

INITIAL SEPTIC INVESTIGATION

HCL Project # 24746

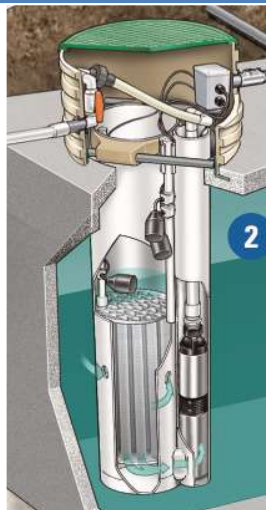
RDCK File # Z2410F

Tax Role # 21-707-03623.000

21-707-03622.000

21-707-03621.000

Spearhead-SPHD Expansion On-Site Wastewater Review



hemsworth
ARCHITECTURE

SPEARHEAD



HIGHLAND CONSULTING LTD
CIVIL ENGINEERING

Prepared By:

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V1L 4B6

Rev	Desc.	By	Date
A	For Review	PK	Jan 6, 2025
B	Draft to Client	PK	Jan 8, 2025
C	Final	PK	Jan 17, 2025



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1. PROJECT BACKGROUND

The subject property is located approximately 15 km northeast of the City of Nelson in a predominantly Rural Residential Area. The proposed development consists of three existing residential lots which are located directly west of the existing Spearhead wood product manufacturing business and directly adjacent to and accessed from Highway 3A.

Legal Description	Size
4612 Starlight Road, LOT 5 DISTRICT LOT 790 KOOTENAY DISTRICT PLAN 2449 (015-282-228)	0.53 ha
4614-4616 Starlight Road, LOT 4 DISTRICT LOT 790 KOOTENAY DISTRICT PLAN 2449 (015-289-567)	0.68 ha
4643 Highway 3A, LOT 3 DISTRICT LOT 790 KOOTENAY DISTRICT PLAN 2449 (015-289-559)	0.81 ha

It is understood that Spearhead (client) are currently investigating the feasibility to build an expansion on the site of their current factory in Nelson, BC. The new facility will both increase their existing manufacturing capacity and allow for the production of high end glulams. Located to the north of Highway 3A, the site features a significant slope from north to south and has their existing offices and shop space on it.

The proposed project will be broken into two phases:

- Phase 1 - consisting of a single story $\pm 5,300$ sq.m. of light industrial space with a steel and glulam structure with CLT wall and roof panels. Mechanical and electrical rooms as well as parking will be located below the building.
- Phase 2 - includes a ± 600 sq.m. addition to the phase 1 industrial space, and $\pm 1,800$ sq.m. of office space (with a daycare component) in a three story building.

It is the client's intention that all three phases will be designed concurrently, however only phase 1 will be built at this time.

The purpose of this report is to assess the subject property(s) capacity for an on-site septic system with additional redundancy.

2. OBSERVATIONS

A site assessment was completed by Mr Paul Kernan. P.Eng, and Jacob Hildebrand of Highland Consulting Ltd on November 19th & 20th, 2024. The assessment consisted of several test pits at 1.5m depth and several perc tests. A full set of soil logs and associated percolation results can be found in appendix B. 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 septic system for all combined phases (1 & 2) of development will provide the capacity for a 5300 m² production shop, new offices, a day care facility and a 1500 m² shop expansion. This equates to a total conservative flow of 5.78 m³/day maximum daily flow rates. Flow rates of 22.7 m³/day or less typically falls under Interior Health (IH) jurisdiction and is required to be designed to the Sewage System Regulation (SSR) and conform to the Sewage System Standard Practice Manual Version 3.



A site investigation report, soil assessment and detailed design of system are required to be filed with IH, prior to construction.

3. EXISTING SEWAGE SYSTEM REVIEW

It is beyond the scope of this report to review the existing septic system filed under IH servicing the existing spear head facility. It is understood that the proposed new facility will have its own on-site system meeting IH legislation.

4. FLOW RATES

Accommodation	# Units	Flow per unit (L/day)	Daily Flow (L/day)
Type/Phase			
Phase 1 - 5300 sq.m Production Shop			
Production (Factory) Shop Staff	65	50	3250
Phase 2 - New Offices/Day Care			
Office staff	20	50	1000
Day Care	12	65	780
Additional staff	15	50	750
		Sub Total Flow	5780

Figure 1. Theoretical Flow Rates

*Daily per capita design flow rates are obtained for Maximum Daily Flow from Sewage System Standard Practice Manual (Version 3), Ministry of Health (SPM V3). Further investigation is required.

5. SEWAGE SYSTEM DESIGN

5.1. Hydraulic Loading Rate (HLR)

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

Treatment Standard	HLR	Basal Area Required
Type 1	40 L/m ² /d	144.5 m ² /day
Type 2	65 L/m ² /d	88.92 m ² /day
Type 3	130 L/m ² /d	44.46 m ² /day

Figure 2. Hydraulic Loading Rates



Table II- 22. Maximum allowable HLR based on soil type

SOIL TEXTURE GROUP	STRUCTURE AND CONSISTENCE CATEGORY	TYPE 1 (L/DAY/M ²)	TYPE 2 (L/DAY/M ²)	TYPE 3 (L/DAY/M ²)
Very or Extremely Gravelly Sands	F or P	45	65	150
Gravelly Sands and Coarse Sand	F	40	65	130
	P	35	65	120
Sand, Loamy Sand	F	30	60	90
	P	27	50	80
Fine Sands, Loamy Fine Sands, Sandy Loams	F	27	50	80
	P	23	45	70
	VP	17	40	50
Loam, Silt Loam, Silt	F	23	40	70
	P	15	30	50
	VP	12	25	35
Clay Loam, Sandy Clay Loam, Silty Clay Loam	F	15	25	40
	P	12	15	20
	VP	NA	NA	NA
Sandy Clay, Silty Clay, Clay	F	12	15	20
	P	NA	15	15
	VP	NA	NA	NA

Table II- 23. Maximum allowable HLR based on permeability or percolation rate

KFS RANGE (MM/DAY)	PERCOLATION TEST RANGE (MIN/INCH)	TYPE 1 (L/DAY/M ²)	TYPE 2 (L/DAY/M ²)	TYPE 3 (L/DAY/M ²)
> 8000	< 1.0	45	65	150
4000 – 8000	1 – 2	45	65	130
2000 – 4000	2 – 4	35	65	100
1000 - 2000	4 – 7.5	30	60	90
550 – 1,000	7.5 – 15	27	50	80
300 - 550	15 – 30	23	40	70
150 – 300	30 – 60	15	25	40
75 – 150	60 – 120	12	15	20
< 75	> 120	NA		



Table II- 21. Soil structure and consistence categories

MOIST CONSISTENCE OR CEMENTATION	LOOSE TO FRIABLE NON CEMENTED EXTREMELY WEAKLY CEMENTED	FIRM* VERY WEAKLY CEMENTED*	VERY FIRM OR STRONGER WEAKLY CEMENTED OR STRONGER
OR DRY CONSISTENCE	LOOSE TO SLIGHTLY HARD	MODERATELY HARD*	HARD OR STRONGER
STRUCTURE			
Single grain (structure-less) soils	F	P	NA
Strong or moderate grade: Granular, Blocky or Prismatic	F	P	NA
Weak grade: Granular, Blocky or Prismatic	P	VP	NA
Weak grade Platy structure and Sandy Loam or Loam	P	VP	NA
Weak grade Platy structure, all other soils	VP	VP	NA
Moderate or Strong grade Platy structure	NA	NA	NA
Massive (structure-less) soils	VP	VP	NA
F=Favorable, P=Poor, VP=Very Poor, NA=Not allowed.			

5.2. Design Calculations

The soil stratum predominantly consists of a Gravelly Coarse Sand (please refer to Appendix B for soil data).

The Hydraulic Loading Rate (HLR) of the native soils are given as 40 L/m²/Day for type 1 effluent, requiring a basal infiltration area of 144.5 m². This may be split into several zones for equal ground distribution. For the purposes of this report a conceptual design would consist of three zones of 17m x 2.833m, each consisting of 4 runs of pressurized Sch 40 PVC laterals.

The conceptual design may consist of:

- (i) 4000 Igal concrete septic tank
- (ii) 2500 Igal concrete pump tank
- (iii) Hydro Tek Valve
- (iv) Seepage bed. 3 zones of 17m x 2.833m

The conceptual plan set is based upon the expected flows and waste strengths provided herein for the purpose of serving 5,780 L/DAY (1,271 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 are to 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.



5.3. Critical Standards

The critical Standards are highlighted in the Standard Practice Manual (SPM) version 3.

Table II- 19. Minimum required horizontal separation distances

MINIMUM HORIZONTAL DISTANCE TO	FROM DISPERSAL SYSTEM	FROM WATERTIGHT TREATMENT OR PUMP TANK
	METRES	METRES
Water sources and wells		
Surface source of drinking water	30	15
Domestic water supply well ¹	30	30
Domestic water supply well, high pumping rate ²	60	30
Domestic water supply well, high pumping rate, in unconfined aquifer ²	90	30
Irrigation well or open loop geothermal well	15	7.5
Deep monitoring well or closed loop geothermal well ³	6	6
Shallow monitoring well ⁴	3	0
Drinking water lines and cisterns		
Drinking water suction line	30	15
Drinking water suction line, sleeved ⁵	7.5	3
Drinking water line, under pressure	3	3
Drinking water line, under pressure, sleeved ⁵	1	1
Drinking water supply cistern, below ground	15	3
Water bodies and surface breakout		
Permanent fresh water body ⁶	30	10
Intermittent fresh water body ⁷	15	10
Marine water body ⁸	15	7.5
Break-out point or downslope drain ⁹	7.5	0



Table III- 16. Guidelines for minimum horizontal separation distances

DISTANCE TO	FROM DISPERSAL SYSTEM (METRES)	FROM LAGOON (METRES)	FROM WATERTIGHT SUBSURFACE TREATMENT TANK (METRES)
Property lines	3	*	1
Building or structure (where there is not a perimeter drain)	1	*	1
Dispersal system (including other dispersal system)	6	6	3
Buried utility services	1	1	1
Drinking water supply cistern, at or above ground	1	*	1

5.4. Design Rational

Due to the size of the lot, soil depth and proposed future development, an area has been identified on a gentle slope to the North-West corner of the property Lot 5 Plan NEP14442, District Lot 790, Kootenay Land District. As the soil type is predominantly a gravelly coarse sand, it is recommended to pressure distribute the effluent over the contours to allow equal distribution and slow the percolation rate so that proper treatment can be maintained. Drainage solutions are to be implemented around the proposed septic field(s). Sewerage from the proposed development will typically be residential strength only.

5.5. Well Locations

The closest point of diversion and well location(s) are greater than 30m from proposed septic field.

5.6. Linear Loading Rate (LLR)

The required Linear Loading Rate from SPM version 3 Table 27/28 are indicated as (5,780 L/day / 400 L/day/m= 14.45 m). Therefore, the minimum contour length will be met, and ground water mounding will not affect the treatment.



5.7. Monitoring Requirements

SYSTEM OR TREATMENT TYPE	INSPECTION (BY MAINTENANCE PROVIDER)	FLOW	BOD AND TSS	FECAL COLIFORMS	NOTES
Type 1	12 months	12 months			
ET or ETA	6 months	6 months			During the wet season
Type 2	6 months	6 months	6 months		
Type 3	1 month, 7 months, 13 months	1 month, 7 months, 13 months	1 month, 7 months, 13 months	1 month, 7 months, 13 months	
Lagoon	12 months				Flow monitoring for diagnosis only

6. SOIL PROFILES

Please refer to Appendix B for full details.

7. CONCLUSION

The subject property (PID 015-282-228, 015-289-567, & 015-289-559) has the on-site septic capacity for the proposed Spearhead expansion project with a theoretical design flow rate of **5780 L/day**. The septic may consist of pressurized distribution Type 1 dispersal field(s) and provided the system is designed correctly by qualified persons, will meet Sewerage System Regulation and not pose a health hazard. Provided the foregoing recommendations are followed, the subject property may be used safely for the intended use.

8. CLOSURE

This report has been prepared by Highland Consulting Ltd (HCL) for use by the client and includes distribution or reproduction as may be required for their purposes. The review, assessments, and evaluations contained herein have been carried out in accordance with generally accepted engineering practice. Engineering judgment based on similar experience has been applied in developing recommendations and conclusions. No other warranty is made, either expressed or implied. The disclosure of any information contained within report is the sole responsibility of the client. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. HCL accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report.

LIMITATION OF LIABILITY – Notwithstanding any other provision of this agreement, the total liability of Highland Consulting Ltd for liabilities, claims, judgements, demands and causes of action arising under



or related to this agreement, whether based in contract or tort, shall be eliminated to the total compensations actually paid to Highland Consulting Ltd for the services hereunder. All claims by CLIENT shall be deemed relinquished unless filled within one (1) year after substantial completion of the services hereunder.

Highland Consulting Ltd trusts that this 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
Permit to Practice # 1002652

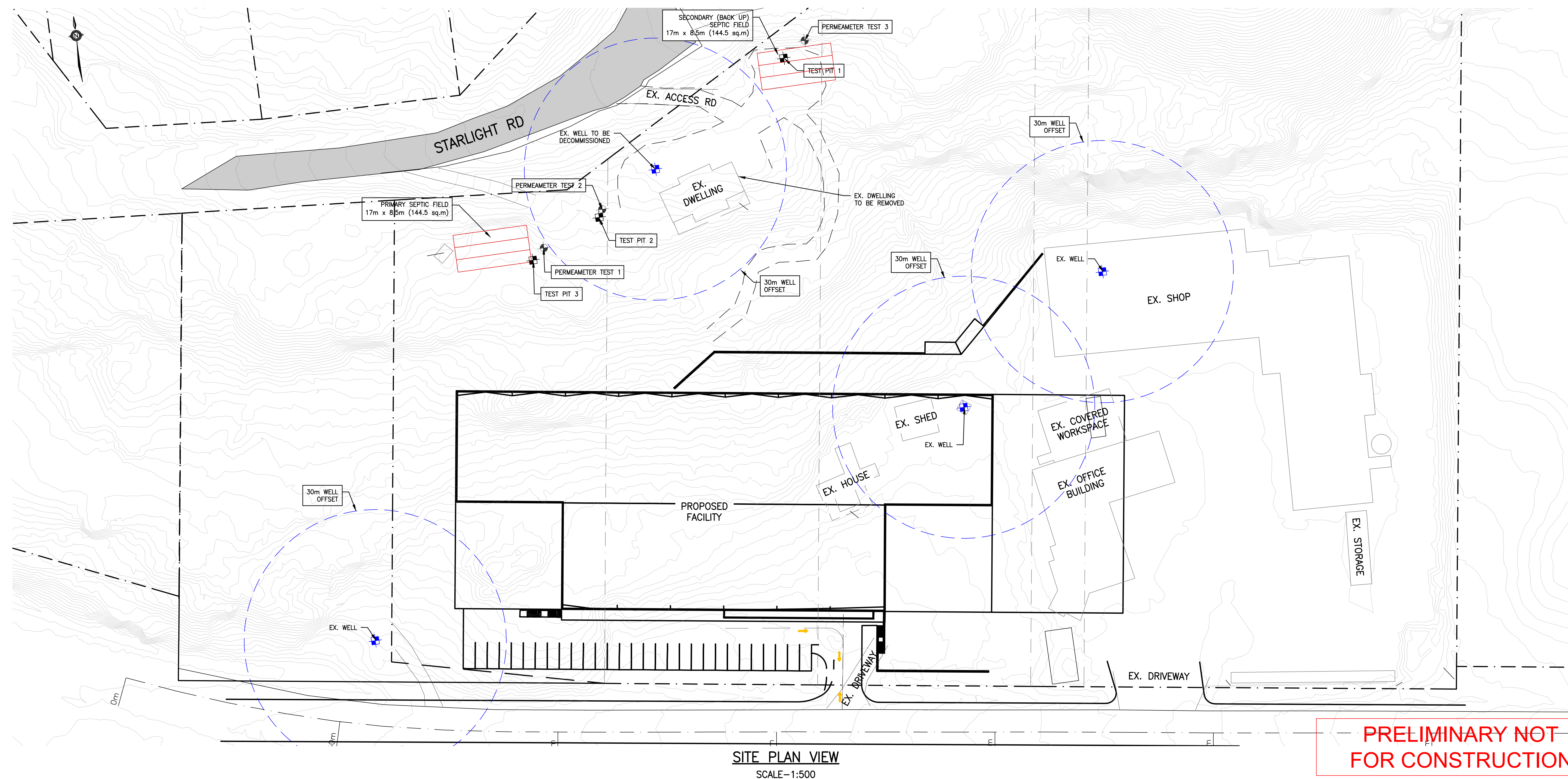
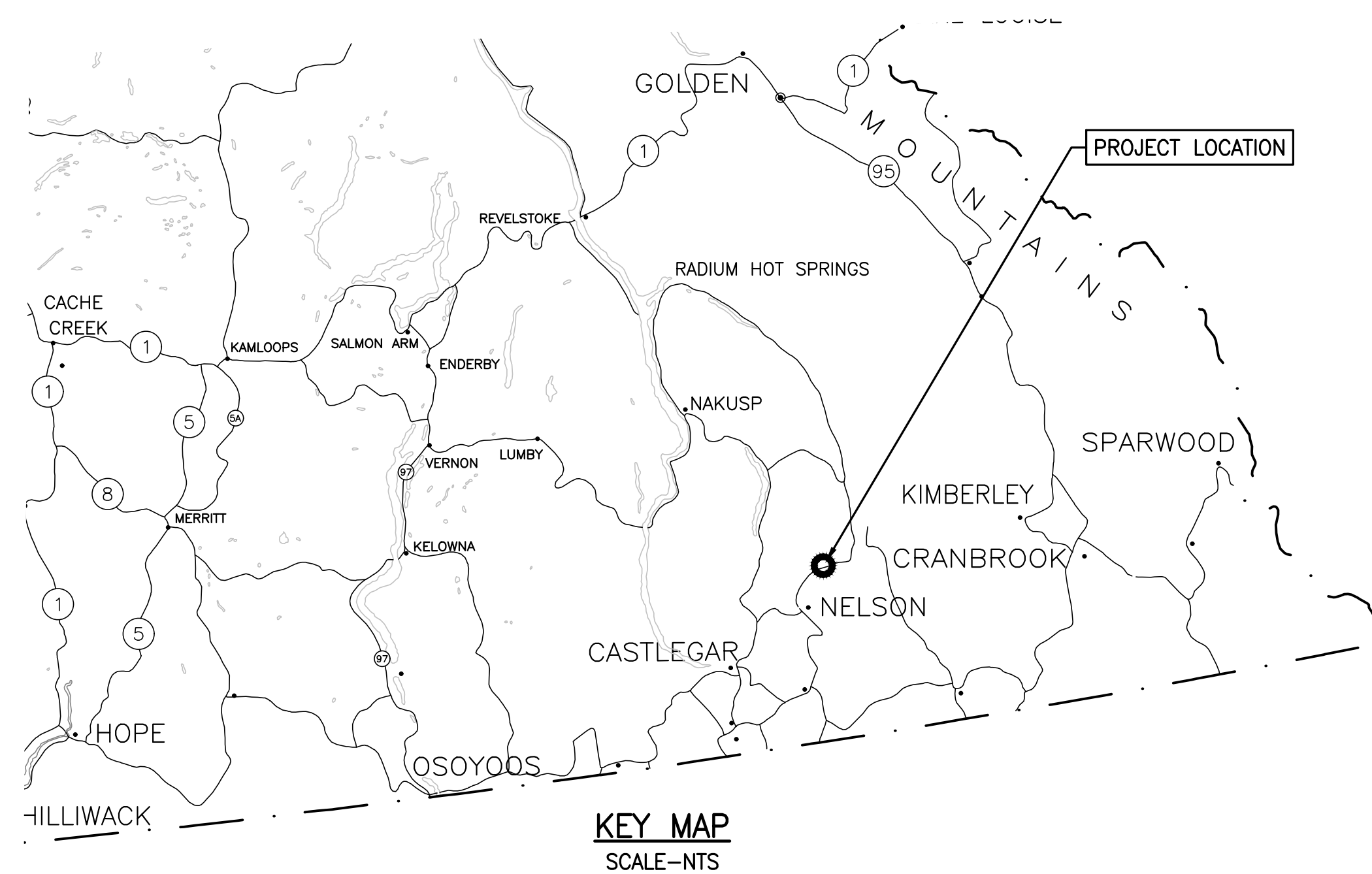


Permit to Practice No.1002652

Paul Kernan, P.Eng, Civil Engineer
Principal/Owner

APPENDIX A

Drawings/Design Sketch



PRELIMINARY NOT
FOR CONSTRUCTION

LEGEND:

GENERAL NOTES:

ALL DIMENSIONS ARE SPECIFIED IN METERS UNLESS OTHERWISE STATED.

LOT PLAN BASED ON ROCK MAPPING DATA AND
SURVEY CARRIED OUT BY CLIENT. HIGHLAND
CONSULTING IS NOT LIABLE FOR INACCURACIES IN
DRAWING.

SCALE IS BASED ON ARCH EXPANDED D (24"X36')
DRAWINGS.

NO VARIATION TO THIS DRAWING SHALL BE PERMITTED UNLESS AUTHORIZED BY ENGINEER IN WRITING

THE CONCEPTUAL DESIGN IS BASED UPON THE EXPECTED FLOWS AND WASTE STRENGTHS PROVIDED HEREIN FOR THE PURPOSE OF SERVING FLOWS OF 5780L/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 INFLUENT 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.

AT CROSSINGS WHERE THE VERTICAL SEPARATION BETWEEN THE WATER MAIN AND THE SEWER MAIN IS LESS THAN 450mm, ALL JOINTS WITH IN 3.0m OF THE CROSSING SHALL BE WRAPPED WITH DENSOTAPE OR EQUIVALENT.

NO CLEANING CHEMICALS TO BE USED IN HOME CONTAINING ANTIMICROBIAL CHEMICALS INCLUDING (BUT NOT LIMITED TO) FORMALDEHYDE, RESTAURANT CLEANERS, FLOOR WAX, STRIPPER AND OTHER

SEPTIC TANK TO MEET SPECIFICATIONS OF SEWAGE
SYSTEM STANDARD PRACTICE MANUAL AND CURRENT
CSA STANDARDS.

SEWAGE SYSTEM TO BE INSTALLED BY AUTHORIZED PERSONS

ALL SETBACKS TO MEET CRITERIA AS SET OUT IN
STANDARD PRACTICE MANUAL 3

EXACT LOCATION OF PROPOSED SEPTIC SYSTEM TO
BE CONFIRMED BY ENGINEER/ DESIGNER PRIOR TO
CONSTRUCTION.

AERIAL IMAGERY FROM RDCK MAPPING IMPORTED
DECEMBER 16, 2024

[illegible]

B	ISSUED TO CLIENT	16-JAN-2
A	FOR REVIEW	20-DEC-2
REV.	DESCRIPTION	DATE
	ISSUED	



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SEA

PROJECT TITLE
SPEARHEAD EXPANSION
STARLIGHT RD, NELSON
SEPTIC

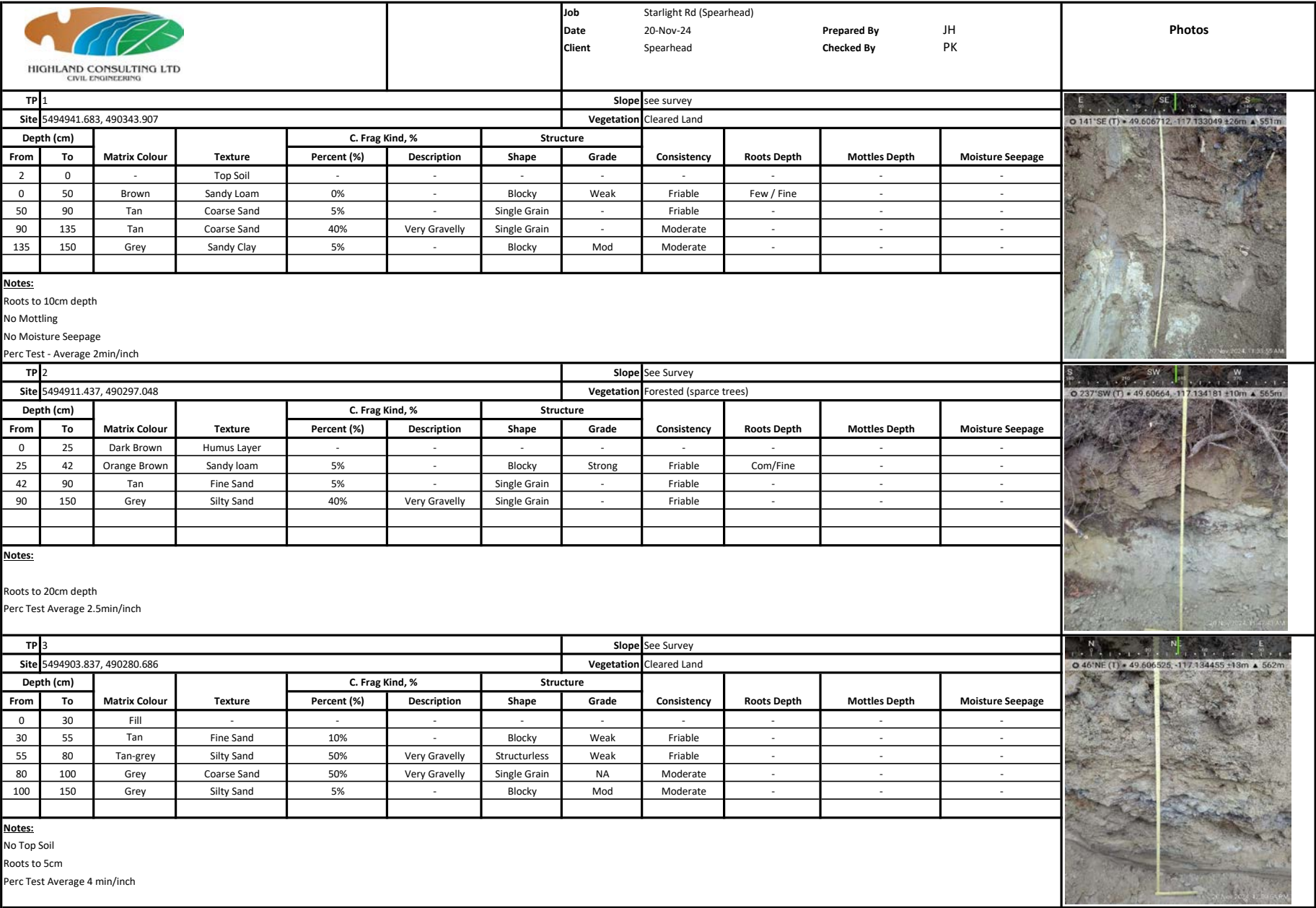
DRAWING TITLE	GENERAL LAYOUT
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CLIENT NAME SPEARHEAD

SCALE: REFER TO DWG	JOB No. 24746
DRAWN: JH	
CHECKED: PK	
DATE: 16-Jan-25	
PLOT: 16-Jan-25	DWG. No. S01

APPENDIX B

Soil Logs



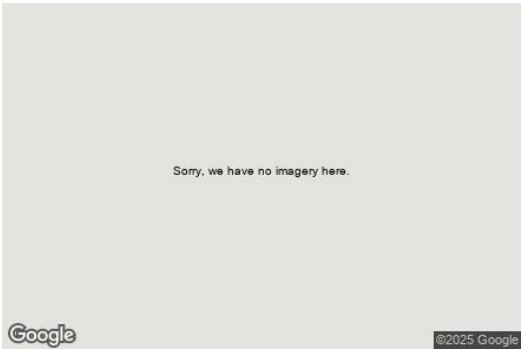
APPENDIX C

Legal Information



The information in this report is provided for your information and convenience. If the information has been altered for any reason from the format in which it was originally received verification may be required by BC Assessment. In any case of doubt, the official BC Assessment records shall prevail.

4612 STARLIGHT RD KOKANEE CREEK
Area-Jurisdiction-Roll: 21-707-03623.000



Total value \$170,000

2025 assessment as of July 1, 2024

Land	\$170,000
Buildings	\$0

Previous year value	\$164,000
Land	\$164,000
Buildings	\$0

Property information

Year built	
Description	Vacant Residential Less Than 2 Acres
Bedrooms	
Baths	
Carports	
Garages	
Land size	1.33 Acres
First floor area	
Second floor area	
Basement finish area	
Strata area	
Building storeys	
Gross leasable area	
Net leasable area	
No.of apartment units	

Legal description and parcel ID

LOT 5, PLAN NEP2449, DISTRICT LOT 790, KOOTENAY
LAND DISTRICT
PID: 015-282-228

Sales history (last 3 full calendar years)

Aug 29, 2022	\$170,000
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Manufactured home

Width
Length
Total area

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4614 STARLIGHT RD KOKANEE CREEK VIL 6N4
Area-Jurisdiction-Roll: 21-707-03622.000



Total value \$614,000

2025 assessment as of July 1, 2024

Land	\$219,000
Buildings	\$395,000

Previous year value	\$634,000
Land	\$212,000
Buildings	\$422,000

Property information

Year built	1957
Description	1 STY Duplex - Standard
Bedrooms	2
Baths	1
Carports	
Garages	
Land size	1.67 Acres
First floor area	826
Second floor area	
Basement finish area	
Strata area	
Building storeys	1
Gross leasable area	
Net leasable area	
No.of apartment units	

Legal description and parcel ID

LOT 4, PLAN NEP2449, DISTRICT LOT 790, KOOTENAY
LAND DISTRICT
PID: 015-289-567

Sales history (last 3 full calendar years)

Mar 8, 2024	\$625,000
Feb 8, 2024	\$532,900

Manufactured home

Width
Length
Total area

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4643 HIGHWAY 3A KOKANEE CREEK VIL 6N4
Area-Jurisdiction-Roll: 21-707-03621.000



Total value \$684,000

2025 assessment as of July 1, 2024

Land	\$244,000
Buildings	\$440,000

Previous year value	\$671,000
Land	\$236,000
Buildings	\$435,000

Property information

Year built	2008
Description	1 STY house - Standard
Bedrooms	2
Baths	2
Carports	C
Garages	
Land size	2 Acres
First floor area	1,330
Second floor area	
Basement finish area	
Strata area	
Building storeys	1
Gross leasable area	
Net leasable area	
No.of apartment units	

Legal description and parcel ID

LOT 3, PLAN NEP2449, DISTRICT LOT 790, KOOTENAY
LAND DISTRICT
PID: 015-289-559

Sales history (last 3 full calendar years)

No sales history for the last 3 full calendar years

Manufactured home

Width
Length
Total area

Register with BC Assessment



Search properties on a map



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