

# **MR 1-9 Storm Drainage Summary**



Wallace 2-Lot Preliminary Short Plat by RKK Construction

3633 90<sup>th</sup> Ave SE Mercer Island, WA 98040

6,720 SF maximum (40% lot area) (NEW & REPLACED Impervious)

November 20, 2018

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# General:

This site's new and replaced impervious area is ABOVE 5,000 sf, site is subject to minimum requirements MR1-9 identified below.

MR1 = Preparation of Storm Water Site Plans	See C2.0 Drainage Plan
MR2 = Construction Storm Water Pollution Prevention Plan	See future C1.0 Erosion Control (TESCP) Plan in plan set.
MR3 = Source Control of Pollution	See future C1.0 for erosion control measures recommended to mitigate erosion and sediment discharge from site during construction phase.
MR4 = Preservation of Natural Drainage Systems and Outfalls	Development of this short plat will substantially maintain existing drainage patterns in this area. Runoff routed to the city storm will recombine with the natural path within a ¼ mile.
	Runoff from new impervious areas will be routed through a detention pipe which will attenuate peak flow rates and release runoff to the City Storm drain in 90 <sup>th</sup> Ave SE, which flows north and east to the creek in the Gallagher Hill Open Space.



MR5 = On-site Stormwater Management	No BMP's are proposed. See our assessment of various BMP's starting on page 2. Runoff will be detained and conveyed to City storm in 90 <sup>th</sup> Ave SE. Detention is considered a BMP which will mitigate peak flow rates and release volume rates from site for most storm events.
MR6 = Runoff Treatment	Not proposed – PGIS will be less than 5,000 SF
MR7 = Flow Control	Detention proposed; see preliminary engineering plan C3.0 for size and location.
MR8 = Wetlands Protection	Not applicable. No wetlands.
MR9 = Operations and Maintenance	Will provide upon request.

# Background:

This is the preliminary engineering report for the Wallace 2-Lot Short Plat on the northwest corner of SE 37<sup>th</sup> Street and 90<sup>th</sup> Ave SE. Project is located in the NE quadrant of Mercer Island, not far from City Hall, just west of Gallagher Hill. One lot will be separated into two, one house, guest house, and driveway demolished, and two houses and two separate driveways will be constructed.

This is a gently sloped lot, 4-5% average grade. Formal stormwater detention is proposed for this short plat. See preliminary engineering, C3.0 for proposed size and location. System is designed for the maximum build-out of 40% for these two lots using Mercer Island's Prescriptive sizing table based on an older King County single event detention sizing methodology.

No storm BMP's are proposed at this time, beyond detention.

# Soils and Infiltration Feasibility:

This lot is in an "Infiltration LID facilities may be feasible, and soil has moderate infiltration potential" area per Mercer Island's infiltration feasibility map. However, Mercer Island's soil map maps this area as Qvt soil, which is glacial till and not good for infiltration. We are not proposing BMP's at this time.

## Proposed On-site Stormwater management:

The List Approach (List #2) selection process was applied to site:



## Lawn and Landscaped Areas:

 Post-Construction Soil Quality and Depth in accordance with Chapter D5 of Bellevue SWES and BMP T5.13 in Chapter 5 of Volume V of the DOE Manual. Compost-Amended Soil is required.

#### Roofs:

Full Dispersion:
 Infeasible due to lack of 100 LF flowpath

Downspout Full Infiltration:
 Infeasible because by definition full infiltration requires better soils than are present here

#### Bioretention:

Not recommended for couple reasons – Vashon glacial till soil plus it's better served to send all roof water to the tank if a tank is required.

Downspout Dispersion:

Not recommended typically if detention is proposed. It's better served to send all roof water to the tank if a tank is required.

Perforated Stub-Out Connection:
 Not recommended – Vashon glacial till soil plus fact detention is proposed.

#### Other Hard Surfaces:

Full Dispersion:
 Infeasible due to lack of 100 LF flowpath

Permeable Pavement:

Not advised if soils are till and detention is proposed. We can revisit this at building permit design and determine of it makes sense.

#### Bioretention:

Not recommended for couple reasons – Vashon glacial till soil plus it's better served to send all roof water to the tank if a tank is required.

Sheet Flow/Concentrated Flow Dispersion:
 This can be looked at in more detail at building permit time.

Impervious Area	Spread	sheet
Preliminary Eng	•	
Fremilinary Lin	gineerin	9
Wallace 2-Lot Short Plat, 3633 90th Ave SE, N	Mercer Isla	and, WA 98040 - CES #1779
Gross Site area	16,801	sf
GIOSS SITE area	The state of the s	
	0.386	acres
Existing Impervious Area		
Ex main house roof	2,912	sf
Ex guest house roof	742	sf
Ex driveway, on-site	468	sf
total existing =	4,122	sf
Maximum Impervious Area (on-site)	40% lot c	overage (bldg+drive)
Lot 1 (west)	3,360	sf
Lot 2 (east)	3,360	sf
max. total on-site proposed =	6,720	sf
max. new + replaced impervious =		sf
max. new impervious =	2,598	sf

 Table 1

 ON-SITE DETENTION DESIGN FOR PROJECTS BETWEEN 500 SF AND 9,500 SF NEW PLUS REPLACED IMPERVIOUS SURFACE AREA

New and Replaced		Detenti Lengt	on Pipe	Lowest	Orifice er (in) <sup>(3)</sup>		Outlet Invert	Second	Orifice ter (in)
Impervious Surface Area	Detention Dine	Lengi	.11 (11)	Diamet	er (III)	to second	Office (It)	Dianie	ter (III)
(sf)	Detention Pipe Diameter (in)	B soils	C soils	B soils	C soils	B soils	C soils	B soils	C soils
` '	36"	30	22	0.5	0.5	2.2	2.0	0.5	0.8
500 to 1,000 sf	48"	18	11	0.5	0.5	3.3	3.2	0.9	0.8
	60"	11	7	0.5	0.5	4.2	3.4	0.5	0.6
	36"	66	43	0.5	0.5	2.2	2.3	0.9	1.4
1,001 to 2,000 sf	48"	34	23	0.5	0.5	3.2	3.3	0.9	1.2
	60"	22	14	0.5	0.5	4.3	3.6	0.9	0.9
	36"	90	66	0.5	0.5	2.2	2.4	0.9	1.9
2,001 to 3,000 sf	48"	48	36	0.5	0.5	REQUI	DED	9	1.5
	60"	30	20	0.5	0.5			9	1.1
	36"	120	78	0.5	0.5		H BASED	4	1.6
3,001 to 4,000 sf	48"	62	42	0.5	0.5	ON MA	X BUILDO	U I 8	1.3
	60"	42	26	0.5	<b>2</b> .5	3.8	3.9	0.9	1.3
	36"	134	91	0.5	0.5	2.8	2.2	1.7	1.5
4,001 to 5,000 sf	48"	73	49	0.5	0.5	3.6	2.9	1.6	1.5
	60"	46	31	0.5	0.5	4.6	3.5	1.6	1.3
	36"	162	109	9.5	0.5	2.7	2.2	1.8	1.6
5,001 to 6,000 sf	48"	90	59	0.5	0.5	3.5	2.9	1.7	1.5
	60"	54	37	0.5	0.5	4.6	3.6	1.6	1.4
	36"	192	128	0.5	0.5	2.7	2.2	1.9	1.8
6,001 to 7,000 sf	48"	102	68	0.5	0.5	3.7	2.9	1.9	1.6
	60"	64	43	0.5	0.5	4.6	3.6	1.8	1.5
	36"	216	146	0.5	0.5	2.8	2.2	2.0	1.9
7,001 to 8,000 sf	48"	119	79	0.5	0.5	3.8	2.9	2.2	1.7
	60"	73	49	0.5	0.5	4.5	3.6	2.0	1.6
	36"	228	155	0.5	0.5	2.8	2.2	2.1	1.9
8,001 to 8,500 sf <sup>(1)</sup>	48"	124	84	0.5	0.5	3.7	2.9	1.9	1.8
	60"	77	53	0.5	0.5	4.6	3.6	2.0	1.6
	36"	NA <sup>(1)</sup>	164	0.5	0.5	NA <sup>(1)</sup>	2.2	NA <sup>(1)</sup>	1.9
8,501 to 9,000 sf	48"	NA <sup>(1)</sup>	89	0.5	0.5	NA <sup>(1)</sup>	2.9	NA <sup>(1)</sup>	1.9
	60"	NA <sup>(1)</sup>	55	0.5	0.5	NA <sup>(1)</sup>	3.6	NA <sup>(1)</sup>	1.7
	36"	NA <sup>(1)</sup>	174	0.5	0.5	NA <sup>(1)</sup>	2.2	NA <sup>(1)</sup>	2.1
9,001 to 9,500 sf <sup>(2)</sup>	48"	NA <sup>(1)</sup>	94	0.5	0.5	NA <sup>(1)</sup>	2.9	NA <sup>(1)</sup>	2.0
	60"	NA <sup>(1)</sup>	58	0.5	0.5	NA <sup>(1)</sup>	3.7	NA <sup>(1)</sup>	1.7

#### Notes:

- Minimum Requirement #7 (Flow Control) is required when the 100-year flow frequency causes a 0.15 cubic feet per second increase (when modeled in WWHM with a 15-minute timestep). Breakpoints shown in this table are based on a flat slope (0-5%). The 100-year flow frequency will need to be evaluated on a site-specific basis for projects on moderate (5-15%) or steep (> 15%) slopes.
- Soil type to be determined by geotechnical analysis or soil map.
- Sizing includes a Volume Correction Factor of 120%.
- Upper bound contributing area used for sizing.
- <sup>(1)</sup> On Type B soils, new plus replaced impervious surface areas exceeding 8,500 sf trigger Minimum Requirement #7 (Flow Control)
- <sup>(2)</sup> On Type C soils, new plus replaced impervious surface areas exceeding 9,500 sf trigger Minimum Requirement #7 (Flow Control)
- (3) Minimum orifice diameter = 0.5 inches

in = inch

ft = feet

sf = square feet

#### **Basis of Sizing Assumptions:**

Sized per MR#5 in the Stormwater Management Manual for

Puget Sound Basin (1992 Ecology Manual)

SBUH, Type 1A, 24-hour hydrograph

2-year, 24-hour storm = 2 in; 10-year, 24-hour

storm = 3 in; 100-year, 24-hour storm = 4 in

Predeveloped = second growth forest (CN = 72 for Type B

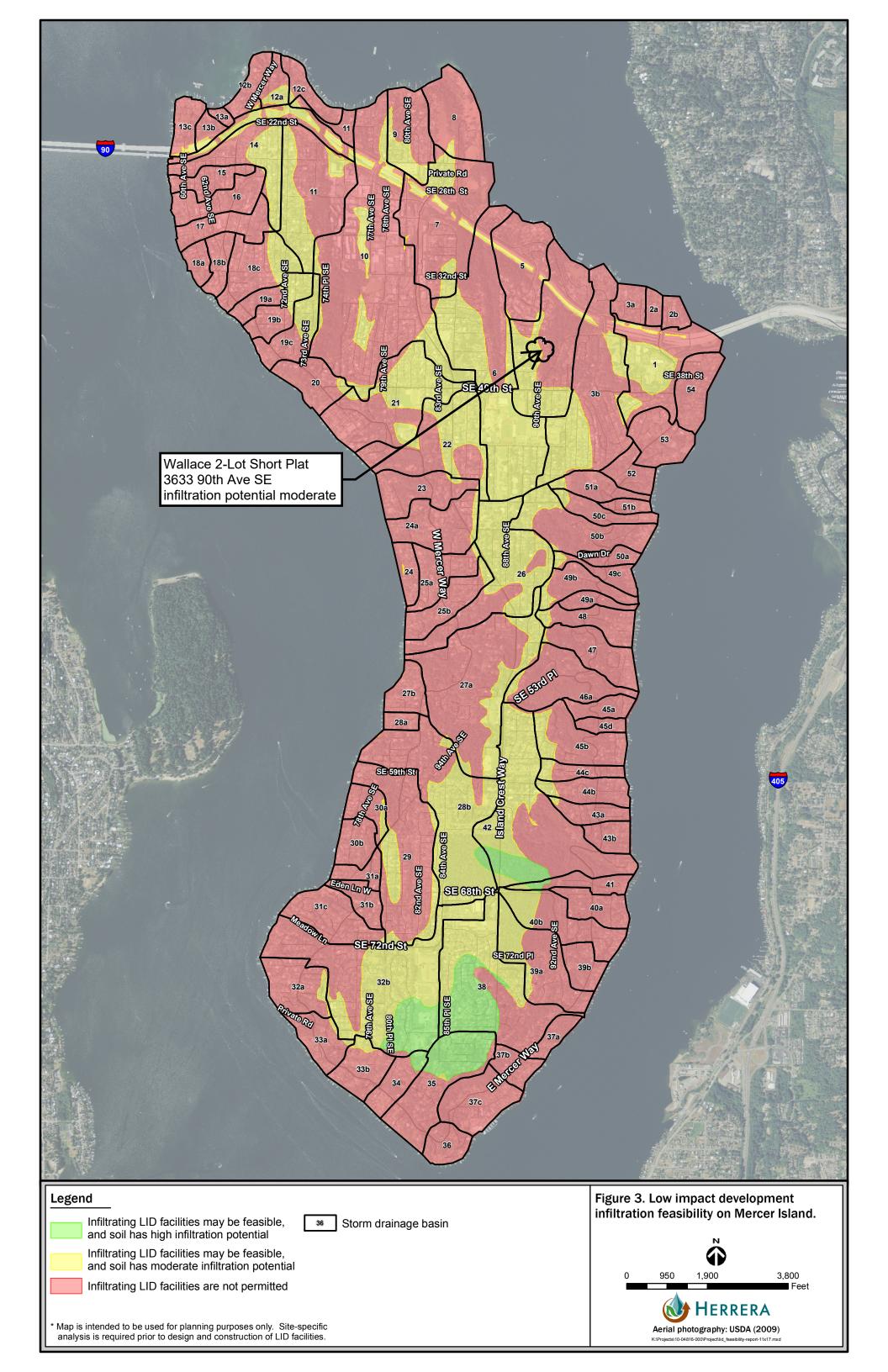
soils, CN = 81 for Type C soils)

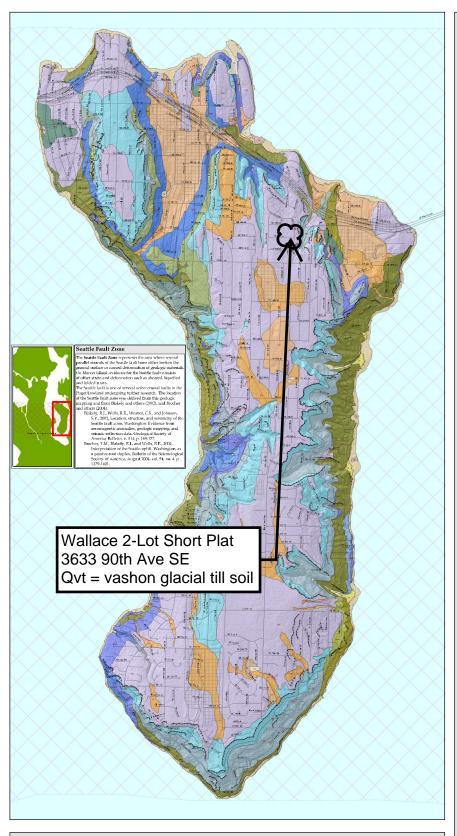
Developed = impervious (CN = 98)

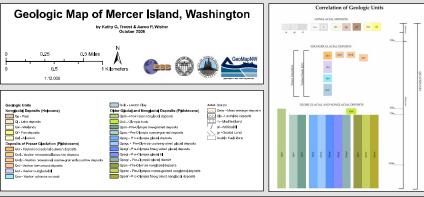
0.5 foot of sediment storage in detention pipe

Overland slope = 5%

Last updated 1-26-18 2







Age & Geologie Unit	Name	Summary Description	Thickness	Density/ Hardness	Permeability Factor
blocene	NONGLACIAL DEPO				
Я	Artificialim	I'll and ye golds haven, depoted hard-desire of darft the original depote Locally directed and darft the original depote Locally directed or County, and one of the original depote the county of the county of the original depote the county of the county of the Sugar colory beam and bouldery research. Mapped whose brigation provides all friend information in deflication exists or rethree light and the county of the county of the county of the county of the county of the county of the Landshood of All and against the verse greated fear— who had county of the county of the county of proposed for the local original depote the county of proposed for the local original depote the county of the bounder of readings not enjoyed. Locally directed and decided white.	Mapped where \$2 m; but friend ill comession across most of the Chy; 2 m to \$7 ms beneath roadways, in guillies, revines, on took and former take hards, in other low-lying places, at colonial objest, and on slopet.	Very soft to still or very losse to dense; variable degree of compaction during placement	Voids commony variable and unpeedicable grain size augular and large particles commer; variable degree of compaction
St.	Creded land	divided into:  Land substantially altered by occavation or grading- may include substantial blockways of all two substan- tian may on whom plants in transfer of its definate secant. Quadational with unit "a?"	and on tiopes.  Large areas for 1- 90 (other roadways not mapped)	Very soft to lord or very lorse to very dense: variable	Depends on thekness of noterial removed, grain size, and degree of compactive of fill or
ģmw.	Mass-wastage deposits	Odlaviam, soil, lancidide debris, and organic matter with indistinct morphology. Common below up rigs where peedy deposits are also to be a present the peed of the peed of the peed of the feed of the Limit and Pert Lill. Potancios managoral care of more, we depolypoist us or what there is the about the peed of the peed of the Deposits, both mapped and managoral models. Deposits, both mapped and managoral models that the peed of the peed of the peed of the peed of the peed to the peed of the peed of the peed of the bitter! Castert. To cally ordering the peed of the peed of the peed of the peed of the bitter! Castert. To cally ordering the peed of	Typically about 2 m, locally >10 m ulong scyp slopes	competition  Loose to dense and soft to stiff; variable degree of consolidation depends on material in collusters and the coherency	instruction deposits  Intermixed the and coanse-grained deposits, variable degree of consolication
Qls	Landtlide deposits	bieret steeke. To silly subshisked inten- Diminst al houses in the study otherwise starkist, deposits immersion, above sleepe or move by Diminst allowed and the starking of the starking of the starking of the starking of the starking of the starking of the starking of the starking of the starking of the binary starking over the starking of the starking of the starking over the starking over the starking over the deposits oversith from the starking over the starking over the starking over the starking over the starking oversity of the starking oversity of the starking oversity over the starking oversity of the starking oversity oversity of the starking oversity of the starking oversity oversity oversity of the local into the starking oversity oversity of the local into the starking oversity oversity oversity of the starking oversity oversity oversity oversity oversity oversity oversity oversity oversity oversity of the starking oversity oversit	Variable, commenty 2 to 18 re abone steep slopes	Very loose to very dones or soft to 'saul' variable degree of degree of consolidation depends on material coherency	Intentional Che and consec-guarand deposits, voids commen, variable degree of consolication, slide guarant and other sheet runss offer preferred pathnesss.
àr	Pea:	desponds.  Predominately organize matter constrained of plant material and vecody defents, eccumulated in bedien growth data about 1 min distallations and the constraint of many public victor. As terms into a way sport of many about 1 min distallation and approximately in the constraint of the const	>1 to 4 m	Very soil to modium stiff or very labse to medium dense	Commonly saturates
Ny	Wetland deposits	Organic-rich silt, sandy silt, peet, and fine-grained affluvium, peorly almined and intermittently seet. Areas identified from Mercer Island GB Weilands layer which was based on; not all such deposits.	L to 5 ms Typically 2 to 3 ar	Very soft to medium stiff or very laose to medium	Controlly saturates
248	Alluvium	have been delineated.  Sond, elli, gravel, and cobbles deposited by streams and running water. May include landside debris and collusium attengine, locally contains soft next lenses, locally middledel into.	One in a 7 m; in river and stracm valleys	Lone to dense or solt to stiff	Perdominantly sand and horizontally budged, fire- and coate-grained lease
G	Take-deposits	Silt and day with head small raws, and, and other expants unfamility deposits a capient to Lake Washington. Most recepted areas are also bettern sociences to expose a rive a lake Washington was not known for a large state of the capital and the late of the capital and the late of a large state of the late	Oracle 16 m adjacent a Line WA	Vary soft to medium still or very loose to med um dense	Probabilistic III for grained and borizontally bedded
QI	Tan deposits	Stord, still, gravel, and cobbles deposited in lobote form where streams emerge from contraing valleys and reduced gradients coops sediment loads to be deposited. Present at I beare of streams can not side of island. Gradatinnal with units Qal and Ql.	3 to 5 m	Lanse to dense or soft to stiff	Variable grain size
Scistoco no	YOUNGER GLACIAL	T. DEPOSITS			
Qi:	Deposits at Vashacast (1965), not used as a Recessional outwash deposits	well costed, and less common rily, and and sile. Deposited in curvant channel that carried must-chaning glacial meltivote during ion retriect may from the kernagin. Also in Audo departs but accumulated in an adjustation recessional also. Discontinuous May include this lag on glacial till uptants arthough deposits see than about 1 m (2.4) this, and though deposits see than about 1 m (2.4) this, and though deposits see than about 1 m (2.4) this, and though deposits see than about 1 m (2.4).	~3 to 5 us typ(oilly in channels	Love to desire	Use sonally bedded to cross bedded, critoriny to well graded, charactized, coasse by depusity coasses.
Qvd	Recovering deposits	Luminated site and elsey, loss to high plantirity, with local sand layers, pack, and other organic sediments, deposition in coordinating water and ophomeral lakes. Locally include high planticity cay with some justical of Terres-and layers of sole and distinuition may be greated. Terres-and layers of sole and claiming the greated is designed with a court of the court	One to 4 mion uplands; as much as 10 m in city center area	Very self to NOT	Horizontally healthst sandy channels may breach the lacestrine deposits
Qv:k	Reconstruct facustrine sandy deposits	Qvr, Qvric, Qp, and Q: Prodominantly sand, Clean to allty, horizontally to cross hedded, deposited in recessional lakes	1. to 8 m.	Louse to dense	Interspressed silt and gravel layers
Qvi	ice-contact deposits	Introducted till end outwork irregularly shaped believe fill and nutwork. On work consists of man and managed for the work consists of many depth city in principles of the start has the phartestally bedded to except copping. The till coresist of matrix supported graceful send with that are a may not be expected graceful, november when they are the property of the copy for the copy for the copy for the copy of t	i to 30 me in posities on the coland	Louis to very dense; ratiable	International irregularly disspect bodies of EU and consequence deposits, may have skeep dips
QvI	Vashon IC	Catipare detents of self-card and customization to self-card and customization under the continuation grave algorithm temperated and deposition under the Continual Linguistic Institution and and grave flowers, such that communes Conservation of the Continuation of C	Typically 3 or 10 m. locally 17m , locally absent	Derre to very dense; sand is commonly lose dense	Vertical fractures, and lenses, send bodies, irregular bodies, oracle sub- borizontal bristing, common; commonly capped by +/+ i mon gravelly send
Qu	Alfrance Outwash Deposits	DAB our set send and great deposited by a cross leading from advancing in scheet. May great private from St. Betterness, each process in appearant and an economical two over part. Cerema's, in merchillard to early slightly uniform. May be correcting by Carena till harden better DAB of the correction by Carena till harden bear for the harden to the best of the correction of the correction of the correction of the correction of the correct of with increasing the correction of the correct of with increasing	Locally over 60 miltick; wide- spread, locally about 8	Dense to very dense	Predom routly medium grained sand, horiscotally to cross backed, land silt back-common throughout
Qric	Lawton Clay of Mulliacoux and others (1965)	Laminated to mavine till, it apper till, net villy clay to the control of the product for booking to the control of the product for booking to the control of the control o	0 to 8.27 m; generally present in pre-Vashou willings lesbow 202 0 in elevation	Very stiff to hard	Vertical fracturey fine send partings common near top and lactum of unit
Seistacene Opt	DEDER GLACIAL AT Deposits of pre- Zuore glaciation age	Not used as a map unit. Locally divided into:			
Qpin	Nonglacial deposits	Sond, gravel, vill, clay, and organic deposits of inferred neeplecial origin, based on the presence of post, patroods, and typica less one or a secubiam Caronic Range provenance for sedimentary district Mapped amount the reconstant lake valley and CR34 Hill and near the northeast edge of the map.	18 to 30 m, discontinuous	Very de-se and hard	I confized iron-recide cemented layers, interbedded and internised fine- and coarse-grained layer
ub 1943 1-70 ka	Olympic bods of Mirsed and Bookt (1988)	The time also time also principle and point, and point, also point, and point, also point, and point, also point, and point, also point, and point, and point, and point, and gazed cas in this hope, or mise adjust a present point and gazed cas in this hope, are in a dispersable, and a possible are possible and point	7 to 10 m, discontinuous	Very dense and hard	Localized iron-order convided layers, inter-bedded and internated fine- and coasso-grained layer.
po Qpa:	Deposits of pre- Observer age Pine-grained deposits	Not used as a map unit. Locally divided into: Silt and clay, may have sandy interbeds, laminoled to massive. Mapped on the north half of the island.	i ili to 27 m, disconilizzana	Hard	Localized inter-recide
Qpor	Course-grained deposits	to massive. Mapped on the north half of the Island.  Sand and gravel, clean to allay, with nome silk layers, lightly to motivately oxidized. Mapped on the series side of First Hill and on the north-half of the island. Tilety percent at more fact that in the	6 to 20 m, discontinuous	Very detee	cemented layers and sandy partings Localized iron-octde contented layers and channels
Opog	Clacial deposits	successive.  Sth. sand, gaved and till of plastal origin. Wouldy to strongly os bilard. Underdise Varhon age deposits and thun must, also he of per-Chympia age. Seitherer is of inferred glastal (porthern) origin, beard or presence of data to internal grains requiring southworth for wheat transport. Mapped on the new terminal affects, the infinite for the original pro- sent transport of the control of the con- trol the new terminal affects, the infinite of the con- trol the new terminal affects, the infinite of the con-	/ to 10 m <sub>b</sub> discontinuous	Very dense and hard	Localized irre-verted concented by e.s., interbedded and intermixed fine- and counse-grained by ce
Greke	Coarse grained glacial deposits	divided into:  Send and greed, clear to silty, with some silt layers, medicately to here if y axiditud, mapped at two locations in the oncer part of the island at long clevation.	i 8 to 17 m, d Recellica cus	Very de se	Totalized iron occle cemented layers and channels.
Qleck,	Time grained glacial deports	Silt and chay, may been sounly interbade, huminoted to massive. Mapped at several locations along the west side of the island, including around this LID.	iff to 33 m, discontinuous, as much as 58 m in channels in the salvantare	Hed	Tocalized iron order cemented layers and sandy partings
Qprg1 Qprgd	III' deposits  Clacial diamict	Till thick enough to shore at map scale. Most cateracyc on sortform west slopes of the listand Silt and clay, slightly sandy, with few chopstones	Discontinuous, i to 15 m.	Very dense and hard Very dense	Localized iron-recide comunited layers, sandy partings, and lientes Localized iron-recide
Qpon	Nonglecial deposits	Silt and day, slightly sandy, with few chopstones and sledike fill-like, but finer grained and with force grand closel than most Pupel to Moshard life. Zorily to wholly glatiomatine is origin. Mapped on seek, certral part of biland. Servic, gravel, silt, they, and organic deposits of	to 27 m. 7 to 50 m, discontinuous	and very band  Very de ne and hard	concented layers, sandy partings and leases
Qpone		Sorel, gravel, silt, they and organic deposits of interest neeplecial origin, based on the personne of plateonic, and topical agency or a section Coccade Range provisionate for submittany clasts. Provide near full electric field of gravel, close to fill, with fill layers and	10 to 13 m,	and hard	Totalized iron orests comented by ex-, interbedded and internated fine- and coarse grained by er I coalized iron-reide
	Corresperingd nonglacial deposits	Seed and goverly close to silt, with silt layers and past, medicataly to heavily oxiditized. Mapped at one location, south end of the cast-central side of the shand. More prevalent in the subsurface	discontinuous		channels
Qpon:	Pine-grained nongiacial deposits	Sit and clay, may have sandy interbeds, and peak, laminated to massive.	7 to 17 m, discontinuous	Hard	Localized iron-order comented layers and stundy partiage