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November 2, 2023
2286-03

Harmac Pacific, a Division of Nanaimo Forest Products Ltd.
1000 Wave Place
Nanaimo, BC V9X 1J2

Attention: **Mr. Ryan Prontack, P.Eng.**
Project Engineer

Re: Proposed Industrial Park – Harmac Pacific Division
Draft Site Servicing Report, In Support of Rezoning Application
(950 & 1260 Phoenix Way)

Attached please find a copy of our site servicing report in support of the rezoning application to the City of Nanaimo for 950 & 1260 Phoenix Way for the development of an Industrial Park.

It is understood the intent of the park is for the creation of a Forestry Industry Park that would complement the existing forestry related businesses (pulp mill, sawmill, shake and shingles, specialty lumber) in the area. The park is to be comprised of 13 licensed lots ranging in size from 3 ha to 10.4 ha.

We have carried out a preliminary assessment of the water, sanitary sewer, storm drainage, transportation, and hydro/tel/gas services for the proposed development; reviewed the anticipated design standards to be applied for both on-site and off-site infrastructure works; and have developed a conceptual site servicing plan.

If you require further clarification or additional information, do not hesitate to contact us.

Yours truly,

KOERS & ASSOCIATES ENGINEERING LTD.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA R.J. HOFFMAN

Rob Hoffman, P.Eng.
Principal

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA C. M. D. HOLMES
Nov 2, 2023

Chris Holmes, P.Eng.
Project Engineer

Permit to Practice 1001658

Enclosures

950 & 1260 PHOENIX WAY
PROPOSED INDUSTRIAL PARK
-
SITE SERVICING REPORT
(in support of a rezoning application)

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1 INTRODUCTION

1.1 Authorization

Koers & Associates Engineering Ltd. was retained by Nanaimo Forest Products Ltd. (NFP) to prepare a site servicing report for the development of an industrial park on two adjoining parcels of land; 950 Phoenix Way and 1260 Phoenix Way.

1.2 Study Purpose

The purpose of this report is to present:

- a brief overview of the existing conditions on the property,
- a summary of the proposed industrial park, and
- a conceptual site servicing plan for the industrial park.

This report has been prepared to accompany a rezoning application to be submitted by the Owner (Harmac Pacific) along with other documents (prepared by others) to the City of Nanaimo.

2 LAND-USE

2.1 Existing Conditions & Zoning

2.1.1 Land-Use

Both properties are undeveloped and treed as shown in the 2022 airphoto on the City of Nanaimo's on-line NanaimoMap. A copy of the airphoto along with the outline of both properties, their size, current zoning and the location of the City of Nanaimo's Cable Bay Trail park is shown in **Figure 1**.

2.1.2 Zoning

Both properties are currently zoned AR1- Rural Resource as shown in **Table 1**. The AR1 zoning provides for agriculture and rural uses on larger lots without urban services.

Table 1 – Existing Zoning and Property Size

Address	Zoning	Ha
950 Phoenix Way	AR1	59.7
1260 Phoenix Way	AR1	40.0
	Total:	99.6

2.1.3 Topography

In general, the properties slope to the north (towards the ocean) and east (towards Cable Bay Trail) with a local height of land (95 m geodetic), located in the southwest corner of 1260 Phoenix Way. Ground elevations across the proposed development range from 95 m geodetic in the southwest corner of 1260 Phoenix Way, to 10 m geodetic in the northeast corner of 905 Phoenix Way adjacent to Cable Bay Trail as shown in **Figure 2**.

The ground slopes across the property range from a low of ±2.5% to a high of ±60%, with an overall average in the 7% to 10% range.

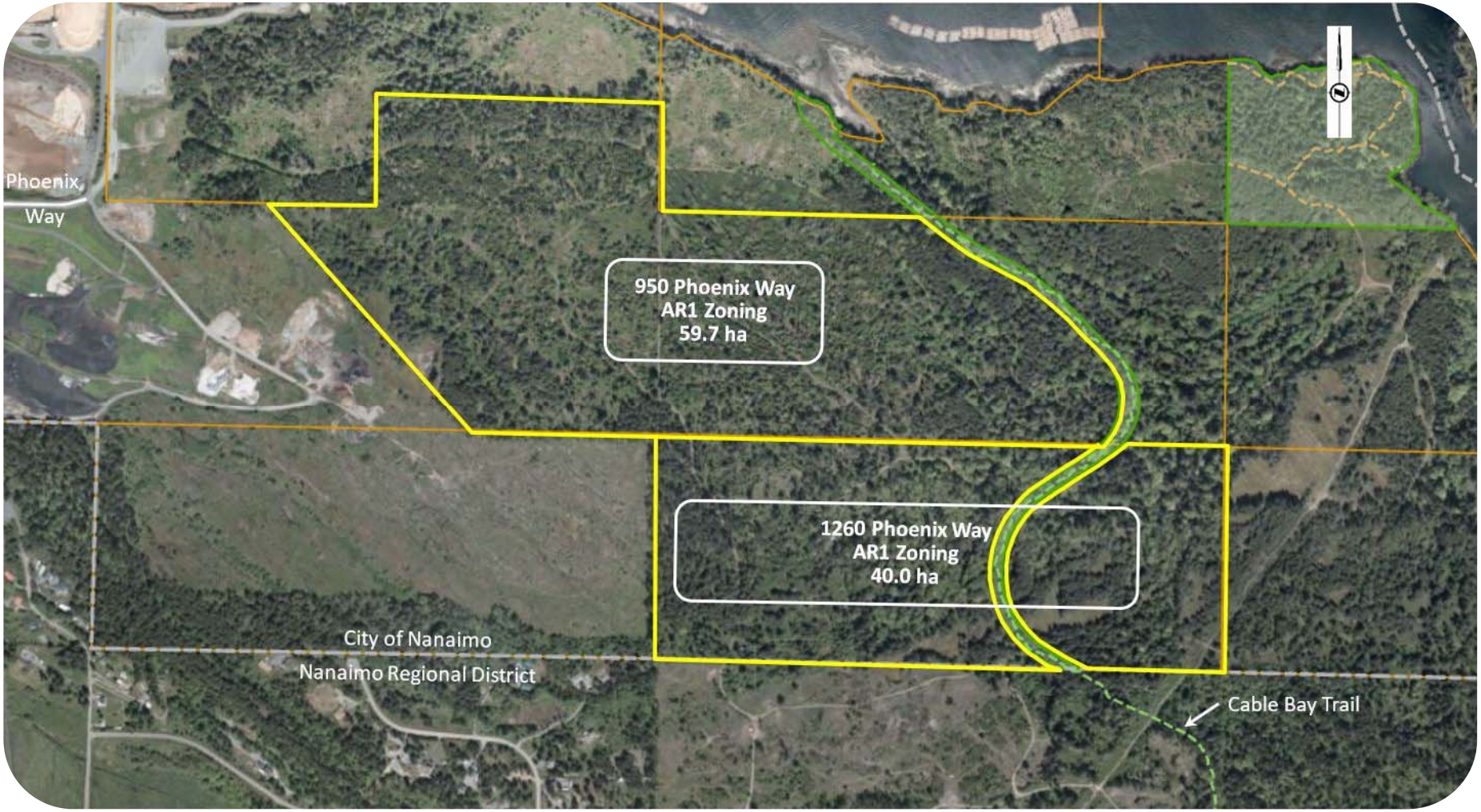


Figure 1 – Proposed Industrial Park, 2022 Airphoto
(Airphoto from City of Nanaimo on-line NanaimoMap)

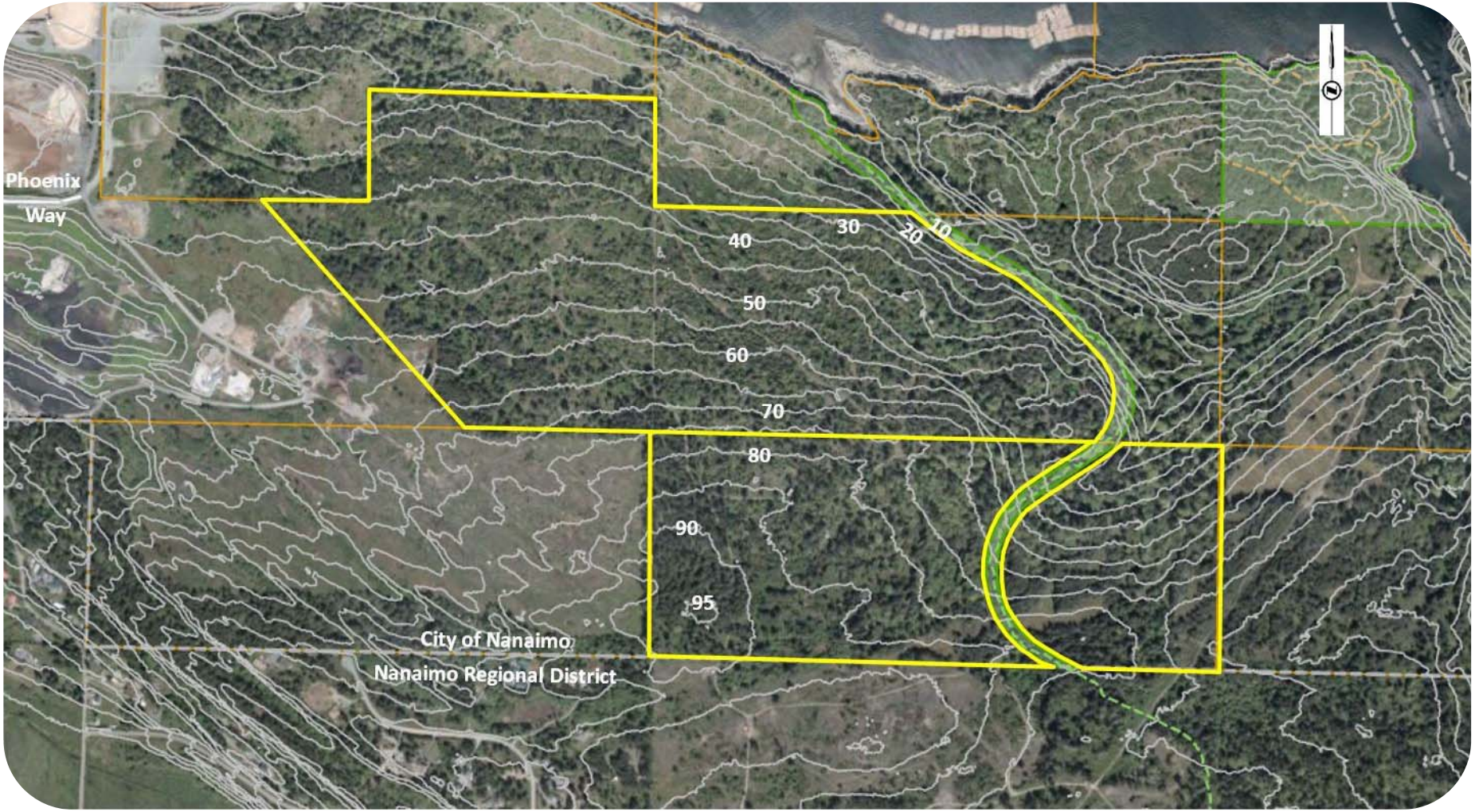


Figure 2 – Ground Elevation Contours, Existing Conditions
(airphoto and ground elevation contours (5 m interval) from City of Nanaimo on-line NanaimoMap)

2.2 Cable Bay Trail

Cable Bay Trail is a 2 km long dedicated forested trail park within the City of Nanaimo. The trail bi-sects 1260 Phoenix Way and runs along the east property line of 950 Phoenix Way. The trail located within a minimum 20 m wide dedicated Road Allowance that is defined as Part Section 21, Range 3 in Plan VIP59192.

The trail can be accessed at the north end of Nicola Road, located just outside of the City's south boundary, in the Regional District of Nanaimo.

2.3 Proposed Development & Zoning

2.3.1 Proposed Zoning

The proposed zonings for both properties is:

- I4 - Industrial.

This zoning provides for heavy industrial development that is not compatible with residential uses.

2.3.2 Proposed Licensed Lots

The industrial park is proposed to be comprised of 13 licensed lots ranging in size from 3 ha to 10.4 ha. The intent is for the creation of a Forestry Industry Park that would complement the existing forestry related businesses (pulp mill, sawmill, shakes and shingles, specialty lumber) in the area. The proposed size of each licensed lot is listed below in **Table 2.** The proposed lot layout is shown in **Figure 3**.

Table 2 – Number & Size of Proposed Licensed Lots

Licensed Lot No.	Size (ha)
1	10.0
2	9.0
3	8.1
4	8.6
5	5.8
6	3.0
7	5.3
8	4.8
9	5.8
10	6.5
11	4.6
Subtotal Area:	71.5
12 (1)	5.3
13 (1)	10.4
Combined Area:	87.2

Notes:

(1) Proposed Licensed Lot 12 and Lot 13 do not require rezoning; they are zoned I4.

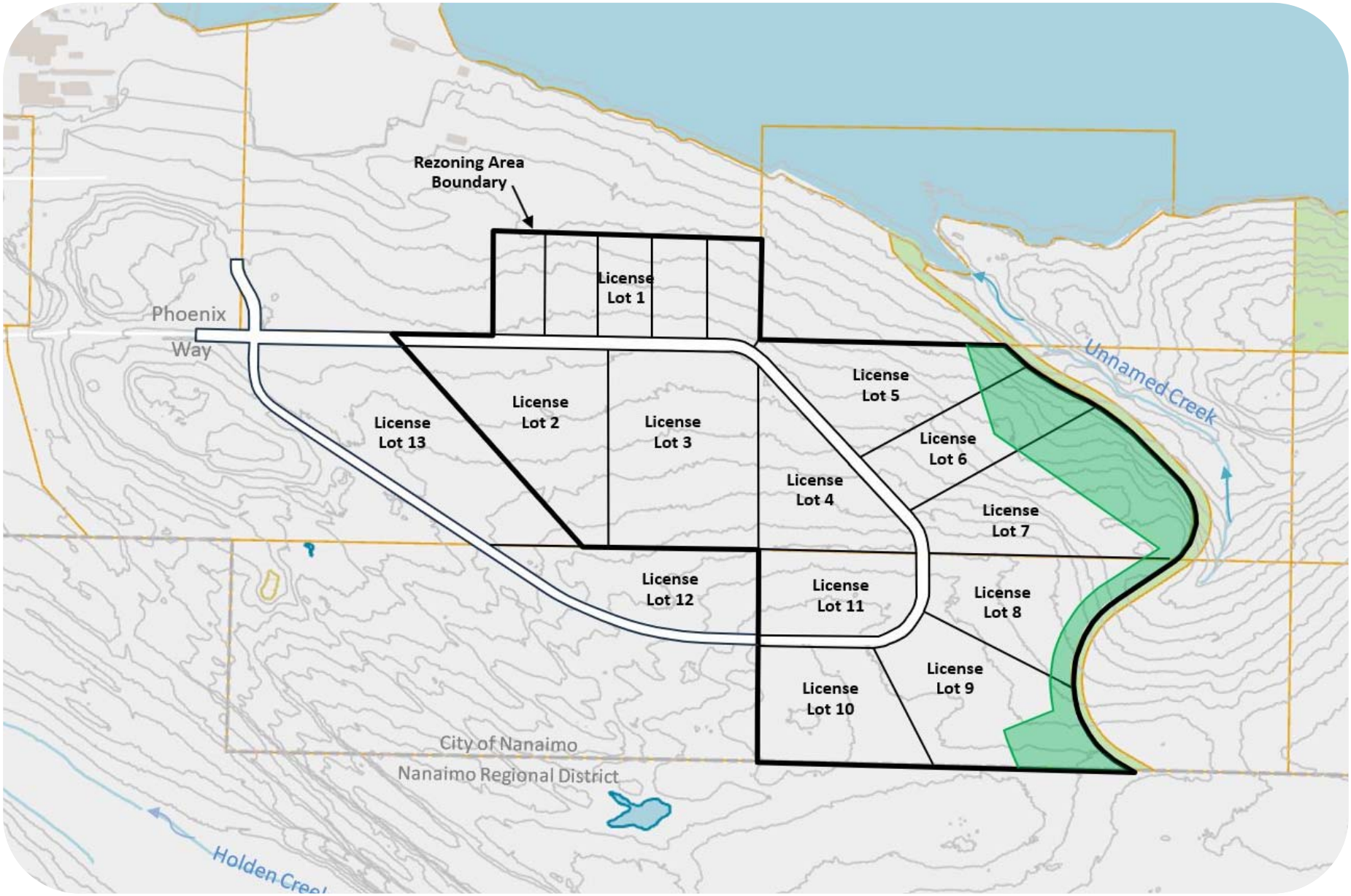


Figure 3 – Proposed Industrial Park Lot Layout
(base map from City of Nanaimo on-line NanaimoMap)

2.3.3 Proposed Cable Bay Trail Setback

A setback on the west side of the Cable Bay Trail parkland is proposed, ranging from 50 m to 150 m as shown in **Figure 3**.

The proposed setbacks result in a total area of 11.1 ha, represents 11% of the combined area of the two properties as noted below in **Table 3**.

Table 3 – Cable Bay Trail Proposed Setback

Description	Area (ha)
950 & 1260 Phoenix Way	99.6
Proposed Setback adjacent to Cable Bay Trail	11.1
Setback as % of Total Area	11 %

3 DESIGN STANDARDS

3.1 On-Site Infrastructure

The proposed development will be constructed on privately owned property and will be owned and maintained by the property owner(s). As such, infrastructure design and construction will be undertaken in accordance with:

- BC Building & Plumbing Codes,
- Protection of the environment (Engineering & Geoscientists Code of Ethics, item no. 1), and
- Good engineering practice.

3.2 Off-Site Infrastructure

The design and construction of off-site work to be owned and/or maintained by the local municipal government (City of Nanaimo or Nanaimo Regional District) or a provincial government agency (BC Ministry of Transportation and Infrastructure) would be subject to securing approvals from the appropriate authority(s).

4 TRANSPORTATION

4.1 Site Access & Intersection

Access to the proposed development will come from Phoenix Way on the portion of the road that is privately owned and maintained as shown in **Figure 4**.

The existing intersection on the curve just before the entrance to the log sorting yard (900 Phoenix Way) will be reconfigured, moving it to the east as shown on **Drawing No. 2286-SK2**.

4.2 Internal Road Network

Within the properties, the proposed licensed lots will be accessed by an internal looped road. The looped road will be designed with a top width to accommodate two way traffic.

The road geometry (vertical and horizontal) will be designed to accommodate large tracker-semitrailer vehicles, i.e., WB-20. The looped road will be constructed across two adjacent properties (1250 Phoenix Way and 1000 Wave Place) to prevent a dead-end road. It will also provide access to these two properties and the future development of Licensed Lot 12 and Licensed Lot 13.

A secondary access road is proposed to provide rear access to proposed licensed lots 2, 3 and 4.

The proposed roads would be constructed within proposed road easements.

The proposed internal road network is shown in **Figure 3.**

4.3 Traffic Impact Assessment

An assessment of the potential impact of the proposed development on the City of Nanaimo's roads and nearby intersections was carried out by Watt Consulting Group for Nanaimo Forest Products. The findings are presented in their report entitled *950 & 1260 Phoenix Way Development Traffic Impact Assessment, -DRAFT- dated July 7, 2023*.

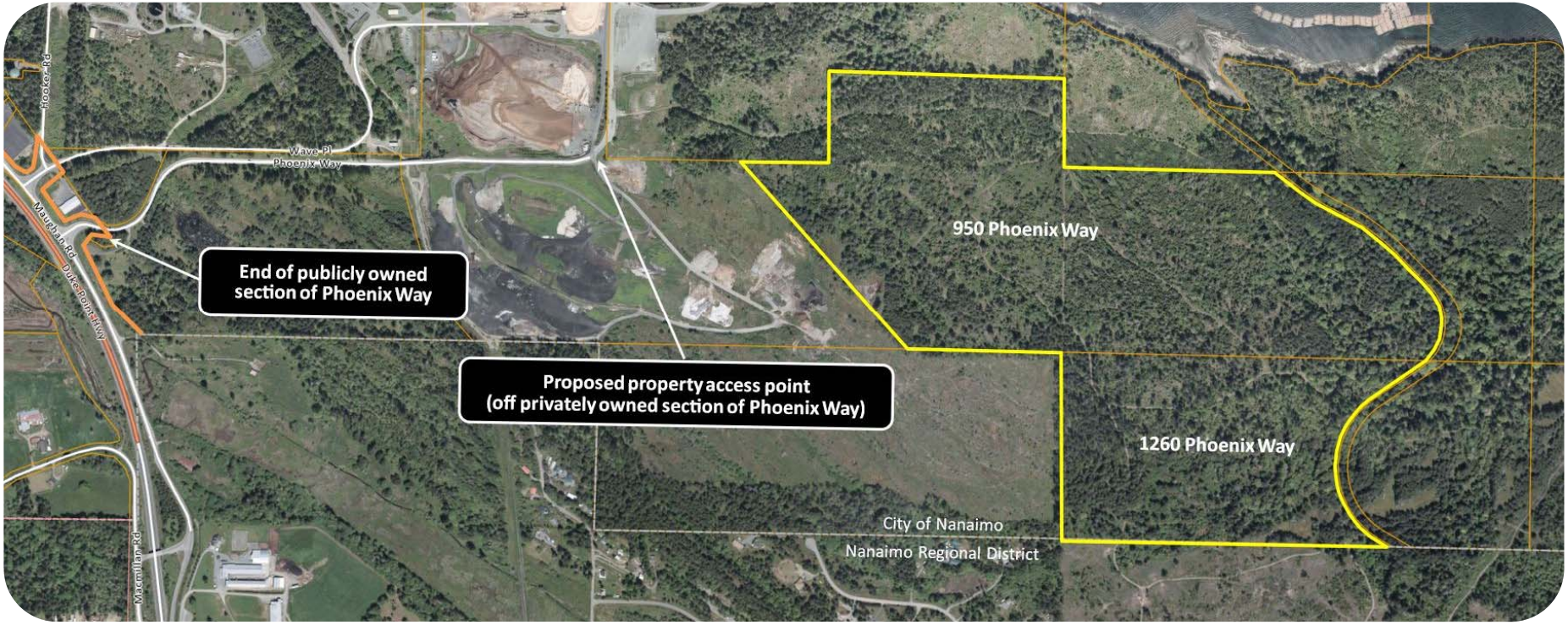


Figure 4 – Proposed Industrial Park Site Access Point
(airphoto from City of Nanaimo on-line NanaimoMap)

5 WATER SERVICE

5.1 City of Nanaimo Connection

Water service for the proposed development would be provided by a connection to the City of Nanaimo's water distribution system. Connection would be made to the City's 750 mm dia. DI main which is installed along Wave Place. The proposed connection is conceptually shown on **Figure 5**.

5.2 Static Pressures

The Water Place watermain is fed from the City's Extension Reservoirs which have a 155 m Hydraulic Grade Line (HGL).

The ground elevation in the area of the proposed connection is approximately 28 m, which generates a static pressure of 1,245 kPa (180 psi).

As shown in **Figure 2**, the ground elevation within the proposed development ranges from a low of ±20 m in the northeast corner, adjacent to Cable Bay Trail, to a high of ±95 m in the southwest corner adjacent to the City of Nanaimo/Regional District of Nanaimo boundary. These elevations result in a static pressure ranging from 1,320 to 585 kPa (190 to 85 psi).

Within the proposed development, the distribution main would be installed within the proposed roadway area (see **Figure 3**). The ground elevation along the alignment of the proposed roadway ranges from ±42 m to ±90 m, resulting in a static pressure ranging from 1,105 to 635 kPa (160 to 92 psi).

5.3 System Demands

The proposed water distribution system will be designed to meet potable and fire flow demands in accordance with the City's MoESS requirements for Water Distribution System.

5.3.1 Potable Water Design Demands

For Industrial land use, the City's MoESS specify potable water demands to be calculated based on an equivalent service population density and per capita design demands. The resulting equivalent service population and design water demands are presented in **Table 4** and **Table 5**; respectively.

Table 4 – Development Equivalent Service Population

Land-Use	Total Lot Area ha	Population Density capita/ha	Equivalent Service Population capita
Industrial	71.5 (1)	36 (2)	2,574

Notes:

1. As calculated in **Table 2**.
2. City of Nanaimo MoESS, 5.03 Design Population.

Table 5 – Design Potable Water Demands

Description	Unit Design Demand Lpcd	Equivalent Service Population capita	Design Demand m^3/day	(l/s)
Average Day	435 (1)	2,574 (2)	1,120	(13)
Maximum Day	1,135 (1)	2,574 (2)	2,920	(34)
Peak Hour	1,820 (1)	2,574 (2)	4,685	(54)

Notes:

1 City of Nanaimo MoESS, 5.01A Water Demand.

2 See **Table 4**.

5.3.2 Fire Flow Design Demand

The City's MoESS lists a design fire flow requirement of 300 L/s at the fire hydrant for the proposed I4 Industrial land-use, as shown in **Table 6**.

Table 6 – Design Fire Flow Demand

Land-Use	Hydrant Flows at Main l/s
Industrial (I4)	300 (1)

Notes:

1 City of Nanaimo MoESS, Table W-1: Hydrant Fire Flows by Land-Use Zone.

Fire flows will govern the sizing of mains and the water meter.

Further analyses will refine calculations during the detailed design study, including selection of pipe pressure class.

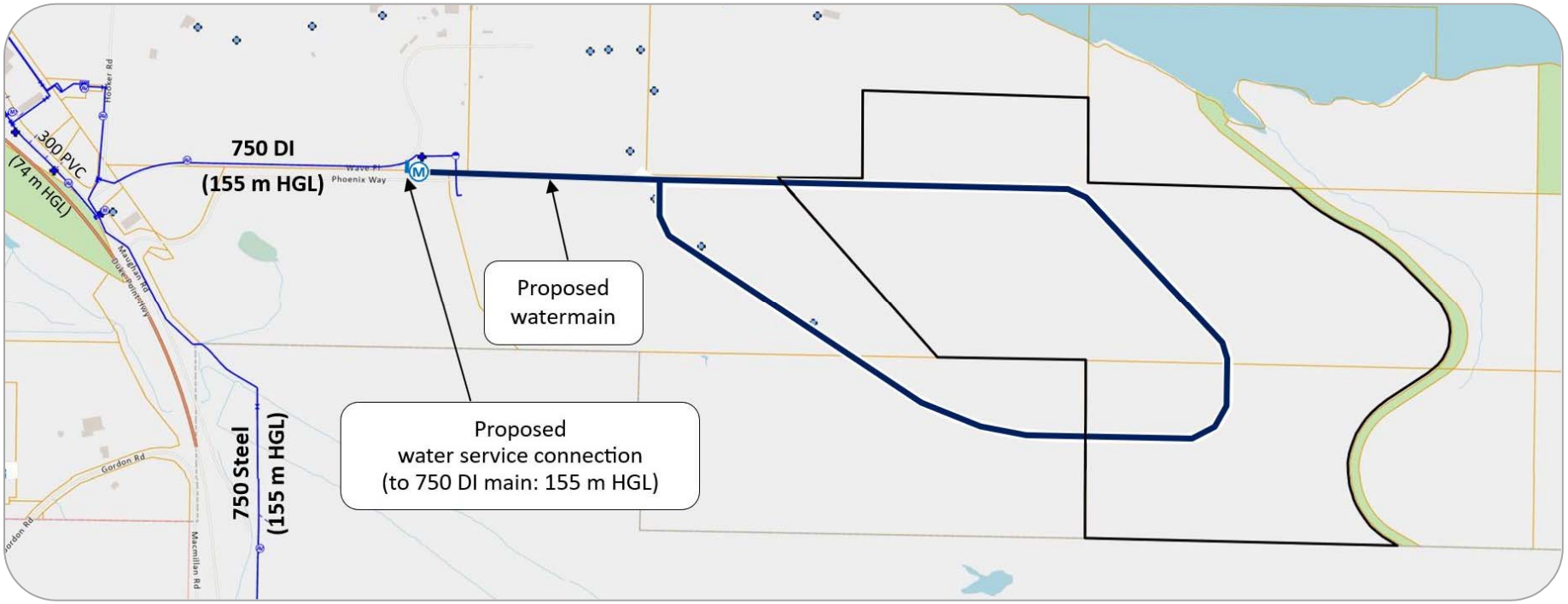


Figure 5 – Proposed Industrial Park Site
Water Service Connection
(base map from City of Nanaimo on-line NanaimoMap)

6 SANITARY SEWER SERVICE

6.1 Regional District of Nanaimo Connection

Sanitary sewer service for the proposed development would be provided by a connection to the Regional District of Nanaimo's sewage collection system located within the Duke Point Sewer Local Service Area. Connection would be made to the 300 mm dia. gravity main on Maughan Road. It is assumed that further extension of this gravity main along Maughan Rd (towards Phoenix Way) is not feasible due to ground elevations. The proposed connection would therefore be a sewage forcemain. The proposed connection point is conceptually shown on **Figure 6**.

It is anticipated that the proposed development would be serviced by a combination gravity/forcemain system. Some properties would pump their sewage up to a gravity service connection at the property line that would be connected to the gravity system conveying the sewage to a lift station that would pump to the RDN system at Maughan Road.

6.2 Design Flows

Both the City of Nanaimo (CoN) and the Regional District of Nanaimo (RDN) design standards specify that sewage flows for industrial development are to be calculated based on: an equivalent service population density; a per capita design flow; a peaking factor; and an allowance for Inflow & Infiltration (I&I).

The CoN design standards result in a slightly higher peak day wet weather design flow compared to that of the RDN design standards, as shown in **Table 7**. The higher design standard would be used. Sizing of mains and the lift station to be completed during detailed design.

Table 7 – Design Sewage Flows

Jurisdiction	Unit Design Demand lpcd	Equivalent Service Population capita	Dry Weather			Wet Weather	
			Ave Day l/s	Peaking Factor	Peak Day l/s	Inflow & Infiltration Allowance l/s	Peak Day l/s
CoN	230 (1)	2,574 (2)	6.9	3.5 (3)	24.2	20.7 (4)	44.9
RDN	300 (5)	3,575 (6)	12.4	2.74 (7)	34.1	8.3 (8)	42.4

Notes:

1 City of Nanaimo MoESS, 6.01A Sewage Flows

2 36 capita/ha x 71.5 ha

3 Harmon Formula:

$$PF = 1 + \frac{14}{4 + \sqrt{P}}$$ where: P = Service Population (in thousands)

4 25,000 l/ha per day x 71.5 ha

5 RDN Bylaw No. 300, Section 13, 2.3 Sewage Flow Calculation

6 50 capita/ha x 71.5 ha

7 PF = 6.75 x Population$^{-0.11}$

8 10,000 l/ha x 71.5 ha

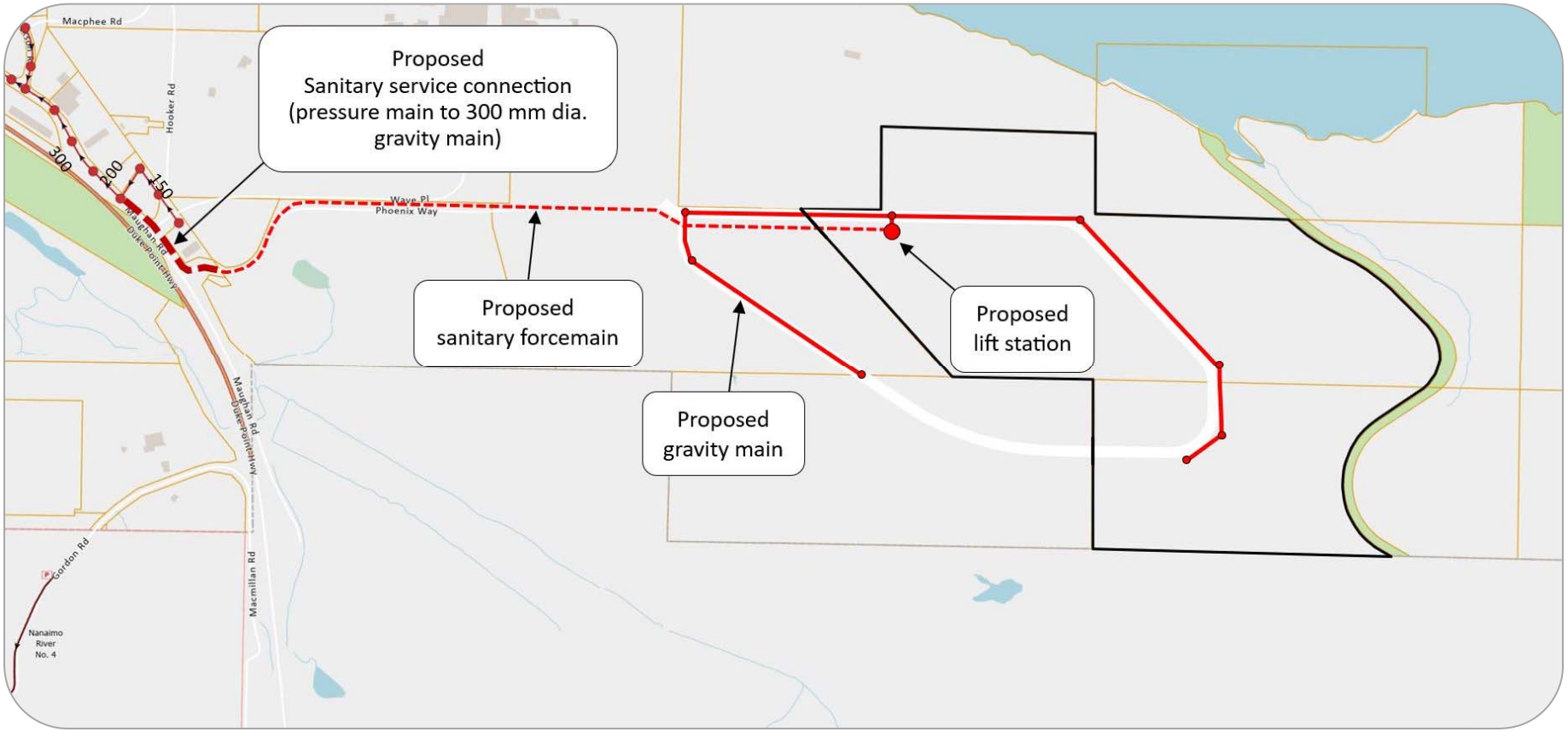


Figure 6 – Proposed Industrial Park Site
Sanitary Sewer Service Connection
(base map from City of Nanaimo on-line NanaimoMap)

7 STORMWATER MANAGEMENT

7.1 Existing Conditions

7.1.1 Watercourses

There are no defined watercourse(s) on the property. The closest identified watercourse is the unnamed creek east of the Cable Bay Trail. The creek is reported to be approximately 1 km long with a catchment area of approximately 100 ha and its headwaters in the northeast corner of 1260 Phoenix Way. The majority of 1260 Phoenix Way and a portion of 950 Phoenix Way slope/drain to the northeast and are within the Unnamed Creek catchment area. The remainder of the two properties slope/drain to the northwest. Both properties are part of an approximately 110 ha catchment area with no defined watercourse(s) and slope/drain to the ocean. The approximate boundaries of these two catchment areas along with ground elevation contours (5 m interval) are presented in **Figure 7**.

7.1.2 Soils

The local soils report and mapping (published by the provincial government) indicates the surface soil on and around the two properties is Tzuhalem, which is classified as rapidly draining soils. The report further notes that sandstone or conglomerate bedrock normally is encountered between 0.4 m and 0.8 m from the surface.

The Tzuhalem soil on the two properties are classified as gravelly, sandy loam, 0.1 m to 0.5 m thick over bedrock. Rock outcroppings are associated within the area of 1260 Phoenix Way but not 950 Phoenix Way. A copy of BC soil classification for the two properties is presented in **Figure 8**.

7.2 Proposed Drainage System

7.2.1 Collection & Point of Discharge

Drainage ditches are proposed to be construction alongside the internal road network to manage and control stormwater runoff. An interceptor ditch is proposed to be constructed on the lots that front onto the Cable Bay Trail (proposed lots 5, 6, 7 and 8). The ditch would intercept runoff from the developed area above it on each of these lots as well as from Lot 9. The ditch would be designed support the infiltration of stormwater runoff, allowing it to continue to be part of the Unnamed Creek catchment area. Larger flows would be diverted away by the interceptor ditch and conveyed safely away from the Cable Bay for discharge to the ocean (Northumberland Channel) via the drainage ditch to be constructed in a proposed Statutory Right-of-Way (SRW) on the western side of 1060 Phoenix Way (Rem. Sect 22, Range 3). Culverts would be installed at driveway crossings and to convey runoff from one side of the road to the other as required by topography.

An interceptor ditch is also proposed to be constructed on the lot along the north side of the proposed development (proposed lot 1). The ditch would receive runoff from internal road as well as proposed lot 1 and convey it to the proposed drainage ditch to be constructed on the western side of 1060 Phoenix Way and discharged to the ocean. We understand that NFP has been in discussions with the owner of 1060 Phoenix Way about obtaining a suitable SRW through their property, and that both parties have agreed to the concept in principle and are working towards a formal agreement. The proposed interceptor ditches, the ocean discharge, and storm drainage system catchment area are presented in **Figure 9**.

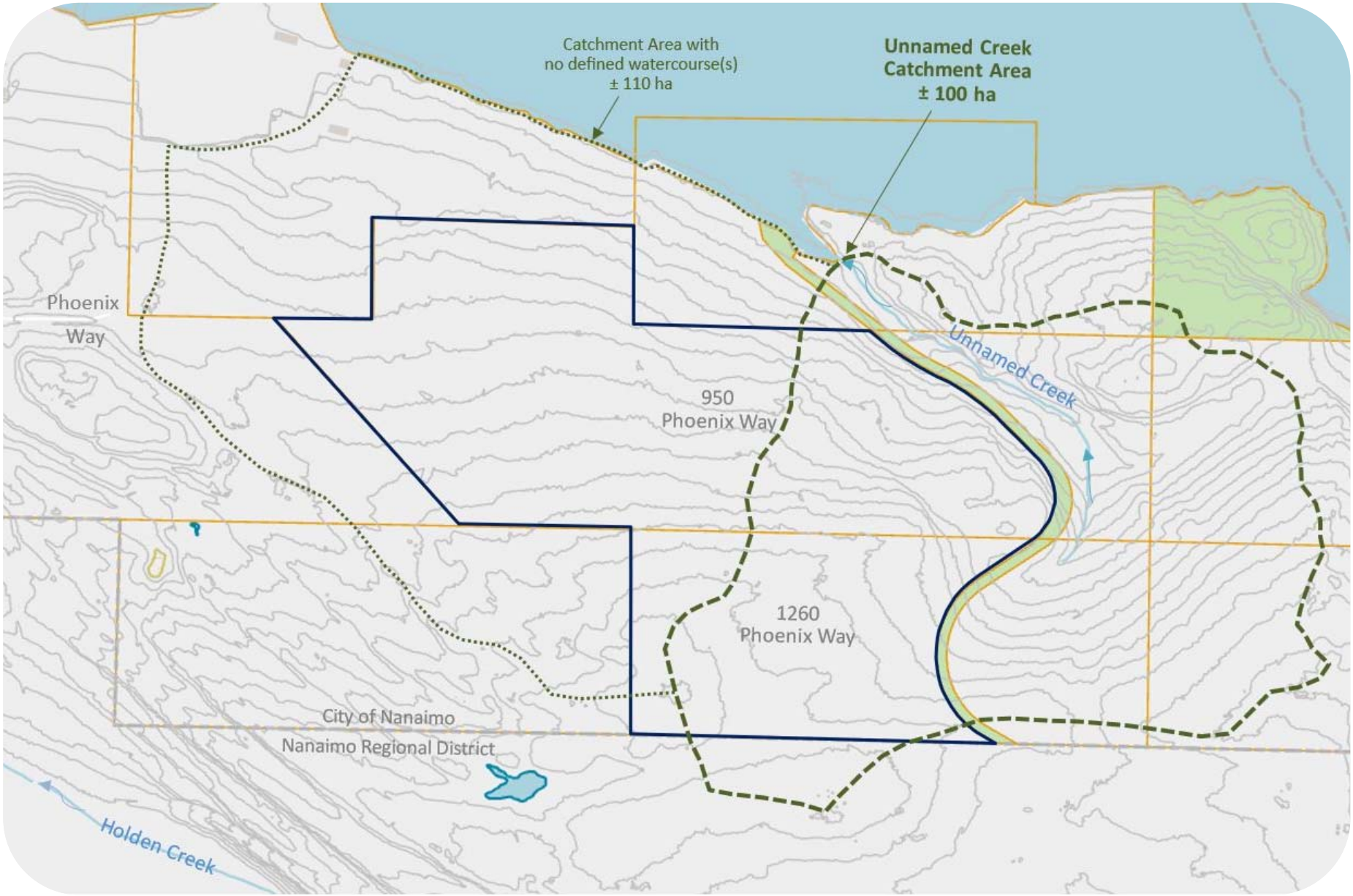
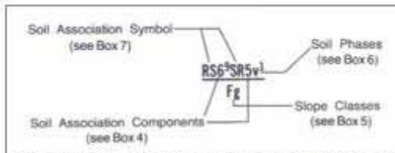


Figure 7 – Area Creeks & Water Bodies
(base map, with 5 m contours, from City of Nanaimo on-line NanaimoMap)



Soil inclusions of 15 to 20% of soil map delineations may not be identified unless they are strongly contrasting (such as rock outcrops, organic areas, etc.).

3. Composite Map Unit Symbols

Composite map symbols are used where two or three soil associations are inter-mixed or occupy such small areas that they cannot be separated at the scale of mapping. The composite symbols are usually written in decreasing order of occurrence within the map unit.

Examples

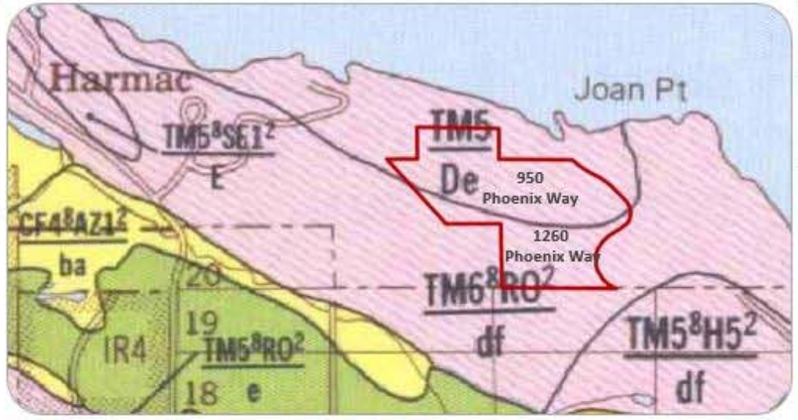
$RN1^{5}QP1^{4}$ – 60%RN1, 40%QP1

$RT6^{6}HA1^{3}RA1^{1}$ – 60%RT6, 30%HA1, 10% RA1

4. Soil Association Components

A Soil Association is a group of related soils developed on similar parent materials, which differ due to changes such as soil depth, soil drainage, soil textures, aspect, etc. Soil Association Components describe these differences between soils within the Association.

Soil Component Number	Description
1	This is the modal or most commonly occurring soil in the soil association and is described in box 7. It is the only significant soil found within the areas mapped by component 1. Other components contain the modal soil and a second less common soil. Components 6, 7 and 9 are exceptions as they contain only a minor portion of the modal soil.
2	Less common soil is drier due to factors such as: slightly coarser textures, southern aspects, or slightly lower rainfall locations (rain shadows) than the modal soil.
3	Less common soil is wetter due to factors such as: finer textures, northerly aspects, or slightly higher rainfall locations than the modal soil.
4	Less common soil has a different soil development within the same environment (such as presence of duric horizons).
5	Less common soil is shallower to bedrock than the modal soil.
6	Shallower soils are most common, with the modal soil being less common.
7	Dominant soil has a different soil profile development than the modal soil (such as presence of duric horizons). Variable component. See the detailed soil legend in the report.
8	Less common soil is very weakly developed (Regosolic).
9	Most common modal soil is a saline phase.



5. Slope Classes*

*From CDA, 1974

Simple topography Single slopes (regular surface)		Complex topography Multiple slopes (irregular surface)		Slope %
A	depressional to level	a	nearly level	0 to 0.5
B	very gently sloping	b	gently undulating	0.5 + to 2
C	gently sloping	c	undulating	2 + to 5
D	moderately sloping	d	gently rolling	5 + to 9
E	strongly sloping	e	moderately rolling	9 + to 15
F	steeply sloping	f	strongly rolling	15 + to 30
G	very steeply sloping	g	hilly	30 + to 60
H	extremely sloping	h	very hilly	over 60

Where a range of slope classes is given in a map unit the dominant slope class is listed first.

Examples:

GH -dominantly single slopes of 30 to 60% with significant inclusions > 60%

Gf -dominantly single slopes of 30 to 60% with significant inclusions of 15 to 30% multiple slopes

gf -dominantly multiple slopes of 30 to 60% with significant inclusions of 15 to 30% multiple slopes

9. Most Common Drainage

Symbol	Class* (*From CDA, 1974)	Description
r	rapidly drained	- soil holds little moisture after rain i.e. coarse textured soils.
w	well drained	- no excess moisture for most of the year.
m	moderately well drained	- excess moisture for a short but significant period of the year.
i	imperfectly drained	- soil remains wet in subsurface horizons for moderately long periods during the year.
p	poorly drained	- excess moisture throughout soil for a large part of the year.
vp	very poorly drained	- free water remains at or within 30 cm of the surface most of the year.

6. Phases

Phase symbols are used to show some important but irregularly occurring soil characteristics within a map delineation.

SEEPAGE:

Symbol	Phase	Description
v	seepage significant	20 to 50% of the soil association component is affected by seepage.
w	seepage dominant	more than 50% of the soil association component is affected by seepage.

IMPEDED DRAINAGE:

x	impeded drainage significant	20 to 50% of the soil association component is affected by imperfect drainage resulting in gleyed soils.
y	impeded drainage dominant	more than 50% of the soil association component is imperfectly drained resulting in gleyed soils. Poorly drained areas also occur and Gleysolic soils are present.

EROSION:

e	eroded	a significant part of the soil association component is affected by erosion.

SYMBOL	NAME	PARENT MATERIAL	MOST COMMON TEXTURE (see Box 8)	MOST COMMON DRAINAGE (see Box 9)	MOST COMMON SOIL (see Box 10)	VEGETATION ZONATION (see Box 11	COMMENTS
RO	Rock Outcrop	bedrock	-	-	-	-	bedrock within 10 cm of the surface
TM	Tzuhalem	colluvium	gls	r	O.DYB-shli	CgF-wC	sandstone or conglomerate bedrock

8. Most Common Texture

When two strongly contrasting textures are within 1 m of the soil surface, the surface texture is written first and separated from the subsurface texture by a slash (/), for example sil/gsl.

FOR ALL PARTICLES LESS THAN 2 mm DIAMETER

Symbol	Specific Textures* (*From CSSC, 1978)
c	clay
sic	silty clay
cl	clay loam
sicl	silty clay loam
scl	sandy clay loam
l	loam
sil	silt loam
si	silt
sl	sandy loam
ls	loamy sand
s	sand
h	humic (organic)
m	mesic (organic)

MODIFIERS

Symbol	Modifier Description
g	gravelly - particles 2 mm to 8 cm in diameter which occupy 20 to 50% of the soil volume.
vg	very gravelly - particles 2 mm to 8 cm in diameter which occupy 50 to 90% of the soil volume.

10. Most Common Soil

Symbol	Subgroup* (*From CSSC, 1978)	Phase
O.SB	Orthic Sombric Brunisol	
O.SB-shli	Orthic Sombric Brunisol	shallow lithic
DU.SB	Duric Sombric Brunisol	
O.DYB	Orthic Dystric Brunisol	
O.DYB-shli	Orthic Dystric Brunisol	shallow lithic
E.DYB	Eluviated Dystric Brunisol	
DU.DYB	Duric Dystric Brunisol	
O.HG	Orthic Humic Gleysol	
R.HG	Rego Humic Gleysol	
FE.HG	Fera Humic Gleysol	
T.M.	Terric Mesisol	
T.H	Terric Humisol	
O.FHP	Orthic Ferro-Humic Podzol	
O.FHP-shli	Orthic Ferro-Humic Podzol	shallow lithic
OT.FHP	Ortstein Ferro-Humic Podzol	
P.FHP	Placic Ferro-Humic Podzol	
DU.FHP	Duric Ferro-Humic Podzol	
GLOT.FHP	Gleyed Ortstein Ferro-Humic Podzol	
O.HFP	Orthic Humo-Ferric Podzol	
O.HFP-shli	Orthic Humo-Ferric Podzol	shallow lithic
OT.HFP	Ortstein Humo-Ferric Podzol	
DU.HFP	Duric Humo-Ferric Podzol	
GL.HFP	Gleyed Humo-Ferric Podzol	
GLOT.HFP	Gleyed Ortstein Humo-Ferric Podzol	
O.R.	Orthic Regosol	

11. Vegetation Zonation*

*From Harcombe (In preparation).

INNER COASTAL REGION

Symbol	Forest Zone: Subzone	Elevation Range
CgF-wC	Coastal grand fir - western red cedar zone	0-300 m
CwH:a	Coastal western hemlock zone: coast Douglas-fir subzone	0-500 m
CwH:b	Coastal western hemlock zone: western hemlock subzone	0-1000 m
CwH-aF:b	Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone	700-1100 m
SAmH-aF	Subalpine mountain hemlock - Pacific silver fir zone (includes Alpine tundra zone)	1000-2040 m

OUTER COASTAL REGION

Symbol	Forest Zone: Subzone	Elevation Range
CwH-af:a	Coastal western hemlock - Pacific silver fir zone: western red cedar subzone	0-600 m
CwH-aF:b	Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone	550-1100 m
SAmH-aF	Subalpine mountain hemlock - Pacific silver fir zone (includes Alpine tundra zone)	950-2200 m

**(from BC MoE Technical Report 17
Soils of Southern Vancouver Island, Report No. 44, Aug 1985)**

Figure 8 – BC Soil Mapping in and around Proposed Development

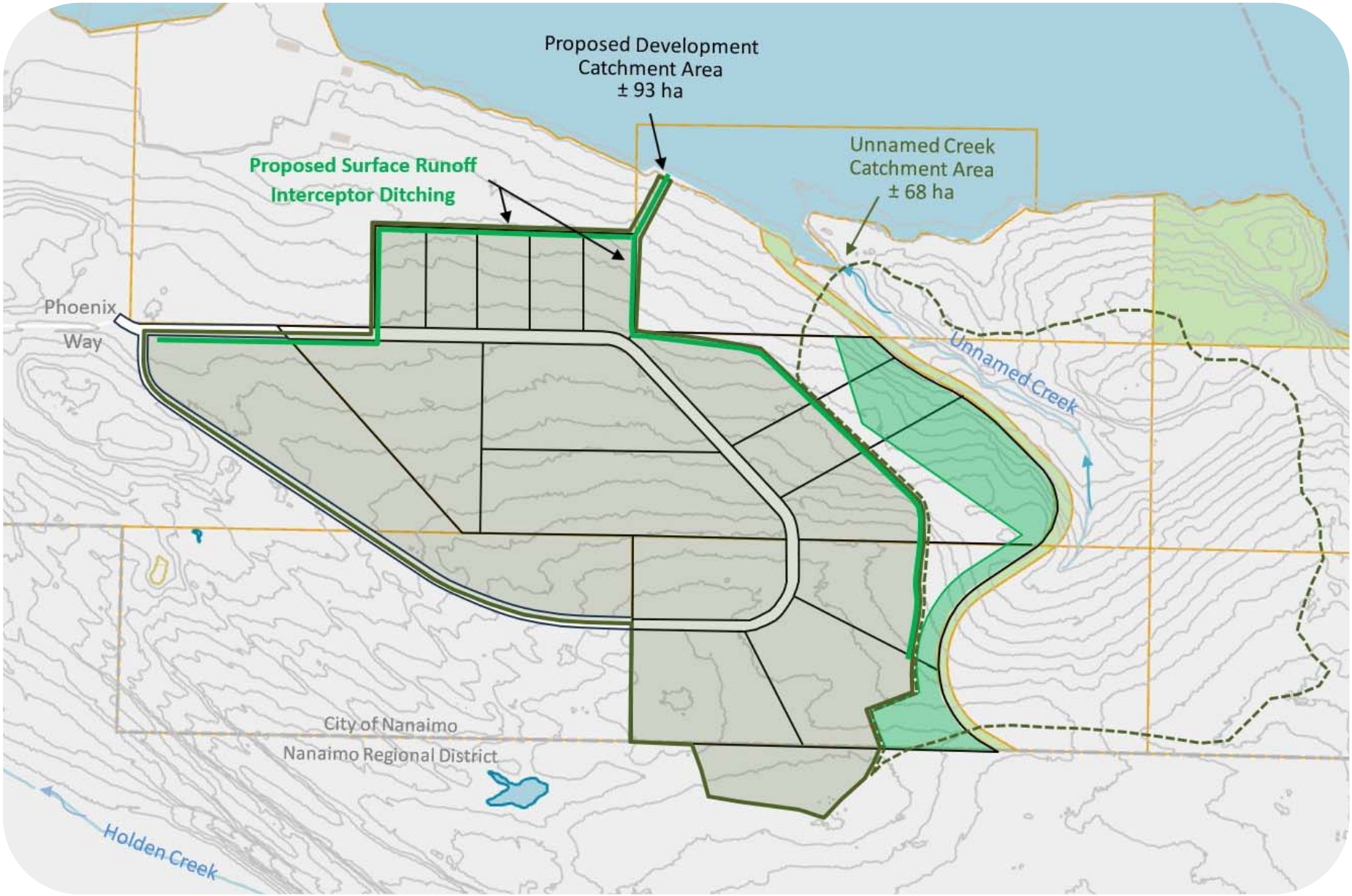


Figure 9 – Proposed Development Stormwater Runoff Catchment Area
(base map, with 5 m contours, from City of Nanaimo on-line NanaimoMap)

7.2.2 Water Quality

The storm drainage system is to be designed in accordance with the City's stormwater runoff water quality requirements and good engineering practice.

Water quality Best Management Practices (BMPs) will be designed in a manner that prevents harmful materials from entering the natural watercourses (City's design criteria 7.14 Water Quality).

Individual Lot Water Quality BMPs

The application of water quality BMPs, such as rain gardens, erosion/sediment loading control, and treatment of runoff from uncovered parking areas greater than 100 m^2 to remove oil, total suspended soils, and other contaminants (City's design criteria 7.13 Rainwater Best Management Practices) will be applied to each proposed lot and will be based on the extent and type of activity that occurs. These works would be designed and constructed in conjunction with lot clearing and once the specific industrial activity to be undertaken on the lot is known.

Road side & Interceptor Ditching BMPs

Along the sections of ditches with steeper slope that will result in higher velocities (typically ≥ 1.5 m/s), erosion protection will be required.

On steeper slopes where excessive velocities (typically ≥ 3 m/s) will occur, the use of grade control structures or an enclosed (pipe) storm drainage system may be required.

The road cross section design will include grass lined shoulders and ditches for treatment of paved surface runoff during "first flush events", when debris and contaminants are the highest.

The construction of sediment traps in front of culverts by deepening the ditch invert will be designed.

7.2.3 Detention

Peak Flow and runoff volume controls are not anticipated to be required as runoff (from developed areas) will be discharged directly into the ocean by drainage works to be owned and maintained by the developer and not the City of Nanaimo. This approach is consistent with the City Stormwater Management Design Criteria, 7.03 Stormwater Runoff, .7 Peak Flow and Runoff Volume Control, (a) Developments Not Upstream of a Creek, River or Wetland.

7.2.4 Infiltration

Ditches will be designed to promote groundwater infiltration (City Stormwater Management Design Criteria 7.10 Open Channels (Within Private Property and Easements).

7.2.5 Ditches & Culvert Capacity

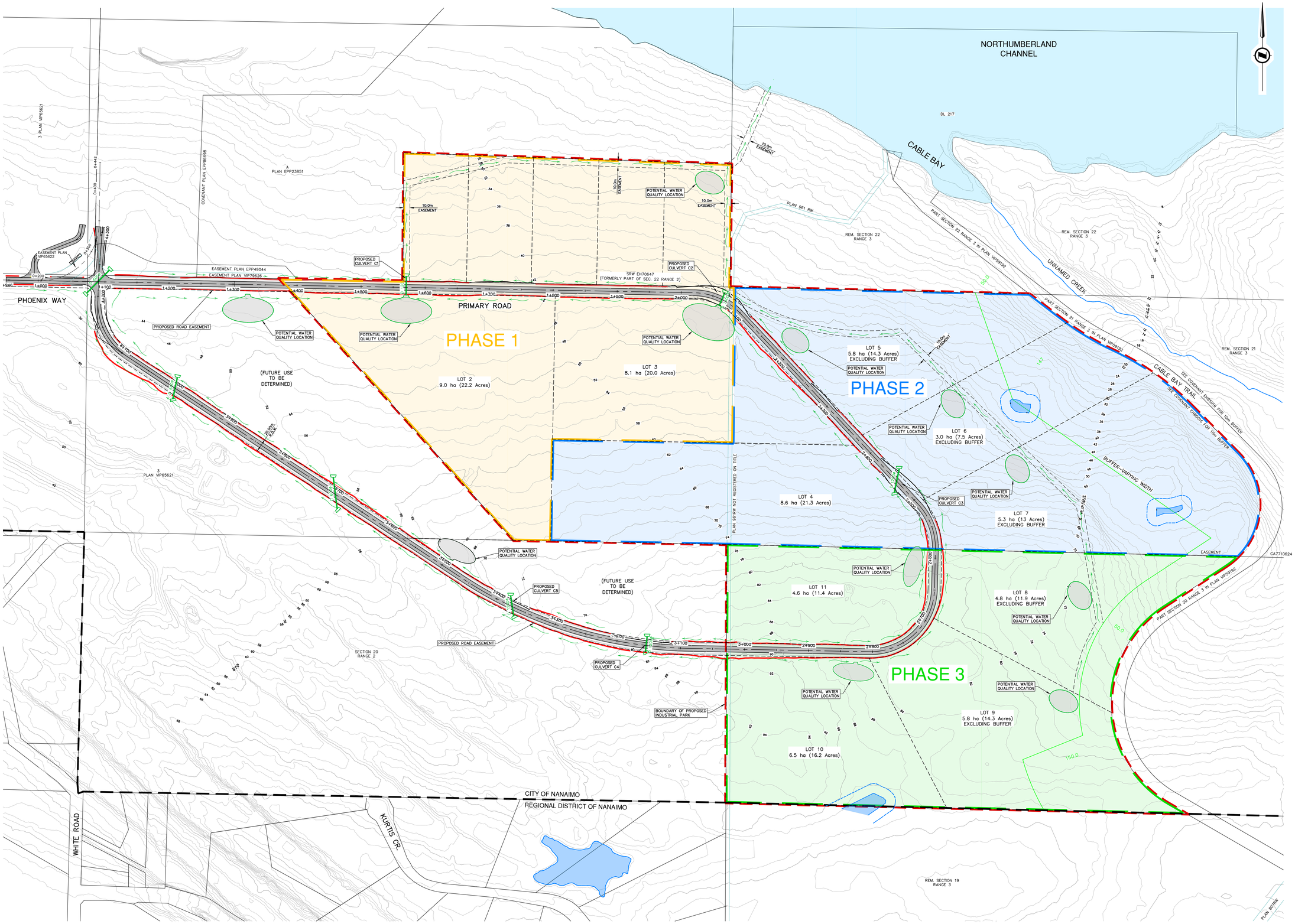
Roadside ditches, interceptor ditches and culverts would be designed to convey the 100 year design flow.

A preliminary conceptual plan showing the potential locations of ditches, culverts, and water quality treatment facilities is presented in the enclosed **Drawing No. 2286-SK2**.

8 HYDRO/TEL/CABLE & GAS

Third party utility services are presently installed along Phoenix Way on above ground utility poles and would be extended into the proposed development along the proposed internal road network.

Gas is located below ground along Phoenix Way and would be extended into the proposed development along the proposed internal access road network.



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RECORD OF REVISIONS

REV	DATE	BY	ENG	DESCRIPTION
1	24AUG23	DK	RH	CLIENT COMMENTS
2	22SEP23	DK	RH	CLIENT COMMENTS
3	02NOV23	DK	RH	ENVIRON. NOTE

ISS.	DATE	BY	ENG	DESCRIPTION
A	02NOV23	DK	RH	REZONE APPL.

RECORD OF ISSUE

NOTES:

1. CONTOURS ARE GENERATED UTILIZING THE GIS INFORMATION AVAILABLE ON THE CITY OF NANAIMO WEBPAGE UNDER OPEN DATA CATALOGUE LICENCE.
2. CULVERT LOCATIONS AND DIAMETERS SHOWN FOR CONCEPTUAL PURPOSES ONLY. EXACT LOCATION & SIZING TO BE DETERMINED DURING DETAILED DESIGN.
3. POTENTIAL WATER QUALITY AND LOCATION SHOWN FOR CONCEPTUAL PURPOSES ONLY. NEED FOR, TYPE OR, SIZING AND LOCATION, CONTINGENT ON; ACTUAL LOT DEVELOPMENT; FINISHED SITE GRADING; SURFACE TREATMENT; AND BUSINESS ACTIVITY.
4. FOR SITE ENVIRONMENTAL ASSESSMENT INFORMATION, SEE "ENVIRONMENTAL ASSESSMENT REZONING PHASE 950 & 1260 PHOENIX WAY, NANAIMO, BC" DRAFT SEPTEMBER 7, 2023 BY AQUAPARIAN ENVIRONMENTAL CONSULTING LTD.

SEAL

PROJECT NO.	2286
DRAWN	DK
DESIGNED	RH
CHECKED	
APPROVED	
DATE	FEBRUARY 2023
SCALE	1:2,000

CLIENT

HARMAC PACIFIC

PROJECT

HARMAC INDUSTRIAL PARK

TITLE

DRAINAGE & SRW SCHEMATIC

DRAWING No.	REV.	SHEET
2286–SK2	3	2/2

File: 2286 Harmac Industrial Park.dwg Plot Time: Nov 02, 2023 - 11:19am User: dkennedy