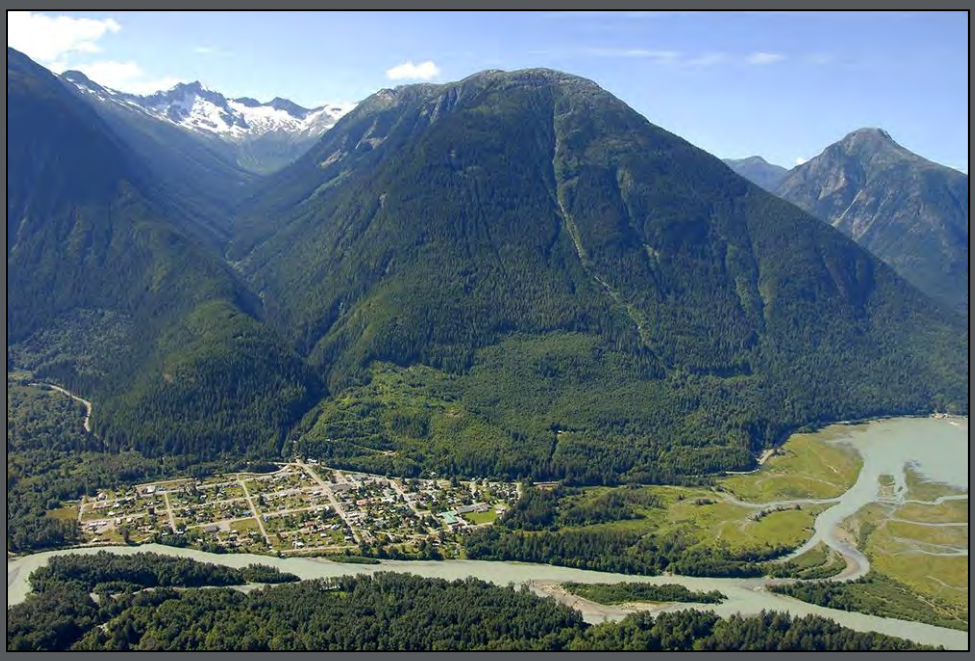
3383.0001.01

REPORT

CONCEPTUAL DESIGN REPORT
TOWNSITE WASTEWATER SERVICING

April 2013

Central Coast Regional District
Bella Coola, BC



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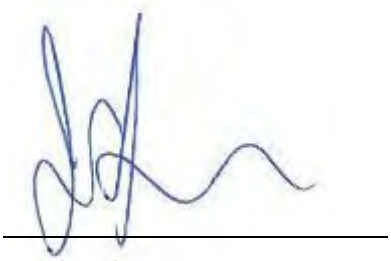

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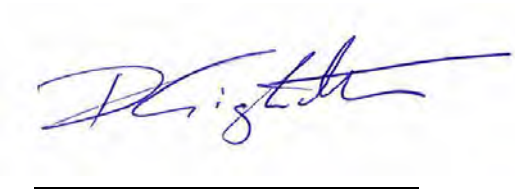

Peter Gigliotti, P.Eng.
Senior Review

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EXECUTIVE SUMMARY

The Central Coast Regional District (CCRD) unincorporated Townsite of Bella Coola is located at the head of North Bentinck Arm on the central coast of British Columbia. Existing homes and buildings within Townsite are serviced by onsite septic systems consisting of septic tanks and leaching fields. The CCRD and the health authorities have concerns regarding the long-term sustainability of the onsite systems and the risks to groundwater and river water quality. The Bella Coola General Hospital is already suffering from effluent disposal problems and looking for solutions. These concerns led to commissioning of this assignment.

The neighbouring Nuxalk Nation community of Main Village is planning to construct a communal wastewater system with a centralized treatment and disposal facility. Discussions are underway with the Central Coast Regional District and Bella Coola General Hospital regarding the potential to collaborate on a regional wastewater system.

Two wastewater servicing concepts are considered: a collection system to service all of Townsite and a much smaller system solely to service the Hospital.

The Townsite system consists of a network of gravity collection sewers, a centralized pump station, and a forcemain to convey sewage to the Nuxalk Nation system at Burke Avenue. The Class ‘C’ capital cost estimate for the Townsite system is $2,800,000.

If the Nuxalk Nation system proceeds in the short-term, it may be possible to service the Hospital with a single dedicated service. The Hospital system would consist of an onsite pump station and a forcemain to the Nuxalk Nation system. The Class ‘C’ capital cost estimate for the Hospital system is $230,000. If there are delays to implementation of the Nuxalk Nation system, the Hospital should investigate means of upgrading their onsite facility and / or leasing additional land for effluent application.

The report also briefly examines the required revenues to fund the sewer system capital costs and the annual operation and maintenance costs. The analysis is based on senior government funding assistance for the capital project. The typical formula provides 1/3 funding by the federal government, 1/3 by the provincial government and 1/3 by the local government. The local government portion is funded by the property owners within the specified service area through property taxes. Operation and maintenance costs, as well as a negotiated share of the Nuxalk Nation system operating costs are typically funded by user fees. The preliminary approximation of the impact to a typical single family dwelling is $50 per month excluding applicable costs to Nuxalk Nation.

Both the Townsite and Hospital servicing concepts are dependent upon the implementation of the Nuxalk Nation communal wastewater system. In that regard, continued collaboration with the Nuxalk Nation is strongly encouraged.

1.0 INTRODUCTION

This report was commissioned by the Central Coast Regional District (CCRD) on February 19, 2013.

1.1 Subject and Purpose

This report presents a conceptual design for a community wastewater servicing scheme for the CCRD Bella Coola Townsite. The purpose of the assignment is to determine the means and cost of implementing a sewage collection system to service Townsite that would ultimately be connected to a larger regional wastewater system.

1.2 Location

The unincorporated Townsite of Bella Coola is located at the head of North Bentinck Arm on the central coast of British Columbia, approximately 450 km west of Williams Lake. The community is accessible via Highway #20 from the east, as well as by Pacific Coastal Airlines and BC Ferries. The core area of Townsite is located immediately west of the Nuxalk Nation settlement of Main Village on Bella Coola IR #1 as shown below.

1.3 Background

In July 2011, Urban Systems Ltd. was retained by the Nuxalk Nation to complete a feasibility study to evaluate communal wastewater servicing options for Nuxalk's Main Village and identify a recommended alternative. This project was funded by Aboriginal Affairs and Northern Development Canada (AANDC), with the support of Health Canada, in response to ongoing environmental and public health concerns with the failing onsite septic systems. Challenges with the individual septic systems include aging systems, small lot sizes, a high groundwater table, and highly permeable soils. Accordingly, a communal sewage collection system with centralized treatment and disposal is being proposed.

Recognizing that the neighbouring community of Townsite may be experiencing similar challenges with individual septic systems, Nuxalk Nation engaged in discussions with the CCRD and Bella Coola General Hospital regarding the potential to collaborate on a regional wastewater system.

1.4 Project Rationale

The objective of this project is to develop a conceptual design for a sewage collection system to service Townsite that would form a component of a joint regional wastewater system with the Nuxalk Nation.

1.5 References

For more information regarding the previous study completed for the Nuxalk Nation, refer to:

- *Nuxalk Nation, Feasibility Study Report, Main Village Community Wastewater System, CPMS #08333;* January 2013, Urban Systems Ltd.

Through the course of the Nuxalk Nation study, several joint meetings were held with representatives from the Nuxalk Nation, CCRD, Bella Coola General Hospital, AANDC, and Urban Systems. The scope of the Nuxalk Nation study included provisions for determining the additional costs of central sewage facilities if sewage flow from Townsite were ever connected. Accordingly, that report contains estimates of the additional cost to upsize the central pumping and transmission system and treatment and disposal system to accommodate flows from Townsite. However, the scope did not include the development of cost estimates to retrofit a domestic sewage collection system in Townsite. This is the objective of this assignment.

2.0 EXISTING SEPTIC SYSTEMS

The existing homes, buildings, and businesses within Townsite are all serviced by onsite septic systems. These systems are understood to consist of a septic tank for solids removal followed by effluent disposal to ground via leaching field or seepage pit. Although no formal investigation has been completed, there have been anecdotal reports of septic system failures over recent years.

The Bella Coola General Hospital is serviced by an onsite packaged wastewater treatment plant and leaching field. It is reported that the leaching field has reached its operating capacity and there is no space for expansion. This is a concern for the Hospital since the undersized and saturated leaching field is preventing expansion of the hospital facilities and could also become a health hazard.

In general, it appears that the existing onsite septic systems in Townsite may not be effective over the long-term.

3.0 DESIGN CRITERIA

The anticipated sewage flows from Townsite were assessed as part of the Nuxalk Nation study. The sections below provide a brief overview of the applicable design criteria for the Townsite collection system.

3.1 Population Projections

The current population of Townsite including residential and commercial properties is estimated to be the equivalent of 250 people. Despite declining population trends over recent years, a projected growth rate of 1% was assumed over the next 20 years. Although somewhat conservative, this growth rate is considered appropriate for estimating future wastewater flows. The projected 2023 and 2033 populations for Townsite are summarized in the table below.

Table 3.1: Population Projections

	Townsite
Average Annual Growth Rate	1.0%
2013 Population	250
2023 Population	276
2033 Population	305

3.2 Wastewater Design Flows

Projected wastewater flows were derived using the AANDC *Design Guidelines for Wastewater Systems, British Columbia Region, Third Edition*. The estimated design flows are based on a theoretical average dry weather flow (ADWF) of 320 L/c/d plus an allowance for institutional / commercial / industrial (ICI) flow and inflow and infiltration (I&I). The projected design flows for Townsite are summarized in the table below.

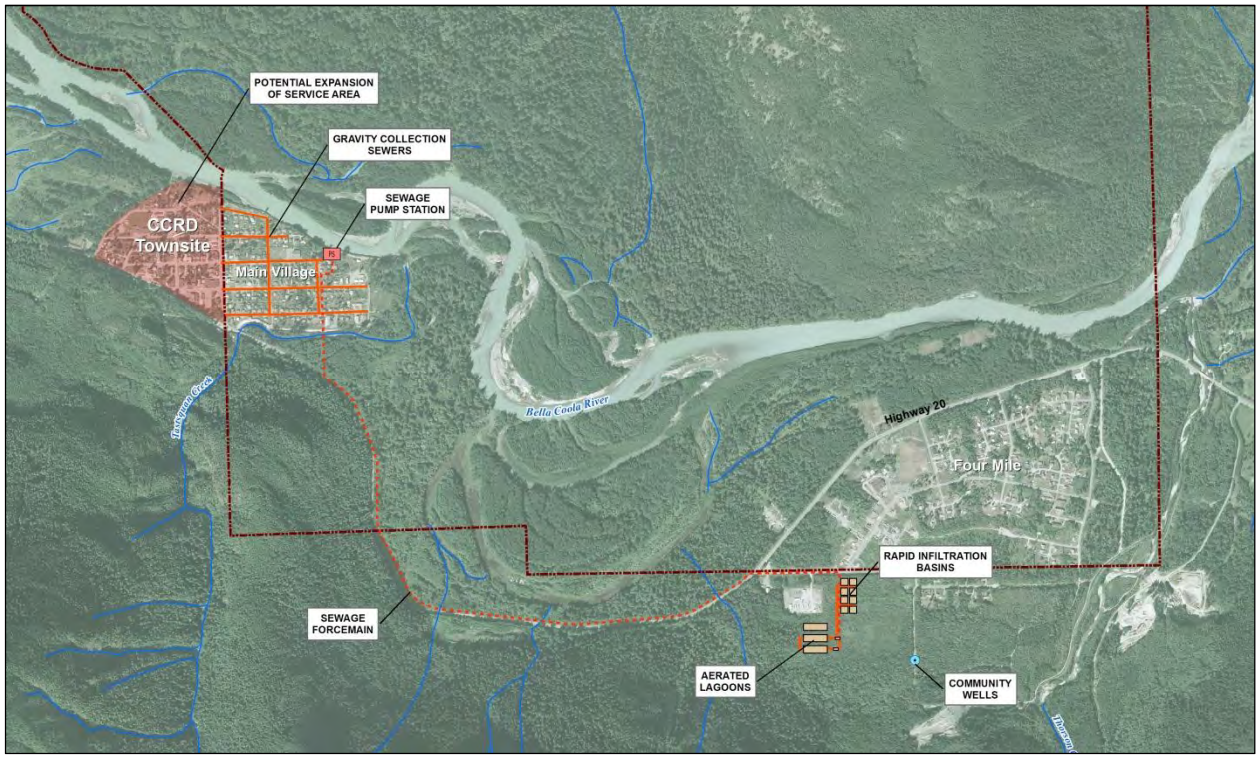
Table 3.2: Wastewater Design Flows

Year	ADWF (m^3/day)	ICI (m^3/day)	I&I (m^3/day)	PWWF (m^3/day)
2013	80	-	22	142
2023	88	-	22	154
2033	98	-	22	169

Other methods for estimating sewage design flows (such as the BC Ministry of Health Sewerage System Standard Practice Manual and comparison with potable water consumption data) yield similar results to those derived using the AANDC design guidelines.

4.0 CENTRALIZED TREATMENT FACILITY

It is envisioned that the Townsite collection system would connect to the larger communal wastewater system proposed by Nuxalk Nation. Below is a depiction of the centralized treatment and re-entry components proposed for the Nuxalk Nation sewage system.



4.1 Location of Treatment Facilities

The proposed treatment and re-entry site is located just south of Tonquin Road adjacent to the BC Hydro power generating station. This site is currently designated as Provincial Crown Land and is zoned as residential according to the *Central Coast Regional District Zoning Bylaw*. The Official Community Plan (OCP) designation is rural. In order to construct the proposed work, Crown Land Tenure must be obtained from the Province and the land parcel may need to be re-zoned by the CCRD.

4.2 Treatment Process

The proposed treatment process consists of a conventional aerated lagoon facility modified to include a moving bed biofilm reactor and sodium hypochlorite disinfection. The treated effluent would then be applied to ground via a series of rapid infiltration basins.

5.0 COLLECTION AND PUMPING SYSTEMS

This section provides a general overview of collection and pumping systems that are relevant to this assignment.

Gravity Sewage Collection

This system consists of a piped service connection to each home and building. There are no septic tanks as the service connections or "sewer laterals" are all directly connected to a sewer pipe fronting the lot. The lateral pipe typically has a clean out located just outside of the home or building. The network of sewer pipes gather wastewater from each lot and convey it by gravity to a centralized pump station or treatment facility. This type of collection system is well suited for areas with moderate topography so that the sewer pipes can be installed at an appropriate slope without being buried overly deep.

Gravity Effluent Collection

This type is very similar to a gravity sewage collection system. The primary difference is that each lot retains the septic tank for solids removal. The sewer laterals only convey the effluent (water portion of the sewage) into the network of gravity sewers. The solids are pumped out of each septic tank and disposed of accordingly. This type of system is generally used when the centralized treatment or re-entry system is only capable of accepting effluent and not suited for treating municipal sewage. The property owner is faced with the cost of regular septic tank pump-outs.

Low Pressure Forcemain

For this type of system each lot is essentially equipped with its own small pump station. Each sewer lateral flows to a small sump where the sewage collects. Once the sump is near full, a small sewage grinder pump is triggered to convey the sewage from the sump to a forcemain pipe that fronts the lot. The collective efforts of the various grinder pumps convey the sewage along the forcemain. The forcemain could terminate at a centralized treatment facility or could discharge into a gravity sanitary sewer. This type of collection system is often used to service areas that are very flat in topography. It is also commonly used to service a low section of a larger collection area that is suitable for gravity mains.

Pump Stations

There are several styles and configurations of sewage pump stations. The two most commonly used are:

- Submersible pumps located in a wet well with a weatherproof kiosk for electrics and controls.
- Above-ground self-priming pumps located in a building above a wet well. Electrics and controls are in the same building.

In either configuration, a standby power generator is required in the event of a power failure. Both configurations avoid confined space entry. The facility should have provisions for flow recording, telemetry for remote alarms and Supervisory Control and Data Acquisition (SCADA), and odour control.

6.0 SERVICING CONCEPTS

Two (2) potential servicing concepts were considered as part of this assignment:

1. A collection system to service all of the CCRD Townsite.
2. A system solely to service the Bella Coola General Hospital.

6.1 Townsite System

Townsite is well suited for a gravity sewage collection system for the following reasons:

- The proposed treatment facility will be capable of accepting sewage (as opposed to effluent only); therefore, there is no need for the existing septic tanks to remain in service.
- The topography generally descends in elevation towards the northwest providing a natural low point near the base of Clayton Street.
- Gravity sewage collection systems are most favourable from an operation and maintenance perspective.

The following sections provide additional discussion regarding various aspects of this servicing concept. A conceptual servicing plan is provided in **Appendix A**.

6.1.1 Sewer Pipe Alignments

Available record drawings indicate that the water distribution mains throughout Townsite generally follow the laneways at the rear of the lots. Considering the narrow laneway width (6 m), potential conflicts with the existing watermain, and constricted working space, it is recommended that the proposed sewer pipes follow the road rights-of-way. Below are a few guidelines used in selecting sewer pipe alignments:

- Sewers must be separated horizontally from watermains by a minimum of 3 metres.
- Sewer manholes should be a maximum of 150 metres apart and utilized at all changes of direction.
- Sewer pipes should be a minimum of 200 mm diameter and services should be a minimum of 100 mm diameter.
- Sewer gradients should be a minimum of 0.5% for 200 mm diameter pipes and 2.0% for 100 mm diameter services to maintain self-cleansing velocities.
- While every effort can be made to minimize removal of asphalt surfaces, it is recognized that much of the surface will be lost with the effect of tracked excavators, sidecasting of material, and installation of service lines across the roadway. The cost estimates have been based on restoration of half of the roadway width.

The road rights-of-way throughout Townsite are under the jurisdiction of the Ministry of Transportation and Infrastructure (MOTI). Accordingly, a Utility Permit will be required to construct the proposed sanitary sewers along the streets. Discussions with the MOTI are recommended to confirm applicable regulations, specifications, and approvals. This may have an impact on the capital cost projections.

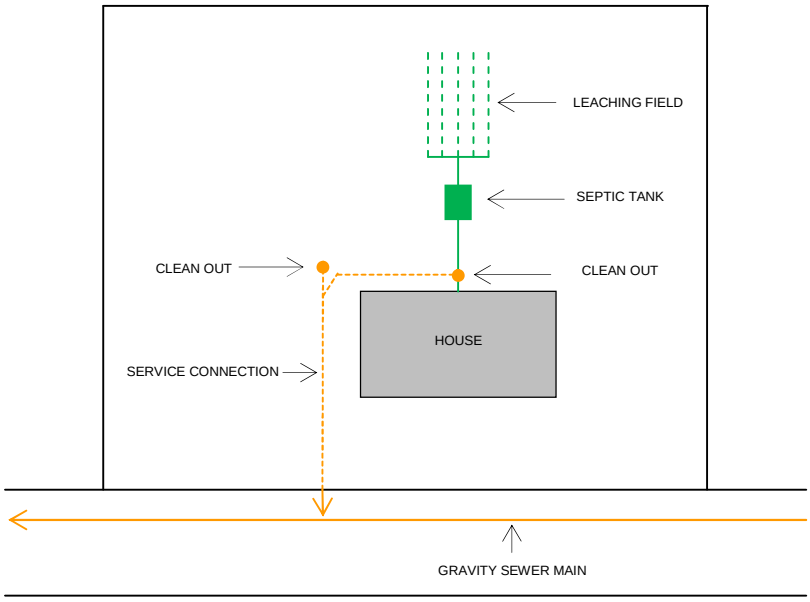
6.1.2 Service Connections

Typically, the municipality is responsible for installing service connection pipes up to the property line of each lot. The property owner is then responsible for piping on the private side and decommissioning the existing septic tank and field. The decommissioning process generally involves pumping out the septic tank, removing the lid, and filling the tank with clean sand or gravel.

Factors that will impact the depth and location of the service connection (and in turn the sewer main) include:

- The elevation of the lowest occupied floor of the home or building.
- The need to connect basement washrooms (in some cases a sump pump is required to accommodate basements).
- The location of the existing septic tank.

The most common method of connecting a lot is to tie into the existing outlet pipe from the home between the clean out and septic tank and re-direct flow to the new sewer main. This is illustrated in the schematic below.



Note that the above schematic depicts the scenario where the existing septic system is in the back yard while the sewer main is at the front of the lot. This means that the service connection needs to run around the house (unless the internal plumbing can be reversed to the front of the building).

6.1.3 Pump Station

Although yet to be confirmed by topographic survey, the natural low point of Townsite appears to be at the northwest end of Clayton Street. This general area is the logical location for a centralized sewage

pump station since the gravity sewers could converge to this site. The pump station would include the following components:

- A wet well chamber to accept incoming sewage.
- Solids harvesting sewage pumps to convey the sewage along the forcemain.
- An electric / control kiosk (which should be raised above the known flood risk elevation).
- A method of monitoring and recording flows.
- A backup generator and automatic transfer switch.
- Security fencing.

Overall, the facility would require an area of approximately 10 m x 10 m.

6.1.4 Forcemain Alignment

A forcemain is required to convey sewage from the pump station to the Nuxalk Nation collection system. The route chosen follows Clayton Street to Burke Avenue. The forcemain pipe would parallel the gravity sewer on Clayton Street to minimize road restoration. The discharge of the forcemain is to a proposed manhole on Burke Avenue.

6.2 Hospital System

This servicing concept involves connecting only the Hospital to the Nuxalk Nation wastewater system, regardless of whether or not the remainder of Townsite ever connects. To achieve this, an onsite pump station would be required at the Hospital that would convey sewage to Burke Avenue via a forcemain. A conceptual servicing plan illustrating this is provided in **Appendix A**.

6.2.1 Onsite Collection

Currently, sewage from the Hospital is conveyed to the “trash tank” of the treatment facility by a combination of pumping and gravity flow. The north doctor’s residence is also connected to this same trash tank while the south doctor’s residence has a dedicated septic tank and leaching field. The treatment facility (including the trash tank) is located adjacent to Elcho Street between the east driveway and the north doctor’s residence.

6.2.2 Pump Station

The northeast portion of the lot is considered a favourable location for the pump station because:

- Sewage from the Hospital and north doctor’s residence already flows to this location.
- The south doctor’s residence could be easily piped in.
- This appears to be a natural low point in the property.

A packaged duplex grinder pump assembly would be suitable to accommodate the expected flows from the Hospital and two doctor’s residences. These systems are usually pre-assembled and ready for installation with connections to power and plumbing.

Standby power is recommended for the pump station since the wet well chamber could fill up and cause a sewage backup during an extended power outage. It is understood that there is sufficient standby power available from the Hospital's current backup power supply.

As an alternative to the above, it may be possible to utilize components of the existing wastewater treatment facility for the wet well. The existing pumps do not appear large enough to convey sewage to Burke Avenue, but the pump chamber could serve as a wet well. In this case, a retrofit would be required to change out the pumps to larger ones. At this time, the cost estimates have been based on the construction of a new pump station assembly. It is, however, recommended that an onsite assessment be undertaken to ascertain the potential to retrofit existing tanks for use as a pump station.

6.2.3 Forcemain

A forcemain is required to convey sewage from the pump station to the Nuxalk Nation collection system. The most direct route is to follow Elcho Street and Clayton Street east to Burke Avenue.

Note that the portion along Clayton Street is consistent with the proposed forcemain route for the Townsite concept. A 50 mm diameter forcemain is adequate for the Hospital if grinder pumps are used. A 100 mm diameter forcemain is required if solids handling pumps are used. Installation of a 100 mm diameter forcemain that could serve as a future forcemain for the central Townsite pump station would avoid the "throw away" aspect of this scheme when / if a community wide system is implemented. The additional cost associated with upsizing the pipe would be minimal as the excavation, backfilling, etc. would be consistent for a 50 mm or 100 mm diameter pipe. For this scenario, the CCRD and Hospital could share the costs of the common forcemain.

A Utility Permit would be required from the MOTI to construct the proposed forcemain within the road right-of-way.

6.2.4 Temporary vs Permanent Infrastructure

This servicing concept could serve as a permanent connection for the Hospital in the event that the larger Townsite collection system is never constructed.

However if the Townsite system is constructed, the Hospital could be connected to a gravity sewer fronting the lot. The onsite pump station might no longer be required. On the other hand, if the community sewer is not deep enough to pick up the Hospital service by gravity, the onsite pump station will continue to be used.

6.2.5 Hospital Options

The Hospital has indicated that there are significant concerns with respect to onsite sewage disposal. The leaching field is saturated and presents a potential health risk hazard.

Pumping to a community sewer system would relieve the problem. However, the timing of the Nuxalk Nation community sewer system is uncertain and will depend, to a large extent, on the availability of funding from AANDC. Other options may need to be considered if the Nuxalk Nation sewer system is delayed. There are a number of systems currently available that may be able to remedy the leaching field

shortcomings. These include, raised mounds with specially designed infiltration conduits and engineered granular material, effluent re-circulation systems, and a host of other techniques. Ultimately, the objective is to connect to a piped community sewer system, but some short-term measures may be necessary if the Nuxalk Nation system is delayed.

7.0 CLASS 'C' COST ESTIMATES

7.1 Capital Costs

The table below summarizes the Class 'C' capital cost estimates for each servicing concept. The Class 'C' estimates are based on conceptual information and represent a 25% contingency level. A detailed breakdown of these cost estimates is included in **Appendix B**.

Table 7.1: Capital Cost Estimates

Servicing Concept	Estimated Capital Cost
Townsite System	$2,798,500
Hospital System	$230,800

The cost estimates are in 2013 Canadian dollars and exclude taxes. The capital cost estimates represent construction costs, but also include allowances for contingency and engineering.

7.2 Operation and Maintenance

7.2.1 MTSA

The operation and maintenance (O&M) of the centralized treatment and disposal facility would be undertaken by the Nuxalk Nation. Since these facilities (as well as portions of the collection and pumping systems) would be accommodating additional flow from the Townsite and / or Hospital, compensation would be required for a portion of the O&M costs. A Municipal Type Servicing Agreement (MTSA) is typically implemented for these types of arrangements. An example is the bulk potable water servicing agreement between the CCRD and Nuxalk Nation.

Wastewater MTSAs can be structured in a number of ways, such as:

- Payment based on the total flow conveyed from the Townsite pump station.
- Payment based on a percentage of the potable water use (generally 80%).
- A flat fee for each designated type of service connection (residential, commercial, etc.).
- A lump sum annual or monthly fee.

Further discussions between the CCRD, Hospital, and Nuxalk Nation would be required to determine the preferred form of servicing agreement.

7.2.2 O&M of Townsite System

The CCRD would be responsible for the operation and maintenance of the Townsite collection system, pump station, and forcemain. In terms of complexity, the system would almost certainly be classified as a

Small Wastewater System as defined by the Environmental Operators Certification Program (EOCP). It would be recommended that the CCRD employ a trained and certified primary and backup operator for the wastewater system.

The estimated annual operation and maintenance costs are expected to be in the order of $30,000 per year.

An alternative to the above would be for the CCRD to retain the Nuxalk Nation certified operators for the O&M of the Townsite portion of the wastewater system. In this case, the specifics of the O&M arrangement could be incorporated into the MTSA.

Since the Hospital currently operates and maintains a small pump station, treatment facility, and leaching field, it is assumed that they would have the capacity to operate and maintain the pumping system discussed in this report for the Hospital servicing concept.

7.3 User Fees

Analysis of user fees and revenue generation associated with sewer servicing are beyond the scope of this assignment. It is understood that the CCRD will internally assess cost recovery mechanisms.

Typically, debenture payments are recovered through property taxes, and operating costs are recovered through user fees. Sometimes a community-wide “environmental levy” is also assessed on each property to make up any shortfall.

This is an early stage to attempt to develop models for the required revenue to fund the system. However, an approximation of the impact to the average property owner can be made using some assumptions, including:

- The project capital cost may be eligible for senior government funding at the 2/3 level.
- The CCRD borrowing power may allow for financing of 1/3 of the capital cost through the Municipal Finance Authority. This is assumed as 25 years at the borrowing rate of 3% per annum compound interest. This would require the approval of the property owners in the Townsite area by referendum vote.
- Debt financing may be recovered through property taxes and formation of a specified service area.
- Annual O&M costs may be recovered through user fees.

A summary of the potential costs to the average property owner is provided as follows:

- Estimated Annual Increase to Property Taxes

  = Total Estimated Capital Cost x 1/3 x Capital Recovery Factor / 124 Lots

  = $2,798,500 x 1/3 x 0.0574 / 124

  = $432

- Estimated Annual User Fee

  = Estimated Annual O&M Cost / 124 Lots

  = $24,000 / 124

  = $194

- MTSA fees to be negotiated with Nuxalk Nation may also result in a user cost to property owners.

Property owners will also be responsible for the construction of the service connection within their property and decommissioning their septic tank. These costs could range from $4,000 to $7,000 depending on the location of the house and septic tank, soil conditions, existing landscaping, and water table. Property owners will also be subject to a one-time connection charge to the municipal sewer pipe. The amount is yet to be determined, but generally ranges from $800 to $1,500.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Both the Townsite and Hospital servicing concepts are dependent upon the construction of the Nuxalk Nation communal wastewater system. In that regard, continued support and collaboration with the Nuxalk Nation is strongly encouraged.

8.1.1 Townsite

In order to proceed with the Townsite collection system, the following activities are recommended (in no particular order):

- Discuss the format of an MTSA with the Nuxalk Nation.
- Confirm / establish the service area for the CCRD system.
- Identify funding and cost recovery mechanisms.
- Complete a topographic survey to determine ground profiles, ground floor and basement elevations, locations of existing septic tanks and leaching fields, and other relevant data.
- Complete a geotechnical investigation to determine subsurface conditions along the pipe alignments and at the pump station location.
- Initiate discussions with the MOTI regarding proposed works within the road rights-of-way.
- Assess potential environmental considerations.
- Secure the land required for the pump station.

8.1.2 Hospital

Recommended next steps specific to servicing the Hospital include:

- Discuss the format of a servicing agreement with the Nuxalk Nation.
- Discuss cost sharing options with the CCRD for the Clayton Street portion of the forcemain.
- Assess the ability to use existing infrastructure as the wet well chamber.
- Initiate discussions with the MOTI regarding proposed works within the road rights-of-way.
- Confirm pump performance requirements.
- Secure funding.

APPENDIX A
SERVICING CONCEPT PLANS

Photo Source: www.ccrd-bc.ca

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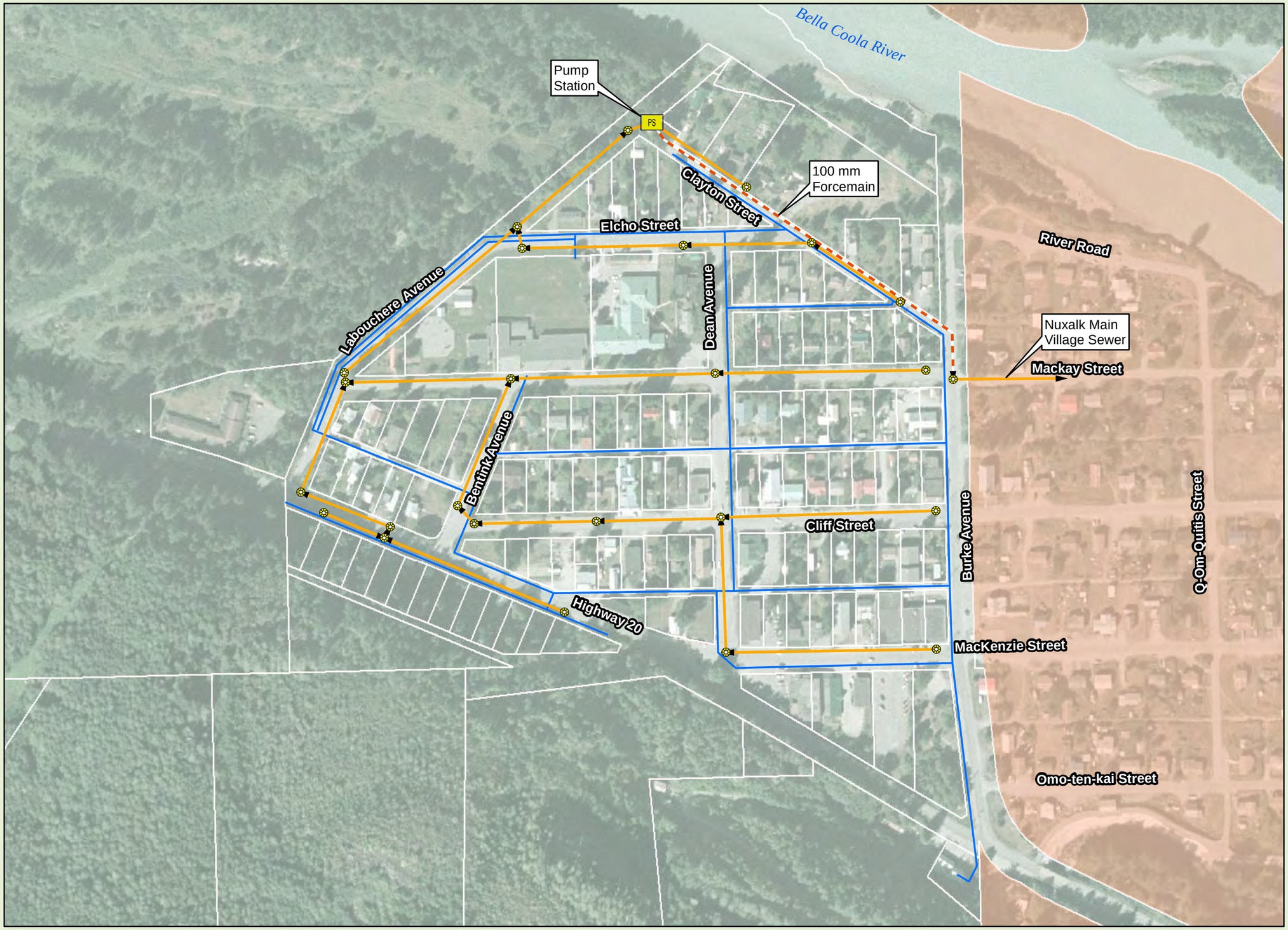

CENTRAL COAST REGIONAL DISTRICT

CLEAN AIR CLEAR WATER

Legend

- Sanitary Manhole
- PS — Pump Station
- Sanitary Sewer (200mm)
- Forcemain
- Watermain (existing)
- FN Lands

Bella Coola Townsite Sanitary Sewer Concept

Townsite System

URBAN systems

0 50 100 200
Metres

Figure 1

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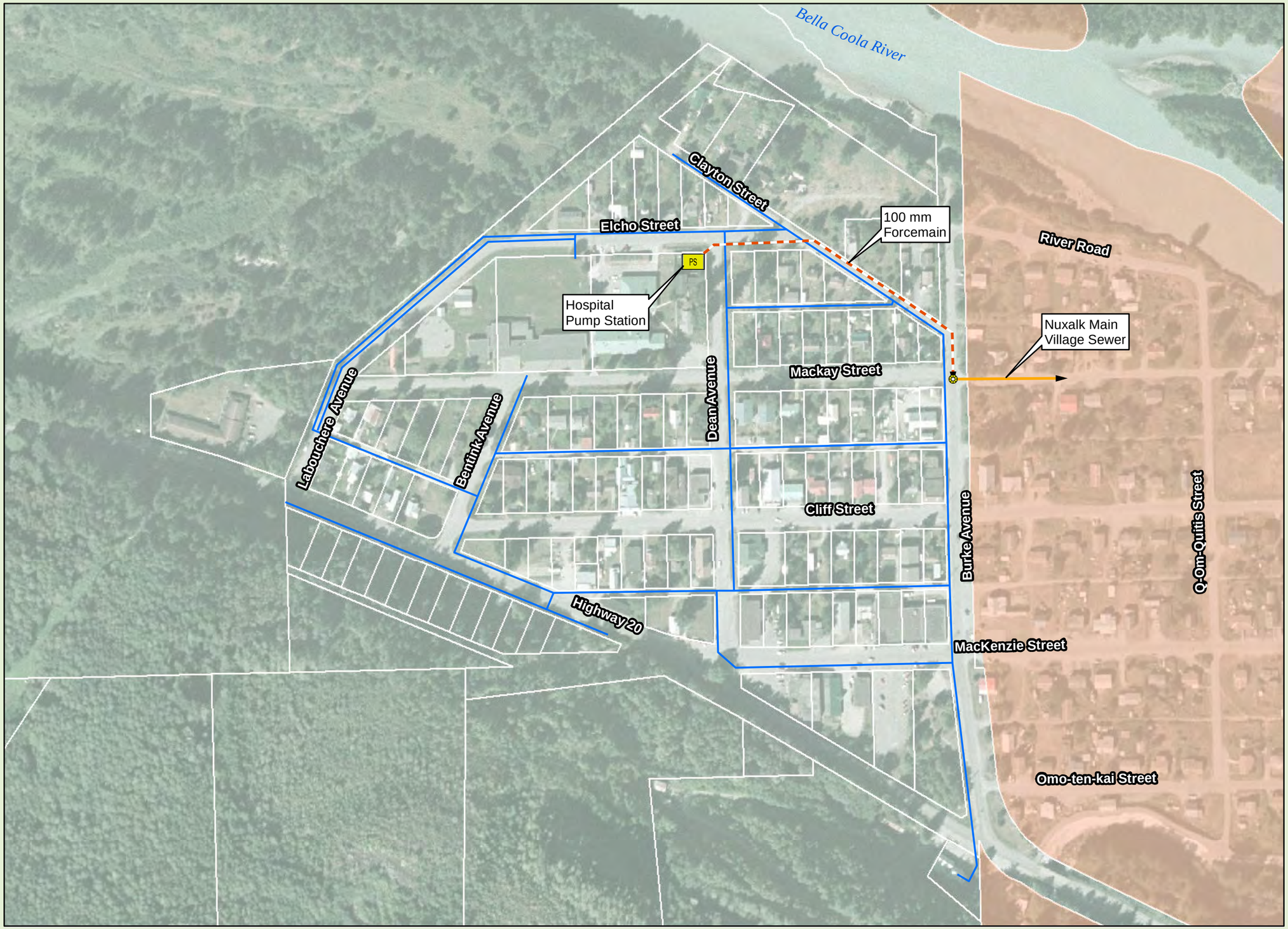

CENTRAL COAST REGIONAL DISTRICT

Legend

- Sanitary Manhole
- PS — Pump Station
- Sanitary Sewer
- Forcemain
- Watermain (existing)
- FN Lands

Bella Coola Townsite Sanitary Sewer Concept

Hospital System

Figure 2

URBAN systems

0 50 100 200
Metres

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APPENDIX B
CLASS 'C' COST ESTIMATES

Photo Source: www.ccrd-bc.ca

URBAN systems

CENTRAL COAST REGIONAL DISTRICT
TOWNSITE WASTEWATER SERVICING
TOWNSITE
CLASS 'C' CAPITAL COST ESTIMATE

Item	Description	Unit	Quantity	Unit Price	Amount
1. General Requirements					
1.1	Contractor Insurance & Bonding	L.S.	1	$ 20,000	$ 20,000
1.2	Mobilization & Demobilization	L.S.	1	$ 50,000	$ 50,000
1.3	Erosion & Sediment Control	L.S.	1	$ 10,000	$ 10,000
1.4	Survey & Construction Layout	L.S.	1	$ 10,000	$ 10,000
				Subtotal:	***$ 90,000***
2. Collection System					
2.1	200 mm Ø PVC Gravity Sanitary Sewer	m	2,360	$ 300	$ 708,000
2.2	1050 mm Ø Manhole	ea.	25	$ 7,000	$ 175,000
2.3	100 mm Ø PVC Sanitary Service to PL c/w Clean Out	ea.	124	$ 2,500	$ 310,000
2.4	Road Restoration	m^2	9,500	$ 48	$ 456,000
2.5	Dewatering Allowance	L.S.	1	$ 20,000	$ 20,000
2.6	Rock Blasting Allowance	m^3	200	$ 100	$ 20,000
				Subtotal:	***$ 1,689,000***
3. Sewage Pump Station					
3.1	Civil and Structural Works	L.S.	1	$ 40,000	$ 40,000
3.2	Mechanical Works	L.S.	1	$ 25,000	$ 25,000
3.3	Electrical Works	L.S.	1	$ 50,000	$ 50,000
3.4	Security Fencing	m	40	$ 50	$ 2,000
3.5	Standby Power	L.S.	1	$ 20,000	$ 20,000
				Subtotal:	***$ 137,000***
4. Forcemain					
4.1	100 mm Ø HDPE Sanitary Forcemain	m	330	$ 250	$ 82,500
4.2	Road Restoration (included with gravity sewer)	m^2	0	$ -	$ -
				Subtotal:	***$ 82,500***
SUBTOTAL					***$ 1,998,500***
	Contingency (25%)				$ 500,000
	Engineering (15%)				$ 300,000
TOTAL WITH ENGINEERING & CONTINGENCY					***$ 2,798,500***

Notes:

1. It is assumed that asphalt restoration will include half of the roadway width.
2. Dewatering and rock blasting are nominal allowances. These must be assessed with geotechnical investigation.
3. It is assumed that all homes will be able to connect by gravity. However, there may be homes with lower basement fixtures that will require a sump pump. This must be confirmed by field survey.

CENTRAL COAST REGIONAL DISTRICT
TOWNSITE WASTEWATER SERVICING
HOSPITAL
CLASS 'C' CAPITAL COST ESTIMATE

Item	Description	Unit	Quantity	Unit Price	Amount
1. General Requirements					
1.1	Contractor Insurance & Bonding	L.S.	1	$ 2,000	$ 2,000
1.2	Mobilization & Demobilization	L.S.	1	$ 5,000	$ 5,000
1.3	Erosion & Sediment Control	L.S.	1	$ 500	$ 500
1.4	Survey & Construction Layout	L.S.	1	$ 500	$ 500
				Subtotal:	***$ 8,000***
2. Collection System					
2.1	Connection to Existing Sanitary Service c/w Clean Out	L.S.	1	$ 2,500	$ 2,500
				Subtotal:	***$ 2,500***
3. Sewage Pump Station					
3.1	Duplex Grinder Pump Assembly	L.S.	1	$ 30,000	$ 30,000
3.2	Electrical Works	L.S.	1	$ 10,000	$ 10,000
				Subtotal:	***$ 40,000***
4. Forcemain					
4.1	100 mm Ø HDPE Sanitary Forcemain	m	270	$ 250	$ 67,500
4.2	Road Restoration	m^2	975	$ 48	$ 46,800
				Subtotal:	***$ 114,300***
SUBTOTAL					***$ 164,800***
	Contingency (25%)				$ 41,000
	Engineering (15%)				$ 25,000
TOTAL WITH ENGINEERING & CONTINGENCY					***$ 230,800***