



**REGIONAL DISTRICT OF CENTRAL KOOTENAY**  
**DEVELOPMENT PERMIT**  
**DP2202A (Anger Enterprises)**

Date: April 19, 2022

Issued pursuant to Section 490 and 491 of the *Local Government Act*

1. This Development Permit is issued to Anger Enterprises of 16060 Highway 3A, Crawford Bay as the registered owner (hereinafter called the "Permittee") and shall only apply to those lands within the Regional District of Central Kootenay, in the Province of British Columbia legally described as Lot 4 District Lot 3888 Kootenay District Plan 789 Except Part Included in Plans 2859 & 10754 (PID 016-036-557) as shown on the attached Schedules 1 and 2, forming part of this Permit, referred to hereafter as the "said lands".
2. This Development Permit is issued subject to compliance with all of the bylaws of the Regional District of Central Kootenay applicable thereto, except as specifically varied or supplemented by this Permit.
3. This Development Permit shall not have the effect of varying the use or density of land as specified in the applicable Zoning Bylaw of the Regional District of Central Kootenay, nor a Floodplain Specification under Section 524 of the Local Government Act.
4. The said lands have been designated 'Country Residential' and are located within a Development Permit Area pursuant to the Comprehensive Land Use Bylaw No. 2315, 2013 as amended.
5. The Permittee has applied to the Regional District of Central Kootenay to build ten (10) guest cottages and to use land and buildings situated on the said lands for this purpose. Pursuant to this Development Permit and subject to the terms and conditions herein contained, as well as all other applicable Regional District Bylaws, the Regional District of Central Kootenay hereby authorizes the use of the said lands for the intended purpose.
6. The Permittee is required to obtain approval in writing from the Regional District of Central Kootenay prior to the construction any new buildings, external additions to existing buildings or for any deviation from the development authorized under Section 5.0 of this Development Permit. Furthermore, the Permittee is hereby advised of the following requirements:
  - 6.1 The Regional District of Central Kootenay Building Department requires that the Permittee obtain a demolition permit and/or building permit prior to the removal of any existing buildings and structures, the renovation, expansion or alteration of any existing building and the construction of any new building.
  - 6.2 The Permittee will ensure that construction on site reflects the siting and development standards as set out in Schedules 2 & 3 of this permit.
  - 6.3 Existing screening will be retained on the western property line adjacent to the proposed sites of the ten (10) cabins.
  - 6.4 All construction shall be required to comply with the requirements of RDCK Floodplain Management Bylaw 2080, 2009 and amendments thereto.
  - 6.5 All habitable space must be constructed in accordance with the geotechnical report provided by Dr. Anthony Salway entitled 'Flood Hazard Assessment of Lot 4 DL 388 Plan

- 789 (Except Plan 2859 10754) KD Crawford Creek Fan', dated October 25, 2011 and attached to this permit as Schedule 4.
- 6.6 A construction permit will be issued by the Interior Health Authority for the purpose of altering the waterlines to accommodate the change from RV sites to cabins.
  - 6.7 The number of Recreational Vehicle sites will be limited to twenty two (22) in order to ensure that development is aligned with the report entitled 'Septic Site Investigation HCL Project #12091' by Highland Consulting dated May 16<sup>th</sup>, 2012 and attached to this permit as Schedule 5.
  - 6.8 Common lands shall remain protected from further development.
  - 6.9 The terms of this permit must be clearly communicated to all agents, contractors, sub-agents and employees involved in the development authorized under Section 5 of this Development Permit.
  - 6.10 A building permit shall be required prior to any construction involving land in this location at which time the Permittee shall be required to address sewage disposal issues to the satisfaction of the Interior Health Authority and Regional District of Central Kootenay Senior Building Official.
7. The said lands shall be developed strictly in accordance with the terms and conditions of this Development Permit and the requirements of all applicable Regional District Bylaws as well as any plans and specifications which may, from time to time, be attached to this Permit shall form a part thereof.
  8. In accordance with the Local Government Act, if the development authorized by this Development Permit is not commenced within two years of the date of this Permit, this Permit shall lapse.
  9. In accordance with the Local Government Act, 'Notice' shall be filed in the Land Title Office that the said lands are subject to this Development Permit.
  10. The terms of this Development Permit including subsequent amendments, are binding on all persons who acquire an interest in the said lands associated with this Permit.
  11. It is understood and agreed that the Regional District has made no representations, covenants, warranties, guarantees, promises, or agreement (verbal or otherwise) with the Permittee other than those in this Development Permit. It is solely the responsibility of the Permittee to ensure that the requirements of all other applicable government agencies are satisfied.
  12. This Development Permit does not constitute a building permit.
  13. This Development Permit shall come into force and effect 14 days after the date of issuance unless a Waiver of Appeal is received from the Permittee at which time the Development Permit shall be deemed to be issued upon receipt of the Waiver of Appeal. OR If a Notice of Appeal is received the Development Permit shall be suspended until such time as the Board of the Regional District of Central Kootenay has decided the Appeal.

*S Sudan*

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Sangita Sudan, General Manager of Development Services

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April 29, 2022

Date of Approval (date of review and approval)

May 2, 2022

Date of Issuance (pending receipt of securities)

**April 1: Subject Property**

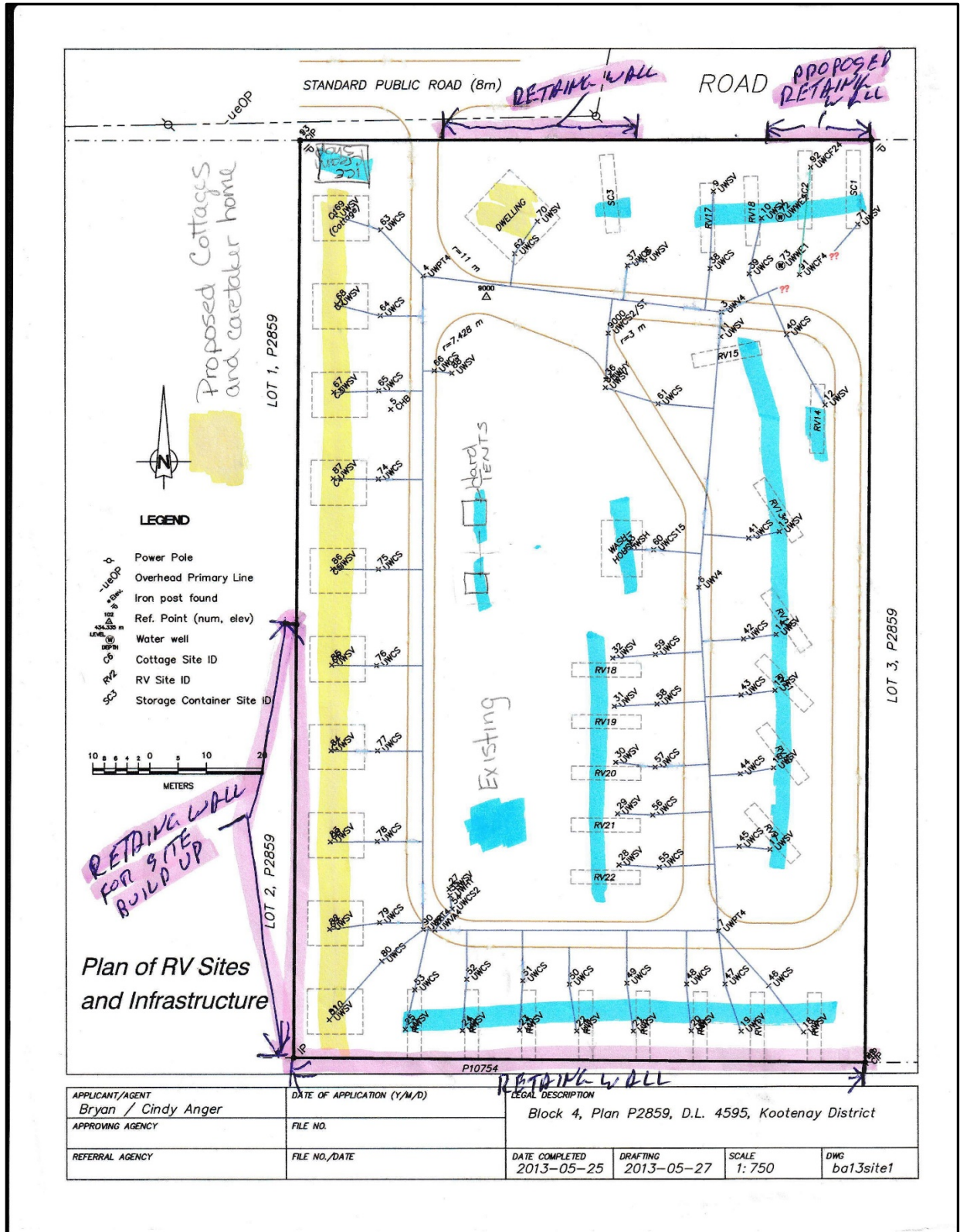


**Development Permit  
DP2202A  
Overview Map**

Map Projection: UTM Zone 11    Map Datum: NAD83  
Date Plotted: Thursday, April 21, 2022



Schedule 2: Site Plan



Plan of RV Sites and Infrastructure

APPLICANT/AGENT Bryan / Cindy Anger	DATE OF APPLICATION (Y/M/D)	LEGAL DESCRIPTION Block 4, Plan P2859, D.L. 4595, Kootenay District			
APPROVING AGENCY	FILE NO.	DATE COMPLETED 2013-05-25	DRAFTING 2013-05-27	SCALE 1:750	DWG ba13site1
REFERRAL AGENCY	FILE NO./DATE				



**Schedule 4: Geotechnical Report**

FLOOD HAZARD ASSESSMENT OF  
LOT 4 DL 388 PLAN 789 (EXCEPT PLAN 2859 10754) KD  
CRAWFORD CREEK FAN

By

Dr. Anthony A. Salway, P.Geo.  
Integrated Hydropedology Ltd.  
2954 Six Mile Road  
Nelson, BC  
V1L 6W3

For

Bryan and Cindy Anger  
Site 134, Comp. 1, R.R. #4,  
Rocky Mountain House  
AB  
T4T 2A4

October 25, 2011

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FIGURE 1 – LOCATION MAP, Scale 1:250,000

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## INTRODUCTION

Integrated Hydropedology Ltd (IHP) was retained in 2011, to assess a property, Lot 4 DL 388 Plan 789 (Except Plan 2859 10754) KD, in Crawford Bay (the subject property), with respect to the potential impacts of flooding from Crawford Creek. Since the subject property is located on the fan, to the southwest of the creek, the true right (west) bank was surveyed in detail on July 8, 2011. The survey revealed that the creek is moderately well to well confined, in its existing channels, to the east of the subject property. However, there are a number of low points on the right bank, that could be breached during high flows. Some of these potential avulsion points lead into overflow channels, that will merely result in the water returning to the main creek, after travelling only a short distance downstream.

However, there are two mechanisms that could cause flood waters to reach the subject property.

- a) An avulsion can occur at the fan apex, or somewhat lower down, adjacent to the Hawkins or Draper properties. Crawford Creek can avulse to the southwest, into a relic channel.
- b) Water could back up behind the golf course bridge.

The backing up of water from the bridge is not considered to be of significant consequence to the subject property. However, an avulsion is somewhat more significant.

Figure 1 is a location map for Crawford Bay, in which the property is located. Figure 2 is a Flood Plain Map from the RDCK showing the subject property, which is located to the east of the store and gas station (Fire Nos. 16050 and 16044).

## BACKGROUND INFORMATION AND PREVIOUS STUDIES

### Review of Relevant BC Government Documents

The following relevant government documents have been reviewed.

- Central Kootenay Regional District, 2009. Floodplain Management Bylaw, No. 2080
- Central Kootenay Regional District, 2011. Subdivision Bylaw No. 2159.
- Community Charter [SBC 2003] Chapter 26
- Ministry of Water, Land and Air Protection, 2004. Flood Hazard Area Land Use Management Guidelines. Government of BC.
- RSBC (1996), Chapter 250, Land Title Act, Section 219.
- RSBC (1996), Chapter 323, Local Government Act, Section 910.

## Aerial Photography

The following air photographs were examined with respect to the identification of previous avulsions on the fan.

- 1945 series A7661 #59, 60
- 1969 series BC5347 #207, 208
- 1972 series BC5490 #60, 61
- 1984 series BC84021, #241, 242
- 1997 series BCB97092 #180, 181

The historical photos do not show any avulsion paths, with the exception of the most recent 1997 air photo pairs that indicate the potential pathways that water could take, if an avulsion occurs at the Hawkins' property.

## FIELD INVESTIGATIONS

Appendix 1 contains a strategic set of photographs, taken from the golf course bridge down to the subject property, on May 28, 2006, October 12, 2009 and July 8, 2011. The 2006 photos were taken in support of a report prepared for Mr. Dunic, Mr. Marcheterre and the East Shore Health Care Support Services Society, entitled, "Flood Hazard Assessment of Lot 8, Plan 788, DL 2335, KD, Crawford Creek Fan", dated February 17, 2007. Figure 3 was taken from this report and shows the station locations, low spots and slumps. The photos, that were taken on October 12, 2009, were a follow up of the 2006 photos. Many of the photos form triplets, that show the progressive condition of the creek, from 2006 to 2011. It should be noted that the May 2006 photos were taken during moderately high flows, the October 2009 photos were taken during low flows and the July 2011 photos were taken during peak flows. Nevertheless, comparisons can be made of each set of triplets (labeled A, B and C).

The following section is a discussion of these comparisons, numbered according to the triplets. Photos 1A to C show the golf course lodge access bridge, which, of course, is unchanged. Photos 2A and B were taken looking downstream from the bridge, at a bedrock canyon. Once again, nothing has changed. Photos 3A and B show an overflow channel at Stn 0+010. This overflow channel has not been deepened or widened, over the period of time, May 2006 to October 2009.

Stn 0+000, Photos 4A to C. These photos were taken looking across the creek at the left channel. The woody debris resting on the mid channel bar is essentially unchanged.

Stn 0+034, Photos 5A to C. The downstream end of the mid channel bar is unchanged except for an increase in vegetation in July 2011.



Stn 0+053, Photos 6A to C. Once again, the downstream end of the mid channel bar has woody debris resting on it. It can easily be seen, particularly from the two large logs, resting at right angles to each other, that the woody debris is unchanged.

Stn 0+061, Photos 7A to C. The foreground is essentially unchanged.

Stn 0+097, Photos 8A and B. There is no change in the quantity of woody debris in the overflow channel.

Stn 0+097, Photo 9A to C. The top of the dyke in Photos 9B and 9C has parallel logs resting on it, which have not moved.

Stn 0+187, Photo 10A. The main flow in the left channel is 1 to 2 m above the flow in the right channel, as observed on May 28, 2006.

Stn 0+125, Photos 10B to D. A large debris jam formed in the left channel in 2009. In 2011, this debris jam showed no indication of having changed (note the configuration of logs).

Stn 0+155. Photos 11A to C. Photos 11A and B are closeups of the jam and Photo 11C is similar to Photo 10D.

Stn 0+278, Photos 12A to C. The parallel logs on the right bank in the foreground are identical..

Stn 0+302, Photos 13A to C. The two parallel dykes have remained unchanged.

Stn 0+316, Photos 14A to C. The outside bend is unchanged, except for an increase in vegetation in July 2011.

Stn 0+340, Photos 15A to C. Multiple parallel logs rest on the right bank at right angles to the channel. They are also unchanged.

Stn 0+609, Photos 16A to C. A small slump was observed in the right bank, in May 2006. This slump also remains the same.

Stn 0+609, Photos 17A to C. A significant pile of woody debris rests on the upstream end of a mid channel bar. Photos 17A and C clearly indicate that this pile of debris has not moved.

Stn 0+609, Photos 18A to C. The righthand bank is unchanged.

Stn 0+620, Photos 19A to C. A second small slump was observed in the right bank in May 2006. It cannot be clearly seen from the photographs, but this small slump is also unchanged.

Stn 0+620, Photos 20A to C. The same observations apply as in Photos 19A to C.

Stn 0+800, Photos 21A and B. As expected, the thick morainal blanket on the left bank remains intact.

Stn 0+810, Photos 22A and B. The two spanning logs in the backwater channel show no sign of having moved.

Stn 0+823, Photos 23A to C. The dyking along this reach has been improved and is now more than adequate.

Stn 0+844, Photos 24A and B. This is a general shot showing large boulders on the left bank, at the upper end of the golf course.

Photos 25 to 28 show sections of dyking adjacent to the subject property, that are once again, more than adequate.

## **CONCLUSIONS**

The photographic comparisons detailed above for the years 2006, 2009 and 2011 are very revealing. In general terms Crawford Creek has remained remarkably stable during this period of time, which can be regarded as representative of any 200 year event. It is indeed unusual to be able to obtain detailed documentation on 5 years of flood flows for such a creek.

In short, all woody debris resting on the true right hand bank and the mid channel bars has remained essentially undisturbed. No increase in the size of the small slumps is apparent and no new slumps have appeared. The dykes remain intact.

## **RECOMMENDATIONS**

- 1) locate all buildings on high ground.
- 2) elevate the lower floor of any building, such that the underside of it is at least one metre above the natural ground.

Therefore, it can be stated that the land may be safely used for the use intended.



## CLOSURE

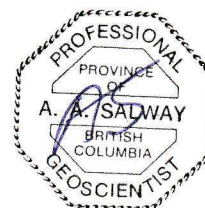
IHP has not acted for nor as an agent of the RDCK, in the preparation of this report. The content of this report substantially conforms, where applicable, with the Terms of Reference for Preparation of Flood Hazard Assessment Reports, prepared for Requests for Relaxation of Floodplain Management Provisions and Requirements for Professional Engineers/Geoscientists undertaking Geotechnical Reports/Flood Hazards Assessment Reports (RDCK, November 2004).

The stratigraphic and geologic information contained in this report was inferred from surface observations. Actual subsurface conditions may vary from those inferred from surface observations. Where more precise knowledge is required, additional investigation and review will be necessary. Surface water observations were those obtained on the survey dates and interpretations were solely based on those observations. Deviations in surface and subsurface flow may occur as a result of differing meteorological conditions, as well as development and construction activities. If conditions change substantially, IHP should be given the opportunity to observe these conditions and review the report in light of the new findings.

The services performed by IHP on this project were consistent with the level of skill ordinarily exercised by members of the profession, currently practising under similar conditions in the jurisdiction in which such services are provided. Professional judgement has been applied in developing the conclusions and recommendations in this report. No warranty or guarantee, express or implied, is made concerning the contents of this report.

This report is for the exclusive use of Bryan and Cindy Anger, and the Regional District of Central Kootenay, and should not be distributed to any other party without permission from the author. Any use which a third party makes of this report is the responsibility of the third party. IHP does not accept responsibility for damages, if any, suffered by any third party, as a result of decisions made or actions based on the report.

*Anthony A. Salway*



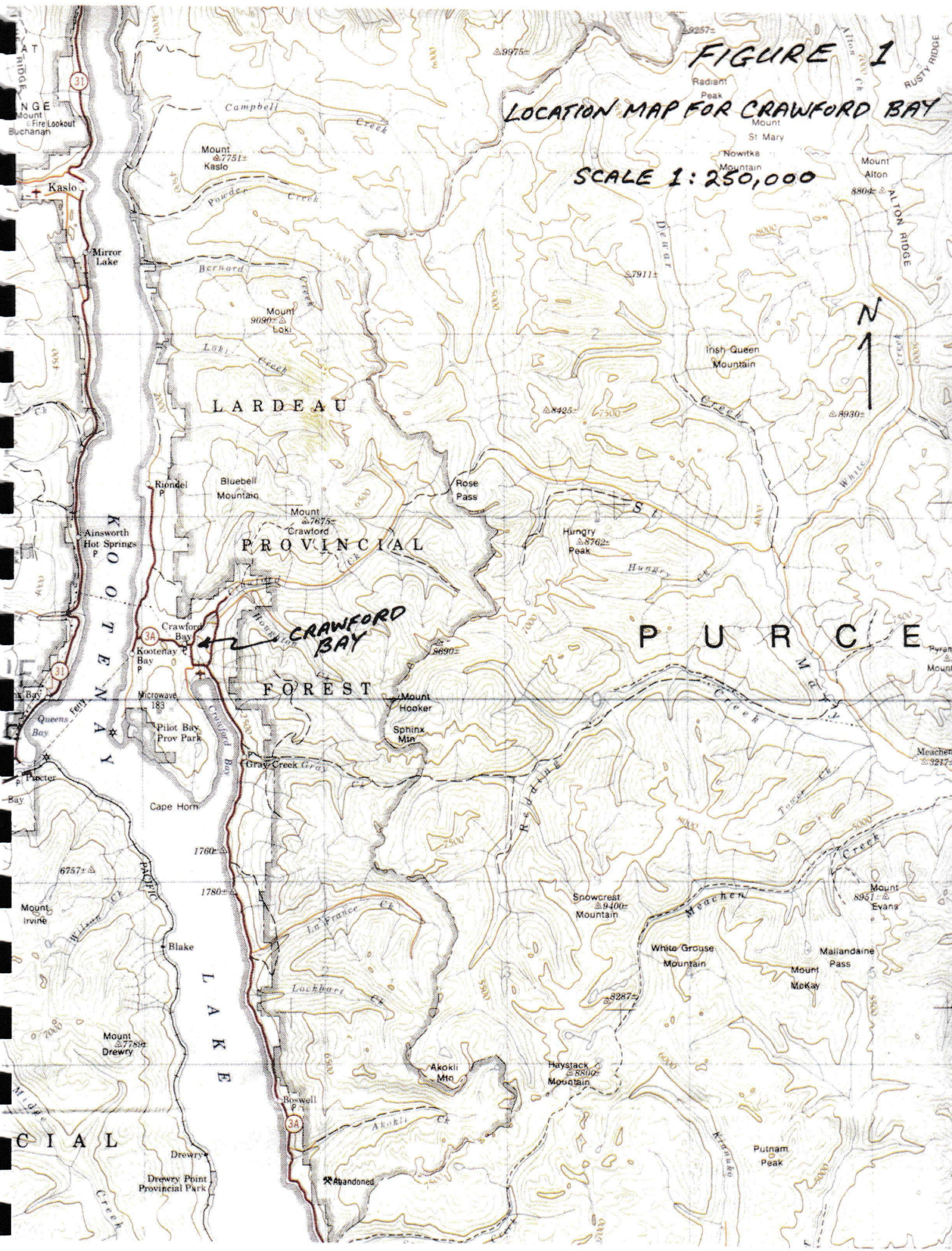

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Dr. Anthony A. Salway, P.Ge.

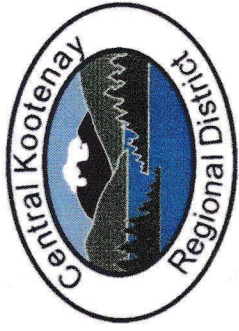


# FIGURE 1 LOCATION MAP FOR CRAWFORD BAY

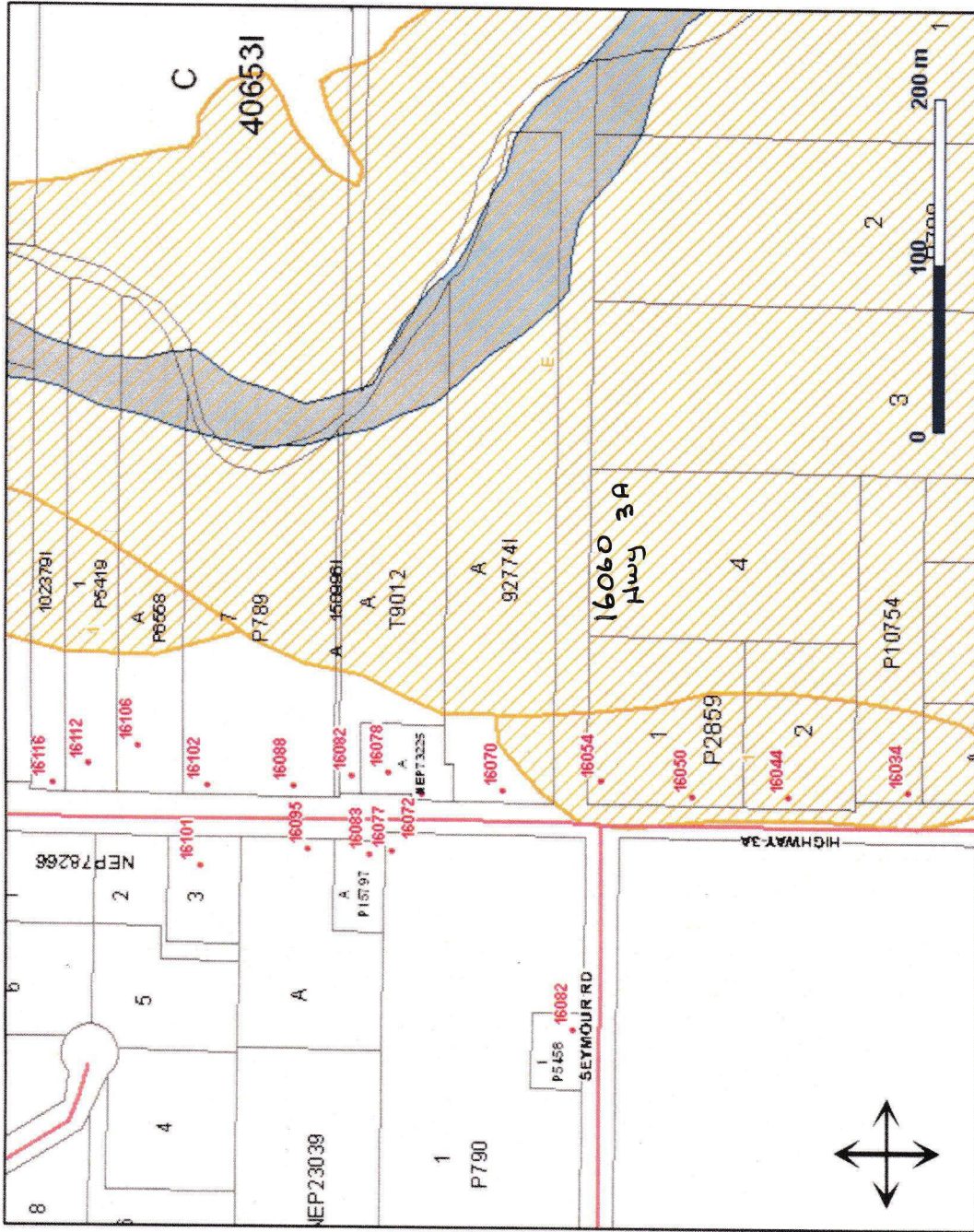
SCALE 1:250,000







- Legend**
- House Points
  - Creeks
  - Roads
  - ▭ RDCK Boundary
  - ▭ Cadastre
  - ▭ Cadastre\_Owner
  - ▭ Floodplain
  - ▭ NSFEA



Scale 1:3975

23 October 2011, 11:12

**FIGURE 2**

Disclaimer: This map was compiled by RDCK, using data believed to be accurate; however, a margin of error is inherent in all maps. This product is distributed without warranties of any kind, either expressed or implied, including but not limited to warranties of suitability of particular purpose or use.

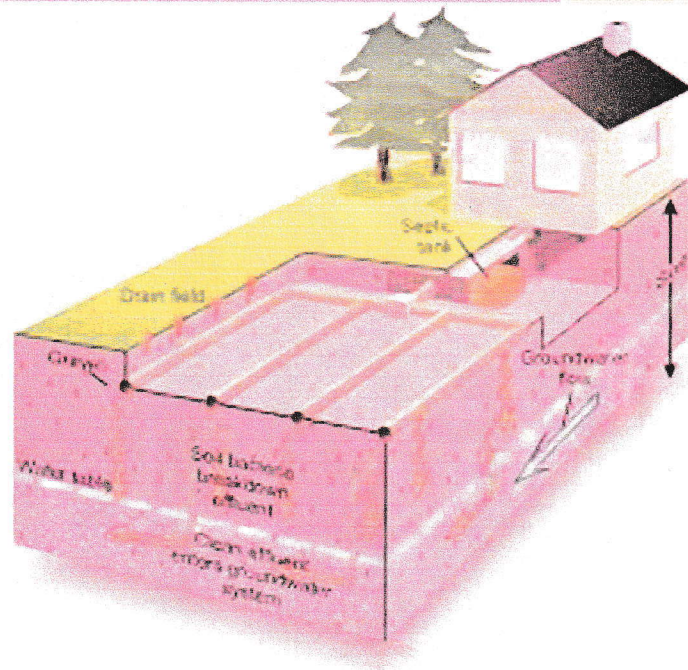
**Schedule 5: Septic Report**



# SEPTIC SITE INVESTIGATION

HCL Project # 12091

## Anger RV Park Crawford Bay, BC



Prepared By:

Highland Consulting Ltd

619B Front Street,

Nelson, BC

V1L 4B6

HIGHLAND CONSULTING LTD  
CIVIL ENGINEERING



Revision

Rev A

Date Submitted

16<sup>th</sup> May, 2012





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**APPENDICES**

**APPENDIX A – Drawings/Design Sketch**

**APPENDIX B - Legal Information**

**APPENDIX C - Soil Logs**



## 1. PROJECT BACKGROUND

It is Highland Consulting Ltd's (HCL) understanding that the proponents, Mr Bryan Anger is planning to construct a Recreation Vehicle development on Lot 4, DL 3888, KOOTENAY DISTRICT PLAN 789, PID - 016-036-557. The subject property is currently unused and has been cleared for development. The proposed development is estimated to create approximately 22 RV lots, 10 cabins and a 3 bedroom caretaker house and is planned to have a community Waste Water Treatment Plant (WWTP) and Water Treatment Plant (WTP) with associated water source supply. Phasing has not been determined at this stage, however it is believed that the development will proceed in a phased manner and follow the lot layout already created by the client.

It is also HCL understanding that the subject property is currently within the Flood plain and is required to follow the Flood Plain Management Practices as governed by Regional District of Central Kootenay (RDCK) Bylaw No. 2080, 2009.

A sewage treatment system is required for the development and it is anticipated that after treatment, disposal will be direct to ground. The sewage system design will require approval from Interior Health Agency (IHA) and designed by a Professional Engineer.

## 2. OBSERVATIONS

A site assessment was completed by Mr Paul Kernan, P.Eng of Highland Consulting Ltd on April 13, 2011 and May 28th, 2012. The assessment consisted of several test pits at 1.5m depth and several percolation tests. A full set of soil logs and associated percolation results can be found in appendix C. The location map (Appendix A) indicates the test pit locations. In addition to the above, assessment on slope grade, surrounding surface water features and relevant features such as buildings, existing septic systems, bedrock crops, potential break out points and existing/proposed wells were undertaken.

The ultimate build out of development is estimated to create approximately 20.754 m<sup>3</sup>/day (4560 lgal/Day) maximum daily flow rates which falls under Interior Health Agency (IHA) jurisdiction and is required to be designed to the sewage system Regulation and conform to the Sewage System Standard Practice Manual Version 2, September 2007. It is HCL recommendation that pre-treatment of waste water be implemented to increase performance and reduce septic field area. Therefore the cost estimates and conceptual design is based on a combined Waste Water Treatment and Ground Disposal system.

A site investigation report, soil assessment and detailed design of system is required to be filed with IHA, prior to construction. As the development type is recreational, a financial security/assurance plan is not required by IHA.

Water wells and water intakes are located greater than 30m from proposed septic field area.

## 3. EXISTING SEWAGE SYSTEM REVIEW

There is no existing sewerage system on the subject property.



#### 4. FLOW RATES

The following flow rates are obtained from the Sewage System Regulation, Standard Practice Manual Version 2. Table 2.3.

Facility Type	# Units	Estimated Maximum Daily Flow
Campground/Trailer with all services(non year round)	22	22 x 365L/day = 8.03 m <sup>3</sup> /day (1760 Igal/day)
Cabins	10	1 x 1136 L/day = 11.36 m <sup>3</sup> /day (2500 Igal/day)
3 Bedroom Home	1	1 x 1364 L/day = 1.36 m <sup>3</sup> /day (300 Igal/day)
	<b>Total Sewage Flow</b>	<b>= 20.754 m<sup>3</sup>/day (4,560 Igal/day)</b>

*Table 1. Estimated Maximum Daily Flow for Anger RV*

#### 5. SEWAGE SYSTEM DESIGN

##### 5.1. Hydraulic Loading Rate

A HLR for the native soils are selected from a soil analysis.

Treatment Standard	HLR	Vertical Separation	Basal Area Required
Type 1	25 L/sq.m/d (0.5 Igal/sq.ft/d)	610mm (24")	310 sq.m/d (9120 sq.ft)
Type 2	49 L/sq.m/d (1 Igal/sq.ft/d)	460mm (18")	464 sq.m/d (4560sq.ft)

*Table 2. Hydraulic Loading Rates for Anger RV*





### ***5.2. Design Calculations***

The attached sewerage system design is based on a 20,754 m<sup>3</sup>/day. There will be no garburators, water softener, suits or B & B services.

Plan set is based upon the expected flows and waste strengths provided herein for the purpose of serving 20,754 L/DAY (4,560 IGAL/DAY). Any change in usage that would affect flows or waste strength requires a review by the designer. Once a facility is placed into operation, the flows and waste strengths to the facility should be monitored to standard Practice Manual criteria. If flow or any of the effluent waste strengths exceed those listed in the design, measures should be taken to reduce these parameters to those listed on the plan set. Otherwise additional treatment capacity and plant expansion will be necessary.

The soil stratum predominantly consists of a Very Gravelly Sandy Loam, with moderate blocky type structure. The Hydraulic Loading Rate (HLR) of the native soils for type 2 effluent are given as 49 L/sq.m/day (1 Igal/sq.ft/day) for type 2 effluent, requiring a basal infiltration area of 424 sq.m (4560 sq.ft) or 572 sq.m (6156 sq.ft) for seepage bed ground disposal. The design consists of two seepage bed areas sized to 18.288m x 15.24m (60' x 50'). The seepage bed will consist of a Intermittent Sand Filter by Orenco Systems with 600mm of modified C-33 sand. The Seepage bed(s) will consist of two cells with 6 pressurized zones each.

### ***5.3. Critical Standards***

The critical Standards are highlighted in the Standard Practice Manual (SPM).



**Table 2-4 Minimum Vertical Separation (VS) for Trench, At Grade or Seepage Bed Systems**

PRE-TREATMENT AND DISPERSAL TYPE	MINIMUM VERTICAL SEPARATION IN NATIVE SOIL	MINIMUM AS CONSTRUCTED VERTICAL SEPARATION	NOTES
Type 1 or 2, gravity distribution	36" (91 cm)	36" (91 cm)	No fill to be used below gravity system. Recommended 42" (107 cm) VS in Loamy Sand (or coarser) or over fractured rock or over unconfined aquifers.
Type 1, pressure distribution	24" (61 cm)	24" (61 cm)	Recommended 30" (76 cm) minimum VS in soils coarser than Loamy Fine Sand over fractured rock or unconfined aquifers.
Type 2, pressure distribution	24" (61 cm)	24" (61 cm)	Where Type 2 effluent is applied at higher loading rates than Type 1, consideration should be given to increasing VS to ensure adequate pathogen removal, particularly in coarser soils.
Type 2, pressure distribution, reduced soil depth	18" (46 cm)	30" (76 cm)	Where native soil VS is less than 24" minimum final VS is 30" (76 cm)
Type 3, pressure distribution	18" (46 cm)	18" (46 cm)	
Type 3, pressure distribution, reduced soil depth	6" (15 cm)	24" (61 cm)	Where native soil VS is less than 12", minimum final VS is 24" (61 cm)

**Table 2-5 Minimum Vertical Separation for Sand Mounds, Sand-lined Trenches**

RESTRICTIVE LAYER/BASAL AREA SOILS	MINIMUM VERTICAL SEPARATION IN NATIVE SOIL
SHWT (Seasonal High Water Table)	10" (25 cm)
Permanent water table	24" (61 cm)
Fine sand/Loamy Fine Sand or coarser soils over: Fractured bedrock	24" (61 cm)
Fractured bedrock, under finer soils	18" (46 cm)
Non fractured bedrock or other low permeability restrictive layer	10" (25 cm)





Table 2-6 Horizontal Setback Distances for Critical Setbacks

Distance to	From dispersal system (metres/feet)				From watertight subsurface treatment tank (metres/feet)
	LAGOON	TYPE 1/2 GRAVITY DIST.	TYPE 1/2 PRESSURE DIST.	TYPE 3 PRESSURE DIST.	
Source of drinking water, well or water suction lines		30 m / 100 ft.	100 ft.		15 m / 50 ft.
High pumping rate Water Supply System well		60 m / 200 ft.			30 m / 100 ft.
High pumping rate Water Supply System well in unconfined aquifer		90 m / 300 ft.			
Break-out point or downslope drain (including perimeter drain)	15 m / 50 ft.	15 m / 50 ft.	7.5 m / 25 ft.	7.5 m / 25 ft.	1 m / 3 ft.
Fresh water	30 m / 100 ft.	30 m / 100 ft.	100 ft.		
Fresh water (seasonal)	30 m / 100 ft.	30 m / 100 ft.	15 m / 50 ft.	15 m / 50 ft.	10 m / 33 ft.
Marine water	30 m / 100 ft.	15 m / 50 ft.			

Table 2-7 Horizontal Setback Distances for other setbacks

DISTANCE TO	From dispersal system (METRES/FEET)			FROM WATERTIGHT SUBSURFACE TREATMENT TANK (METRES/FEET)
	LAGOON	TYPE 1/2	TYPE 3	
Property lines	15 m / 50 ft.	3 m / 10 ft.	1.5 m / 5 ft.	1 m / 3 ft.
Water lines (pressure)	3 m / 10 ft.	3 m / 10 ft.	1 m / 3 ft.	1 m / 3 ft.
Building or structure non-dwelling (where there is not a perimeter drain)	15 m / 50 ft.	1.5 m / 5 ft.	1 m / 3 ft.	1 m / 3 ft.
Building dwelling (where there is not a perimeter drain)	60 m / 200 ft.	3 m / 10 ft.	2 m / 6 ft.	1 m / 3 ft.
Utility services	1.5 m / 5 ft.	1 m / 3 ft.	1 m / 3 ft.	1 m / 3 ft.





Type of facility	Unit	Design Flow Rate (litres/ imperial gallons per day)	
<b>RECREATION CAMPING</b>	<b>UNIT</b>	<b>DESIGN FLOW RATE (LITRES/ GALLONS PER DAY)</b>	
Campgrounds tents only	Per site	180	39
Campground, trailers water, sewer and electrical connection at site; non year round	Per site	365	80
Having year round operation	Per site	545	120
Cabin Resort	Per person	318	70
Day camps no meal	Per person	38	8
Day camps with meals	Per person	68	15
Day camps (primitive)	Per person	40	9
Construction camps flush toilets	Per person	189	41
Construction camps no flush toilets	Per person	123	27
Youth camps	Per person	189	41
Work camps	Per bed	227	50
Luxury camps	Per person	378	83
Cottages & small seasonal dwellings, no washroom, no laundry or kitchen (central comfort station)	Per bedroom	189	42
Cottages & small seasonal dwellings, with washrooms, non commercial use (residential accessory)	Per bedroom	568	125
<b>PARKS AND PICNIC GROUNDS</b>	<b>UNIT</b>	<b>DESIGN FLOW RATE (LITRES/ GALLONS PER DAY)</b>	
Picnic and fairgrounds with bath houses, showers, toilets	Per person	38	8
Picnic and fairgrounds with toilet only	Per person	18	4
Beaches with showers & toilets	Per person	40	9
Visitor Centre	Per person	23	5
Country club Resident present	Per person	372	81
Country club Non resident	Per person	95	20
Country club Showers in use	Per fixture	1,800	395
Country club Water closet	Per fixture	550	120
Country club Lavatory	Per fixture	350	77
Country club Urinals – hand flush	Per fixture	350	77
Country clubs Showers	Per person	40	9
Country club, add for day staff	Per employee	50	11

#### 5.4. Design Rational

The available area for ground discharge is approximately 700m<sup>2</sup> (7535ft<sup>2</sup>) located on the southwest side of the subject property, therefore pre-treatment of effluent is required prior to ground discharge to reduce the overall septic field area. In addition the native soils have a percolation rate of less than 5 min/inch, therefor it is recommended to install a seepage bed with modified c-33 sand media with #100 seive fines of less than 4%.

Sewerage from the proposed development will typically be residential strength, however it is also understood that the development will contain Recreation Vehicles which may use chemicals to control odours. Although non-biodegradable chemicals are not permitted in the campground, additional provision has been taken by providing additional retainage volume in the septic tanks. In addition consideration must be given to the flow variants that may occur due to seasonal demand.





A typical WWTP would comprise of mechanical system which may include (but limited to) technology such as; (i) Activated sludge, (ii) Rotating Biological Contactor (RBC), (iii) Sequencing Batch Reactor (SBR) and (iv) Membrane Filtration. The WWTP would typically be designed as a package plant with associated pumps, tankage, and clarification process.

A biological treatment system would include (i) Sand filtration, (ii) Combined ground disposal and Treatment, (iii) Constructed Wetland Treatment and (iv) Solar Aquatic Treatment System (Living Machine).

The treated effluent will ultimately dictate the septic field area requirement. Table 2. illustrates the Hydraulic Load Rate (HLR) based on treatment standards.

As the site conditions allow for gravity collection systems, it is proposed to implement gravity mains to connect with the individual services to a common septic tank with 3 days retention time. This will eliminate the risk of relying on a pumped system. The initial investigation concludes that the soil type is predominantly sandy loam which will allow for a in ground treatment system as opposed to a mechanical system.

Due to the natural of the development consisting of seasonal use occupancy and the fluxuations of flow rates, a combined waste water treatment disposal system has been selected as the treatment type using a Intermittent Sand Filter (ISF) by Orenco Systems. The proposed treatment will treat effluent to type 2 standards (45mg/L BOD & TSS). The Operational and Maintenance (O&M) cost would also be reduced significantly.

## 6. SOIL PROFILES

Please refer to Appendix C

## 7. CONSTRUCTION NOTES

Construction of sewerage system is to comply with Standard Practice Manual, Version 2 and is required to be installed by a qualified Registered Onsite Wastewater Practitioner (ROWP) with the Installer designation. Installation must meet the requirements of the Standard Practice Manual, Version 2 and is solely the responsibility of the Installer. In addition please refer to design drawings for specific construction methods.



## **8. CLOSURE**

Thank you for the opportunity to be involved with this project. This Site Investigation Report is based on site observations and soil assessment results and although the design is based on current design standards as set out in the Standard Practice Manual, Version 2, Highland Consulting Ltd is not liable for inaccuracies in estimates provided in this design.

This Site Investigation Report has been prepared for use by Mr Bryan Anger and includes distribution or reproduction as may be required for their purposes.

Highland Consulting Ltd trusts that this Site Investigation Report meets your requirements, however if you have any questions or require further information, please do not hesitate in contacting the undersigned.

Yours sincerely,  
**HIGHLAND CONSULTING LTD**

**Paul Kernan, P.Eng, Civil Engineer**  
*Principle/Owner*