SAVE-ON-SEPTIC SERVICES INC

Wild Rose Garden Centre
750 Tin Can Alley
Gabriola Island, B.C.

October 12, 2023

Project Reference: Feasibility study and Assessment of site conditions on Lot B, Plan 60373 for suitability for development of a wastewater treatment and dispersal system- 750 Tin Can Alley, Gabriola Island, B.C.

Attn: Kent Moen,

Background:

Mr. Kent Moen (owner) is proposing a residential/commercial mixed-use development for retail and food services on Lot B, located at 750 Tin Can Alley near the village. This report will provide information on the feasibility of providing an on-site wastewater treatment and dispersal system for this project. I will provide the soils testing data and a conceptual design of the wastewater treatment and dispersal system that will meet or exceed the requirements of the Standards of Practice Manual (SPM). I will outline our approach to minimize the environmental impact on the site.

Scope of Work:

The soil investigation involved digging 1.2m deep test pits with a machine to determine the soil characteristics and ability to renovate wastewater. I was also investigating the winter water table depths and surface features such as storm water run-off impact, proximity to a drinking water source and property boundaries. There appears to be a layer of solid rock at various depths that tends to slope in a southerly direction towards North Road. There is a drinking water well 100 meters south of the test area and we would need to minimize the impact on this potable water source. 10 test pits were dug and logged for characteristics and are included in this report. To test the permeability of the soils 4 test holes were dug and perk tests performed to document the suitability of the soil to renovate wastewater. The site conditions and soils will meet the strict guidelines set out in the SPM to minimize any environmental impact. This report also reviews the various options for pre-treatment and discuss the most appropriate level of treatment prior to dispersal.

Site Evaluation:

The property tends to slope towards the southwest corner at an overall slope of 7-8% and the upper half having a gentler slope about 5%. The site has had impact from tree removal and vehicle traffic from the garden centre. The soils in the test area located neat the northern boundary appears to be less impacted by development.

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I saw no evidence of stormwater erosion or impact from stormwater runoff and the site appears to be well drained. According to regional maps the principal soil type is a well drained Saturna soil. The location of the well was situated about 100 meters downslope along the eastern boundary. No other neighboring wells were encountered during this investigation. This well exceeds the setback distance (30m) and should pose no environmental impact from the dispersal area. There was a large outcrop of bedrock encountered in several locations that limit the area for dispersal, however the design shall take this into consideration to avoid discharging into these areas where thin soils are present. Both the dispersal area and the receiving area shall have sufficient depths of soil to adequately renovate the wastewater discharge to mitigate the environmental impact on the site. The northern neighbouring property has a pipe discharging stormwater onto the site and into a rock pit. This rock pit will be diverted to a new location that does not impact the dispersal site.

Test Pits:

There are a total of 10 test pits that were machine dug to a depth of about 1.2m or less if a limiting layer was encountered. There were 2 that were too shallow due to solid rock near the surface (see sketch) and were mapped as an area to avoid for development. The remaining 8 test pits revealing the stratified layer and soil types were documented. (See attached soil Logs) These test pits were then compared with the SPM requirements and other factors such as root penetration into the soils as well as soil mottling indicating the presence of the winter watertable. The results of this testing determined that there was 64cm-112cm of permeable soil overlaying a restrictive layer such as solid sandstone rock or winter watertable. The SPM requires a minimum separation of 60 cm for type 1,2&3 effluent discharges. We have sufficient depth for all 3 types with a sand filled bed design per the SPM. There is sufficient area to support a type 1 drain field design. Based on calculated daily flows of 9095L per day and soil permeability the required field length would need to be approximately 250m (820 feet) in total with a minimum length per run of 27.6m (90.6 feet) to meet the linear loading requirements of the SPM.

Percolation Testing:

There were 3 percolation tests performed on the site within the test area.(see attached test results) This test determines the ability of the soil to effectively move downward through the soil to renovate the wastewater prior to coming into contact with the under-laying ground water. The more porous the soils allow the wastewater to move quickly down through the soil. In our case the soils proved to be in the class of coarse sand and has a very high permeability. This class of soils allows the wastewater to move through the soil particles to quickly thus only partially treating the wastewater. In order to overcome this we need to pressure dose the field and limit the amount of effluent per dose (micro-dosing) using a timer in the control panel. This will allow the wastewater to be held between the soil particles by osmosis allowing it to come into contact with the micro-organisms for a longer duration thus providing better treatment of the wastewater prior to reaching the limiting layer. For coarse textured soils the hydraulic loading rate would be 40L/m2/ day.

Percolation Results:

PH #1- Average 1:50 mins. /inch
PH #2- Average 2:00 mins. /inch
PH #3- Average 1:15 mins. /inch

Coarse Sandy Soils:

The soil log results indicate that the characteristics of the permeable layer encountered on site are predominantly coarse sand with 10-15% cobbles. This has a loading rate in the SPM of 40L/m2/day for Type 1 discharges. These soils are very well drained and with certain design considerations are capable of effectively removing contaminants from the wastewater. These design considerations are pressure dosing and timed dosing per the SPM.

Daily Design Peak Flows:

The estimated flows generated from the proposed development are as follows:

-60 Seat restaurant- 60X90L/person -5400L (Phase 2)
-Retail garden centre and 1 bedroom residential- Retail- 139m2 x 5L= 695L
Apartment- 600L
-Coffee shop/Bakery 120persons x 20L= 2400L
TOTAL 9095L per day

Characteristics of the Wastewater:

The retail space and residential suite are both considered to be residential strength wastewater. The coffee shop and restaurant are considered to discharge high strength wastewater. This high strength component in the wastewater discharge would be required to be pre-treated to reduce both the FOG (Fats Oils & Grease) and the high BOD/TSS from the waste stream prior to discharging into the drain field (Must meet Type 1 treatment levels). This involves providing grease interceptor tanks and type 2 aeration and settling to reduce it to acceptable levels. An engineer is required to have oversight in the design of this high strength treatment system per the SPM.

Area for Drain Field:

The area of infiltrative surface requirements for Type 1 effluent discharge is as follows:

$$AIS = \frac{9095L}{40} = \mathbf{227.38\ m2}$$

$$\text{Total Length of Field} = \frac{227.38m2}{0.91m} = \mathbf{249.87}\ \text{Lineal Metres (820 lineal feet)}$$
(0.91m (Maximum Width of Trench per SPM)

$$\text{Linear Loading Length} = \frac{9095L}{330} = \mathbf{27.56m}$$ (This is the minimum length of trench per SPM)

The drain field laterals would be 96 feet long and center fed from a central 2'' Dia. manifold. There would be 9 laterals evenly spaced at 6 feet on centre. The area required for the drain field would need to be 100 feet long by 54 feet wide and be positioned perpendicular to the slope. The position of the drain field would have to meet all setback requirements of the SPM. The test area would be large enough to accommodate this field design. There is also an area eastern boundary that is large enough and could be developed for a 50% reserve area should problems arise.

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Local Area Water Wells:

There is only one well within close proximity of the wastewater system. This drilled well services our site (Lot B) and is located downslope approximately 100m away from the proposed drain field test site. The Lot above (Lot C) is served by a rainwater catchment system with a cistern tank. The location of the only well in the area exceeds the 30m setback requirements of the SPM.

Appropriate Design Considerations:

-All components of the wastewater system meet or exceed the requirements of the SPM.

-Providing the appropriate level of treatment for the high strength component the project and engaging an engineer to review the proposed design per the SPM.

-Provide redundancy in the system to reduce the risk of untreated wastewater discharges on the site.

Conclusion:

Lot B at 750 Tin Can Alley has sufficient potential to disperse pre-treated wastewater in the ground safely without any degradation of the local environment or contamination of the local drinking water source that under-lays the site. All of the setback and regulatory requirements within the SPM can be met by the designer. Since the high strength wastewater is being proposed for this development a review of the design is required and all documents must be stamped by a professional engineer prior to submission to Vancouver Island Health Authority.

Proposed Design Options:

The residential/ retail portion of the discharge can be Type 1 treatment prior to dispersal. The high strength portion of the discharge must undergo further treatment to reduce the wastewater strength to meet or exceed Type 1 treatment levels. This wastewater must have reductions of FOG (Fat, Oils & Grease) and BOD/TSS to 20mgL FOG/ 300 BOD/ 250 TSS to be able to safely be dispersed in the drain field without degradation to the receiving environment.

Environmental Impact:

Once discharges start the pre-treatment tanks and treatment devises will provide a wastewater discharge suitable to be dispersed into the ground. Once dispersed into the soils natural processes will complete the full renovation of the wastewater. The risk to the environment shall be eliminated by choosing the most effective pre-treatment devices to reduce the wastewater to Type 1 treatment levels prior to discharge.

Operation & Maintenance:

The SPM dictates that on-going maintenance must be performed on all septic systems to ensure proper operating levels are met. The bi-annual maintenance must be performed by a qualified service provider (ROWP). To ensure proper levels of treatment are being met it would be recommended that testing of the wastewater be performed annually. An Operations and Maintenance manual will be provided to the owner by the designer per the SPM.

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If you have any questions, please contact me at 250-748-5676

Kind Regards,

Steve Brydges, ROWP
Save On Septic Services Inc.

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SEE SKETCH PLAN FOR LOCATIONS.

Observed Soil Conditions

Test Pit Logs

Date*: SEPT. 21/23 Site: 750 TIN CAN ALLEY Logged by: ~~Mike~~ SDB

TP# 1 Pit Location: S.W. END OF D/FIELD SITE Slope: ~~8~~ 6-7%

Soil Horizons (depths measured in cm / m / in / ft)

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	1"	~~BTown~~	Topsoil	SG.	loose	1%	YES	NØ	NØ
1"	11"	L.Brown	S.Loam	SG	loose	5%	YES	Ø	Ø
11"	35"	Brown	C.Sand.	SG.	loose	10-15%	YES	Ø	Ø
35"+		Tan	Clay/Silt	massive	hard	5%	NO	yes	Ø
				Roots to 35" / W/T @ 35"					

Notes

TP # 2 Pit Location: EAST OF TH# 1 Slope: 7-8%

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	5"	D.BROWN	TOPSOIL	SG.	LOOSE	2%	YES	NØ	NØ
5"	25"	TAN	S.LOAM	SG.	LOOSE	5%	YES	Ø	Ø
25"		SOLID SANDSTONE ROCK				~~100~~ N/A	YES	Ø	Ø
				Roots to 25"		W/T not present			

Notes

Based on USDA *Field Book for Describing and Sampling Soils* (2002).
* Date water table measured

REGISTERED ONSITE WASTEWATER PRACTITIONER
STEVE D. BRYDGES
IN PL
OW0681
ASTTBC

SEE SKETCH PLAN FOR LOCATIONS.

Observed Soil Conditions

Test Pit Logs

Date*: SEPT. 21/23 Site: 750 TIN CAN ALLEY. Logged by: ~~Mike~~ SDB

TP# 3 Pit Location: 50' W OF EAST BOUNDARY Slope: ~~8~~ 8%

Soil Horizons (depths measured in cm / m / in / ft)

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	2"	Brown	Topsoil	S.G.	Loose	1%	yes	ø	ø
2"	26"	Tan	C. Sand.	S.G.	"	5-10%	yes	ø	ø
26"		SOLID	SANDSTONE ROCK @ 26"						
			Roots to 26" NO W/T.						

Notes

TP # ~~3~~ 4 Pit Location: W. of E. ℄ 10' Slope: 6-7%

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	3"	BROWN	Topsoil	S.G.	Loose	2%	yes	ø	ø
3	44"	Brown	C. Sand	S.G.	Loose	2-4%	yes	ø	ø
		Clayey	Silt @ 44" w mottles			—		.	
			Roots to 44"						

Notes

Based on USDA *Field Book for Describing and Sampling Soils* (2002).
* Date water table measured

REGISTERED ONSITE WASTEWATER PRACTITIONER
ASTTBC
STEVE D. BRYDGES
IN PL
OW0381

SEE SKETCH FOR LOCATIONS

Observed Soil Conditions

Test Pit Logs

Date*: SEPT. 21/23 Site: 750 TIN CAN ALLEY Logged by: ~~Mike~~ SDB

TP# 5 Pit Location: 9' from E P/L. Slope: 8 6%

Soil Horizons (depths measured in cm / m / in / ft)

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	2"	Brown	Topsoil	S.G.	Loose	1%	yes	ø	ø
2"	34"	Brown	C. Sand	SG	"	5%	yes	ø	ø
34"	49"	Tan	Silt Loam	SG.	"	10%	yes	yes	ø
			Roots to 44"						
			Mottles @ 45"						

Notes

TP # 6 Pit Location: 13' from E. PL Slope: 6%

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	29"	BROWN	C. Sand	SG.	LOOSE	5%	yes	ø	ø
29"	37"	Tan	Silt Loam	SG.	LOOSE	5-10%	ø	yes	ø
37"+		SOLID	SANDSTONE ROCK						
			Roots to 29" / Mottles @ 29"						

Notes

Based on USDA *Field Book for Describing and Sampling Soils* (2002).
* Date water table measured

REGISTERED ONSITE WASTEWATER PRACTITIONER
ASTTBC
STEVEN D. BRYDGES
IN PL
OW0081

SEE SKETCH FOR LOCATIONS.

Observed Soil Conditions

Test Pit Logs

Date*: SEPT. 21/23 Site: 750 TIN CAN ALLEY Logged by: ~~Mike~~ SDB

TP# 7 Pit Location: 49' W of E.R Slope: ~~8~~ 6-7%

Soil Horizons (depths measured in cm / m / (in) / ft)

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	14	Brown	C. Sand	S.G.	Loose	5%	yes	Ø	Ø
14"+		Solid Sandstone Rock							
			Hole is too shallow						
			Roots to 14"						

Notes

TP # 8 Pit Location: 98' W. of E.R Slope: 6%

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	17"	Brown	C. Sand	S.G.	Loose	5%	yes	Ø	Ø
17"+		Sandstone Rock							
			Hole is too shallow						
			Roots to 17"						

Notes

Based on USDA *Field Book for Describing and Sampling Soils* (2002).
* Date water table measured

REGISTERED ONSITE WASTEWATER PRACTITIONER
AST TBC
STEVE D. BRYDGES
IN PL
OW0381

SEE SKETCH FOR LOCATIONS.

Observed Soil Conditions

Test Pit Logs

Date*: SEPT. 21/23 Site: 750 TIN CAN ALLEY Logged by: ~~Mike~~ SDB

TP# 9 Pit Location: 42' S of N P/L Slope: 7-8%

Soil Horizons (depths measured in cm / m / in / ft)

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	2"	Brown	Topsoil	SG	Loose	2%	yes	Ø	Ø
2	29"	Brown	C. Sand	SG.	Loose	5%	yes	Ø	Ø
29	37	Tan	F. Sand	SG.	Hard.	5-10%	Ø	yes	Ø
37"+		Solid Sandstone							
		Roots to 29" / Mottles @ 29"							

Notes

TP # 10 Pit Location: 43' S of N P/L Slope: 6-8%

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	1"	Brown	Topsoil	SG			yes	Ø	Ø
1	30"	Brown	C. Sand	SG			yes	Ø	Ø
30-35		Tan	Silt	SG.			Ø	yes	Ø
35+		Solid sandstone rock							
		Roots to 30" / Mottles @ 30"							

Notes

Based on USDA *Field Book for Describing and Sampling Soils* (2002).

* Date water table measured

ONSITE WASTEWATER PRACTITIONER · REGISTERED · ASTTBC · STEVE D. BRYDGES · IN PL · OW0081

Observed Soil Conditions

Test Pit Logs

Date*: SEPT. 21/23 Site: 750 TIN CAN ALLEY Logged by: ~~Mike~~ SDB

TP# 11 Pit Location: 31' E. OF TH#9 Slope: 0 7-8%

Soil Horizons (depths measured in cm / m (in) / ft)

Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage
0	2"	Brown	Topsoil	SG.	Loose	2%	yes	Ø	Ø
2"	27"	Brown	C. Sand	SG.	Loose	10%	yes	Ø	Ø
27"	36"	Tan	F. Sand	SG.	Hard	5-10%	Ø	yes	Ø
		Solid	sandstone @ 36"						
			Roots to 27" w mottles @ 27"						

Notes

TP # 2 Pit Location: Slope:

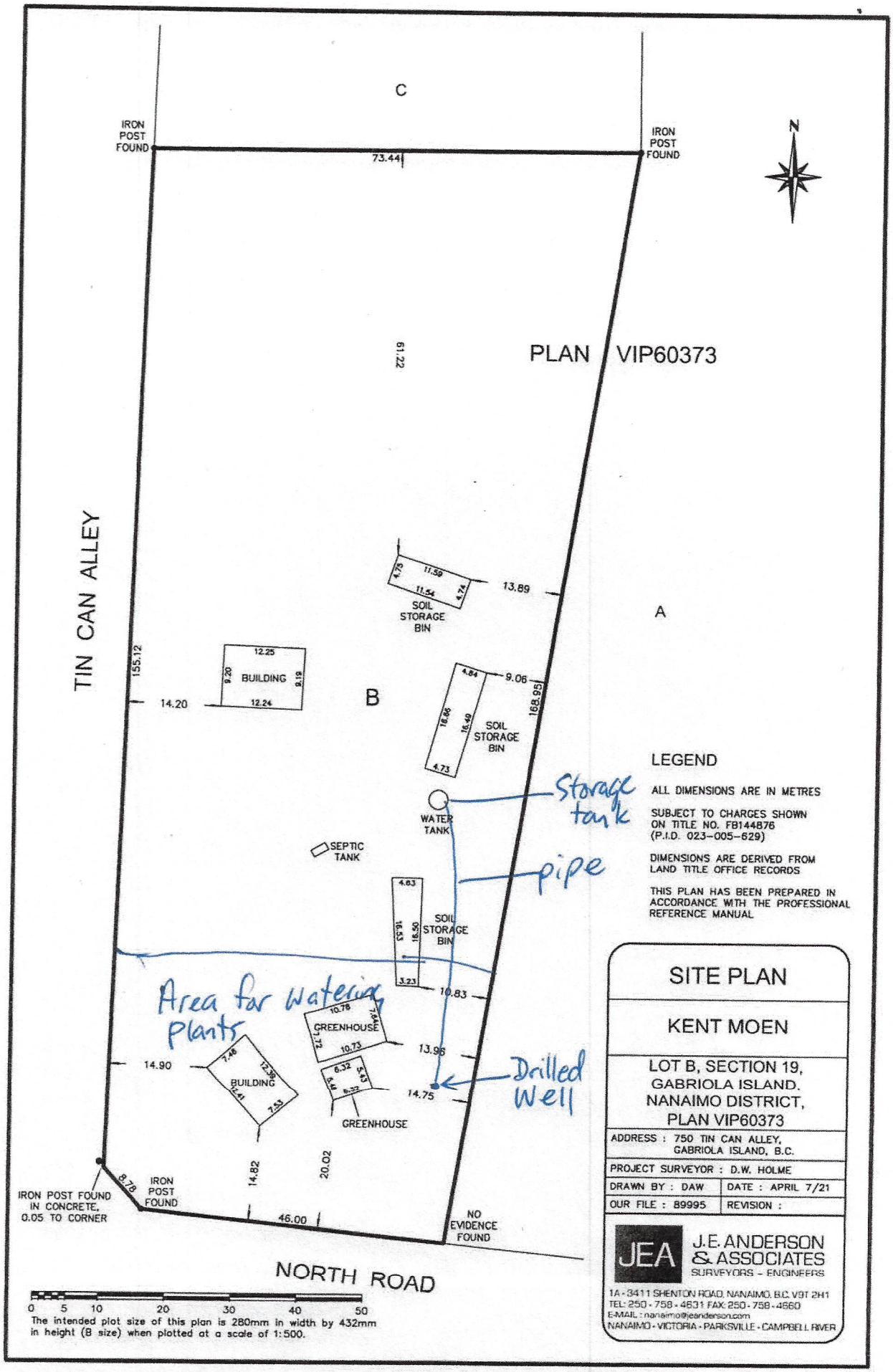
Depth from	Depth to	Colour	Texture	Structure	Rupture resistance (or density)	Coarse gravel (%)	Roots depth & quantity	Mottles depth & quantity	Moisture seepage

Notes

Based on USDA *Field Book for Describing and Sampling Soils* (2002).
* Date water table measured

Percolation test

Location (address): 750 TIN CAN ALLEY, GABRIOLA								File #:
Date: SEPT. 21/23		Tested by: SDB						
Weather: SUNNY								
Test number	Depth of base of hole from surface (cm)	Timings, mins per inch for water to drop from 6" to 5" from base of hole.						Lowest rate (min per inch)
		#1	#2	#3	#4	#5	#6	
1		1:40	1:45	1:45	1:50	1:50	1:50	
2		1:50	1:50	1:45	1:55	1:55	2:00	
3		1:05	1:10	1:10	1:05	1:10	1:15	
4		1:40	1:45	1:45	1:45	1:50	1:50	
5								
6								
7								
8								
Percolation rate for system sizing								
Notes:	HLR = 40L/M²/DAY.							



LEGEND

ALL DIMENSIONS ARE IN METRES

SUBJECT TO CHARGES SHOWN ON TITLE NO. FB144876 (P.I.D. 023-005-629)

DIMENSIONS ARE DERIVED FROM LAND TITLE OFFICE RECORDS

THIS PLAN HAS BEEN PREPARED IN ACCORDANCE WITH THE PROFESSIONAL REFERENCE MANUAL

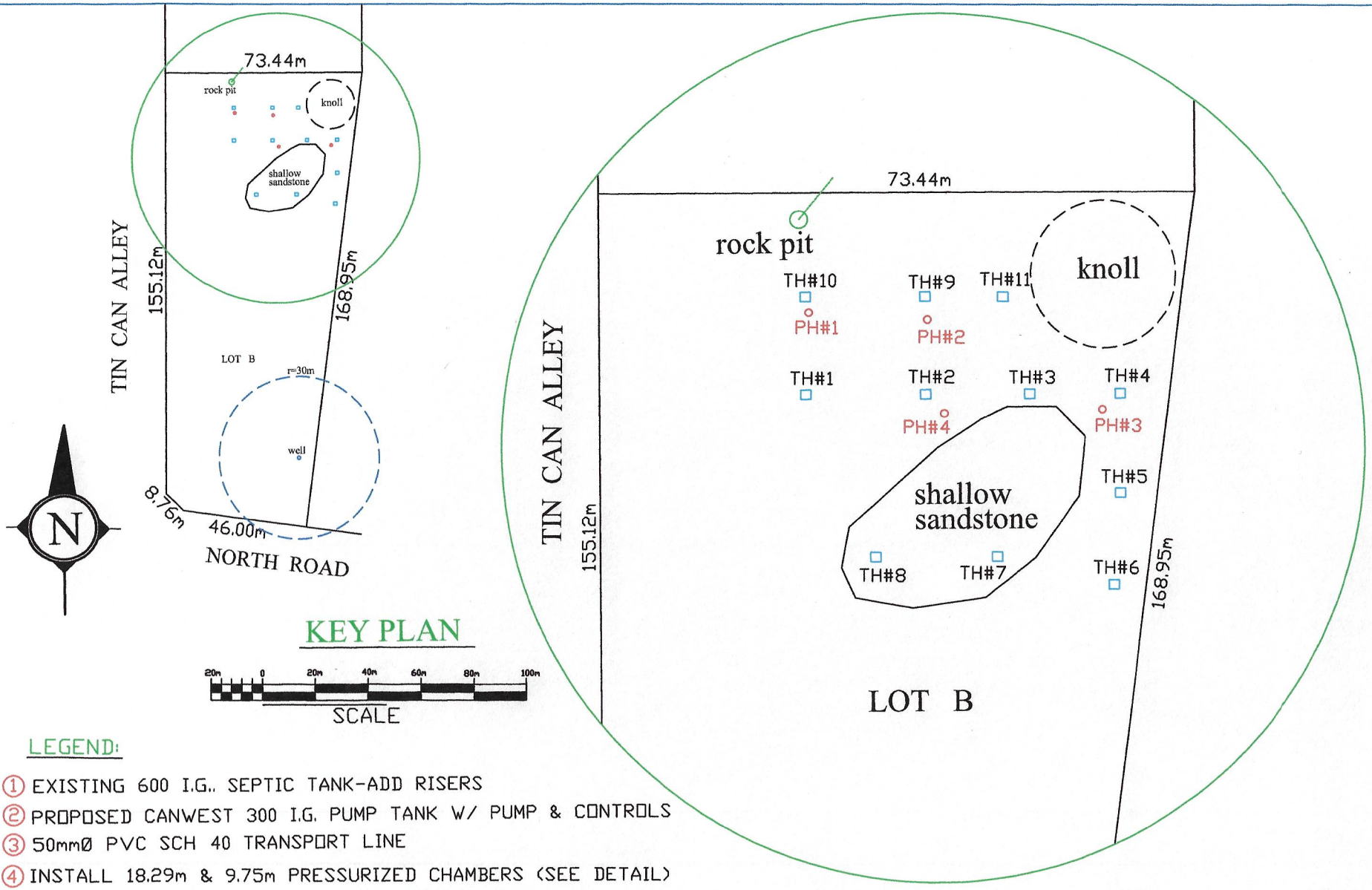
SITE PLAN

KENT MOEN

LOT B, SECTION 19, GABRIOLA ISLAND, NANAIMO DISTRICT, PLAN VIP60373

ADDRESS : 750 TIN CAN ALLEY, GABRIOLA ISLAND, B.C.	
PROJECT SURVEYOR : D.W. HOLME	
DRAWN BY : DAW	DATE : APRIL 7/21
OUR FILE : 89995	REVISION :

JEA J.E. ANDERSON & ASSOCIATES
SURVEYORS - ENGINEERS
1A - 3411 SHENTON ROAD, NANAIMO, B.C. V9T 2H1
TEL: 250 - 758 - 4631 FAX: 250 - 758 - 4660
E-MAIL : nanaimo@jeanderson.com
NANAIMO - VICTORIA - PARKSVILLE - CAMPBELL RIVER



LEGEND:

1. EXISTING 600 I.G.. SEPTIC TANK-ADD RISERS
2. PROPOSED CANWEST 300 I.G. PUMP TANK W/ PUMP & CONTROLS
3. 50mmØ PVC SCH 40 TRANSPORT LINE
4. INSTALL 18.29m & 9.75m PRESSURIZED CHAMBERS (SEE DETAIL)
5. PROPOSED FLUSH-OUTS AT DISTAL ENDS
6. 100mmØ PVC SCH 40 TRANSPORT SEWER

▫ DENOTES 4' TEST HOLE LOCATION
○ DENOTES PERK TEST LOCATION

NOTE: ALL PIPE TO BE SCH. 40 PVC UNLESS OTHERWISE SHOWN

SAVE ON SEPTIC
#2C-2763 CHARLOTTE ROAD, DUNCAN, B.C. V9L 5J2
TELEPHONE: 250-748-5676 CELL: 250-802-9652

PROJECT: PROPOSED SEPTIC FIELD-SITE PLAN OF 750 TIN CAN ALLEY, GABRIOLA
CLIENT: KENT MOEN

SCALE: AS SHOWN
DRAWING BY: SDB
DESIGN BY: SDB
DATE: NOV. 3/23
FILE No: 00-245
DWG. No: 1 OF 1