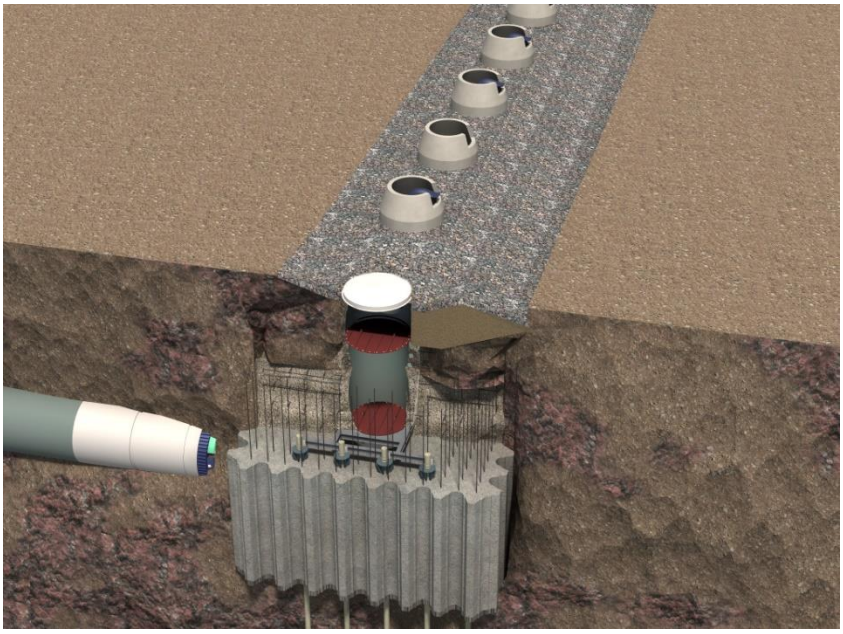
APPENDIX B
GEOTECHNICAL REPORTS

B.1: Geotechnical Data Report

Part B: Appendix A, Boring Logs

Annacis Island WWTP New Outfall System

Vancouver Fraser Port Authority
Project and Environmental Review Application



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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

CDM Smith

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APPENDIX A

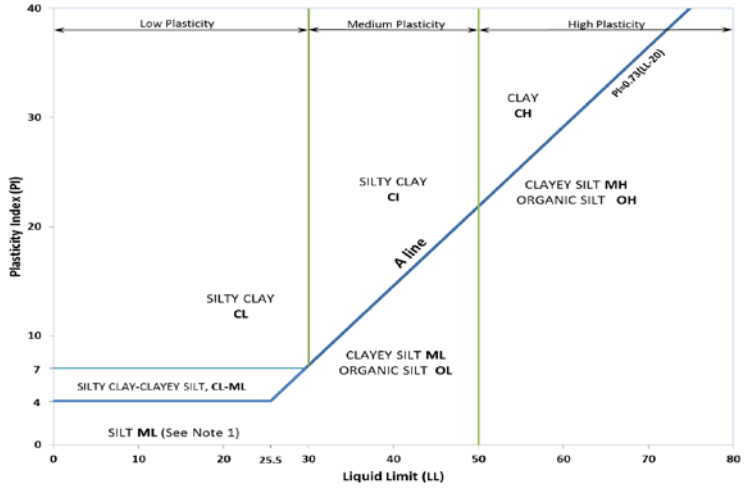
Records of Boreholes and CPT Logs

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% **(see Note 2)**	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:
The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Large Diameter Penetration Resistance (LPT), N:
The number of blows by a 136 kg (300 lb) hammer dropped 760 mm (30 in.) required to drive a 76 mm (3 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)
An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
GS	Grab Sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
2. Definition of compactness descriptions are based on SPT-'N' ranges as provided in Terzaghi, Peck and Mesri (1996) and correspond to typical average N_{60} values. Many factors affect the recorded SPT-'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), groundwater conditions, and grainsize. As such, the recorded SPT-'N' value(s) should be considered only an approximate guide to the compactness term. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1,2] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c′	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT No.: 1525010 / 2000

RECORD OF AUGERHOLE: AH16-01

SHEET 1 OF 2

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447773.14 E: 503567.78 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23, 2016
DRILLING CONTRACTOR: Conetec Investigations Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		104.21														
0			ASPHALT																
			FILL - Granular Road Base		0.10														
					103.51														
1	Hydrovac	Vacuumed	FILL - **(SP)** SAND, fine to medium, trace fines; brown; moist.		0.70														
2																			
3						1	AS												
					101.01														
			(OL/ML) ORGANIC SILT to CLAYEY SILT; brown to dark grey, with wood fibres; soft to firm.		3.20	2	AS												
					100.61														
			(CL) SILTY CLAY, trace organics; grey, with wood fibres; soft to firm.		3.60	3	AS												
4					100.25														
			(SM/ML) SILTY SAND to SILT and SAND, fine; grey; moist.		3.96	4	AS												
			- seams of silt between 4.7 m and 5.2 m depth.			5	AS												Cementatious Grout Backfill
5					99.03														
	M7 Truck Mounted Auger Drill Rig	Solid Stem Auger	**(SP)** SAND, fine to medium, trace fines; grey; moist.		5.18	6	AS												
6																			
						7	AS												
7					97.05														
			(SM/ML) SILTY SAND to SILT and SAND, fine sand; grey, with seams of clayey silt; moist.		7.16	8	AS												
8						9	AS												
					95.68														
			(SP) SAND, fine to medium, trace fines; grey; moist.		8.53	10	AS												
9																			
						11	AS												
10			*CONTINUED NEXT PAGE*																

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160
GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL | SAND | FINES | SILT | CLAY

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: MA
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 22/1/18

PROJECT No.: 1525010 / 2000

RECORD OF AUGERHOLE: AH16-01

SHEET 2 OF 2

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447773.14 E: 503567.78 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23, 2016
DRILLING CONTRACTOR: Conetec Investigations Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	M7 Truck Mounted Auger Drill Rig / Solid Stem Auger	**(SP)** SAND, fine to medium, trace fines; grey; moist. *(continued)*							Wp W Wl; NP - Non-Plastic; 20 40 60 80; SHEAR STRENGTH Cu, kPa; nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160									
11					12	AS												Cementatious Grout Backfill
12				92.02	13	AS												
		End of Augerhole.		12.19														
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: MA
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF AUGERHOLE: AH16-02

SHEET 1 OF 1

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447998.33 E: 503389.04 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 21, 2016
DRILLING CONTRACTOR: Conetec Investigations Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0		Ground Surface		103.78													
		ASPHALT		103.68													
		FILL - Granular Road Base		0.10													
				103.08													
	Hydrovac / Vacuumed	FILL - **(SP)** SAND, fine to medium; brown; moist.		0.70													
1																	
2					1	AS											
				100.88													
3		**(CL)** SILTY CLAY, trace organics; grey with orange staining; wet, soft to firm.		2.90	2	AS											
					3	AS											
				99.97													
4		**(SM)** SILTY SAND, fine; grey with orange staining, moist.		3.81	4	AS											
				99.67													
		(ML) CLAYEY SILT, trace to some fine sand; grey; wet.		4.11	5	AS											
				99.21													Cementatious Grout Backfill
		(ML/SM) sandy SILT to SAND and SILT, fine sand; grey; moist.		4.57	6	AS											
5	M7 Truck Mounted Auger Drill Rig / Solid Stem Auger			98.75													
		(SP) SAND, fine to medium, trace fines; grey; moist.		5.03													
6					7	AS											
7					8	AS											
8					9	AS											
9					10	AS											
				94.64													
		End of Augerhole.		9.14													
10																	

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: MA
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 22/1/18

PROJECT No.: 1525010 / 2000

RECORD OF AUGERHOLE: AH16-03

SHEET 1 OF 2

CLIENT: CDM Smith Canada ULC

DATUM: CVD28GVRD2005

PROJECT: AIWWTP Transient Mitigation and Outfall System

DRILLING DATE: March 22, 2016

LOCATION: Annacis Island, Delta, B.C.

DRILLING CONTRACTOR: Badger Day Lighting/Conetec Investigations Ltd.

N: 5448126.68 E: 503450.09 UTM NAD83 (Ground) Zone: 10

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002 (GRAVEL / SAND / FINES / SILT / CLAY)	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		105.10										
0		ASPHALT		104.99										
		FILL - Granular Road Base		0.10										
				104.40										
	Hydrovac / Vacuumed	FILL - **(SP)** SAND, fine to medium, trace fines; brown; moist.		0.70										
1					1	AS								
		- trace to some gravel between 1.8 m and 2.4 m depth.												
2					2	AS								
3														
				101.59	3	AS								
		(CL) SILTY CLAY, trace organics; grey with orange staining, seams of fine sand; firm.		3.51										
					4	AS								
4					5	AS								
				100.53										
		(SP) SAND, fine to medium, trace to some fines; grey; wet.		4.57										
				100.22	6	AS								
5	M7 Truck Mounted Auger Drill Rig / Solid Stem Auger	**(CL-ML)** SILTY CLAY to CLAYEY SILT, some fine sand; grey with orange staining; wet, stiff to firm.		4.88	13	AS								Cementatious Grout Backfill
					7	AS								
				99.61										
		(SM/ML) SILTY SAND to SILT and SAND, fine sand; grey; wet.		5.49	8	AS								
6				99.00										
		(SP) SAND, fine to medium, trace fines; grey; wet.		6.10										
					9	AS								
7														
8														
					10	AS								
9														
					11	AS								
10		*CONTINUED NEXT PAGE*												

DEPTH SCALE

1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS

LOGGED: MA

CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF AUGERHOLE: AH16-03

SHEET 2 OF 2

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5448126.68 E: 503450.09 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 22, 2016
DRILLING CONTRACTOR: Badger Day Lighting/Conetec Investigations Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	M7 Truck Mounted Auger Drill Rig / Solid Stem Auger	**(SP)** SAND, fine to medium, trace fines; grey; wet. *(continued)*							Wp W Wl; NP - Non-Plastic; 20 40 60 80; SHEAR STRENGTH Cu, kPa; nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160									
11					12	AS												Cementatious Grout Backfill
12				92.90														
		End of Augerhole.		12.19														
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: MA
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01

SHEET 1 OF 5

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447176.58 E: 503670.21 UTM (Ground) Zone: 10

DRILLING DATE: September 21, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.
Sampler Hammer: See note at End of Borehole

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Mudline		90.90														
0	Fraste Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, very loose to loose.		0.00														
1					1	51 SS	50	4		1	97	2						
2																		
3					2	51 SS	46	4										
4																		
5					3	51 SS	50	4		0	98	2						Cementitious Grout Backfill
6					4	51 SS	46	6										
7																		
8					5	51 SS	63	9		1	97	2						
9				81.76														
		(SP) SAND, fine to coarse, trace fines, trace fine sub-angular gravel; grey; wet, compact to dense.		9.14	6	51 SS	75	19										
10		*CONTINUED NEXT PAGE*																

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01

SHEET 2 OF 5

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447176.58 E: 503670.21 UTM (Ground) Zone: 10

DRILLING DATE: September 21, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to coarse, trace fines, trace fine sub-angular gravel; grey; wet, compact to dense. *(continued)*															
11					7	51 SS	58	20		2	94	4					
12					8	51 SS	54	24									
13																	
14					9	51 SS	63	41									
15																	Cementitious Grout Backfill
16					10	51 SS	67	40		0	95	5					
17																	
18					11	51 SS	83	40									
19																	
20		*CONTINUED NEXT PAGE*			12	51 SS	79	26		4	90	6					

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01

SHEET 3 OF 5

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447176.58 E: 503670.21 UTM (Ground) Zone: 10

DRILLING DATE: September 21, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to coarse, trace fines, trace fine sub-angular gravel; grey; wet, compact to dense. *(continued)*			13	51 SS	83	31										
21																		
22					14	51 SS	63	39		0	92	8						
23					15	51 SS	50	57										
24				66.34	16A													
25		**(GP)** GRAVEL, sub-rounded to sub-angular, trace to some sand; grey; wet. - trace to some cobbles - sand, trace to some gravel from 24.4 m to 24.6 m depth. - sandy gravel to gravel, some sand from 24.6 m to 25.0 m depth.		24.56	16B	76 SS	88	54										Cementitious Grout Backfill
26					17	76 SS	46	39										
27																		
28					18	76 SS	75	37										
29					19	76 SS	50	3										
30		**(CI)** SILTY CLAY, seams of fine sand; grey; wet, stiff to hard.		61.54 29.36														

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01

SHEET 4 OF 5

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447176.58 E: 503670.21 UTM (Ground) Zone: 10

DRILLING DATE: September 21, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(Cl)** SILTY CLAY, seams of fine sand; grey; wet, stiff to hard. *(continued)*																
31																		
32					20	76 SS	63	15										
33					21	76 SS	100	WR							15			
34				56.31														
35		**(GP-SP)** GRAVEL, sub-angular to sub-rounded, fine to coarse, some sand to sandy; grey; wet.		34.59	22	76 SS	71	26		80	17	3						Cementitious Grout Backfill
36		- possible cobbles or boulders at 36.0 m depth.																
37					23	76 SS	58	25										
38					24	76 SS	33	30										
39		**(CL)** SILTY CLAY, some gravel to gravelly; grey; wet, stiff.		52.42 38.48														
40					25	76 SS	33	30		6	36	58	39	19	12			

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01

SHEET 5 OF 5

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447176.58 E: 503670.21 UTM (Ground) Zone: 10

DRILLING DATE: September 21, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002 (GRAVEL / SAND / FINES / SILT / CLAY)	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	**(CL)** SILTY CLAY, some gravel to gravelly; grey; wet, stiff. *(continued)* - possible cobbles or boulders from 40.2 m to 41.2 m depth			25		33	30						
41				49.29										
		(ML/CL) sandy SILT to clayey SILT, fine to coarse sand, some sub-rounded gravel; grey; wet.		41.61	26	76 SS	100	>50	H ○		4			
42														
43	Fraste Track Mounted on Spudded Barge / HQ Coring - Soil				27	76 SC	10							Cementitious Grout Backfill
				47.36										
		(CI/CH) SILTY CLAY to CLAY; grey; wet, hard.		43.54										
44					28	76 SC	43		○		30			
45														
46					29	76 SC	100							
				44.42										
		End of Borehole.		46.48										
47														
48		NOTE: LPT - Large Penetration Test, SAMPLER HAMMER, 136kg; DROP, 762mm 76 SS - Large Split Spoon Sample SPT - Standard Penetration Test, SAMPLER HAMMER, 63.5kg; DROP, 762 mm 51 SS - Standard Split Spoon Sample												
49														
50														

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01B

SHEET 1 OF 4

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5445012.95 E: 503466.28 UTM (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: September 22, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.
Sampler Hammer: See note at End of Borehole

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	Fraste Track Mounted / Mud Rotary (Automatic Trip Hammer)	Mudline		90.81					20 40 60 80; 40 80 120 160								
		Drillout		0.00													Cementitious Grout Backfill
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01B

SHEET 2 OF 4

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5445012.95 E: 503466.28 UTM (Ground) Zone: 10

DRILLING DATE: September 22, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste Track Mounted; Mud Rotary (Automatic Trip Hammer)	Drillout *(continued)*															
11																	
12																	
13																	
14																	
15																	Cementitious Grout Backfill
16																	
17																	
18																	
19																	
20		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01B

SHEET 3 OF 4

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5445012.95 E: 503466.28 UTM (Ground) Zone: 10

DRILLING DATE: September 22, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20			Drillout *(continued)*															
21																		
22																		
23					67.42													
24	Fraste Track Mounted	Mud Rotary (Automatic Trip Hammer)	**(GP-SP)** Gravel, sub-rounded to sub-angular, some sand to sandy, trace to some fines; grey; wet. - trace of cobbles from 23.5 m to 24.1 m depth.		23.39	1	76 SS	67	34									
25						2	76 SS	54	15		80	17	3					Cementitious Grout Backfill
26																		
27						3	76 SS	46	31									
28						4	76 SS	67	30		67	26	7					
29																		
30			**(CI)** SILTY CLAY; grey; wet, stiff to hard.		61.07 29.74	5	76 SS	100	2							16		

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-01B

SHEET 4 OF 4

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5445012.95 E: 503466.28 UTM (Ground) Zone: 10

DRILLING DATE: September 22, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste Track Mounted / Mud Rotary (Automatic Trip Hammer)	**(CI)** SILTY CLAY; grey; wet, stiff to hard. *(continued)*			5		100	2										
31																		Cementitious Grout Backfill
32				58.76	6	TP	100											
		End of Borehole.		32.05														
33		NOTE: LPT - Large Penetration Test, SAMPLER HAMMER, 136kg; DROP, 762mm 76 SS - Large Split Spoon Sample																
34		SPT - Standard Penetration Test, SAMPLER HAMMER, 63.5kg; DROP, 762 mm 51 SS - Standard Split Spoon Sample																
35																		
36																		
37																		
38																		
39																		
40																		

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-02

SHEET 1 OF 4

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447248.13 E: 503657.59 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.
Sampler Hammer: See note at End of Borehole

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Mudline		93.43														
0	Fraste Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, loose to compact.		0.00														
1																		
2					1	51 SS	88	6		0	96	4						
3					2	51 SS	63	10										
4																		
5					3	51 SS	79	8		0	96	4						Cementitious Grout Backfill
				87.83														
		(SP) SAND, fine to medium, trace fines; grey; wet, compact.		5.60														
6					4	51 SS	83	14										
7																		
8					5	51 SS	83	14										
9																		
10					6	51 SS	75	11		0	97	3						

CONTINUED NEXT PAGE

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160
GRADATION % CLAY PARTICLE SIZE <= 0.002

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-02

SHEET 2 OF 4

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447248.13 E: 503657.59 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact. *(continued)*																
11					7	51 SS	79	17										
12					8	51 SS	67	18		0	96	4						
13		- trace gravel from 13.4 m to 21.7 m depth.																
14					9	51 SS	79	31										
15					10	51 SS	67	22		3	93	4						Cementitious Grout Backfill
16																		
17					11	51 SS	67	27										
18																		
19					12	51 SS	71	21										
20		*CONTINUED NEXT PAGE*			13	51 SS	67	20										

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-02

SHEET 3 OF 4

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447248.13 E: 503657.59 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact. *(continued)*			13	51 SS	67	20	0	94	6						
21				71.76													
22		**(GW-SP)** sandy GRAVEL, fine to coarse, sub-rounded to sub-angular; grey; wet.			14	51 SS	38	45									
23					15	76 SS	83	44	59	36	5						
24					16	76 SS	67	47									
25				68.74 24.69													Cementitious Grout Backfill
26		**(GP)** GRAVEL, sub-rounded to sub-angular, trace to some sand; grey; wet.			17	76 SS	67	17	94	5	1						
27					18	76 SS	83	13									
28																	
29		- becomes very loose below 28.7 m depth.			19	76 SS	54	4	90	3	7						
30				63.46		76	100	1									

CONTINUED NEXT PAGE

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

GRADATION % CLAY PARTICLE SIZE <= 0.002

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-02

SHEET 4 OF 4

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447248.13 E: 503657.59 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	**(CL-ML)** SILTY CLAY to CLAYEY SILT; grey; wet, firm to stiff. *(continued)*			20b	SS									10			
					20b	76 SS	100	1										
31																		
32					21	51 SS	0	WR										
33																		Cementitious Grout Backfill
34					22	TP	100											
35																		
				57.62														
36		**(GP-SP)** sandy GRAVEL, sub-rounded; grey; moist to wet.		35.81	23	51 SS	17	>50		58	36	6					
				56.75														
37		End of Borehole.		36.68														
38		NOTE: LPT - Large Penetration Test, SAMPLER HAMMER, 136kg; DROP, 762mm; 76 SS - Large Split Spoon Sample. SPT - Standard Penetration Test, SAMPLER HAMMER, 63.5kg; DROP, 762 mm; 51 SS - Standard Split Spoon Sample																
39																		
40																		

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-03

SHEET 1 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447343.14 E: 503632.76 UTM (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: October 3-7, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.
Sampler Hammer: See note at End of Borehole

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		104.36													
0			ASPHALT PAVEMENT		0.08													
			FILL - Granular Road Base		103.98	1	GS											
	Hydrovac	Vacuumed	FILL - **(SP)** SAND, trace fines; brown; dry to moist, loose.		0.38													
1						2	GS											
						3	51 SS	67	10									
2					102.07													
			(MH) CLAYEY SILT, trace fine sand, trace organics; brown to grey; moist, firm to stiff.		2.29													
3						4	51 SS	63	6						26	2.4	OC	
4					100.09													
			(ML) CLAYEY SILT, some fine sand; grey; wet, soft to firm. - wood debris between 4.3 m and 4.4 m depth.		4.27	5	51 SS	92	4						16	1.9	OC	Cementitious Grout Backfill
5																		
6	Fraste Track Mounted on Spudded Barge	Mud Rotary (Automatic Trip Hammer)				6	51 SS	75	2									
7					96.97													
			(SM) SILTY SAND, fine to medium, seams of silt; grey; wet, loose.		7.39	7	51 SS	75	6		0	65	35					
8																		
					95.47													
9			**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact.		8.89	8	51 SS	79	10									
10			*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-03

SHEET 2 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447343.14 E: 503632.76 UTM (Ground) Zone: 10

DRILLING DATE: October 3-7, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact. *(continued)*																	
					9	51 SS	75	11			0	88	12						
11																			
12					10	51 SS	83	14											
13																			
					11	51 SS	75	13			0	95	5						
14																			
15					12	51 SS	79	12											Cementitious Grout Backfill
16																			
					13	51 SS	75	16			0	97	3						
17																			
18					14	51 SS	79	21											
19																			
					15	51 SS	79	21			0	96	4						
20		*CONTINUED NEXT PAGE*																	

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-03

SHEET 3 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447343.14 E: 503632.76 UTM (Ground) Zone: 10

DRILLING DATE: October 3-7, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact. *(continued)*			15		79	21									
21					16	51 SS	83	26									
22				81.78													
		(SP) SAND, fine to medium, trace fines; grey; wet, compact to dense.		22.58	17	51 SS	92	44		0	94	6					
23																	
24					18	51 SS	88	36									
25																	Cementitious Grout Backfill
26					19	51 SS	83	36		1	94	5					
27		- trace fine gravel from 27.1 m to 27.7 m depth.			20	51 SS	67	26									
28																	
29					21	51 SS	79	23		0	94	6					
		(GP-SP) GRAVEL, fine to coarse, sub-rounded to sub-angular, some sand to sandy, with cobbles; grey; wet.		75.12 29.24													
30		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-03

SHEET 4 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447343.14 E: 503632.76 UTM (Ground) Zone: 10

DRILLING DATE: October 3-7, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen - ■, Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(GP-SP)** GRAVEL, fine to coarse, sub-rounded to sub-angular, some sand to sandy, with cobbles; grey; wet. *(continued)*															
					22	76 SS	54	27		88	10	2	1	1			
31																	
32					23	76 SS	63	32									
33																	
					24	76 SS	54	34		67	23	10	8	2			
34																	
35					25	76 SS	54	19									Cementitious Grout Backfill
36																	
					26	76 SS	58	21		78	15	7	6	1			
37																	
38					27	76 SS		20									
39																	
				64.68 39.67	28	76 SS	42	15		42	53	5	3	2			
40		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-03

SHEET 5 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447343.14 E: 503632.76 UTM (Ground) Zone: 10

DRILLING DATE: October 3-7, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40		**(CL/CI)** SILTY CLAY, some fine sand to sandy, seams of silt; grey; wet, firm to stiff. *(continued)*															
41					29	51 SS	100	WR						12			
42					30	76 TP	92							9			
43																	
44	Fraste Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)			60.16													
45		**(CI)** SILTY CLAY, some fine sand, seams of silt; grey; wet, firm to stiff.		44.20													Cementitious Grout Backfill
46																	
47					31	51 SS	100	WR						19			
48				56.35	32	76 TP											
49		**(CL-ML)** SILTY CLAY to CLAYEY SILT, some gravel to gravelly, fine, angular to sub-angluar gravel; grey; wet; stiff to very stiff.		48.01	33	76 SS	100	WR		9	22	69	45	24	9		
50				54.68 49.68													

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-03

SHEET 6 OF 6

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447343.14 E: 503632.76 UTM (Ground) Zone: 10

DRILLING DATE: October 3-7, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste Track Mounted on Spudded Barge Mud Rotary - Soil Coring	**(ML-SM)** sandy SILT to SILTY SAND, some gravel to gravelly, fine to coarse, subrounded gravel, fine sand; grey; wet, very dense. *(continued)*			34	51 SS	100	>50	Wp W Wl; NP - Non-Plastic; 20 40 60 80; SHEAR STRENGTH Cu, kPa; nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160									
51					35	SC	60											
52																		
53					36	SC	0											
54																		Cementitious Grout Backfill
55					37/38	SC	73			14	39	47	39	8				
56					39	SC	14											
57																		
58				46.14	40	SC	21											
		End of Borehole.		58.22														
59		NOTE: LPT - Large Penetration Test, SAMPLER HAMMER, 136kg; DROP, 762mm 76 SS - Large Split Spoon Sample SPT - Standard Penetration Test, SAMPLER HAMMER, 63.5kg; DROP, 762 mm 51 SS - Standard Split Spoon Sample																
60																		

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-04

SHEET 1 OF 3

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Fraserview Place
N: 5447500.157 E: 503617.418 UTM (Ground) Zone: 10

DRILLING DATE: July 8, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		104.12														
0			Asphalt.		0.15														
			FILL - Granular Road Base		103.36														
	Hydrovac	Vacuumed	FILL - **(SP)** SAND, fine to medium, trace fines; brown; dry to moist, compact.		0.76	1	CS												
2					101.07	2	SS	75	9										
			(ML-OL) CLAYEY SILT to ORGANIC SILT, some fibrous organics; brown-grey; soft.		3.05	3	CS									15			
4					99.85	4	SS	100	2		0	17	83						
			(SP) SAND, fine to medium, trace to some fines; grey to dark grey; seams of silt to clayey silt, wet, loose.		4.27														
6						5	SS	75	3										
						6	SS	67	9										
8						7	SS	71	7		0	90	10						
			(SP) SAND, fine to medium, trace fines; grey to dark grey: wet, compact.		94.62 9.50														Envirogrout (30% Bentonite)
10	Fraste XL-2	Mud Rotary				8	SS	71	11										
						9	SS	79	11										
12						10	SS	71	12										
14						11	SS	75	13										
16						12	SS	71	20										
18						13	SS	71	18										
						14	SS	75	22										
20			*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 100

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

Golder Associates

PROJECT No.: 1532895 / 1000

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Fraserview Place
N: 5447500.157 E: 503617.418 UTM (Ground) Zone: 10

RECORD OF BOREHOLE: BH15-04

SHEET 2 OF 3

DATUM: CVD28GVRD2005

DRILLING DATE: July 8, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20			**(SP)** SAND, fine to medium, trace fines; grey to dark grey: wet, compact. *(continued)*															
						15	SS	71	16									
22						16	SS	75	16									
24						17	SS	71	18									
						18	SS	67	25		1	94	5					
26			- trace gravel at 25.8 m depth.															
			- seams of clayey silt at 26.8 m depth.			19	SS	100	8									
						20	SS	75	39									
28			- trace gravel at 28.0 m depth.															
30	Fraste XL-2	Mud Rotary				21	SS	75	26									Envirogrout (30% Bentonite)
						22	SS	83	36									
32						23	SS	83	20									
34			- possible gravelly sand to sandy gravel between 34.0 m and 36.0 m depth.			24	SS	33	19									
					68.15	25	CS											
36			**(CL-ML)** SILTY CLAY to CLAYEY SILT, seams of fine sand; grey; wet, soft to firm.		35.97	26	SS	67	6									
						27	SS	100	WR	⊢○					7			
38						28	SS	67	1	○								
40			*CONTINUED NEXT PAGE*		64.12													

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 24/1/18

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-04

SHEET 3 OF 3

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Fraserview Place
N: 5447500.157 E: 503617.418 UTM (Ground) Zone: 10

DRILLING DATE: July 8, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste XL-2	Mud Rotary	**(CI)** SILTY CLAY, seams of fine sand; grey; wet, soft to firm.		40.00															
						29	TP	100												
42						30	SS	92	WR											
						31	TP	100				0	1	99	58	41	17			
44																				
					208.4															
						32	SS	100	WR											
46																				
						33	TP	100												Envirogrout (30% Bentonite)
48					55.96															
			(ML/SM) SILT and SAND, fine sand, some gravel to gravelly, sub-angular; grey; moist to wet, very dense. (TILL-LIKE) - last 150mm - 50 blows at Sa. 34.		48.16	34	SS	58	42			11	41	48						
						35	SS	75	>50											
50																				
						36	SS	55	>50											
52																				
						37	SS	70	>50			40	27	33						
54																				
						38	SS	67	>50											
					49.26															
			End of Borehole.		54.86															
56																				
58																				
60																				

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-05

SHEET 1 OF 3

DATUM: CVD28GVRD2005

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - 1425 Derwent Way (Parking Lot)
N: 5447669.134 E: 503591.967 UTM (Ground) Zone: 10

DRILLING DATE: July 15, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0			Ground Surface		103.84														
			Asphalt.		0.05														
			FILL - Granular Road Base		103.38														
			FILL - **(SP)** SAND, fine to medium, trace fines; brown; dry to moist, compact.		0.46														
2																			
					100.94	1	SS	88	13										
			(OL) ORGANIC SILT, some fine sand, trace to some fibres; brown-grey; moist to wet, soft.		2.90	1B	SS												
						2	TP	88											
4						3	SS	92	3	NP									
					98.96														
			(SP) SAND, fine to medium, trace fines; grey; wet, loose to compact.		4.88														
						4	SS	83	12										
6																			
						5	SS	67	8										
8																			
						6	SS	75	8										
	Fraste XL-2	Mud Rotary																	Envirogrout (30% Bentonite)
10						7	SS	75	12		0	96	4						
12						8	SS	71	9										
						9	SS	75	11										
14																			
			- seams of silt between 14.9 m and 16.8 m depth.			10	SS	83	12										
16																			
						11	SS	100	9										
18						12	SS	83	14										
						13	SS	71	20										
20			*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-05

SHEET 2 OF 3

DATUM: CVD28GVRD2005

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - 1425 Derwent Way (Parking Lot)
N: 5447669.134 E: 503591.967 UTM (Ground) Zone: 10

DRILLING DATE: July 15, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20			**(SP)** SAND, fine to medium, trace fines; grey; wet, loose to compact. *(continued)*															
						14	SS	75	22									
22						15	SS	63	12									
24						16	SS	67	24									
						17	SS	67	22									
26						18	SS	83	25		0	93	7					
28						19	SS	100	30									
30	Fraste XL-2	Mud Rotary	- seams of silt to clayey silt between 29.9 m and 30.5 m depth.			20	SS	100	15									Envirogrout (30% Bentonite)
32						21	SS	83	23									
						22	SS	92	23									
34						23	SS	100	30									
36						24	SS	92	27									
38						25	SS	92	23									
			- approx. 10 mm thick silt seam at 39.0 m depth.			26	SS	88	21									
40			*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-05

SHEET 3 OF 3

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - 1425 Derwent Way (Parking Lot)
N: 5447669.134 E: 503591.967 UTM (Ground) Zone: 10

DRILLING DATE: July 15, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40			**(SP)** SAND, fine to medium, trace fines; grey; wet, loose to compact. *(continued)*			27	SS	92	25									
					62.23													
42			**(SP)** SAND, fine to medium, trace fines; grey; wet, dense.		41.61	28	SS	100	38									
44						29	SS	83	38									
46						30	SS	79	33									
48	Fraste XL-2	Mud Rotary				31	SS	79	32									Envirogrout (30% Bentonite)
			- interlayers of sand and gravel between 48.5m and 49.4m.			32	SS	67	44									
					54.46													
50			**(CL/CI)** SILTY CLAY, seam of sand; grey; firm to stiff. - shell fragments between 49.7 m and 50.3 m depth.		49.38	33	SS	75	WR		0	2	98	51	47			
						34	TP	100								23		
52																		
						35	SS	100	WR		0	12	88	52	36	9		
54																		
						36	SS	0	1									
					48.98													
			End of Borehole.		54.86													
56																		
58																		
60																		

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 24/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 1 OF 9

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Mudline		88.87														
0	Fraste Mud Rotary Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to coarse, trace fines; grey; wet, very loose.		0.00	1	SS	4	WH										
1																		
2					2	SS	50	1		0	98	2						
				86.27														
		(SP) SAND, fine to coarse, trace fines; grey; wet, compact.		2.59														
3					3	SS	67	12		0	97	3						
4																		
5					4	SS	67	19										Cementitious Grout Backfill
6																		
					5	SS	67	11		0	95	5						
7																		
8					6	SS	67	12										
9																		
					7	SS	71	19		0	95	5						
10		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 2 OF 9

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to coarse, trace fines; grey; wet, compact. *(continued)*			8	SS	67	29										
11																		
12					9	SS	83	24										
13																		
14					10	SS	71	17		2	96	2						
15				74.08 14.78														Cementitious Grout Backfill
		(SP) SAND, fine to coarse, trace fines; grey; wet, compact to dense.																
		- trace gravel from 15.2 m to 15.9 m depth.			11	SS	83	30										
16																		
17					12	SS	96	35		0	97	3						
18																		
		- a layer of sandy SILT to CLAYEY SILT from 18.5 m to 22.9 m depth.			13	SS	83	31										
19																		
20					14	SS	79	28										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 3 OF 9

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste Mud Rotary Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to coarse, trace fines; grey; wet, compact to dense. *(continued)*			14	SS	79	28		0	97	3						
21					15	SS	63	15		0	97	3						
22																		
23					16	SS	67	33		0	94	6						
24					17	SS	58	20										
25																		Cementitious Grout Backfill
26					18	SS	58	23		0	95	5						
27				61.74 27.13														
		(CL/Cl) SILTY CLAY, trace fine sand; grey; wet, firm to stiff.			19	SS	100	WR	⊖					12				
28																		
29		- seams of SILT, some sand to sandy SILT from 27.1 m to 37.2 m depth.			20	SS	100	WR	○									
30		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 4 OF 9

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	**(CL/Cl)** SILTY CLAY, trace fine sand; grey; wet, firm to stiff. *(continued)*																
31					21	SS	100	WR	○									
32					22	SS	100	WR	○ NP									
33																		
34		- seams of SILT, some sand to sandy SILT from 27.1 m to 37.2 m depth.			23	SS	100	WR	○									
35					24	SS	100	WR	○									Cementitious Grout Backfill
36																		
37					25	SS	100	WR	⊢○						5			
38					26	SS	100	WR	○									
39																		
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 5 OF 9

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste Mud Rotary Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(CL/Cl)** SILTY CLAY, trace fine sand; grey; wet, firm to stiff. *(continued)*																
41					27	TP	100											
42																		
43																		
44																		
45					28	TP	88											Cementitious Grout Backfill
46					29	SS	100	WR	○									
47																		
48					30	SS	100	WR	⊢○						11			
49					31	TP	100											
50		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 6 OF 9

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste Mud Rotary Track Mounted on Spudded Barge Mud Rotary (Automatic Trip Hammer)	**(CL/CI)** SILTY CLAY, trace fine sand; grey; wet, firm to stiff. *(continued)*															
					32	SS	100	WR									
51																	
52					33	SS	100	WR									
53				35.53													
		(CL/CI) SILTY CLAY; grey; wet, stiff.		53.34													
					34	SS	100	WR									
54																	
55					35	SS	100	WR						12			Cementitious Grout Backfill
				33.39													
		Drilled Out. (Possible SILTY CLAY inferred)		55.47													
56																	
57																	
58																	
59																	
				29.13													
				59.74													
60		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 7 OF 9

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	Drilled Out. (Possible SILTY CLAY inferred, occasional gravelly and silty sand layers up to 0.75 m in thickness) *(continued)*																
61																		
62																		
63																		
64																		
65																		Cementitious Grout Backfill
66																		
67																		
68																		
69																		
70		*CONTINUED NEXT PAGE*																

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 8 OF 9

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary (Automatic Trip Hammer)	Drilled Out. (Possible SILTY CLAY inferred, occasional gravelly and silty sand layers up to 0.75 m in thickness) *(continued)*															Cementitious Grout Backfill
71																	
72																	
73																	
74																	
75																	
76																	
77																	
78																	
79				9.36													
80		**(SM)** SILTY SAND, fine; grey; wet; very dense.		79.50	36	SS	100	>50		0	83	17					
		CONTINUED NEXT PAGE															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-09

SHEET 9 OF 9

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447364.85 E: 504096.16 UTM (Ground) Zone: 10

DRILLING DATE: September 20, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐; 40 80 120 160)	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
80				8.75	36	SS	100	>50									
				80.11													
		End of Borehole.															
81																	
82																	
83																	
84																	
85																	
86																	
87																	
88																	
89																	
90																	

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-10

SHEET 1 OF 5

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447418.53 E: 504065.11 UTM (Ground) Zone: 10

DRILLING DATE: September 17, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Mudline		91.83														
0	Fraste Track Mounted on Spudded Barge Mud Rotary (Auto Trip Hammer)	**(SP)** SAND, fine to coarse, trace to some gravel, trace to some fines, trace shells; grey to brown; wet, very loose.		0.00	1	SS	4	2										
1																		
2					2	SS	38	WH		7	87	6						
				89.24														
		(SP) SAND, fine to coarse, trace fines; grey; wet, loose to compact.		2.59														
3					3	SS	58	10										
4																		
5					4	SS	44	10		0	95	5						Cementitious Grout Backfill
				86.19														
		(SP) SAND, fine to coarse, trace fines; grey; wet, compact.		5.64														
6					5	SS	63	15										
7																		
					6	SS	83	17		0	95	5						
8																		
9																		
					7	SS	83	15										
10		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-10

SHEET 2 OF 5

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447418.53 E: 504065.11 UTM (Ground) Zone: 10

DRILLING DATE: September 17, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Q - ●, U - ◐, Pocket Pen - ■)	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste Track Mounted on Spudded Barge Mud Rotary (Auto Trip Hammer)			81.62														
		(SP) SAND, fine to coarse, trace sub-angular gravel, trace fines; grey; wet, compact.		10.21														
11					8	SS	83	28		4	88	8						
12					9	SS	67	18										
13																		
14					10	SS	75	20		4	93	3						
15																		Cementitious Grout Backfill
					11	SS	75	22										
16				75.52														
		(SP) SAND, fine to coarse, trace gravel, trace fines; wet, dense to very dense.		16.31														
17					12	SS	75	51		1	95	4						
18					13	SS	79	39										
19				72.48														
		(SP) SAND, fine to coarse, trace to some fines; grey; wet, compact to dense.		19.35														
20					14	SS	58	21										
		CONTINUED NEXT PAGE																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-10

SHEET 3 OF 5

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447418.53 E: 504065.11 UTM (Ground) Zone: 10

DRILLING DATE: September 17, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste Track Mounted on Spudded Barge Mud Rotary (Auto Trip Hammer)	**(SP)** SAND, fine to coarse, trace to some fines; grey; wet, compact to dense. *(continued)*			14	SS	58	21		0	95	5						
21		- layer of gravelly SAND with a thickness of 50 mm at 19.8 m depth.			15	SS	67	18										
22																		
23					16	SS	58	14		0	94	6						
24																		
25					17	SS	67	39										Cementitious Grout Backfill
26					18	SS	67	41		0	92	8						
27																		
28					19	SS	63	41		0	93	7						
29																		
30		*CONTINUED NEXT PAGE*			20	SS	63	24										

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-10

SHEET 4 OF 5

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447418.53 E: 504065.11 UTM (Ground) Zone: 10

DRILLING DATE: September 17, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste Track Mounted on Spudded Barge Mud Rotary (Auto Trip Hammer)			61.65													
		(CL/CI) SILTY CLAY, trace fine sand, seams of silty to sandy silt; grey; wet, firm to stiff.		30.18													
31					21	SS	100	WR						13			
32																	
33					22	TP	75										
34																	
35					23	SS	100	6									Cementitious Grout Backfill
36																	
37					24	SS	100	WR									
38				53.73													
		(ML) CLAYEY SILT to SILT, some fine sand; grey; wet, firm.		38.10	25	SS	100	WR						3			
39																	
40					26	SS	100	WR									

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-10

SHEET 5 OF 5

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447418.53 E: 504065.11 UTM (Ground) Zone: 10

DRILLING DATE: September 17, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste Track Mounted on Spudded Barge / Mud Rotary (Auto Trip Hammer)	**(ML)** CLAYEY SILT to SILT, some fine sand; grey; wet, firm. *(continued)*			26	SS	100	WR											
41																			
42					27	SS	100	WR		○									Cementitious Grout Backfill
43				48.24	28	TP	91												
		End of Borehole.		43.59															
44																			
45																			
46																			
47																			
48																			
49																			
50																			

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: VT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-11

SHEET 1 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447494.34 E: 504024.93 UTM (Ground) Zone: 10

DRILLING DATE: October 9-13, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		104.20														
0	Hydrovac	Vacuumed	FILL - **(SP)** SAND, fine to medium, trace gravel; grey; dry, loose to compact.		0.00														
1			- sand and gravel layer from 0.6 m to 0.9 m depth.																
2					101.45														
3			**(MH)** CLAYEY SILT, trace to some organics; grey; wet, soft to firm.		2.74	1	SS	50	3							20			
					100.84														
4	Fraste Mud Rotary Track Mounted on Spudded Barge	Mud Rotary	**(SP-SM)** SAND, fine to medium, some fines; grey; wet, loose.		3.35														
						2	SS	54	7		0	87	13						
5																			Cementitious Grout Backfill
6						3	SS	58	5										
7					96.88														
			(SP) SAND, fine to medium, trace to some fines; grey; wet, loose to compact.		7.32	4	SS	67	10		0	93	7						
8																			
9						5	SS	75	10										
10			*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-11

SHEET 2 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447494.34 E: 504024.93 UTM (Ground) Zone: 10

DRILLING DATE: October 9-13, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact. *(continued)*																
					6	SS	75	12		0	91	9						
11																		
12					7	SS	79	11										
13				91.20 / 13.00														
		(SP) SAND, fine to medium, trace to some fines; grey; wet, compact.			8	SS	58	11		0	96	4						
14																		
15					9	SS	58	11										Cementitious Grout Backfill
16																		
17					10	SS	79	19		0	94	6						
18																		
					11	SS	83	24										
19																		
20					12	SS	75	17										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-11

SHEET 3 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447494.34 E: 504024.93 UTM (Ground) Zone: 10

DRILLING DATE: October 9-13, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact. *(continued)*			12	SS	75	17		0	94	6						
21					13	SS	58	20										
22																		
23					14	SS	75	21		0	94	6						
24					15	SS	63	20										
25																		Cementitious Grout Backfill
26					16	SS	79	26		0	95	5						
27		**(SP)** SAND, fine to medium, trace fine gravel, trace to some fines; grey; wet, dense.		77.50 / 26.70	17	SS	79	35										
28																		
29					18	SS	71	40										
30		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-11

SHEET 4 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447494.34 E: 504024.93 UTM (Ground) Zone: 10

DRILLING DATE: October 9-13, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary	**(SP)** SAND, fine to medium, trace fine gravel, trace to some fines; grey; wet, dense. *(continued)*			19	SS	75	32	3	90	7	3	4				
31																	
32					20	SS	83	30									
33																	
34					21	SS	58	22	0	95	5						
35					22	SS	79	33									Cementitious Grout Backfill
36																	
37					23	SS	83	28	0	88	12	7	5				
38																	
39					24	SS	83	34									
40		*CONTINUED NEXT PAGE*			25	SS	75	46	0	92	8						

WATER CONTENT PERCENT
Wp W Wl NP - Non-Plastic
20 40 60 80

SHEAR STRENGTH Cu, kPa
nat V. + Q - ●
rem V. ⊕ U - ◐
Pocket Pen - ■
40 80 120 160

GRADATION % CLAY PARTICLE SIZE <= 0.002

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-11

SHEET 5 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447494.34 E: 504024.93 UTM (Ground) Zone: 10

DRILLING DATE: October 9-13, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary	**(SP)** SAND, fine to medium, trace fine gravel, trace to some fines; grey; wet, dense. *(continued)*															
41					26	SS	83	35									
42				62.13													
		(CL-ML) SILTY CLAY to CLAYEY SILT, seams of silt and fine sand; grey; wet, firm to stiff.		42.06	27	SS	100	WR						11			
43																	
					28	TP	92										
44																	
45																	Cementitious Grout Backfill
					29	SS	0	WR									
46																	
47					30	SS	75	WR									
48																	
					31	SS	96	WR						9			
49																	
50		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH15-11

SHEET 6 OF 6

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447494.34 E: 504024.93 UTM (Ground) Zone: 10

DRILLING DATE: October 9-13, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste Mud Rotary Track Mounted on Spudded Barge / Mud Rotary	**(CL-ML)** SILTY CLAY to CLAYEY SILT, seams of silt and fine sand; grey; wet, firm to stiff. *(continued)*			32	SS	100	WR	○ (40)									
51																		
52					33	TP	96											
53																		
54																		Cementitious Grout Backfill
55					34	SS	100		○ (80)									
56																		
57																		
58					35	TP	92											
				45.67														
		End of Borehole.		58.52														
59																		
60																		

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-13

SHEET 1 OF 3

DATUM: CVD28GVRD2005

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Waste Water Treatment Plant - Facility Enterance
N: 5447931.088 E: 503881.683 UTM (Ground) Zone: 10

DRILLING DATE: July 3, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		103.76													
0	Hydrovac	Vacuumed	Asphalt.		103.56													
			FILL - Granular Road Base		0.20 103.00													
			FILL - **(SP)** SAND, fine to medium, trace fines; brown; dry to moist, compact.		0.76	1	CS											
2					100.51	2	SS	54	7									
			(OL) ORGANIC SILT, some fibres; dark brown; wet, soft to firm.		3.25 99.95	3	TP	96							7			
4			**(SM)** SAND and SILT to SILTY SAND, seams of clayey silt; grey; wet, loose to compact.		3.81													
						4	SS	67	11		0	72	28					
6			- wood piece at 6.0 m depth.															
						5	SS	83	5									
8																		
						6	SS	67	8									
10																		Envirogrout (30% Bentonite)
						7	SS	67	3		0	50	50					
	Fraste XL-2	Mud Rotary			92.79													
			(SP) SAND, fine to medium, trace to some fines; grey; wet, compact.		10.97													
12						8	SS	71	13									
						9	SS	63	12									
14																		
						10	SS	75	9									
16																		
						11	SS	75	15									
18						12	SS	83	12									
						13	SS	71	26									
20			*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-13

SHEET 2 OF 3

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Waste Water Treatment Plant - Facility Enterance
N: 5447931.088 E: 503881.683 UTM (Ground) Zone: 10

DRILLING DATE: July 3, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20		**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact. *(continued)*																
					14	SS	67	22		0	94	6						
22					15	SS	58	20										
24					16	SS	67	20										
					17	SS	75	18										
26				77.39 / 26.37														
		(SP) SAND, fine to medium, trace to some fines; grey; wet, compact to dense.			18	SS	83	31										
28		- trace gravel at 28.5 m depth.			19	SS	83	29										
		- wood piece at 29.0 m depth.																
30	Fraste XL-2 / Mud Rotary	- seams of clayey silt at 30 m depth.			20	SS	88	27										Envirogrout (30% Bentonite)
					21	SS	79	21										
32					22	SS	75	28										
34					23	SS	79	22										
36					24	SS	75	29		0	93	7						
38					25	SS	83	22										
					26	SS	79	33										
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-13

SHEET 3 OF 3

DATUM: CVD28GVRD2005

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Waste Water Treatment Plant - Facility Enterance
N: 5447931.088 E: 503881.683 UTM (Ground) Zone: 10

DRILLING DATE: July 3, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen - ■; Q - ●, U - ◐)	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40			**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact to dense. *(continued)*			27	SS	71	29									
42					61.70													
	Fraste XL-2	Mud Rotary	**(SM/ML)** SILTY SAND and CLAYEY SILT, interlayered, seams of fine sandy silt; grey; wet.		42.06	28	SS	100	WR									
44						29	SS	79	35		0	85	15					
						30A	SS	80	WR									
						30B	SS	80	43									
46						31	SS	79	27									Envirogrout (30% Bentonite)
48					55.30													
			(CL/CI) SILTY CLAY, thin layers of fine sand; grey; wet, firm.		48.46	32	TP	100			0	2	98	71	27	13		
50																		
						33	SS	100	WR									
52						34	TP	100										
54						35	SS	100	6		0	5	95	70	25	12		
					48.90													
			End of Borehole.		54.86													
56																		
58																		
60																		

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 24/1/18

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-14

SHEET 1 OF 3

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Derwent Place
N: 5447725.766 E: 503994.818 UTM (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: July 6, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		104.17													
0	Hydrovac	Vacuumed	Asphalt.		0.15													
			FILL - Granular Road Base		103.41													
			FILL - **(SP)** SAND, fine to medium, trace fines; brown; dry to moist, compact.		0.76	1	CS											
2						2	SS	83	10									
			(OL) ORGANIC SILT, some fibres; dark brown; wet, soft to firm.		100.82 3.35													
4			**(SP)** SAND, fine to coarse, trace fines; grey; wet, loose to compact. - possible gravel layers approx. 200 mm thick between 4.3 m and 7.6 m depth.		100.06 4.11	3	SS	42	2	10	80	10						
						4	SS	0	13									
6						5	SS	75	14									
8						6	SS	0	8									
10	Fraste XL-2	Mud Rotary			94.11													Envirogrout (30% Bentonite)
			(SP) SAND, fine to medium, trace to some fines; grey; wet, compact. - trace fine gravel from 10.1 m to 10.7 m depth.		10.06	7	SS	71	7									
12						8	SS	75	12									
						9	SS	71	9									
14						10	SS	67	10									
16						11	SS	75	16	0	96	4						
18						12	SS	79	18									
						13	SS	75	19									
20			*CONTINUED NEXT PAGE*															

WATER CONTENT PERCENT: Wp, W, Wl; NP - Non-Plastic; 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

GRADATION % CLAY PARTICLE SIZE <= 0.002

DEPTH SCALE
1 : 100

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 24/1/18

PROJECT No.: 1532895 / 1000

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Derwent Place
N: 5447725.766 E: 503994.818 UTM (Ground) Zone: 10

RECORD OF BOREHOLE: BH15-14

SHEET 2 OF 3

DATUM: CVD28GVRD2005

DRILLING DATE: July 6, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20			**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact. *(continued)*																
						14	SS	75	21										
22						15	SS	83	32										
			- trace to some gravel from 23.2 m to 25.0 m depth.																
24						16	SS	75	54										
			- seams of silt at 25.3 m depth.			17	SS	88	22	○	0	37	63						
26						18	SS	54	19										
28						19	SS	75	27										
30	Fraste XL-2	Mud Rotary	- seams of silty sand at 30.2 m depth.			20	SS	79	25	○	2	79	19						Envirogrout (30% Bentonite)
32						21	SS	88	25										
			- seams of silt from 32.9 m to 33.5 m depth.			22	SS	17	23										
34						23	SS	79	31		0	91	9						
36			- seams of silt to clayey silt from 36.0 m to 41.2 m depth.			24	SS	83	32										
38						25	SS	79	24										
						26	SS	83	33	○	0	86	14						
40			*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

PROJECT No.: 1532895 / 1000

RECORD OF BOREHOLE: BH15-14

SHEET 3 OF 3

CLIENT: Black & Veatch
PROJECT: Annacis Outfall
LOCATION: Annacis Island - Derwent Place
N: 5447725.766 E: 503994.818 UTM (Ground) Zone: 10

DRILLING DATE: July 6, 2015
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

SAMPLER HAMMER, 63.5kg; DROP, 762mm

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40			**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact. *(continued)*		63.17	27	SS	83	20										
			(CL-ML) SILTY CLAY to CLAYEY SILT; grey-brown; thin layers of sandy silt, wet, firm.		41.00														
42						28	SS	100	1		0	11	89	62	27	2			
44						29	SS	100	2										
						30	SS	100	4										
46						31	SS	100	3										Envirogrout (30% Bentonite)
	Fraste XL-2	Mud Rotary																	
48						32	TP	100								5			
50						33	SS	100	2										
						34	SS	100	WR							4			
52			- occasional gravel encountered from 52.7 m to 53.3 m depth.			35	TP	100								5			
54					49.31	36	SS	100	WR										
			End of Borehole.		54.86														
56																			
58																			
60																			

DEPTH SCALE
1 : 100

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: YW
CHECKED: VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 24/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 1 OF 10

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0		Ground Surface		105.07														
		TOPSOIL.		104.92														
		FILL - **(SP)** SAND, some fines.		0.15														
				104.46														
		FILL - **(GM-SM)** SILTY SAND and GRAVEL; grey; wet, compact.		0.61														
1				104.00														
		FILL - **(SP)** SAND, fine to coarse, trace fines; brown; wet, loose to compact.		1.07														
2					1	SS	58	10										
3					2	SS	83	18		0	94	6						
4				100.34														
		(CL-ML) SILTY CLAY to CLAYEY SILT, with roots, fibres; brown-grey; firm.		4.72	3	SS	29	WR	⊕ +								Cementitious Grout Backfill
				99.27	4	TP	100											
6		**(ML)** CLAYEY SILT with pockets of sand; grey; firm.		5.80														
				98.21														
7		**(SP-SM)** SAND, fine, some silt to silty; grey, with seams of silt to clayey silt, interlayered; wet, loose.		6.86														
8					5	SS	89	4		0	84	16						
9																		
10					6	SS	88	7										

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Fraste MDXL 2 Track Mounted Rig
Mud Rotary (Automatic Trip Hammer)

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 2 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP-SM)** SAND, fine, some silt to silty; grey, with seams of silt to clayey silt, interlayered; wet, loose. *(continued)*		94.37														
		(SP) SAND, fine to medium, trace to some fines; grey; wet, compact.		10.70	7	SS	88	13										
11																		
12					8	SS	92	11		0	91	9						
13																		
14					9	SS	79	11										
		- silt seams at 14.4 m depth.																
15																		Cementitious Grout Backfill
		- silt layer 0.15 m thick at 15.4 m depth.			10	SS	83	10										
16																		
17					11	SS	67	12										
18																		
					12	SS	75	17		0	94	6						
19																		
20					13	SS	71	18										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 3 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, compact. *(continued)*			13	SS	71	18										
21					14	SS	79	13										
22																		
23					15	SS	54	14										
24																		
25					16	SS	63	17		0	94	6						Cementitious Grout Backfill
26					17	SS	58	12										
27																		
28					18	SS	58	18										
29				76.17 28.90	19	SS	50	20										
30		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 4 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen - ■, Q - ●, U - ◐; 40 80 120 160)	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, with silt seams and occasionally silty; grey; wet, compact. *(continued)*															
		- silt seam at 30.5 m depth.			20	SS	100	22		0	88	12					
31																	
32		- silt seams at 32.0 m depth.			21	SS	88	19									
33																	
34					22	SS	83	23									
35					23	SS	54	23		0	93	7					Cementitious Grout Backfill
36																	
37					24	SS	54	16									
38																	
39					25	SS	92	33									
		- seam of brown organics between 39.6 m and 40.2 m depth.			26	SS	75	15									
40										0	91	9					
		CONTINUED NEXT PAGE															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 5 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen - ■, Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40		**(SP)** SAND, fine to medium, with silt seams and occasionally silty; grey; wet, compact. *(continued)*			26	SS	75	15									
41					27	SS	54	21									
42																	
43					28	SS	88	32									
44				60.72													
	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP/SM)** SAND to SILTY SAND, fine to medium, interbedded with seams of silt to clayey silt; grey; wet, compact.		44.35	29	SS	25	24		0	51	49					Cementitious Grout Backfill
45																	
46					30A 30B	SS	88	15									
47																	
48					31	SS	71	25									
49					32	SS	75	29		0	73	27					
50		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 6 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP/SM)** SAND to SILTY SAND, fine to medium, interbedded with seams of silt to clayey silt; grey; wet, compact. *(continued)*			33A	SS	92	26										
				54.47														
		(CL-ML) SILTY CLAY to CLAYEY SILT, some sand to sandy, interbedded with silty sand; grey; wet, stiff.		50.60	33B													
51																		
52					34	SS	100	30		0	5	95	71	24	12			
				52.37														
		(CL/CI) SILTY CLAY, interbedded with SILTY SAND and sandy SILT layers; grey; wet, firm to stiff.		52.70														
53						TP	100											
					35A										15			
54									+ FVT capacity exceeded									
55					36	SS	100	10		0	9	91	66	25			Vibrating Wire Cementitious Grout Backfill	
				49.27														
		(CL) SILTY CLAY, trace to some sand; grey; stiff.		55.80														
56																		
					37	SS	100	WR										
57					38	TP	100											
58									+ FVT capacity exceeded									
59																		
					39	SS	100	13							11			
60		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 7 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(CL)** SILTY CLAY, trace to some sand; grey; stiff. *(continued)*																
61					40	TP	92											
62									+ FVT capacity exceeded									
63					41	SS	100	WR	○									
64		**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded with silt/sandy silt seams; grey; stiff. - seams of silt between at 64.2 m and 64.5 m depth.		41.06 64.01	42	SS	100	WR	⊢○	0	2	98	65	33	7			
65																		Vibrating Wire Cementitious Grout Backfill
66		- seams of silt between 65.8 m and 66.0 m depth.			43	SS	100	WR	○									
67		- seams of silt between 67.1 m and 67.7 m depth.			44	SS	100	WR	○									
68																		
69		- seams of silt at 68.7 m depth.			45	SS	100	WR	⊢○						8			
70		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 8 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded with silt/sandy silt seams; grey; stiff. *(continued)*			46	TP	88											
71																		
72																		
73					47	SS	100	WR										
74		**(CL-ML)** SILTY CLAY to CLAYEY SILT with occasional SILT and fine SAND seams; grey; stiff.		31.27 73.80														
75																	Vibrating Wire Cementitious Grout Backfill	
76		- seams of silt between 76.3 m and 76.7 m depth.			48	SS	100	WR		0	2	98	73	25	7			
77																		
78																		
79																		
80		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 9 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
80	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(CL-ML)** SILTY CLAY to CLAYEY SILT with occasional SILT and fine SAND seams; grey; stiff. *(continued)*																
81																		
82																		
83																		
84					49	SS	100	WR							8			
85																		Cementitious Grout Backfill
86																		
87																		
88																		
89																		
90		*CONTINUED NEXT PAGE*			50	SS	100	WR										

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-01

SHEET 10 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447876.80 E: 503808.29 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 8-9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
90		**(CL-ML)** SILTY CLAY to CLAYEY SILT with occasional SILT and fine SAND seams; grey; stiff. *(continued)*			50	SS	100	WR							12			Cementitious Grout Backfill
				14.54														
		End of Borehole.		90.53														
91																		
92																		
93																		
94																		
95																		
96																		
97																		
98																		
99																		
100																		

WATER CONTENT PERCENT: Wp, W, Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL, SAND, FINES, SILT, CLAY

PLASTICITY INDEX %; ORGANIC CONTENT %; ADDITIONAL LAB. TESTING

PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-02

SHEET 1 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447795.83 E: 503719.46 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23-24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		105.86														
0	Hydrovac	Vacuumed	FILL. - 19mm minus Crushed Gravel.		0.10														
			FILL. SAND, fine to medium, trace fines; grey, moist to wet.																
1																			
2																			
3																			
4			FILL - **(SP)** SAND; fine to medium, trace fines; grey; wet, loose.		101.90	1	SS	83	6										
5					100.42														Cementitious Grout Backfill
	Fraste MDXL 2 Track Mounted Rig	Mud Rotary (Automatic Trip Hammer)	**(OH/MH)** CLAYEY SILT to ORGANIC SILT, trace sand, very thinly bedded; grey; wet, soft to firm.		5.43	2	SS	100	3							31	8.1	OC	
6					99.08														
			(ML/SP) sandy SILT to SAND, fine, thinly bedded; grey; wet, soft to firm.		6.78	3	SS	83	4										
7																			
8					97.86														
			(SP-SM) SAND, fine to medium, some silt to silty, with silt and fine sand seams; grey; wet, loose to compact.		8.00	4	SS	83	10		0	91	9						
9																			
10			*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-02

SHEET 2 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447795.83 E: 503719.46 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23-24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP-SM)** SAND, fine to medium, some silt to silty, with silt and fine sand seams; grey; wet, loose to compact. *(continued)*			5	SS	88	6										
11																		
12					6	SS	83	10										
13					7	SS	83	9										
14				91.56														
		(SP) SAND, fine to medium, trace fines; grey; wet, compact.		14.30														
15					8	SS	75	10		0	94	6					Cementitious Grout Backfill	
16																		
					9	SS	75	14										
17																		
18		- trace wood debris at 18.0 m depth.			10	SS	75	11										
19																		
		- silt seams between 19.2 m and 19.8 m depth.			11	SS	100	16										
20		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-02

SHEET 3 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447795.83 E: 503719.46 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23-24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact. *(continued)*																
21					12	SS	58	19		0	93	7						
22																		
23					13	SS	46	20										
24																		
25					14	SS	75	12										Cementitious Grout Backfill
26		- silt seam at 25.7 m depth.			15	SS	71	12										
27																		
28					16	SS	63	32		0	94	6						
29																		
30		**(SP-SM)** SAND, fine to medium, some silt to silty, interbedded with silt and fine sand; grey; wet, compact.		76.22 29.64	17	SS	75	19										
					18	SS	79	17										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-02

SHEET 4 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447795.83 E: 503719.46 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: March 23-24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP-SM)** SAND, fine to medium, some silt to silty, interbedded with silt and fine sand; grey; wet, compact. *(continued)* - seams of silt between 30.0 m to 32.0 m depth.			18	SS	79	17										
31					19	SS	75	20										
32																		
33					20	SS	75	25		0	83	17						
				72.36														
		(SP) SAND, fine to medium, trace fines; grey; wet, compact to dense.		33.50														
34																		
		- silt seam at 34.7 m depth.			21	SS	83	15										
35																		Cementitious Grout Backfill
36					22	SS	54	18										
37																		
					23	SS	42	19										
38																		
39																		
					24	SS	50	16		0	93	7						
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-02

SHEET 5 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447795.83 E: 503719.46 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23-24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact to dense. *(continued)*																	
41					25	SS	50	32											
42					26	SS	88	23											
43																			
44					27	SS	71	24											
45					28	SS	96	45											Cementitious Grout Backfill
46																			
47		- seams of silt at 47.0 m depth.			29	SS	79	37			0	79	21						
48					30	SS	75	26											
49				57.10 48.76															
50		**(SM)** SILTY SAND, fine to medium, with seams of silt; grey; wet, compact.			31	SS	88	21											

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-02

SHEET 6 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447795.83 E: 503719.46 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23-24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SM)** SILTY SAND, fine to medium, with seams of silt; grey; wet, compact. *(continued)*			31	SS	88	21	+ FVT capacity exceeded								
				55.26													
		(CL-ML) SILTY CLAY to CLAYEY SILT, interbedded with silt and sandy silt; grey; firm to stiff.		50.60													
51					32	SS	100	WR						6			
52																	
53					33	SS	100	WR									
54									+ FVT capacity exceeded								
					34	SS	100	WR						7			
55																	Cementitious Grout Backfill
56					35	TP	100										
57																	
58																	
59					36												
					36A	TP	100							9			
60		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-02

SHEET 7 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447795.83 E: 503719.46 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 23-24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60		End of Borehole.		45.81 / 60.05					+ FVT capacity exceeded								
61																	
62																	
63																	
64																	
65																	
66																	
67																	
68																	
69																	
70																	

WATER CONTENT PERCENT: 20 40 60 80
SHEAR STRENGTH Cu, kPa: 40 80 120 160

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 1 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0		Ground Surface		103.79													
		ASPHALT		0.05													
		FILL. Granular Road Base		103.04													
1	Hydrovac / Vacuumed	FILL - **(SP)** SAND, fine to medium, some fines; grey; wet, loose.		0.75													
2					1A	SS	83	10									
				100.87													
3		**(OL)** ORGANIC SILT, with wood fibres; dark brown; wet, soft.		2.92	1B										38		
				100.59	2A												
		(CL-ML) SILTY CLAY to CLAYEY SILT with SILT and fine SAND laminations, trace organics; grey; wet, soft to firm.		3.20	2	TP	100										
4					2B												
					3	SS	100	2									
5																	Cementitious Grout Backfill
				98.46													
	Fraste MDXL 2 Track Mounted Rig / Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact.		5.33	4	SS	67	13									
6																	
7					5	SS	67	9		0	95	5					
8																	
9					6	SS	71	10									
10		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 2 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact. *(continued)*			7	SS	88	13										
11																		
12					8	SS	67	7										
13																		
14					9	SS	75	8										
15					10	SS	54	11		0	95	5						Cementitious Grout Backfill
16																		
17					11	SS	92	18										
18					12	SS	79	11										
19																		
20					13	SS	63	14		0	91	9						

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 3 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20			**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact. *(continued)*															
21						14	SS	79	15									
22						15	SS	71	13									
23																		
24	Fraste MDXL 2 Track Mounted Rig	Mud Rotary (Automatic Trip Hammer)				16	SS	75	18		0	96	4					
25																		Cementitious Grout Backfill
26						17	SS	58	26									
					77.29													
			(SP/ML) SAND, trace to some fines; grey, interbedded with silt and clay seams; grey; wet, compact.		26.50													
27						18	SS	92	13									
28																		
29						19	SS	100	17									
30						20	SS	83	19									
			CONTINUED NEXT PAGE															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 4 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP/ML)** SAND, trace to some fines; grey, interbedded with silt and clay seams; grey; wet, compact. *(continued)*			20	SS	83	19										
31																		
					21	SS	100	9		0	40	60						
32				71.49														
		(SP) SAND, fine to medium, some fines, trace wood; grey; wet, compact.		32.30														
33					22	SS	100	25										
34																		
					23	SS	83	19										
35																	Cementitious Grout Backfill	
36					24	SS	83	19		0	92	8						
				66.89														
37		**(SP)** SAND, fine to medium, trace fines; grey; wet, compact to dense.		36.90														
					25	SS	75	18										
38																		
39																		
					26	SS	83	22										
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 5 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact to dense. *(continued)*																
41					27	SS	67	25										
42		- seams of silt between 42.1 m and 42.7 m depth.			28	SS	88	25		0	90	10						
43																		
44					29	SS	88	42										
45					30	SS	67	32										Cementitious Grout Backfill
46				57.49														
		(SP) SAND, fine, some fines; grey; wet, compact.		46.30														
47					31	SS	92	23		0	92	8						
48				55.63														
		(CI) SILTY CLAY, trace sand with very thin SILT and fine SAND seams; grey; wet, firm to stiff.		48.16	32	SS	100	WR	○								
49					33	TP	100											
50		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 6 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste MDXL 2 Track Mounted Rig / Mud Rotary (Automatic Trip Hammer)	**(CI)** SILTY CLAY, trace sand with very thin SILT and fine SAND seams; grey; wet, firm to stiff. *(continued)*															
51					34 / 34A / 34B	TP	100							13 / 14			
52																	Vibrating Wire
53					35 / 35A	TP	100							21			
54				49.69													
		(CL) SILTY CLAY, trace sand, trace sub-angular gravel, with thin SILT and SAND seams; grey; wet, firm to stiff.		54.10	36	SS	100	WR						14			
55																	Cementitious Grout Backfill
56					37	SS	100	15									
57				46.79													
		(CL/CI) SILTY CLAY, some sand, trace to some sub-angular gravel; grey; stiff to very stiff. - layer of silty sand to clayey silt between 57.1m and 57.8m depth.		57.00	38	SS	100	49						18			
58																	
				45.27													
		(CI/CH) SILTY CLAY to CLAY, trace sand; grey; very stiff to hard.		58.52													
59					39	SS	100	29									Vibrating Wire
60		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 7 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(CI/CH)** SILTY CLAY to CLAY, trace sand; grey; very stiff to hard. *(continued)*															
					40	SS	100	16							31		
61					41A												
					41C 41	TP	92								25		
					41B												
62																	
63																	
					42	SS	100	43									
64																	
65					43	SS	100	39		0	3	97	64	33	22		Cementitious Grout Backfill
66																	
					44	SS	100	35									
67																	
68					45	TP	100										
69																	
					46	SS	100	52									
70		*CONTINUED NEXT PAGE*															Vibrating Wire

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-03

SHEET 8 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447703.76 E: 503596.26 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 28-29, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(CI/CH)** SILTY CLAY to CLAY, trace sand; grey; very stiff to hard. *(continued)*			46	SS	100	52										
71																		
72																		
73					47	SS	100	42		0	2	98	58	40	21			
74				29.99 73.80														Cementitious Grout Backfill
75		**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand; brown to grey; hard.																
76					48	SS	100	63										
77					49	SS	92	70		0	2	98	82	16	10			
78		End of Borehole.		26.07 77.72														
79																		
80																		

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT/DGW
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-04

SHEET 1 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447875.91 E: 503484.95 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: March 21-22, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0		Ground Surface		104.27														
	Hydrovac Vacuumed	FILL - **(SP-SM)** SAND, fine to medium, some fines to silty; brown-grey; dry to moist, compact. (Inferred)		0.00														
3				101.32														
		(ML-CL) SILT to CLAYEY SILT, trace sand, trace to some organics; grey; wet, soft to firm.		2.95	1A / 1B / 1C	SS	100	6	⊕ +									
5				98.81														Cementitious Grout Backfill
	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, some fines, with shell fragments; grey; wet, loose to compact.		5.46	2	SS	50	7										
7					3	SS	75	8										
9					4	SS	79	4										
				94.52														
10				9.75	5	SS	83	9										

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WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160
GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL | SAND | FINES | SILT | CLAY

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-04

SHEET 2 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447875.91 E: 503484.95 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 21-22, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002 GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines, trace shell fragments; grey; loose to compact. *(continued)*			5	SS	83	9										
11					6	SS	83	8		0	95	5						
12																		
13					7	SS	100	7										
14					8	SS	83	8										
15																		Cementitious Grout Backfill
				88.77														
				15.50														
16		**(SP)** SAND, fine to medium, trace fines, trace shell fragments; grey; wet, compact.			9	SS	71	12										
17																		
18					10	SS	83	15										
19																		
20					11	SS	79	13										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-04

SHEET 3 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447875.91 E: 503484.95 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 21-22, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines, trace shell fragments; grey; wet, compact. *(continued)*																
21					12	SS	83	19		0	95	5						
22																		
23					13	SS	67	19										
24		- seams of silt between 23.8 m and 24.4 m depth.			14	SS	50	22										
25																		Cementitious Grout Backfill
26					15	SS	54	19										
27																		
28					16	SS	83	30										
29					17	SS	100	26										
30					18	SS	67	18										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-04

SHEET 4 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447875.91 E: 503484.95 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 21-22, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines, trace shell fragments; grey; wet, compact. *(continued)*			18	SS	67	18		0	95	5						
31		**(SP)** SAND, fine to medium, trace fines; grey; wet, compact to dense.		73.34 30.93	19	SS	75	24										
32																		
33					20	SS	88	33										
34																		
35					21	SS	96	31										Cementitious Grout Backfill
36					22	SS	92	27										
37																		
38					23	SS	92	20										
39					24	SS	92	26										
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-04

SHEET 5 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447875.91 E: 503484.95 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 21-22, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact to dense. *(continued)*																
41					25	SS	100	32		0	93	7						
42		- seams of clayey silt between 42.1 m and 44.8 m depth.			26	SS	92	30										
43																		
44					27	SS	92	31										
45																		Cementitious Grout Backfill
46					28	SS	92	35										
47		**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded with seams of SILT and fine SAND; grey; wet, firm to stiff.		57.64 46.63	29	SS	100	WH	○									
48					30	SS	100	WR	⊢○						10			
49																		
50		*CONTINUED NEXT PAGE*							⊕ +									

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-04

SHEET 6 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447875.91 E: 503484.95 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 21-22, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen - ■; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded with seams of SILT and fine SAND; grey; wet, firm to stiff. *(continued)*			31	TP	100											
					31A										6			
51																		
					32	SS	100	WR		0	3	97	71	26	3			
52																		
53					33	SS	100	WR										
54					34	TP	100		+ FVT capacity exceeded									Cementitious Grout Backfill
55																		
56				48.19														
		(ML-CL) CLAYEY SILT to SILTY CLAY, interbedded laters of silt and clayey silt; grey; firm to stiff.		56.08	35	SS	100	WR							5			
57					36	TP	100											
				46.36														
58		End of Borehole.		57.91														
59																		
60																		

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-05

SHEET 1 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5448049.34 E: 503348.63 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: March 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		103.77														
0		ASPHALT																
		FILL - Granular Road Base		103.52														
		FILL - **(SP)** SAND , fine to medium, trace fines; brown; moist, loose.		0.25														
1	Hydrovac / Vacuumed																	
2																		
3				100.77														
		(CL-ML) SILTY CLAY to CLAYEY SILT, seams of sandy silt, with wood fibres; grey; wet.		3.00					⊕ +									
4		- SILTY SAND to SAND and SILT at 4.0 m depth.			1	TP	100											
5																		Cementitious Grout Backfill
				98.28														
	Fraste MDXL 2 Track Mounted Rig / Mud Rotary (Automatic Trip Hammer)	**(SM)** SILTY SAND, with seams of silt to clayey silt; grey; wet, very loose to loose.		5.49	2	SS	71	2		0	74	26						
6																		
7					3	SS	83	7										
8																		
				95.21														
		(SP) SAND, fine to medium, trace to some fines; grey; wet, loose to compact.		8.56	4	SS	100	9										
9																		
10		*CONTINUED NEXT PAGE*																

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

GRADATION % CLAY PARTICLE SIZE <= 0.002

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-05

SHEET 2 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5448049.34 E: 503348.63 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact. *(continued)*			5	SS	75	8										
11																		
12					6	SS	75	11										
13					7	SS	71	14										
14																		
15					8	SS	75	8		0	94	6					Cementitious Grout Backfill	
16																		
17					9	SS	75	13										
18					10	SS	83	17										
19																		
20		*CONTINUED NEXT PAGE*			11	SS	75	14										

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-05

SHEET 3 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5448049.34 E: 503348.63 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact. *(continued)*																
				83.07														
		(SP) SAND, fine to medium, trace fines; grey; wet, compact.		20.70														
21					12	SS	67	21										
22					13	SS	67	17										
23																		
24					14	SS	46	18										
25																		Cementitious Grout Backfill
26					15	SS	54	16		0	95	5						
27					16	SS	54	25										
28																		
29					17	SS	71	16										
				73.87														
30				29.90	18	SS	63	29										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-05

SHEET 4 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5448049.34 E: 503348.63 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines, interbedded seams of silt; grey; wet, compact to dense. *(continued)*			18	SS	63	29										
31					19	SS	58	26										
32																		
33					20	SS	54	34										
34																		
35					21	SS	71	28		0	95	5						Cementitious Grout Backfill
36					22	SS	42	31										
37				66.58														
		(ML-CL) CLAYEY SILT to SILTY CLAY, seams of silt to sandy silt; grey; wet, firm to stiff.		37.19	23	SS	100	4										
38																		
39					24	SS	100	4		0	11	89	62	27	8			
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-05

SHEET 5 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5448049.34 E: 503348.63 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen - ■; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002 (GRAVEL / SAND / FINES / SILT / CLAY)	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste MDXL 2 Track Mounted Rig Mud Rotary (Automatic Trip Hammer)	**(ML-CL)** CLAYEY SILT to SILTY CLAY, seams of silt to sandy silt; grey; wet, firm to stiff. *(continued)*													
		- silt and sand between 40.2 m and 40.7 m depth.			25A 25B	SS	100	10							
41															
42					26	SS	100	3							
43															
44					27	SS	100	WR				11			
				58.97											
45		**(CL)** SILTY CLAY, trace fine sand; grey; wet, firm to stiff.		44.80	28	TP	100								Cementitious Grout Backfill
46															
47					29A 29 29B	TP	100								
48					30	SS	100	WH							
49															
				54.47											
50		**(CL)** SILTY CLAY, trace sand, seams of silt and fine sand; grey; wet, stiff.		49.30	31	SS	100	16							
		CONTINUED NEXT PAGE													

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-05

SHEET 6 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5448049.34 E: 503348.63 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen - ■; Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste MDXL 2 Track Mounted Rig	Mud Rotary (Automatic Trip Hammer)	**(CL)** SILTY CLAY, trace sand, seams of silt and fine sand; grey; wet, stiff. *(continued)*			31	SS	100	16							5			
51						32	SS	100	2										
52																			
53						33	SS	100	22							9			Cementitious Grout Backfill
54																			
55						34	TP	100											
					48.15														
			End of Borehole.		55.63														
56																			
57																			
58																			
59																			
60																			

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RRT
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-06

SHEET 1 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447695.81 E: 503670.06 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		103.74													
0	Hydro Vacuumed		ASPHALT.															
			FILL - Granular Road Base		103.51													
			FILL - **(SP)** SAND, fine to medium, trace fines; brown; moist, loose.		0.23													
1																		
2																		
					101.15													
			(OL) ORGANIC SILT; black; wet, soft.		2.59	1	SS	54	7									
3					100.69													
			(OH-MH) ORGANIC SILT to CLAYEY SILT, trace wood; grey; wet, soft to firm.		3.05	2	TP	100								24		
4																		
					99.17													
			(SP) SAND, fine to medium; trace to some fines, with SILTY fine SAND layers; grey; wet, loose.		4.57	3	SS	63	8		0	89	11					Cementitious Grout Backfill
5																		
					97.95													
	Fraste ML	Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, interlayered with fine SAND some fines; grey; wet, loose to compact.		5.79	4	SS	50	11		0	94	6					
6																		
7						5	SS	63	10									
8																		
9						6	SS	67	11		0	96	4					
10			*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-06

SHEET 2 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447695.81 E: 503670.06 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, interlayered with fine SAND some fines; grey; wet, loose to compact. *(continued)*			7	SS	75	11										
11				92.16														
12		**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact.		11.58	8	SS	71	11		0	95	5						
13					9	SS	67	12										
14																		
15		- silty sand with thin organic seams at 15.0 m depth.			10	SS	67	10		0	78	22						Cementitious Grout Backfill
				88.19														
		(SP) SAND, fine to medium, trace fines; grey; wet, compact.		15.54														
16					11	SS	71	14										
17																		
18					12	SS	75	21		0	95	5						
19																		
20					13	SS	83	22										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-06

SHEET 3 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447695.81 E: 503670.06 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact. *(continued)*																	
21					14	SS	83	24			0	95	5						
22																			
23					15	SS	58	18											
24																			
25					16	SS	88	15			0	97	3						Cementitious Grout Backfill
26																			
				77.22	17	SS	71	19											
				26.52															
27		**(SM)** SILTY SAND, interlayered with silty clay to clayey silt between 26.8 m and 27.4 m and silty sand to silt between 29.9 m and 30.5 m; grey; wet, compact.			18	SS	88	18			0	26	74						
28																			
29					19	SS	29	22											
30					20	SS	83	28											
		CONTINUED NEXT PAGE																	

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-06

SHEET 4 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447695.81 E: 503670.06 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(SM)** SILTY SAND, interlayered with silty clay to clayey silt between 26.8 m and 27.4 m and silty sand to silt between 29.9 m and 30.5 m; grey; wet, compact. *(continued)*			20	SS	83	28										
31		**(SP)** SAND, fine, some fines; grey; wet, compact.		72.74 31.00	21	SS	79	20		0	92	8						
32																		
33					22	SS	88	22										
34																		
35					23	SS	79	18		0	95	5					Cementitious Grout Backfill	
36					24	SS	63	19										
37		**(SP)** SAND, fine to medium, trace to some fines; grey; wet, dense.		66.74 37.00														
38					25	SS	83	36		0	89	11						
39					26	SS	71	30										
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-06

SHEET 5 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447695.81 E: 503670.06 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace to some fines; grey; wet, dense. *(continued)*																
41					27	SS	71	30		0	95	5						
42					28	SS	92	30										
43		- seams of silt between 43.5 m and 44.1 m depth.																
44					29	SS	67	31		0	90	10						
45					30	SS	83	30										Cementitious Grout Backfill
46																		
47					31	SS	75	44										
				56.27														
48		**(CL/ML)** SILTY CLAY and CLAYEY SILT, interlayered; grey; wet, firm to stiff.		47.47														
49					32	SS	100	WR	○									
50		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-06

SHEET 6 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447695.81 E: 503670.06 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(CL/ML)** SILTY CLAY and CLAYEY SILT, interlayered; grey; wet, firm to stiff. *(continued)*			33	TP	100						64	36	15 12			
51					34	TP												
52																		
53					35	TP	100											
54																		
55					36	TP	100											Cementitious Grout Backfill
56																		
57					37	TP	100											
58																		
59																		
60		*CONTINUED NEXT PAGE*			38	SS	100	WR										

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-06

SHEET 7 OF 7

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447695.81 E: 503670.06 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY %	SAMPLES: BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60		End of Borehole.		43.69 / 60.05													
61																	
62																	
63																	
64																	
65																	
66																	
67																	
68																	
69																	
70																	

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 1 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q -, U -)	GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		103.90														
0			ASPHALT.																
			FILL - Granular Road Base.		103.70														
			FILL - **(SP)** SAND, fine to medium, trace fines; brown; moist, loose.																
1	Hydro Vacuumed																		
2																			
					100.98														
3			**(ML-OL)** CLAYEY SILT to ORGANIC SILT; grey-brown; wet, soft to firm.		2.92	1	SS	83	3							16			
4					99.79														
			(CL-ML) SILTY CLAY to SILT, interlayered, trace fine sand; grey; wet, very loose.		4.11	2	SS	83	5										
5																		Cementitious Grout Backfill	
						3	SS	96	4	NP									
6	Fraste ML	Mud Rotary (Automatic Trip Hammer)																	
7						4	SS	92	3										
					95.98														
8			**(SP)** SAND, fine, trace to some fines; grey; wet, loose.		7.92														
9						5	SS	67	8		0	89	11						
10			*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 2 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine, trace to some fines; grey; wet, loose. *(continued)*			6	SS	71	5										
11				92.62														
		(SP) SAND, fine to medium, trace to some fines; grey; wet, loose to compact.		11.28														
12					7	SS	67	10		0	91	9						
13					8	SS	63	10										
14																		
15					9	SS	71	12										Cementitious Grout Backfill
16																		
17					10	SS	79	18		0	94	6						
18					11	SS	75	18										
19																		
20					12	SS	71	18										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 3 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20		**(SP)** SAND, fine to medium, trace to some fines; grey; wet, loose to compact. *(continued)*																
21					13	SS	71	23		0	87	13						
22		- seams of clayey silt and organics at 22.9 m depth.			14	SS	36	16										
23																		
24					15	SS	63	8										
				79.52														
25	Fraste ML / Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact.		24.38													Cementitious Grout Backfill	
26					16	SS	54	23		3	91	6						
		- seams of gravel noted during drilling at 26.2 m depth.																
27					17	SS	63	26										
28																		
29					18	SS	50	24										
30					19	SS	71	26										

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 4 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste ML / Mud Rotary (Automatic Trip Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, compact. *(continued)*			19	SS	71	26		0	94	6						
31		- seams of silt at 29.9 m depth.		72.05														
32		**(ML)** SILT to CLAYEY SILT; grey, wet, stiff.		31.85	20	SS	100	13										
33					21	SS	79	28	NP	0	58	42	37	5				
34				69.76														
35		**(CL-ML)** SILTY CLAY to CLAYEY SILT, interlayered with silt and fine sand seams, trace organics; grey; wet, firm.		34.14	22	SS	100	15		0	28	72	60	12				Cementitious Grout Backfill
36					23	TP	100											
37									⊕ +									
38					24	SS	100	WR							9			
39					25	SS	100	WH		0	18	82						
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 5 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste ML / Mud Rotary (Automatic Trip Hammer)			63.82													
		(SP) SAND, fine, trace to some fines, with silt seams; grey; wet; dense.		40.08													
					26	SS	88	40									
41																	
42		- seams of silt between 42.1 m and 46.3 m depth.			27	SS	79	56		0	88	12					
43																	
					28	SS	75	32									
44																	
45																	Cementitious Grout Backfill
					29	SS	75	40									
46																	
				57.57													
		(SP-SM) SILTY SAND to SAND, fine, with silt seams, some fines; grey; wet, dense.		46.33													
47		- single wood fragment at 46.9 m depth.			30	SS	71	36		0	84	16					
48																	
		- seam of organics at 48.5 m depth.			31	SS	83	52									
49																	
					32	SS	58	37									
50																	

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 6 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; 20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐; 40 80 120 160)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(SP-SM)** SILTY SAND to SAND, fine, with silt seams, some fines; grey; wet, dense. *(continued)*			32	SS	58	37									
51		- seams of clayey silt at 51.5 m depth.			33	SS	83	49		0	95	5					
52		- trace organics at 52.7 m depth.															
53					34	SS	75	53									
54																	
55					35	SS	79	54									Cementitious Grout Backfill
56				47.51													
57		**(CL-ML)** SILTY CLAY to CLAYEY SILT, interlayered with silt seams and fine sand; grey; wet, firm to stiff.		56.39													
58																	
59					36	TP	100										
60		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 7 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen - ■	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	Fraste ML Mud Rotary (Automatic Trip Hammer)	**(CL-ML)** SILTY CLAY to CLAYEY SILT, interlayered with silt seams and fine sand; grey; wet, firm to stiff. *(continued)*							221								
61																	
62																	
63																	
64					37A 37	TP	100							11			
65		**(CL)** SILTY CLAY; grey; wet, stiff.		38.98 64.92													Cementitious Grout Backfill
66																	
67																	
68																	
69																	
70		*CONTINUED NEXT PAGE*			38	SS	100	WR		0	3	97					

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-07

SHEET 8 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447535.78 E: 503791.07 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE:
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT / SHEAR STRENGTH Cu, kPa	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	Fraste ML / Mud Rotary (Automatic Trip Hammer)	**(CL)** SILTY CLAY; grey; wet, stiff. *(continued)*			38	SS	100	WR										
71																		
72																		
73																		
74																		Cementitious Grout Backfill
75																		
				28.31														
76		**(CL/CI)** SILTY CLAY, trace sub-rounded to sub-angular gravel; grey; wet, stiff.		75.59														
77					39	SS	100	WR		1	17	82			19			
				26.18														
		End of Borehole.		77.72														
78																		
79																		
80																		

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen - ■; 40 80 120 160

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-08

SHEET 1 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447262.49 E: 504015.60 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: December 16, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -; Q - ●, U - ◐)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Mudline		87.25														
0	Fraste ML - Spudded Barge / Mud Rotary (Automatic Tap Hammer)	**(SP)** SAND, fine to medium, trace fines; grey; wet, very loose to loose.		0.00														
1																		
2					1	SS	0	WH										
3					2	SS	17	4										
4																		
5					3	SS	33	11		2	95	3						Cementitious Grout Backfill
				81.61														
		(SP) SAND, fine to medium, trace to some fines; grey; compact.		5.64														
6		- trace of fine sub-angular gravel at 6.4 m depth.			4	SS	42	16		0	96	4						
7																		
8					5	SS	58	21										
9					19A													
					6	SS	42	27		0	93	7						
10		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM/RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-08

SHEET 2 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447262.49 E: 504015.60 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: December 16, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	SHEAR STRENGTH Cu, kPa (nat V., rem V., Pocket Pen)	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Fraste ML - Spudded Barge Mud Rotary (Automatic Tap Hammer)			77.04															
		(SP) SAND, fine to coarse, trace fines; grey; wet, compact.		10.21															
11					7	SS	58	15											
		- trace sub-angular gravel at 11.0 m depth.																	
12					8	SS	46	24			0	95	5						
13		- gravelly layer between 13.1 m to 13.6 m depth.																	
14					9	SS	58	25											
15				72.01															Cementitious Grout Backfill
		(SP) SAND, fine to coarse, trace fines, trace sub-angular gravel; grey; wet, dense.		15.24	10	SS	54	33			3	88	9						
16																			
17					11	SS	71	36											
18				69.27															
		(SP) SAND, fine to coarse, trace to some fines, trace sub-angular gravel; grey; wet, compact.		17.98															
		- silt seams with fine sand partings at 18.5 m depth.			12	SS	58	17			1	95	4						
19																			
20					13	SS	67	22											
		CONTINUED NEXT PAGE																	

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM/RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-08

SHEET 3 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447262.49 E: 504015.60 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: December 16, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V., rem V., Pocket Pen)	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Fraste ML - Spudded Barge Mud Rotary (Automatic Tap Hammer)	**(SP)** SAND, fine to coarse, trace to some fines, trace sub-angular gravel; grey; wet, compact. *(continued)*			13	SS	67	22		1	92	7						
				66.37														
21		**(SP)** SAND, fine to medium, trace fines, trace sub-angular gravel; grey; wet, compact to dense.		20.88														
					14	SS	46	28		0	94	6						
22																		
23		- possibly pushing gravel during SPT at sample 15.			15	SS	8	44										
24																		
					16	SS	71	25		0	89	11						
25																		Cementitious Grout Backfill
				61.34														
26		**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand; grey; wet, firm.		25.91	17	SS	100	WH										
27																		
					18	SS	100	WR							8			
28																		
29					19	TO	100		NP						7			
		- trace gravel at 29.6 m depth.																
30		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM/RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-08

SHEET 4 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447262.49 E: 504015.60 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: December 16, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Fraste ML - Spudded Barge Mud Rotary (Automatic Tap Hammer)	**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand; grey; wet, firm. *(continued)*																
31					20	SS	100	WR										
32					21	TO	100							6				
33																		
34					22	SS	92	WR										
35					23	TO	100											Cementitious Grout Backfill
36																		
37					24	TO	100							8		GS		
38																		
39					25	TO	88							5				
40		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM/RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-08

SHEET 5 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447262.49 E: 504015.60 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: December 16, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Fraste ML - Spudded Barge Mud Rotary (Automatic Tap Hammer)	**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand; grey; wet, firm. *(continued)*																
41					26	SS	100	WR	○									
42																		
43																		
44																		
45																		Cementitious Grout Backfill
46					27	SS	100	WR	○									
47				40.01														
		(ML-CL) sandy SILT to clayey SILT, some sub-angular gravel; grey; wet, compact to very stiff.		47.24														
48																		
49																		
50		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM/RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF BOREHOLE: BH16-08

SHEET 6 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447262.49 E: 504015.60 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: December 16, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

SAMPLER HAMMER, 63.5kg; DROP, 762mm

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	RECOVERY %	BLOWS/0.3m	WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Pocket Pen -, Q -, U -)	GRADATION % CLAY PARTICLE SIZE <= 0.002: GRAVEL	SAND	FINES	SILT	CLAY	PLASTICITY INDEX %	ORGANIC CONTENT %	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Fraste ML - Spudded Barge Mud Rotary (Automatic Tap Hammer)	**(ML-CL)** sandy SILT to clayey SILT, some sub-angular gravel; grey; wet, compact to very stiff. *(continued)*																
					28	SS	100	24		4	25	71						
51																		
52																		
53																		Cementitious Grout Backfill
54																		
55					29	SS	71	>50		2	31	67			8			
				31.78 55.47														
		End of Borehole.																
56																		
57																		
58																		
59																		
60																		

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM/RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 1 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface		104.83													
0		FILL - **(SP)** SAND, fine to medium, trace to some fines; brown; wet.		0.00 / 104.38													
		FILL - **(SM/GM)** SILTY SAND and GRAVEL; brown; wet.		0.46 / 103.92													
1		FILL - **(SP-SM)** SAND, fine to medium, some fines; brown; wet.		0.91	1	GS		1									
2					2	GS											Bentonite Chips
3	DR 13 Truck Mounted Sonic Drill / Sonic				3	GS		2									
4				99.96													
5		**(ML)** CLAYEY SILT to SILT, trace fine sand, trace wood fibres and roots; grey.		4.88 / 99.20	4	GS				0	56	44				OC	
6		**(ML)** SILT, interbedded seams and laters of sandy silt; grey; non-cohesive, wet.		5.64				3									Time Release Pellets
7				97.82													
		(SP) SAND, fine to medium, trace to some fines; grey; wet.		7.01 / 97.06	5	GS											Blotter Sand
8		**(ML/SM)** SILT to sandy SILT, interbedded with occasional fine sand seams or partings; grey; wet.		7.77													Filter Sand
					6	GS				0	59	41					
9		- wood fibres at 8.8 m depth.						4									Slotted PVC Pipe
10		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 2 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	DR 13 Truck Mounted Sonic Drill / Sonic	**(ML/SM)** SILT to sandy SILT, interbedded with occasional fine sand seams or partings; grey; wet. *(continued)*			7	GS		4		0	92	8					
				94.17													
		(SP) SAND, fine to medium, trace fines; grey; wet.		10.67													
				93.83													
11		**(SP/SM)** SAND, fine, some silt to silty; grey; wet.		11.00													
					8	GS											
12								5									
				92.03													
		(ML-SM) SILT and interbedded silty fine sand; grey; wet.		12.80													
13					9	GS											
				91.13													
		(SP) SAND, fine, trace fines; grey; wet.		13.70													
14																	
					10	GS											
				89.93													
15		**(SP/SM)** SAND, fine, some silt to silty; occasional silt seams, grey; wet.		14.90				6									Bentonite Chips
16		- wood fibres at 16.0 m depth.															
				88.33													
		(SP) SAND, fine to medium, trace fines; grey; wet.		16.50	11	GS											
17																	
18								7									
					12	GS											
19																	
20		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 3 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace fines; grey; wet. *(continued)*						7									
21																	
22					13	GS		8									
23																	
24																	
25					14	GS		9									Bentonite Chips
26																	
27																	
28					15	GS		10									
29				75.53													
30		**(SP/SM)** SILTY SAND to SAND, some fines; grey; wet. - seams of silt and clayey silt at 30.2 m depth.		29.30				11									Time Release Pellets
		CONTINUED NEXT PAGE															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 4 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP/SM)** SILTY SAND to SAND, some fines; grey; wet. *(continued)*			16	GS											
				74.33													
		(SM) SILTY SAND, fine; grey; wet.		30.50													
31		- seams of silt and clayey silt at 31.0 m depth.						11									Time Release Pellets
32					17	GS											
				72.53													
		(SP) SAND, fine to medium, trace to some fines; grey; wet.		32.30													Blotter Sand
33					18	GS											Filter Sand
34								12									Slotted PVC Pipe
35					19	GS											
36					20	GS											
37								13									
38					21	GS											Bentonite Chips
39								14									
40		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
GRADATION %: 80 60 40 20

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 5 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace to some fines; grey; wet. *(continued)* - trace organics at 40.2 m depth.			22	GS		14									
41																	
42		- wood fibres and fragments at 42.1 m depth.			23	GS		15									
43																	
44				60.83													
		(SM/ML) SILTY SAND to SILT with occasional silt seams, fine sand and clay seams; grey; wet.		44.00	24	GS											Bentonite Chips
45																	
					25	GS		16									
46																	
47					26	GS											
		- sand, trace fines 0.3 m thick at 47.5 m depth.															
48																	
				56.03				17									
49		**(SM)** SILTY SAND, fine, with silt and clayey seams; grey; wet.		48.80	27	GS											Time Release Pellets
50		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 6 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	DR 13 Truck Mounted Sonic Drill / Sonic	**(SM)** SILTY SAND, fine, with silt and clayey seams; grey; wet. *(continued)*			28	GS		17									
				54.24													
		(ML/CL) SILT to SILTY CLAY, interlayered with silt and fine sand seams; grey; wet.		50.60													
51					29	GS											Time Release Pellets
52								18									
																	Blotter Sand
53																	Filter Sand
					30	GS											
54																	Slotted PVC Pipe
					31	GS											
55								19									Filter Sand
56					32	GS											
				48.13													
		(CL) SILTY CLAY with occasional silt and fine sand seams; grey; wet.		56.70													
57					33	GS											
																	Bentonite Chips
58								20									
59					34	GS											
								21									
60		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 7 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	DR 13 Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY with occasional silt and fine sand seams; grey; wet. *(continued)*															
61					35	GS		21									
62					36	GS											
63					37	GS											
64								22									
65					38	GS											Bentonite Chips
66		**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded with silt and sandy silt seams; grey; wet.		39.03 65.80	39	GS											
67								23									
68					40	GS											
69								24									
70					41	GS											
		CONTINUED NEXT PAGE															

SHEAR STRENGTH: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-01

SHEET 8 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447879.05 E: 503811.08 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 4-5, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen ■, Q - ●, U - ◐) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	DR 13 Truck Mounted Sonic Drill / Sonic	**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded with silt and sandy silt seams; grey; wet. *(continued)*															
71					42	GS		24									
72																	Bentonite Chips
73					43	GS		25									
74		**(CL)** SILTY CLAY, with occasional silt and fine sand seams; grey; wet.		31.03 73.80	44	GS											
75		End of Sonic Hole.		29.85 74.98													
76																	
77																	
78																	
79																	
80																	

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 1 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa: nat V. + Q - ● / rem V. ⊕ U - ◐ / Pocket Pen ■ (40 80 120 160)	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	DR 13 Truck Mounted Sonic Drill / Sonic	Ground Surface		103.79														
		ASPHALT		103.59														
		FILL - Granular Road Base		0.20														
		FILL - **(SP-SM)** SAND, fine to medium, trace to some fines; brown-grey; moist to wet.						1										
1		- silty sand between 0.9 m and 1.2 m depth.			1	GS												
2								2										Bentonite Chips
				100.84														
3		**(ML)** sandy CLAYEY SILT with organics; dark brown; wet.		100.69														
		(CL-ML) SILTY CLAY to CLAYEY SILT, trace wood fibres and roots; grey.		3.10	2	GS												
4		- silt and sand seams and trace organics between 4.2 m and 4.9 m depth.						3										
				98.89	3	GS												
5		**(SM/ML)** SILTY SAND and sandy SILT, interbedded; grey; wet.		4.90				4										
				97.85														Time Release Pellets
6		**(SP)** SAND, fine to medium, trace fines; grey; wet.		5.94	4	GS												
7								5										Blotter Sand
					5	GS												
8		- seam of silt at 7.9 m depth.																Filter Sand
								6										
9					6	GS												Slotted PVC Pipe
								7										
10		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 2 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace fines; grey; wet. *(continued)*						7									
11		- seams of silt between 10.7 m and 11.0 m and 11.3 m and 11.7 m depths.			7	GS		8									
12					8	GS											
13		- no core recovery, inferred soil conditions from 12.5 m to 17.0 m depth.						9									
14								10									
15																	Bentonite Chips
16								11									
17																	
18					9	GS		12									
19																	
20		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 3 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace fines; grey; wet. *(continued)*			10	GS		12									
					10	GS											
21																	
					11	GS		13									
22																	
23																	
					12	GS											
24								14									
25					13	GS											Bentonite Chips
26																	
				77.27													
		(SP-SM) SAND, trace to some fines; grey; wet.		26.52													
					14	GS											
27		- seams of silt to clayey silt between 26.5 m and 29.3 m depth.															
28								15									
29					15	GS											
								16									
30		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 4 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP-SM)** SAND, trace to some fines; grey; wet. *(continued)*															
31		- seams of clayey silt from 31.0 m to 31.4 m depth.						16									
32																	
33		- seams of clayey silt from 32.3 m to 38.4 m depth.			18	GS											
34								17									Bentonite Chips
35					19	GS											
36					20	GS											
37								18									
38		- seam of organic silt at 38.0 m depth.			21	GS											
39								19									
40		*CONTINUED NEXT PAGE*			22	GS											Time Release Pellets

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 5 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP-SM)** SAND, trace to some fines; grey; wet. *(continued)*															
41								19									Time Release Pellets
42																	Blotter Sand
43					23	GS		20									Filter Sand
44																	Slotted PVC Pipe
45																	
46		- seams of silt and silty clay between 46.3 m and 47.8 m depth.			24	GS		21									Bentonite Chips
					25	GS											
47				55.94													
48		**(CL)** SILTY CLAY, interbedded with seams of silt and fine sand, trace shell fragments; grey; wet.		47.85	26	GS											Time Release Pellets
49								22									
50		*CONTINUED NEXT PAGE*			27	GS											Blotter Sand

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SOIL CORE RECOVERY %: 80 60 40 20

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 6 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	DR 13 Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, interbedded with seams of silt and fine sand, trace shell fragments; grey; wet. *(continued)*						22									Filter Sand
51								23							+ FVT capacity exceeded		Slotted PVC Pipe
52					28	GS											Filter Sand
53					29	GS									+ FVT capacity exceeded		
54				49.54				24									
55		**(CL)** SILTY CLAY, trace to some sand, trace fine sub-angular gravel, trace shell fragments; grey; wet.		54.25	30	GS											
56					31	GS		25									Bentonite Chips
57		- layer of silty sand to sand and silt, trace to some sub-angular gravel between 57.0 m and 58.0 m depth.															
58					32	GS											
59					33	GS		26									
60		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■ (40, 80, 120, 160)
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic (20, 40, 60, 80)

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 7 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	DR 13 Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, trace to some sand, trace fine sub-angular gravel, trace shell fragments; grey; wet. *(continued)*			34	GS		26									
61		- trace organics at 61.3 m depth.			35	GS											
62								27									
63					36	GS											
64		- no gravel noted below 64.3 m depth.						28									
65					37	GS											Bentonite Chips
66																	
67					38	GS											
68					39	GS		29									
69																	
70		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■; Cu, kPa: 40, 80, 120, 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20, 40, 60, 80
GRADATION %: CLAY PARTICLE SIZE <= 0.002
SOIL CORE: RECOVERY %: 80, 60, 40, 20

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-02

SHEET 8 OF 8

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447707.25 E: 503594.57 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: March 31 to April 3, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	DR 13 Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, trace to some sand, trace fine sub-angular gravel, trace shell fragments; grey; wet. *(continued)*			40	GS		29									
71					41	GS											
72								30									
73					42	GS											Bentonite Chips
				30.33													
		(CL-ML) SILTY CLAY to CLAYEY SILT, trace fine sand; brown-grey; wet.		73.46	43	GS											
74																	
75								31									
76					44	GS											
				27.28													
		End of Sonic Hole.		76.51													
77																	
78																	
79																	
80																	

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-03

SHEET 1 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447423.44 E: 503628.54 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 8, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	DR 13 Truck Mounted Sonic Drill / Sonic	Ground Surface		104.04													
		Drilled out to 26.2 m depth.		0.00													Concrete and Flushmount
1																	
2																	Bentonite Chips
3																	
4																	
5																	
6																	Bentonite Pellets
7																	
8																	Filter Sand
9																	Slotted PVC Pipe
10		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● ; rem V. ⊕ U - ◐ ; Pocket Pen ■ ; 40 80 120 160

WATER CONTENT PERCENT: Wp W Wl ; NP - Non-Plastic ; 20 40 60 80

SOIL CORE RECOVERY %: 80 60 40 20

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-03

SHEET 2 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447423.44 E: 503628.54 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	DR 13 Truck Mounted Sonic Drill / Sonic	Drilled out to 26.2 m depth. *(continued)*															Bentonite Chips
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80
RECOVERY %: 80 60 40 20

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-03

SHEET 3 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447423.44 E: 503628.54 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 8, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	DR 13 Truck Mounted Sonic Drill / Sonic	Drilled out to 26.2 m depth. *(continued)*															
21																	
22																	
23																	
24																	
25																	Bentonite Chips
26				77.83													
		(SP) SAND, fine to medium, trace to some fines; grey; wet. - silt seam at 26.5 m depth.		26.21				1									
27																	
28					1	GS											
29								2									
30		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-03

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447423.44 E: 503628.54 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	DR 13 Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace to some fines; grey; wet. *(continued)*															
				73.26													
		(CL-ML) SILTY CLAY, interbedded with silt and fine sand seams; grey, wet.		30.78													
31				72.95				2									
		(SM) SILTY SAND, trace gravel; grey; wet.		31.09													
				72.71													
		(GP) sandy GRAVEL, fine to coarse gravel, trace fines, trace shell fragments; grey; wet.		31.33													
32					2	GS											
				71.73													
		(GP) GRAVEL, fine to coarse, sub-rounded gravel, some sand; grey; wet.		32.31													
33																	
34								3									
35																	Bentonite Chips
				68.68													
		(SM/GP) SILTY SAND and GRAVEL, fine to coarse sand, round to sub-rounded gravel; grey; wet.		35.36													
				68.38													
		(CL) SILTY CLAY, trace fine sand; grey; firm to stiff. - trace gravel and shell fragments from 35.7 m to 36.3 m depth.		35.66													
36					3	GS											
37								4									
38					4	GS											
39					5	GS		5									
40		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-03

SHEET 5 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447423.44 E: 503628.54 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 8, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	DR 13 Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, trace fine sand; grey; firm to stiff. *(continued)*						5									
41					6	GS											
42																	
43					7	GS		6									
44					8	GS											
45					9	GS											Bentonite Chips
46								7									
				57.16													
47		**(SM/ML)** SILTY SAND to sandy SILT, some gravel, fine to coarse, rounded to sub-rounded gravel; grey; moist. [TILL-LIKE]		46.88	10	GS											
				56.49													
		BOULDER		47.55													
48				55.94													
		(ML) sandy SILT, trace to some gravel, fine to coarse, rounded to sub-rounded gravel; grey; moist. [TILL-LIKE]		48.10	11	GS		8									
49																	
50		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-03

SHEET 6 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447423.44 E: 503628.54 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 8, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	DR 13 Truck Mounted Sonic Drill / Sonic	**(ML)** sandy SILT, trace to some gravel, fine to coarse, rounded to sub-rounded gravel; grey; moist. [TILL-LIKE] *(continued)*			12	GS		8									
				53.44													
		(SM) SILTY SAND, fine to medium, trace rounded gravel; grey; wet. [TILL-LIKE]		50.60	13	GS											
51				52.83													
		(ML) sandy SILT, trace to some gravel, rounded to sub-rounded gravel; grey; moist. [TILL-LIKE]		51.21													Bentonite Chips
52								9									
53					14	GS											
				50.40													
		End of Sonic Hole.		53.64													
54																	
55																	
56																	
57																	
58																	
59																	
60																	

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-04

SHEET 1 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447338.81 E: 503633.24 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen ■, Q - ●, U - ◐) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	DR 13 Truck Mounted Sonic Drill / Sonic	Ground Surface		104.34													
		Drilled out to 26.2 m depth.		0.00													Concrete and Flushmount
1																	
2																	Bentonite Chips
3																	
4																	
5																	
6																	Bentonite Pellets
7																	
8																	Filter Sand
9																	Slotted PVC Pipe (Shallow)
10		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-04

SHEET 2 OF 6

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447338.81 E: 503633.24 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	DR 13 Truck Mounted Sonic Drill / Sonic	Drilled out to 26.2 m depth. *(continued)*															Bentonite Chips
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-04

SHEET 3 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447338.81 E: 503633.24 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	DR 13 Truck Mounted Sonic Drill / Sonic	Drilled out to 26.2 m depth. *(continued)*															Bentonite Chips
21																	
22																	
23																	
24																	
25																	
26				78.13													
		(SP) SAND, fine to medium, trace fine gravel, trace to some fines; grey; wet.		26.21													
27																	
28					1	GS		1									
29																	
								2									
30				74.47 / 29.87													
		CONTINUED NEXT PAGE															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-04

SHEET 4 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447338.81 E: 503633.24 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	DR 13 Truck Mounted Sonic Drill / Sonic	**(GP/SP)** sandy GRAVEL to SAND and GRAVEL, fine to coarse, rounded to sub-rounded gravel, fine to coarse sand, trace fines and seashell fragments; grey; wet. *(continued)*														
31					2	GS		2								Bentonite Chips
32				72.03												
		(GP) GRAVEL, fine to coarse, rounded to sub-rounded, trace to some sand, with cobbles; grey; wet.		32.31												
33																
34								3								Bentonite Pellets
35																
				68.98												
		(GP) sandy GRAVEL, fine to coarse rounded to sub-rounded gravel, trace fines; grey; wet.		35.36												
36																Filter Sand
																Slotted PVC Pipe (Deep)
37					3	GS		4								
38		- increasing fines content below 38.4 m depth.														
39								5								Bentonite Chips
				64.72												
		(CL) SILTY CLAY, trace to some rounded fine to coarse gravel; grey; wet.			4	GS										
40		*CONTINUED NEXT PAGE*														

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■ (40, 80, 120, 160)

WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic (20, 40, 60, 80)

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-04

SHEET 5 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447338.81 E: 503633.24 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: April 9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	DR 13 Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, trace to some rounded fine to coarse gravel; grey; wet. *(continued)*						5									
41		- no core recovery, inferred soil conditions from 41.5 m to 44.5 m depth.															
42								6									
43																	
44																	
45		- trace to some sand and trace seashell fragments below 44.5 m depth.			5	GS		7									Bentonite Chips
46		- wood fragments at 46.2 m depth.															
47					6	GS											
48					7	GS		8									
49		**(SM/ML)** SILTY SAND to sandy SILT, fine to coarse sand, trace to some gravel, fine to coarse, rounded to sub-rounded gravel; grey; moist. [TILL LIKE] - sand seam at 49.2 m depth.		55.57 / 48.77	8	GS											
50		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-04

SHEET 6 OF 6

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447338.81 E: 503633.24 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: April 9, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

Dated April 27, 2016

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen ■; Q - ●, U - ◐) / WATER CONTENT PERCENT (Wp, W, Wl; NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	DR 13 Truck Mounted Sonic Drill / Sonic																
				53.75	9	GS		8									
		(SP) SAND, fine to coarse, trace to some fines, trace gravel; grey; moist. [TILL-LIKE]		50.59													
51				53.13													Bentonite Chips
		(ML) gravelly sandy SILT to sandy SILT, trace to some gravel, fine to coarse, rounded to sub-rounded; grey; moist. [TILL-LIKE]		51.21				9									
52				52.22													
		End of Sonic Hole.		52.12													
53																	
54																	
55																	
56																	
57																	
58																	
59																	
60																	

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: DGM
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 1 OF 10

CLIENT: CDM Smith Canada ULC

DATUM: CVD28GVRD2005

PROJECT: AIWWTP Transient Mitigation and Outfall System

LOCATION: Annacis Island, Delta, B.C.

DRILLING DATE: November 22-23, 2016

DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

N: ~5447699.52 E: ~503671.5

Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0			Ground Surface		103.64													
			ASPHALT.															
			FILL - Granular Road Base.		103.41													
			FILL - **(SP)** SAND, fine to medium, trace fines; brown.		0.23													
1	Hydro	Vacuumed							1									
2																		
					100.90													
			(OL) ORGANIC SILT, with wood fibres and roots; dark brown; wet.		2.74													
3					100.29	1	GS											
			(CL-ML) SILTY CLAY to CLAYEY SILT, trace wood with fine sand seams and laminations; grey; wet.		3.35													
						2	GS											Bentonite Pellets
4																		
					98.76													
5			**(SP-SM)** SAND, fine, some fines; grey; wet.		4.88													
					98.26													
			(SP-ML) SAND, fine, with silt layers and seams; grey; wet.		5.38													
						3	GS											
					97.85													
6	Truck Mounted Sonic Drill	Sonic	**(SP)** SAND, fine to medium, trace fines; grey; wet.		5.79				2									
7																		
8																		Filter Sand
						4	GS											
9									3									Slotted PVC Pipe
10			*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160

WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE

1 : 50

SOIL CLASSIFICATION SYSTEM: GACS

LOGGED: RB

CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 2 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~5036671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace fines; grey; wet. *(continued)*						3									Filter Sand
11					5	GS											
12								4									
13																	
14				89.62													
		(SM) SILTY SAND, fine, with silt seams; grey; wet.		14.02													
15					6	GS		5									Bentonite Pellets
				88.10													
		(SP) SAND, fine to medium, trace fines; grey; wet.		15.54													
16		- seams of silt at 16.2 m depth.															
17					7	GS											
18								6									
19																	
20		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 3 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace fines; grey; wet. *(continued)*						6									
21					8	GS		7									
22																	
23																	
24					9	GS		8									
25																	Bentonite Pellets
26																	
				77.12													
27		**(ML)** SILT to CLAYEY SILT, with thin laminations of fine sand; grey; wet.		26.52	10	GS											
				75.90				9									
28		**(SM)** SILTY SAND, fine; grey; wet.		27.74													
29		- clayey silt to sandy silt layer between 28.6 m and 29.0 m depth.															
30		*CONTINUED NEXT PAGE*						10									

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 4 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Truck Mounted Sonic Drill / Sonic	**(SM)** SILTY SAND, fine; grey; wet. *(continued)* - silt from 30.2 m to 30.3 m depth.			11	GS											Bentonite Pellets
31								10		0	89	11			○		Filter Sand
32				71.33													Slotted PVC Pipe
		(SP) SAND, fine, trace to some fines; grey; wet.		32.31													
33					12	GS											Filter Sand
34								11									
35																	
36					13	GS											
37								12									Bentonite Pellets
38		- seams of occasional silt below 38.4 m depth.															
39								13									
40		*CONTINUED NEXT PAGE*			14	GS											

SHEAR STRENGTH: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

Golder Associates

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 5 OF 10

DATUM: CVD28GVRD2005

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine, trace to some fines; grey; wet. *(continued)*						13									
41																	
42					15	GS											
43								14									
44																	
45																	Bentonite Pellets
46								15									
				56.85													
47		**(CL-ML)** CLAYEY SILT to SILTY CLAY, interlayered with silt and fine sand seams; grey; wet.		46.79	16	GS											
48					17	GS		16									
49				54.57													
		(CL) SILTY CLAY, trace to some fine sand, with silt and fine sand seams; grey to dark grey; wet.		49.07													
50					18	GS											

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 6 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, trace to some fine sand, with silt and fine sand seams; grey to dark grey; wet. *(continued)*						16									
51					19	GS											Bentonite Pellets
52								17									
53					20	GS											Filter Sand
54					21	GS											Slotted PVC Pipe
55								18									Filter Sand
56					22	GS											
57																	
58					23	GS		19									Bentonite Pellets
59		- seashell fragments at 58.8 m depth.			24	GS											
60		*CONTINUED NEXT PAGE*						20									

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 7 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, trace to some fine sand, with silt and fine sand seams; grey to dark grey; wet. *(continued)*			25	GS											
61		- trace sand and sub-angular gravel between 60.7 m and 61.4 m depth.															
		(SM) SILTY SAND, some fine to coarse sub-angular gravel; grey; wet.		42.22 61.42	26	GS		20									
62		**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand; grey; wet.		41.61 62.03													
63					27	GS											
64								21									
65																	Bentonite Pellets
66																	
67								22/23									
68					28	GS											
69								24									
70					29	GS											

CONTINUED NEXT PAGE

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 8 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70			**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand; grey; wet. *(continued)*															
71									24									
						30	GS											
72																		
73																		
									25									
74						31	GS											
					28.66													
75	Truck Mounted Sonic Drill	Sonic	**(ML)** CLAYEY SILT, trace fine sand; grey; wet.		74.98													Bentonite Pellets
76									26									
77						32	GS											
78			- trace fine to coarse sub-angular gravel below 78.0 m depth.															
						33	GS											
79									27/28									
80			*CONTINUED NEXT PAGE*															

SHEAR STRENGTH: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; Cu, kPa; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 9 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen ■, Q - ●, U - ◐) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
80	Truck Mounted Sonic Drill / Sonic	**(ML)** CLAYEY SILT, trace fine sand; grey; wet. *(continued)*						27/28									
					34	GS											
81				22.56													
		(ML) SILT, trace fine sand, trace fine to coarse sub-angular gravel; grey; wet. - gradual change from silt to sandy silt and silty fine sand with depth.		81.08													
82								29									
					35	GS											
		- cobble noted at 82.8 m depth.															
83																	
84																	
					36	GS											
85																	Bentonite Pellets
								30									
86																	
					37	GS											
87				16.44													
		(ML-SM) sandy SILT to SILTY SAND, fine; grey; wet.		87.20													
88																	
					38	GS											
89								31									
90		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-05

SHEET 10 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: ~5447699.52 E: ~503671.5
Note: Coordinates and Elevation have not been surveyed and are considered to be approximate only.

DRILLING DATE: November 22-23, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
90	Sonic	**(ML-SM)** sandy SILT to SILTY SAND, fine; grey; wet. *(continued)*						31									Slough
				13.11													
		End of Sonic Hole.		90.53													
91																	
92																	
93																	
94																	
95																	
96																	
97																	
98																	
99																	
100																	

SHEAR STRENGTH: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 1 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa: nat V. + Q - ● / rem V. ⊕ U - ◐ / Pocket Pen ■ (40 80 120 160)	WATER CONTENT PERCENT: Wp W Wl, NP - Non-Plastic (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0	Hydro Vacuumed / Truck Mounted Sonic Drill Sonic	Ground Surface		104.15														
		Asphalt.																
		FILL - Granular Road Base		103.93														
		FILL - **(SP)** SAND, fine to medium, trace to some fines; brown; moist to wet.		0.23				1										
1																		
2								2										
3					1	GS				0	99	1						
4				99.89														Bentonite Pellets
		(OL) ORGANIC SILT, with wood fibres; brown; wet.		4.27														
		(ML-SM) CLAYEY SILT to SILTY SAND, fine sand, silt and fine sand laminations; grey; wet.		99.58 4.57														
5				98.52														
		(ML) SILT to sandy SILT; grey; wet.		5.64														
6					2	GS												
		(SP) SAND, fine to medium, trace to some fines; grey; wet.		97.91 6.25				3										
7																		
8																		Filter Sand
9				95.01				4										
		(SM) SILTY SAND, fine, seams of silt; grey; wet.		9.14														Slotted PVC Pipe
					3	GS				0	85	15						
				94.40														
		(SP-SM) SAND, fine to medium, some fines; grey; wet.		9.75														
10		*CONTINUED NEXT PAGE*																

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 2 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Truck Mounted Sonic Drill / Sonic	**(SP-SM)** SAND, fine to medium, some fines; grey; wet. *(continued)*						4									Filter Sand
11				92.95													
		(SP) SAND, fine to medium, trace fines; grey; wet.		11.20													
12					4	GS		5		0	98	2					
13				91.05													
		(SP) SAND, fine to medium, trace to some fines; grey; wet.		13.11													
14																	
					5	GS											
15								6									Bentonite Pellets
16				88.00													
		(SP) SAND, fine to medium, trace fines; grey; wet.		16.15													
17																	
18					6	GS		7		0	99	1					
19																	
20		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 3 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace fines; grey; wet. *(continued)*						7									
				83.43													
		(SP) SAND, fine to coarse, trace fine to coarse, sub-angular gravel, trace fines; grey; wet.		20.73													
21					7	GS											
								8									
22																	
23																	
24																	
					8	GS		9		0	99	1					
25																	Bentonite Pellets
26																	
27					9	GS											
								10									
28																	
29				74.89													
		(ML) SILT to CLAYEY SILT, with clay/silt laminations, trace sand; grey; wet.		29.26													
					10	GS		11		0	23	77			○ NP		
30				74.13													
		CONTINUED NEXT PAGE															

SHEAR STRENGTH: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 4 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Truck Mounted Sonic Drill / Sonic	**(SP/SM)** SAND to SILTY SAND, fine to medium, with silt seams and layers; grey; wet.		30.02				11								Bentonite Pellets
31																Filter Sand
32				71.85												Slotted PVC Pipe
		(SP) SAND, fine to medium, trace fine gravel, clay seams; grey; wet.		32.31	11	GS				6	68	26				
				71.54												
		(SP) SAND, fine to medium, trace to some fines; grey; wet.		32.61												
33		- seams of silt between 33.2 m and 33.8 m depth.														Filter Sand
34								12								
35					12	GS				0	97	3				
36																
37								13								Bentonite Pellets
					13	GS				0	96	4				
38																
39								14								
40		*CONTINUED NEXT PAGE*														

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■ (40, 80, 120, 160)
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic (20, 40, 60, 80)

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 5 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Truck Mounted Sonic Drill / Sonic	**(SP)** SAND, fine to medium, trace to some fines; grey; wet. *(continued)*			14	GS		14									
41				62.70													
		(CL-ML) SILTY CLAY to sandy CLAYEY SILT, fine sand; grey. - seam of silt between 43.6 m and 43.9 m depth.		41.45													
42																	
43					15	GS		15									
44				59.65													
		(CL) SILTY CLAY, interbedded with seams of silt and sandy silt; grey; wet.		44.50													
45																	Bentonite Pellets
46								16									
					16	GS				0	3	97					
47																	
48																	
49								17									
					17	GS				0	3	97					
50		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 6 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY, interbedded with seams of silt and sandy silt; grey; wet. *(continued)*						17									
51																	
52								18									
					18	GS											
53				50.51													
		(CL-ML) SILTY CLAY to CLAYEY SILT, interbedded with seams of silt; grey; wet.		53.64													
54					19	GS											
55								19									Bentonite Pellets
56					20	GS											
				47.46													
		(CL) SILTY CLAY; grey; wet.		56.69													
				47.16													
57		**(CL-ML)** SILTY CLAY to CLAYEY SILT, seams of silt; grey; wet.		57.00													
				46.55	21	GS											
		(CL) SILTY CLAY; grey; wet.		57.61													
58								20									
59					22	GS											
60		*CONTINUED NEXT PAGE*						21									

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 7 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY; grey; wet. *(continued)*			23	GS											
61		- dark grey seams or pockets of organic silt from 59.7 m to 62.8 m depth.						21									
62					24	GS											
63																	
64					25	GS		22									
65					26	GS											Bentonite Pellets
66																	
67					27	GS											
68					28	GS		23									
69																	
70		*CONTINUED NEXT PAGE*			29	GS		24									

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 8 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	Truck Mounted Sonic Drill / Sonic	**(CL)** SILTY CLAY; grey; wet. *(continued)*															
					30	GS		24									
71																	
				32.22													
72		**(ML)** sandy CLAYEY SILT, some fine to coarse, sub-angular gravel; grey; wet.		71.93													
					31	GS											
73								25									
				30.24	32	GS											
74		**(ML)** SILT to sandy SILT, some fine to coarse, sub-angular gravel to gravelly; grey; moist.		73.91													
75		- cobbles at 75.1 m depth.															Bentonite Pellets
76																	
					33	GS		26		4	37	59					
77																	
				26.13													
78		**(ML)** SILT to CLAYEY SILT, some sand, some fine to coarse, sub-angular gravel; grey; moist.		78.03	34	GS											
79								27									
					35	GS											
80		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■; Cu, kPa; 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 9 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
80	Truck Mounted Sonic Drill / Sonic	**(ML)** SILT to CLAYEY SILT, some sand, some fine to coarse, sub-angular gravel; grey; moist. *(continued)*						27									
81					36	GS											
				22.47													
		(ML) SILT to sandy SILT, trace to some fine to coarse, sub-angular gravel; grey; moist.		81.69													
82		- boulder from 82.5 m to 83.0 m depth.						28									
83																	
				20.64	37	GS											
		(ML/SM) SILT to SILTY SAND, fine, interlayered; grey; moist.		83.52													
84																	
85																	Bentonite Pellets
					38	GS		29									
86																	
87				16.98													
		(SM) SILTY SAND to SAND, fine, some fines; grey; moist to wet.		87.17													
88																	
					39	GS		30		0	84	16					
89																	
90		*CONTINUED NEXT PAGE*															

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-06

SHEET 10 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447405.46 E: 503902.98 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 25, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
90	Sonic			13.93				30									
		End of Sonic Hole.		90.22													
91																	
92																	
93																	
94																	
95																	
96																	
97																	
98																	
99																	
100																	

Shear strength scale: 40 80 120 160
Water content percent scale: 20 40 60 80

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: CP
CHECKED: YEW/VF

REV: 0

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 1 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0			Ground Surface		103.49													
			ASPHALT.															
			FILL. Granular Road Base.		103.22													
			FILL - **(SP)** SAND, fine to medium, trace fines; brown; wet.		0.27													
1	Hydro	Vacuumed							1									
2																		
3			**(SM/ML)** silty SAND, interlayered with silt to sandy silt seams, trace organics; grey; wet.		100.60 2.90													
						1	GS									NP		
					99.84													
4			**(SM)** SILTY SAND to SAND, fine, some fines; grey to brown; wet.		3.66													Bentonite Pellets
5																		
			- seams of silt between 5.3 m and 5.5 m depth															
6	Truck Mounted	Sonic							2									
			- seams of silt between 6.6 m and 7.2 m depth.			2	GS				0	63	37					
7																		
8																		Filter Sand
						3	GS											
9					94.50				3									
			(SP) SAND, fine to medium, trace fines; grey to brown; wet.		8.99													Slotted PVC Pipe
10			*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 2 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Truck Mounted / Sonic	**(SP)** SAND, fine to medium, trace fines; grey to brown; wet. *(continued)*						3									Filter Sand
11																	
12					4	GS		4		0	96	4					
13		- silt seam at 12.2 m depth.															
14																	
15								5									Bentonite Pellets
16		- silt seam at 15.6 m depth.			5	GS				0	97	3					
17																	
18								6									
19					6	GS											
20		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 3 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Truck Mounted / Sonic	**(SP)** SAND, fine to medium, trace fines; grey to brown; wet. *(continued)*			6	GS		6									
21		- trace wood fibres and fragments between 21.0 m and 21.6 m depth.						7									
22					7	GS				0	98	2					
23																	
24					8	GS		8		0	97	3					
25																	Bentonite Pellets
26					9	GS											
				77.28													
		(SP) SAND, fine, trace to some fines; grey-brown; wet.		26.21													
27					10	GS				0	99	1					
				75.76				9									
		(SP) SAND, fine to medium, trace fines; grey-brown; wet.		27.74													
28					11	GS											
29																	
								10									
30		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■; Cu, kPa: 40, 80, 120, 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20, 40, 60, 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 4 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DATUM: CVD28GVRD2005

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30	Truck Mounted / Sonic	**(SP)** SAND, fine to medium, trace fines; grey-brown; wet. *(continued)*			12	GS		10									Bentonite Pellets
31																	Filter Sand
					13	GS				0	99	1					
32																	Slotted PVC Pipe
33		- seams of silt between 32.9 m to 34.4 m depth.			14	GS				0	97	3					Filter Sand
34								11									
					15	GS				0	98	2					
35																	
36					16	GS											
37								12									Bentonite Pellets
					17	GS				0	97	3					
38																	
39				64.43	18	GS											
		(CL-ML) SILTY CLAY to CLAYEY SILT, interbedded silt and clay seams and layers; grey; wet.		39.07				13							○ NP		
					19	GS											
40		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 5 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
40	Truck Mounted / Sonic	**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded silt and clay seams and layers; grey; wet. *(continued)*						13									
41					20	GS											
		(CL-ML) SILTY CLAY to CLAYEY SILT, interbedded with silt to sandy silt seams and layers; grey; wet.		62.09 / 41.40													
42					21	GS											
43								14									
44					22	GS											
45					23	GS											Bentonite Pellets
46								15									
47					24	GS											
48																	
49								16									
50		*CONTINUED NEXT PAGE*			25	GS											

SHEAR STRENGTH: nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■; Cu, kPa: 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
RECOVERY %: 80 60 40 20

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 6 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
50	Truck Mounted / Sonic	**(CL-ML)** SILTY CLAY to CLAYEY SILT, interbedded with silt to sandy silt seams and layers; grey; wet. *(continued)*						16									
51																	Bentonite Pellets
52								17									
53					26	GS											Filter Sand
54																	Slotted PVC Pipe
55								18									Filter Sand
56					27	GS											
57				46.19													
58		**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand, occasional silt; grey; wet.		57.30	28	GS		19									Bentonite Pellets
59																	
60		*CONTINUED NEXT PAGE*						20									

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic; 20 40 60 80
SOIL CORE RECOVERY %: 80 60 40 20

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 7 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	SOIL CORE: RUN No.	RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
60	Truck Mounted / Sonic	**(CL-ML)** SILTY CLAY to CLAYEY SILT, trace fine sand, occasional silt; grey; wet. *(continued)*															
					29	GS											
61								20									
62																	
63																	
					30	GS											
64								21									
65																	Bentonite Pellets
				37.96													
		(CL) SILTY CLAY, trace fine sand; grey; wet.		65.53													
66																	
67								22									
					31	GS											
68																	
69																	
								23									
70		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE_SONIC_GRADATION (AUTO) sreddy 19/1/18

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 8 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL / SAND / FINES / SILT / CLAY	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Pocket Pen ■, Q - ●, U - ◐) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
70	Truck Mounted / Sonic	**(CL)** SILTY CLAY, trace fine sand; grey; wet. *(continued)*											
71					32	GS		23					
72													
73				30.34									
		(CL) SILTY CLAY, trace fine sand, trace seashells and fragments; grey, with dark grey staining; wet.		73.15									
					33	GS		24					
74													
75													Bentonite Pellets
76													
					34	GS		25					
77													
78													
79								26					
80					35	GS							
		CONTINUED NEXT PAGE											

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 9 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
80	Truck Mounted / Sonic			23.33													
		(CL-CI) SILTY CLAY, trace fine sand; grey; wet.		80.16				26									
81																	
82					36	GS		27									
		- trace gravel between 82.6 m and 83.2 m depth.															
83				20.28													
		(CL-CI) SILTY CLAY, some fine to coarse sand, trace to some fine to coarse, angular to sub-angular gravel; grey; wet.		83.21													
84																	
85					37	GS		28									Bentonite Pellets
				17.85													
		(ML) SILT, some fine sand, trace fine to coarse sub-angular gravel, with occasional clayey seams; grey; wet.		85.65													
86					38	GS											
87																	
		- cobble at 87.2 m depth															
88					39	GS		29									
89																	
90		*CONTINUED NEXT PAGE*															

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ◐; Pocket Pen ■; 40 80 120 160
WATER CONTENT PERCENT: Wp W Wl; NP - Non-Plastic; 20 40 60 80

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

PROJECT No.: 1525010 / 2000

RECORD OF SONIC HOLE: SH16-07

SHEET 10 OF 10

CLIENT: CDM Smith Canada ULC
PROJECT: AIWWTP Transient Mitigation and Outfall System
LOCATION: Annacis Island, Delta, B.C.
N: 5447956.05 E: 503387.44 UTM NAD83 (Ground) Zone: 10

DRILLING DATE: November 24, 2016
DRILLING CONTRACTOR: Mud Bay Drilling Co. Ltd.

DATUM: CVD28GVRD2005

INCLINATION: -90°

DEPTH SCALE METRES	DRILLING RIG / DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	SOIL CORE: RUN No.	SOIL CORE: RECOVERY %	GRADATION % (CLAY PARTICLE SIZE <= 0.002): GRAVEL	SAND	FINES	SILT	CLAY	SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ◐, Pocket Pen ■) / WATER CONTENT PERCENT (Wp, W, Wl, NP - Non-Plastic)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
90	Sonic			13.27				29									
		End of Sonic Hole.		90.22													Slough
91																	
92																	
93																	
94																	
95																	
96																	
97																	
98																	
99																	
100																	

SHEAR STRENGTH Cu, kPa: 40 80 120 160
WATER CONTENT PERCENT: Wp — W — Wl; NP - Non-Plastic
20 40 60 80

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: RB
CHECKED: YEW/VF

REV: 0

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