# RECORD OF BOREHOLE P-1A

Figure A-8



LOCATION See Figure 2 DATUM 394.02 ft. MSL DATE 3/25/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | | |
| | For lithology, see log of boring P-1 | | | | | 40<br>45<br>50<br>55<br>60<br>65 | | Pea gravel<br>1" Schedule 40 flush threaded PVC casing<br>Bentonite slurry |

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047 /29

Figure A-8

Page 3 of 4

# RECORD OF BOREHOLE P-1A

LOCATION See Figure 2 DATUM 394.02 ft. MSL DATE 3/25/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | | |
| | For lithology, see log of boring P-1 | | | | | 75<br>80<br>85<br>90<br>95<br>100 | | Bentonite slurry<br>1" Schedule 40 flush threaded PVC casing |

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047/29

# RECORD OF BOREHOLE P-1A

Figure A-8



LOCATION See Figure 2 DATUM 394.02 ft. MSL DATE 3/25/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | | |
| | For lithology, see log of boring P-1 | | | | | 110<br>115<br>120<br>125<br>130 | | #8 Mcnterey sand<br>4/10/86<br>1" Schedule 40 PVC screen .020" slots<br>Cap<br>Pea gravel<br>Bentonite pellet seal |

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047/29

Figure A-9

Page 1 of 4

# RECORD OF BOREHOLE P-1B

LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | | |
|---|---|---|---|---|---|---|---|---|
| ELEVN / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 | PIEZOMETER INST. |
| | | | | | | | WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | |

For lithology, see log of boring P-1

5
10
15
20
25
30

6" Locking steel surface casing

Cement grout

Pea gravel

1" Schedule 40 flush threaded PVC casing

Bentonite slurry

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047/30

Figure A-9



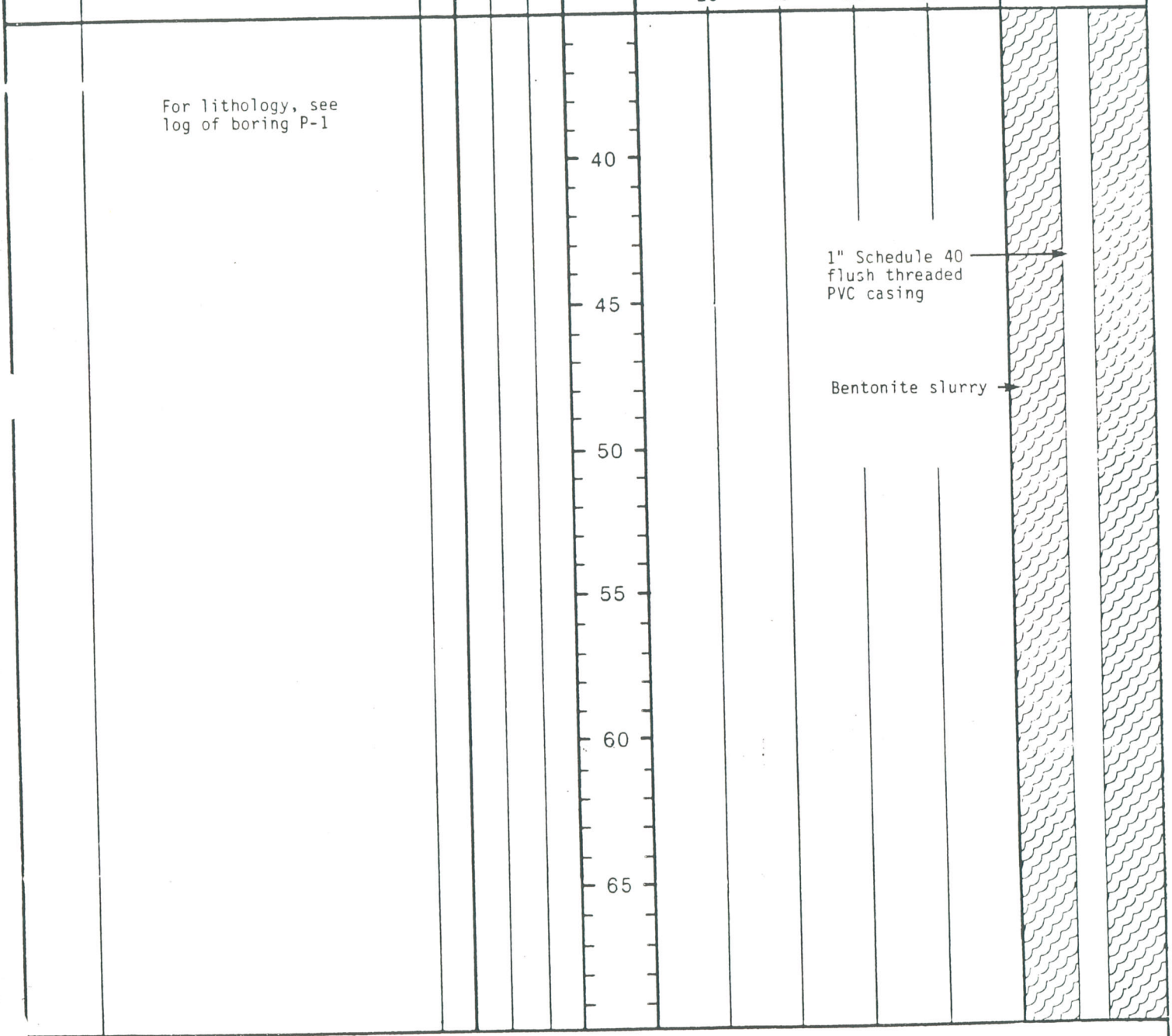
# RECORD OF BOREHOLE P-1B

LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST | PIEZOMETER |
|---|---|---|---|---|---|---|---|---|
| ELEVN / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | ▲ "N" BLOWS PER FOOT 20 40 60 80 | INST. |
| | | | | | | | WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | |

For lithology, see log of boring P-1




REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047/30

# RECORD OF BOREHOLE P-1B

Figure A-9



LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | |
| | For lithology, see log of boring P-1 | | | | | 75<br>80<br>85<br>90<br>95<br>100 | | Bentonite slurry<br>1" Schedule 40 flush threaded PVC casing<br>10x20 Silica sand<br>1" Schedule 40 PVC screen .020" slots<br>4/10/86<br>Cap<br>Pea gravel |

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047/30

# RECORD OF BOREHOLE P-1B

Figure A-9



LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | | |
| | For lithology, see log of boring P-1 | | | | | 110 | Bentonite pellet seal → | |

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047/30

# RECORD OF BOREHOLE P-2

Figure A-10
Page 1 of 4

LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| ELEVN / DEPTH | DESCRIPTION | USCS SYMBOL | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/6 IN. | DEPTH | STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| 373.73 | | | | | | | | |
| 0.0 | Dense to very dense, grayish-brown, silty, gravelly, fine to coarse SAND (Till) | GM SM | 1 | DO | 33 22 19 | 5 | | 6" Locking steel surface casing; Bentonite/ cement grout; 3/4" PVC gas monitoring probe; Pea gravel |
| | | | 2 | DO | 36 50/4" | 10 | | |
| | | | 3 | DO | 50/6" | 15 | | |
| | | | 4 | DO | 50/6" | 20 | | |
| | | | 5 | DO | 50/3" | 25 | | 1.25" Schedule 40 flush threaded PVC casing |
| | | | 6 | DO | 50/2" | 30 | | |
| 341.2 | | | | | | | | |
| 32.5 | Very dense, grayish-brown, fine to coarse SAND, trace to little GRAVEL and SILT (Proglacial sand) | SP | 7 | DO | 36 50/3" | | | |

REMARKS: DO = Drive Open

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.08

# RECORD OF BOREHOLE P-2

Figure A-10
Page 2 of 4

LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| ELEVN / DEPTH | DESCRIPTION | USCS SYMBOL | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/6 IN | DEPTH |
|---|---|---|---|---|---|---|
| | Very dense, grayish-brown, fine to coarse SAND, trace to little GRAVEL and SILT (Proglacial sand) | SP | 8 | DO | 50/6" | 40 |
| | | | 9 | DO | 50/6" | 45 |
| | | | 10 | DO | 50/6" | 50 |
| | | | 11 | DO | 50/6" | 55 |
| | | | 12 | DO | 31 50/3" | 60 |
| | | | 13 | DO | 50/6" | 65 |
| | | | 14 | DO | 28 50/5" | |

STANDARD PENETRATION TEST
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.

Pea gravel

1.25" Schedule 40 flush threaded PVC casing

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.08

# RECORD OF BOREHOLE P-2



LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| ELEVN / DEPTH | DESCRIPTION | USCS SYMBOL | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/6 IN. | DEPTH | STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT (20 40 60 80) / WATER CONTENT, PERCENT (Wp Wn Wl; 20 40 60 80) | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| 301.7 | | SP | | | | | | Pea gravel |
| 72.0 | Very dense, medium to coarse SAND | SP | 15 | DO | 34 50/5" | 75 | | |
| | | | 16 | DO | 34 50/4" | 80 | | 1.25" Schedule 40 flush threaded PVC casing |
| | | | 17 | DO | 50/6" | 85 | | |
| 282.7 | | | 18 | DO | 28 50/3" | 90 | | Bentonite pellet seal |
| 91.0 | Very hard, dark gray, SILT, little to trace fine sand, (Upper lacustrine silt) | ML | 19 | DO | 34 50/4" | | | |
| | | | 20 | DO | 21 30 43 | 95 | | 4/10/86 |
| 275.7 | | | | | | | | #8 Aqua sand |
| 98.0 | Very hard, dark grayish brown, sandy SILT, (Upper lacustrine silt) | SM | 21 | DO | 50/5" | 100 | | |
| 270.7 | | | | | | | | 1.25" Schedule 40 PVC screen 0.020" slots |
| 103.0 | Very dense, dark gray, fine to medium silty SAND | ML | | | | | | |

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.08

# RECORD OF BOREHOLE P-2



LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

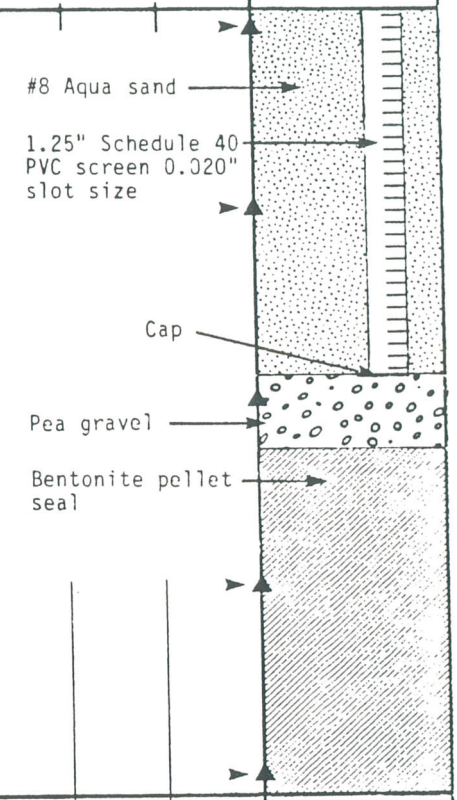
SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD—HOLLOW STEM AUGER

| ELEVN / DEPTH | DESCRIPTION | USCS SYMBOL | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/6 IN. | DEPTH |
|---|---|---|---|---|---|---|
| | Very dense, dark gray, fine to medium silty SAND | SM | 22 | DO | 33 50/4" | |
| | | | 23 | DO | 25 50/4" | 110 |
| 261.2 | | | | | | |
| 112.5 | Very hard, grayish brown, SILT, little to trace fine sand (Lower lacustrine silt) | ML | 24 | DO | 40 50/4" | 115 |
| | Grades to silty fine SAND (Lower lacastrine silt) | | 25 | DO | 29 39 50/3" | 120 |
| 247.7 | | | 26 | DO | 47 50/4" | 125 |
| 126.0 | End of hole at 126.0 feet | | | | | |

STANDARD PENETRATION TEST
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.




REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.08

Figure A-11



# RECORD OF BOREHOLE P-2A

LOCATION See Figure 2 DATUM 373.6 ft. MSL DATE 3/24/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | |
| | For lithology, see log of boring P-2 | | | | | 5, 10, 15, 20, 25, 30 | | 6" locking steel surface casing; Cement seal; Pea gravel; 2" Schedule 40 flush threaded PVC casing; Bentonite slurry |

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047 /31

Figure A-11



# RECORD OF BOREHOLE P-2A

LOCATION See Figure 2 DATUM 373.6 ft. MSL DATE 3/24/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | | |
| | For lithology, see log of boring P-2 | | | | | 40<br>45<br>50<br>55<br>60<br>65 | | Bentonite slurry<br>2" Schedule 40 flush threaded PVC casing |

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047/31

# RECORD OF BOREHOLE P-2A

Figure A-11



LOCATION See Figure 2 DATUM 373.6 ft. MSL DATE 3/24/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

| SOIL PROFILE | | | SAMPLES | | | | STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80 | PIEZOMETER INST. |
|---|---|---|---|---|---|---|---|---|
| ELEVN. / DEPTH | DESCRIPTION | USCS SYMBOL | NUMBER | TYPE | BLOWS/6 IN. | DEPTH | | |
| | For lithology, see log of boring P-2 | | | | | 75<br>80<br>85<br>90<br>95<br>100 | | #8 Aqua sand<br>4/10/86<br>2" Schedule 40 PVC screen .020 slots<br>Pea gravel<br>Bentonite pellet seal |

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047/31

# Test Pit Logs

**Golder Associates**
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

REPORT TO
HARPER OWES

# RESULTS OF GEOTECHNICAL INVESTIGATION
# PROPOSED SURFACE DRAINAGE DESIGN
# VASHON LANDFILL PROJECT

Distribution:

5 copies - Harper Owes
Seattle, Washington

3 copies - Golder Associates
Redmond (Seattle), Washington

June 1986

853-1047.2

## TABLE 1: TEST PIT LOGS

### TEST PIT TP-1

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 3 | Medium dense brown Sandy SILT, some Gravel, some Cobbles, little trash debris (FILL) |
| 3 to 5 | Dense brown Silty Sand, some Gravel (FILL) |
| 5 to 10 | Misc. TRASH, wood, plastic, fabric, sawdust, etc. (GARBAGE) |
| | No seepage on 3/31/86 |

### TEST PIT TP-2

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 1 | Medium dense brown Sandy SILT, some Gravel (TILL) |
| 1 to 3 | Medium dense orange-brown Sandy SILT, with roots (WEATHERED TILL) |
| 3 to 8 | Very dense brown Silty SAND, some Gravel (TILL) |
| | seepage at -5.5 feet on 3/31/86 |

### TEST PIT TP-3

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 1 | Medium dense orange brown Silty SAND, some Gravel, occasional roots (WEATHERED TILL) |
| 1 to 8.5 | Very dense grey brown Silty SAND, some Gravel, little Cobbles (TILL) |
| | No seepage on 3/31/86 |

### TEST PIT TP-4

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 1 | Medium dense reddish brown Silty SAND, some Gravel (WEATHERED TILL) |
| 1 TO 9.5 | Very dense grey brown Silty SAND, some Gravel, little Cobbles, a 24" boulder encountered (TILL) |
| | Seepage at -2.5 feet and -4.5 feet on 3/31/86 |

TABLE 1: TEST PIT LOGS (Continued)

TEST PIT TP-5

| DEPTH (FT) | STRATUM |
|---|---|
| 0 TO 1 | Medium dense orange brown Silty SAND, some Gravel (WEATHERED TILL) |
| 1 TO 9.5 | Very dense grey brown Silty SAND, some Gravel, sandy zones at -7.5' and -8.5' (TILL) |
| | Seepage at -7.5 feet on 3/31/86 |

TEST PIT TP-6

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 3 | Medium dense grey brown Silty fine to coarse SAND, little to some Gravel, little to some Trash (FILL AND TRASH) |
| 3 to 7.5 | Misc. TRASH, wood, plastic, fabric, sawdust, rubber tires, etc. (GARBAGE) |
| | No seepage on 3/31/86 |

TEST PIT TP-7

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 3 | Medium dense grey brown Silty fine to coarse SAND, little to some Gravel, little to some Trash (FILL AND TRASH) |
| 3 to 9 | Misc. TRASH, wood, plastic, fabric, sawdust, rubber tires, etc. (GARBAGE) |
| | No seepage on 3/31/86 |

TEST PIT TP-8

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 1 | Medium dense orange brown Sandy SILT, little Gravel, some organics (FILL) |
| 1 to 4.5 | Medium dense orange brown Silty SAND, some Gravel, little Cobbles (WEATHERED TILL) |
| 4.5 to 11 | Very dense grey brown Gravelly SAND, some cobbles, little Silt (SANDY TILL) |
| | No seepage on 3/31/86 |

TABLE 2 - HAND PROBE

HP-1

| DEPTH (FT) | STRATUM |
|---|---|
| 0 TO 1 | Brown f/m SAND, little to some Silts, trace Gravel (RECENT ALLUVIUM) |
| 1 to 4 | Orange brown f/c SAND, little Silt, trace Gravel (DENSE SANDS) |

HP-2

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 1 | Dark brown organic TUFF |
| 1 to 4 | Orange brown medium SAND, little to some Silt, little gravel (DENSE SAND) |

HP-3

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 0.5 | Dark brown organic TUFF |
| 0.5 to 4 | Orange brown f/m SAND, little to some Silt, trace gravel (DENSE SAND) |

HP-4

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 1 | Brown Gravelly SAND, trace Silt (RECENT ALLUVIUM) |
| 1 to 1.1 | Organic Clayey Silt (RECENT ALLUVIUM) |
| 1 to 4 | Orange brown Silty fine SAND, little Gravel (DENSE SAND) |

HP-5

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 4 | Brown f/m SAND, lenses of soft Clayey Silt (RECENT ALLUVIUM) |

TABLE 2 - HAND PROBE (CONTINUED)

HP-6

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 1 | Light grey SAND, little silt |
| 1 to 4 | Orange brown Silty SAND, little gravel (DENSE SAND) |

HP-7

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 4 | Brown f/m SAND, little to some Gravel, trace SILT, metal debris fragment at -4' (RECENT ALLUVIUM) |

HP-8

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 2 | Brown Gravelly f/c SAND, trace Cobbles (RECENT ALLUVIUM) |

HP-9

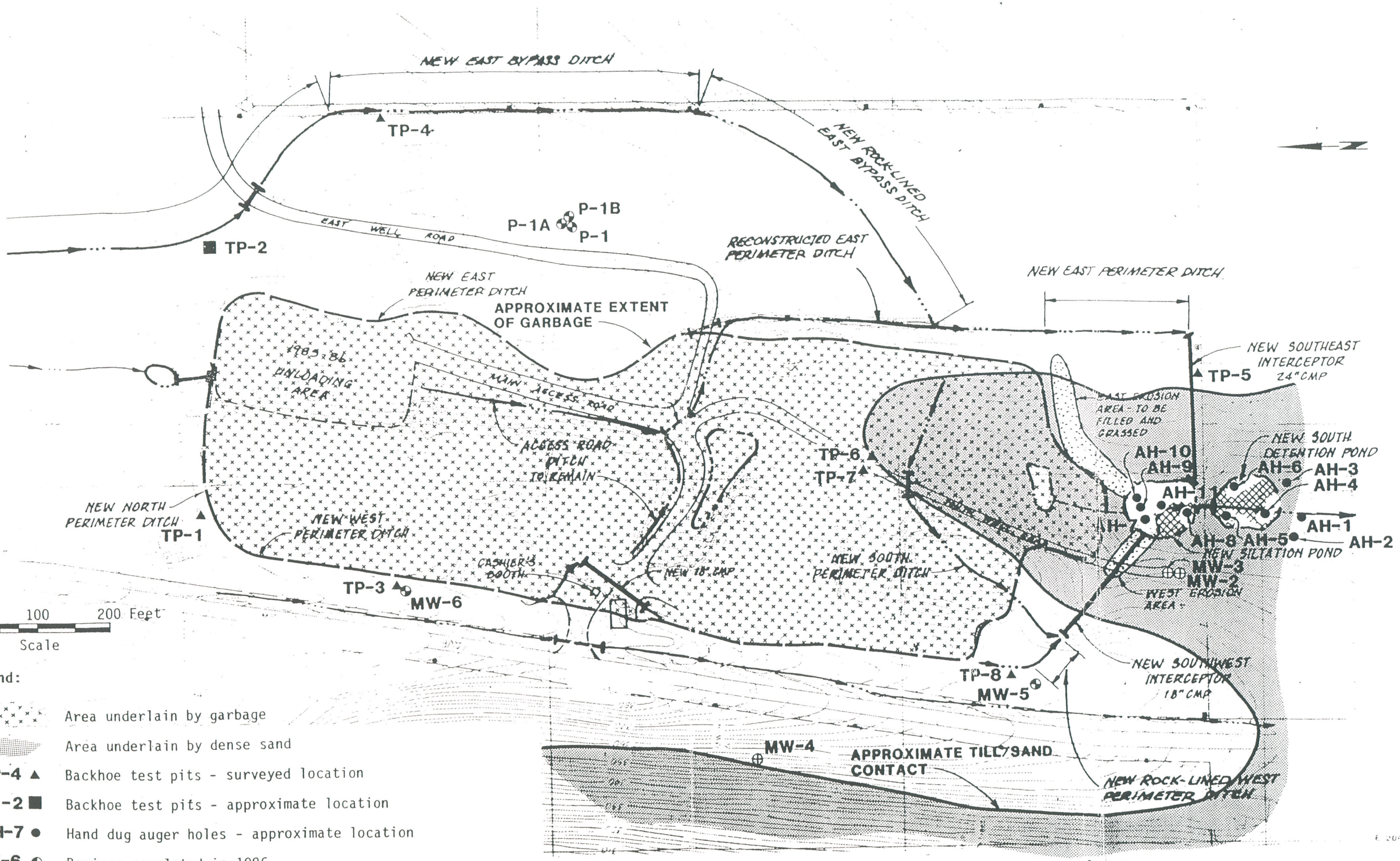
| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 4 | Brown f/c SAND, little Gravel, trace Silt (RECENT ALLUVIUM) |

HP-10

| DEPTH (FT) | STRATUM |
|---|---|
| 0 to 3 | Brown Gravelly f/c SAND (RECENT ALLUVIUM) |

SITE PLAN
VASHON LANDFILL DRAINAGE IMPROVEMENTS

Figure 1




Legend:

- Area underlain by garbage
- Area underlain by dense sand
- TP-4 ▲ Backhoe test pits - surveyed location
- TP-2 ■ Backhoe test pits - approximate location
- AH-7 ● Hand dug auger holes - approximate location
- MW-6 ◔ Borings completed in 1986
- MW-4 ⊕ Borings completed prior to 1986

Source:
Based on Harper-Owes drawing entitled "Alternative No. 4 - Seperate Flow Control and Siltation Ponds".

Golder Associates

Rev. VASHON LANDFILL/18
Dwg. No. 853-1047-002 Date 5/22/86 Eng. M.D.

**Golder Associates**
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

REPORT TO
HARPER OWES

# SUPPLEMENTARY GEOTECHNICAL INVESTIGATION FOR VASHON LANDFILL CLOSURE AND EXPANSION DESIGN

Distribution:
1 copy - Harper Owes
Seattle, Washington
5 copies - Golder Associates
Seattle (Redmond), Washington

October 1987

873-1174

TABLE 1
TEST PIT LOGS*

| | |
|---|---|
| 1 | |
| 0 to 1.5 ft | Loose, brown-gray, silty SAND, little gravel (FILL) |
| 1.5 to 3.0 ft | Soft, brown, organic SILT, little sand, roots, and grass (TOPSOIL/ORGINAL GROUND SURFACE) |
| 3.0 to 7.5 ft | Compact to dense, gray-brown to gray, massive, silty, fine to medium SAND, little to trace gravel; becomes sandier with depth to medium SAND, little to trace silt and gravel, moist (TILL) |
| | Test pit was terminated at 7.5 ft depth. No water was encountered in the test pit. |
| 2 | |
| 0 to 0.5 ft | Loose, brown, fine to medium SAND, little gravel |
| 0.5 to 7.5 ft | Loose, dark brown to gray, silty SAND, little garbage to GARBAGE in layers |
| | Test pit was terminated at 7.5 ft depth. No water was encountered in the test pit. |
| 3 | |
| 0 to 1.5 ft | Loose, brown, fine sandy SILT, little trace gravel |
| 1.5 to 5.0 ft | Dense, gray, silty, fine to medium SAND, trace gravel (TILL) |
| | Test pit was terminated at 5.0 ft depth. No water was encountered in the test pit. |

* Test pits were excavated and logged on February 25 and 26, 1987. Test locations are shown in Figure 1.

4

| | |
|---|---|
| 0 to 0.5 ft | Loose, gray, silty, fine SAND (FILL) |
| 0.5 to 2.5 ft | GARBAGE |
| | Test pit was terminated at 2.5 ft depth. No water was encountered in the test pit. |

5

| | |
|---|---|
| 0 to 2.0 ft | Loose, brown, silty, fine SAND (FILL) |
| 2.0 to 6.0 ft | GARBAGE with silty, fine sand |
| | Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit. |

6

| | |
|---|---|
| 0 to 0.5 ft | Loose, brown, fine to medium SAND, little to trace roots |
| 0.5 to 6.0 ft | Compact, brown, weakly bedded, fine to medium SAND, trace gravel |
| | Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit. |

7

| | |
|---|---|
| 0 to 3.0 ft | Loose, brown-gray, silty fine SAND, little to trace gravel (FILL) |
| 3.0 to 5.5 ft | GARBAGE |
| | Test pit was terminated at 5.5 ft depth. No water was encountered in the test pit. |

8

| | |
|---|---|
| 0 to 1.5 ft | Loose, brown, sandy GRAVEL (ROAD FILL) |
| 1.5 to 6.0 ft | Loose to compact, gray, fine, sandy SILT, little to trace gravel (WEATHERED TILL) |
| 6.0 to 9.5 ft | Dense, brown, massive, fine, sandy SILT, little to trace gravel (TILL) |
| | Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit. |

9

| | |
|---|---|
| 0 to 2.5 ft | Compact, brown, medium to fine SAND (FILL) |
| 2.5 to 3.0 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 3.0 to 4.5 ft | Very dense, mottled brown and gray, massive, silty, fine to medium SAND, little to trace gravel (TILL) |
| | Test pit was terminated at 4.5 ft depth. No water was encountered in the test pit. |

10

| | |
|---|---|
| 0 to 1.5 ft | Compact, brown, silty, fine to medium SAND (FILL) |
| 1.5 to 3.5 ft | Very dense, brown, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 3.5 ft depth. No water was encountered in the test pit. |

11

| | |
|---|---|
| 0 to 0.5 ft | Loose, gray-brown, silty, fine SAND (FILL) |
| 0.5 to 2.5 ft | GARBAGE |
| | Test pit was terminated at 2.5 ft depth. No water was encountered in the test pit. |

12

| | |
|---|---|
| 0 to 1.0 ft | Loose, gray, fine sandy SILT, little to trace gravel (FILL) |
| 1.0 to 3.0 ft | GARBAGE |
| | Test pit was terminated at 3.0 ft depth. No water was encountered in the test pit. Dense to very dense till was encountered in the far western edge of the test pit. |

13

| | |
|---|---|
| 0 to 5.5 ft | Loose to compact, brown, fine sandy SILT, little gravel and garbage (FILL) |
| 5.5 to 8.5 ft | Loose to compact, dark brown, fine sandy SILT, little roots and organics (FOREST TOPSOIL) |
| 8.5 to 9.0 ft | Very dense, light brown, fine to medium sandy SILT, little gravel (TILL) |
| | Test pit was terminated at 9.0 ft depth. No water was encountered in the test pit. |

14

| | |
|---|---|
| 0 to 3.0 ft | Loose to compact, brown-gray, fine to medium sandy SILT, little gravel (FILL) |
| 3.0 to 6.5 ft | Loose, dark brown, fine sandy SILT, little large roots and organics (FOREST TOPSOIL) |
| | Test pit was terminated at 6.5 ft depth. Water was encountered in the test pit at 6.0 ft depth. |

15

| | |
|---|---|
| 0 to 4.5 ft | Compact, brown, massive, silty, fine to medium SAND, little gravel (TILL) |
| 4.5 to 5.0 ft | Very dense, brown, massive, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 5.0 ft depth. No water was encountered in the test pit. |

16

| | |
|---|---|
| 0 to 3.0 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 3.0 to 9.5 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit. |

17

| | |
|---|---|
| 0 to 3.0 ft | Loose to compact, brown, fine sandy SILT, little gravel and debris/garbage (FILL) |
| 3.0 to 4.0 ft | Loose, dark brown, silty, organic SAND, many roots (TOPSOIL) |
| 4.0 to 6.5 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 6.5 to 9.5 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel, moist below 9.2 ft (TILL) |
| | Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit. |

18

| | |
|---|---|
| 0 to 5.0 ft | Loose to compact, brown, massive, fine to medium sandy SILT, little gravel and debris/garbage (FILL) |
| 5.0 to 6.0 ft | Loose, dark brown, organic, silty SAND, many large roots (FOREST TOPSOIL) |
| 6.0 to 9.0 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 9.0 to 10.7 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 10.7 ft depth. No water was encountered in the test pit. |

19

| | |
|---|---|
| 0 to 0.2 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.2 to 4.0 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 4.0 to 8.0 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 8.0 ft depth. No water was encountered in the test pit. |

20

| | |
|---|---|
| 0 to 1.0 ft | Loose, brown, silty, fine SAND, little gravel (FILL) |
| 1.0 to 4.0 ft | Loose, dark brown, fine sandy SILT, little roots and organics (TOPSOIL) |
| 4.0 to 6.0 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 6.0 to 9.5 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit. |

21

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 5.0 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 5.0 to 9.5 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit. |

22

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 2.0 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 2.0 to 8.5 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 8.5 ft depth. No water was encountered in the test pit. |

23

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 3.0 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 3.0 to 8.0 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel to fine to medium SAND, little silt and gravel (TILL) |
| | Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit. |

24

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 2.5 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 2.5 to 9.0 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 9.0 ft depth. No water was encountered in the test pit. |

25

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 2.5 ft | Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 2.5 to 3.5 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 3.5 ft depth. No water was encountered in the test pit. |

26

| | |
|---|---|
| 0 to 2.0 ft | Compact, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL) |
| 2.0 to 7.5 ft | Dense to very dense, gray, fissile, silty, fine to medium SAND, little gravel to fine to medium SAND, little gravel and silt (TILL) |
| | Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit. |

27

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 4.5 ft | Compact to dense, fine to medium SAND, little silt and gravel (TILL) |
| | Test pit was terminated at 5.5 ft depth. No water was encountered in the test pit. |

28

| | |
|---|---|
| 0 to 3.0 ft | Compact, brown, fine SAND, little silt (FILL) |
| 3.0 to 9.0 ft | Dense, gray, massive, fine to medium SAND, little silt and gravel (TILL) |
| | Test pit was terminated at 9.0 ft depth. No water was encountered in the test pit. |

29

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 2.0 ft | Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL) |
| 2.0 to 6.0 | Very dense, gray, fissile, fine to medium SAND, little silt and gravel to silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit. |

30

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 1.5 ft | Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL) |
| 1.5 to 5.0 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel, occassional boulders >18 inches (TILL) |
| | Test pit was terminated at 5.0 ft depth. No water was encountered in the test pit. |

31

| | |
|---|---|
| 0 to 1.0 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 1.0 to 2.0 ft | Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL) |
| 2.0 to 4.0 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 4.0 ft depth. No water was encountered in the test pit. |

32

| | |
|---|---|
| 0 to 0.5 ft | Loose, dark brown, organic, silty SAND (TOPSOIL) |
| 0.5 to 2.0 ft | Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL) |
| 2.0 to 6.0 ft | Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL) |
| | Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit. |

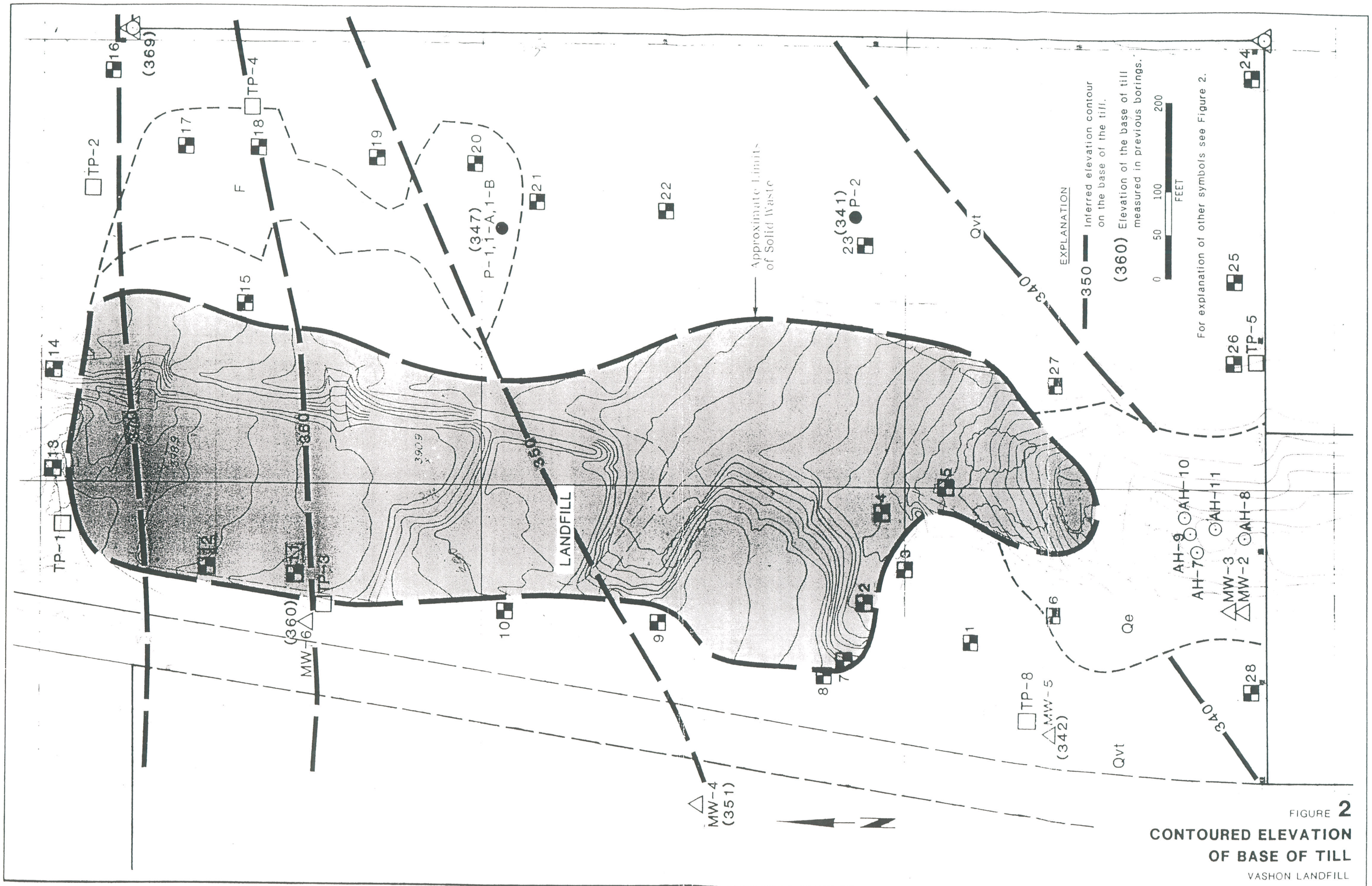



FIGURE **2**

**CONTOURED ELEVATION OF BASE OF TILL**

VASHON LANDFILL

PROJECT NO 873-1174-000 DWG NO 6052 DATE 10/6/87 DRAWN TB APPROVED CK

Golder Associates

# Gas Probes and Extraction Wells

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, North of main gate | | *Coordinates (SPN NAD83 ft)*<br>E:1227778 N:163363 (est) | *Exploration Number*<br>**VTP-1D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev.*<br>NA (est) | |
| *Operator*<br>Dave | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/3/2016 | *Top of Casing Elev.*<br>NA (est) | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| -2 | | Valved hose barb | | | | | | -2 |
| -1 | | | | | | | | -1 |
| 0 | | | | | | | | 0 |
| 1 | | Concrete surface seal | | | PID= 0.0 | | Overdrilled section of VTP-1S to 10' bgs, no soil samples collected. Installed VTP-1D at same location. | 1 |
| 2 | | | | | | | | 2 |
| 3 | | | | | PID= 0.0 | | | 3 |
| 4 | | 3/4-inch SCH 40 PVC 0-31 ft bgs | | | | | | 4 |
| 5 | | | S1 | | PID= 0.0 | | | 5 |
| 6 | | 3/8-inch Bentonite chip backfill 2-30 ft bgs | | | | | | 6 |
| 7 | | | | | | | | 7 |
| 8 | | | | | PID= 0.0 | | | 8 |
| 9 | | | | | | | | 9 |
| 10 | | | | | | | **Vashon Till/A Unit**<br>Very dense, slightly moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, diamict fabric, no odor. | 10 |
| 11 | | | | | PID= 0.0 | | | 11 |
| 12 | | | | | | | | 12 |
| 13 | | | | | PID= 0.0 | | | 13 |
| 14 | | | | | | | | 14 |
| 15 | | | S2 | | PID= 0.0 | | | 15 |
| 16 | | | | | | | | 16 |
| 17 | | | | | PID= 0.0 | | | 17 |
| 18 | | | | | | | | 18 |
| 19 | | | | | | | | 19 |
| 20 | | | | | | | | 20 |
| 21 | | | S3 | | | | | 21 |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-1D**
Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, North of main gate | | *Coordinates (SPN NAD83 ft)*<br>E:1227778 N:163363 (est) | *Exploration Number*<br>**VTP-1D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev.*<br>NA (est) | |
| *Operator*<br>Dave | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/3/2016 | *Top of Casing Elev.*<br>NA (est) | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 23 | | | | | PID= 0.0 | | | 23 |
| 24 | | | | | | | | 24 |
| 25 | | | | | PID= 0.0 | | | 25 |
| 26 | | | S3 | | | | | 26 |
| 27 | | | | | | | | 27 |
| 28 | | | | | PID= 0.0 | | | 28 |
| 29 | | | | | | | **Vashon Advance Outwash/B Unit** | 29 |
| 30 | | Gravel filter pack 30-34 ft bgs | | | PID= 0.0 | | Slightly moist to moist, brown, slightly silty SAND (SP-SM); trace silt, trace fine subangular to subrounded gravel, predominantly medium sand, no odor | 30 |
| 31 | | | | | PID= 0.0 | | Moist, brown SAND (SP); trace silt, trace fine subangular to subrounded gravel, predominantly medium sand, no odor | 31 |
| 32 | | 3/4-inch 0.020 slot SCH 40 screen 31-33.5 ft bgs | S4 | | | | | 32 |
| 33 | | | | | | | | 33 |
| 34 | | Endcap | | | PID= 0.0 | | Bottom of exploration at 34 ft. bgs. | 34 |
| 35 | | | | | | | | 35 |
| 36 | | | | | | | | 36 |
| 37 | | | | | | | | 37 |
| 38 | | | | | | | | 38 |
| 39 | | | | | | | | 39 |
| 40 | | | | | | | | 40 |
| 41 | | | | | | | | 41 |
| 42 | | | | | | | | 42 |
| 43 | | | | | | | | 43 |
| 44 | | | | | | | | 44 |
| 45 | | | | | | | | 45 |
| 46 | | | | | | | | 46 |

**Legend**

Sample Method: ◫ Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-1D**
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

# SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

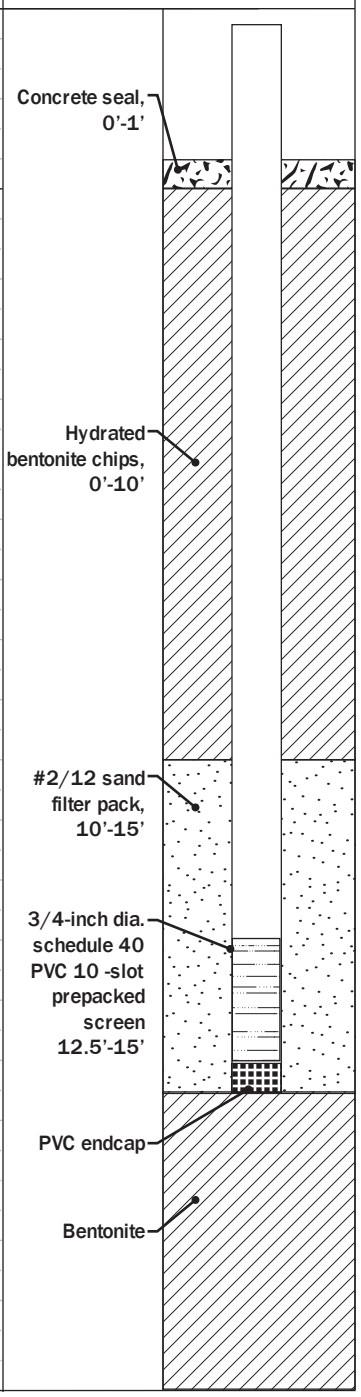
HERRERA

**Probe / Boring ID** VTP1S
**Total depth:** 23'
**Sheet** 1 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: 123' N and 12' W of EF-2 West side of landfill
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' sampler w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

| GEM (% volume) | Sample Type, Interval | % Recovery | Depth (feet, BGS) | Soil Group | Water Level (feet) | Soil Description |
|---|---|---|---|---|---|---|
| | | | 3 | | | |
| | | | | | | stickup 2.7' |
| | | | 2 | | | |
| | | | 1 | | | |
| | | | 0 | | | |
| $CH_4$ 0<br>$CO_2$ 0<br>$O_2$ 20.8 | 5-ft core sample | 80 | 1<br>2<br>3<br>4<br>5 | SM | | Grass/Topsoil, damp<br>Light brown - tan silty gravelly, SAND, damp (till)<br>wet @ 2' (water perched near top of till) |
| $CH_4$ 0<br>$CO_2$ 0<br>$O_2$ 20.9 | 5-ft core sample | 85 | 6<br>7<br>8<br>9<br>10 | | | Grayish brown, damp<br>Static water level 8.9' 5/1/2013 |
| $CH_4$ 0<br>$CO_2$ 0<br>$O_2$ 20.8 | 5-ft core sample | 100 | 11<br>12<br>13<br>14<br>15 | | | |
| $CH_4$ 0<br>$CO_2$ 0<br>$O_2$ 21.0 | 5-ft core sample | 100 | 16<br>17<br>18<br>19<br>20 | SM | | (Second boring drilled to 15' and probe constructed)<br>Grayish-brown silty gravelly SAND, damp (till) |



# SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

HERRERA

**Probe / Boring ID** VTP1S
**Total depth:** 23'
**Sheet** 2 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: 123' N and 12' W of EF-23 West side of landfill
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

| GEM (% volume) | Sample Type, Interval | % Recovery | Depth (feet, BGS) | Soil Group | Water Level (feet) | Soil Description | Probe / Boring Detail |
|---|---|---|---|---|---|---|---|
| $CH_4$ 0<br>$CO_2$ 0<br>$O_2$ 21 | 3-ft core sample | 100 | 21<br>22<br>23 | | | Probe unable to penetrate beyond 23'<br><br>Pressure grouted (with first boring) with bentonite slurry, left two 5' sections of pipe and cutting shoe in hole.<br><br>Soil vapors were measured in bore hole using GEM 2000 gas analyzer. | |

Last Modified: 6/20/2013
Filepath: G:\Graphics\Y2009\09-04304-000\gas_probe_VTP1S.ai

# SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

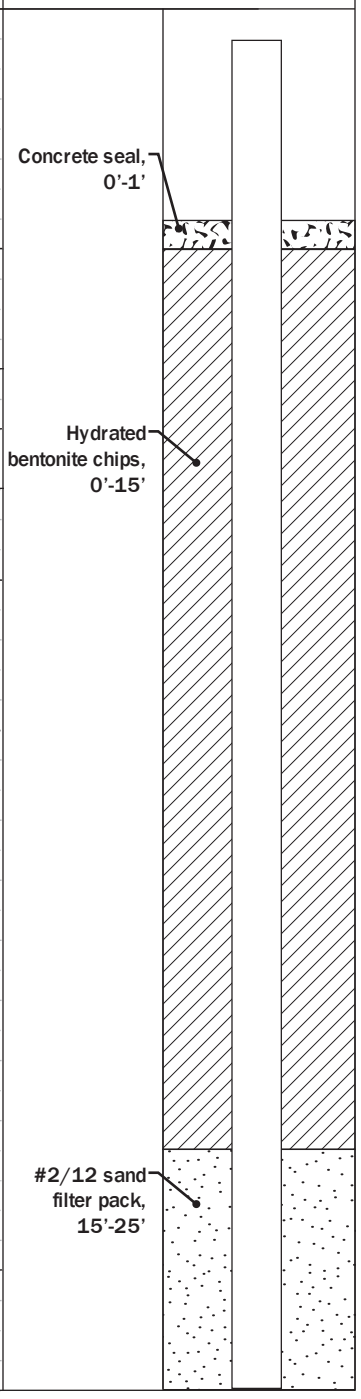
HERRERA

Probe / Boring ID: VTP2D
Total depth: 25'
Sheet 1 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: South side LF (50' E and 100' S of condensate trap)
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

| GEM (% volume) | Sample Type, Interval | % Recovery | Depth (feet, BGS) | Soil Group | Water Level (feet) | Soil Description |
|---|---|---|---|---|---|---|
| | | | 4 | | | Stickup 3.5' |
| | | | 3 | | | |
| | | | 2 | | | |
| | | | 1 | | | |
| | | | 0 | | | Grass/Topsoil, damp |
| | | | 1 | | | Brown silty SAND, tr, gravel, damp |
| $CH_4$ 0 | 5-ft | | 2 | SM | | |
| $CO_2$ 0 | core | | | | | Brown gravelly silty SAND, damp |
| $O_2$ 21 | sample | 80 | 3 | | | dense |
| | | | 4 | | | |
| | | | | | | Geotextile liner Brown sandy |
| | | | 5 | GW | | GRAVEL, tr, silt, damp |
| | | | 6 | | | Gray gravelly, sandy SILT, |
| $CH_4$ 0 | 5-ft | | | | | tr, clay, damp |
| $CO_2$ 0 | core | | 7 | ML | | |
| $O_2$ 21 | sample | 60 | | | | |
| | | | 8 | | | |
| | | | | | | Gray, gravelly silty SAND |
| | | | 9 | SM | | tr, clay, damp |
| | | | 10 | | | |
| | | | 11 | | | |
| $CH_4$ 0 | 5-ft | 60 | 12 | | | |
| $CO_2$ 0 | core | | | | | |
| $O_2$ 21 | sample | | 13 | | | |
| | | | 14 | | | |
| | | | 15 | | | |
| | | | 16 | | | |
| $CH_4$ 0 | 5-ft | | | | | |
| $CO_2$ 0 | core | 70 | 17 | | | |
| $O_2$ 21 | sample | | | SM | | Gray silty SAND, damp-wet, fuel odor |
| | | | 18 | | | |
| | | | 19 | | | |




Last Modified: 06/20/2013
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# SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

HERRERA

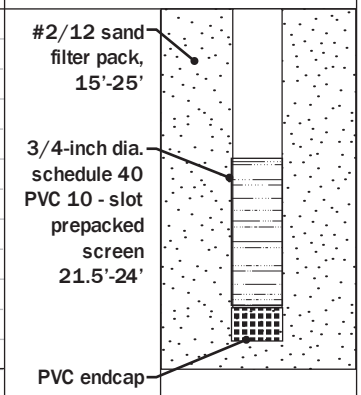
**Probe / Boring ID** VTP2D
**Total depth:** 25'
**Sheet** 2 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: South side LF (50' E and 100' S of condensate trap)
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

| GEM (% volume) | Sample Type, Interval | % Recovery | Depth (feet, BGS) | Soil Group | Water Level (feet) | Soil Description |
|---|---|---|---|---|---|---|
| | | | 20 | MSW | | Refuse, shredded paper, cloth, fiberglass, plastic, damp-wet |
| $CH_4$ 0<br>$CO_2$ 0<br>$O_2$ 21 | 5-ft core sample | 50 | 21<br>22 | | ▽ | Static water level 21.92' 5/1/2013 |
| | | | 23 | | | |
| | | | 24 | | | Silty SAND mixed with refuse, sawdust, plastic, fiberglass, damp |
| | | | 25 | | | |
| | | | | | | Soil vapors were measured in borehole using GEM 2000 gas analyzer. |

Probe / Boring Detail



# SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

HERRERA

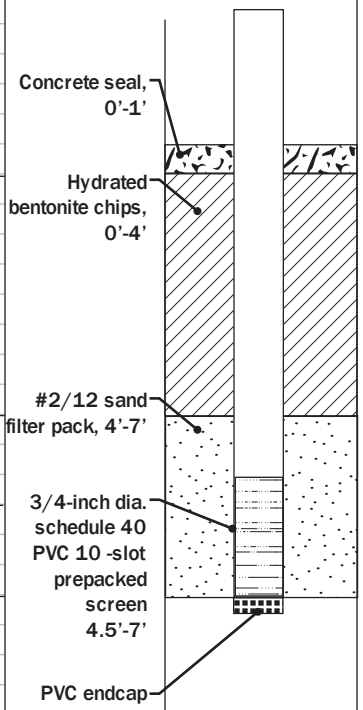
Probe / Boring ID VTP2S
Total depth: 7'
Sheet 1 of 1

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: South side LF (50' E and 100' S of condensate trap)
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

| GEM (% volume) | Sample Type, Interval | % Recovery | Depth (feet, BGS) | Soil Group | Water Level (feet) | Soil Description |
|---|---|---|---|---|---|---|
| | | | 3 | | | |
| | | | 2 | | | Stickup 3' |
| | | | 1 | | | |
| | | | 0 | | | Grass/Topsoil, damp |
| | | | 1 | | | Brown silty SAND, tr, gravel, damp |
| $CH_4$ 0 | 5-ft | | | | | |
| $CO_2$ 0 | core | | 2 | SM | | |
| $O_2$ 21 | sample | | | | | Brown gravelly silty SAND, damp |
| | | 80 | 3 | | | dense |
| | | | 4 | | | |
| | | | | | | Geotextile liner, Brown sandy |
| | | | 5 | GW | | GRAVEL, tr, silt, damp |
| | | | | | | |
| $CH_4$ 0 | 3-ft | | 6 | | | Gray gravelly, sandy SILT, |
| $CO_2$ 0 | core | | | | | tr, clay, damp |
| $O_2$ 21 | sample | 60 | 7 | ML | | |
| | | | | | | Soil vapors were measured in borehole |
| | | | 8 | | | using GEM 2000 gas analyzer. |
| | | | 9 | | | |
| | | | 10 | | | |
| | | | 11 | | | |
| | | | 12 | | | |
| | | | 13 | | | |
| | | | 14 | | | |
| | | | 15 | | | |
| | | | 16 | | | |
| | | | 17 | | | |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |

Probe / Boring Detail



| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | Project Address & Site Specific Location: Vashon Island, East side of South Slope | | Coordinates (SPN NAD83 ft): E:1228037 N:162717 | Exploration Number: **VTP-3D** |
| Contractor: Holt Services, Inc | Equipment: Rotary drill rig | Sampling Method: Rotary core | Ground Surface (GS) Elev. (NAVD88): 361.58' | Ecology Well Tag No. BJX-258 |
| Operator: Pete | Exploration Method(s): Sonic | Work Start/Completion Dates: 8/5/2016 to 8/8/2016 | Top of Casing Elev. (NAVD88): 365.08' | Depth to Water (Below GS): No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| -2 | 364 | Valved hose barb | | | | | | -2 |
| -1 | 363 | | | | | | | -1 |
| 0 | 362 | | | | | | | 0 |
| 1 | 361 | Concrete surface seal | | | | | **FILL**<br>Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass) | 1 |
| 2 | 360 | | | | PID= 0.0 | | | 2 |
| 3 | 359 | | | | | | | 3 |
| 4 | 358 | 3/4-inch SCH 40 PVC 0-36 ft bgs | | | | | Geotextile fabric at 4 ft bgs | 4 |
| 5 | 357 | | S1 | | PID= 0.0 | | Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs). | 5 |
| 6 | 356 | 3/8-inch Bentonite chip backfill 2-34 ft bgs | | | PID= 0.0 | | | 6 |
| 7 | 355 | | | | | | | 7 |
| 8 | 354 | | | | PID= 0.0 | | | 8 |
| 9 | 353 | | | | | | | 9 |
| 10 | 352 | | | | | | | 10 |
| 11 | 351 | | | | | | | 11 |
| 12 | 350 | | | | PID= 0.0 | | | 12 |
| 13 | 349 | | | | | | Some brown mottling at 12.5 ft bgs | 13 |
| 14 | 348 | | | | PID= 0.0 | | 6-inch rounded cobble | 14 |
| 15 | 347 | | S2 | | | | **LANDFILL DEBRIS**<br>Moist, gray to black, gravelly, sandy Fill; trash bags, paper, glass, metal wires, textiles, plastic | 15 |
| 16 | 346 | | | | PID= 0.0 | | | 16 |
| 17 | 345 | | | | | | | 17 |
| 18 | 344 | | | | PID= 0.0 | | | 18 |
| 19 | 343 | | | | | | | 19 |
| 20 | 342 | | | | PID= 0.0 | | | 20 |
| 21 | 341 | | S3 | | | | | 21 |
| | 340 | | | | | | | |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-3D**

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, East side of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1228037 N:162717 | *Exploration Number*<br>**VTP-3D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>361.58' | Ecology Well Tag No.<br>BJX-258 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/5/2016 to 8/8/2016 | *Top of Casing Elev. (NAVD88)*<br>365.08' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 23 | 339 | | S3 | | PID= 170 | | Debris includes fiberglass, plastic shavings and scraps | 23 |
| 24 | 338 | | | | PID= 289 | | | 24 |
| 25 | 337 | | | | | | | 25 |
| 26 | 336 | | | | PID= 87 | | | 26 |
| 27 | 335 | | | | | | | 27 |
| 28 | 334 | | | | PID= 170 | | | 28 |
| 29 | 333 | | | | PID= 150 | | Debris includes lumber, insulation, cardboard, with ~5% organics (roots, twigs) | 29 |
| 30 | 332 | | | | | | | 30 |
| 31 | 331 | | | | PID= 84 | | | 31 |
| 32 | 330 | 10-inch conductor casing set at 35 ft bgs and sealed with 3 ft of hydrated bentonite chips | S4 | | | | | 32 |
| 33 | 329 | | | | PID= 35 | | **Vashon Advance Outwash/B Unit**<br>Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand | 33 |
| 34 | 328 | Gravel filter pack 34-40 ft bgs | | | | | | 34 |
| 35 | 327 | | | | | | | 35 |
| 36 | 326 | | | | | | | 36 |
| 37 | 325 | 3/4-inch 0.020 slot SCH 40 screen 36-38.5 ft bgs | | | PID= 70 | | | 37 |
| 38 | 324 | | | | | | | 38 |
| 39 | 323 | Endcap | S5 | | PID= 26.8 | | | 39 |
| 40 | 322 | | | | | | | 40 |
| 41 | 321 | 3/8-inch Bentonite chip backfill 40-43.5 ft bgs | | | PID= 72 | | | 41 |
| 42 | 320 | | | | | | | 42 |
| 43 | 319 | | | | PID= 23.1 | | | 43 |
| 44 | 318 | | | | | | Bottom of exploration at 43.5 ft. bgs. | 44 |
| 45 | 317 | | | | | | | 45 |
| 46 | 316 | | | | | | | 46 |
| | 315 | | | | | | | |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-3D**
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

# King County Vashon Island Landfill - 090057

## Monitoring Well Log

| | | | | |
|---|---|---|---|---|
| Aspect CONSULTING | Project Address & Site Specific Location: Vashon Island, East side of South Slope | | Coordinates (SPN NAD83 ft): E:1228042 N:162717 | Exploration Number: **VTP-3S** |
| Contractor: Holt Services, Inc | Equipment: Rotary drill rig | Sampling Method: Rotary core | Ground Surface (GS) Elev. (NAVD88): 362.15' | Ecology Well Tag No. BJX-255 |
| Operator: Dave | Exploration Method(s): Sonic | Work Start/Completion Dates: 8/5/2016 | Top of Casing Elev. (NAVD88): 365.9' | Depth to Water (Below GS): No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 0 | 365 | Valved hose barb | | | | | | 0 |
| -2 | 364 | | | | | | | -2 |
| -1 | 363 | | | | | | | -1 |
| 0 | 362 | Concrete surface seal | | | | | **FILL** Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass) | 0 |
| 1 | 361 | | | | | | | 1 |
| 2 | 360 | | | | PID= .4 | | | 2 |
| 3 | 359 | | | | | | | 3 |
| 4 | 358 | 3/4-inch SCH 40 PVC 0-25 ft bgs | | | PID= 2.8 | | Geotextile fabric at 4 ft bgs<br>Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs). | 4 |
| 5 | 357 | | S1 | | | | | 5 |
| 6 | 356 | 3/8-inch Bentonite chip backfill 2-23 ft bgs | | | PID= 1.9 | | | 6 |
| 7 | 355 | | | | | | | 7 |
| 8 | 354 | | | | PID= 0.6 | | | 8 |
| 9 | 353 | | | | | | | 9 |
| 10 | 352 | | | | | | | 10 |
| 11 | 351 | | | | | | | 11 |
| 12 | 350 | | | | PID= 17.3 | | | 12 |
| 13 | 349 | | | | | | Some brown mottling at 12.5 ft bgs | 13 |
| 14 | 348 | | | | PID= 31.1 | | 6-inch rounded cobble | 14 |
| 15 | 347 | | S2 | | | | | 15 |
| 16 | 346 | | | | PID= 63.5 | | **LANDFILL DEBRIS** Moist, gray to black, gravelly, sandy Fill; trash bags, paper, glass, metal wires, textiles, plastic | 16 |
| 17 | 345 | | | | | | | 17 |
| 18 | 344 | | | | PID= 85 | | | 18 |
| 19 | 343 | | | | PID= 41.1 | | | 19 |
| 20 | 342 | | | | | | | 20 |
| 21 | 341 | | S3 | | | | | 21 |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-3S**

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | Project Address & Site Specific Location: Vashon Island, East side of South Slope | | Coordinates (SPN NAD83 ft): E:1228042 N:162717 | Exploration Number: **VTP-3S** |
| Contractor: Holt Services, Inc | Equipment: Rotary drill rig | Sampling Method: Rotary core | Ground Surface (GS) Elev. (NAVD88): 362.15' | Ecology Well Tag No. BJX-255 |
| Operator: Dave | Exploration Method(s): Sonic | Work Start/Completion Dates: 8/5/2016 | Top of Casing Elev. (NAVD88): 365.9' | Depth to Water (Below GS): No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 23 | 339 | | S3 | | PID= 670 | | Debris includes fiberglass, plastic shavings and scraps | 23 |
| 24 | 338 | Gravel filter pack 23-29 ft bgs | | | PID= 415 | | | 24 |
| 25 | 337 | | | | | | | 25 |
| 26 | 336 | 3/4-inch 0.020 slot SCH 40 screen 25-27.5 ft bgs | | | PID= 518 | | | 26 |
| 27 | 335 | | | | | | | 27 |
| 28 | 334 | Endcap | | | PID= 650 | | | 28 |
| 29 | 333 | | | | PID= 822 | | Debris includes lumber, insulation, cardboard, with ~5% organics (roots, twigs) | 29 |
| 30 | 332 | | | | | | | 30 |
| 31 | 331 | 3/8-inch Bentonite chip backfill 29-40 ft bgs | | | PID= 960 | | | 31 |
| 32 | 330 | | | | | | | 32 |
| 33 | 329 | | | | PID= 431 | | | 33 |
| 34 | 328 | | | | | | | 34 |
| 35 | 327 | | S4 | | PID= 250 | | **Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand | 35 |
| 36 | 326 | | | | | | | 36 |
| 37 | 325 | | | | PID= 30 | | | 37 |
| 38 | 324 | | | | | | | 38 |
| 39 | 323 | | | | PID= 26 | | | 39 |
| 40 | 322 | | | | | | Bottom of exploration at 40 ft. bgs. | 40 |
| 41 | 321 | | | | | | | 41 |
| 42 | 320 | | | | | | | 42 |
| 43 | 319 | | | | | | | 43 |
| 44 | 318 | | | | | | | 44 |
| 45 | 317 | | | | | | | 45 |
| 46 | 316 | | | | | | | 46 |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-3S**

Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | Project Address & Site Specific Location: Vashon Island, West side of South Slope | | Coordinates (SPN NAD83 ft): E:1227935 N:162743 | Exploration Number: **VTP-4D** |
| Contractor: Holt Services, Inc | Equipment: Rotary drill rig | Sampling Method: Rotary core | Ground Surface (GS) Elev. (NAVD88): 358.08' | Ecology Well Tag No. BJX-256 |
| Operator: Pete | Exploration Method(s): Sonic | Work Start/Completion Dates: 8/8/2016 to 8/9/2016 | Top of Casing Elev. (NAVD88): 361.86' | Depth to Water (Below GS): No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| -2 | 360 | Valved hose barb | | | | | | -2 |
| -1 | 359 | | | | | | | -1 |
| 0 | 358 | Concrete surface seal | | | | | **FILL** Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass) | 0 |
| 1 | 357 | | | | | | | 1 |
| 2 | 356 | | | | PID= 0.0 | | | 2 |
| 3 | 355 | | | | | | | 3 |
| 4 | 354 | 3/4-inch SCH 40 PVC 0-51.5 ft bgs | | | PID= 0.0 | | Geotextile fabric at 4 ft bgs<br>Slightly moist, gray brown, sandy, silty GRAVEL (GM); fine to medium sand, fine to coarse, subrounded gravel, with rare root organics | 4 |
| 5 | 353 | | S1 | | | | | 5 |
| 6 | 352 | 3/8-inch Bentonite chip backfill 2-50 ft bgs | | | PID= 0.0 | | Slightly moist to moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse, subrounded gravel, with rare root organics | 6 |
| 7 | 351 | | | | | | | 7 |
| 8 | 350 | | | | PID= 0.0 | | | 8 |
| 9 | 349 | | | | | | | 9 |
| 10 | 348 | | | | | | | 10 |
| 11 | 347 | | | | | | | 11 |
| 12 | 346 | | | | PID= 0.0 | | | 12 |
| 13 | 345 | | | | | | | 13 |
| 14 | 344 | | | | PID= 2.8 | | **LANDFILL DEBRIS** Moist, black to gray, sandy, gravelly Fill; clothing, textiles, metal cans, plastic scraps, etc. | 14 |
| 15 | 343 | | S2 | | | | | 15 |
| 16 | 342 | | | | PID= 8.9 | | | 16 |
| 17 | 341 | | | | | | Becomes brown | 17 |
| 18 | 340 | | | | PID= 14.2 | | | 18 |
| 19 | 339 | | | | | | | 19 |
| 20 | 338 | | | | | | Includes scattered thinly bedded sand | 20 |
| 21 | 337 | | S3 | | | | | 21 |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-4D**

Sheet 1 of 3

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, West side of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227935 N:162743 | *Exploration Number*<br>**VTP-4D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>358.08' | Ecology Well Tag No.<br>BJX-256 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/8/2016 to 8/9/2016 | *Top of Casing Elev. (NAVD88)*<br>361.86' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 23 | 335 | | | | PID= 6.1 | | | 23 |
| 24 | 334 | | | | PID= 7.6 | | | 24 |
| 25 | 333 | | | | | | | 25 |
| 26 | 332 | | S3 | | PID= 7.3 | | | 26 |
| 27 | 331 | | | | | | | 27 |
| 28 | 330 | | | | PID= 14.8 | | | 28 |
| 29 | 329 | | | | | | Debris includes lumber and wood | 29 |
| 30 | 328 | | | | | | | 30 |
| 31 | 327 | | | | | | | 31 |
| 32 | 326 | | | | PID= 9.1 | | | 32 |
| 33 | 325 | | | | | | | 33 |
| 34 | 324 | | | | PID= 22 | | Debris includes steel up to 1/4" thick | 34 |
| 35 | 323 | | S4 | | | | | 35 |
| 36 | 322 | | | | | | | 36 |
| 37 | 321 | | | | PID= 22.4 | | | 37 |
| 38 | 320 | | | | | | | 38 |
| 39 | 319 | | | | PID= 26.1 | | | 39 |
| 40 | 318 | | | | | | Debris more intermittent and includes twigs and branches | 40 |
| 41 | 317 | | | | PID= 52 | | | 41 |
| 42 | 316 | | | | | | | 42 |
| 43 | 315 | | S5 | | PID= 31.2 | | | 43 |
| 44 | 314 | | | | | | | 44 |
| 45 | 313 | | | | PID= 28.3 | | | 45 |
| 46 | 312 | | | | | | | 46 |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-4D**

Sheet 2 of 3

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, West side of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227935 N:162743 | *Exploration Number*<br>**VTP-4D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>358.08' | Ecology Well Tag No.<br>BJX-256 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/8/2016 to 8/9/2016 | *Top of Casing Elev. (NAVD88)*<br>361.86' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 48 | 310 | Conductor casing set at 50 ft and sealed with 3 feet of hydrated bentonite chips before advancing | S5 | | PID= 9.1 | | **Vashon Advance Outwash/B Unit**<br>Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand | 48 |
| 49 | 309 | | | | | | | 49 |
| 50 | 308 | | | | | | | 50 |
| 51 | 307 | | | | PID= 8.7 | | | 51 |
| 52 | 306 | Gravel filter pack 50-56 ft bgs | | | | | | 52 |
| 53 | 305 | 3/4-inch 0.020 slot SCH 40 screen 51.5-54 ft bgs | | | | | | 53 |
| 54 | 304 | Endcap | | | PID= 6.3 | | | 54 |
| 55 | 303 | | S6 | | | | | 55 |
| 56 | 302 | | | | | | | 56 |
| 57 | 301 | 3/8-inch Bentonite chip backfill 56-60 ft bgs | | | | | | 57 |
| 58 | 300 | | | | PID= 4.1 | | | 58 |
| 59 | 299 | | | | | | | 59 |
| 60 | 298 | | | | | | Bottom of exploration at 60 ft. bgs. | 60 |
| 61 | 297 | | | | | | | 61 |
| 62 | 296 | | | | | | | 62 |
| 63 | 295 | | | | | | | 63 |
| 64 | 294 | | | | | | | 64 |
| 65 | 293 | | | | | | | 65 |
| 66 | 292 | | | | | | | 66 |
| 67 | 291 | | | | | | | 67 |
| 68 | 290 | | | | | | | 68 |
| 69 | 289 | | | | | | | 69 |
| 70 | 288 | | | | | | | 70 |
| 71 | 287 | | | | | | | 71 |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-4D**

Sheet 3 of 3

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, West side of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227927 N:162741 | *Exploration Number*<br>**VTP-4S** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>358.58' | Ecology Well Tag No.<br>BJX-254 |
| *Operator*<br>Dave | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/4/2016 | *Top of Casing Elev. (NAVD88)*<br>362.58' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| -2 | 361 | Valved hose barb | | | | | | -2 |
| -1 | 360 | | | | | | | -1 |
| 0 | 359 | | | | | | | 0 |
| 1 | 358 | Concrete surface seal | | | | | **FILL**<br>Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass) | 1 |
| 2 | 357 | | | | PID= 0.0 | | | 2 |
| 3 | 356 | | | | | | | 3 |
| 4 | 355 | 3/4-inch SCH 40 PVC 0-22.5 ft bgs | | | PID= 0.0 | | Geotextile fabric at 4 ft bgs<br>Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs). | 4 |
| 5 | 354 | | S1 | | | | | 5 |
| 6 | 353 | 3/8-inch Bentonite chip backfill 2-21 ft bgs | | | PID= 0.0 | | | 6 |
| 7 | 352 | | | | | | | 7 |
| 8 | 351 | | | | PID= 0.0 | | | 8 |
| 9 | 350 | | | | | | | 9 |
| 10 | 349 | | | | | | | 10 |
| 11 | 348 | | | | | | | 11 |
| 12 | 347 | | | | PID= 0.0 | | | 12 |
| 13 | 346 | | | | | | | 13 |
| 14 | 345 | | | | PID= 2.2 | | | 14 |
| 15 | 344 | | S2 | | | | | 15 |
| 16 | 343 | | | | PID= 1.6 | | **LANDFILL DEBRIS**<br>Moist, gray to black, gravelly, sandy Fill; trash bags, paper, glass, metal wires, textiles, plastic | 16 |
| 17 | 342 | | | | | | | 17 |
| 18 | 341 | | | | PID= 4.7 | | | 18 |
| 19 | 340 | | | | | | | 19 |
| 20 | 339 | | | | | | | 20 |
| 21 | 338 | | | | PID= 6.6 | | | 21 |
| | 337 | | S3 | | | | | |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-4S**

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, West side of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227927 N:162741 | *Exploration Number*<br>**VTP-4S** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>358.58' | Ecology Well Tag No.<br>BJX-254 |
| *Operator*<br>Dave | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/4/2016 | *Top of Casing Elev. (NAVD88)*<br>362.58' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 23 | 336 | Gravel filter pack 21-27 ft bgs | S3 | | PID= 15 | | Debris includes fiberglass, plastic shavings and scraps | 23 |
| 24 | 335 | 3/4-inch 0.020 slot SCH 40 screen 22.5-25 ft bgs | | | PID= 34 | | | 24 |
| 25 | 334 | | | | | | | 25 |
| 26 | 333 | | S4 | | PID= 4.9 | | | 26 |
| 27 | 332 | | | | | | | 27 |
| 28 | 331 | | | | PID= 3.1 | | | 28 |
| 29 | 330 | | S5 | | | | Debris includes lumber, insulation, cardboard, with ~5% organics (roots, twigs) | 29 |
| 30 | 329 | 3/8-inch Bentonite chip backfill 27-45ft bgs | | | | | | 30 |
| 31 | 328 | | | | PID= 1.2 | | | 31 |
| 32 | 327 | | | | | | | 32 |
| 33 | 326 | | S6 | | PID= 0.6 | | | 33 |
| 34 | 325 | | | | | | | 34 |
| 35 | 324 | | | | | | Debris includes glass, plastic, animal fur | 35 |
| 36 | 323 | | | | PID= 0.5 | | | 36 |
| 37 | 322 | | | | | | | 37 |
| 38 | 321 | | S7 | | | | | 38 |
| 39 | 320 | | | | PID= 0.5 | | | 39 |
| 40 | 319 | | | | | | | 40 |
| 41 | 318 | | | | PID= 0.4 | | | 41 |
| 42 | 317 | | | | | | | 42 |
| 43 | 316 | | S8 | | PID= 0.1 | | **Vashon Advance Outwash/B Unit**<br>Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand | 43 |
| 44 | 315 | | | | | | | 44 |
| 45 | 314 | | | | | | Bottom of exploration at 45 ft. bgs. | 45 |
| 46 | 313 | | | | | | | 46 |
| | 312 | | | | | | | |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log VTP-4S**

Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

# King County Vashon Island Landfill - 090057

## Monitoring Well Log

| Project Address & Site Specific Location | Coordinates (SPN NAD83 ft) | Exploration Number |
|---|---|---|
| Vashon Island, West side of South Slope | E:1227860 N:162780 | **VTP-5D** |

| Contractor | Equipment | Sampling Method | Ground Surface (GS) Elev. (NAVD88) | Ecology Well Tag No. |
|---|---|---|---|---|
| Holt Services, Inc | Rotary drill rig | Rotary core | 359.6925' | BKY-334 |

| Operator | Exploration Method(s) | Work Start/Completion Dates | Top of Casing Elev. (NAVD88) | Depth to Water (Below GS) |
|---|---|---|---|---|
| Pete | Sonic | 1/9/2017 | 363.0922' | No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 0 | 360 | Valved hose barb<br>6-inch SCH 80 PVC Monument<br>Concrete surface seal | | | PID= 0.7 | | Topsoil; fine to medium sand, abundant root mass.<br>**FILL**<br>Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine subangular gravel. | 0 |
| 5 | 355 | 3/4-inch SCH 40 PVC 0-24 ft bgs<br>3/8-inch Bentonite chip backfill 2-22 ft bgs | S1 | | PID= 4.6<br>PID= 2.0 | | Geotextile at 4 ft bgs and becomes gray brown. | 5 |
| 10 | 350 | | | | PID= 2.0<br>PID= 45.1 | | Moist, brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel.<br>**LANDFILL DEBRIS**<br>Moist gray, sandy, gravelly Fill; fine to medium sand, debris (trash bags, plastic) | 10 |
| 15 | 345 | | S2 | | PID= 162.3<br>PID= 816 | | Debris includes paper and plastic shavings. | 15 |
| 20 | 340 | Conductor casing set at 20 ft and sealed with 3 feet of hydrated bentonite chips before advancing<br>Gravel filter pack 22-28 ft bgs | S3 | | PID= 25.5<br>PID= 15.1 | | **Vashon Advance Outwash/B Unit**<br>Moist, gray brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel. | 20 |
| 25 | 335 | 3/4-inch 0.020 slot SCH 40 screen 24-26.5 ft bgs | | | PID= 34.5<br>PID= 35.1 | | | 25 |
| 30 | 330 | 3/8-inch Bentonite chip backfill 28-30 ft bgs | S4 | | PID= 7.7 | | Bottom of exploration at 30 ft. bgs. | 30 |

**Legend**

Sample Method
- No Soil Sample Recovery
- Continuous core 4" ID
- Continuous core 7"

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-5D**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTWPROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

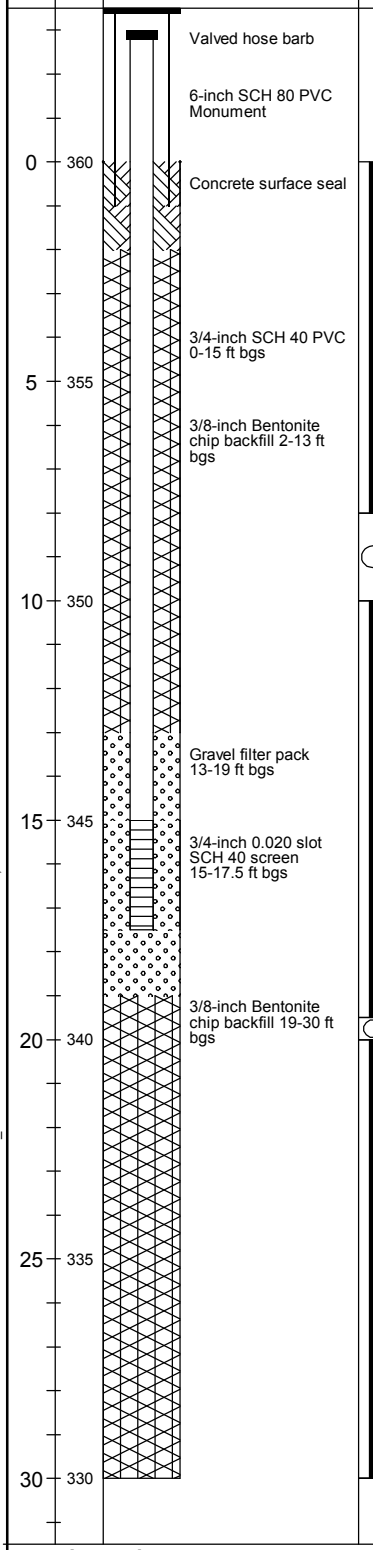
# King County Vashon Island Landfill - 090057

## Monitoring Well Log

| Project Address & Site Specific Location | Coordinates (SPN NAD83 ft) | Exploration Number |
|---|---|---|
| Vashon Island, West side of South Slope | E:1227865 N:162778 | **VTP-5S** |

| Contractor | Equipment | Sampling Method | Ground Surface (GS) Elev. (NAVD88) | Ecology Well Tag No. |
|---|---|---|---|---|
| Holt Services, Inc | Rotary drill rig | Rotary core | 360.0117' | BKY-333 |

| Operator | Exploration Method(s) | Work Start/Completion Dates | Top of Casing Elev. (NAVD88) | Depth to Water (Below GS) |
|---|---|---|---|---|
| Pete | Sonic | 1/9/2017 | 363.3776' | No Water Encountered |




| Depth (feet) | Elev. (feet) | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|
| 0 | 360 | | | | Topsoil; fine to medium sand, abundant root mass. | 0 |
| | | | | | **FILL** | |
| | | | PID= 0.0 | | Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine subangular gravel. | |
| 5 | 355 | | PID= 0.0 | | Geotextile at 4 ft bgs and becomes gray brown. | 5 |
| | | | PID= 0.0 | | Moist, brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel. | |
| | | | | | **LANDFILL DEBRIS** | |
| | | | PID= 1.5 | | Moist gray, sandy, gravelly Fill; fine to medium sand, debris (trash bags, cardboard, plastic) | |
| 10 | 350 | | PID= 124 | | Debris includes aluminum cans, copper, rope, cloth, rubber. | 10 |
| | | | PID= 57.3 | | | |
| 15 | 345 | | PID= 12.5 | | | 15 |
| | | | PID= 399 | | Debris includes rubber gloves, paper, plastic shavings. | |
| | | | PID= 206 | | | |
| 20 | 340 | | | | **Vashon Advance Outwash/B Unit** | 20 |
| | | | PID= 14.8 | | Moist, gray brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel. | |
| | | | PID= 7.9 | | | |
| 25 | 335 | | PID= 10.9 | | | 25 |
| | | | PID= 9.0 | | No gravel below 28 ft bgs | |
| | | | PID= 11.4 | | | |
| 30 | 330 | | | | Bottom of exploration at 30 ft. bgs. | 30 |

**Legend**

Sample Method
- No Soil Sample Recovery
- Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-5S**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTWPROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

# King County Vashon Island Landfill - 090057

## Monitoring Well Log

| Project Address & Site Specific Location | Coordinates (SPN NAD83 ft) | Exploration Number |
|---|---|---|
| Vashon Island, South end of South Slope | E:1227887 N:162558 | **VTP-6D** |

| Contractor | Equipment | Sampling Method | Ground Surface (GS) Elev. (NAVD88) | Ecology Well Tag No. |
|---|---|---|---|---|
| Holt Services, Inc | Rotary drill rig | Rotary core | 324.8379' | BKY-331 |

| Operator | Exploration Method(s) | Work Start/Completion Dates | Top of Casing Elev. (NAVD88) | Depth to Water (Below GS) |
|---|---|---|---|---|
| Pete | Sonic | 1/10/2017 | 328.3087' | No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 0 | 325 | Valved hose barb<br>6-inch SCH 80 PVC Monument<br>Concrete surface seal | | | | | Topsoil; fine to medium sand, abundant root mass. | 0 |
| | | | | | | | **FILL**<br>Very moist to wet, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded gravel.<br>Hand dug to 3 ft bgs<br>Becomes gray brown. | |
| | | | | | PID= 0.0 | | | |
| 5 | 320 | 3/4-inch SCH 40 PVC 0-18.5 ft bgs<br>3/8-inch Bentonite chip backfill 2-17 ft bgs | S1 | | PID= 0.9 | | **LANDFILL DEBRIS**<br>Moist gray, sandy, gravelly Fill; fine to medium sand, debris (plastic shavings, bags) | 5 |
| | | | | | PID= 4.5 | | Becomes wet. | |
| | | | | | PID= 1.2 | | | |
| 10 | 315 | | | | | | Woody debris between 10 and 14 ft bgs. | 10 |
| | | | | | PID= 2.3 | | | |
| | | | | | PID= 2.8 | | | |
| 15 | 310 | Conductor casing set at 17 ft and sealed with 3 feet of hydrated bentonite chips before advancing<br>Gravel filter pack 17-23 ft bgs<br>3/4-inch 0.020 slot SCH 40 screen 18.5-21 ft bgs | S2 | | PID= 0.7 | | | 15 |
| | | | | | PID= 0.6 | | **Vashon Advance Outwash/B Unit**<br>Moist, brown SAND (SP); trace fine rounded gravel, fine to medium sand. | |
| | | | | | PID= 0.4 | | | |

**Legend**

Sample Method
- Grab Sample
- Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-6D**

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTWPROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, South end of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227887 N:162558 | *Exploration Number*<br>**VTP-6D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>324.8379' | Ecology Well Tag No.<br>BKY-331 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>1/10/2017 | *Top of Casing Elev. (NAVD88)*<br>328.3087' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 20 | 305 | | S2 | | | | **Vashon Advance Outwash/B Unit**<br>Moist, brown SAND (SP); trace fine rounded gravel, fine to medium sand. (continued)<br>Gravel becomes fine to coarse. | 20 |
| | | | S3 | | PID= 1.1 | | | |
| | | 3/8-inch Bentonite chip backfill 23-40 ft bgs | | | PID= 1.9 | | | |
| 25 | 300 | | | | | | | 25 |
| | | | | | PID= 0.8 | | Moist, gray, silty SAND (SM); fine massive sand<br>Frequent very thin laminae of light gray silt between 26 and 27 ft bgs. | |
| | | | S4 | | PID= 1.0 | | Moist, gray brown SAND (SP); fine to medium sand.<br>1-inch lens of gray silty sand and red orange mottling on edges.<br>1-inch lens of gray silty sand and red orange mottling on edges. | |
| 30 | 295 | | | | | | | 30 |
| | | | | | | | Moist, gray, silty SAND (SM); fine sand w/ trace red mottling. | |
| | | | | | PID= 0.2 | | Moist, gray brown SAND (SP); predominantly fine sand.<br>Sand becomes fine to coarse. | |
| 35 | 290 | | S5 | | | | | 35 |
| | | | | | PID= 2.1 | | Moist, brown, silty SAND (SM); fine sand. | |
| | | | | | PID= 17.9 | | Moist, gray brown SAND (SP); predominantly fine sand, coarsening with depth. | |
| 40 | 285 | | | | | | Bottom of exploration at 40 ft. bgs. | 40 |

**Legend**

Sample Method
- Grab Sample
- Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-6D**
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTWPROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

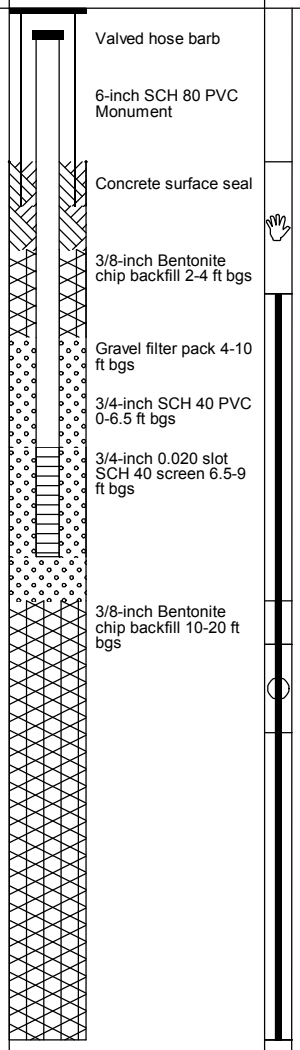
# King County Vashon Island Landfill - 090057

## Monitoring Well Log

| Project Address & Site Specific Location | Coordinates (SPN NAD83 ft) | Exploration Number |
|---|---|---|
| Vashon Island, South end of South Slope | E:1227892 N:162560 | **VTP-6S** |

| Contractor | Equipment | Sampling Method | Ground Surface (GS) Elev. (NAVD88) | Ecology Well Tag No. |
|---|---|---|---|---|
| Holt Services, Inc | Rotary drill rig | Rotary core | 324.5111' | BKY-330 |

| Operator | Exploration Method(s) | Work Start/Completion Dates | Top of Casing Elev. (NAVD88) | Depth to Water (Below GS) |
|---|---|---|---|---|
| Pete | Sonic | 1/10/2017 | 328.2467' | No Water Encountered |




| Depth (feet) | Elev. (feet) | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|
| 0 | 325 | | | | | Topsoil; fine to medium sand, abundant root mass. | 0 |
| | | | | | | **FILL**<br>Very moist to wet, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded gravel. | |
| | | | | | | Becomes gray brown. | |
| | | | | | | Hand dug to 3 ft bgs | |
| 5 | 320 | S1 | | PID= 1.1 | | **LANDFILL DEBRIS**<br>Moist gray, sandy, gravelly Fill; fine to medium sand, debris (plastic shavings, bags) | 5 |
| | | | | PID= 7.1 | | | |
| | | | | PID= 13.8 | | | |
| 10 | 315 | | | | | Becomes wet. | 10 |
| | | | | PID= 7.3 | | Becomes moist with woody debris between 12.5 and 14 ft bgs. | |
| 15 | 310 | S2 | | PID= 14.8 | | | 15 |
| | | | | PID= 2.0 | | Debris includes plastic bags and glass. | |
| | | | | PID= 2.5 | | **Vashon Advance Outwash/B Unit**<br>Moist, brown SAND (SP); trace fine subrounded gravel, fine to medium sand. | |
| 20 | 305 | | | | | Bottom of exploration at 20 ft. bgs. | 20 |
| 25 | 300 | | | | | | 25 |
| 30 | 295 | | | | | | 30 |

**Legend**

Sample Method
- No Soil Sample Recovery
- Grab Sample
- Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-6S**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTWPROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, West side of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227762 N:162804 | *Exploration Number*<br>**VTP-7** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>359.775' | Ecology Well Tag No.<br>BKX-135 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>4/3/2018 | *Top of Casing Elev. (NAVD88)*<br>359.199' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| | | 12-inch steel flush monument<br>Valved hose barb | | | | | Dry to slightly moist, brown, Topsoil; fine to medium sand, fine subrounded gravel, numerous organics (root mass, grass) | |
| | | Concrete surface seal | | | PID= 39.6 | | **Fill**<br>Moist, brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine subrounded to subangular gravel. | |
| | | 3/8-inch Bentonite chip backfill 2-8 ft bgs | | | PID= 69 | | | |
| 5 | 355 | 2-inch SCH 40 PVC 0-9 ft bgs | S1 | | PID= 24.0 | | | 5 |
| | | | | | PID= 162 | | Becomes gray brown. | |
| | | Gravel filter pack 8-15 ft bgs | | | | | **Landfill Debris**<br>Very moist, black to gray, silty, sandy, gravelly Fill; plastic scraps, thin aluminum sheets, paper, cardboard, garbage bags, etc.<br>Becomes moist. | |
| | | | | | PID= 414 | | | |
| 10 | 350 | 2-inch 0.020 slot SCH 40 screen 9-14 ft bgs | | | CH4= 1.6% | | | 10 |
| | | | S2 | | PID= 70.0 | | | |
| | | | | | PID= 66.7 | | Fiberglass fibers<br><br>Plywood at bottom of debris contact. | |
| 15 | 345 | 3/8-inch Bentonite chip backfill 15-20 ft bgs | | | CH4= 0%<br>PID= 345 | | **Vashon Advance Outwash/Unit B**<br>Moist, gray brown, SAND (SP); fine to medium sand, fine subrounded to subangular gravel. | 15 |
| | | | S3 | | PID= 27.3 | | | |
| | | | | | PID= 13.6 | | | |
| 20 | 340 | | | | CH4= 0% | | Bottom of exploration at 20 ft. bgs. | 20 |

**Legend**

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-7**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINT\WPROJECTSIKC_VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, East side of leachate pond | | *Coordinates (SPN NAD83 ft)*<br>E:1227838 N:162641 | *Exploration Number*<br>**VTP-8** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>359.315' | Ecology Well Tag No.<br>BKX-134 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>4/3/2018 | *Top of Casing Elev. (NAVD88)*<br>358.892' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| | | 12-inch steel flush monument<br>Valved hose barb | | | | | Topsoil; fine to medium sand, rare root fibers. | |
| | | Concrete surface seal | | | PID= 280 | | **Fill**<br>Slightly moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded gravel. | |
| | | 3/8-inch Bentonite chip backfill 2-14 ft bgs | | | PID= 713 | | | |
| | 355 | | | | | | | |
| 5 | | 2-inch SCH 40 PVC 0-15 ft bgs | S1 | | PID= 455 | | Becomes gray brown. | 5 |
| | | | | | PID= 304 | | Becomes dark gray brown with coarse subrounded gravel and subrounded cobbles. silty SAND (SM) | |
| | 350 | | | | | | | |
| 10 | | | | | CH4= 0%<br>PID= 134 | | Becomes brown.<br>Becomes gray and siltier. | 10 |
| | | | S2 | | PID= 280 | | Becomes brown. | |
| | | | | | PID= 207 | | | |
| | 345 | | | | | | Root fiber organics. | |
| 15 | | Gravel filter pack 14-21 ft bgs | | | CH4= 0%<br>PID= 513 | | **Landfill Debris**<br>Very moist, black to gray, sandy, gravelly Fill; red and blue plastic scraps, paper, cardboard, garbage bags, white fibers, glass. | 15 |
| | | 2-inch 0.020 slot SCH 40 screen 15-20 ft bgs | | | PID= 570 | | | |
| | | | S3 | | | | Becomes silty. | |
| | 340 | | | | PID= 5073 | | | |
| 20 | | | | | CH4= 0% | | | 20 |
| | | | | | PID= 2877 | | **Fill**<br>Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| | | 3/8-inch Bentonite chip backfill 21-25 ft bgs | S4 | | | | **Vashon Advance Outwash/Unit B**<br>Moist, gray brown, SAND (SP); trace silt, fine to medium sand, fine subrounded to subangular gravel. | |
| | 335 | | | | PID= 1312 | | | |
| 25 | | | | | CH4= 0% | | Bottom of exploration at 25 ft. bgs. | 25 |

**Legend**

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-8**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, South Perimeter Road | | *Coordinates (SPN NAD83 ft)*<br>E:1227987 N:162784 | *Exploration Number*<br>**VTP-9** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>373.646' | Ecology Well Tag No.<br>BKX-132 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>4/2/2018 | *Top of Casing Elev. (NAVD88)*<br>373.223' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 0 | | 12-inch steel flush monument<br>Valved hose barb | | | | | 14-inch thick Asphalt. | 0 |
| | | Concrete surface seal | | | | | **Fill**<br>Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| | 370 | 3/8-inch Bentonite chip backfill 2-7 ft bgs | | | | | | |
| 5 | | 2-inch SCH 40 PVC 0-7.5 ft bgs | | | CH4= 0.1%<br>PID= 204 | | Geotextile at 6 ft.<br>Moist, gray brown, gravelly, silty SAND (SM); fine to coarse sand, fine to coarse subrounded to subangular gravel. | 5 |
| | | Gravel filter pack 7-10 ft bgs | S1 | | PID= 506 | | | |
| | 365 | 2-inch 0.020 slot SCH 40 screen 7.5-10 ft bgs | | | | | | |
| 10 | | | | | CH4= 0%<br>PID= 405 | | Bottom of exploration at 10 ft. bgs.<br>Note: Vaccumed down to 6 ft bgs | 10 |
| | 360 | | | | | | | |
| 15 | | | | | | | | 15 |
| | 355 | | | | | | | |

**Legend**

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-9**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, South perimeter road | | *Coordinates (SPN NAD83 ft)*<br>E:1227882 N:162832 | *Exploration Number*<br>**VTP-10** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>376.139' | Ecology Well Tag No.<br>BKX-133 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>4/2/2018 | *Top of Casing Elev. (NAVD88)*<br>375.311' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| | | 12-inch steel flush monument<br>Valved hose barb | | | | | 7-inch thick Asphalt. | |
| | 375 | Concrete surface seal | | | | | Slightly moist, brown, gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| | | 3/8-inch Bentonite chip backfill 2-6.75 ft bgs | | | | | **Fill**<br>Slightly moist to dry, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| 5 | | 2-inch SCH 40 PVC 0-7.5 ft bgs | | | | | | 5 |
| | 370 | | S1 | | CH4= 0% | | Geotextile at 6.75 ft. | |
| | | Gravel filter pack 6.75-10 ft bgs | | | PID= 213 | | Moist, brown, gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine subrounded gravel. | |
| | | 2-inch 0.020 slot SCH 40 screen 7.5-10 ft bgs | | | | | Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel.<br>Sand becomes predominantly fine. | |
| 10 | | | | | PID= 72.4<br>CH4= 0% | | Bottom of exploration at 10 ft. bgs.<br><br>Note: Vaccumed down to 6 ft bgs | 10 |
| | 365 | | | | | | | |
| 15 | | | | | | | | 15 |
| | 360 | | | | | | | |

**Legend**

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-10**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, Northwest perimeter road | | *Coordinates (SPN NAD83 ft)*<br>E:1227950 N:163802 | *Exploration Number*<br>**VTP-11S** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>401.479' | Ecology Well Tag No.<br>BKX-137 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>4/6/2018 | *Top of Casing Elev. (NAVD88)*<br>400.832' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| | | 12-inch steel flush monument<br>Valved hose barb | | | | | Moist, brown, silty, sandy Topsoil; fine to medium sand, abundant root mass. | |
| | 400 | Concrete surface seal | | | | | **Fill**<br>Moist, brown, slightly gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine subrounded gravel. | |
| | | | | | PID= 23.9 | | Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| | | 3/8-inch Bentonite chip backfill 2-5 ft bgs | | | | | | |
| | | 2-inch SCH 40 PVC 0-6 ft bgs | | | | | | |
| 5 | | | S1 | | PID= 60.5 | | | 5 |
| | | Gravel filter pack 5-12 ft bgs | | | | | | |
| | | | | | | | Becomes slightly silty SAND (SP-SM). | |
| | 395 | 2-inch 0.020 slot SCH 40 screen 6-11 ft bgs | | | | | **Vashon Till/Unit A** | |
| | | | | | PID= 33.9 | | Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| | | | | | PID= 66.9 | | | |
| 10 | | | | | CH4= 0% | | | 10 |
| | | | | | PID= 14.1 | | | |
| | 390 | | S2 | | | | | |
| | | 3/8-inch Bentonite chip backfill 12-15 ft bgs | | | PID= 31.4 | | | |
| 15 | | | | | PID= 38.5<br>CH4= 0% | | Bottom of exploration at 15 ft. bgs. | 15 |
| | 385 | | | | | | | |

**Legend**

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-11S**

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINT\WPROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, Northwest perimeter road | | *Coordinates (SPN NAD83 ft)*<br>E:1227938 N:163804 | *Exploration Number*<br>**VTP-11D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>402.145' | Ecology Well Tag No.<br>BKX-136 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>4/5/2018 | *Top of Casing Elev. (NAVD88)*<br>401.479' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| | | 12-inch steel flush monument<br>Valved hose barb | | | | | Moist, brown, silty, sandy Topsoil; fine to medium sand, abundant root mass. | |
| | | Concrete surface seal | | | PID= 35.5 | | **Fill**<br>Moist, brown, slightly gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine subrounded gravel. | |
| | 400 | 3/8-inch Bentonite chip backfill 2-30 ft bgs | | | | | | |
| | | | | | PID= 54.3 | | Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| 5 | | 2-inch SCH 40 PVC 0-31 ft bgs | S1 | | | | | 5 |
| | | | | | PID= 50.8 | | Becomes slightly silty SAND (SP-SM). | |
| | 395 | | | | | | **Vashon Till/Unit A**<br>Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel. | |
| | | | | | PID= 107 | | | |
| 10 | | | | | CH4= 0% | | | 10 |
| | | | | | PID= 201 | | | |
| | 390 | | | | | | | |
| | | | S2 | | PID= 463 | | | |
| 15 | | | | | PID= 579 | | | 15 |
| | | | | | PID= 820 | | | |
| | 385 | | | | | | | |
| | | | | | CH4= 0% | | Becomes slightly silty SAND (SP-SM). | |
| | | | S3 | | | | | |
| 20 | | | | | PID= 15,000 | | Moist, gray brown, gravelly, silty SAND (SM); predominantly fine to coarse sand, fine to coarse subrounded to subangular gravel. | 20 |
| | 380 | | S4 | | | | | |
| | | | | | PID= 326 | | | |

**Legend**

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-11D**

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, Northwest perimeter road | | *Coordinates (SPN NAD83 ft)*<br>E:1227938 N:163804 | *Exploration Number*<br>**VTP-11D** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>402.145' | Ecology Well Tag No.<br>BKX-136 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>4/5/2018 | *Top of Casing Elev. (NAVD88)*<br>401.479' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 25 | | | | | PID= 2420 | | Moist, gray brown, gravelly, silty SAND (SM); predominantly fine to coarse sand, fine to coarse subrounded to subangular gravel. (continued) | 25 |
| | 375 | | S4 | | PID= 140 | | | |
| 30 | | Gravel filter pack 30-42 ft bgs<br>2-inch 0.020 slot SCH 40 screen 31-41 ft bgs | | | CH4= 0.1% | | **Vashon Advance Outwash/Unit B**<br>Moist, brown, gravelly SAND (SP); trace silt, predominantly fine to medium sand, fine to coarse subrounded to subangular gravel. | 30 |
| | 370 | | | | | | Gravel becomes trace between 32 and 33.5 ft bgs. | |
| 35 | | | S5 | | | | Gravel becomes trace between 35 and 36 ft bgs. | 35 |
| | 365 | | | | | | Gravely silty sand (SM) lens. | |
| 40 | | | | | CH4= 0% | | | 40 |
| | 360 | 3/8-inch Bentonite chip backfill 42-45 ft bgs | S6 | | | | | |
| 45 | | | | | | | Bottom of exploration at 45 ft. bgs.<br>Note: Elevated PID readings due to hot drilling conditions. | 45 |
| | 355 | | | | | | | |

**Legend**

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration Log VTP-11D**
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, Center of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227986 N:162728 | *Exploration Number*<br>**GW-9** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>358.19' | Ecology Well Tag No.<br>BJX-257 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/9/2016 to 8/10/2016 | *Top of Casing Elev. (NAVD88)*<br>362.28' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| | 361 | HDPE top flange with viton gasket | | | | | | |
| -2 | 360 | | | | | | | -2 |
| -1 | 359 | HDPE T-joint | | | | | | -1 |
| 0 | 358 | Concrete surface seal | | | | | **FILL**<br>Dry to slightly moist, brown, slightly silty SAND (SP-SM); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass) | 0 |
| 1 | 357 | | | | | | | 1 |
| 2 | 356 | | | | | | | 2 |
| 3 | 355 | | | | PID= 0.0 | | | 3 |
| 4 | 354 | 4-inch SDR 11 HDPE 0-17 ft bgs | | | | | Geotextile fabric at 4 ft bgs<br>Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs). | 4 |
| 5 | 353 | | S1 | | PID= 0.0 | | | 5 |
| 6 | 352 | 3/8-inch Bentonite chip backfill 2-15 ft bgs | | | | | | 6 |
| 7 | 351 | | | | PID= 68 | | | 7 |
| 8 | 350 | | | | | | | 8 |
| 9 | 349 | | | | PID= 90 | | | 9 |
| 10 | 348 | | | | | | | 10 |
| 11 | 347 | | | | | | | 11 |
| 12 | 346 | | | | PID= 117 | | **LANDFILL DEBRIS**<br>Moist, black to gray, sandy, gravelly Fill; clothing, textiles, metal cans, plastic scraps, paper, cardboard, tubing, garbage bags, etc. | 12 |
| 13 | 345 | | | | | | | 13 |
| 14 | 344 | | | | | | | 14 |
| 15 | 343 | | S2 | | | | | 15 |
| 16 | 342 | | | | PID= 155 | | | 16 |
| 17 | 341 | | | | | | | 17 |
| 18 | 340 | | | | | | | 18 |
| 19 | 339 | | | | PID= 40 | | | 19 |
| 20 | 338 | | | | | | | 20 |
| 21 | 337 | | S3 | | | | | 21 |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log GW-9**

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | *Project Address & Site Specific Location*<br>Vashon Island, Center of South Slope | | *Coordinates (SPN NAD83 ft)*<br>E:1227986 N:162728 | *Exploration Number*<br>**GW-9** |
| *Contractor*<br>Holt Services, Inc | *Equipment*<br>Rotary drill rig | *Sampling Method*<br>Rotary core | *Ground Surface (GS) Elev. (NAVD88)*<br>358.19' | Ecology Well Tag No.<br>BJX-257 |
| *Operator*<br>Pete | *Exploration Method(s)*<br>Sonic | *Work Start/Completion Dates*<br>8/9/2016 to 8/10/2016 | *Top of Casing Elev. (NAVD88)*<br>362.28' | *Depth to Water (Below GS)*<br>No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 23 | 336 | | | | | | | 23 |
| 24 | 335 | | | | PID= 162 | | | 24 |
| 25 | 334 | Gravel filter pack 17-35 ft bgs | | | | | | 25 |
| 26 | 333 | | | | | | | 26 |
| 27 | 332 | 4-inch SDR 11 HDPE screen with 1/2-inch perforations 17-35 ft bgs | S3 | | PID= 124 | | | 27 |
| 28 | 331 | | | | | | | 28 |
| 29 | 330 | | | | | | | 29 |
| 30 | 329 | | | | PID= 28 | | | 30 |
| 31 | 328 | | | | | | | 31 |
| 32 | 327 | | | | PID= 12.1 | | | 32 |
| 33 | 326 | | | | | | | 33 |
| 34 | 325 | | | | | | | 34 |
| 35 | 324 | | | | PID= 9.7 | | | 35 |
| 36 | 323 | Welded endcap | S4 | | | | | 36 |
| 37 | 322 | | | | | | | 37 |
| 38 | 321 | 3/8-inch Bentonite chip backfill 36-40 ft bgs | | | PID= 8.1 | | | 38 |
| 39 | 320 | | | | | | **Vashon Advance Outwash/B Unit**<br>Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand | 39 |
| 40 | 319 | | | | PID= 3.2 | | | 40 |
| 41 | 318 | | | | | | Bottom of exploration at 40 ft. bgs. | 41 |
| 42 | 317 | | | | | | | 42 |
| 43 | 316 | | | | | | | 43 |
| 44 | 315 | | | | | | | 44 |
| 45 | 314 | | | | | | | 45 |
| 46 | 313 | | | | | | | 46 |
| | 312 | | | | | | | |

**Legend**

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

**Exploration log GW-9**

Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

# King County Vashon Island Landfill - 090057

## Monitoring Well Log

| | | | | |
|---|---|---|---|---|
| Aspect CONSULTING | *Project Address & Site Specific Location*: 18900 Westside Highway SW, Vashon, WA 98070, North of leachate lagoon, between VTP-4S and VTP-5S. | | *Coordinates (SPN NAD83 ft)*: E:-122.500 N:47.4340 | *Exploration Number*: **GW-10** |
| *Contractor*: Holt Services, Inc. | *Equipment*: Rotary drill rig | *Sampling Method*: Rotary core | *Ground Surface (GS) Elev. (NAVD88)*: 359.9499' | Ecology Well Tag No. BKX482 |
| *Operator*: Pete | *Exploration Method(s)*: Sonic | *Work Start/Completion Dates*: 6/25/2018 to 6/26/2018 | *Top of Casing Elev. (NAVD88)*: 363.7966' | *Depth to Water (Below GS)*: No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 0 | 360 | Sealed top flange gasket<br>HDPE Tee-joint<br>Concrete surface seal, 0 to 2 feet bgs | | | PID = 5.7 | | **FILL**<br>SILTY SAND WITH GRAVEL (SM); Moist, light brown; medium to coarse gravels, fine to coarse sand, non-cohesive material.<br>Geotextile fabric observed at 3.5 feet bgs | 0 |
| 5 | 355 | 4-inch Sch 80 HDPE, +3.85 to 15.5 feet bgs<br>3/8-inch bentonite chip backfill, 2 to 14.5 feet bgs | | | PID = 20.8<br>PID = 8.0 | | SANDY SILT WITH GRAVEL (ML); Moist, dark gray; fine to coarse sands, medium to coarse gravels, more cohesive. | 5 |
| 10 | 350 | | | | PID = 20.2<br>CH4 = 0.0 | | SILTY SAND WITH GRAVEL (SM); Moist, dark gray; fine to coarse gravels with cobbles, fine to coarse sand. | 10 |
| 15 | 345 | 3/4-inch to 1-inch gravel filter pack, 14.5 to 29.5 feet bgs | | | PID = 57.8<br>PID = 112.5 | | SAND WITH SILT (SP-SM); Moist, light brown; fine to coarse sand.<br>**LANDFILL DEBRIS**<br>SILTY SAND WITH GRAVEL (SM); Moist, dark gray to black; plastic bags, plastic, glass, metal scraps.<br>Debris includes red plastic, red painted lumber, plywood, woody debris, metal scraps. | 15 |
| 20 | 340 | 4-inch Sch 80 HDPE screen with 1/2-inch perforations, 15.5 to 28.5 feet bgs | | | PID = 29.0<br>PID = 33.9<br>CH4 = 0.0 | | Debris includes glass, plastic bags, textiles, woody debris, newspaper | 20 |

**Legend**

Sample Method: Continuous core 7" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: MVA/PSB

**Exploration Log GW-10**



NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_090057-310.1.7.6_VASHONLF.GPJ July 18, 2018

| Aspect CONSULTING | King County Vashon Island Landfill - 090057 | | Monitoring Well Log | |
|---|---|---|---|---|
| | Project Address & Site Specific Location: 18900 Westside Highway SW, Vashon, WA 98070, North of leachate lagoon, between VTP-4S and VTP-5S. | | Coordinates (SPN NAD83 ft): E:-122.500 N:47.4340 | Exploration Number: **GW-10** |
| Contractor: Holt Services, Inc. | Equipment: Rotary drill rig | Sampling Method: Rotary core | Ground Surface (GS) Elev. (NAVD88): 359.9499' | Ecology Well Tag No. BKX482 |
| Operator: Pete | Exploration Method(s): Sonic | Work Start/Completion Dates: 6/25/2018 to 6/26/2018 | Top of Casing Elev. (NAVD88): 363.7966' | Depth to Water (Below GS): No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| | | | | | PID = 59.6 | | **LANDFILL DEBRIS** SILTY SAND WITH GRAVEL (SM); Moist, dark gray to black; plastic bags, plastic, glass, metal scraps. (continued) Debris includes blue plastic jugs, glass, aluminum cans, lumber, egg cartons, concrete | |
| 25 | 335 | | | | PID = 85.5 | | Debris includes charcoal, ash debris, glass, metal, burned paper (appears visibly burnt) | 25 |
| | | | | | PID = 37.1 | | Debris includes blue plastic, glass, wood debris | |
| | | Welded endcap | | | | | | |
| 30 | 330 | Backfilled with bentonite chips to 35 feet bgs | | | PID = 14.4 CH4 = 0.0 | | | 30 |
| | | | | | | | SILTY SAND (SM); Moist, light brown; charcoal debris, trace lumber debris | |
| | | | | | PID = 8.8 | | **Vashon Advance Outwash/B unit** SAND (SP); Moist, light brown; trace silt, fine to coarse sand, trace fine to coarse gravels, no visible landfill debris. | |
| 35 | 325 | | | | PID = 4.1 | | Bottom of exploration at 35 ft. bgs. | 35 |
| 40 | 320 | | | | | | | 40 |
| 45 | 315 | | | | | | | 45 |

**Legend**

Sample Method: Continuous core 7" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: MVA/PSB

**Exploration Log GW-10**

Sheet 2 of 2

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_090057-310.1.7.6_VASHONLF.GPJ July 18, 2018

# King County Vashon Island Landfill - 090057

## Monitoring Well Log

Aspect CONSULTING

| Project Address & Site Specific Location | Coordinates (SPN NAD83 ft) | Exploration Number |
|---|---|---|
| 18900 Westside Highway SW, Vashon, WA 98070, Northwest of leachate lagoon, between VTP-7 and VTP-5D. | E:-122.501 N:47.4341 | **GW-11** |

| Contractor | Equipment | Sampling Method | Ground Surface (GS) Elev. (NAVD88) | Ecology Well Tag No. |
|---|---|---|---|---|
| Holt Services, Inc. | Rotary drill rig | Rotary core | 360.1557' | BKX483 |

| Operator | Exploration Method(s) | Work Start/Completion Dates | Top of Casing Elev. (NAVD88) | Depth to Water (Below GS) |
|---|---|---|---|---|
| Pete | Sonic | 6/25/2018 to 6/26/2018 | 363.6807' | No Water Encountered |

| Depth (feet) | Elev. (feet) | Exploration Completion and Notes | Sample Type/ID | Analytical Sample Number & Lab Test(s) | Field Tests | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 0 | 360 | Sealed top flange gasket<br>HDPE Tee-joint<br>Concrete surface seal, 0 to 2 feet bgs | | | | | TOPSOIL; Dry, light brown; root mass, non-cohesive material. | 0 |
| | | | | | PID = 3.2 | | **FILL**<br>SAND WITH SILT AND GRAVEL (SW-SM); Moist, dark brown; fine to coarse sand, fine to coarse gravels, minor orange staining. | |
| 5 | 355 | 4-inch Sch 80 HDPE, +3.53 to 10.5 feet bgs<br>3/8-inch bentonite chip backfill, 2 to 9.5 feet bgs | | | PID = 3.2 | | Geotextile fabric at 6.5 feet bgs | 5 |
| | | | | | PID = 11.1 | | **LANDFILL DEBRIS**<br>SILTY SAND WITH GRAVEL (SM); Moist, dark brown to black; debris includes plastic, metal, glass shards, brick, plastic dish gloves. | |
| 10 | 350 | 3/4-inch to 1-inch gravel filter pack, 9.5 to 18 feet bgs<br>4-inch Sch 80 HDPE screen with 1/2-inch perforations, 10.5 to 17 feet bgs | | | PID = 7.0<br>CH4 = 1.1 | | | 10 |
| | | | | | PID = 35.0 | | Debris includes wood debris, plastic, metal | |
| 15 | 345 | Welded endcap | | | PID = 290.0 | | Debris includes fiberglass, shredded paper, metal wires | 15 |
| | | | | | PID = 132.1 | | Debris includes plastic, plastic bags, cardboard, lumber | |
| | | | | | | | SAND (SP); Moist, dark blue-gray; trace gravel, and trace plastic debris. | |
| 20 | 340 | Backfilled with bentonite chips to 25 feet bgs | | | PID = 202.7<br>CH4 = 0.0 | | **Vashon Advance Outwash/B Unit**<br>SAND (SW); Moist, dark gray; trace gravel and trace silt, no debris observed, noticeable refuse odor. | 20 |
| | | | | | PID = 19.3 | | | |
| 25 | 335 | | | | PID = 11.9 | | Bottom of exploration at 25 ft. bgs. | 25 |

**Legend**

Sample Method: Continuous core 7" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: MVA/PSB

**Exploration Log GW-11**

Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINT\PROJECTS\2018_090057-310.1.7.6_VASHONLF.GPJ July 18, 2018

# Decommissioned Well Logs

# Monitoring Well Construction Log

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-1 | 1 of 2 |

| | | | |
|---|---|---|---|
| Project Name: | King County Closed Landfills | Ground Surface Elev | 403.64 |
| Location: | Vashon Island Landfill | Top of Casing Elev. | Approx 404 |
| Driller/Method: | Holt Services / Sonic | Depth to Water (ft BGS) | |
| Sampling Method: | Continuous Core | Start/Finish Date | 4/3/2015 |

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|

**Decommissioning Details**

Monitoring well decommissioned by overdrilling using rotosonic drilling methods
0 to 2 feet: Soil backfill
2 to 131 feet: Bentonite chips (66 bags)

Well monument had been damaged previously, and was sitting on top of the PVC.

An approximately 1-foot diameter void existed around the well from ground surface to approximately 50 feet below ground surface. The void was backfilled with bentonite as part of the decommissioning process.

**Original Well Construction**

+1 feet to 130 feet: Nominal 3-inch O.D., Schedule 80 PVC blank riser and 10-slot screen

0 to 112.5 feet: Bentonite
112.5 to 130 feet: Gravel backfill

Sampler Type:
No Recovery

PID - Photoionization Detector
Static Water Level
Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 2

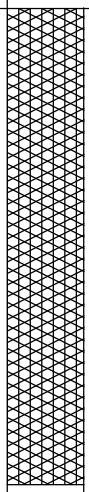
KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

# Monitoring Well Construction Log

Aspect CONSULTING

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-1 | 2 of 2 |

| | | | |
|---|---|---|---|
| Project Name: | King County Closed Landfills | Ground Surface Elev | 403.64 |
| Location: | Vashon Island Landfill | Top of Casing Elev. | Approx 404 |
| Driller/Method: | Holt Services / Sonic | Depth to Water (ft BGS) | |
| Sampling Method: | Continuous Core | Start/Finish Date | 4/3/2015 |

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 105 300<br>110 295<br>115 290<br>120 285<br>125 280<br>130 275<br>135 270<br>140 265<br>145 260<br>150 255<br>155 250<br>160 245<br>165 240<br>170 235<br>175 230<br>180 225<br>185 220<br>190 215<br>195 210<br>205 |  | | | | | | | 105<br>110<br>115<br>120<br>125<br>130<br>135<br>140<br>145<br>150<br>155<br>160<br>165<br>170<br>175<br>180<br>185<br>190<br>195 |

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

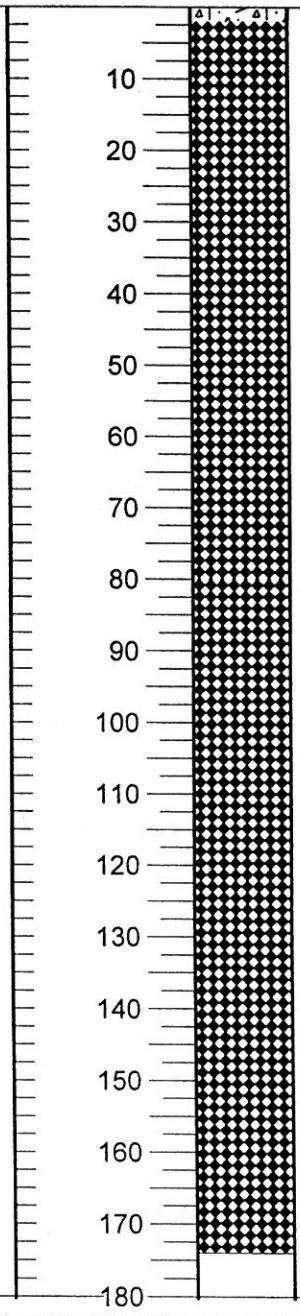
Figure No. C - 2

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-6** |
| LOCATION | **Vashon Island, Washington** | PAGE | **1 of 1** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **392.4** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **174.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|




**DECOMMISSIONING DETAILS**
0 to 2.0 feet: Concrete.
2.0 to ~80.0 feet: Bentonite chips (48 stacks).
80.0 to 174.0 feet: Bentonite grout (~500 gallons).

**ORIGINAL CONSTRUCTION**
+2.5 to ~23.0 feet: Nominal 8-inch O.D. steel casing and drive shoe, also used as security monument.
+2.0 to 5.0 feet: Nominal 2-inch O.D., Schedule 40 gas probe ("GP-6").
+1.8 to 11.5 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and screen ("MW-6S").
+1.7 to 160.0 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and screen ("MW-6D").

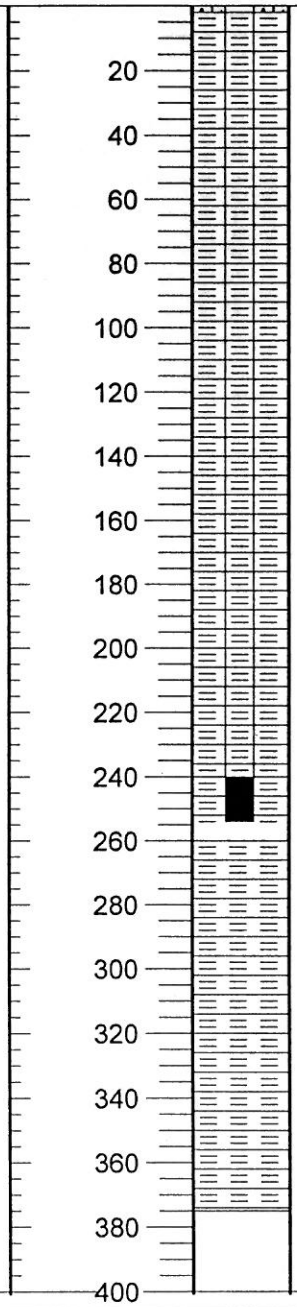
0 to 3.0 feet: Concrete.
3.0 to 102.0 feet: Pea gravel.
102.0 to 115.0 feet: #8 Aqua sand.
115.0 to 116.0 feet: Pea gravel.
116.0 to 121.0 feet: Bentonite pellets.
121.0 to 136.0 feet: Pea gravel.
136.0 to 142.0 feet: Bentonite pellets.
142.0 to 148.0 feet: Slough.
148.0 to 160.5 feet: #8 Aqua sand.
160.5 to 161.0 feet: Pea gravel.
161.0 to 163.0 feet: Bentonite pellets.
163.0 to 166.5 feet: Slough.
Total original borehole depth: 166.5 feet.

**REMARKS**
Existing nominal 8-inch casing and drive shoe were removed, then existing well assemblies and backfill were overdrilled using nominal 8-inch-diameter casing to below the original installation depth. Backfill was placed concurrent with casing removal.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-11** |
| LOCATION | **Vashon Island, Washington** | PAGE | **1 of 1** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **404.3** |
| DRILL METHOD | **Dual Rotary** | TOTAL DEPTH | **375.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **7/29/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|




**DECOMMISSIONING DETAILS**
0 to 2.0 feet: Concrete.
2.0 to 254.0 feet: Bentonite grout pumped into well screen and casing using the tremie method.

**ORIGINAL CONSTRUCTION**
Depth of boring = 375.0 feet.

~2.5 to 242.0 feet: Nominal 2" PVC casing.
242.0 to 254.0 feet: Nominal 2" PVC screen and end plug.

0 to 2.0 feet: Concrete.
2.0 to 235.0 feet: Bentonite grout.
235.0 to 240.0 feet: Bentonite chips.
240.0 to 254.0 feet: 20 x 40 CSSI sand.
254.0 to 260.0 feet: Pea gravel.
260.0 to 375.0 feet: Bentonite grout.

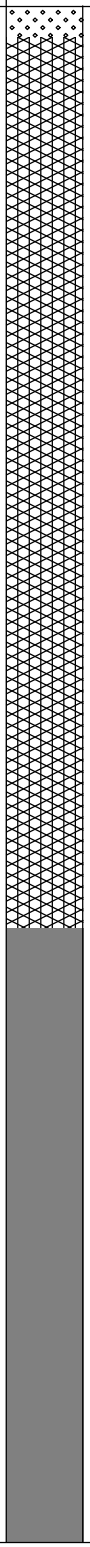
**REMARKS**
Original N: 1471.91 E: 3023.75.

# Monitoring Well Construction Log

Aspect CONSULTING

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-14 | 1 of 2 |

| | | | |
|---|---|---|---|
| Project Name: | King County Closed Landfills | Ground Surface Elev | 373.62 |
| Location: | Vashon Island Landfill | Top of Casing Elev. | Approx. 376 |
| Driller/Method: | Holt Services / Sonic | Depth to Water (ft BGS) | |
| Sampling Method: | Continuous Core | Start/Finish Date | 4/7/2015-4/9/2015 |

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 5 370<br>10 365<br>15 360<br>20 355<br>25 350<br>30 345<br>35 340<br>40 335<br>45 330<br>50 325<br>55 320<br>60 315<br>65 310<br>70 305<br>75 300<br>80 295<br>85 290<br>90 285<br>95 280<br>275 |  | | | | | | **Decommissioning Details**<br>Monitoring well decommissioned by overdrilling using rotosonic drilling methods<br>0 to 2 feet: Soil backfill<br>2 to 60 feet: Bentonite chips<br>60 to 150 feet: Bentonite grout<br>150 to 180 feet: Bentonite chips<br><br>**Original Well Construction**<br>+2 feet to 172 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and 10-slot screen<br><br>0 to 2 feet: Concrete<br>2 to 150 feet: Bentonite grout<br>150 to 154 feet: Bentonite chips<br>154 to 172 feet: No. 20-40 Colorado Silica Sand<br>172 to 180 feet: Bentonite chips | 5<br>10<br>15<br>20<br>25<br>30<br>35<br>40<br>45<br>50<br>55<br>60<br>65<br>70<br>75<br>80<br>85<br>90<br>95 |

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

# Monitoring Well Construction Log

Aspect CONSULTING

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-14 | 2 of 2 |

| | | | |
|---|---|---|---|
| Project Name: | King County Closed Landfills | Ground Surface Elev | 373.62 |
| Location: | Vashon Island Landfill | Top of Casing Elev. | Approx. 376 |
| Driller/Method: | Holt Services / Sonic | Depth to Water (ft BGS) | |
| Sampling Method: | Continuous Core | Start/Finish Date | 4/7/2015-4/9/2015 |

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 105 270<br>110 265<br>115 260<br>120 255<br>125 250<br>130 245<br>135 240<br>140 235<br>145 230<br>150 225<br>155 220<br>160 215<br>165 210<br>170 205<br>175 200<br>180 195<br>185 190<br>190 185<br>195 180<br>175 | | | | | | | | 105<br>110<br>115<br>120<br>125<br>130<br>135<br>140<br>145<br>150<br>155<br>160<br>165<br>170<br>175<br>180<br>185<br>190<br>195 |

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

# Monitoring Well Construction Log

Aspect CONSULTING

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-5 | 1 of 2 |

| | | | |
|---|---|---|---|
| Project Name: | King County Closed Landfills | Ground Surface Elev | 355.86 |
| Location: | Vashon Island Landfill | Top of Casing Elev. | Approx. 358 |
| Driller/Method: | Holt Services / Sonic | Depth to Water (ft BGS) | |
| Sampling Method: | Continuous Core | Start/Finish Date | 4/3/2015-4/7/2015 |

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 355 / 5 / 350 / 10 / 345 / 15 / 340 / 20 / 335 / 25 / 330 / 30 / 325 / 35 / 320 / 40 / 315 / 45 / 310 / 50 / 305 / 55 / 300 / 60 / 295 / 65 / 290 / 70 / 285 / 75 / 280 / 80 / 275 / 85 / 270 / 90 / 265 / 95 / 260 | | | | | | | **Decommissioning Details**<br>Monitoring well decommissioned by overdrilling using rotosonic drilling methods<br>0 to 2 feet: Soil backfill<br>2 to 152 feet: Bentonite chips (84 bags)<br><br>**Original Well Construction**<br>+2 feet to 5 feet: Nominal 3/4-inch O.D. PVC gas monitoring probe<br>+2 feet to 84 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and 20-slot screen ("MW-5S")<br>+2 feet to 126 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and 20-slot screen ("MW-5D")<br><br>0 to 3 feet: Concrete<br>3 to 69 feet: Pea gravel<br>69 to 84 feet: #8 Monterey sand<br>84 to 84.5 feet: Pea gravel<br>84.5 to 89 feet: Bentonite pellets<br>89 to 101 feet: Pea gravel<br>101 to 106 feet: Bentonite pellets<br>106 to 113 feet: Pea gravel<br>113 to 126 feet: #8 Monterey sand<br>126 to 132 feet: Bentonite pellets<br>132 to 151 feet: Pea gravel | 5 / 10 / 15 / 20 / 25 / 30 / 35 / 40 / 45 / 50 / 55 / 60 / 65 / 70 / 75 / 80 / 85 / 90 / 95 |

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 4

KCSWD_SONIC LOG KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

# Monitoring Well Construction Log

Aspect CONSULTING

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-5 | 2 of 2 |

| | | | |
|---|---|---|---|
| Project Name: | King County Closed Landfills | Ground Surface Elev | 355.86 |
| Location: | Vashon Island Landfill | Top of Casing Elev. | Approx. 358 |
| Driller/Method: | Holt Services / Sonic | Depth to Water (ft BGS) | |
| Sampling Method: | Continuous Core | Start/Finish Date | 4/3/2015-4/7/2015 |

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 255 / 105 | | | | | | | | 105 |
| 250 / 110 | | | | | | | | 110 |
| 245 / 115 | | | | | | | | 115 |
| 240 / 120 | | | | | | | | 120 |
| 235 / 125 | | | | | | | | 125 |
| 230 / 130 | | | | | | | | 130 |
| 225 / 135 | | | | | | | | 135 |
| 220 / 140 | | | | | | | | 140 |
| 215 / 145 | | | | | | | | 145 |
| 210 / 150 | | | | | | | | 150 |
| 205 / 155 | | | | | | | | 155 |
| 200 / 160 | | | | | | | | 160 |
| 195 / 165 | | | | | | | | 165 |
| 190 / 170 | | | | | | | | 170 |
| 185 / 175 | | | | | | | | 175 |
| 180 / 180 | | | | | | | | 180 |
| 175 / 185 | | | | | | | | 185 |
| 170 / 190 | | | | | | | | 190 |
| 165 / 195 | | | | | | | | 195 |
| 160 | | | | | | | | |

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 4

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

# MW-27 Decommissioning Summary Memo

# Memo

August 22, 2016 Aspect Project No.: 090057

**To:** Isabel McClure – King County Solid Waste Division (KCSWD)

**cc:** Anne Holmes, Tom Theno, Dan Swope – KCSWD
Henry Haselton, Adam Griffin – Aspect Consulting LLC

**From:** Aaron Pruitt, LG – Aspect Consulting LLC
John Strunk, LHG – Aspect Consulting LLC

**Re:** **Vashon Island Closed Landfill - Task 310.1.10 - Contract No. E000102E08**
**MW-27 Decommissioning Summary Memo**

---

Field investigations performed in the Spring of 2015 at the Vashon Island Closed Landfill included the installation of four new wells (MW-33 through MW-36). One of the new wells, MW-34, was installed in close proximity to existing well MW-27. Evaluations of stratigraphic and water level data from both MW-27 and MW-34 indicate that MW-27 was completed in a way that may allow interconnection of the Cc3 and D hydrogeologic units. Evaluation of MW-27 well completion details, stratigraphic information obtained from sonic drilling and core samples at MW-34 and groundwater hydrographs provided information to support a recommendation to decommission MW-27. KCSWD approved the recommendation in May 2016 to decommission MW-27.

The decommissioning of MW-27 occurred between July 5th and July 12th, 2016. The well was decommissioned by overdrilling using a rotosonic drill rig operated by Holt Services, Inc. (Holt), a subcontractor to Aspect Consulting, LLC (Aspect). The well was overdrilled with a 9-inch inner diameter barrel to 90 feet below ground surface (ft bgs), and a 7-inch inner diameter drill barrel from 90 ft bgs to the total depth of 237 ft bgs (see Decommissioning Log, Attachment A). During overdrilling, it was noted that the well deviated from plumb to the southeast at 37 ft bgs, and well casing was not extracted below the deviation. Soil cuttings from 90 ft bgs to 100 ft bgs included a small amount of hydrated bentonite, likely from MW-27 completion.

After overdrilling to total depth, the boring was backfilled with bentonite pellets from 237 ft bgs to 210.5 ft bgs, and bentonite chips from 210.5 ft bgs to 2 ft bgs. Ten bags of bentonite chips were required to backfill 7 feet of boring at a depth starting at 176 ft bgs, when only 3.5 bags of bentonite chips would be expected to fill that amount of borehole volume. It is likely that a void (possibly the bottom section of well casing) was filled at the 176 ft depth. The well casing below the deviation at 37 ft bgs was also backfilled with bentonite chips, taking an additional sixteen bags of bentonite

chips. The ground surface was patched with black-dyed concrete. Daily field reports are provided in Attachment B.

During the decommissioning of MW-27, a transducer was deployed in the nearby well MW-34 to monitor water levels in the D-unit aquifer (Figure 1). Water levels increased by over a foot when drilling advanced between 200 ft bgs and 210 ft bgs. This suggests that the low-transmissivity Cf unit between the Cc3 and D unit aquifers is interconnected between 200 ft bgs and 210 ft bgs. This depth is below the former screen depth interval in MW-27, but within the original gravel pack interval in MW-27. This water level response supports the observation that the extended gravel pack interval in MW-27 was serving as a conduit cross-connecting the Cc3 and D units. Water levels fluctuated as drilling continued to total depth, and stabilized as the boring was backfilled with bentonite.

## Limitations

Work for this project was performed for the King County Solid Waste Division (Client), and this memorandum was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This memorandum does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

\\biserver1.aspect.local\projects\King Co Closed Landfills\Phase I\Vashon Is\Task 310.1.10 Infrastructure Improvements\MW-27\MW-27 Decom Memo.docx

**Attachments:**

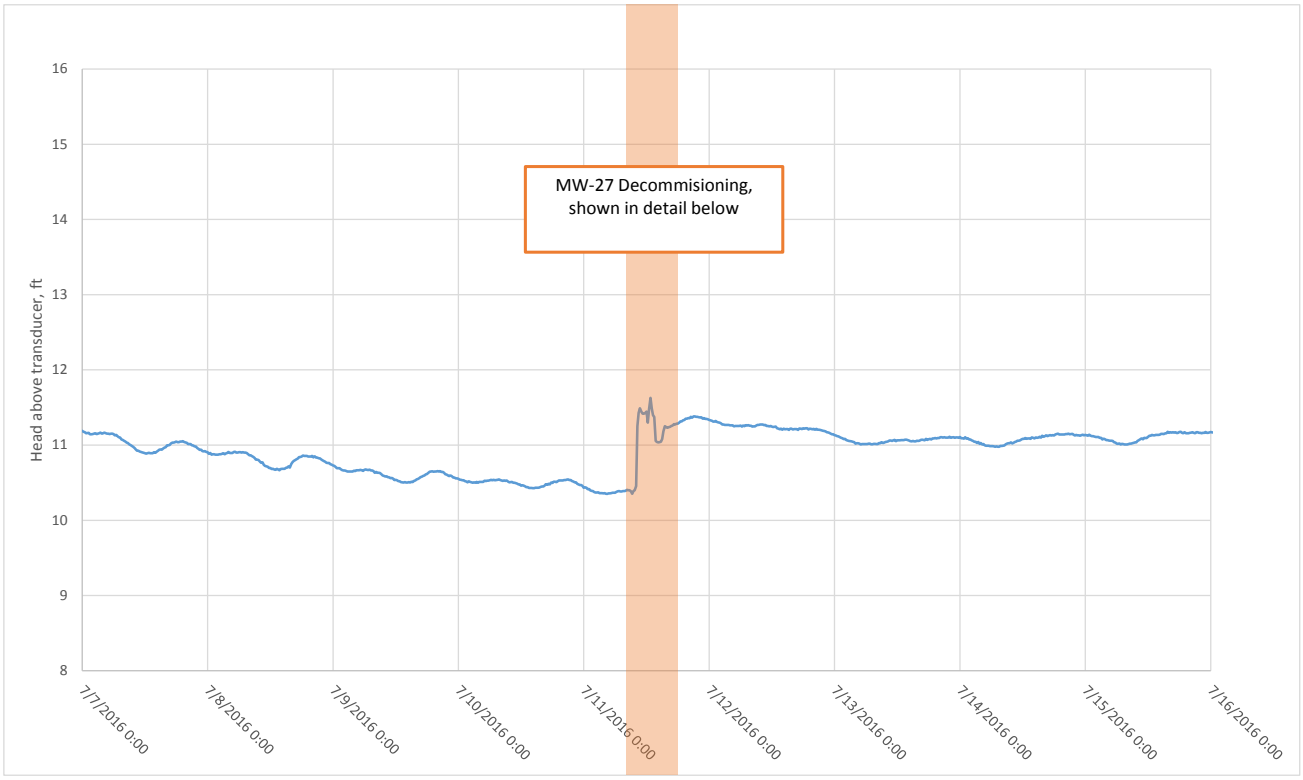
Figure 1 – MW-34 Hydrograph

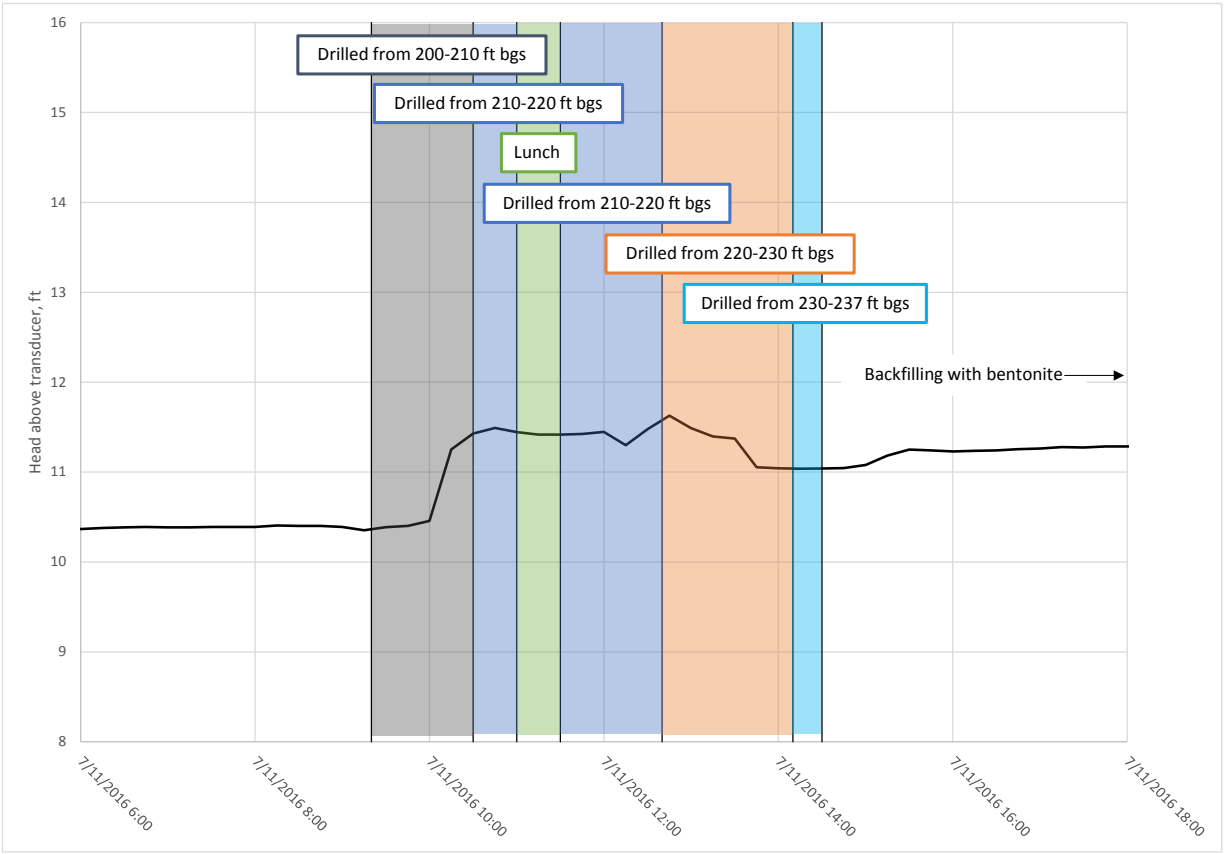
Attachment A – MW-27 Decommissioning Log

Attachment B – Daily Field Reports

Figure 1 – MW-34 Hydrograph

## Figure 1- MW-34 Hydrograph



Attachment A – MW-27 Decommissioning Log

# Monitoring Well Construction Log

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-27 | 1 of 2 |

Project Name: King County Closed Landfills
Location: Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method:

Ground Surface Elev (NGVD 88) 386.34
Top of Casing Elev. (NGVD 88) 388.63
Depth to Water (ft BGS)
Start/Finish Date 7/5/2016-7/12/2016

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 385 | Concrete surface patch | | | | | | **Decommissioning Details**<br>Monitoring well decommissioned by overdrilling using rotosonic drilling methods: 9-inch ID barrel to 90 feet, 7-inch ID barrel 90 to 237 feet.<br><br>0 to 2 feet: Concrete surface patch (dyed black)<br>2 to 210.5 feet: Bentonite chips<br>210.5 to 237 feet: Bentonite pellets<br><br>Additional Notes:<br>-Well casing deviates from plumb to the SE at 37 ft bgs (observed)<br>-Well casing below the deviation not extracted<br>-Remaining well casing below deviation at 37 ft bgs backfilled with bentonite chips (16 bags)<br><br>**Original Well Construction**<br>+2.3 to 186.5 feet: 4-inch OD, Sch 80 PVC blank riser<br>186.5 to 190.6 feet: 4-inch OD, Sch 80 PVC 20-slot screen<br>190.6 to 191.4 feet: 4-inch OD, Sch 80 PVC blank casing joint<br>191.4 to 200.7 feet: 4-inch OD, Sch 80 PVC 20-slot screen<br>200.7 to 201.3 feet: 4-inch OD, Sch 80 PVC blank casing and end plug<br><br>0 to 2 feet: Concrete, steel monument, bollards<br>2.0 to 134.0 feet: 3/4-inch bentonite chips<br>134.0 to 141.0 feet: Slough<br>141.0 to 183.5 feet: 3/4-inch bentonite chips<br>183.5 to 203.5 feet: Norton 16 x 30 silica sand<br>203.5 to 237.0 feet: Pea gravel | |
| 380 | | | | | | | | |
| 375 | Bentonite chips 2 - 210.5 ft bgs | | | | | | | |
| 370 | | | | | | | | |
| 365 | | | | | | | | |
| 360 | | | | | | | | |
| 355 | | | | | | | | |
| 350 | | | | | | | | |
| 345 | | | | | | | | |
| 340 | | | | | | | | |
| 335 | | | | | | | | |
| 330 | | | | | | | | |
| 325 | | | | | | | | |
| 320 | | | | | | | | |
| 315 | | | | | | | | |
| 310 | | | | | | | | |
| 305 | | | | | | | | |
| 300 | | | | | | | | |
| 295 | | | | | | | | |
| 290 | | | | | | | | |
| 285 | | | | | | | | |
| 280 | | | | | | | | |
| 275 | | | | | | | | |
| 270 | | | | | | | | |

Sampler Type:
○ No Recovery

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: MML
Approved by: John Strunk
Figure No. A - 2

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ August 16, 2016

# Monitoring Well Construction Log

| Project Number | Well Number | Sheet |
|---|---|---|
| 090057 | MW-27 | 2 of 2 |

Project Name: King County Closed Landfills
Location: Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method:

Ground Surface Elev (NGVD 88) 386.34
Top of Casing Elev. (NGVD 88) 388.63
Depth to Water (ft BGS)
Start/Finish Date 7/5/2016-7/12/2016

| Depth / Elevation (feet) | Borehole Completion | Sample Type/ID | Laboratory Tests | PID (ppm) | Unit | Material Type | Description | Depth (ft) |
|---|---|---|---|---|---|---|---|---|
| 265 / 125 | Bentonite chips 2 - 210.5 ft bgs | | | | | | | 125 |
| 260 / 130 | | | | | | | | 130 |
| 255 / 135 | | | | | | | | 135 |
| 250 / 140 | | | | | | | | 140 |
| 245 / 145 | | | | | | | | 145 |
| 240 / 150 | | | | | | | | 150 |
| 235 / 155 | | | | | | | | 155 |
| 230 / 160 | | | | | | | | 160 |
| 225 / 165 | | | | | | | | 165 |
| 220 / 170 | | | | | | | | 170 |
| 215 / 175 | | | | | | | | 175 |
| 210 / 180 | | | | | | | | 180 |
| 205 / 185 | | | | | | | | 185 |
| 200 / 190 | | | | | | | | 190 |
| 195 / 195 | | | | | | | | 195 |
| 190 / 200 | | | | | | | | 200 |
| 185 / 205 | | | | | | | | 205 |
| 180 / 210 | | | | | | | | 210 |
| 175 / 215 | Bentontite pellets 210.5 - 237 ft bgs | | | | | | | 215 |
| 170 / 220 | | | | | | | | 220 |
| 165 / 225 | | | | | | | | 225 |
| 160 / 230 | | | | | | | | 230 |
| 155 / 235 | | | | | | | | 235 |
| 150 | | | | | | | | |

Sampler Type:
○ No Recovery

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: MML
Approved by: John Strunk
Figure No. A - 2

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ August 16, 2016

# RESOURCE PROTECTION WELL REPORT

*(SUBMIT ONE WELL REPORT PER WELL INSTALLED)*

CURRENT
Notice of Intent No. AE38181

Construction/Decommission

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Consulting Firm Aspect

Property Owner King County

Site Address 18910 Westside Hwy SW

City Vashon Island County King

Unique Ecology Well ID

Tag No. MW27

Location 1/4 SW 1/4 SW Sec 36 Twn 23 R 2 or WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards

Materials used and the information reported above are true to my best knowledge and belief

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

☒ Driller ☐ Trainee Name (Print) David Dickinson

Driller/Trainee Signature _____

Driller/Trainee License No. 3017

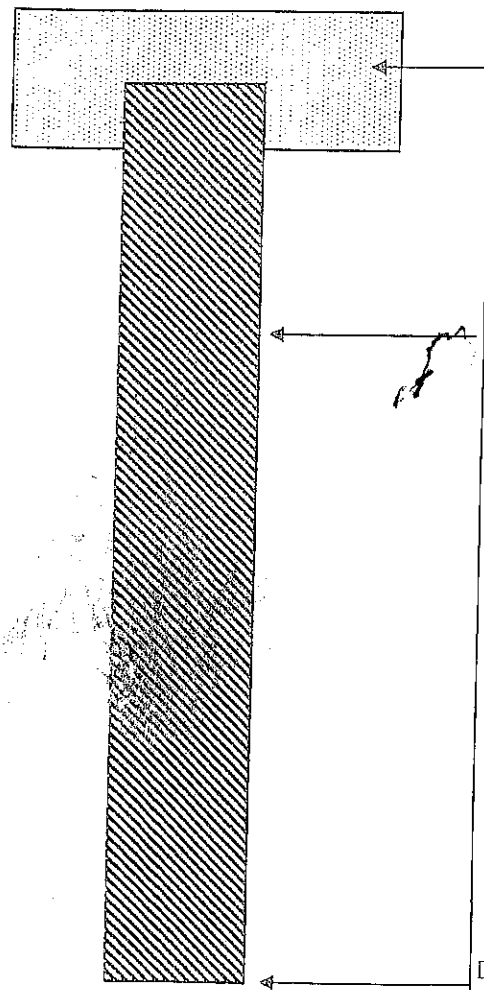
Cased or Uncased Diameter 8 in Static Level _____

Work/Decommision Start Date 7-5-16

If trainee, licesned drillers' Signature and License No. _____

Work/Decommision Completed Date 7-12-16

Construction/Design



Well Data

CONCRETE SURFACE SEAL 2 FT Redi Mix

BACKFILL 208 FT Bentonite Chips

210 Bentonite Pellets.

DEPTH OF BORING 237 FT

Formation Description

0 - 50 FT Bentonite

50 - 225 FT Silty sand + gravel

225 - 237 FT Silt.

Notes:

Drill from surface to 50 ft overdrilling a well at 50 ft, we lost the well during drilling. Aspect P.M. contacted DOE. was told to keep drilling. While backfilling we exposed the pvc. once again and poured in bentonite hole plug till full.

Scale 1" = _____

Page _____ of _____

ECY 050-1-20 (Rev 6/96)

DEPARTMENT OF ECOLOGY
State of Washington

# Notice of Intent to Decommission a Well

Notification Number **AE38181**

This form and required fees **MUST BE RECEIVED** by the Department of Ecology **72 HOURS BEFORE** you construct a well.

Submit one completed form for each job site and required fee (check or money order only) to:
Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611

**NOTE: Please print. Processing your Notice of Intent may be delayed if all fields are not filled in completely.**

| 1. Property Owner | Phone Number |
|---|---|
| King County | |

| Mailing Address | City | State | Zip Code |
|---|---|---|---|
| 18910 Westside Highway SW | Vashon Island | WA | 98070 |

| 2. Agent (if different from above) | Phone Number |
|---|---|
| | |

| Mailing Address | City | State | Zip Code |
|---|---|---|---|
| | | | |

3. Well Location

**Tax Parcel Number, Township, Range, Section,¼, and ¼ ¼ are Required.** Latitude and longitude (if available).

County Name: King - 17

| Well Site Street Address | City | State | Zip Code |
|---|---|---|---|
| 18910 Westside Highway SW | Vashon Island | WA | 98070 |

| Tax Parcel Number | Township | Range | Section | ¼ (within 160 acres) | ¼ -¼ (within 40 acres) |
|---|---|---|---|---|---|
| | 23N | 2E | 36 | SW | SW |

| Latitude Degrees | Latitude Time | Horizontal Collection Method |
|---|---|---|
| | min sec | |
| **Longitude Degrees** | **Longitude Time** | |
| | min sec | |

4. Notice of Intent Number of well being decomissioned

Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission

Resource Protection - $20.00 each Revised Code: 027-WEL1**-02-87-000101 How Many? 1

6. Estimated Decommission Start Date 7/5/2016 Project Name Aspect Vashon Island Closed Landfill

7. Professional's License Number

| 8. Well Drilling Company Name | Holt Services, Inc. | Phone Number (253) 604-4878 |
|---|---|---|
| 9. Well Driller Name | | Driller License Number |

10. **Send the entire form.**

Please copy the notification number (located in the upper and lower right corners) and keep in a safe place. Use this reference number when communicating with the Department of Ecology.

| | |
|---|---|
| Water Well : | $50.00 |
| Soil Sampling, Dewatering, Environmental investigation wells: | No Fee |
| All other wells: | $20.00 each |
| Amount Enclosed $ | $20.00 |

This notification number must be provided to your driller:

**AE38181**

**Your validation will be sent to the e-mail address you provided:** sk@holtservicesinc.com

# Instructions

Item 1: Property owner's name, daytime phone number and mailing address.

Item 2: Agent - If the driller, consultant or other person is acting as your agent and is submitting the notification fee, please provide their name, mailing address and daytime phone number

Item 3: Complete county name and code number from drop down list. If the site street address is available, please fill in the complete address here. Include city and zip code. Please enter the tax parcel number if available. NOTE: Include all dashes and zeros. Please provide the Township, Range, Section, where the well is located. This information can be found in your property legal description or the County Assessor's Office

Item 4: Please enter the original construction notice of intent number if available.

Item 5: Type of well to decommission. Please note those wells that require a fee and those that do not.

Item 6: Enter the approximate decommissioning start date.

Item 7-11: This information should be available from your well driller.

# For Assistance

**Contact the Department of Ecology Regional Office where the well is located.**

*Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima counties contact:*

**Central Regional Office (CRO)** **(509) 575-2490** **TTY 711 and 1-800-833-6388**

*Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman counties contact:*

**Eastern Regional Office (ERO)** **(509) 329-3400** **TTY 711 and 1-800-833-6388**

*Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom counties contact:*

**Northwest Regional Office (NWRO)** **(425) 649-7000** **TTY 711 and 1-800-833-6388**

*Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum counties contact:*

**Southwest Regional Office (SWRO)** **(360) 407-6300** **TTY 711 and 1-800-833-6388**

***ECY 040- 24 To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.***

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-27** |
| LOCATION | **Vashon Island, Washington** | PAGE | **1 of 13** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **380.8** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **237.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **0 to 0.4 foot: ASPHALT** |
| | | | | | | | | **0.4 to 2.5 feet: SILTY GRAVEL (GW-GM)**, brown fines, subrounded to subangular, some fine to medium sand, few fines, moist. (ROAD SUBGRADE) |
| | | | | | | | | **2.5 to 7.0 feet: SILTY GRAVEL (GP-GM)**, brown fines, medium to coarse, subrounded to subangular, some fine to coarse sand, few fines, few cobbles, trace boulders, dry to moist. Trace wood debris, broken glass and plastic debris at 3.0 to 3.5 feet. (FILL) |
| G | 4 | | | 5 | | | | |
| G | 8 | | | 10 | | | | **7.0 to 11.0 feet: SILTY GRAVEL (GM)**, olive gray fines, fine to coarse, subrounded to subangular, some fines, little fine to medium sand, trace cobbles, moist. Gravel content decreases downhole, gradational basal contact. (TILL) |
| G | 12 | | | 15 | | | | **11.0 to 27.0 feet: SILTY SAND (SM)**, olive gray fines, fine to medium, trace to few coarse, some nonplastic fines, some fine to medium gravel, trace coarse gravel, trace cobbles, moist. (TILL) |
| G | 15 | | | 20 | | | | |

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-27** |
| LOCATION | **Vashon Island, Washington** | PAGE | **2 of 13** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **380.8** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **237.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | LITHOLOGIC DESCRIPTION |
|---|---|---|---|
| G | 20 | | **11.0 to 27.0 feet: SILTY SAND (SM)**, continued. |
| | | | @ 23.0 feet: gravelly. |
| G | 25 | | @ 25.0 to 28.0 feet: slight increase in moisture content. |
| | | | **27.0 to 39.0 feet: SILTY SAND (SP-SM)**, yellow brown fines, fine to medium, subrounded to subangular, trace to few subrounded coarse sand and fine gravel, few fines, moist. Transitional to SP. Basal contact defined as where silt occurs disseminated within matrix. (FLUVIAL DEPOSITS) |
| G | 30 | | |
| | | | @ 33.0 feet: smoother drilling.<br>@ 33.0 to 39.0 feet: trace to few fine subrounded to subangular gravel, drilling action suggests gravel occurs in beds, occasional thin (<5 mm) brown sandy silt (ML) as beds, silt also occurs as thin coatings on gravels. |
| G | 35 | | |
| | | | **39.0 to 45.0 feet: SILTY SAND (SM)**, see description on next page. |

## REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | Vashon Island Landfill Closure | BORING NO. | MW-27 |
| LOCATION | Vashon Island, Washington | PAGE | 3 of 13 |
| DRILLED BY | Tacoma Pump & Drilling | REFERENCE ELEV. | 380.8 |
| DRILL METHOD | Dual Rotary, Foremost DR24 | TOTAL DEPTH | 237.0' |
| LOGGED BY | Udaloy | DATE COMPLETED | 8/15/03 |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | LITHOLOGIC DESCRIPTION |
|---|---|---|---|
| G | 40 | | **39.0 to 45.0 feet: SILTY SAND (SM)**, yellow brown fines, fine to medium, trace coarse, some fines, some subrounded to subangular fine gravel, damp to moist. Gradational basal contact. (FLUVIAL DEPOSITS) |
| | | | @ 42.0 to 44.0 feet: few fine gravel. |
| G | 45 | | **45.0 to 74.0 feet: SILTY SAND (SP-SM)**, yellow brown to grayish brown fines, fine to medium, trace coarse, trace to few fines (gradational to SP), little to some rounded, subrounded and subangular fine gravel at 45.0 feet, trace to few fine gravel below. Uncertain basal contact due to discharge hose failure. (FLUVIAL DEPOSITS) |
| G | 50 | | |
| G | 55 | | @ 55.0 feet: remove standard tri-cone drill bit, install sample-through bit. |
| | | | @ 59.0 feet: cobbles. |

GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN

45

50

55

60

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-27** |
| LOCATION | **Vashon Island, Washington** | PAGE | **4 of 13** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **380.8** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **237.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| G | 60 | | | | | | | **45.0 to 74.0 feet: SILTY SAND (SP-SM)**, continued. @ 60.0 to 76.0 feet: very easy drilling, very easy to drive casing, transitional to SP-SM, sand is fine with trace medium, trace fine to coarse subrounded to subangular gravel. |
| G | 65 | | | 65 | | | | |
| G | 70 | | | 70 | | | | |
| | | | | 75 | | | | **74.0 to 77.5 feet: SAND (SP)**, yellow brown fines, fine, trace fines, damp. (FLUVIAL DEPOSITS) |
| G | 76 | | | | | | | **77.5 to 87.0 feet: SAND (SP)**, yellow brown fines, fine with common interbeds of thin (<3 mm) gray silt (ML) beds, damp to moist, silt beds are soft, moderate plasticity, damp to moist. (FLUVIAL DEPOSITS) |
| | | | | 80 | | | | |

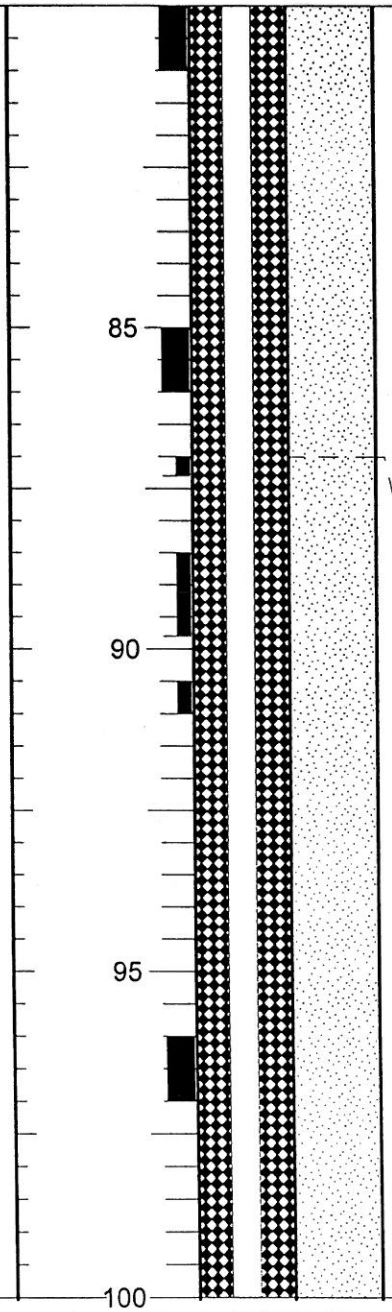
**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-27** |
| LOCATION | **Vashon Island, Washington** | PAGE | **5 of 13** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **380.8** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **237.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | LITHOLOGIC DESCRIPTION |
|---|---|---|---|
| G | 80 | | **77.5 to 87.0 feet: SAND (SP)**, continued. |
| G | 85 | | |
| SS | 87 | 100/3" | @ 87.0 feet: no sample recovery, fragments of a quartzite cobble in sampler drive shoe. No silt beds observed in cuttings below 87.0 feet. |
| SS | 88.5 | 35<br>40<br>50/4" | **87.0 to 102.0 feet: SAND (SP)**, yellow brown fines, fine, trace fines, damp. Grades to SILTY SAND (SM). (FLUVIAL DEPOSITS)<br>@ 88.5 feet: 3-inch recovery, fragments of a quartzite cobble plus slough, no formation. |
| SS | 90.5 | 100 | @ 90.5 feet: SILTY SAND (SM), fine, little to some fines. |
| | | | @ 92.0 feet: color change to brown fines, moist (possible former perched saturated zone?). |
| G | 96 | | |




## REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-27** |
| LOCATION | **Vashon Island, Washington** | PAGE | **6 of 13** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **380.8** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **237.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | LITHOLOGIC DESCRIPTION |
|---|---|---|---|
| G | 100 | | **87.0 to 102.0 feet: SAND (SP)**, continued.<br>@ 100.0 feet: common orange-brown coatings on sand grains, moist. |
| G | 102 | | **102.0 to 106.0 feet: SAND (SP)**, brown-orange fines, fine, trace medium to coarse, trace fine gravel, one gravel clast has red-orange stains, moist, with common beds of brown-gray silt (ML), silt is soft, moist, with moderate plasticity. Casing sinks freely from 104.0 to 106.0 feet. (FLUVIAL DEPOSITS) |
| SS | 106 | 50 | **106.0 to 118.0 feet: SILT (ML)**, brownish gray at upper contact, gray below, trace to some fine sand, soft at upper contact to slightly stiff below, moist, nonplastic to low plasticity. (LACUSTRINE DEPOSITS)<br>@ 108.0 to 113.0 feet: poor sample recovery. |
| SS | | 50 | @ 113.0 feet: no sample recovery. |
| SS | 113.5 | 100/4" | @ 113.5 feet: 100 percent recovery. SANDY SILT (ML), gray, some fine sand, trace fine gravel, slightly stiff, moderate to low plasticity, moist.<br>@ 115.0 feet: add water during drilling. |
| G | 116 | | |
| SS | 117 | NR | @ 117.0 feet: gray very fine SANDY SILT (ML), soft, moderate plasticity, some very fine sand, moist to saturated (apparent capillary saturation). |
| | | | **118.0 to 135.0 feet: SILT (ML)**, gray, soft to stiff. (LACUSTRINE DEPOSITS) |

105 110 115 120

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-27** |
| LOCATION | **Vashon Island, Washington** | PAGE | **7 of 13** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **380.8** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **237.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | LITHOLOGIC DESCRIPTION |
|---|---|---|---|
| G | 120 | | **118.0 to 135.0 feet: SILT (ML),** continued. |
| G | 122 | | |
| G | 124 | | @ 124.0 feet: trace subangular black (basalt) fine gravel, trace brown laminated silt (ML). |
| SS | 126 | 100 | @ 126.0 feet: no sample recovery. Install secondary air compressor to facilitate sample recovery. |
| SS | 130.5 | 99/18" | |
| G | 134 | | @ 132.7 feet: depth to water measured during placement of annular backfill with 8-inch steel casing drive shoe at 134.1 below grade, 08/14/03. Borehole caved to 0.3 feet below drive shoe. |
| SS | 137 | 10<br>30<br>50/5" | **135.0 to 140.0 feet: SAND (SP),** gray fines, fine, few fines. (FLUVIAL/LACUSTRINE DEPOSITS)<br>@ 137.0 feet: 3-inch recovery, SAND (SP), gray fines, fine, trace to few fines. No apparent bedding structures. Based on water levels measured during annular fill placement, sample was likely disturbed by heaving. |

GROUND WATER LEVEL: ▽ 8/14/03

DEPTH IN FEET: 125, 130, 135, 140

SAMPLES / WELL DETAILS / LITHOLOGIC COLUMN

## REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | Vashon Island Landfill Closure | BORING NO. | MW-27 |
| LOCATION | Vashon Island, Washington | PAGE | 8 of 13 |
| DRILLED BY | Tacoma Pump & Drilling | REFERENCE ELEV. | 380.8 |
| DRILL METHOD | Dual Rotary, Foremost DR24 | TOTAL DEPTH | 237.0' |
| LOGGED BY | Udaloy | DATE COMPLETED | 8/15/03 |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| G | 140 | | | | | | | **140.0 to 150.0 feet: SILT (ML)**, gray, very stiff to hard. Trace organic material at 140.0 feet, absent below. (LACUSTRINE DEPOSITS) |
| G | 145 | | | 145 | | | | |
| G | 148 | | | | | | | |
| | | | | 150 | | | | **150.0 to 156.0 feet: SILTY GRAVEL (GM)**, yellow-brown fines, fine to medium, subrounded to subangular, matrix-supported, matrix is laminated gray clayey silt (CL) with yellow-brown staining adjacent to gravels. (FLUVIAL/LACUSTRINE DEPOSITS) |
| G | 152 | | | | | | | |
| | | | | 155 | | | | |
| G | 156 | | | | | | | **156.0 to 164.0 feet: SILT (ML)**, gray, trace clay, very stiff to hard. (LACUSTRINE DEPOSITS) |
| | | | | 160 | | | | |

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

**UDALOY ENVIRONMENTAL SERVICES**

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | Vashon Island Landfill Closure | BORING NO. | MW-27 |
| LOCATION | Vashon Island, Washington | PAGE | 9 of 13 |
| DRILLED BY | Tacoma Pump & Drilling | REFERENCE ELEV. | 380.8 |
| DRILL METHOD | Dual Rotary, Foremost DR24 | TOTAL DEPTH | 237.0' |
| LOGGED BY | Udaloy | DATE COMPLETED | 8/15/03 |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| G | 160 | | | | | | | **156.0 to 164.0 feet: SILT (ML)**, continued. |
| G | 165 | | | 165 | | | | **164.0 to 174.0 feet: SILTY GRAVEL (GP-GM)**, brown-gray fines, medium to coarse, subrounded to subangular, some fine to medium sand, few to little fines (a portion of the fines may be carry-down). (FLUVIAL DEPOSITS) |
| G | 169 | | | 170 | | | | |
| G | 172 | | | | | | | |
| G | 175 | | | 175 | | | | **174.0 to 190.0 feet: GRAVELLY SAND (SP)**, brown fines, fine to medium, trace fines, some fine to coarse gravel, trace cobbles, drills easily. (FLUVIAL DEPOSITS) |
| | | | | 180 | | | | |

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | Vashon Island Landfill Closure | BORING NO. | MW-27 |
| LOCATION | Vashon Island, Washington | PAGE | 10 of 13 |
| DRILLED BY | Tacoma Pump & Drilling | REFERENCE ELEV. | 380.8 |
| DRILL METHOD | Dual Rotary, Foremost DR24 | TOTAL DEPTH | 237.0' |
| LOGGED BY | Udaloy | DATE COMPLETED | 8/15/03 |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **174.0 to 190.0 feet: GRAVELLY SAND (SP)**, continued. |
| G | 181.5 | | | | | | | |
| G | 185 | | | 185 | | | | @ 185.0 feet: ½-inch-thick by 3-inch-diameter disc of PEAT, brown. |
| | | | ▼ 10/14/03 | | | | | |
| | | | | 190 | | | | **190.0 to 197.0 feet: SAND (SP)**, yellow brown fines, medium to coarse, subrounded to angular, few fines at upper contact (SP-SM), trace fines below, few fine to medium gravel, transitional to SW. Gradational basal contact. (FLUVIAL DEPOSITS) |
| G | 191 | | | | | | | |
| G | 195 | | | 195 | | | | **197.0 to 211.0 feet: SILTY GRAVEL (GW-GM)**, yellow gray fines, fine to coarse, subrounded to subangular, few fines, little fine to coarse sand. (FLUVIAL DEPOSITS) |
| | | | | 200 | | | | |

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet ~~below grade on~~ 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

**UDALOY ENVIRONMENTAL SERVICES**

? TD=237' elevation 132.7 ft bgs

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | Vashon Island Landfill Closure | BORING NO. | MW-27 |
| LOCATION | Vashon Island, Washington | PAGE | 11 of 13 |
| DRILLED BY | Tacoma Pump & Drilling | REFERENCE ELEV. | 380.8 |
| DRILL METHOD | Dual Rotary, Foremost DR24 | TOTAL DEPTH | 237.0' |
| LOGGED BY | Udaloy | DATE COMPLETED | 8/15/03 |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| G | 200 | | | | | | | **197.0 to 211.0 feet: SILTY GRAVEL (GW-GM),** continued. |
| G | 205 | | | 205 | | | | |
| G | 209 | | | 210 | | | | **211.0 to 214.0 feet: SILTY GRAVEL (GM),** yellow brown fines, medium to coarse, subrounded to subangular, some fines, continuous with and basal unit of overlying GP-GM. (FLUVIAL DEPOSITS) |
| G | 213 | | | | | | | **214.0 to 217.0 feet: SILTY SAND (SM),** gray fines with black sand grains, very fine to fine, some fines, smooth drilling, uncertain basal contact. (FLUVIAL DEPOSITS) |
| G | 215 | | | 215 | | | | $i_z = \frac{190.2 - 186.5}{217 - 193} = 0.15$ |
| | | | | | | | | @ 217.0 feet: with drive shoe at 217.0 feet, static water depth is 190.2 feet after 30 minutes. |
| | | | | | | | | **217.0 to 227.0 feet: GRAVEL (GP),** gray brown fines (fine to medium, rounded to subrounded, some fine to medium sand, trace fines. Transitional to GP-GM. (FLUVIAL DEPOSITS) |
| | | | | 220 | | | | |

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | Vashon Island Landfill Closure | BORING NO. | MW-27 |
| LOCATION | Vashon Island, Washington | PAGE | 12 of 13 |
| DRILLED BY | Tacoma Pump & Drilling | REFERENCE ELEV. | 380.8 |
| DRILL METHOD | Dual Rotary, Foremost DR24 | TOTAL DEPTH | 237.0' |
| LOGGED BY | Udaloy | DATE COMPLETED | 8/15/03 |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| G | 221 | | | | | | | **217.0 to 227.0 feet: GRAVEL (GP)**, continued. |
| G | 224 | | | 225 | | | | $i_z = \frac{205.8 - 190.2}{227 - 217} = 1.56$ |
| | | | | | | | | @ 227.0 feet: with drive shoe at 227.0 feet, depth to water is 205.8 feet after 30 minutes, rising very slowly after 30 minutes. ~Elev 175' |
| G | 228 | | | | | | | **227.0 to 237.0 feet: SILTY GRAVEL (GM)**, gray fines, medium to coarse, subrounded to subangular, some fines, few to little fine to medium sand, trace cobbles. Easy drilling. (FLUVIAL DEPOSITS) |
| | | | | 230 | | | | |
| G | 232 | | | | | | | |
| | | | | 235 | | | | |
| G | 236 | | | | | | | |
| | | | | | | | | Total depth drilled and sampled = 237.0 feet. |
| | | | | | | | | See Page 13 for Well Completion Details. |
| | | | | 240 | | | | |

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

# LOG OF EXPLORATORY BORING

| | | | |
|---|---|---|---|
| PROJECT NAME | **Vashon Island Landfill Closure** | BORING NO. | **MW-27** |
| LOCATION | **Vashon Island, Washington** | PAGE | **13 of 13** |
| DRILLED BY | **Tacoma Pump & Drilling** | REFERENCE ELEV. | **380.8** |
| DRILL METHOD | **Dual Rotary, Foremost DR24** | TOTAL DEPTH | **237.0'** |
| LOGGED BY | **Udaloy** | DATE COMPLETED | **8/15/03** |

| SAMPLE METHOD | SAMPLE NUMBER | BLOWS PER 6 INCHES | GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN | LITHOLOGIC DESCRIPTION |
|---|---|---|---|---|---|---|---|---|

245

250

255

260

**WELL COMPLETION DETAILS**

+2.3 to 186.5 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.

186.5 to 190.6 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

190.6 to 191.4 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing at joint between screen sections.

191.4 to 200.7 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

200.7 to 201.3 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing and end plug.

185.0 to 186.0 feet: Stainless steel centralizer.
192.0 to 193.0 feet: Stainless steel centralizer.
200.0 to 201.0 feet: Stainless steel centralizer.

0 to 2.0 feet: Concrete.
2.0 to 134.0 feet: Baroid® 3/4-inch bentonite chips.
134.0 to 141.0 feet: Slough.
141.0 to 183.5 feet: Baroid® 3/4-inch bentonite chips.
183.5 to 203.5 feet: Norton™ 16 x 30 silica sand.
203.5 to 237.0 feet: Pea gravel.

**REMARKS**

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

Attachment B – Daily Field Reports

# DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

| | | |
|---|---|---|
| **DATE:** 7/05/16 | **PROJECT NO.** 090057 TASK 310.1.10 | **WEATHER:** PARTLY CLOUDY, HIGH 60'S |
| **PROJECT NAME:** Vashon Landfill | | **CLIENT:** KCSWD |
| **EQUIPMENT USED:** WATER LEVEL IND, | | **PROJECT LOCATION:** VASHON ISLAND, WA |

**THE FOLLOWING WAS NOTED:**
**Arrival Time:** 0901
**Activities:** Ensure access, direct equipment drop off
**Personnel/Visitors:** Matthew Lewis (Aspect)
**Departure Time:** 1300
**Field Forms Used:** Field Notebook

**Summary of Activities:**
Matthew arrived on site, unlocked the south gate, and identified the well to be decommissioned (MW-27 with Ecology Tag AHM-855). At 0910, received a call from driller with Holt Services that there is a problem with the brake system of the truck hauling the drill rig and it is temporarily parked at the Vashon ferry terminal dock until it can be moved to the landfill. A mechanic from Holt was been dispatched to make repairs. At 1000, the roll-off box for soil cuttings is delivered and staged on the side of the perimeter road at the SE corner of the landfill. Driller informs me that repairs will take the rest of the day. I instruct them to leave the rigs near MW-27 after the repairs are made, but not to block access to the perimeter road.

Aspect off site at 1300 after locking the south gate.

**Problems Encountered:** Lost time equipment failure (Holt), no other problems.

| | |
|---|---|
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**FIELD REP.:** MML

# DAILY REPORT

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Seattle, Washington 98104
(206) 328-7443

| | | |
|---|---|---|
| **DATE:** 7/06/16 | **PROJECT NO.** 090057 TASK 310.1.10 | **WEATHER:** PARTLY CLOUDY, MID 60'S |
| **PROJECT NAME:** Vashon Landfill | | **CLIENT:** KCSWD |
| **EQUIPMENT USED:** WATER LEVEL IND, FIELD COMPUTER, DIVERS | | **PROJECT LOCATION:** VASHON ISLAND, WA |

**THE FOLLOWING WAS NOTED:**
**Arrival Time:** 0720
**Activities:** Safety mtg., install divers, remove monument, start overdrilling
**Personnel/Visitors:** Matthew Lewis - Aspect, David (Holt driller) and helpers (Ben, Grady)
**Departure Time:** 1645
**Field Forms Used:** Field Notebook

**Summary of Activities:**
Matthew arrived on site, met driller, have safety meeting. Matthew removes the pump and tubing from MW-27, installs a diver and barometric diver in MW-34 while drillers prep equipment and remove bollards. At 0850, Holt's vac-truck arrives with a jackhammer to remove the concrete monument and leaves at 0930. At 1000 Holt levels rig, preps equipment, and begins over drilling MW-27.

At 1100 Holt's mechanic arrives to make further repairs on truck. He is on and off the site throughout the day, buying parts as necessary.

The soil cuttings returned for depth interval 40 to 50 ft bgs contains no bentonite or PVC well casing from MW-27. I call Bob to report, he recommends drilling to 106 ft bgs to reacquire the well. Well borehole is likely not plumb and vertically aligned between 30 and 40 ft bgs. Review of the MW-27 drill log indicate that the tri-cone bit was replaced with a sample-through bit at 55 ft bgs which could account for a non-plumb borehole.

I go to the hardware store to buy plastic sheeting so that samples can now be laid out and observed for signs of the well materials (bentonite, PVC, filter pack, etc.)

Holt advances to 90 ft bgs with no indication of the well below 40 ft bgs. Samples are covered, gates are locked, roll-box is closed before leaving.

Personnel off site at 1645.

**Problems Encountered:** Well was installed at an angle, not being returned in soil cuttings. No other problems.

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| **Page 1 of 1** | **FIELD REP.:** MML |

# DAILY REPORT

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(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

| | | |
|---|---|---|
| **DATE:** 7/07/16 | **PROJECT NO.** 090057 TASK 310.1.10 | **WEATHER:** CLOUDY/LT RAIN, MID 60'S |
| **PROJECT NAME:** Vashon Landfill | **CLIENT:** KCSWD | |
| **EQUIPMENT USED:** NONE | **PROJECT LOCATION:** VASHON ISLAND, WA | |

**THE FOLLOWING WAS NOTED:**
**Arrival Time:** 0730
**Activities:** Continue drilling, scout future boring locations
**Personnel/Visitors:** Matthew Lewis, Bob Hanford & John Strunk (Aspect), David (Holt driller) and helpers (Ben, Grady), Dan Swope (KCSWD)
**Departure Time:** 1550
**Field Forms Used:** Field Notebook

**Summary of Activities:**
Matthew arrives on site at 0730, Bob and John S. arrive at 0840. Holt is running late, arrives at 0900 and resumes drilling. Bob, John, and Matthew scout locations for future drilling work for gas extraction well and probes on South Slope. After discussion with KCSWD, John recommends drilling to the total depth (237 ft bgs) and backfilling as planned. Holt switched from 9-inch casing to 7-inch casing at 90 ft bgs. Soil cuttings from 90-100 ft bgs contain a very small amount (handful) of bentonite chips. No bentonite was observed below this depth.

Bob and John leave at 1120. Holt advances casing to 150 ft bgs by end of the day.

At 1550, Holt and Aspect leave site.

**Problems Encountered:** No problems.

| | |
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# DAILY REPORT

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(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

| | | |
|---|---|---|
| **DATE:** 7/08/16 | **PROJECT NO.** 090057 TASK 310.1.10 | **WEATHER:** RAINY TO SUNNY, MID 60'S |
| **PROJECT NAME:** Vashon Landfill | **CLIENT:** KCSWD | |
| **EQUIPMENT USED:** NONE | **PROJECT LOCATION:** VASHON ISLAND, WA | |

**THE FOLLOWING WAS NOTED:**
**Arrival Time:** 0800
**Activities:** Continue drilling
**Personnel/Visitors:** Matthew Lewis (Aspect), David (Holt driller) and helpers (Ben, Grady)
**Departure Time:** 1610
**Field Forms Used:** Field Notebook

**Summary of Activities:**
Arrive at 0800. Holt resumes drilling for the day. No indications of well in cuttings. Drilled to 200 ft bgs by end of day.

At 1610 Holt and Aspect leave site after closing roll-off box, locking gates, and covering samples.

**Problems Encountered:** No problems.

| | |
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# DAILY REPORT

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(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

| | | |
|---|---|---|
| **DATE:** 7/11/16 | **PROJECT NO.** 090057 TASK 310.1.10 | **WEATHER:** CLOUDY, MID 60'S |
| **PROJECT NAME:** Vashon Landfill | **CLIENT:** KCSWD | |
| **EQUIPMENT USED:** NONE | **PROJECT LOCATION:** VASHON ISLAND, WA | |

**THE FOLLOWING WAS NOTED:**
**Arrival Time:** 0730
**Activities:** Continue drilling
**Personnel/Visitors:** Matthew Lewis (Aspect), David (Holt driller) and helpers (Ben, Grady)
**Departure Time:** 1615
**Field Forms Used:** Field Notebook

**Summary of Activities:**
Arrive at 0730. Holt continues drilling for the day. No indications of well in cuttings. Drilled to 237 ft bgs by end of day. Boring terminates in slightly moist, hard, gravelly SILT.

At 1430 Holt begins backfilling the boring with bentonite pellets (12 buckets, 50 lbs each). Top of pellets sounded at 210.5 ft bgs. Begin backfilling with 3/8" bentonite chips.

At 1605 Holt reports that it took 10 bags of chips to backfill 7 ft of hole at 176 ft bgs (instead of the expected ~3 ½ bags). Likely a void at that depth has been filled in. I reexamined samples from that interval, and confirm there is no indication of MW-27. The boring is backfilled to 170 ft by end of day.

At 1615 Aspect leave site after closing roll-off box, locking gates, and covering samples. Holt leaves at 1630 after putting some equipment away.

**Problems Encountered:** No problems.

| | |
|---|---|
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**FIELD REP.:** MML

# DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

| | | |
|---|---|---|
| **DATE:** 7/12/16 | **PROJECT NO.** 090057 TASK 310.1.10 | **WEATHER:** CLOUDY, MID 60'S |
| **PROJECT NAME:** Vashon Landfill | **CLIENT:** KCSWD | |
| **EQUIPMENT USED:** NONE | **PROJECT LOCATION:** VASHON ISLAND, WA | |

**THE FOLLOWING WAS NOTED:**
**Arrival Time:** 0730
**Activities:** Complete decommissioning
**Personnel/Visitors:** Matthew Lewis (Aspect), David (Holt driller) and helpers (Ben, Grady)
**Departure Time:** 1615
**Field Forms Used:** Field Notebook

**Summary of Activities:**
Arrive at 0730 and unlock the south gate. Holt arrives at 0800 and resumes backfilling with bentonite chips.

At 1150, Holt reports another void at 37 ft bgs. We attach a flashlight to drop tape and can see the opening to MW-27 at the SE edge of the boring (the conductor casing is at 30 ft bgs leaving 7 ft of open hole). I call Bob, and talk to John S and Erick Miller, they recommend continue filling the void as much as possible, keeping track of how much goes down the well. The total amount of bentonite chips that go down the PVC casing is 16 bags. Holt calls the shop to request more bentonite chips. Holt begins decontaminating the casing removed from the boring, and disposing of samples.

At 1410, a driver from Holt arrives with a pallet of bentonite chips, and they resume backfilling to surface. Holt patches the surface with black-dyed concrete.

- Total materials used for backfilling MW-27
  - 162 bags (50 lbs each) of bentonite chips
  - 12 buckets (50 lbs each) of bentonite pellets
  - 7 bags of concrete
- The roll-off box is about ½ full and closed
- There are 3 drums of decon water are marked and next to the roll-off box

Holt and Aspect leave the site by 1615 after closing the roll-off box, and locking the south gate.

**Problems Encountered:** No problems.

| | |
|---|---|
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| **Page 1 of 1** | **FIELD REP.:** MML |