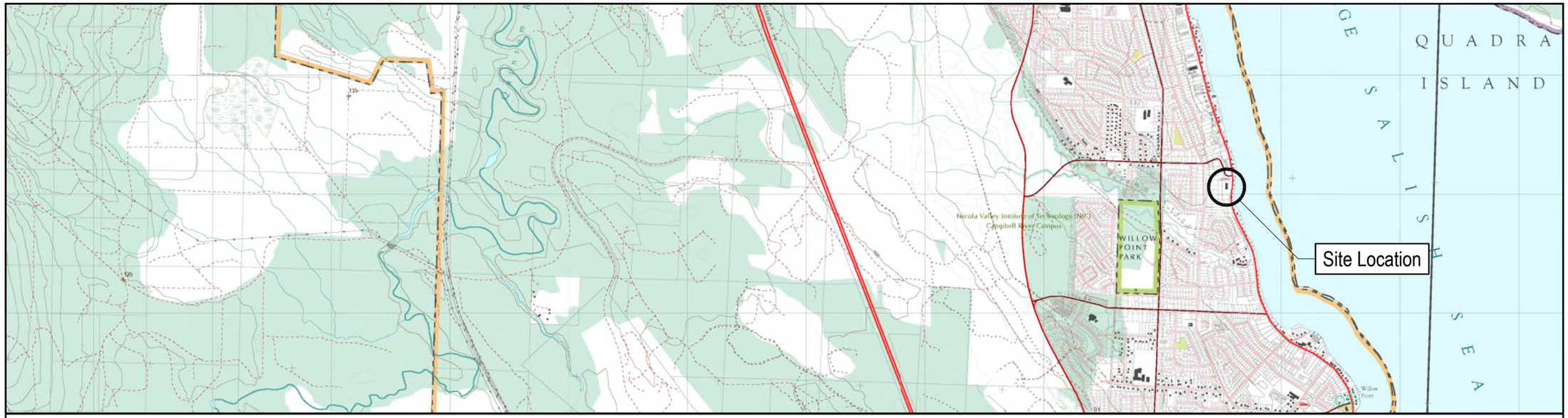

Proposed Slope Improvement
1430 South Island Highway, Campbell River, B.C.

General Notes:

1. This Proposed Slope Improvement Drawing should be read in conjunction with Geotechnical Investigation Report for Proposed Residential Building 1430 South Island Hwy, Campbell River issued on March 8, 2017.
2. The main purpose of the Proposed Slope Improvement measure is to lower the water table and manage runoff to stabilize the slope with respect to translational (shallow) landslides and flow slides. The work is broken into two phases. Phase 1 works are mandatory, while Phase 2 works may or may not be required pending performance of Phase 1 works.
3. Arborist and environmental consultants shall be consulted for re-vegetation recommendations, particularly with respect to species selection, soil substrate requirements, and removal of potential hazardous trees.
4. As built conditions may differ from proposed measures presented herein.

Design Basis for slope improvement:

- Improvement measures are designed to improve the factor of safety of translational landslides and reduce the likelihood of a flow slide.
- Current perched water table condition is close to or at ground surface.
- Horizontal Drain Pipes are designed to lower water table to 1.5 m below ground surface. Drain spacing and locations are based on hydrological modeling.
- Interceptor cutoff ditch to minimize overland and seepage flows on to slope.
- Soil Nail and Mesh System to stabilize top of slope along proposed building corridor.
- Typical soils stratigraphy is 0.2m of top soil underlaid by less than 5 m of sand veneer, and till, comprised of alternating sands, clay, and silts. Thickness may vary along the slope and length of the property due to geological deposition, and disturbance from historical landslides and site re-grading.
- Phase 1 works to be completed first. Phase 2 works are pending based on performance of Phase 1.

Major components of improvement measures:

Phase 1:

- Interceptor Ditch / Cut off at top of escarpment.
- Toe berm fill
- Erosion Protection control on steep exposed soil slopes.
- Re-vegetation on top of slope and on the slope
- Maintenance and monitoring
- Soil Nail and Mesh System on steep slope

Phase 2 (pending performance of Phase 1):

- Horizontal drains located mid slope
- Interceptor swales and weirs on the mid slope
- Armoring of established gullies
- Slope Drains

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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

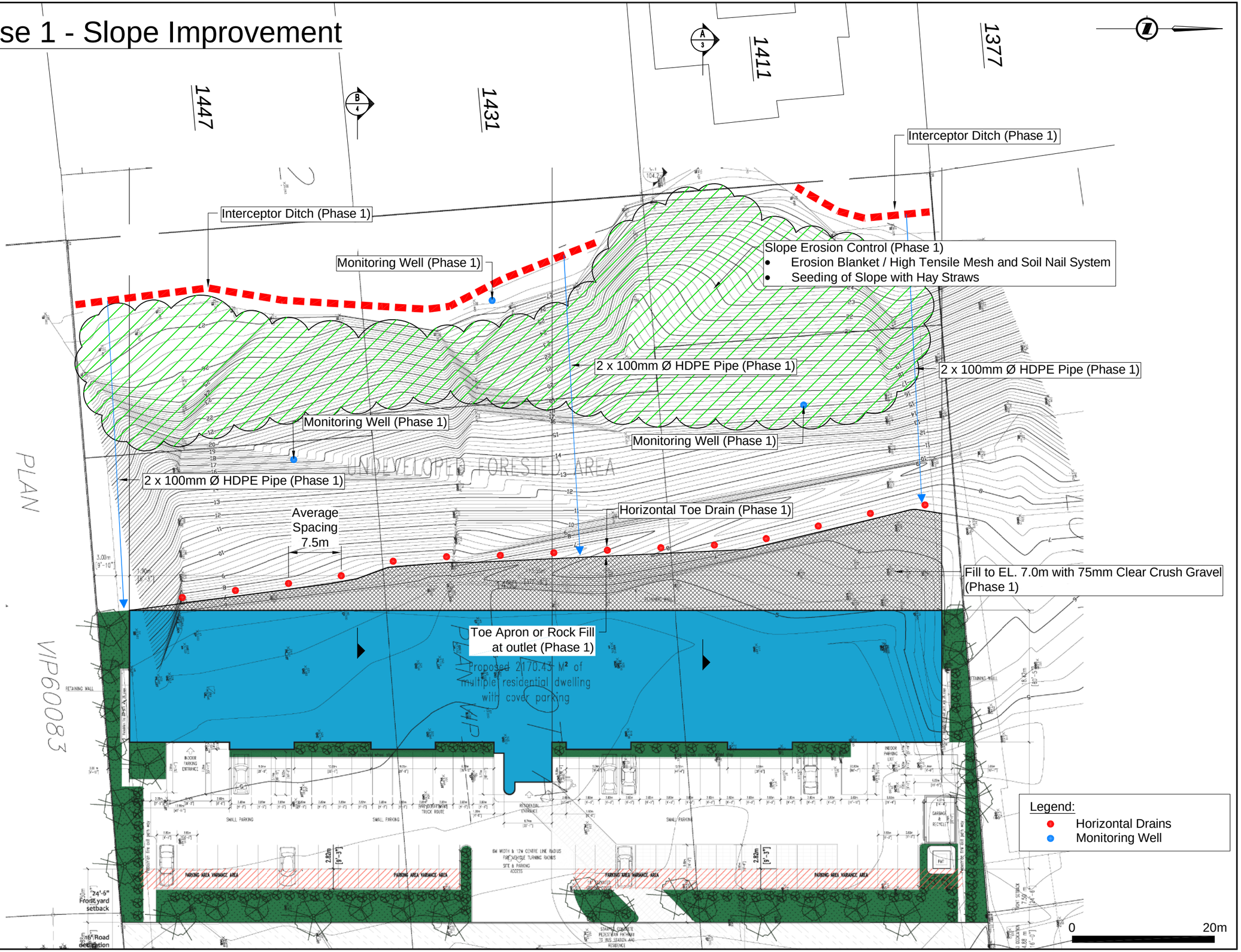
Project Number: 5077

Preliminary Design
Notes & Vicinity Map

Sheet Number:	0 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	N/A

5077-SSI-SH-00 | 1.0

Phase 1 - Slope Improvement



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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

Project Number: 5077

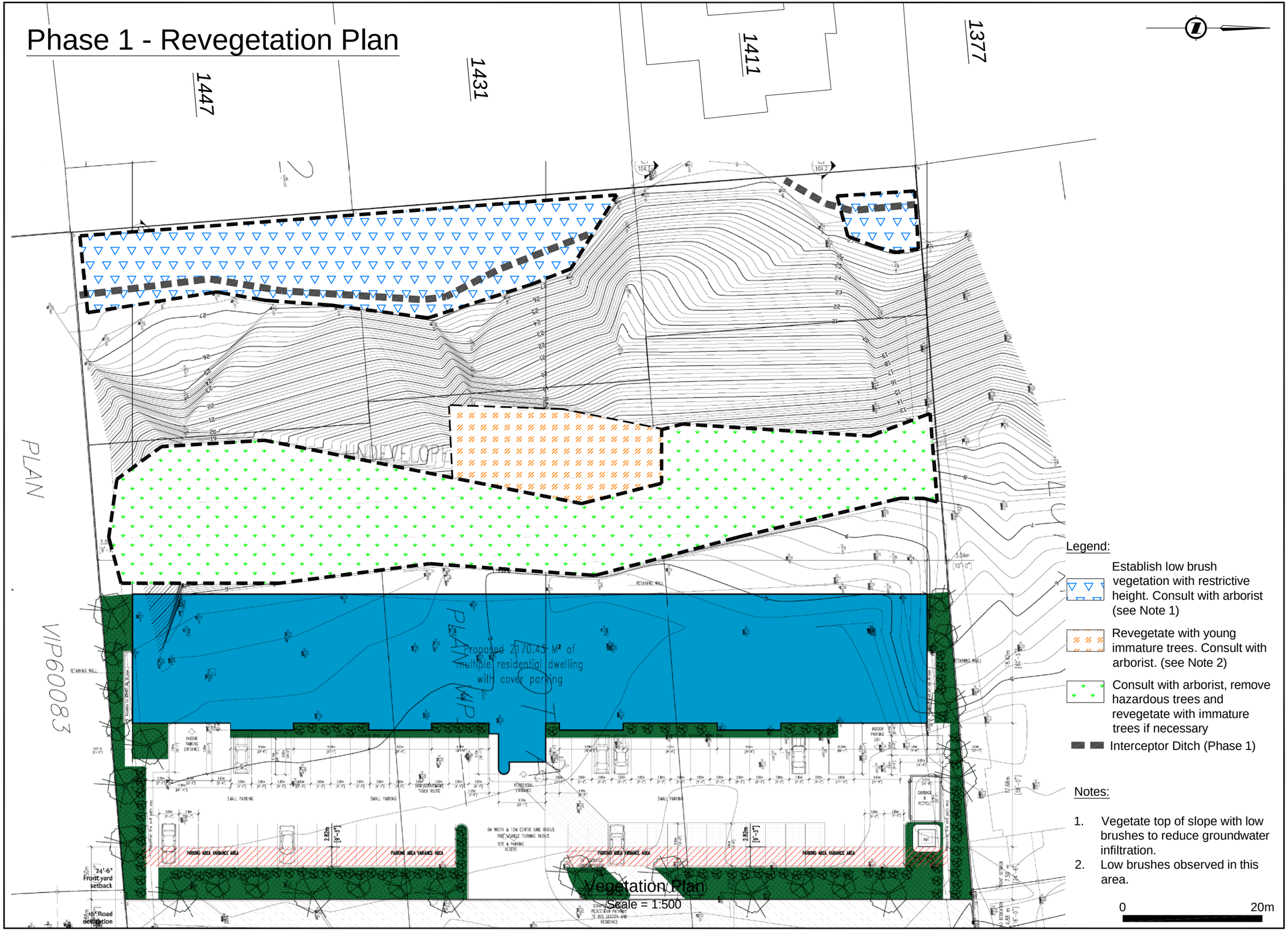
Preliminary Design

Site Plan - Phase 1

Sheet Number:	1 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	1:500

5077-SSI-SH-01 | 1.0

Phase 1 - Revegetation Plan



Vegetation Plan
Scale = 1:500

Legend:

- Establish low brush vegetation with restrictive height. Consult with arborist (see Note 1)
- Revegetate with young immature trees. Consult with arborist. (see Note 2)
- Consult with arborist, remove hazardous trees and revegetate with immature trees if necessary
- Interceptor Ditch (Phase 1)

Notes:

1. Vegetate top of slope with low brushes to reduce groundwater infiltration.
2. Low brushes observed in this area.

0 20m

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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

Project Number: 5077

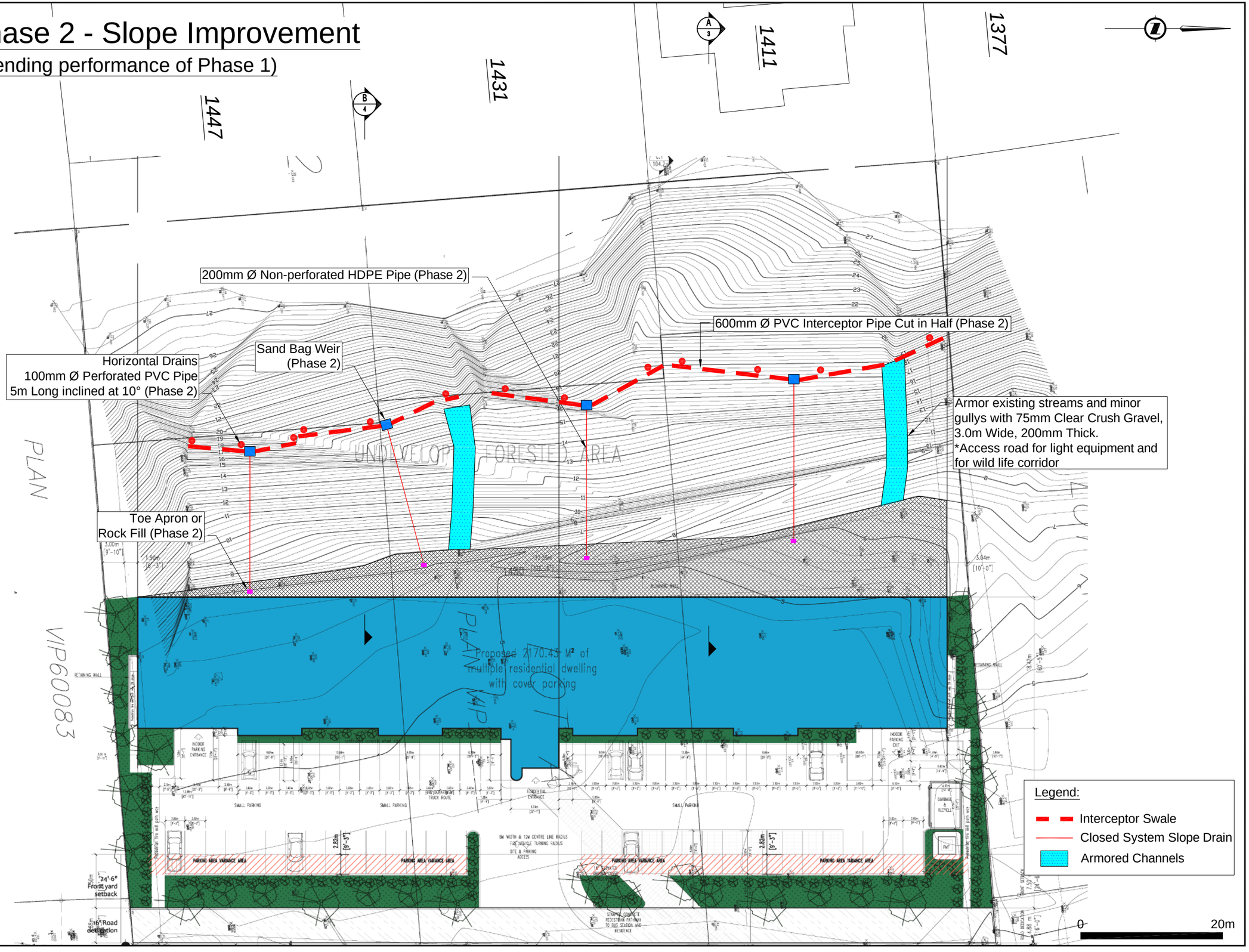
Preliminary Design
Revegetation Plan - Phase 1

Sheet Number:	2 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	1:500

5077-SSI-SH-02 | 1.0

Phase 2 - Slope Improvement

(Pending performance of Phase 1)



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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

Project Number: 5077

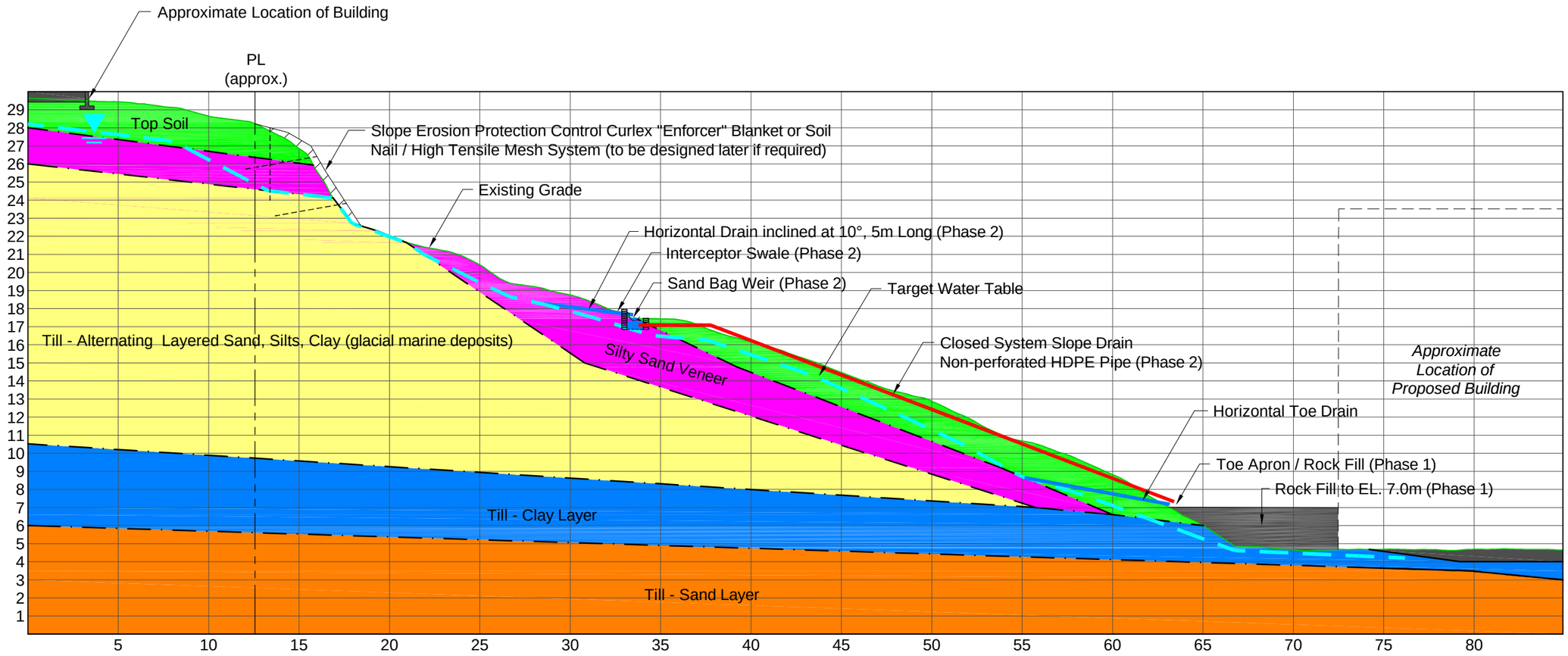
Preliminary Design
Site Plan - Phase 2

Sheet Number:	3 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	1:500

5077-SSI-SH-03 | 1.0

Notes:

Silty Sand Veneer & Top Soil is assumed to have hydraulic conductivity between 0.001 to 1 cm/s. Till layer is considered low permeability.



Legend:

- Top Soil
- Silty Sand Veneer
- Till - Alternating Layered Sand, Silts, Clay (glacial marine deposits)
- Till - Clay Layer
- Till - Sand Layer
- ------ Soil Nail

Section A

Scale = 1:250

0 10m

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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

Project Number: 5077

Preliminary Design
Section A

Sheet Number:	4 of 9
Date Created:	2017-05-25
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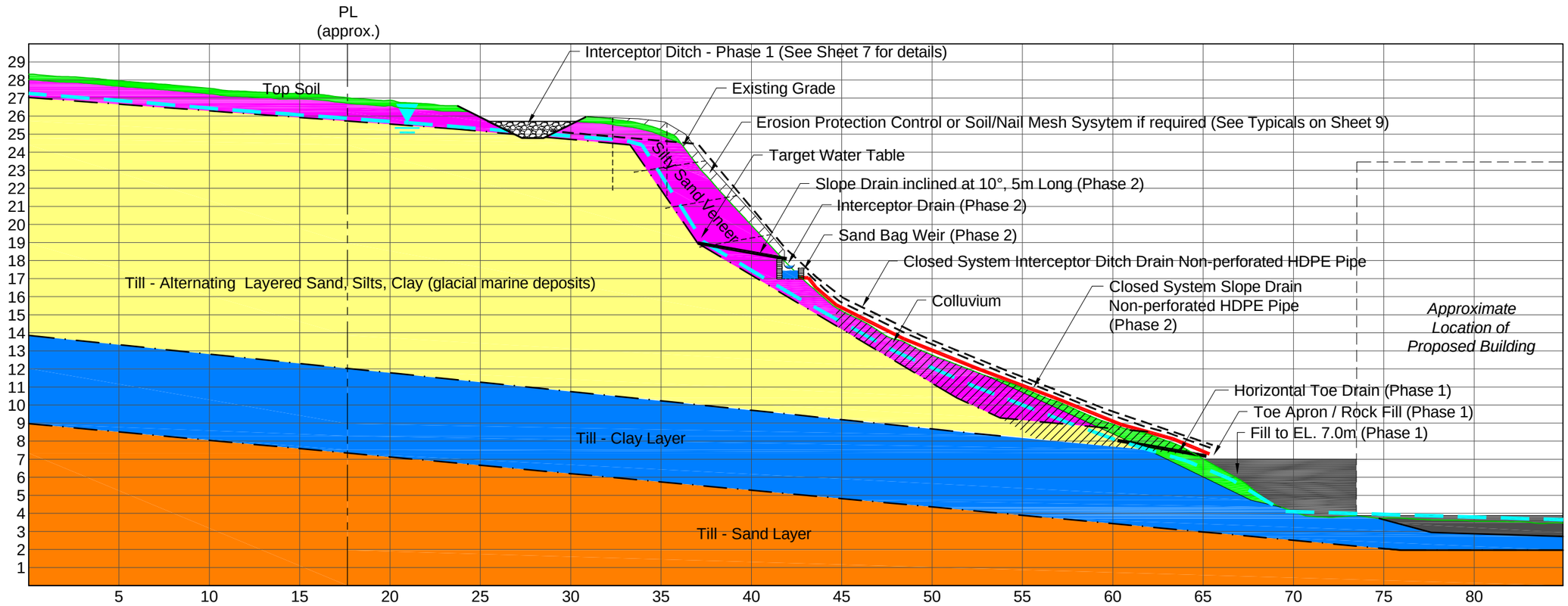
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	As Shown

5077-SSI-SH-04 | 1.0

Notes:

Silty Sand Veneer & Top Soil is assumed to have hydraulic conductivity between 0.001 to 1 cm/s. Till layer is considered low permeability.



Legend:

- Top Soil
- Silty Sand Veneer
- Till - Alternating Layered Sand, Silts, Clay (glacial marine deposits)
- Till - Clay Layer
- Till - Sand Layer
- ------ Soil Nail

Section B

Scale = 1:250

0 10m

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Slope Stability Improvement

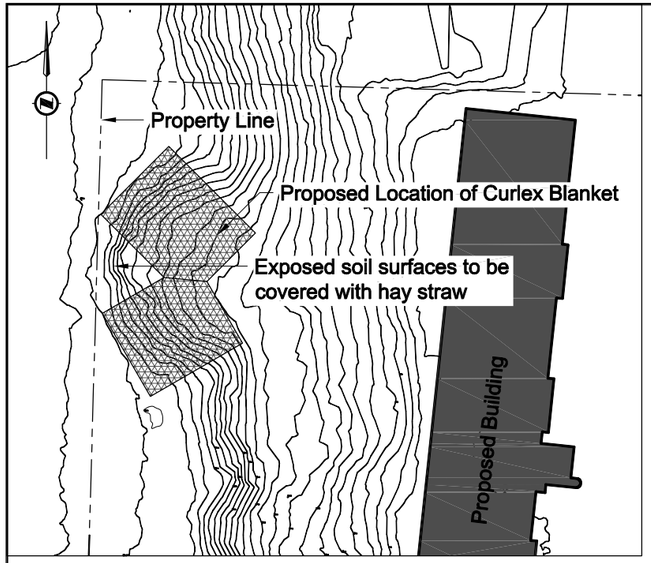
1430 South Island Highway, Campbell River, B.C.

Project Number: 5077

Preliminary Design
Section B

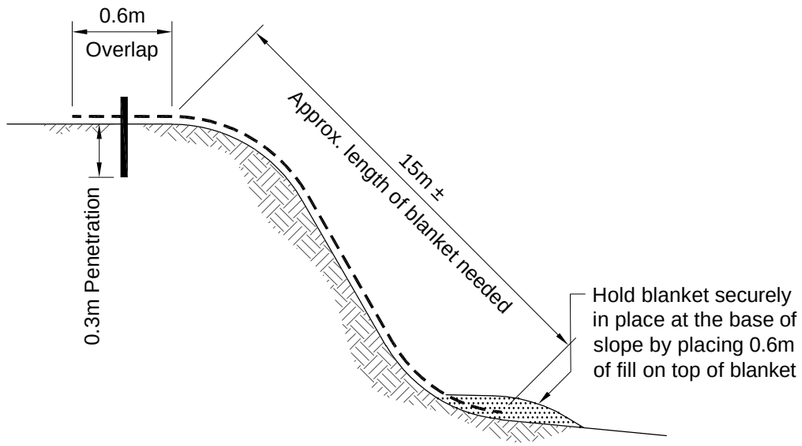
Sheet Number:	5 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	As Shown

5077-SSI-SH-05 | 1.0



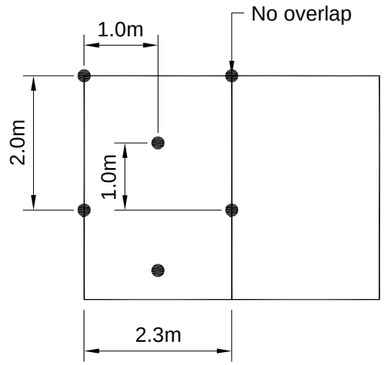
Plan View of Erosion Blanket Placement (Phase 1)

Scale = NTS



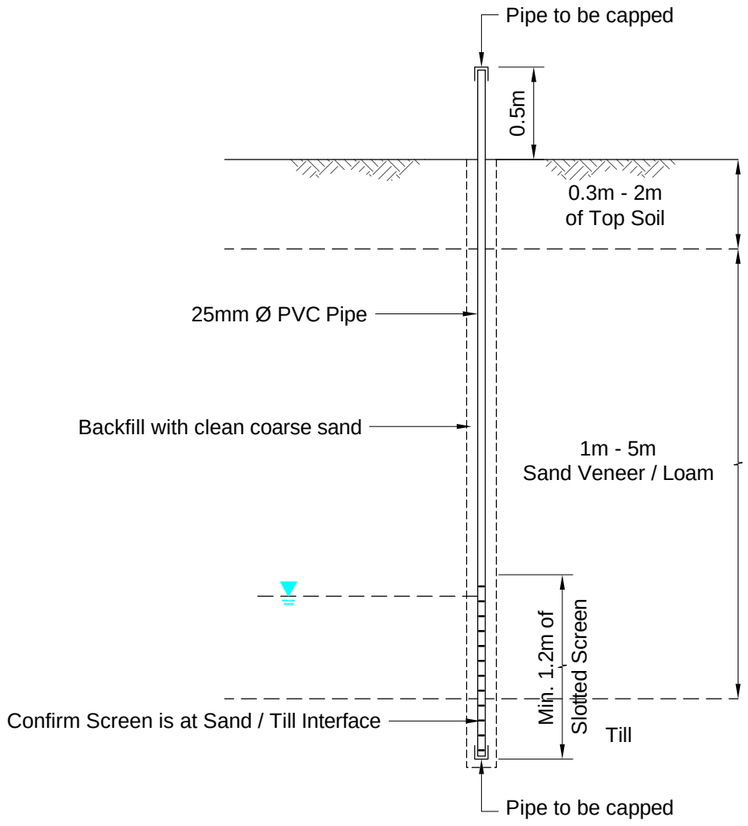
Typical Section of Curlex "Enforcer" Blanket (Phase 1)

Scale = NTS



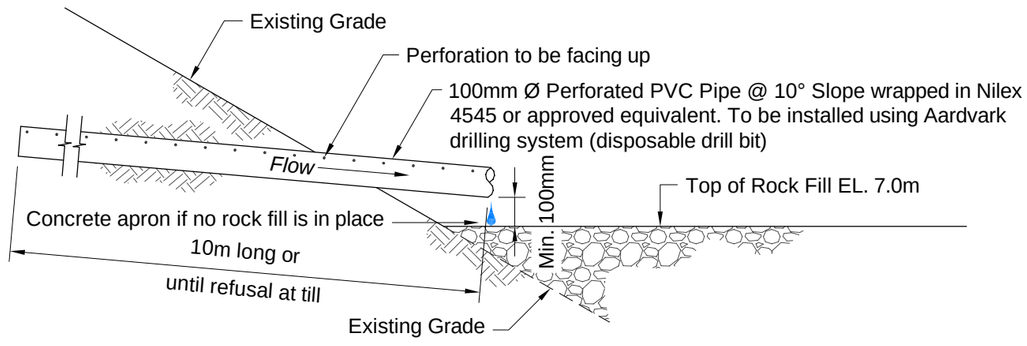
Staple Fastening Pattern (Phase 1)

Scale = NTS



Typical Section of Monitoring Well (Phase 1)

Scale = 1:20



Typical Section of Horizontal Toe Drain (Phase 1)

Scale = 1:20

Phase 1 - Typicals

0 0.5m

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Slope Stability Improvement

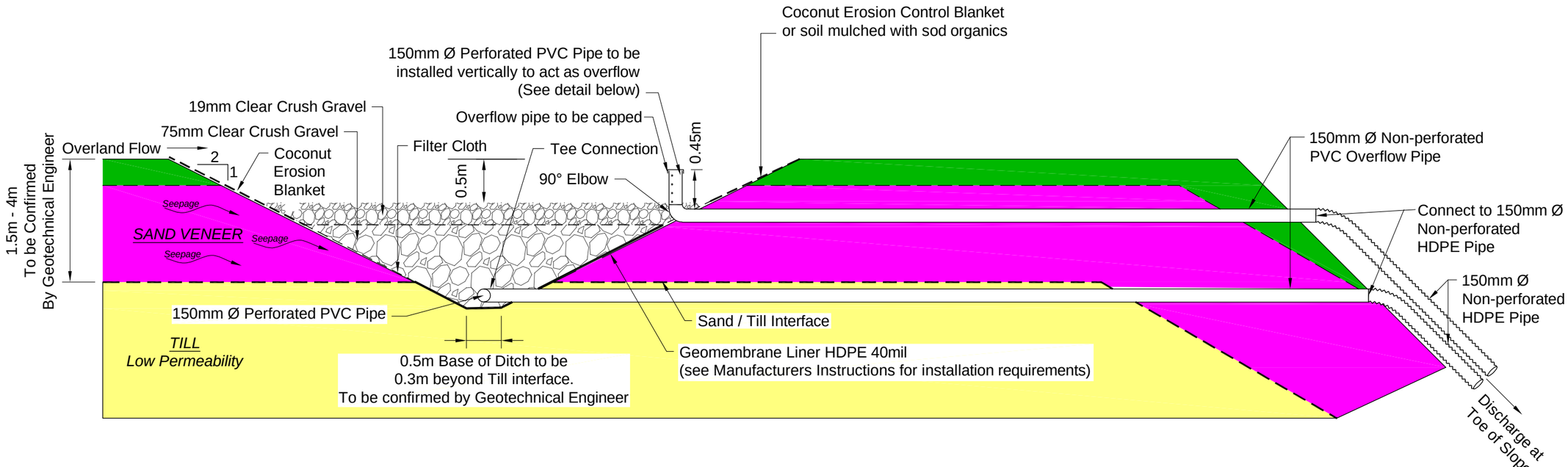
1430 South Island Highway, Campbell River, B.C.

Project Number: 5077

Preliminary Design
Phase 1 Details

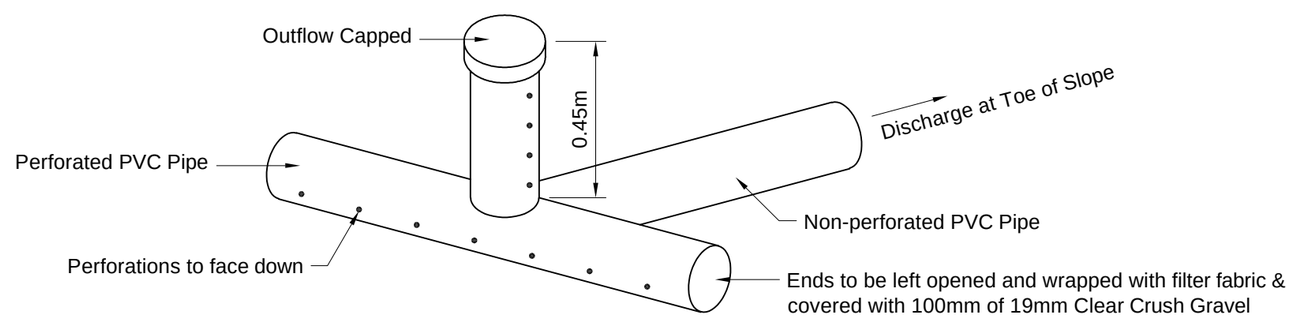
Sheet Number:	6 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	As Shown

5077-SSI-SH-06 | 1.0



Typical Section of Interceptor Ditch (Phase 1)

Scale = 1:50



Typical Detail of Overflow Pipe Inlet

Scale = NTS

0 1m

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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

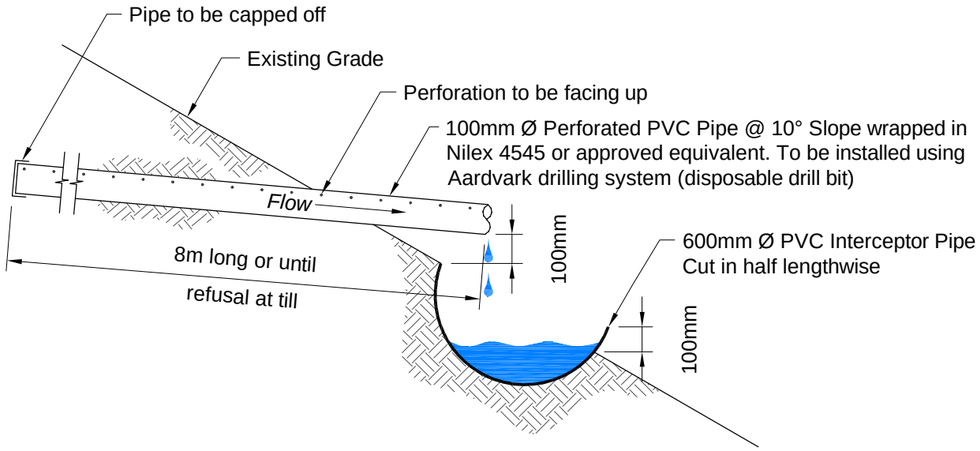
Project Number: 5077

Preliminary Design
Phase 1 - Interceptor Ditch

Sheet Number:	7 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	As Shown

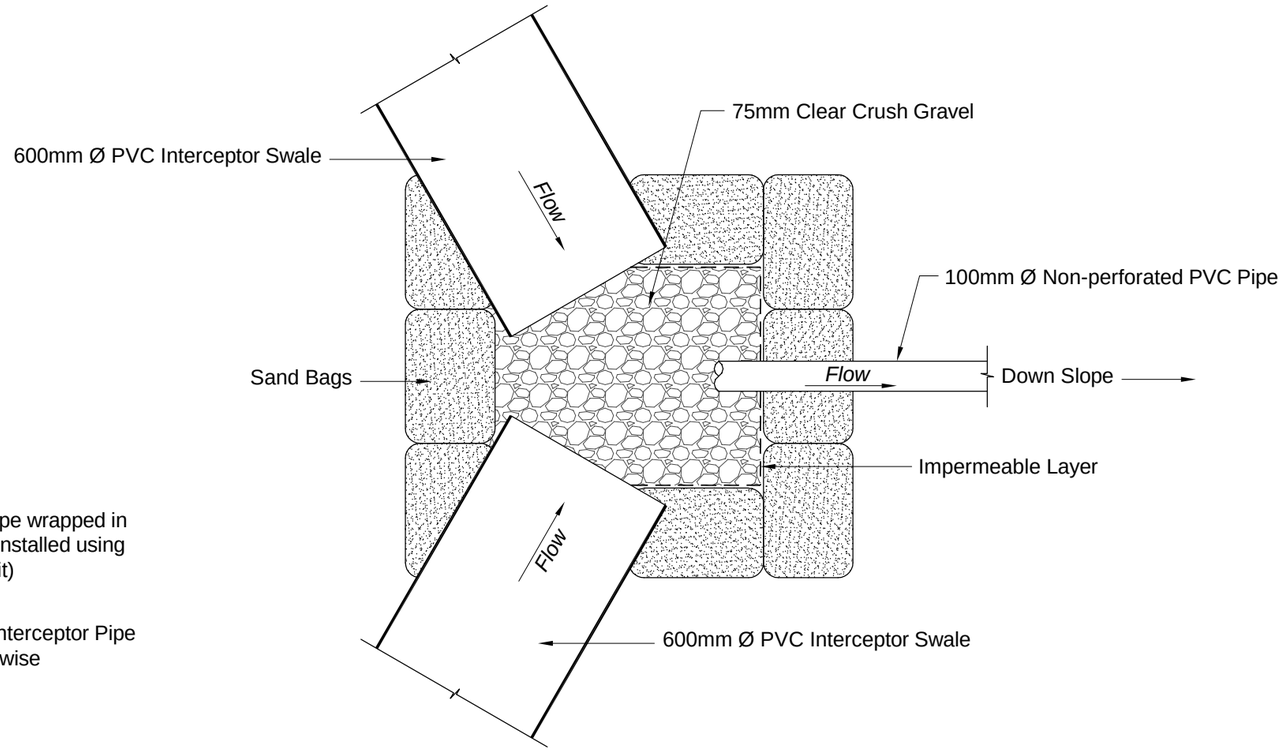
5077-SSI-SH-07 | 1.0

Phase 2 - Typicals



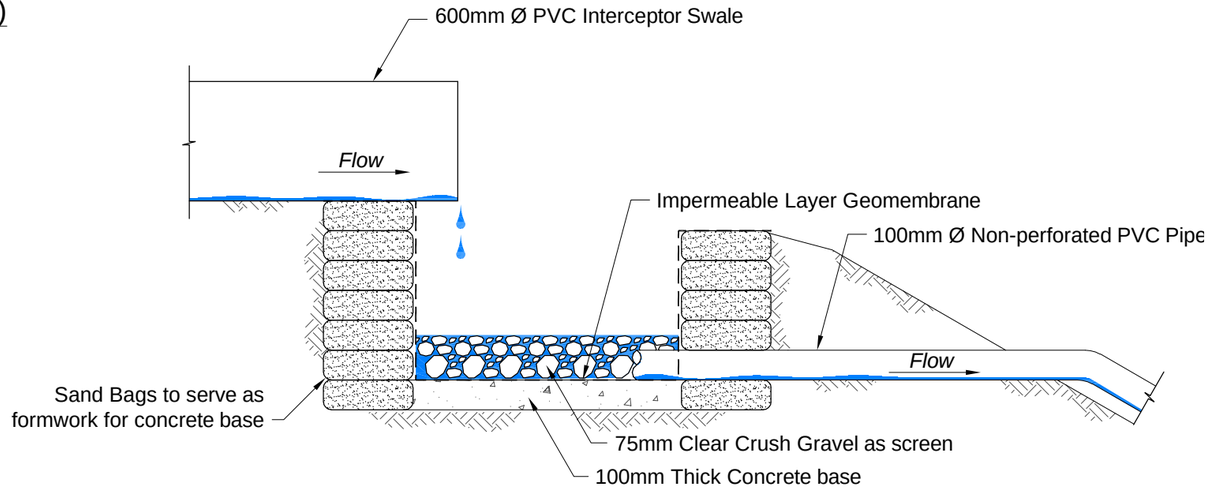
Typical Section of Interceptor Swale & Horizontal Drains (Phase 2)

Scale = 1:20



Plan View of Sand Bag Weir (Phase 2)

Scale = 1:20



Cross Section of Sand Bag Weir (Phase 2)

Scale = 1:20

0 0.5m

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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

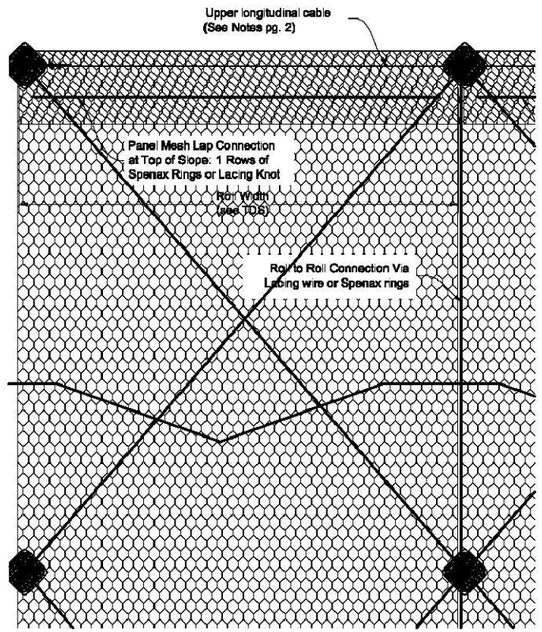
Project Number: 5077

Preliminary Design
Phase 2 Details

Sheet Number:	8 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	As Shown

5077-SSI-SH-08 | 1.0

Phase 1 - Typicals

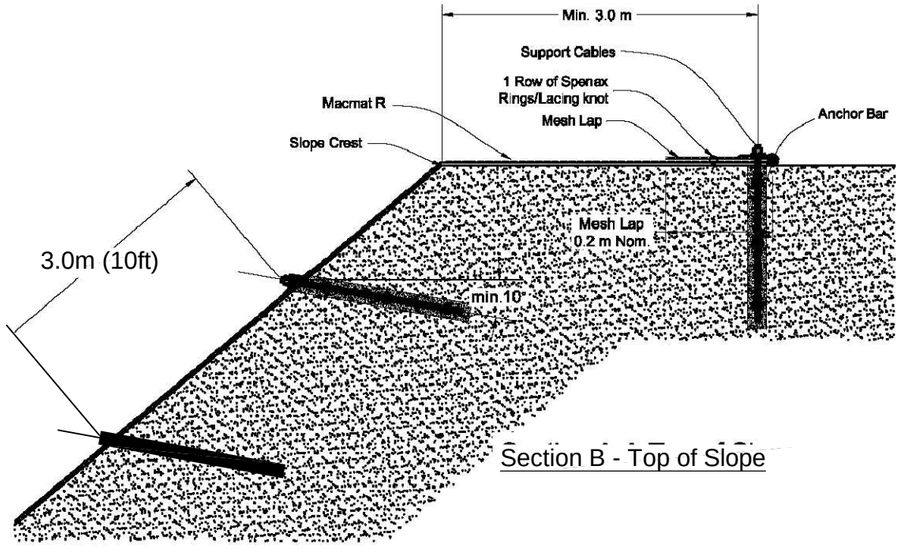


Typical Mesh Face Detail (Phase 1)

Scale = 1:20

All-Thread Bar Anchor Details				
Anchor Designation / Location	Suggested Anchor Spacing / Pattern	Suggested Anchor Depth	Minimum Drilled Hole Ø	Minimum Unfactored Pullout
Threaded Bar Anchor Bar Ø = #8 (25mm)	3.0m x 3.0m	4.0m Min.	75mm Nominal	62 kN (14 Kips)

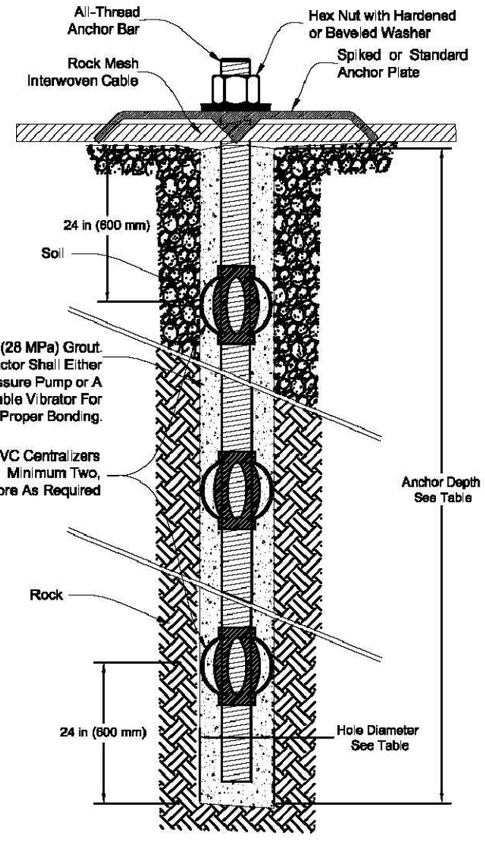
Note:
Anchor details are typical, actual anchor depth, anchor spacing, hole diameter, and minimum pullout to be determined as per insitu conditions and according to the final design.



Section B - Top of Slope

Section B - Top of Slope (Phase 1)

Scale = NTS



Typical Anchor Cross-Section (Phase 1)

Scale = NTS

0 0.5m

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Slope Stability Improvement

1430 South Island Highway, Campbell River, B.C.

Project Number: 5077

Preliminary Design

Soil Nail & Mesh Details

Sheet Number:	9 of 9
Date Created:	2017-05-25
Date Revised:	2017-09-11
Drawn By:	J. Simihag
Reviewed By:	D. Lee
Scale:	As Shown

5077-SSI-SH-09 | 1.0