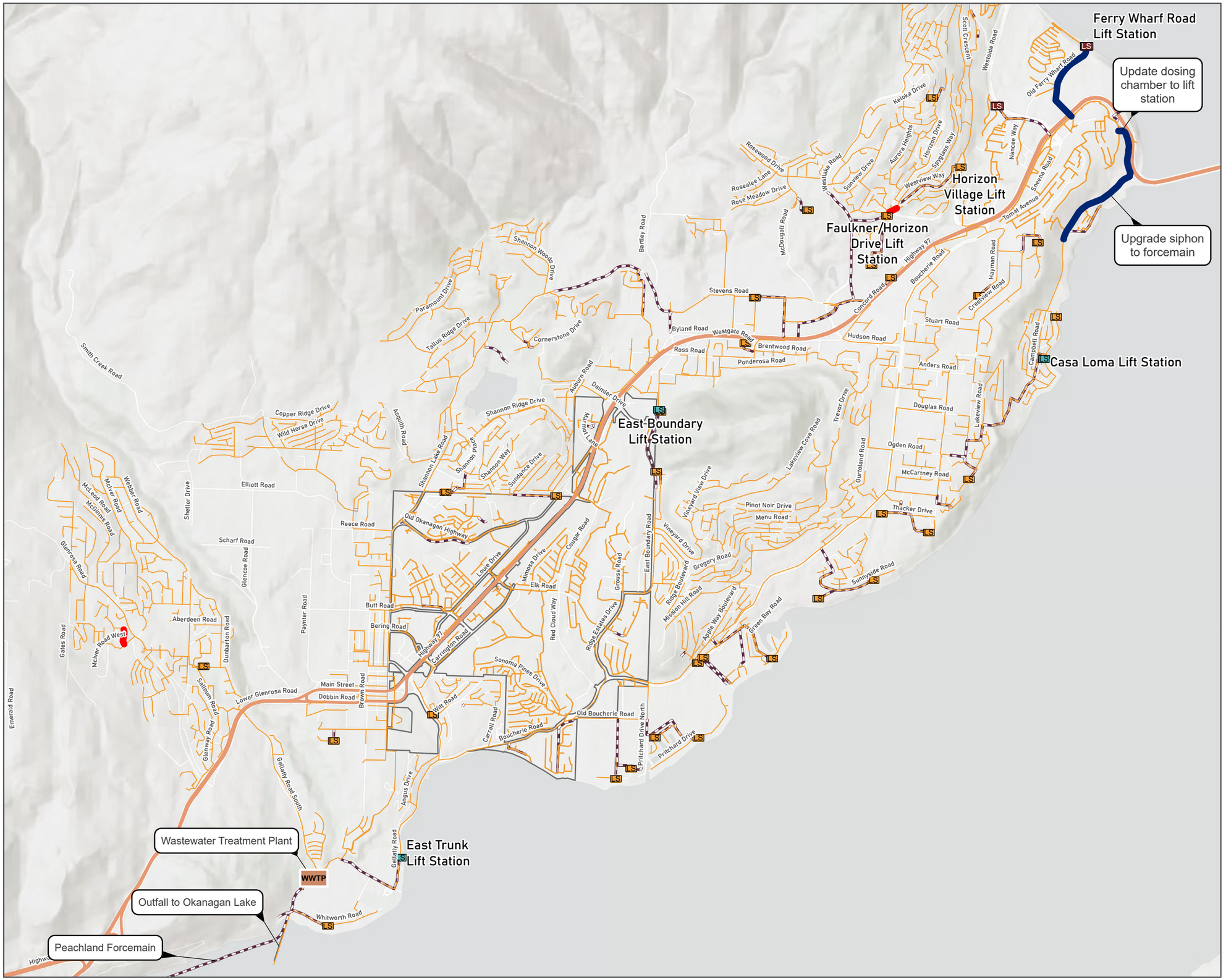
Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	**Status**
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3B - 2024



Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

20-Year 2044 Existing Option 3B DEFICIENCIES & UPGRADES

Legend

- WWTP — Wastewater Treatment Plant
- LS — WFN Lift Station
- LS — West Kelowna Lift Station
- LS — RDCO/Regional Lift Station
- Forcemain
- Gravity
- Option 3B
- 2044 Deficiencies Option 3B (where d/D>=1)

Notes:

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0 200 400 600
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:

- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
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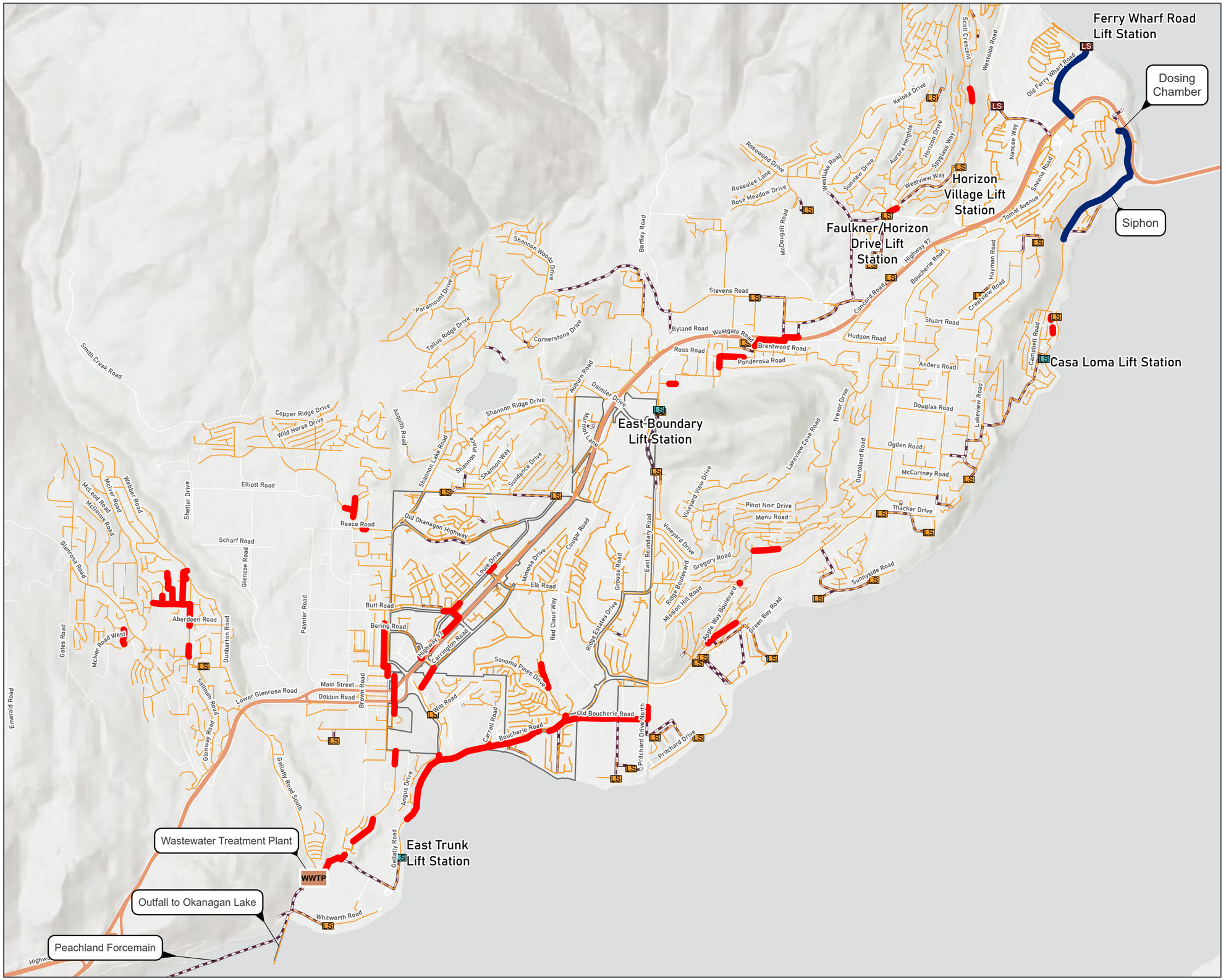
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3B - 2044



Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 3B DEFICIENCIES

Legend

- WWTP Wastewater Treatment Plant
- LS RDCO/Regional Lift Station
- LS WFN Lift Station
- LS West Kelowna Lift Station
- Forcemain
- Gravity
- Option 3B
- 2099 Deficiencies Option 3B (where d/D>=1)

Notes:

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0 200 400 600
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

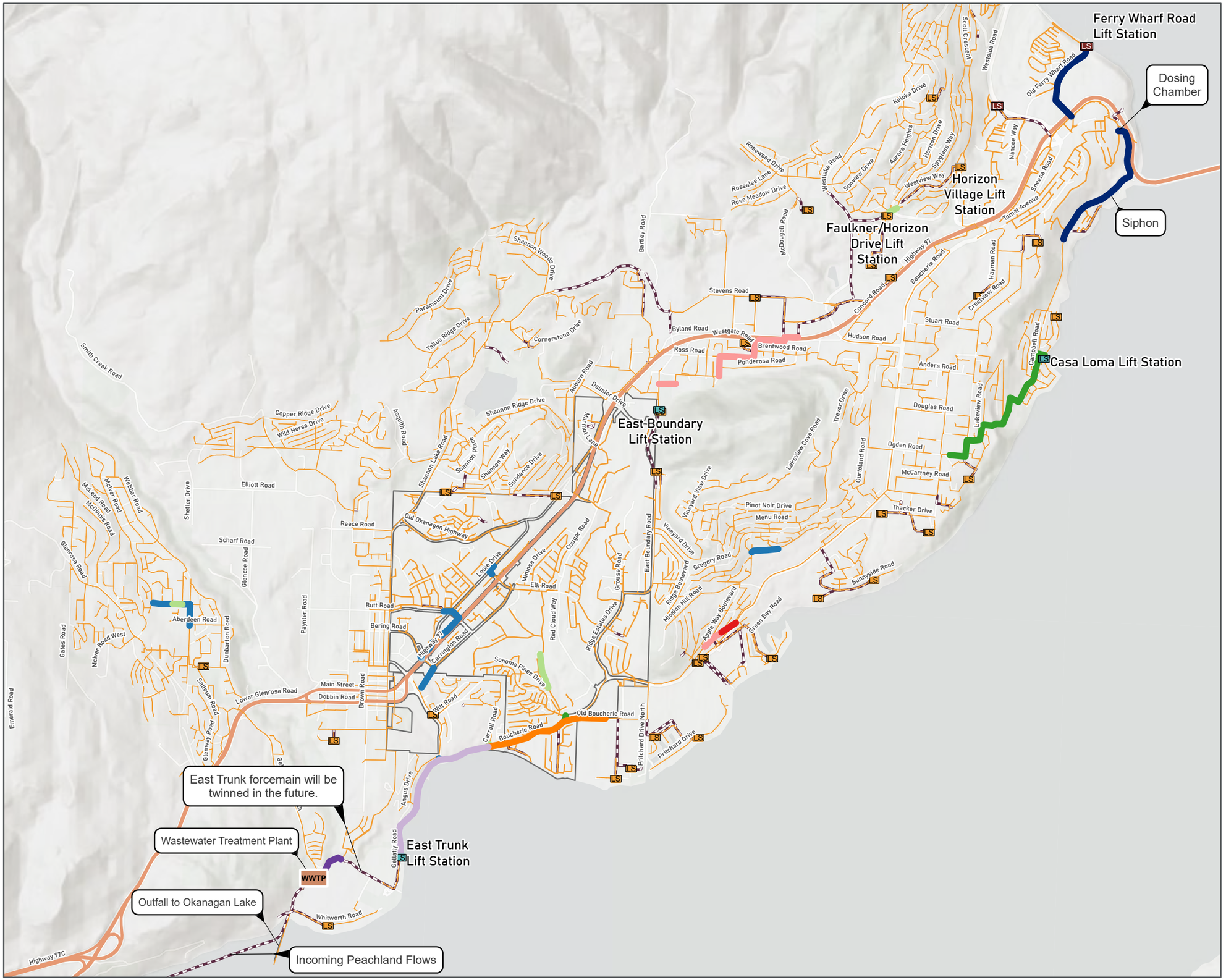
Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3B - 2099



WESTBANK FIRST NATION

Sanitary Modeling – Regional Model Development & Ferry Wharf Lift Station Upgrade Options

Ultimate 2099 Existing Option 3B UPGRADES

Legend

- WWTP Wastewater Treatment Plant
- LS WFN Lift Station
- LS West Kelowna Lift Station
- LS RDCO/Regional Lift Station
- Forcemain
- Gravity
- Option 3B
- 250mm
- 300mm
- 375mm
- 400mm
- 450mm
- 525mm
- 750mm
- 900mm
- 1050mm

Notes:

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0 200 400 600
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

Scale: 1:37,000
(When plotted at 11"x17")

Data Sources:
- Westbank First Nation
- Urban Systems

Project #:	0704.0147.01
Author:	RB
Checked:	LB
Status:	
Revision:	A
Date:	2024 / 4 / 22

URBAN SYSTEMS

FIGURE 3B - 2099

APPENDIX C
Cost Estimates

Ferry Wharf Sanitary Lift Station - Upgrade Options Review
Option 1 - Maintain Existing System Configuration
Class D Cost Estimate

Job No. 0704.0147.01
Prepared by: J.Clowes

Date: 08-Aug-24

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
1	General				
	Mobilization and demobilization	1	LS	$750,000	$750,000
	Insurance and bonding	1	LS	$600,000	$600,000
2	Removals				
	n/a				
3	Ferry Wharf Lift Station, Dosing Chamber and Siphon				
	Ferry Wharf LS - replace existing pumps, add a third pump, and upsize f/m to 250 mm	1	LS	$4,000,000	$4,000,000
4	Casa Loma Lift Station				
	Retro fit existing with smaller pumps and add second lift station at 399 m (each station to be duplex and equipped with 130 HP pumps capable of delivering 75 L/s at 66 m TDH)	1	LS	$5,000,000	$5,000,000
5	East Trunk Lift Station Upgrade				
	Replace with trench style wet well and solids handling VTPs to convey 350 L/s	1	LS	$6,000,000	$6,000,000
	Rock removal	1	LS	$150,000	$150,000
	Air valve direct bury with cover	5	ea	$50,000	$250,000
	Tie-in to existing gravity mains	2	ea	$30,000	$60,000
	Site restoration	1	LS	$75,000	$75,000
	Utility conflict allowance	1	LS	$50,000	$50,000
	Forcemain dewatering	465	lm	$200	$93,000
	400 mm C900 PVC forcemain (twin existing)	930	lm	$900	$837,000
	400 mm plug valve	4	ea	$25,000	$100,000
	chamber c/w 400 mm flow meter (Clamp on style with reader in bldg)	1	LS	$350,000	$350,000
	300 mm sub-base, 100 mm base, 100 mm asphalt	7440	sq.m	$120	$892,800
6	WRWTP Upgrade				
	Stage 4 Upgrades or Acceptable Alternative	1	LS	$20,000,000	$20,000,000
7	Collection System Piping				
	Not required for 2044 scenario				
				Subtotal	$39,207,800
				Engineering & Contingency	$19,603,900
				Estimated Project Cost	$58,811,700
				Project Contingency	$5,881,170
				Total Recommended Project Value	$64,692,870

Ferry Wharf Sanitary Lift Station - Upgrade Options Review
Option 2 - Route to CWK Faulkner Lift Station
Class D Cost Estimate

Job No. 0704.0147.01
Prepared by: J.Clowes

Date: 08-Aug-24

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
1	General				
	Mobilization and demobilization	1	LS	$800,000	$800,000
	Insurance and bonding	1	LS	$600,000	$600,000
2	Removals				
	Decomission siphon and control valve	1	LS	$100,000	$100,000
3	Ferry Wharf Lift Station, Dosing Chamber and Siphon				
	Ferry Wharf LS - replace existing pumps, add a third pump, and upsize f/m to 250 mm	1	LS	$4,000,000	$4,000,000
4	New WFN Lift Station and forcemain				
	New Lift station mid-way between Ferry Wharf and Faulkner	1	LS	$3,000,000	$3,000,000
	250 mm forcemain	2100	lm	$500	$1,050,000
	250 mm plug valve	4	ea	$6,000	$24,000
	50 mm direct bury air valve	6	ea	$50,000	$300,000
	Keefe Creek Crossing	1	LS	$500,000	$500,000
	Road Restoration	1544	sq.m	$120	$185,280
5	Faulkner Lift Station Upgrade				
	Replace with 66 l/s duplex station	1	LS	$3,000,000	$3,000,000
6	East Boundary Lift Staion Upgrade				
	Not required				
7	East Trunk Lift Station Upgrade				
	Replace with trench style wet well and solids handling VTPs to convey 350 L/s	1	LS	$6,000,000	$6,000,000
	Rock removal	1	LS	$150,000	$150,000
	Air valve direct bury with cover	5	ea	$50,000	$250,000
	Tie-in to existing gravity mains	2	ea	$30,000	$60,000
	Site restoration	1	LS	$75,000	$75,000
	Utility conflict allowance	1	LS	$50,000	$50,000
	Forcemain dewatering	465	lm	$200	$93,000
	400 mm C900 PVC forcemain (twin existing)	930	lm	$900	$837,000
	400 mm plug valve	4	ea	$25,000	$100,000
	chamber c/w 400 mm flow meter (Clamp on style with reader in bldg)	1	LS	$350,000	$350,000
	300 mm sub-base, 100 mm base, 100 mm asphalt	7440	sq.m	$120	$892,800
8	WRWTP Upgrade				
	Stage 4 Upgrades or Acceptable Alternative	1	LS	$20,000,000	$20,000,000
9	Collection System Piping				
	Not required for 2044 scenario				
				Subtotal	$42,417,080
				Engineering & Contingency	$21,208,540
				Estimated Project Cost	$63,625,620
				Project Contingency	$6,362,562
				Total Recommended Project Value	$69,988,182

Ferry Wharf Sanitary Lift Station - Upgrade Options Review
Option 3A - Dosing Chamber to CWK Lakeview Heights
Class D Cost Estimate

Job No. 0704.0147.01
Prepared by: J.Clowes

Date: 08-Aug-24

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
1	General				
	Mobilization and demobilization	1	LS	$850,000	$850,000
	Insurance and bonding	1	LS	$650,000	$650,000
2	Removals				
	Decomission siphon and control valve	1	LS	$100,000	$100,000
3	Dosing Chamber Upgrades				
	Ferry Wharf LS - replace existing pumps, add a third pump, and upsize f/m to 250 mm	1	LS	$4,000,000	$4,000,000
	Retro-fit - Add duplex pumps (75 l/s)	1	LS	$2,000,000	$2,000,000
4	New WFN lift station and forcemain				
	Add duplex station mid-way between Dosing Chamber and Lakview Heights (75 l/s)	1	LS	$3,000,000	$3,000,000
	350 mm forcemain	3700	lm	$700	$2,590,000
	350 mm gate valve	7	ea	$7,000	$49,000
	50 mm air valve	7	ea	$50,000	$350,000
	road restoration	14800	sq.m	$120	$1,776,000
5	East Trunk Lift Station Upgrade				
	Replace with trench style wet well and solids handling VTPs to convey 350 L/s	1	LS	$6,000,000	$6,000,000
	Rock removal	1	LS	$150,000	$150,000
	Air valve direct bury with cover	5	ea	$50,000	$250,000
	Tie-in to existing gravity mains	2	ea	$30,000	$60,000
	Site restoration	1	LS	$75,000	$75,000
	Utility conflict allowance	1	LS	$50,000	$50,000
	Forcemain dewatering	465	lm	$200	$93,000
	400 mm C900 PVC forcemain (twin existing)	930	lm	$900	$837,000
	400 mm plug valve	4	ea	$25,000	$100,000
	chamber c/w 400 mm flow meter (Clamp on style with reader in bldg)	1	LS	$350,000	$350,000
	300 mm sub-base, 100 mm base, 100 mm asphalt	7440	sq.m	$120	$892,800
6	WRWTP Upgrade				
	Stage 4 Upgrades or Acceptable Alternative	1	LS	$20,000,000	$20,000,000
7	Collection System Piping				
	375 mm gravity pipe	135	lm	$500	$67,500
				Subtotal	$44,290,300
				Engineering & Contingency	$22,145,150
				Estimated Project Cost	$66,435,450
				Project Contingency	$6,643,545
				Total Recommended Project Value	$73,078,995

Ferry Wharf Sanitary Lift Station - Upgrade Options Review
Option 3B - Dosing Chamber to Campbell Road
Class D Cost Estimate

Job No. 0704.0147.01
Prepared by: J.Clowes

Date: 08-Aug-24

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
1	General				
	Mobilization and demobilization	1	LS	$750,000	$750,000
	Insurance and bonding	1	LS	$550,000	$550,000
2	Removals				
	not required				
3	Ferry Wharf Lift Station, Dosing Chamber and Siphon				
	Ferry Wharf LS - replace existing pumps, add a third pump, and upsize f/m to 250 mm	1	LS	$4,000,000	$4,000,000
4	Casa Loma Lift Station Upgrade				
	Retro fit existing with smaller pumps and add second lift station at 399 m (each station to be duplex and equipped with 130 HP pumps capable of delivering 75 L/s at 66 m TDH)	1	LS	$5,000,000	$5,000,000
5	East Trunk Lift Station Upgrade				
	Replace with trench style wet well and solids handling VTPs to convey 350 L/s	1	LS	$6,000,000	$6,000,000
	Rock removal	1	LS	$150,000	$150,000
	Air valve direct bury with cover	5	ea	$50,000	$250,000
	Tie-in to existing gravity mains	2	ea	$30,000	$60,000
	Site restoration	1	LS	$75,000	$75,000
	Utility conflict allowance	1	LS	$50,000	$50,000
	Forcemain dewatering	465	lm	$200	$93,000
	400 mm C900 PVC forcemain (twin existing)	930	lm	$900	$837,000
	400 mm plug valve	4	ea	$25,000	$100,000
	chamber c/w 400 mm flow meter (Clamp on style with reader in bldg)	1	LS	$350,000	$350,000
	300 mm sub-base, 100 mm base, 100 mm asphalt	7440	sq.m	$120	$892,800
6	WRWTP Upgrade				
	Stage 4 Upgrades or Acceptable Alternative	1	LS	$20,000,000	$20,000,000
7	Collection System Piping				
	Not required for 2044 scenario				
				Subtotal	$39,157,800
				Engineering & Contingency	$19,578,900
				Estimated Project Cost	$58,736,700
				Project Contingency	$5,873,670
				Total Recommended Project Value	$64,610,370

Annual Operations and Maintenance Estimated Cost

	Units	Option 1 Existing Configuration	Option 2 Ferry Wharf Pumps to Faulkner LS	Option 3A Dosing Chamber Pumps to Lakeview Heights
20 Year AADF System Wide Estimate	m^3/d		18,500	
Lift Stations Utilized		1) Ferry Wharf 2) Casa Loma 3) East Trunk	1) Ferry Wharf 2) New WFN LS 3) Faulkner 4) East Boundary 5) East Trunk	1) Ferry Wharf 2) Dosing Chamber 3) New WFN LS 4) East Trunk
Average Daily Flow Allocation from IR10				
Ferry Wharf	l/s	10.38	10.38	10.38
Dosing Chamber Pumps	l/s	0	0	22.31
New WFN LS	l/s	0	10.38	22.31
Faulkner	l/s	0	10.38	0
East Boundary	l/s	0	10.38	0
Casa Loma LS	l/s	22.31	12.31	22.31
East Trunk LS	l/s	22.31	22.31	22.31
Annual Usage				
Ferry Wharf LS	m3/yr	327,489	327,489	327,489
Dosing Chamber Pumps	m3/yr	0	0	703,495
New WFN LS	m3/yr	0	327,489	703,495
Faulkner	m3/yr	0	327,489	0
East Boundary	m3/yr	0	327,489	0
Casa Loma LS	m3/yr	703,495	388,135	703,495
East Trunk LS	m3/yr	703,495	703,495	703,495
Annual Operating Hours				
Ferry Wharf LS (40 L/s)	hr	2,274	2,274	2,274
Dosing Chamber Pumps (58 L/s)	hr	0	0	3,369
New WFN LS Options 2 (40 L/s)	hr	0	2,274	0
New WFN LS Options 3 (58 L/s)	hr	0	0	3,369
Faulkner (66 L/s)	hr	0	1,378	0
East Boundary (198.5 l/s)	hr	0	458	0
Casa Loma LS (75 l/s)	hr	2,606	1,438	2,606
East Trunk LS (350 l/s)	hr	558	558	558
Power Demand				
Ferry Wharf LS (75 kW)	kW-h/yr	170,567	170,567	170,567
Dosing Chamber Pumps (59 kW)	kW-h/yr	0	0	198,785
New WFN LS - Option 2 (75 kW)	kW-h/yr	0	170,567	0
New WFN LS - Option 3 (69kW)	kW-h/yr	0	0	232,477
Faulkner (108 kW)	kW-h/yr	0	148,859	0
East Boundary (104 kW)	kW-h/yr	0	47,661	0
Casa Loma LS (194 kW)	kW-h/yr	505,474	278,882	505,474
East Trunk LS (104 kW)	kW-h/yr	58,066	58,066	58,066
Power Cost ($0.1/kWh)				
Ferry Wharf LS (30 kW)	$/yr	$17,057	$17,057	$17,057
Dosing Chamber Pumps (80 kW)	$/yr	$0	$0	$19,878
New WFN LS - Option 2 (40 kW)	$/yr	$0	$17,057	$0
New WFN LS - Option 3 (90 kW)	$/yr	$0	$0	$23,248
Faulkner (70 kW)	$/yr	$0	$14,886	$0
East Boundary (54 kW)	$/yr	$0	$4,766	$0
Casa Loma LS (222 kW)	$/yr	$50,547	$27,888	$50,547
East Trunk LS (60 kW)	$/yr	$5,807	$5,807	$5,807
	Sub-total ($/yr)	$73,411	$87,460	$116,537
Consumables				
Bioxide ($1.50/L, allow 0.17 L/m3)	L/yr	55,673	55,673	55,673
Ferry Wharf LS	L/yr	0	0	119,594
Dosing Chamber Pumps	L/yr	0	55,673	119,594
New WFN LS Option 2	L/yr	0	55,673	0
New WFN LS Option 3A	L/yr	0	55,673	0
Faulkner	L/yr	119,594	65,983	119,594
East Boundary	L/yr	119,594	119,594	119,594
Casa Loma LS	L/yr	0	0	0
East Trunk LS	L/yr	0	0	0
	Sub-total (L/yr)	294,862	408,270	534,050
	Sub-total ($/yr)	$442,292	$612,405	$801,075
Staff				
Operating Cost Allowance ($60/hr, allow 8 hrs per week for each lift station)				
Ferry Wharf LS	$/yr	$24,960	$24,960	$24,960
Dosing Chamber Pumps	$/yr	$0	$0	$24,960
New WFN LS Option 2	$/yr	$0	$24,960	$0
New WFN LS Option 3a	$/yr	$0	$0	$24,960
Faulkner	$/yr	$0	$24,960	$0
East Boundary	$/yr	$0	$24,960	$0
Casa Loma LS	$/yr	$0	$24,960	$24,960
East Trunk LS	$/yr	$24,960	$24,960	$24,960
	$/yr	$24,960	$24,960	$24,960
	Sub-total ($/yr)	$74,880	$174,720	$149,760
Total Estimated O&M Cost at 20 Year Flows		$590,583	$874,585	$1,067,372

Inflation	2.00%
Rate	4.97%

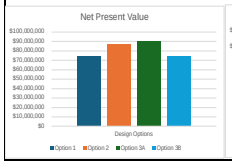
Replacement Schedule

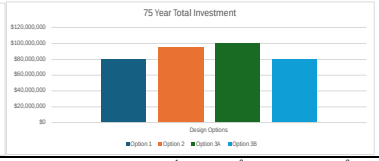
Asset	Construction Investment	Operation & Maintenance	Service Life	Year of Install	1st Replacement Of Mechanical and Electrical Components	2nd Replacement Of Mechanical and Electrical Components	
Option 1	$64,692,870	$590,583	75	2024	2050	2075	
Option 2	$69,988,182	$874,585	75	2024	2050	2075	
Option 3A	$73,078,995	$1,067,372	75	2024	2050	2075	
Option 3B	$64,610,370	$590,583	75	2024	2050	2075	

Note that the O&M cost estimated was deleted from our system so referencing pdf only

Life Cycle Investment Summary

Design Options	NPV	75 Year Total Investment	25 year Asset Renewal Cost
Option 1	$74,141,948	$79,920,064	$630,000
Option 2	$87,071,983	$95,628,703	$620,000
Option 3A	$90,156,489	$100,599,386	$570,000
Option 3B	$74,059,448	$79,837,564	$630,000





	NPV	2024	1 2025	2 2026	3 2027	4 2028	5 2029	6 2030	7 2031	8 2032	9 2033	10 2034	11 2035	12 2036	13 2037	14 2038	15 2039	16 2040	17 2041	18 2042	19 2043	20 2044	Total
Option 1																							
Capital Cost		$64,692,870	0	0	0	0	0	0	0	0	0	0	0	$0	0	0	0	0	0	0	0	0	$64,692,870
O&M		$590,583	$602,395	$614,443	$626,732	$639,266	$652,052	$665,093	$678,394	$691,962	$705,802	$719,918	$734,316	$749,002	$763,982	$779,262	$794,847	$810,744	$826,959	$843,498	$860,368	$877,576	$15,227,194
Total	$74,141,948	$65,283,453	$602,395	$614,443	$626,732	$639,266	$652,052	$665,093	$678,394	$691,962	$705,802	$719,918	$734,316	$749,002	$763,982	$779,262	$794,847	$810,744	$826,959	$843,498	$860,368	$877,576	$79,920,064

	NPV	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Total
Option 2																							
Capital Cost		$73,078,995	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$73,078,995
O&M		$874,585	$892,077	$909,918	$928,117	$946,679	$965,613	$984,925	$1,004,624	$1,024,716	$1,045,210	$1,066,115	$1,087,437	$1,109,186	$1,131,369	$1,153,997	$1,177,077	$1,200,618	$1,224,630	$1,249,123	$1,274,106	$1,299,588	$22,549,708
Total	$87,071,983	$73,953,580	$892,077	$909,918	$928,117	$946,679	$965,613	$984,925	$1,004,624	$1,024,716	$1,045,210	$1,066,115	$1,087,437	$1,109,186	$1,131,369	$1,153,997	$1,177,077	$1,200,618	$1,224,630	$1,249,123	$1,274,106	$1,299,588	$95,628,703

	NPV	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Total
Option 3A																							
Capital Cost		$73,078,995	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$73,078,995
O&M		$1,067,372	$1,088,719	$1,110,494	$1,132,704	$1,155,358	$1,178,465	$1,202,034	$1,226,075	$1,250,596	$1,275,608	$1,301,121	$1,327,143	$1,353,686	$1,380,760	$1,408,375	$1,436,542	$1,465,273	$1,494,578	$1,524,470	$1,554,959	$1,586,059	$27,520,391
Total	$90,156,489	$74,146,367	$1,088,719	$1,110,494	$1,132,704	$1,155,358	$1,178,465	$1,202,034	$1,226,075	$1,250,596	$1,275,608	$1,301,121	$1,327,143	$1,353,686	$1,380,760	$1,408,375	$1,436,542	$1,465,273	$1,494,578	$1,524,470	$1,554,959	$1,586,059	$100,599,386

	NPV	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Total
Option 3B																							
Capital Cost		$64,610,370	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$64,610,370
O&M		$590,583	$602,395	$614,443	$626,732	$639,266	$652,052	$665,093	$678,394	$691,962	$705,802	$719,918	$734,316	$749,002	$763,982	$779,262	$794,847	$810,744	$826,959	$843,498	$860,368	$877,576	$15,227,194
Total	$74,059,448	$65,200,953	$602,395	$614,443	$626,732	$639,266	$652,052	$665,093	$678,394	$691,962	$705,802	$719,918	$734,316	$749,002	$763,982	$779,262	$794,847	$810,744	$826,959	$843,498	$860,368	$877,576	$79,837,564

APPENDIX D
Casa Loma Lift Station
Pump Options

Pump Data Sheet - Cornell

Company: Cornell
Name: Scenario 1 - Two Pumps in Series
Date: 8/1/2017

RDCO - Casa Loma LS
Dry-Pit Submersible
Scenario 1
116 L/s (1839 USGPM) @ 71.5 m (235' TDH)
Each Pump of Two Pumps in Series

Pump:

Size: 6NHTB

Type: Encl Solids Handling
Synch speed: 1800 rpm

Speed: 1770 rpm
Dia: 16.0625 in

Curve: 6NHTB18

Impeller:

Specific Speeds:

Ns: 1880
Nss: ---

Dimensions:

Suction: 10 in
Discharge: 6 in

Search Criteria:

Flow: 1839 US gpm

Head: 235 ft

Preferred Operating Region: 70% - 120% BEP

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP

Temperature: 68 °F
Vapor pressure: 0.3391 psi a
Atm pressure: 14.7 psi a

NPSHa: —

Pump Limits:

Temperature: 250 °F
Pressure: 150 psi g
Sphere size: 3.38 in

Power: ---
Eye area: ---

Motor:

Standard: NEMA
Enclosure: TEFC

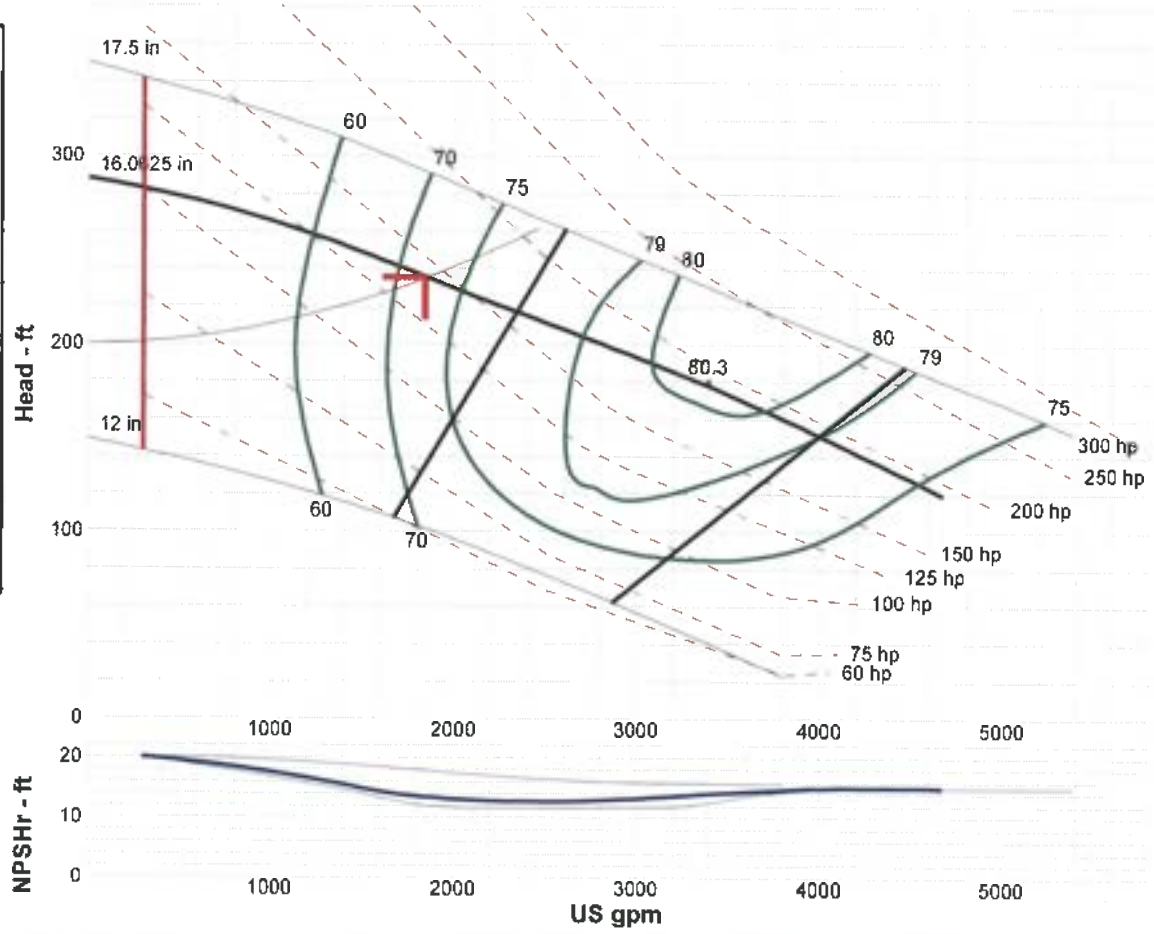
Size: 200 hp
Speed: 1800
Frame: 447T

Sizing criteria: Max Power on Design Curve

Pump Selection Warnings:

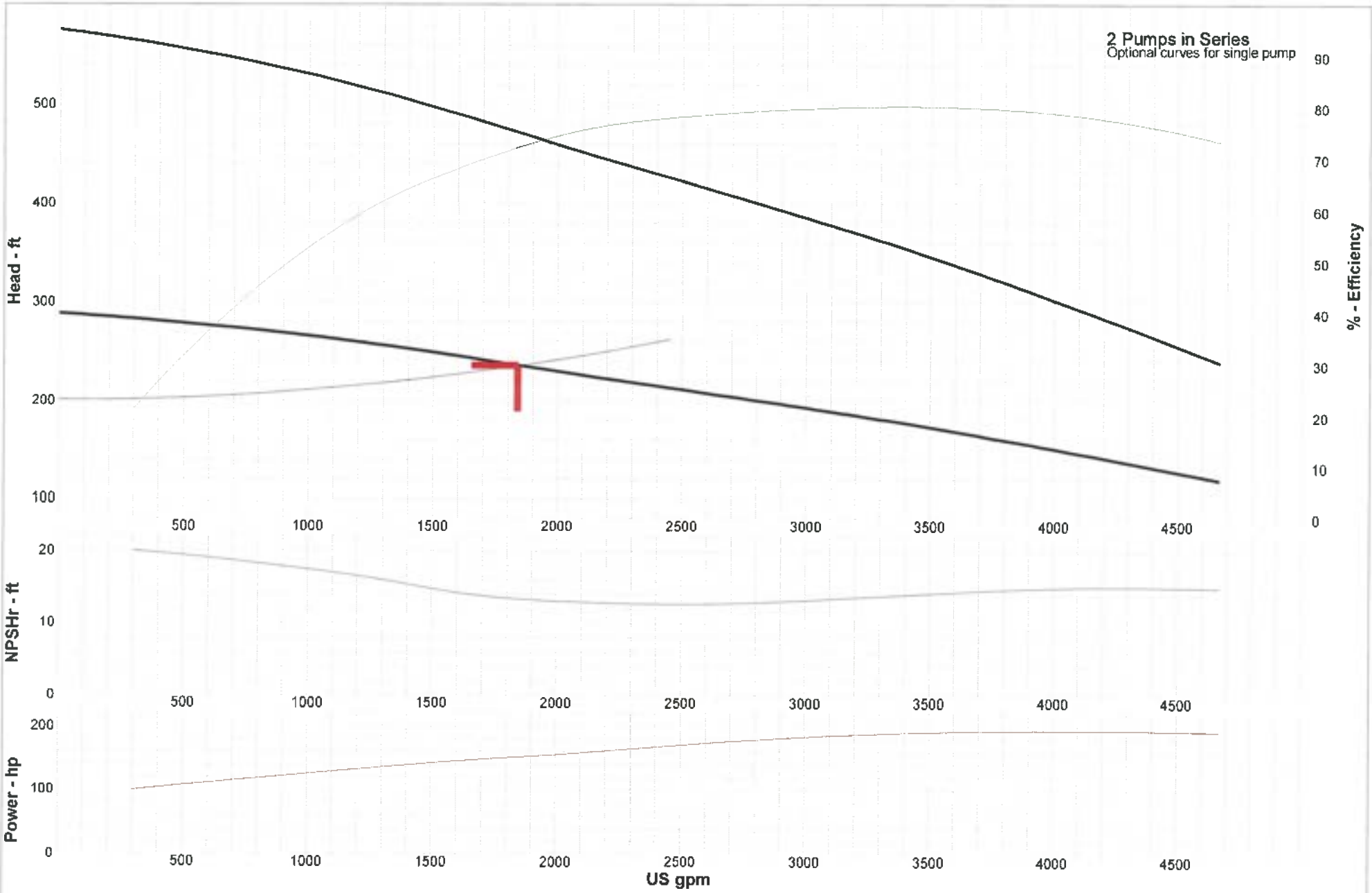
Operating point is not within the preferred operating region

— Data Point —	
Flow:	1839 US gpm
Head:	236 ft
Eff:	72%
Power:	151 hp
NPSHr:	13.5 ft
— Design Curve —	
Shutoff head:	288 ft
Shutoff dP:	125 psi
Min flow:	300 US gpm
BEP:	80% @ 3388 US gpm
NOL power:	193 hp @ 3997 US gpm
— Max Curve —	
Max power:	281 hp @ 5380 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
2207	1770	222	76	161	13
1839	1770	236	72	151	13.5
1471	1770	249	65	141	15.1
1103	1770	261	55	129	16.9
736	1770	271	40	116	18.3



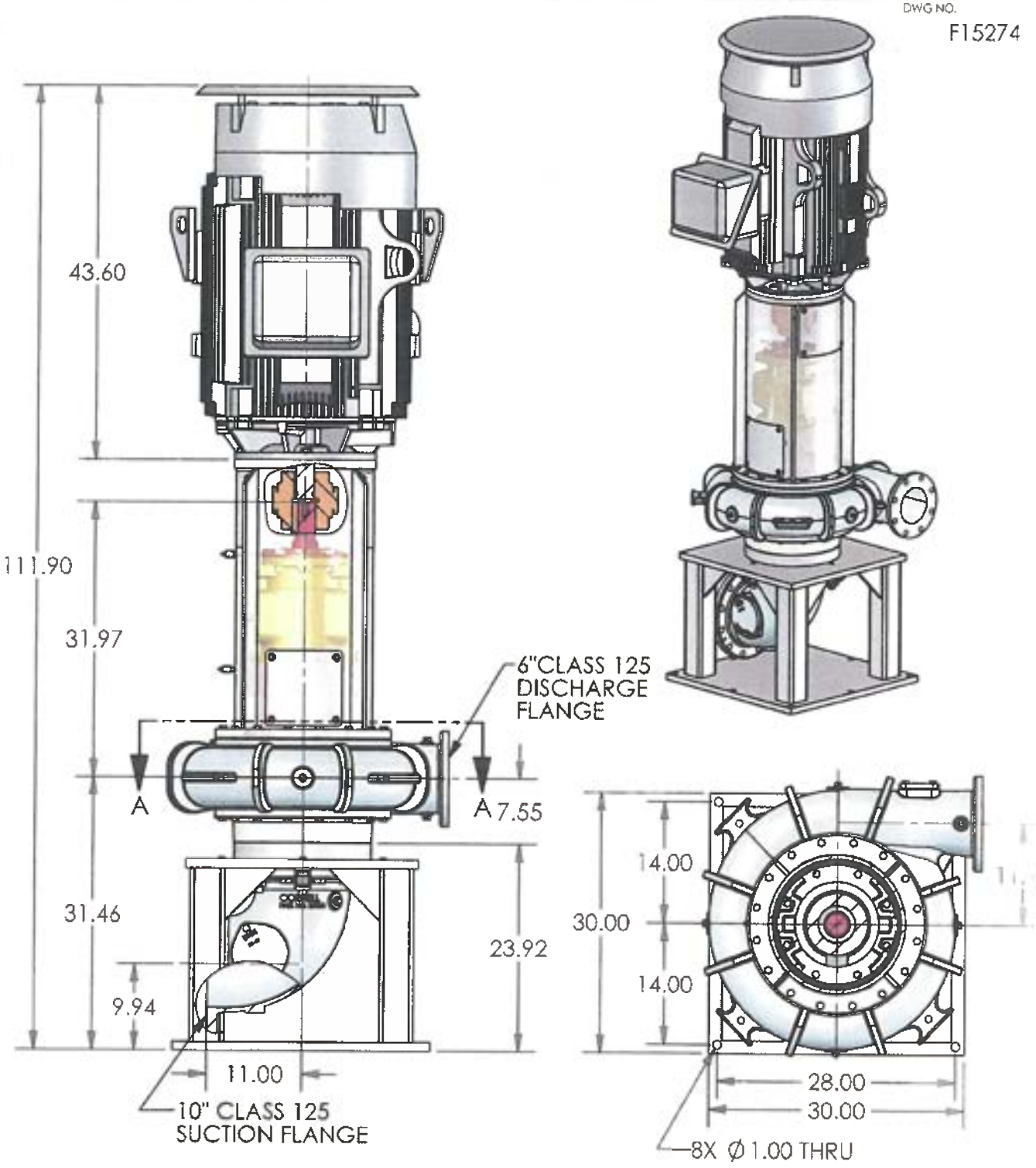
Company: Cornell
Name: Scenario 1 - Two Pumps in Series
8/1/2017

Cornell
Catalog: Cornell.60, Vers 3.10.1
Encl Solids Handling - 1800

Size: 6NHTB
Speed: 1770 rpm
Dia: 16.0625 in
Curve: 6NHTB18

CORNELL®

DWG NO.
F15274



NOTES:
1. OVERALL DIMENSIONS CAN VARY ±.12 INCH
2. DO NOT USE FOR CONSTRUCTION UNLESS CERTIFIED

CORNELL

CUSTOMER:	PUMP SOLUTIONS
P.O. NO.:	
S.O. NO.:	
PROJECT NAME:	CASA LOMA LS
MOTOR MANUF.:	BALDOR HP: 200
FRAME SIZE:	G447HP RPM: 1800 MOTOR
ENCLOSURE:	TEFC 1800 PUMP

REV. NO. | DESCRIPTION | DATE | BY

6NHTB-VC18DB-10X10-200-4

APPROX WEIGHT (LB) 5037
JOB NO.

DR DN | CHECKED DT | DATE 10/27/17 | SCALE TO SCALE | DWG. NO. F15274

CORNELL PUMP COMPANY PORTLAND, OR

SHEET 1 OF 1

DUTY MASTER ALTERNATING CURRENT MOTORS

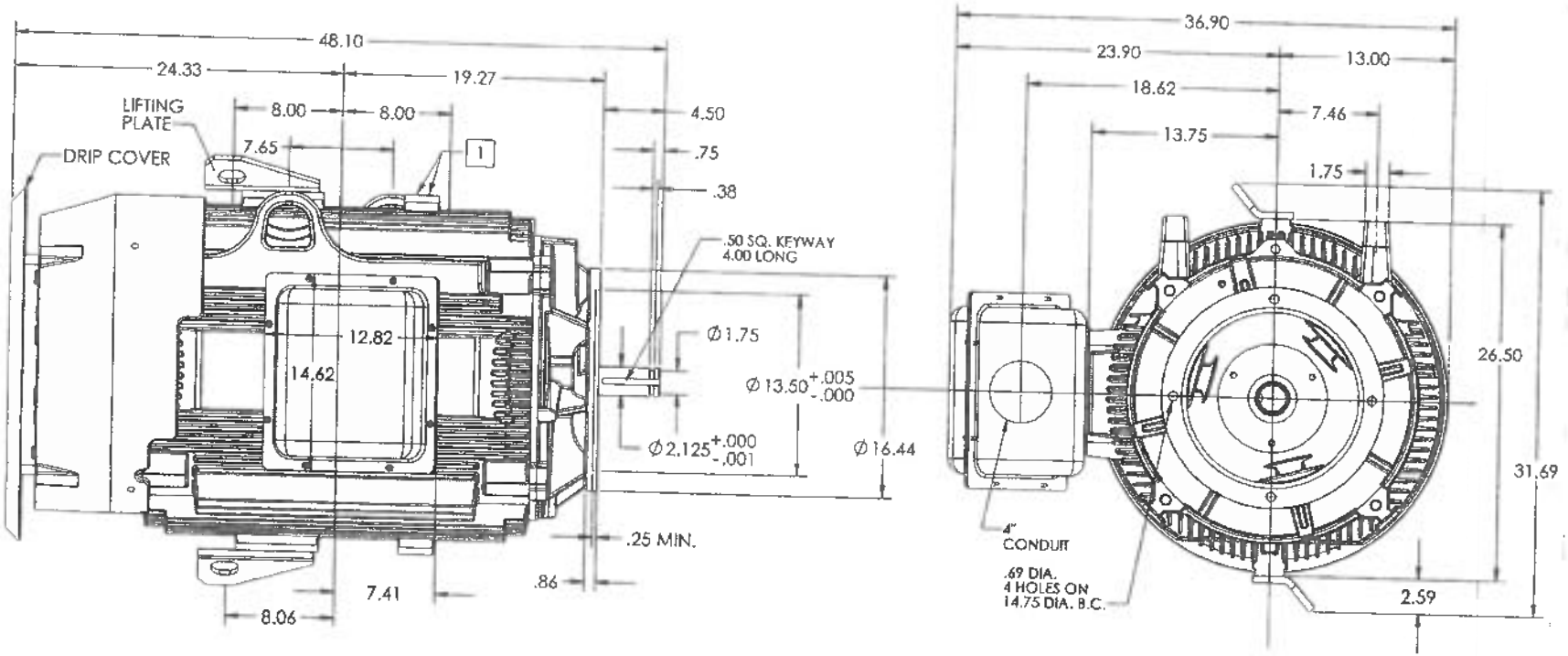
SQUIRREL-CAGE INDUCTION

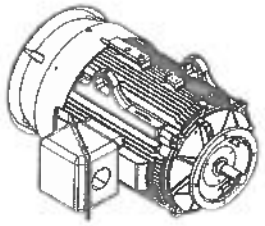
ENCLOSURE: TOTALLY ENCLOSED

FRAME G447HP

COOLING: FAN COOLED

MOUNTING: FOOTLESS, SHAFT DOWN





1. GROUND HOLES: 1 X 1/2-13⊽ ↧.00; 1 X 3/8-16⊽ ↧1.00
2. FACE RUNOUT AND ECCENTRICITY .004 MAX T.I.R
3. MOTOR WEIGHTS MAY VARY BY 15% DEPENDING ON RATING.

DIMENSIONS ARE IN INCHES; SEE SHEET 2 FOR DIMENSIONS IN MILLIMETERS.

[3] WEIGHT (LBS): 2720

IF MOUNTING CLEARANCE DETAILS ARE REQUIRED, CONSULT FACTORY. MAXIMUM PERMISSIBLE SHAFT RUNOUT WHEN MEASURED AT END OF STANDARD SHAFT EXTENSION IS .001" T.I.R. TO 5 INCH DIA.

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT MOTOR PERFORMANCE IS SUITABLE IN THE APPLICATION.

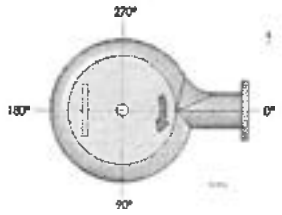
BALDOR

G447HP FTLS STEEL C-FACE, VERT LEFT, DRIP COVER

SOLIDS HANDLING VERTICAL COUPLED (VC18) PUMPS WITH CYCLOSEAL® & CENTERLINE VOLUTE

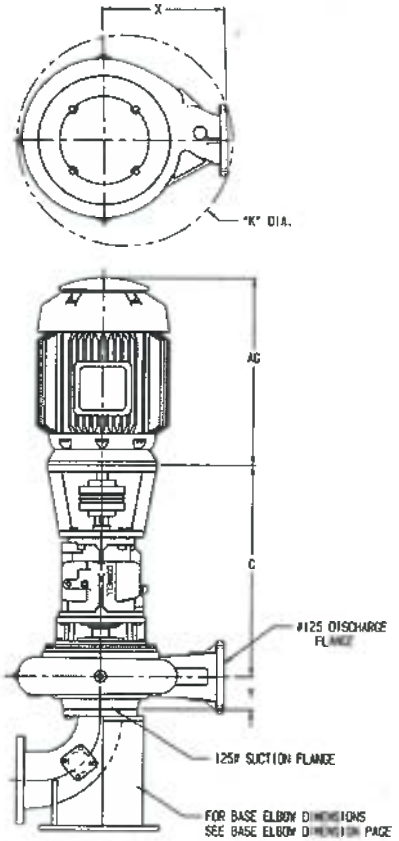
NOTES:

Discharge positions are viewed from the drive end. Standard increments of discharge position are shown in the chart below (DISCH INCR). Consult factory for other discharge positions.



PUMP DIMENSIONS										
		CONNECTION		DISCH.	BD					
MODEL	FRAME	DISCH.	SUCT.	INCR.	DIM.	C	K	X	Y	KEYWAY
4NHTA	VC18	4	4	45°	16.5	32.25	27	14.5	4.75	.62 x .31
4414T	VC18	4	4	45°	16.5	32.25	27	14.5	4.75	.62 x .31
4514T	VC18	4	5	45°	16.5	32.25	27	14.5	4.75	.62 x .31
4NHTB	VC18	4	5	45°	16.5	33.19	30	15.75	5	.62 x .31
6NHT 6NHTA 6NHTH	VC18	6	6	45°	16.5	32.72	33	18.56	5	.62 x .31
6NHTB	VC18	6	10	30°	16.5	33.47	39	20	7.5	.62 x .31
8NNTL	VC18	8	8	45°	16.5	32.56	36	18.5	6.89	.62 x .31
8NHTR	VC18	8	8	45°	16.5	34.19	40	22	7.58	.62 x .31
8NHTA	VC18	8	10	30°	16.5	33.47	46	22.44	7.5	.62 x .31
8NHGA	VC18	8	10	30°	16.5	33.72	41	21.44	9.91	.62 x .31
10NHTA	VC18	10	10	30°	16.5	34.09	56	28	7	.62 x .31
10NNT	VC18	10	10	45°	16.5	33.98	44	23.13	9.19	.62 x .31
12NHTL	VC18	12	8	45°	16.5	35.03	48	25	8.12	.62 x .31
12NHTM	VC18	12	10	30°	16.5	35.03	48	25	8.12	.62 x .31
12NNGL 12NNF	VC18	12	12	30°	16.5	32.93	42	21	9.81	.62 x .31
12NNT	VC18	12	10	30°	16.5	32.93	42	21	10.82	.62 x .31
14NHG 14NHGA	VC18	14	12	30°	16.5	34.36	55	28	10.91	.62 x .31
14NHGH	VC18	14	14	30°	16.5	34.36	55	28	12.53	.62 x .31
16NHG	VC18	16	12	30°	16.5	34.36	55	28	10.91	.62 x .31
16NHGH	VC18	16	14	30°	16.5	34.36	55	28	12.53	.62 x .31
16NHG22	VC18	16	16	45°	16.5	34.36	61	32	11.62	.62 x .31

MOTOR DIMENSION	
NEMA FRAME	AG
182	13.16
184	14.16
213	18.25
215	19.75
254	22.31
256	24.06
284	24.5
286	26
324	27.44
326	28.94
364	26
365	26
404	28.81
405	28.81
444	33
445	33
505	35.25
508	42.25



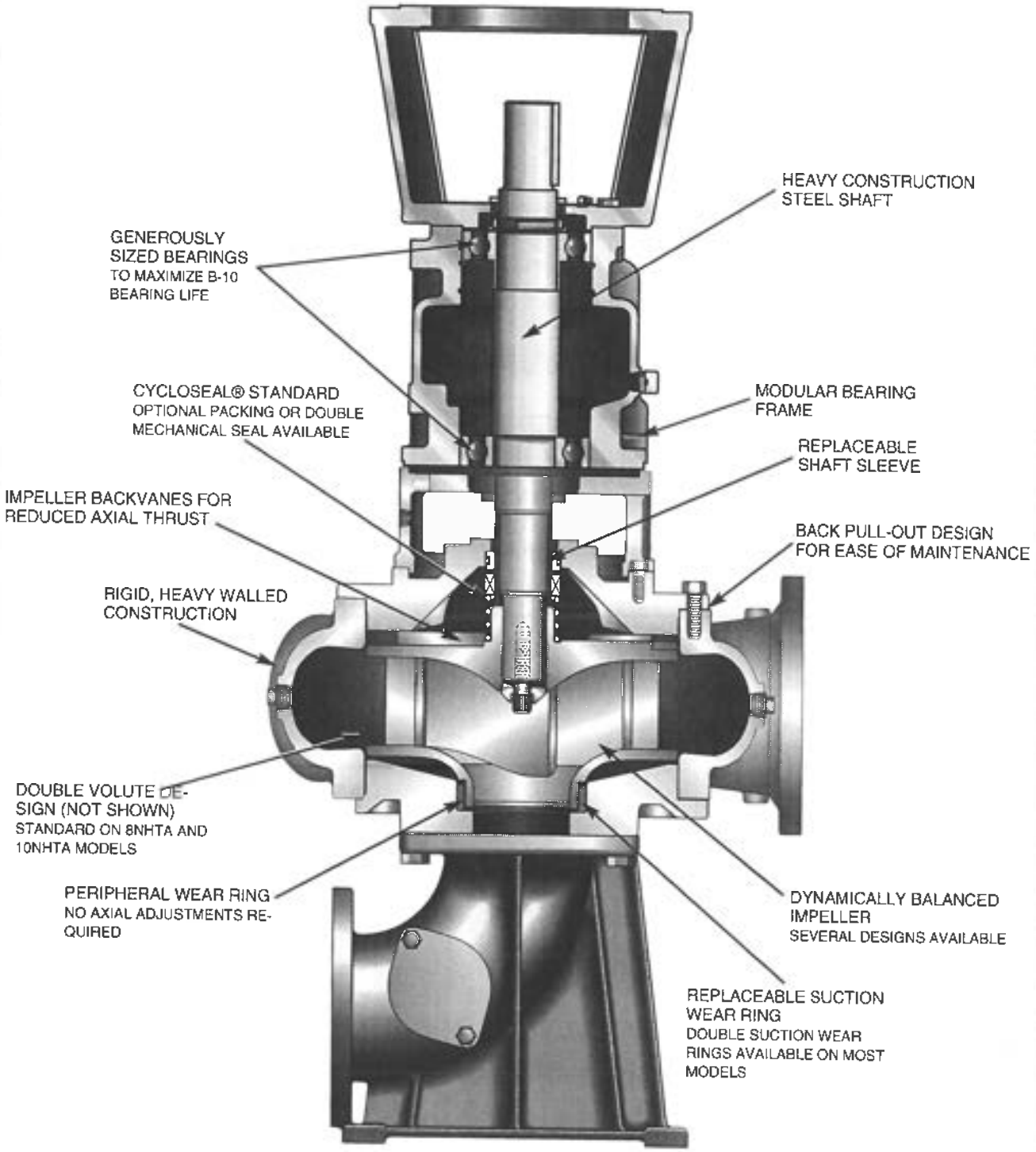
NOTES:

1. "AG" dimension is approximate and may vary depending on manufacturer.
2. Flange connection dimension can vary ± .12 inch.
3. Do not use for construction unless certified.

* TYPICAL ONLY

10/27/09

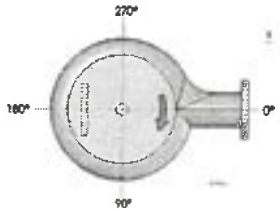
VERTICAL COUPLED (VC) PUMPS



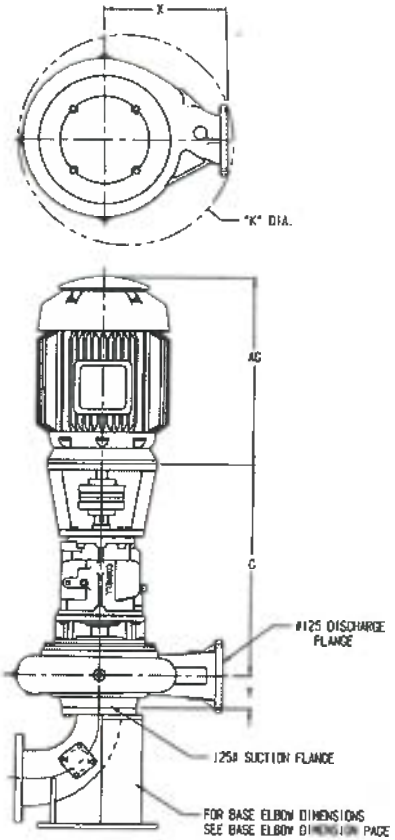
SOLIDS HANDLING VERTICAL COUPLED (VC18) PUMPS WITH CYCLOSEAL® & CENTERLINE VOLUTE

NOTES:

Discharge positions are viewed from the drive end. Standard increments of discharge position are shown in the chart below (DISCH INCR). Consult factory for other discharge positions.



MOTOR DIMENSION	
NEMA FRAME	AG
182	13.16
184	14.16
213	18.25
215	19.75
254	22.31
256	24.06
284	24.5
286	26
324	27.44
326	28.94
364	26
365	26
404	28.81
405	28.81
444	33
445	33
505	35.25
508	42.25



PUMP DIMENSIONS										
MODEL	FRAME	CONNECTION DISCH.	CONNECTION SUCT.	DISCH. INCR.	BD DIM.	C	K	X	Y	KEYWAY
4NHTA	VC18	4	4	45°	16.5	32.25	27	14.5	4.75	.62 x .31
4414T	VC18	4	4	45°	16.5	32.25	27	14.5	4.75	.62 x .31
4514T	VC18	4	5	45°	16.5	32.25	27	14.5	4.75	.62 x .31
4NHTB	VC18	4	5	45°	16.5	33.19	30	15.75	5	.62 x .31
6NHT 6NHTA 6NHTH	VC18	6	6	45°	16.5	32.72	33	18.56	5	.62 x .31
6NHTB	VC18	6	10	30°	16.5	33.47	39	20	7.5	.62 x .31
8NNTL	VC18	8	8	45°	16.5	32.56	36	18.5	6.89	.62 x .31
8NHTR	VC18	8	8	45°	16.5	34.19	40	22	7.58	.62 x .31
8NHTA	VC18	8	10	30°	16.5	33.47	46	22.44	7.5	.62 x .31
8NHGA	VC18	8	10	30°	16.5	33.72	41	21.44	9.91	.62 x .31
10NHTA	VC18	10	10	30°	16.5	34.09	56	28	7	.62 x .31
10NNT	VC18	10	10	45°	16.5	33.98	44	23.13	9.19	.62 x .31
12NHTL	VC18	12	8	45°	16.5	35.03	48	25	8.12	.62 x .31
12NHTM	VC18	12	10	30°	16.5	35.03	48	25	8.12	.62 x .31
12NNGL 12NNF	VC18	12	12	30°	16.5	32.93	42	21	9.81	.62 x .31
12NNT	VC18	12	10	30°	16.5	32.93	42	21	10.82	.62 x .31
14NHG 14NHGA	VC18	14	12	30°	16.5	34.36	55	28	10.91	.62 x .31
14NHGH	VC18	14	14	30°	16.5	34.36	55	28	12.53	.62 x .31
16NHG	VC18	16	12	30°	16.5	34.36	55	28	10.91	.62 x .31
16NHGH	VC18	16	14	30°	16.5	34.36	55	28	12.53	.62 x .31
16NHG22	VC18	16	16	45°	16.5	34.36	61	32	11.62	.62 x .31

NOTES:

1. "AG" dimension is approximate and may vary depending on manufacturer.
2. Flange connection dimension can vary ± .12 inch.
3. Do not use for construction unless certified.

* TYPICAL ONLY

10/27/09

Jeremy Clowes

From:	Bocu, Marius - Xylem <Marius.Bocu@xylem.com>
Sent:	August 8, 2024 4:27 PM
To:	Jeremy Clowes
Subject:	RE: RDCO Casa Loma Pump Selections
Attachments:	20Y flow_Op1_1 x NP 3301 HT 460 SS impeller 105HP 600V 3phase.pdf; 20Y flow_Op2_1 x NP 3315 HT 457 130HP 600V 3phase.pdf; 20Y flow_2X NP 3202 SH 273 72HP 600V 3ph in triplex.pdf; No FM upgr_3 x NP 3202 SH 273 72HP 600V 3ph in triplex_std motor.pdf; No FM upgr_3 x NP 3202 SH 273 72HP 600V 3ph in triplex_IE3 motor.pdf; FM upgr_3 x NP 3202 SH 273 72HP 600V 3ph in triplex.pdf; NO FM upgr_2 x NP 3315 HT 456 imp 160HP 600V 3ph in triplex_std motor.pdf; NO FM upgr_2 x NP 3315 HT 456 imp 130HP 600V 3ph in triplex_std motor.pdf; FM upgr_2 x NP 3315 HT 458 imp 130HP 600V 3ph in triplex_std motor.pdf; Senario 1_buildup no FM upgrade_2 x NP 3301 HT 3~ 460.pdf

assumed option for report

Hi Jeremy,

Based on the information provided here are a few options and pump selections:

20Years **fl**ow

- Duplex system:
  Op1: 1 x NP 3301 HT 460 SS impeller 105HP 600V 3phase
  Op2: 1 X NP 3315 HT 457 130HP (or 160HP if used in the buildup phase) 600V 3phase
  Notes: Both have overloading perf curves but the power limit is below the static head (61M) so it will never reach the overloading zone during operation.
- Triplex system:
  Op1: 2 x NP 3202 SH 273 imp 72HP 600V 3phase

Buildout Flows (75 year **fl**ow)

Quad system

Triplex in operation Flygt NP3202 SH 273 imp 72HP

Op1: No FM upgrade: 3 X NP 3202 SH 273 imp 72HP 600V 3phase (will provide 122.7 l/s, a bit under the 125 l/s required). The pump is equipped with std motor. If we upgrade to IE3 motor the pump will give 123.5 l/s @ 72.7m TDH)
Op2: FM upgrade: 3 X NP 3202 SH 273 imp 72HP 600V 3phase, (will provide 140 l/s, a bit more and need to turn down the speed via VFD to meet the required duty)

Triplex system

Variant1
Op1: 2 x NP3301HT 460 imp if 122 l/s @ 72.4m TDH is fine. The overloading starts very close to the static head but I would still recommend to have means to stop the pump from running beyond the power limit in the controls of VFD.

Variant2

~~Op1: No FM upgrade: 2 x NP 3315 HT 456 imp 160HP 600V 3ph in triplex~~

Op2: FM upgrade: 2 x NP 3315 HT 458 imp (smaller diameter than Op1) 160HP motor (or could use the 130HP motor if Op2 is chosen @ 20Years flows).

assumed option for report

Scenario 1

Triplex installation with two pump installed originally (duplex system, third bay empty for buildup phase)

- Use one NP3301HT with SS impeller for 20years flow then for buildup phase replace the SS impeller with 460HI, if 122 l/s is fine, instead of the 125 l/s, for this phase, and have two pumps in operation with the 3rd on standby. The overloading starts very close to the static head but I would still recommend to have means to stop the pump from running beyond the power limit in the controls of VFD.

Scenario 2

Triplex installation with two pump installed originally (duplex system, third bay empty for buildup phase)

- Use one NP3315 HT 457 imp and 130HP (or 160HP) motor at the 20Year flows then for buildup phase swap the impeller with 456 or 458, depending if the FM is going to be upgraded or not, and have two pumps running to achieve the duty with 3rd in standby

Scenario 3

Quad installation with two pump installed originally (triplex operation with 4th bay empty for buildup phase).

- Use two NP3202 SH 273 imp for 20Year flows then for buildup phase add the 4th pump and run 3 x NP3202 SH to achieve the duty.

There are multiple scenarios that we can review. Let me know if you would like to discuss together.

I hope that all these options are not too confusing. Please review and do not hesitate to call/email should you have any questions or require any further information.

Best Regards,

To help protect your privacy, Microsoft Office prevented automatic download of this picture from the Internet.
Xylem Let's Solve Water

How are we doing?

MARIUS BOCU
Technical Sales Representative
O: 604-941-6664;
DL: 778-284-4256; C: 778-389-2227
74 Glacier Str. Coquitlam, BC V3J 5Y9
marius.bocu@xylem.com
LEAVE FEEDBACK

From: Jeremy Clowes <JClowes@urbansystems.ca>
Sent: Thursday, August 8, 2024 8:25 AM
To: Bocu, Marius - Xylem <Marius.Bocu@xylem.com>
Subject: RDCO Casa Loma Pump Selections

Hi Marius,

I'm looking at upgrades for RDCOs Casa Loma Pump Station. It is currently configured as wet well/dry pit that is equipped with 4 x 150 HP pumps (150 HP x 2 in series in a duty/standby configuration).

We are looking to breakup the pumping head by adding a second lift station so RDCO can avoid the complexity of pumping sewage with high head pumps in series.

Can you provide selections to suit the following flow conditions? Quote is not required and only looking for a pump selection to verify options.

- 20-year Flows (next upgrade planned)
  - Duplex Duty/standby configuration
  - Each pump capable of 75 L/s at 66 m TDH (static lift is 61 m)
  - Consider triplex if needed

- Buildout Flows (75 year flow)
  - Option 1 – No f/m upgrade
    - Duplex or triplex configuration
    - Duty pump(s) capable of 125 L/s at 73 m TDH (static lift is 61m)
  - Option 2 – with f/m upgrade
    - Duplex or triplex configuration
    - Duty pump(s) capable of 125 L/s at 66 m TDH (static lift is 61 m)

Regards,

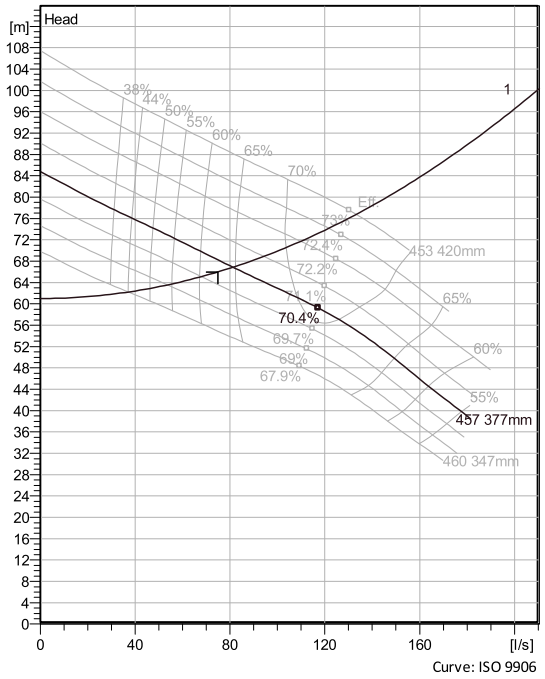
Jeremy Clowes, P.Eng.
Principal, Water and Wastewater Engineer
URBAN systems
304 – 1353 Ellis Street
Kelowna, BC V1Y 1Z9
T: 250 762 2517 x 1212
C: 250 878 7751
jclowes@urbansystems.ca
urbansystems.ca

NP 3315 HT 3~ 457

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%],4 °C,999.9 kg/m³,1.5702 mm²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3315.185 35-35-4AA-W 130hp

Installation type
P - Semi permanent, Wet

Impeller diameter
377 mm

Discharge diameter
150 mm

Pump information

Impeller diameter
377 mm

Discharge diameter
150 mm

Inlet diameter
200 mm

Maximum operating speed
1780 rpm

Number of blades
3

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

Technical specification

Motor - General

Motor number N3315.185 35-35-4AA-W 130hp	**Phases** 3~	**Rated speed** 1780 rpm	**Rated power** 130 hp
ATEX approved No	**Number of poles** 4	**Rated current** 121 A	**Stator variant** 4
Frequency 60 Hz	**Rated voltage** 600 V	**Insulation class** H	**Type of Duty** S1
Version code 185			

Motor - Technical

Power factor - 1/1 Load 0.82	**Motor efficiency - 1/1 Load** 93.8 %	**Total moment of inertia** 1.13 kg m²	**Starts per hour max.** 15
Power factor - 3/4 Load 0.78	**Motor efficiency - 3/4 Load** 94.5 %	**Starting current, direct starting** 584 A	
Power factor - 1/2 Load 0.68	**Motor efficiency - 1/2 Load** 94.6 %	**Starting current, star-delta** 195 A	

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

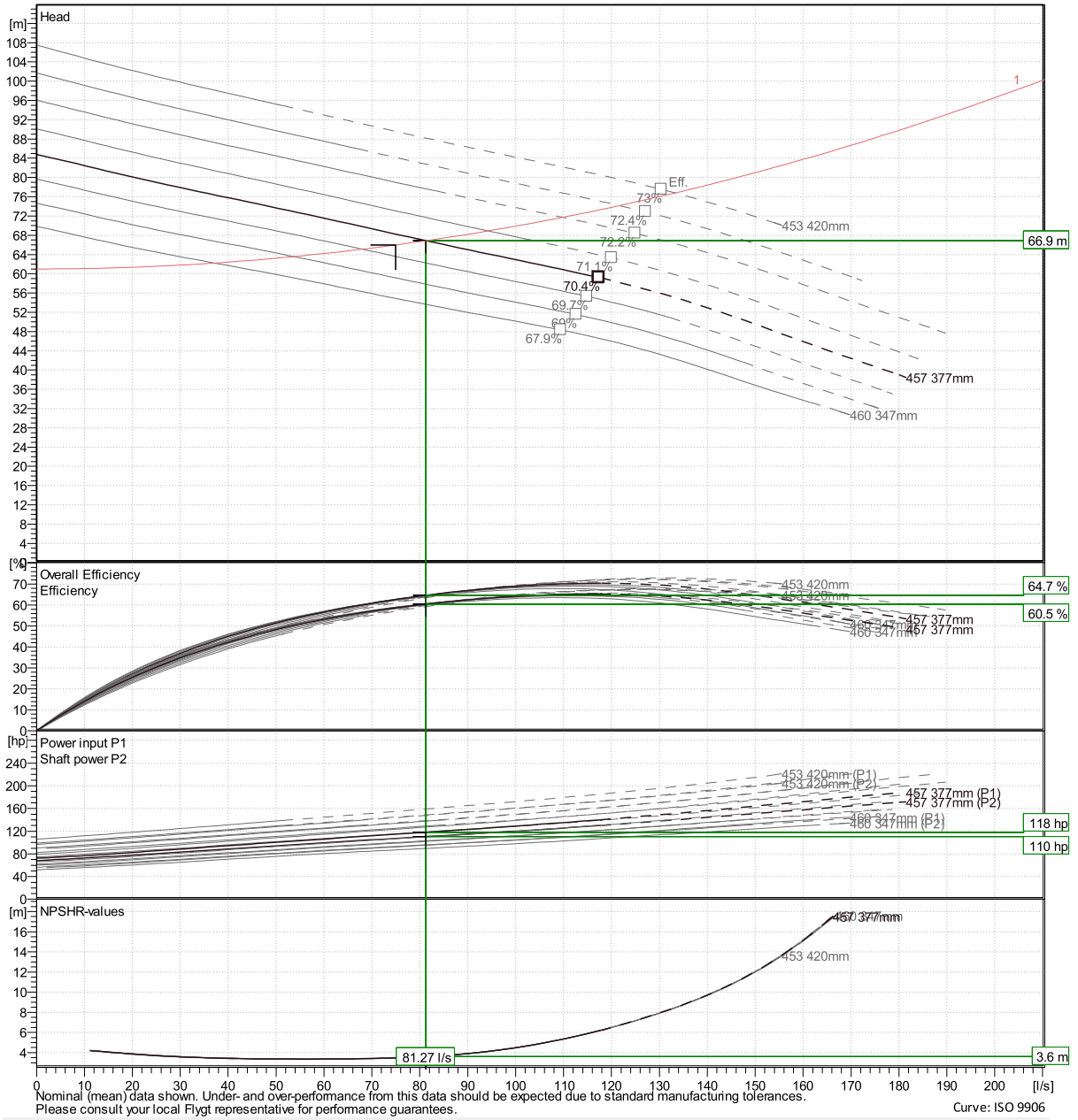
NP 3315 HT 3~ 457

Performance curve

Duty point

Flow	Head
81.3 l/s	66.9 m

Curves according to: Water, pure Water, pure [100%],4 °C,999.9 kg/m³,1.5702 mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

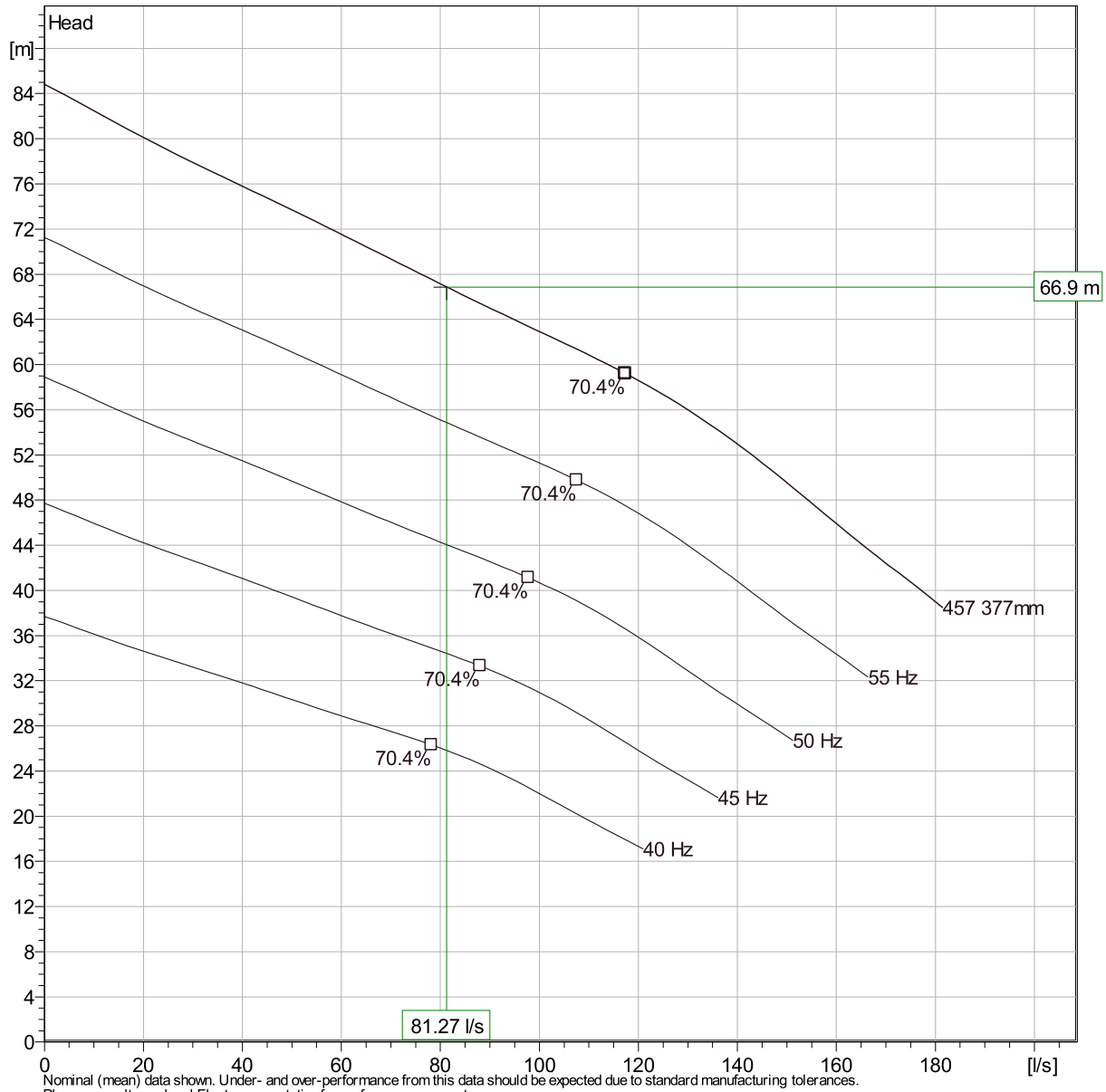
Curve: ISO 9906

Xylect-20443144		Marius Bocu		
	Created on	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

Duty Analysis

Curves according to: Water, pure [100%] ; 4°C; 999.9kg/m³; 1.569mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Operating characteristics

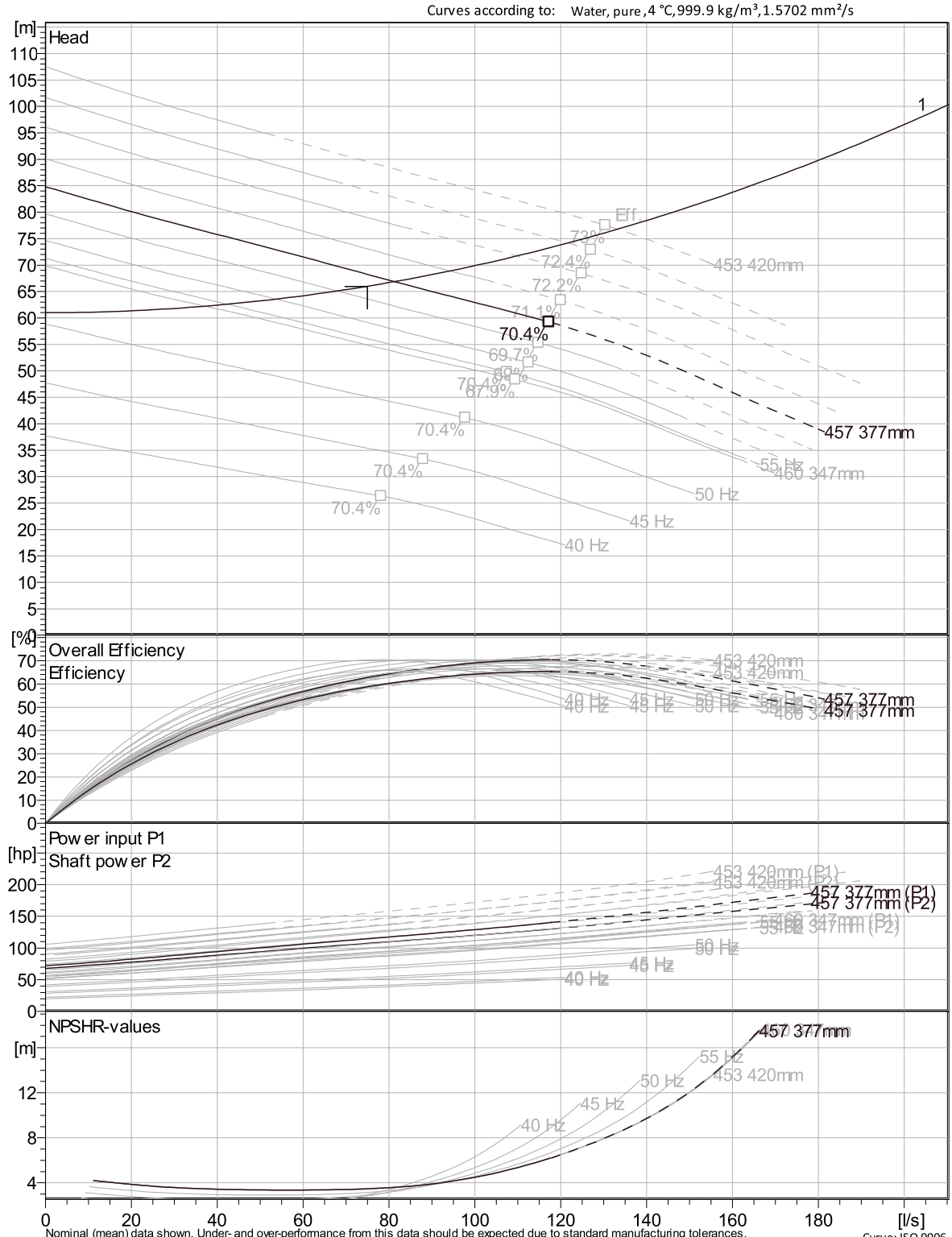
Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	l/s	m	hp	l/s	m	hp		kWh/m³	m
1	81.3	66.9	110	81.3	66.9	110	64.7 %	0.301	3.6

Project		**Created by**	Marius Bocu		
Block	Xylect-20443144	**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

VFD Curve

Curves according to: Water, pure ,4 °C,999.9 kg/m³,1.5702 mm²/s



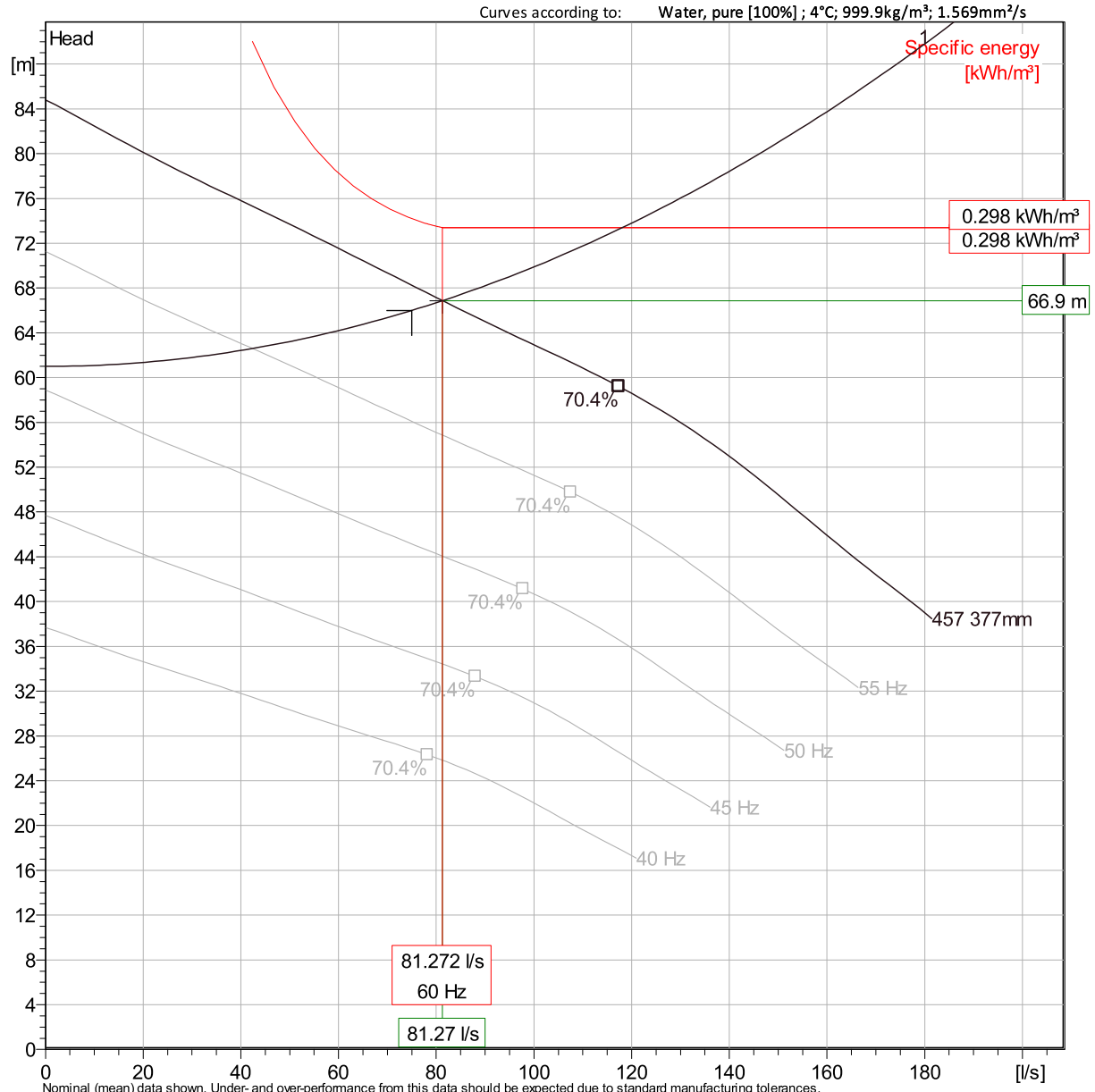
Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Curve: ISO 9906

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Operating Characteristics

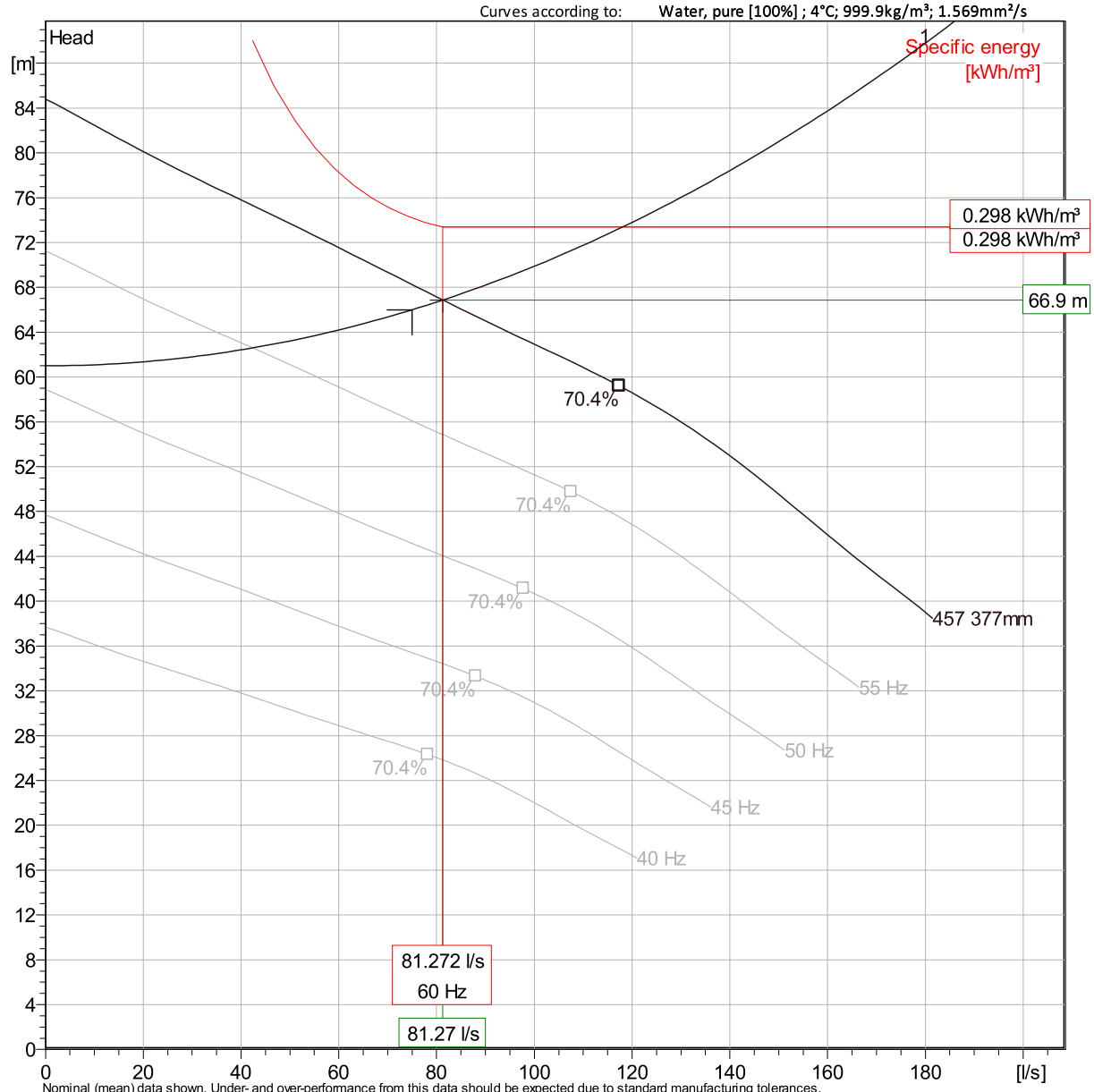
Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
1	60 Hz	81.3	66.9	110	81.3	66.9	110	64.7 %	0.301	3.6
1	55 Hz	42.4	62.6	70.9	42.4	62.6	70.9	49.2 %	0.366	2.94
1	50 Hz									
1	45 Hz									

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

VFD Analysis

Curves according to: Water, pure [100%] ; 4°C; 999.9kg/m³; 1.569mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

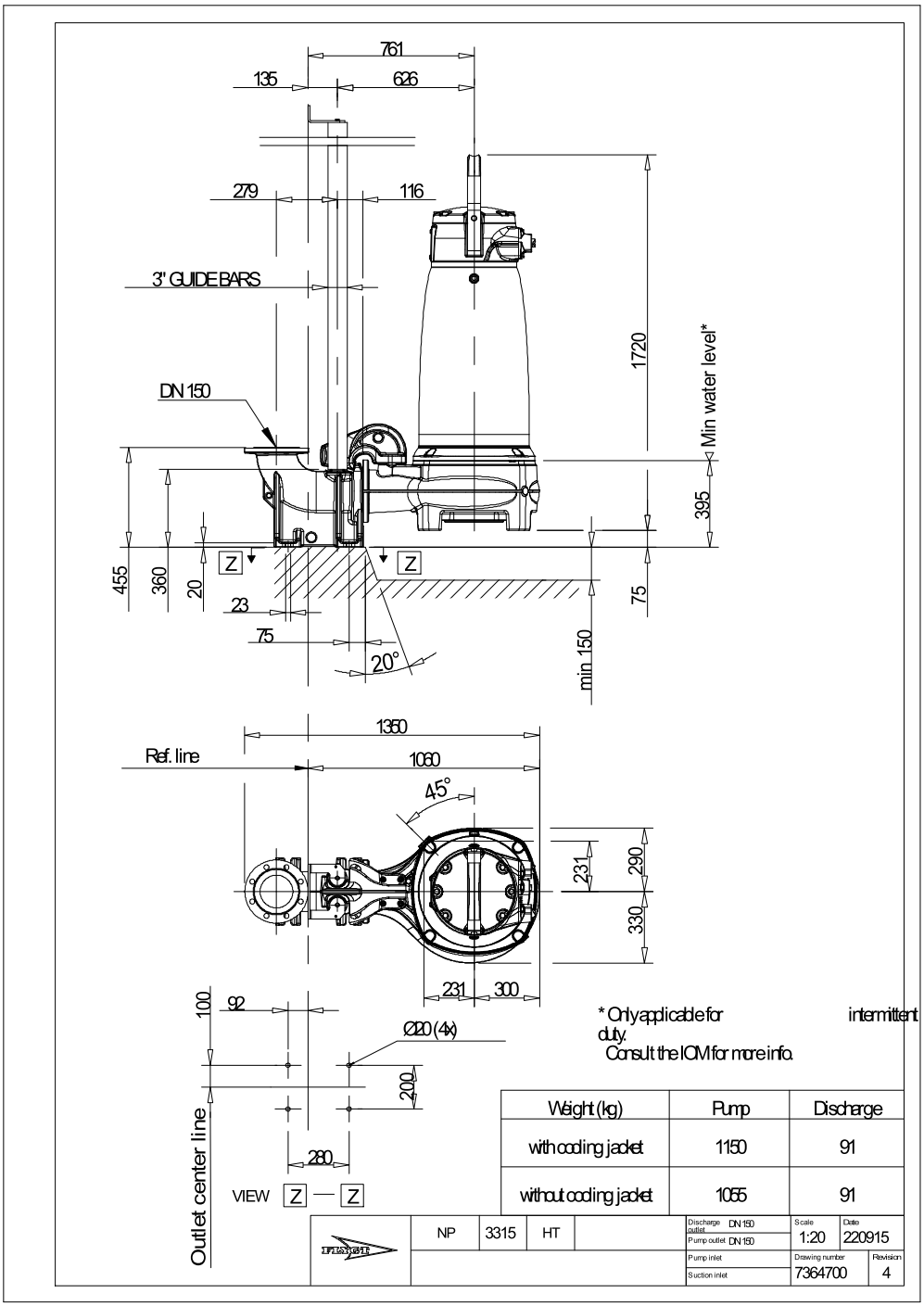
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
1	40 Hz									

Project	Xylect-20443144	**Created by**	Marius Bocu		
Block		**Created on**	8/8/2024	**Last update**	8/8/2024

NP 3315 HT 3~ 457

Dimensional drawing



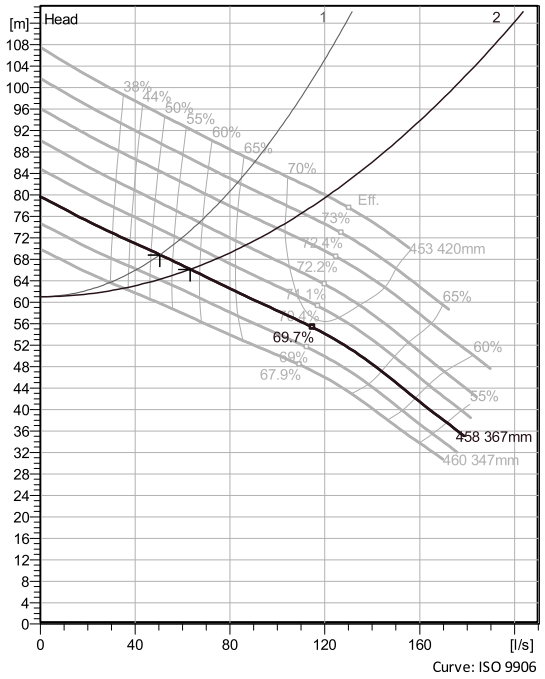
Project	Xylect-20443144	**Created by**	Marius Bocu
Block		**Created on**	8/8/2024 **Last update** 8/8/2024

NP 3315 HT 3~ 458

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%],4 °C,999.9 kg/m³,1.5702 mm²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3315.185 35-35-4AA-W 130hp

Installation type
P - Semi permanent, Wet

Impeller diameter
367 mm

Discharge diameter
150 mm

Pump information

Impeller diameter
367 mm

Discharge diameter
150 mm

Inlet diameter
200 mm

Maximum operating speed
1780 rpm

Number of blades
3

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

Technical specification

Motor - General

Motor number N3315.185 35-35-4AA-W 130hp	**Phases** 3~	**Rated speed** 1780 rpm	**Rated power** 130 hp
ATEX approved No	**Number of poles** 4	**Rated current** 121 A	**Stator variant** 4
Frequency 60 Hz	**Rated voltage** 600 V	**Insulation class** H	**Type of Duty** S1
Version code 185			

Motor - Technical

Power factor - 1/1 Load 0.82	**Motor efficiency - 1/1 Load** 93.8 %	**Total moment of inertia** 1.11 kg m²	**Starts per hour max.** 15
Power factor - 3/4 Load 0.78	**Motor efficiency - 3/4 Load** 94.5 %	**Starting current, direct starting** 584 A	
Power factor - 1/2 Load 0.68	**Motor efficiency - 1/2 Load** 94.6 %	**Starting current, star-delta** 195 A	

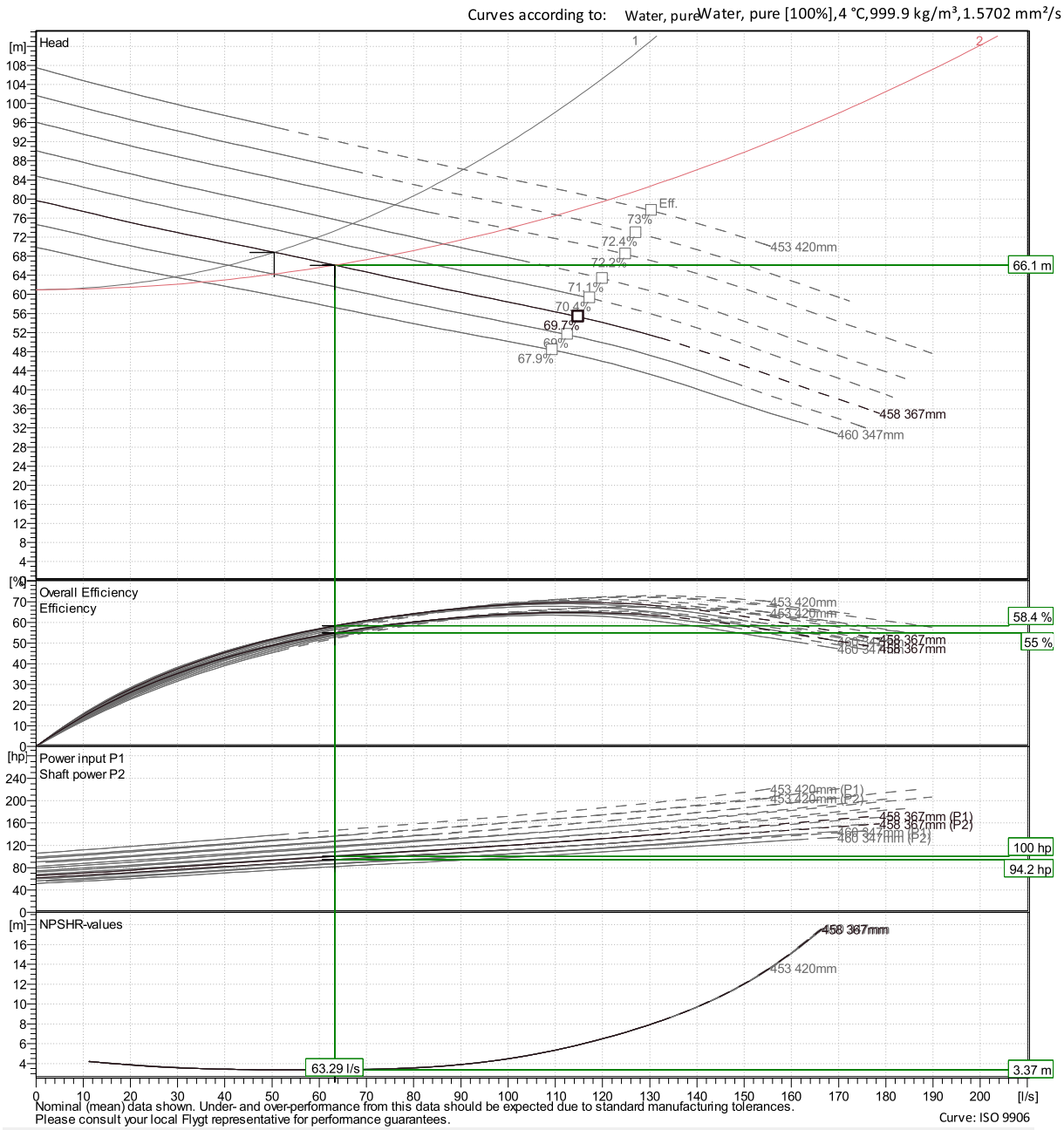
Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

Performance curve

Duty point

Flow	Head
63.3 l/s	66.1 m



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

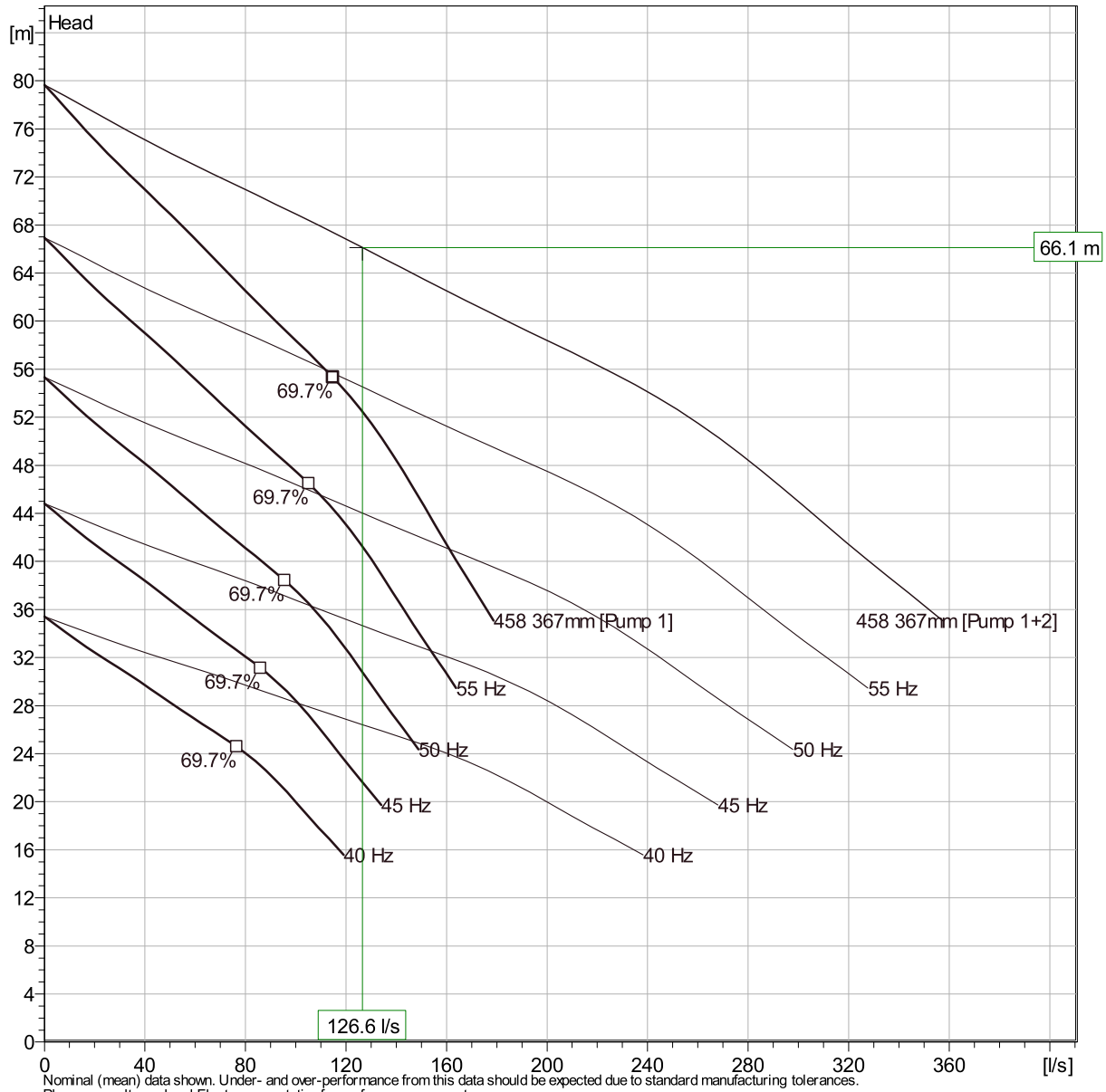
Curve: ISO 9906

Xylect-20443504	Marius Bocu		
Created on	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

Duty Analysis

Curves according to: Water, pure [100%] ; 4°C; 999.9kg/m³; 1.569mm²/s



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Please consult your local Flygt representative for performance guarantees.

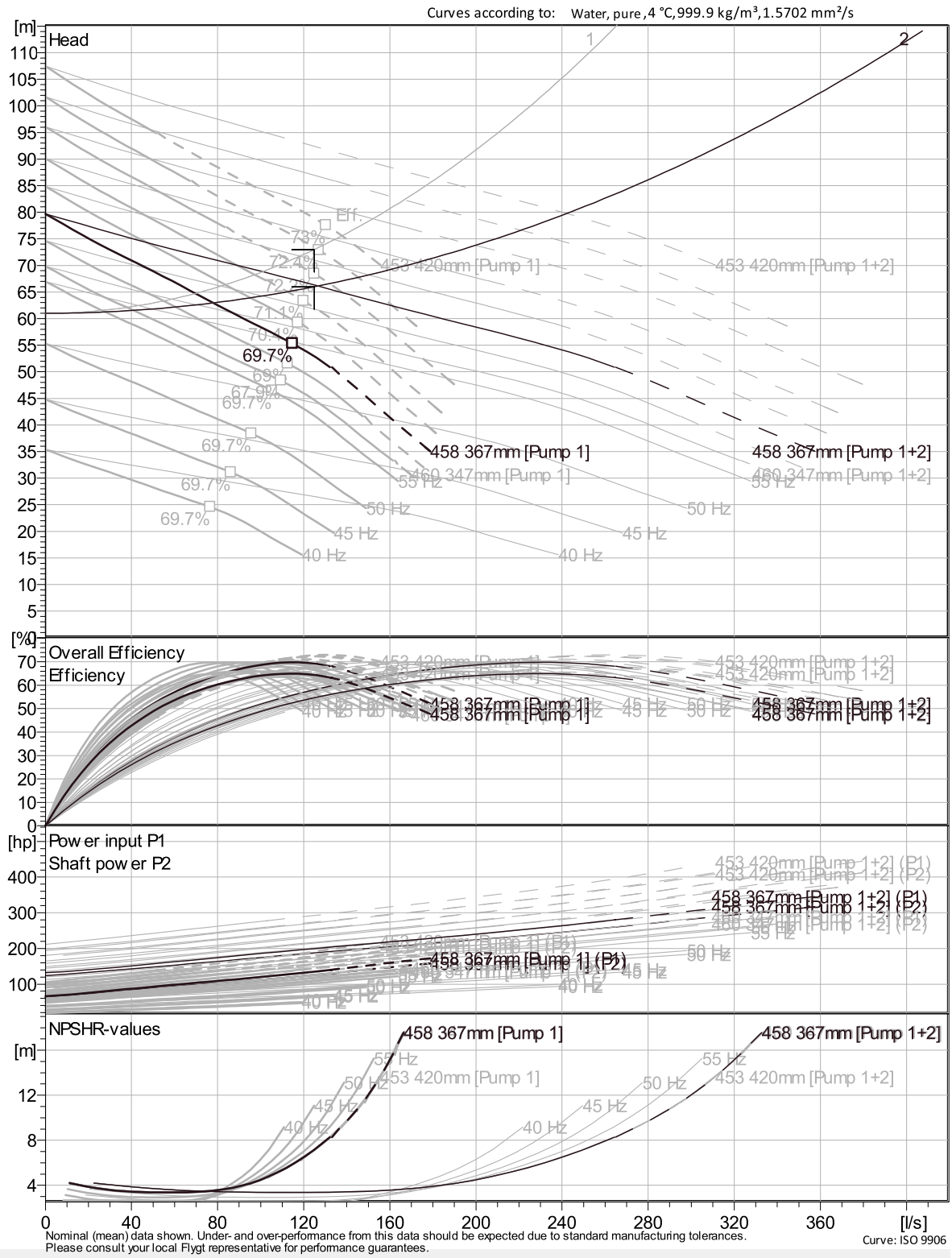
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	l/s	m	hp	l/s	m	hp		kWh/m³	m
2 / 2	63.3	66.1	94.2	127	66.1	188	58.4 %	0.328	3.37
1 / 2	78	62.9	101	78	62.9	101	63.7 %	0.287	3.53
2 / 1	50.5	68.8	87.6	101	68.8	175	52.2 %	0.382	3.37

Project		**Created by**	Marius Bocu		
Block	Xylect-20443504	**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

VFD Curve



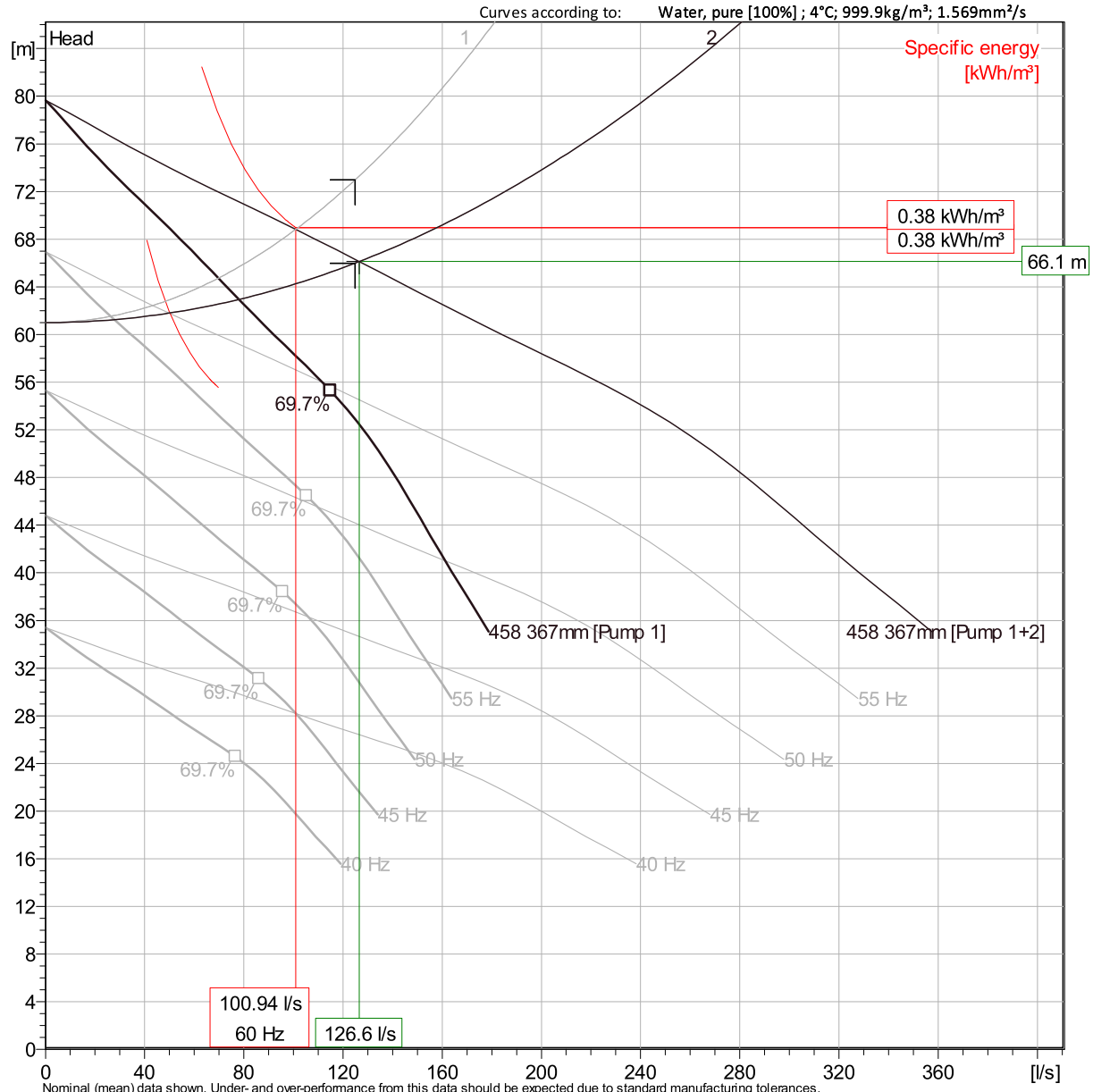
Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Curve: ISO 9906

Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

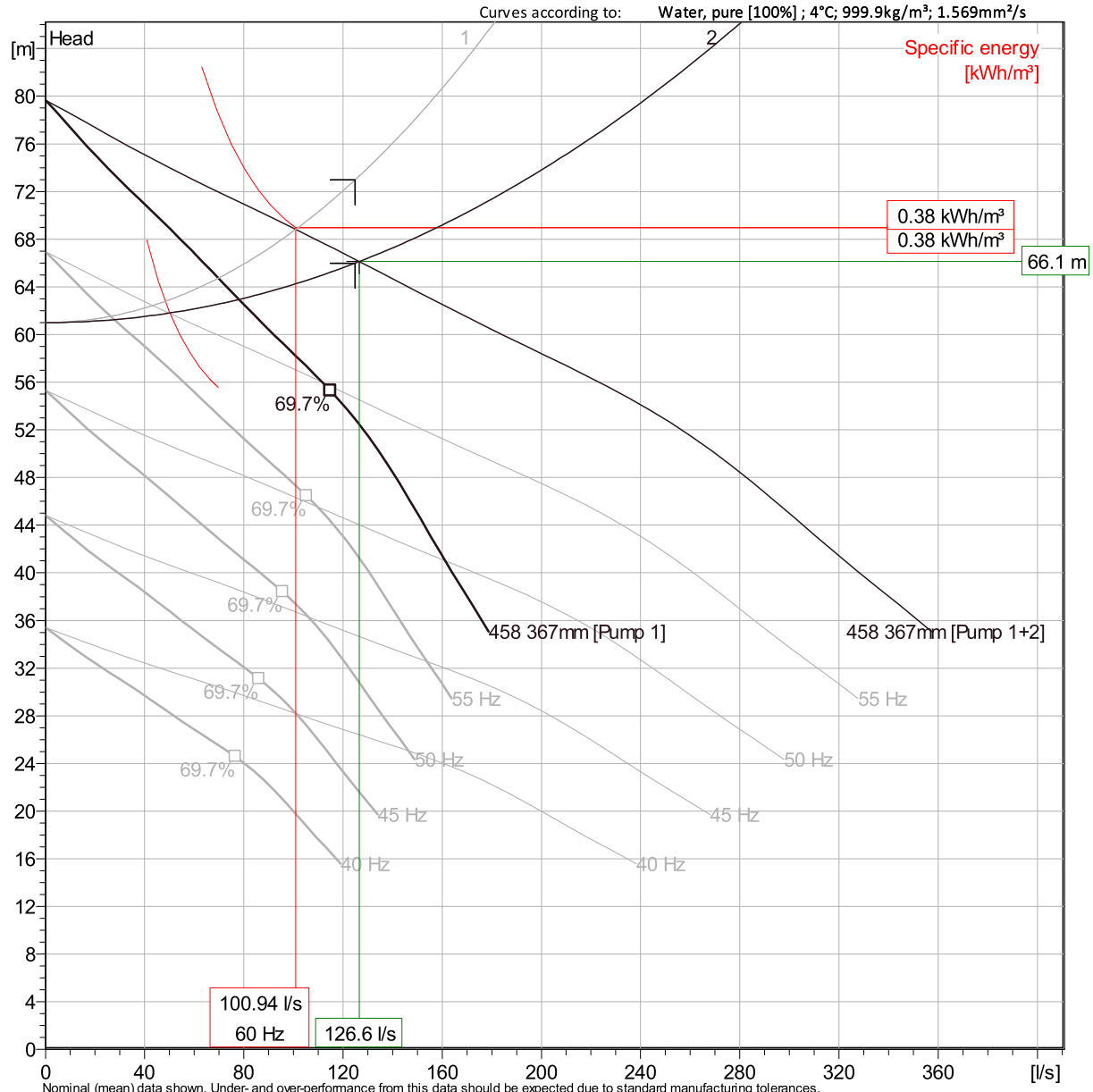
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
2 / 2	60 Hz	63.3	66.1	94.2	127	66.1	188	58.4 %	0.328	3.37
2 / 2	55 Hz	24.9	61.8	57.8	49.8	61.8	116	35 %	0.508	3.18
2 / 2	50 Hz									
2 / 2	45 Hz									

Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

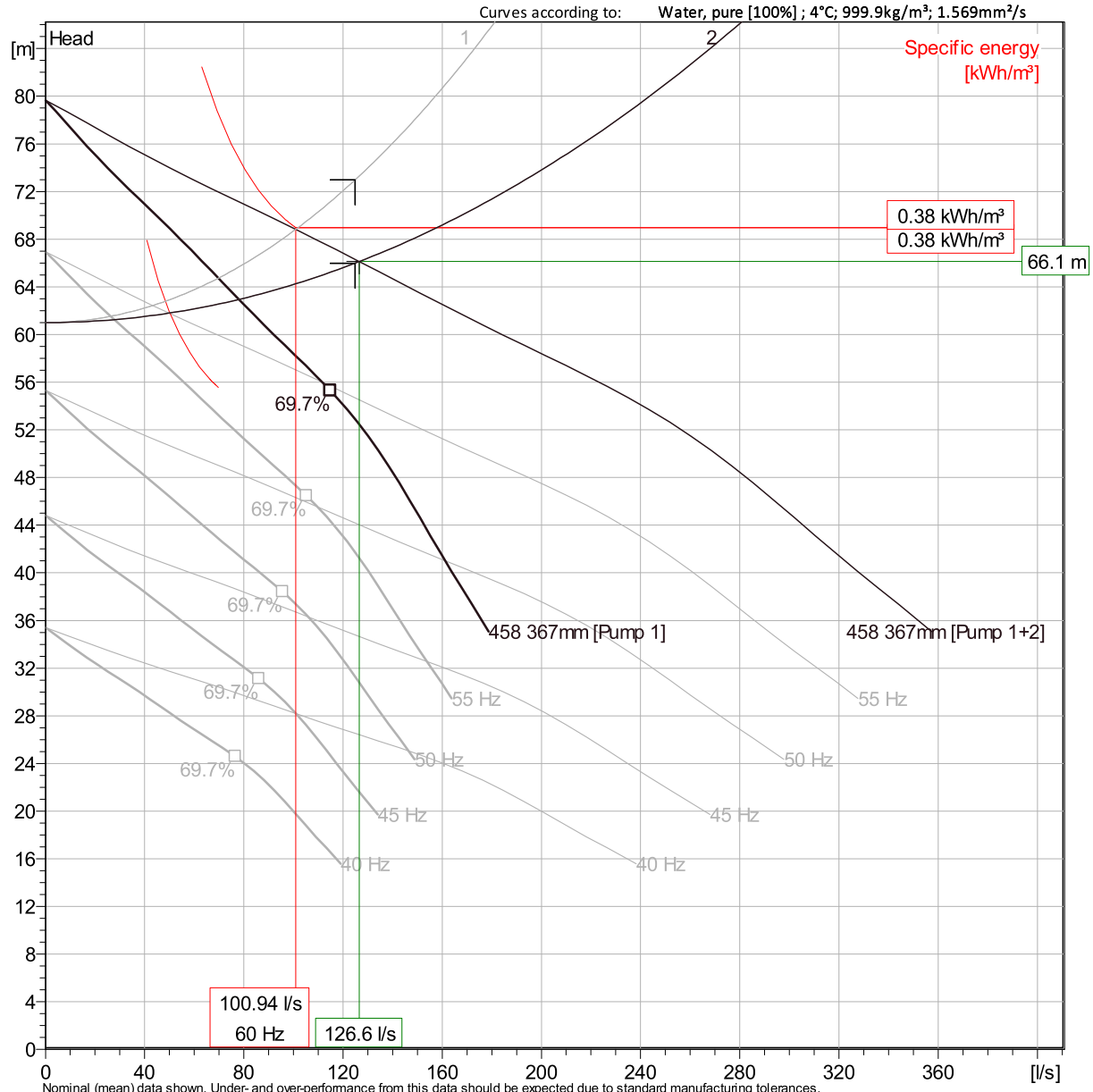
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
2 / 2	40 Hz									
1 / 2	60 Hz	78	62.9	101	78	62.9	101	63.7 %	0.287	3.53
1 / 2	55 Hz	27.8	61.2	59.1	27.8	61.2	59.1	37.9 %	0.466	3.11
1 / 2	50 Hz									

Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

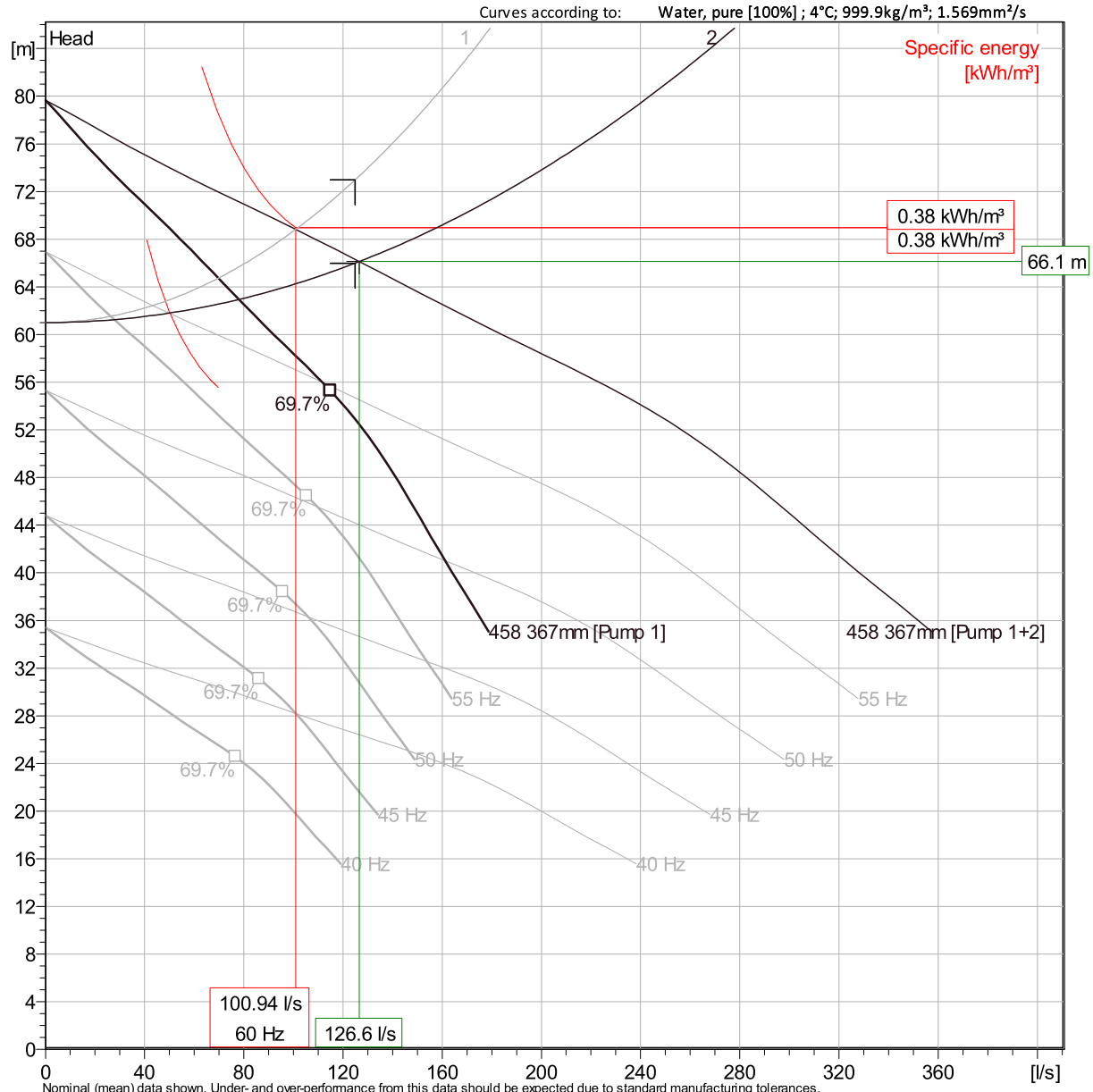
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
1 / 2	45 Hz									
1 / 2	40 Hz									
2 / 1	60 Hz	50.5	68.8	87.6	101	68.8	175	52.2 %	0.382	3.37
2 / 1	55 Hz	21.6	62.4	56.4	43.2	62.4	113	31.5 %	0.572	3.27

Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

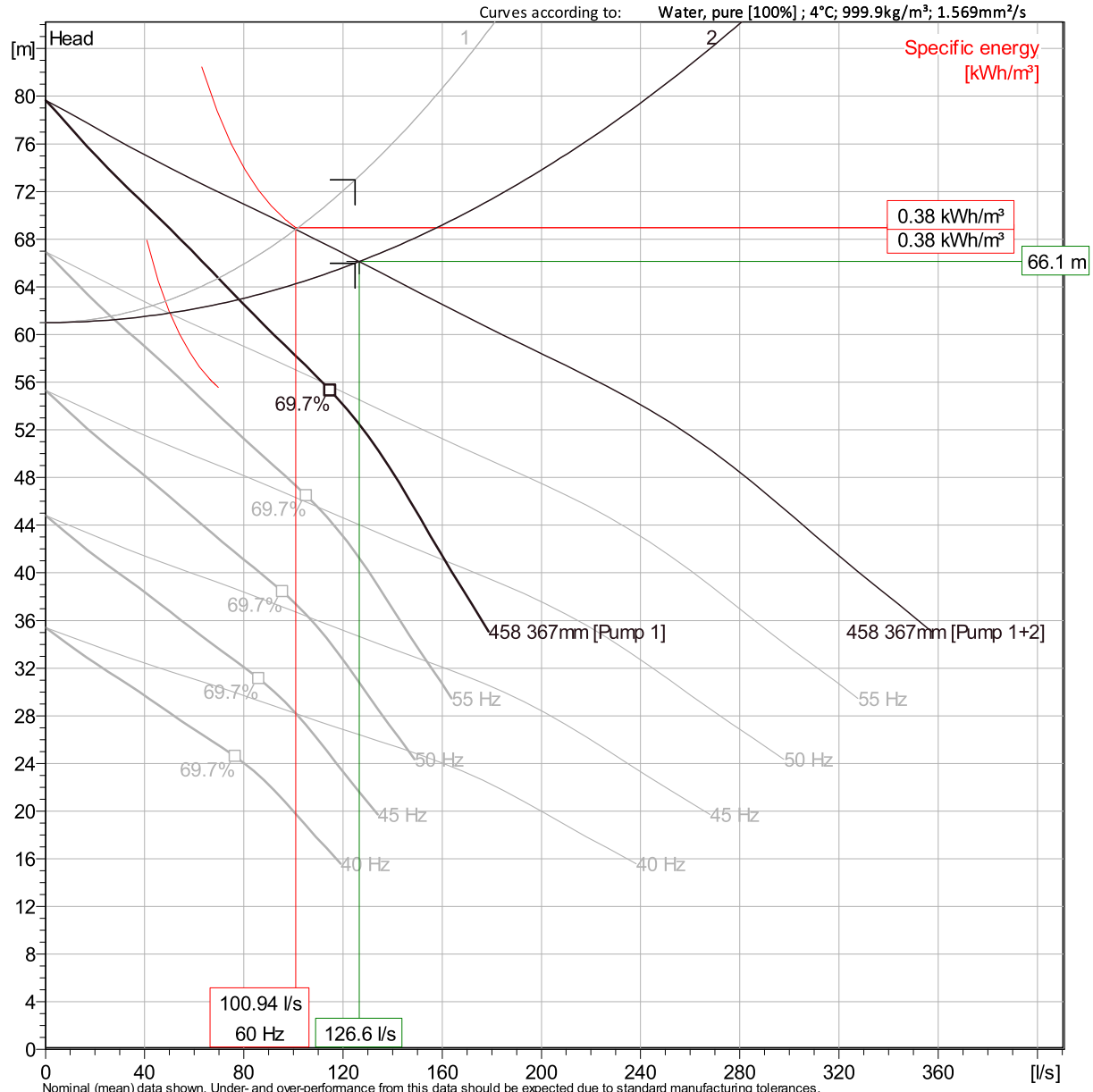
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
2 / 1	50 Hz									
2 / 1	45 Hz									
2 / 1	40 Hz									
1 / 1	60 Hz	69.7	64.7	97.4	69.7	64.7	97.4	61 %	0.308	3.41

Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
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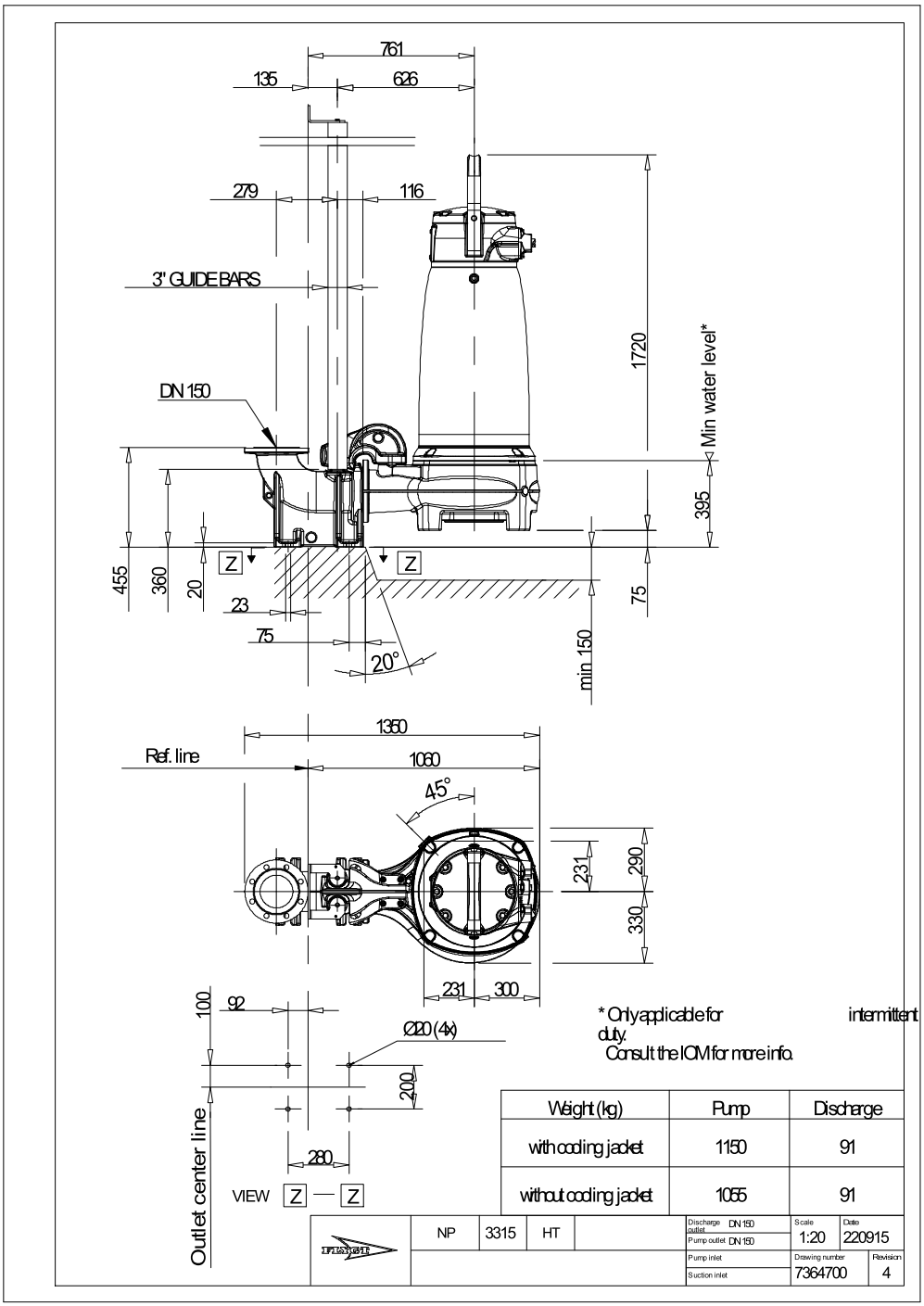
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		l/s	m	hp	l/s	m	hp		kWh/m³	m
1 / 1	55 Hz	26.3	61.5	58.4	26.3	61.5	58.4	36.4 %	0.487	3.15
1 / 1	50 Hz									
1 / 1	45 Hz									
1 / 1	40 Hz									

Project	Xylect-20443504	**Created by**	Marius Bocu		
Block		**Created on**	8/9/2024	**Last update**	8/9/2024

NP 3315 HT 3~ 458

Dimensional drawing



Project	Xylect-20443504	**Created by**	Marius Bocu
Block		**Created on**	8/9/2024 **Last update** 8/9/2024

APPENDIX E
East trunk gravity main trigger point analysis

0704.0147.01 East Trunk Residual Capacity Aug 02, 2024

Existing Peak Wet Weather Conditions

East Trunk Lift Station has 3 pumps.

Normal operation is 2 on and 1 in standby although there are times when all three pumps are operating dur to high flow.

2 pump capacity is 155 L/s.

3 pump capacity is 170 L/s.

Current peak flow into the station under PWWF conditions is estimated by the model to be 205 L/s.

Theoretically, the station is already at capacity, though it has the potential to use some of the upstream 675mm piping to the north, as peaking storage.

Gravity Sewer south of East Trunk Lift Station (Gravity Services)

There is a 250mm main south from the station that picks up Lakeshore homes. The closest service potentially has an invert of 340.96m, which is lower than the HGL seen at the station. Confirmation from RDCO indicates these homes are serviced by gravity. The system therefore has no more capacity for growth without risking a back-up in those services. We recommend verifying the elevation of the lowest gravity service and considering converting the lakeshore homes to pressure services as an interim measure to increase the available capacity prior to upgrading the trunkmain.

Gravity Sewer north of East Trunk Lift Station (Pumped Services)

There are no detailed service cards, but it appears that many of the properties on the high side of the road are connected to a parallel, smaller diameter collection sewer. It is highly likely that the parallel sewer is higher than the trunk main to avoid sewer backups. The first service north of the station is at 4058 Gellatly Road, just south of Kent Park. The approximate invert of the service is 341.62m.

The peak flow that could be added to the system to raise the HGL to 341.62m is 15.5 L/s. This equates to an equivalent population of 1,080 persons.

Conversion of Peak Flow to Equivalent Population

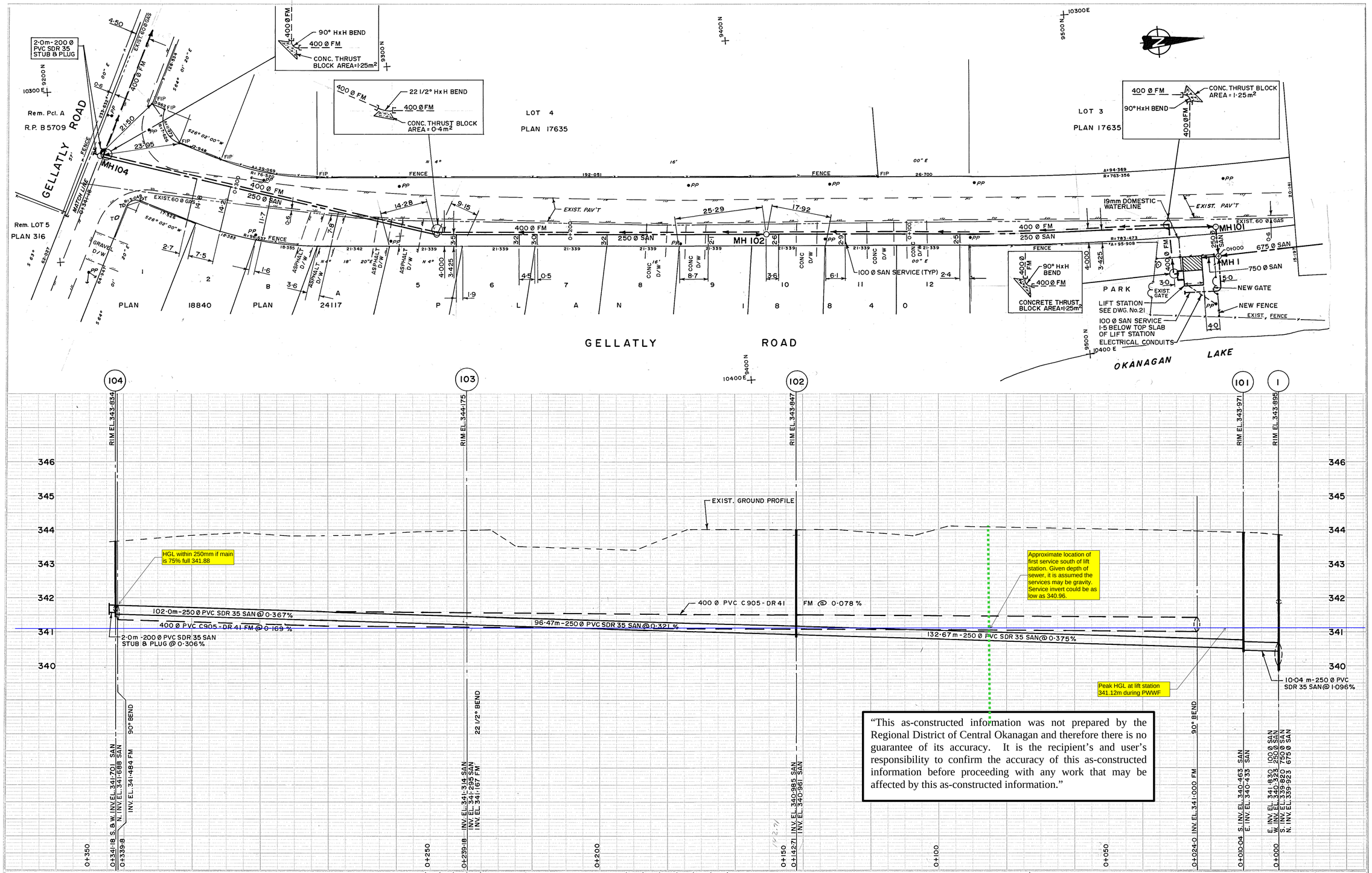
The RDCO servicing bylaw has design criteria for sewer flow calculations.

Average Dry Weather Flow (ADWF)	300 L/capita/day
Peaking factor	100% of the Harmon equation
Infiltration and Inflow	5000 L/ha/day

Density of development	50 people/ha – used the institutional/industrial value to allow for an area estimate of future residential development

The table below can be used to interpolate the equivalent population that aligns with a specific design flow from the preceding sections on residual capacity.

Equivalent Population	Approximate Area (Ha)	Peaking Factor	PDWF (L/s)	I&I (L/s)	PWWF (L/s)
1	0.02	4.473	0.016	0.001	0.017
10	0.20	4.415	0.153	0.012	0.165
20	0.40	4.380	0.304	0.023	0.327
50	1.00	4.315	0.749	0.058	0.807
62	1.24	4.295	0.925	0.072	0.996
100	2.00	4.244	1.473	0.116	1.589
200	4.00	4.148	2.881	0.231	3.112
300	6.00	4.078	4.248	0.347	4.596
400	8.00	4.022	5.586	0.463	6.049
500	10.00	3.974	6.900	0.579	7.478
600	12.00	3.932	8.192	0.694	8.886
700	14.00	3.895	9.466	0.810	10.276
800	16.00	3.860	10.723	0.926	11.649
900	18.00	3.829	11.966	1.042	13.007
1000	20.00	3.800	13.194	1.157	14.352
1200	24.00	3.748	15.615	1.389	17.004
1400	28.00	3.701	17.991	1.620	19.611
1600	32.00	3.659	20.328	1.852	22.180
1800	36.00	3.621	22.631	2.083	24.714
2000	40.00	3.586	24.901	2.315	27.216
2500	50.00	3.508	30.455	2.894	33.349
3000	60.00	3.442	35.858	3.472	39.331
3500	70.00	3.385	41.133	4.051	45.184
4000	80.00	3.333	46.296	4.630	50.926
5000	100.00	3.245	56.337	5.787	62.124



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REV	Y	M	D	REVISION DESCRIPTION	DRN	SUPV	DES	CHK	ENG
3	90	12	13	RECORD OF CONSTRUCTION	DEW		HB	WT	
2	90	04	25	FOR CONSTRUCTION	RBO		HB	WT	
1	90	03	23	FOR TENDER	DEW		HB	WT	
0	90	03	15	FOR APPROVAL	DEW		HB	WT	

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ENGINEER

REGIONAL DISTRICT OF CENTRAL OKANAGAN

EAST TRUNK SANITARY SEWER

STA. 0+000·000 TO STA. 0+341·180

SCALE	JOB No.	DRAWING No.	REV
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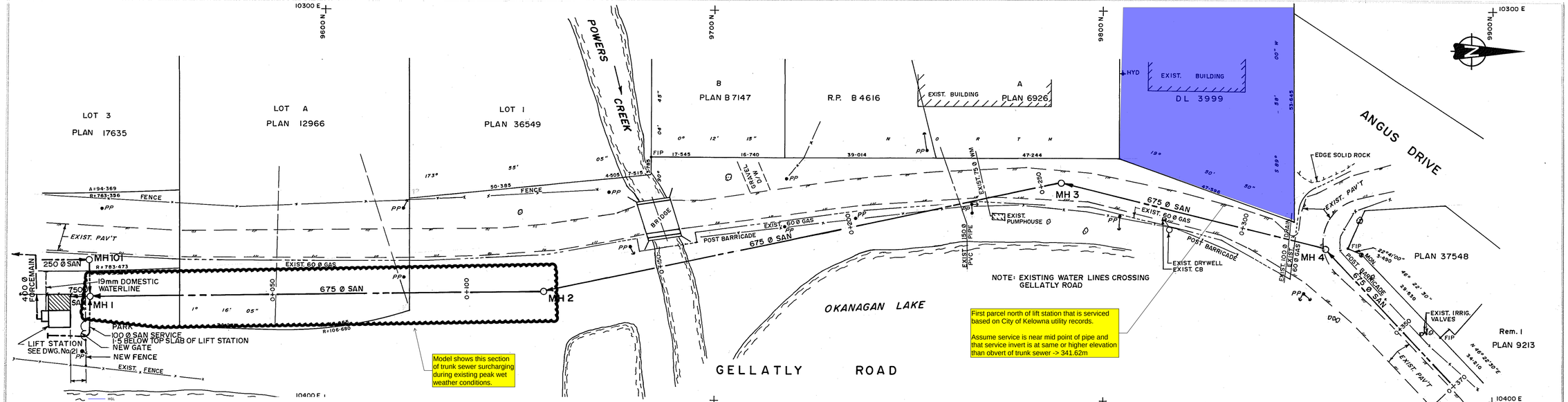

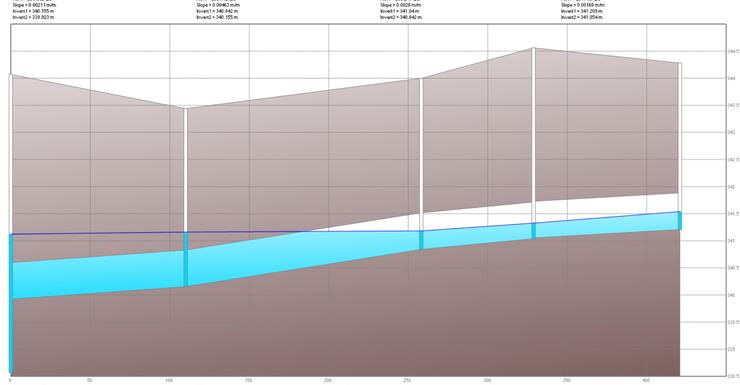

REV	Y	M	D	REVISION DESCRIPTION	DRN	SUPV	DES	CHK	ENG
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0	90	02	13	FOR APPROVAL	DEW		HB		

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REGIONAL DISTRICT OF CENTRAL OKANAGAN

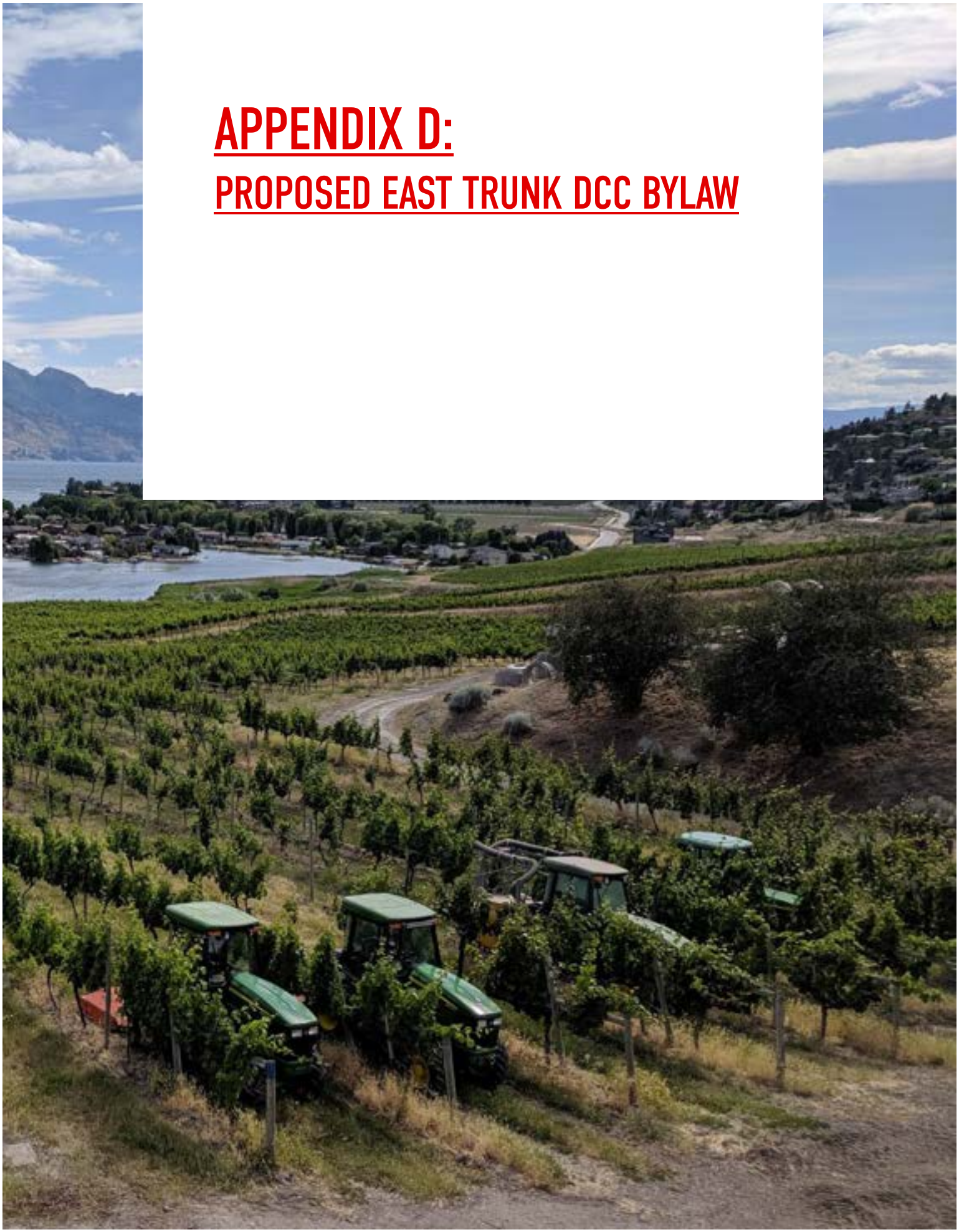
EAST TRUNK SANITARY SEWER

STA. 0+003·210 TO STA. 0+370·000

SCALE	JOB No.	DRAWING No.	REV
HORIZ. : 1:500 VERT. : 1:50	1698-024	4	3

APPENDIX D:

PROPOSED EAST TRUNK DCC BYLAW



APPENDIX E:

ENGAGEMENT MATERIALS