



February 10, 2017

File 16-92

PK Read Engineering Ltd.
PO Box 1014
Mt. Currie, BC
V0N 2K0

Attention: Phil Read, P.Eng:

RE: Proposed 3 Lot Subdivision of DL 1252, Mt. Currie BC

Further to your request, Arden Consulting Engineers Ltd. (ACE) has completed a review and assessment of the subsurface conditions at District Lot 1252, Mount Currie BC for the purpose of assessing the parcel's ability to support onsite wastewater treatment systems (septic system) for the proposed 3 lot subdivision.

BACKGROUND

It is proposed to develop District Lot 1252 into 3 lots (A, B & C) which will be 1.79, 1.53 and 1.57 ha respectively. It is our understanding that the proposed new lots will be serviced by private wells. Accordingly, we have assumed a future well location for the lots which will not conflict with the septic field. We have additionally assumed that the future residences will have a maximum of 4 bedrooms with up to 3,500ft² of living area. Accordingly, the design flow rate is 1,600 Lpd.

The development property is triangular shaped and bounded by Gates Lake on east, Portage Road and the railway to the west and private property to the south. An excavated drainage ditch runs along the south parcel boundary and connects to Gates Lake. For the purposes of the *Sewerage System Regulation (SSR)* this is considered to be a potential breakout point and as such any future septic system should be located greater than 7.5m from the ditch. A setback of 30m is required from surface water and accordingly, no future septic system can be located within 30m of the high water boundary of Gates Lake. The only other potential physical site constraints will be 30m setback distance required to the future private wells. Sufficient horizontal separation, however, is available to locate the future septic fields greater than the required 30m from the wells, lake and ditch.

The property slopes moderately towards Gates Lake with the portion nearest the Lake being level. The elevation climbs from approximately 480m near the lake to approximately 486m near the west end of the parent parcel. The change in elevation is reflected in the vegetation as it changes from deciduous trees and grasses to larger coniferous trees.

ARDEN CONSULTING ENGINEERS LTD.



SUBSURFACE INVESTIGATION FOR SEWAGE DISPOSAL

A subsurface investigation was conducted by ACE on October 16, 2016 for the purpose of evaluating the subsurface conditions and each parcel's ability to support a future onsite sewage dispersal system.

Four testpits were advanced on each of the three future lots. The test pits were advanced using a rubber tired backhoe to depths ranging from 1200- 1500mm Below Ground Surface (BGS) and the subsurface conditions were logged by a member of our engineering staff. The approximate locations of the testpits are shown on the attached site plan.

All of the test pits advanced were suitable for effluent dispersal under the *Sewerage System Regulation*; however, the subsurface conditions nearer to the west side of the property located at the higher elevations were more favourable due to the presence of granular soil and lack of a restrictive layer or the presence of groundwater. Accordingly, the dispersal field locations for the lots A and B were located on the higher ground near the west parcel boundary. Due to the proposed lot configuration, there was no opportunity to locate the dispersal field area for lot C on the higher elevation ridge. Groundwater was recorded at 800mm BGS within the Lot C dispersal field area on November 23, 2016 following heavy rainfall. Seepage was not observed in any of the testholes on lots A and B. Native permeable soil was observed to extend to depths of up to 1500mm within the effluent dispersal area for Lots A and B.

Detailed logs of the test pits are attached.

Six percolation tests were conducted within the proposed effluent dispersal field areas for proposed Lots A, B and C on November 23, 2016. The percolation holes were presoaked for four hours prior to timing. The results are presented below:

Table A Lot A Percolation Test Results

Perc Hole #	Rate (min/inch)	Depth Below Ground Surface (cm)
A1	16	40
A2	23	35
A3	2	40
A4	16	52
A5	16.5	43
A6	9.5	43

The average percolation rate was 14 minutes per inch which is less than the maximum allowable rate of 120 minutes per inch. Assuming Type 1 effluent (treatment by septic tank only) the maximum hydraulic loading rate to the ground is 27 L/m² resulting in a dispersal area of 3m x19.75m based on a design flow of 1,600 Lpd.



Table B Lot B Percolation Test Results

Perc Hole #	Rate (min/inch)	Depth Below Ground Surface (cm)
B1	18	43
B2	23	46
B3	20	46
B4	28	41
B5	24	43
B6	20.5	43

The average percolation rate was 22 minutes per inch which is less than the maximum allowable rate of 120 minutes per inch. Assuming Type 1 effluent (treatment by septic tank only) the maximum hydraulic loading rate to the ground is 23 L/m² resulting in a dispersal area of 3m x 23.2m based on a design flow of 1,600 Lpd.

Table C Lot C Percolation Test Results

Perc Hole #	Rate (min/inch)	Depth Below Ground Surface (cm)
C1	16	30
C2	30	33
C3	17	33
C4	60	30
C5	6	33
C6	10.5	33

The average percolation rate was 23 minutes per inch which is less than the maximum allowable rate of 120 minutes per inch. Assuming Type 1 effluent (treatment by septic tank only) the maximum hydraulic loading rate to the ground is 23 L/m².

OPTIONS FOR EFFLUENT DISPERSAL

A minimum vertical separation of 600 mm from the point of release of effluent to the seasonal high groundwater table or restrictive layer is required to ensure adequate treatment and attenuation of pathogenic bacteria. Based on the depth to water observed on Lot C, a 300mm raised sand mound will be required to achieve the vertical separation. The sand mound would encompass an area of 4.4m x 22.4m based on a design flow rate of 1,600 Lpd. Effluent dispersal areas for Lots A & B can be in ground beds or trenches.

A primary and reserve effluent dispersal area has been identified for each of Lots A, B and C based on the area requirements presented above. The locations are shown on the attached site plan. Based on the results of our investigation, it is our opinion that each of the three proposed lots could safely accommodate both a primary and reserve septic field area using Type 1 effluent and servicing a four bedroom residence. The areas presented are judged to meet the requirements of the SSR Standard Practices Manual.

This letter has been prepared by ACE exclusively for Jens Lohser along with his business partners and is intended to provide an assessment of the parcel's ability to accommodate future septic systems. The conclusions made in this report reflect ACE's best judgement in light of the information available at the time of testing. 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. ACE accepts no responsibility for damages, if



any, suffered by a third party as a result of decisions made or actions based on this letter.

The findings and conclusions documented in this report have been prepared for specific application to this site and have been developed in a manner consistent with that level of care normally exercised by septic design professionals currently practicing under similar conditions in the area.

We trust that this provides the information you currently require. If you have any questions or require comment, please feel free to contact the undersigned.

Yours truly,

ARDEN CONSULTING ENGINEERS LTD.

PER:

A handwritten signature in blue ink, appearing to read 'Rob Arden'.

Rob Arden, P.Eng





Test Hole descriptions: Lot A

Test Hole # A-1

0"- 48"

Silty sand + gravel, dry, brown, loose
Frequent cobbles sub-rounded to
Sub-angular

No Mottling, No Seepage

Test Hole # A-2

0"- 50"

Silty sand + gravel, dry, brown to brownish
grey, loose, frequent cobbles, sub-rounded
to sub-angular

No Mottling, No Seepage

Test Hole # A-3

0"- 50"

Silty sand + gravel, dry, brown to
Greyish brown, loose, frequent
Cobbles sub-rounded to Sub-angular

No Mottling, No Seepage

Test Hole # A-4

0"- 50"

Silty sand + gravel, dry, brown to brownish
grey, loose, frequent cobbles sub-rounded to
sub angular

No Mottling, No Seepage



Test Hole descriptions: Project # 16-92 Lot B

Test Hole # B-1

0"- 20"

Silty sand, brown, loose, dry

20"- 42"

Silty sand+ gravel, brown, loose, dry
Frequent cobbles, sub-angular

No Mottling, No Seepage

Test Hole # B-2

0"- 42"

Silty sand + gravel brown to brownish
grey, loose, dry, frequent cobbles,
sub-angular

No Mottling, No Seepage

Test Hole # B-3

0"- 12"

Silty sand, some gravel, brown, loose, dry

12"- 32"

Silty sand, some gravel, light brown to
Grey, medium, dense, dry

32"- 55"

Silty sand + gravel, brownish grey, dry,
Loose, frequent cobbles, sub-angular

No Mottling, No Seepage

Test Hole # B-4

0"- 28"

Silty sand, some gravel, brown to brownish
Grey, dry, loose, abundant roots, frequent
cobbles, sub-rounded

28"- 45"

Silty sand + gravel, light brown to grey, dry,
Loose, frequent cobbles, sub-rounded

No Mottling, No Seepage



Test Hole descriptions: Project # 16-92 Lot C

Test Hole # C-1

0" - 4"

Silty sand, brown, blocky, dry

4" - 12"

Sand, fine grained, white, mottled

Dry, medium dense

12" - 24"

Sand, medium grained, white to light

Grey, mottled

24" - 36"

Silt, grey, soft, moist

36" - 55"

Organic silt, brown to brownish grey,

Soft, wet, some sand, grey

Seepage @ 52" October 6

Seepage @ 32" November 23

Test Hole # C-2

0" - 12"

Silty sand brown to brownish grey, blocky

Loose, dry,

12" - 55"

Gravelly Sand, coarse to medium grained
sand, sub-rounded gravel loose to medium

Dense

Mottling @ 34", Seepage @ 55"

October 6

Seepage @ 41" Nov 23



Test Hole # C-3

0"- 24"

Silty sand, light brown to grey, med
Dense

24"- 36"

Sandy silt, grey, iron mottled, firm

36"- 55"

Sand, fine grained, grey, loose, wet

Mottling @ 24",

Seepage @ 55" October 6

Seepage @ 32" November 23

Test Hole # C-4

0"- 4"

Silty sand, brown, blocky

4"- 24"

Silty sand, white-grey, medium dense, iron
mottled

24"- 48"

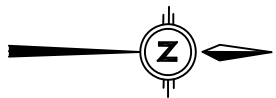
Sandy silt, grey, firm to stiff

48"- 60"

Sand, grey, loose to medium dense, saturated

Seepage @ 60" October 6

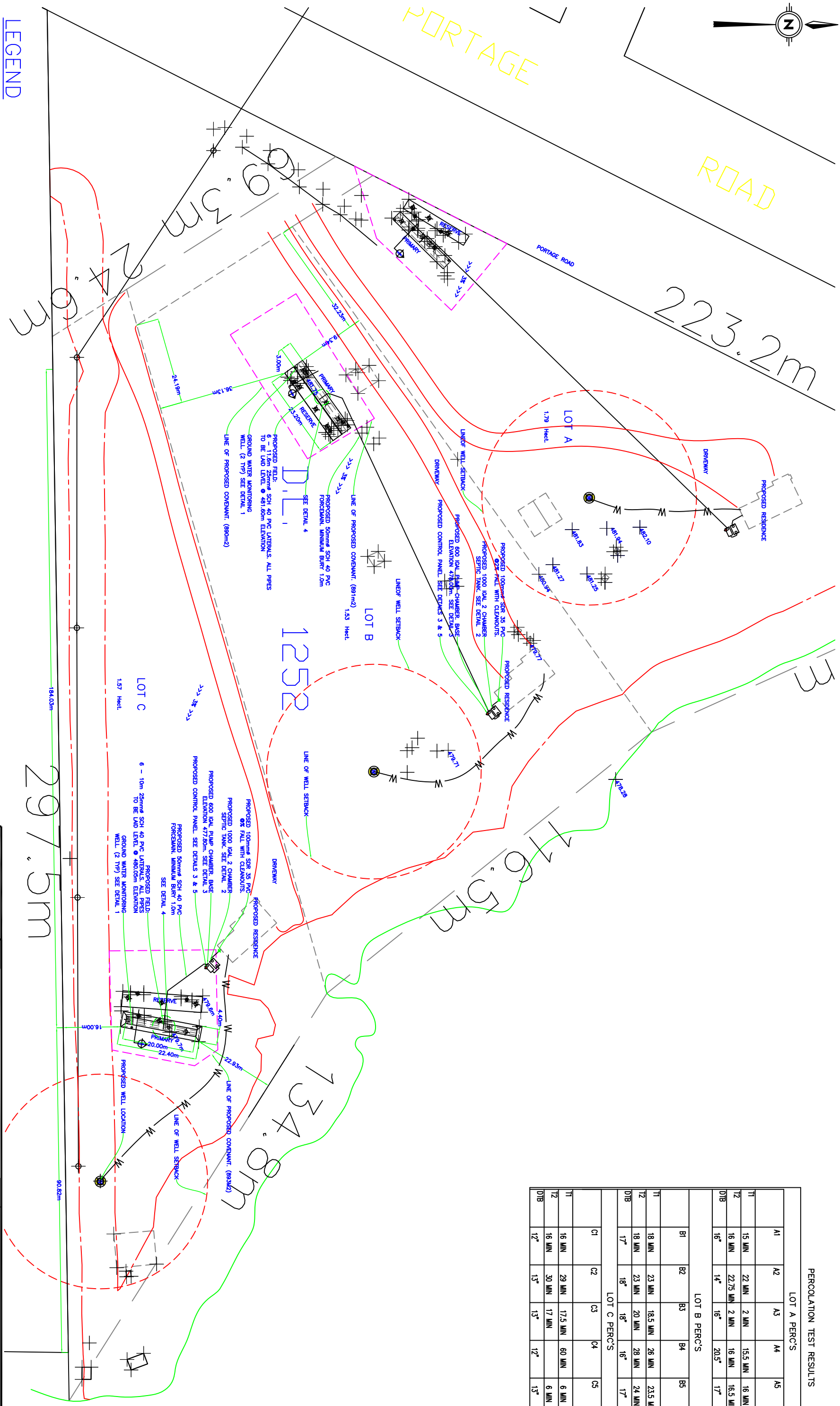
Seepage @ 36" November 23



PORTAGE ROAD

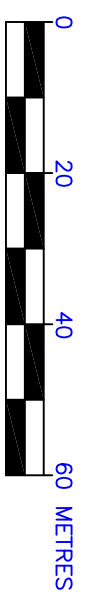
ROAD

223.2m



LEGEND

- LOCATION OF TEST PIT
- LOCATION OF PERCOLATION TEST
- SPEA SETBACK
- WELL LOCATIONS



SCALE 1:10000

NOTE: ORIGINAL SEAL IN RED

SEAL

PERCOLATION TEST RESULTS

LOT A PERC'S						
	A1	A2	A3	A4	A5	A6
T1	15 MIN	22 MIN	2 MIN	15.5 MIN	16 MIN	10.5 MIN
T2	16 MIN	22.75 MIN	2 MIN	16 MIN	16.5 MIN	9.5 MIN
DTB	16"	14"	16"	20.5"	17"	17"
LOT B PERC'S						
	B1	B2	B3	B4	B5	B6
T1	18 MIN	23 MIN	18.5 MIN	26 MIN	23.5 MIN	20 MIN
T2	18 MIN	23 MIN	20 MIN	28 MIN	24 MIN	20.5 MIN
DTB	17"	18"	18"	16"	17"	17"
LOT C PERC'S						
	C1	C2	C3	C4	C5	C6
T1	16 MIN	29 MIN	17.5 MIN	60 MIN	6 MIN	9.75 MIN
T2	16 MIN	30 MIN	17 MIN	60 MIN	6 MIN	10.5 MIN
DTB	12"	13"	13"	12"	13"	13"

ARZEN CONSULTING ENGINEERS LTD.		PK Read Engineering Ltd.	
PROJECT: DL 1252 MT. CURRIE		TITLE: SITE PLAN	
CLIENT:	DATE OF ISSUE:	PROJECT No.	DWG. No.
PK Read Engineering Ltd.	DEC 12/16	16-92	1 OF 1
DWN BY: AC			REV.
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CANCEL PRINTS BEARING CANCELER NUMBER