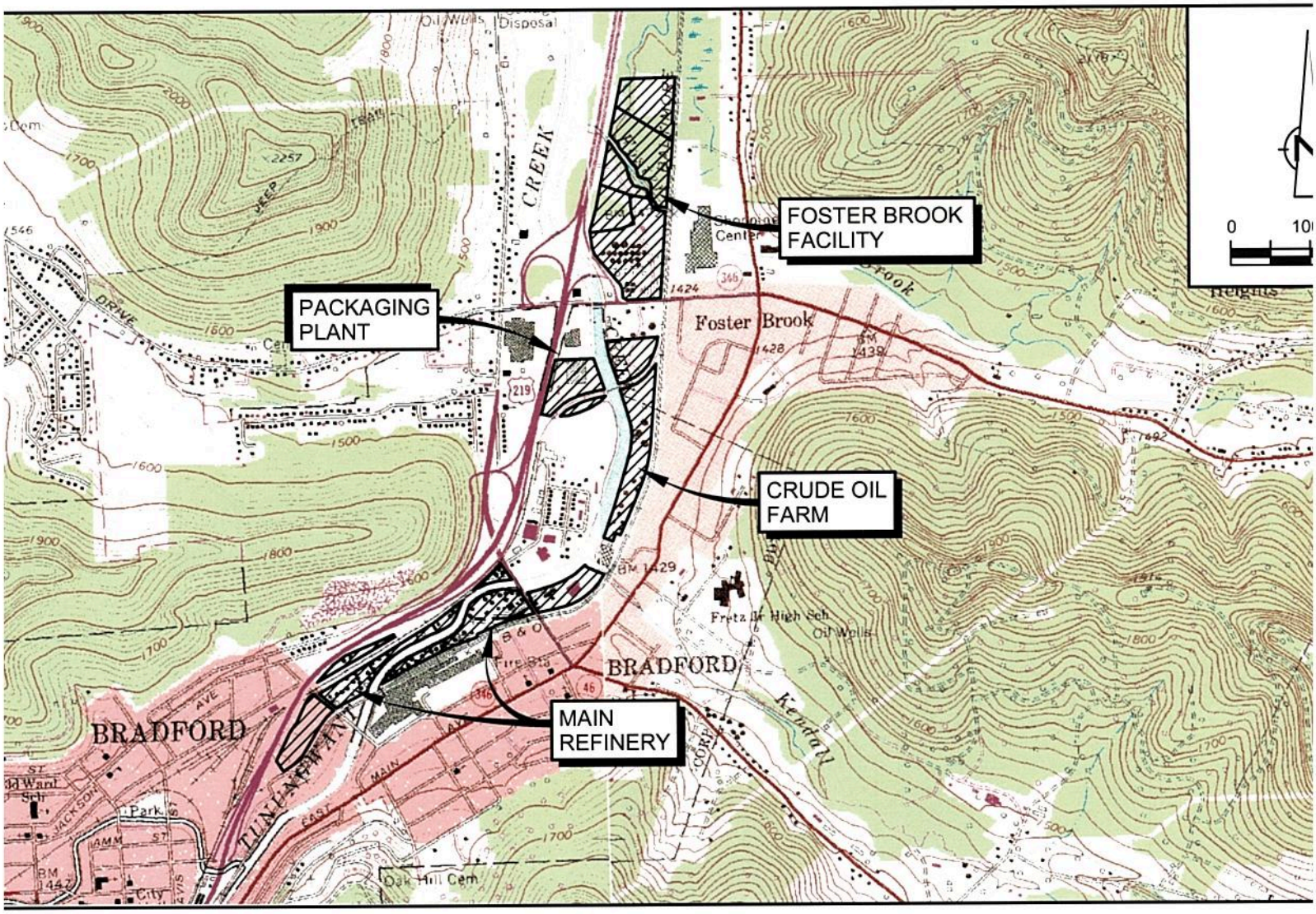
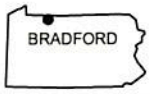


S QUADRANGLE MAP;
DFORD, PENNSYLVANIA
, PHOTOREVISED 1977, REVISED 1981
RICK CITY, PENNSYLVANIA
, PHOTOREVISED 1983, REVISED 1986



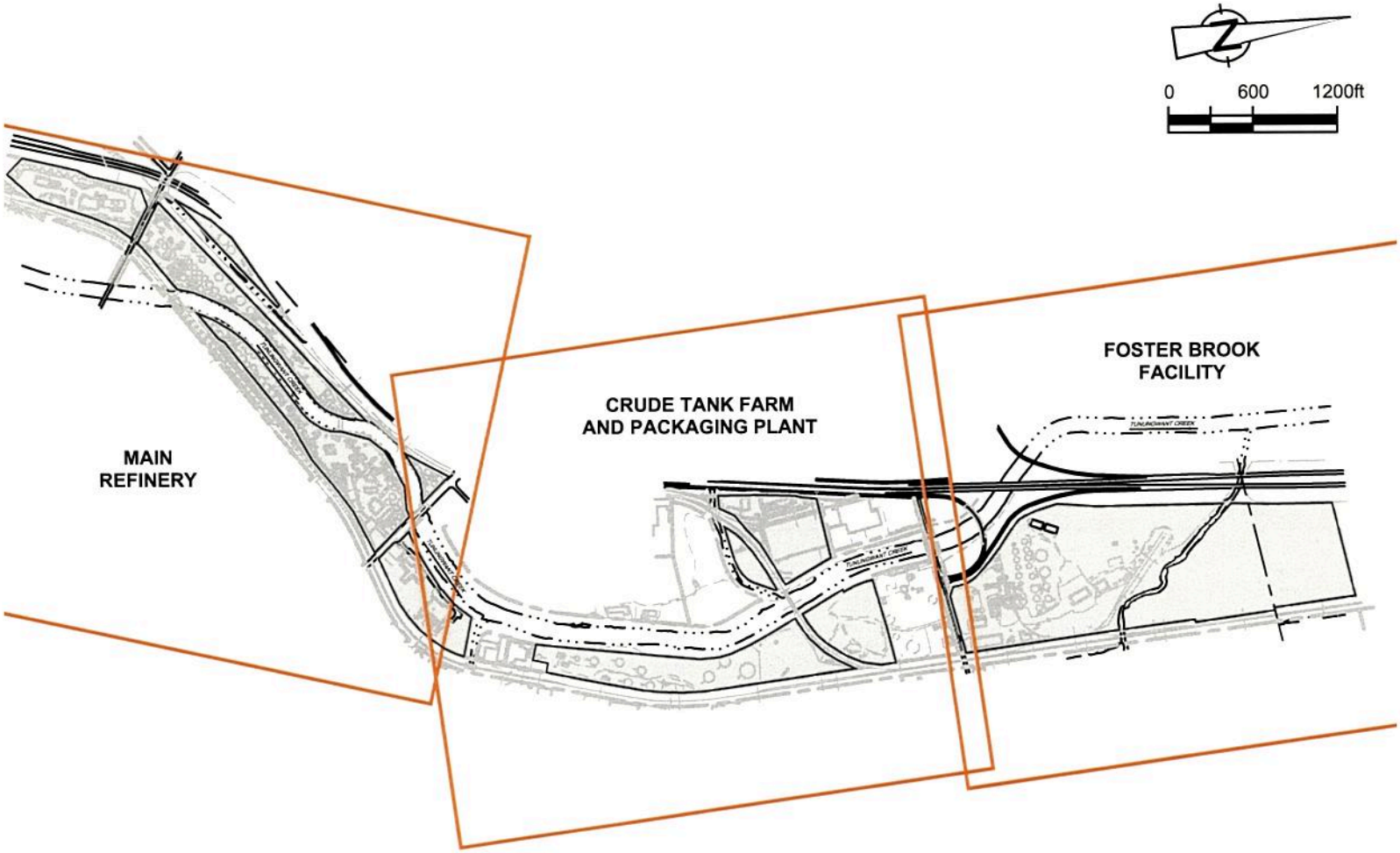
PENNSYLVANIA

fig

SITE LOC

ARG Refinery, Bradford, Penns

N-WA004 JAN 24/2008



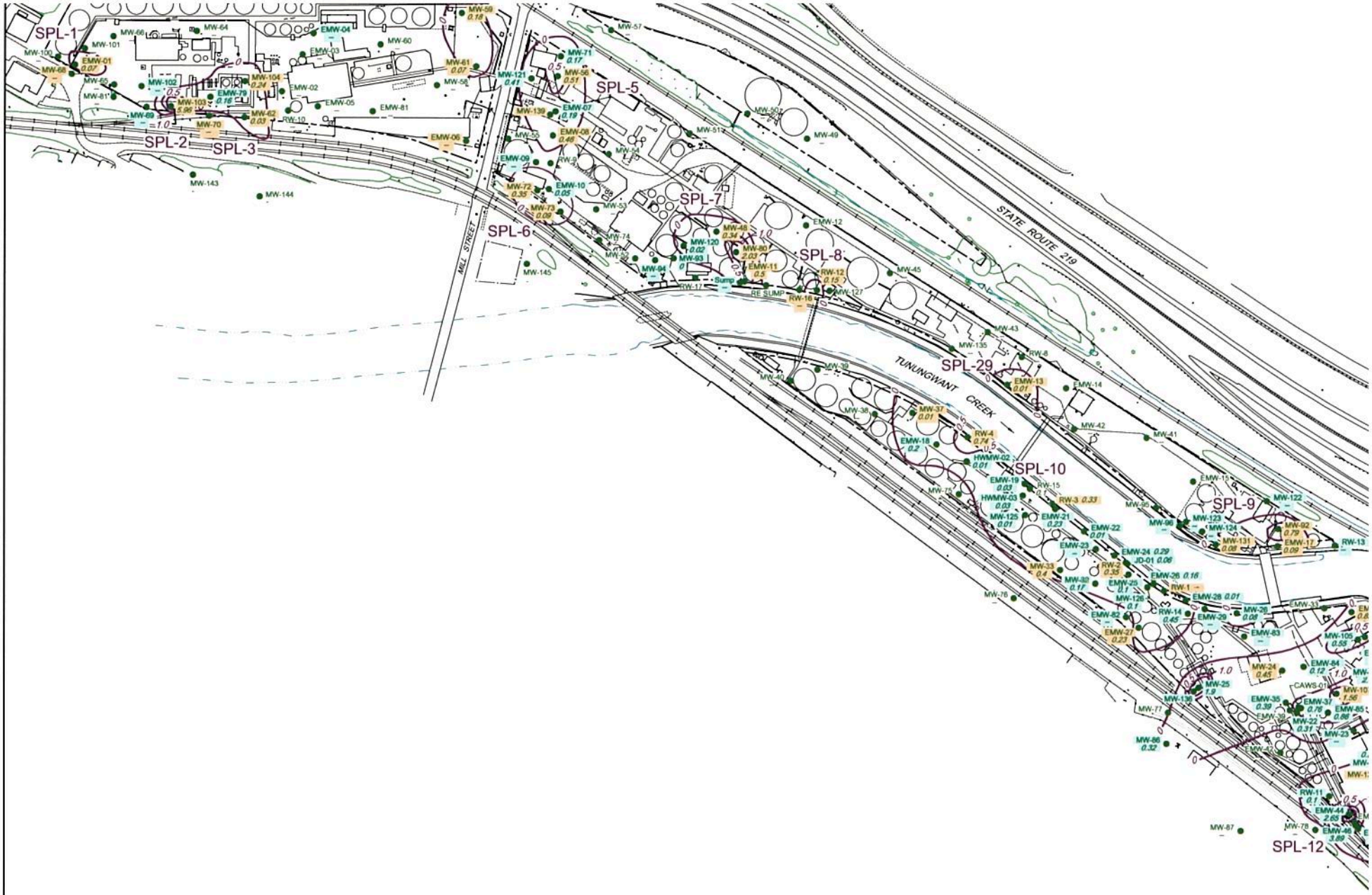
fig

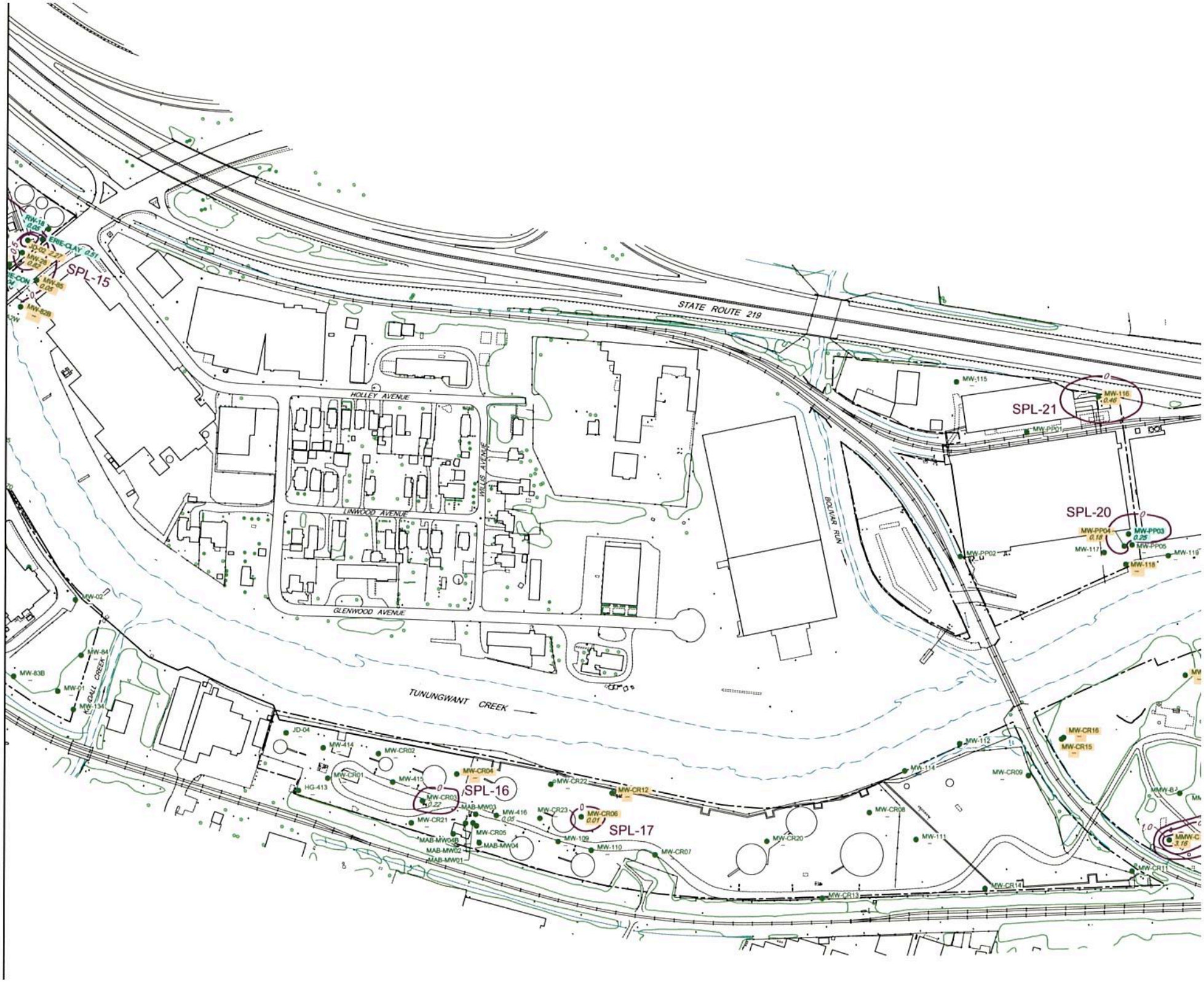
SITE

ARG Refinery, Bradford, Penns

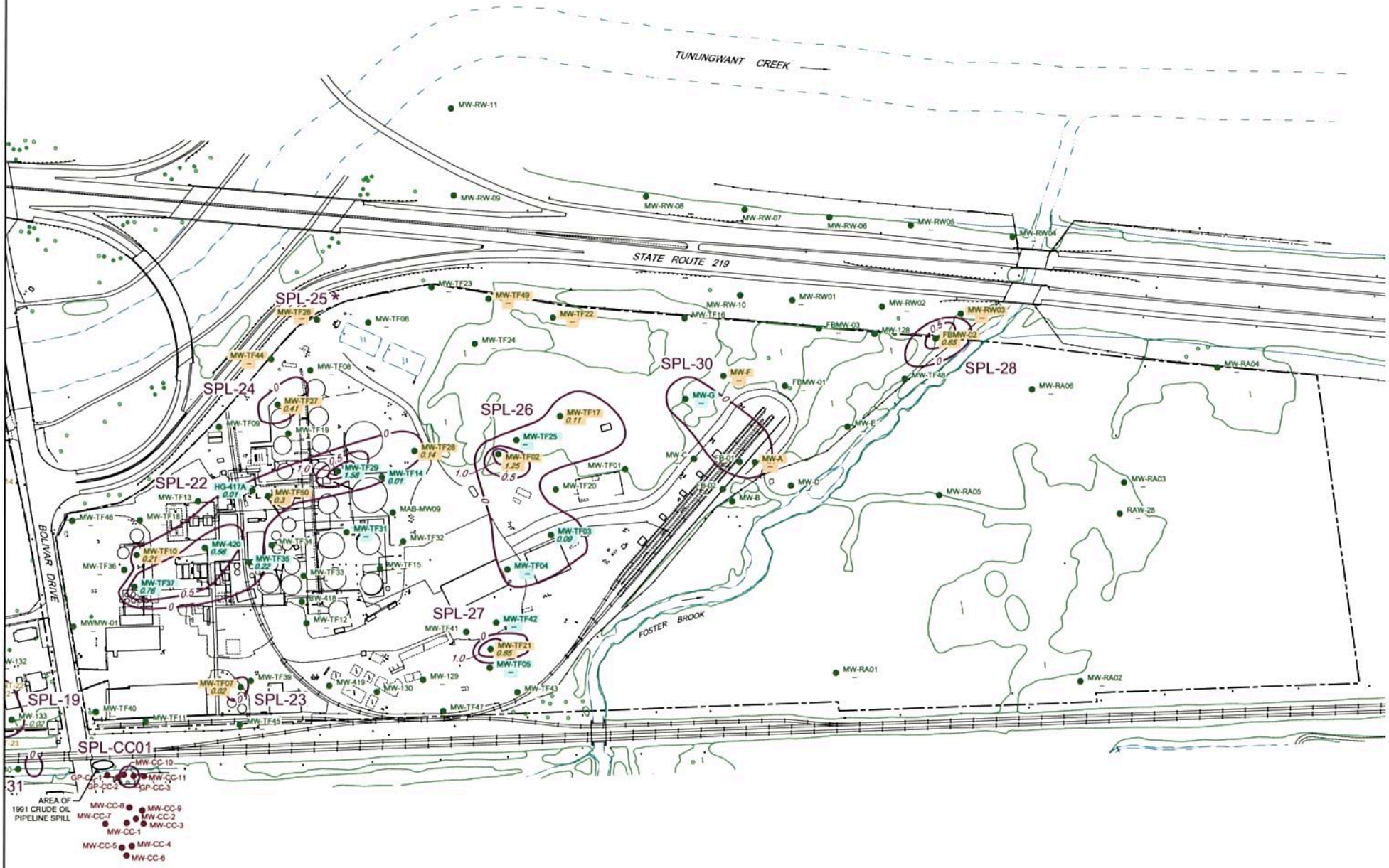
SOURCE:
ESI DRAWING No. BRD-2-150 DATED 10/4/02.

N-WA005 JAN 24/2008

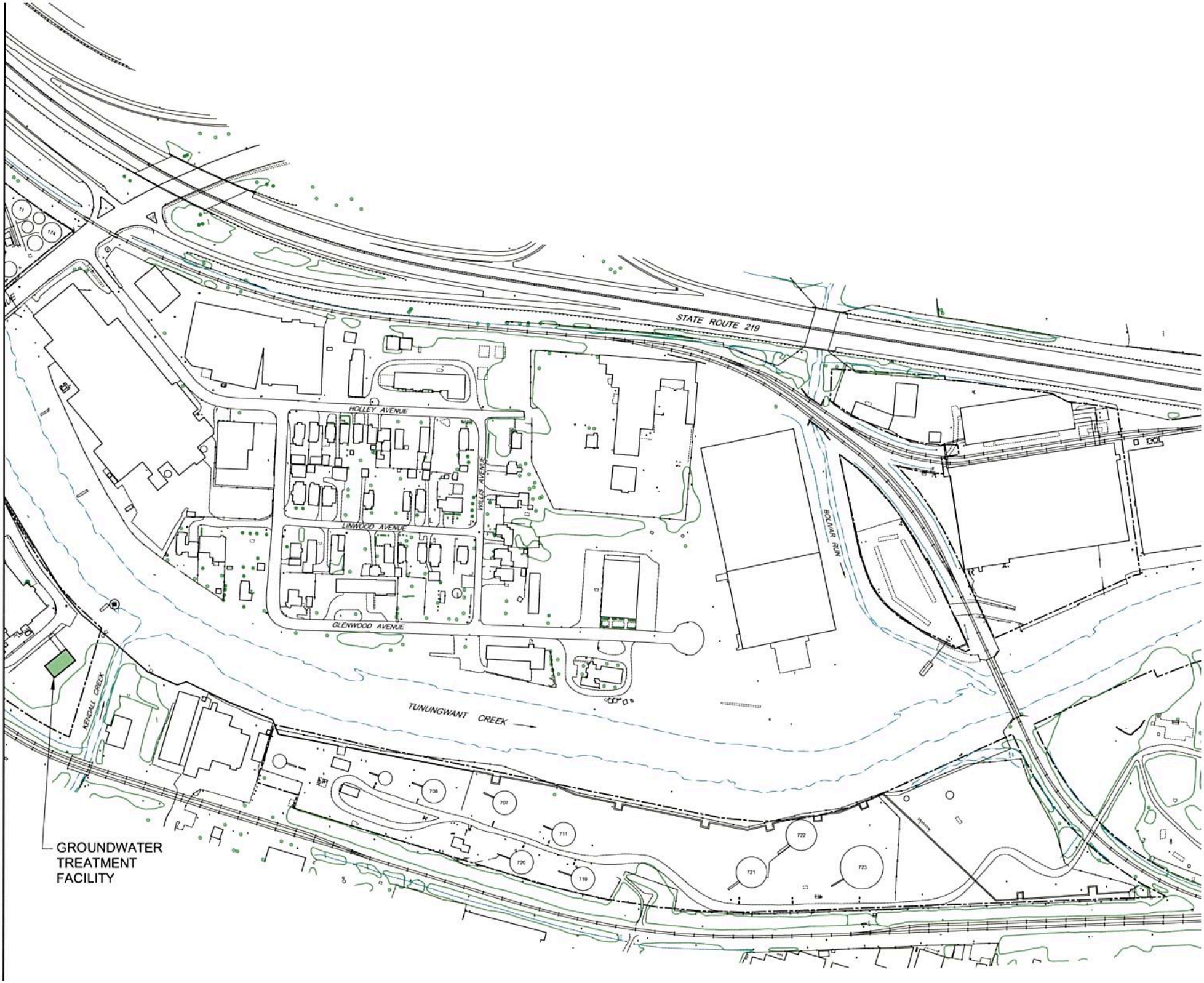

SPL-1
SPL-2
SPL-3
SPL-5
SPL-6
SPL-7
SPL-8
SPL-9
SPL-10
SPL-12
SPL-29
MILL STREET
STATE ROUTE 219
TUNUNGWANT CREEK

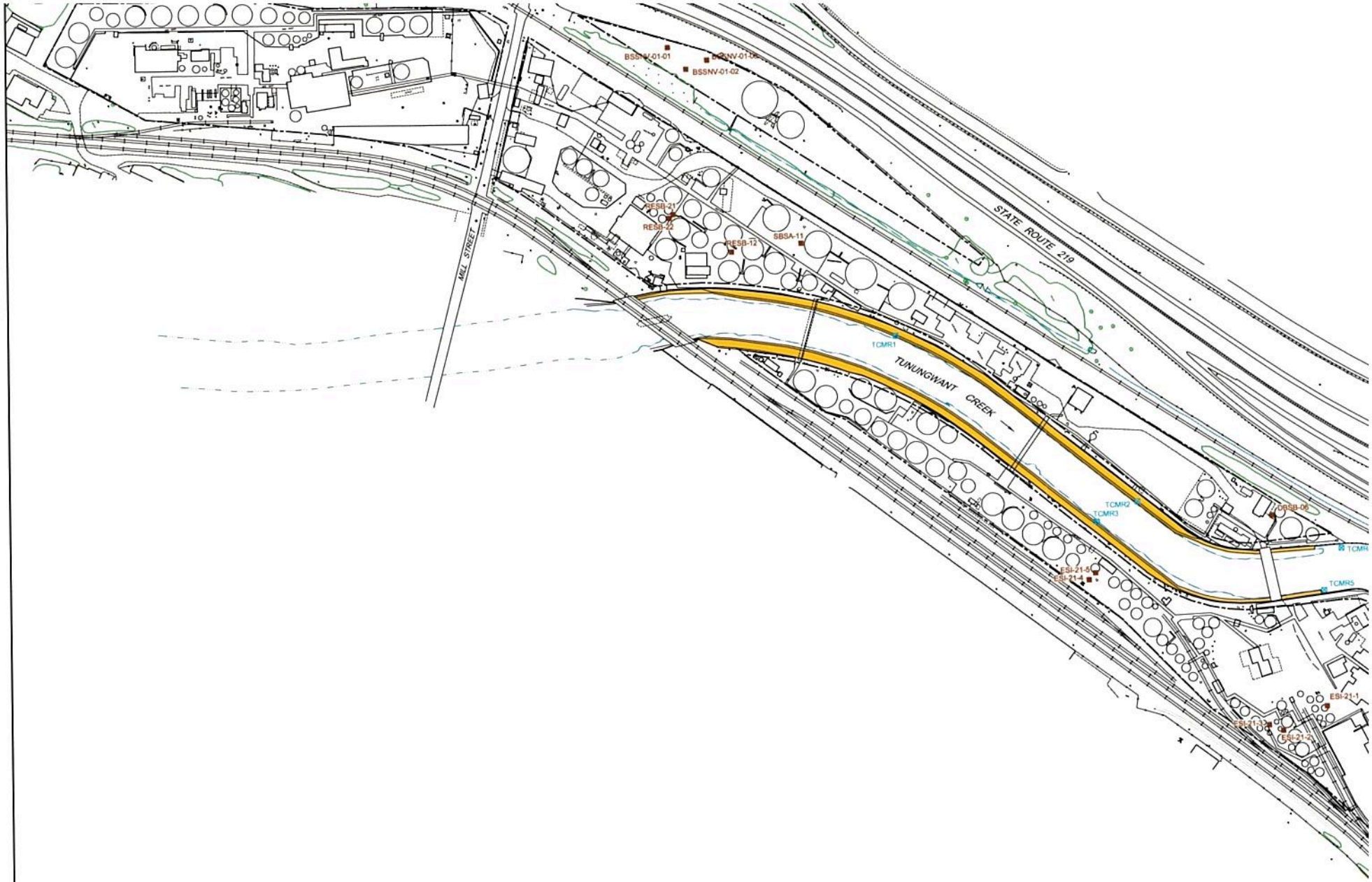


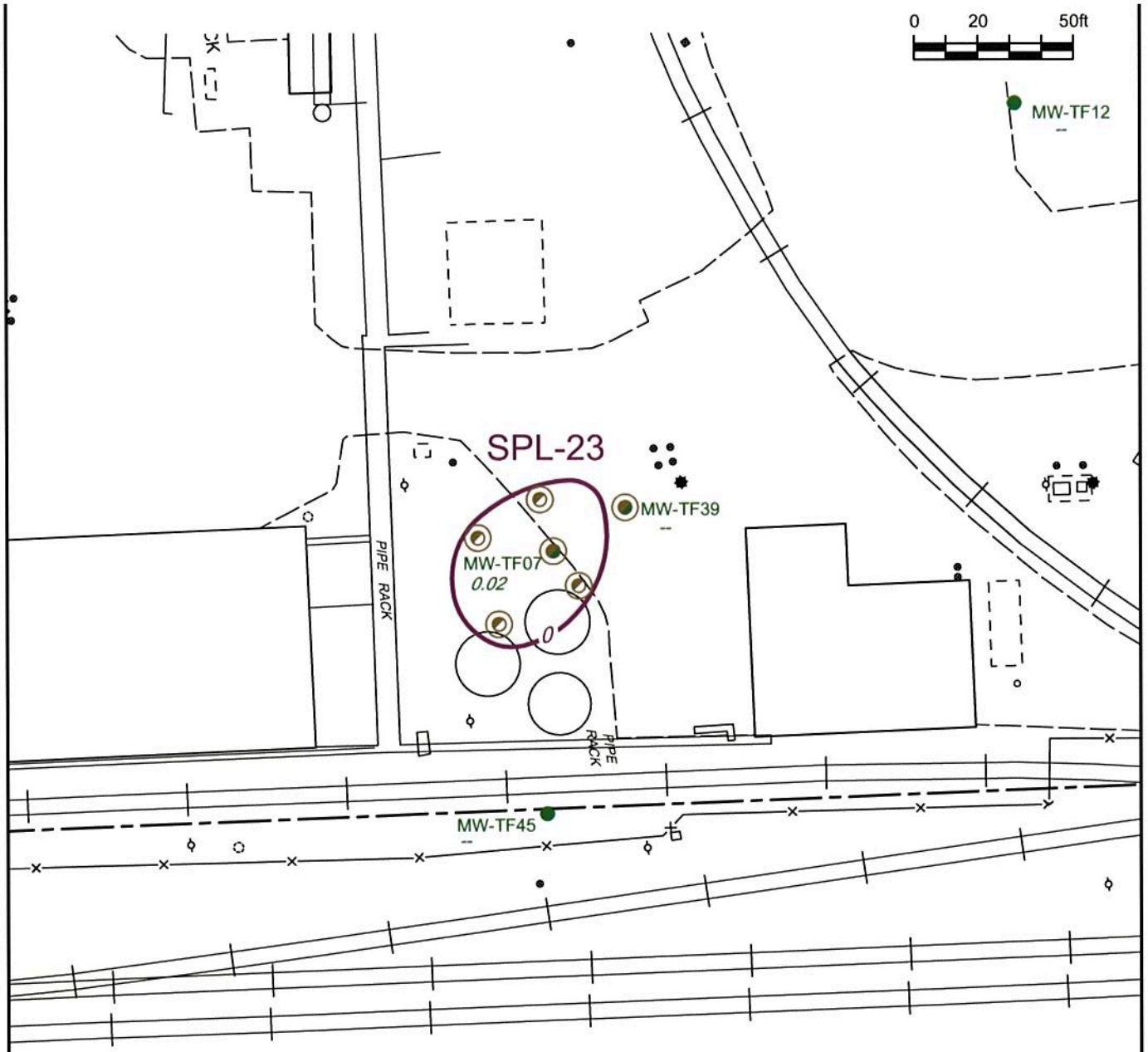
STATE ROUTE 219
HOLLEY AVENUE
LINWOOD AVENUE
GLENWOOD AVENUE
WILLIS AVENUE
BOLIVAR RUN
TUNUNGWANT CREEK
KINDALL CREEK
SPL-15
SPL-16
SPL-17
SPL-20
SPL-21
RW-18
0.05
ERIE-CLAY
0.51
JD-02
2.27
MW-28
0.82
MW-85
0.05
MW-82B
MW-02
MW-84
MW-83B
MW-01
MW-134
JD-04
MW-414
MW-CR02
MW-CR01
HG-413
MW-415
MW-CR04
MW-CR03
0.22
MAB-MW03
MW-416
0.05
MW-CR21
MW-CR05
MAB-MW04B
MAB-MW04
MAB-MW02
MAB-MW01
MW-CR22
MW-CR12
MW-CR23
MW-CR06
0.01
MW-109
MW-110
MW-CR07
MW-CR20
MW-CR08
MW-111
MW-CR13
MW-CR14
MW-CR11
MW-112
MW-114
MW-CR09
MW-CR16
MW-CR15
MW-115
MW-116
0.46
MW-PP01
MW-PP02
MW-PP04
0.18
MW-PP03
0.25
MW-PP05
MW-117
MW-118
MW-119
MMW-C
3.16


TUNUNGWANT CREEK
STATE ROUTE 219
BOLIVAR DRIVE
FOSTER BROOK
SPL-19
SPL-22
SPL-23
SPL-24
SPL-25
SPL-26
SPL-27
SPL-28
SPL-30
SPL-CC01
AREA OF 1991 CRUDE OIL PIPELINE SPILL
MW-RW-11
MW-RW-09
MW-RW-08
MW-RW-07
MW-RW-06
MW-RW05
MW-RW04
MW-RW03
MW-RW02
MW-RW01
MW-RW-10
MW-TF23
MW-TF49
MW-TF22
MW-TF16
FBMW-03
MW-128
FBMW-02
0.65
MW-TF48
MW-RA04
MW-RA06
MW-TF26
MW-TF06
MW-TF24
MW-TF44
MW-TF08
MW-TF27
0.41
MW-TF09
MW-TF19
MW-TF28
0.14
MW-TF29
1.58
MW-TF14
0.01
HG-417A
0.01
MW-TF50
0.3
MW-TF13
MW-TF46
MW-TF18
MAB-MW09
MW-TF31
MW-TF32
MW-420
0.56
MW-TF10
0.21
MW-TF36
0.22
MW-TF37
0.76
MW-TF34
MW-TF33
MW-TF15
MW-418
MW-TF12
MWMW-01
MW-TF17
0.11
MW-TF25
MW-TF02
1.25
MW-TF01
MW-TF20
MW-TF03
0.09
MW-TF04
MW-TF42
MW-TF41
MW-TF21
0.85
MW-TF05
MW-TF43
MW-TF47
MW-129
MW-130
MW-419
MW-TF39
MW-TF07
0.02
MW-TF40
MW-TF11
MW-TF45
MW-133
0.02
MW-132
MW-CC-10
MW-CC-11
GP-CC-1
GP-CC-2
GP-CC-3
MW-CC-8
MW-CC-9
MW-CC-2
MW-CC-3
MW-CC-7
MW-CC-1
MW-CC-5
MW-CC-4
MW-CC-6
MW-F
MW-G
FBMW-01
MW-E
MW-C
FB-01
FB-02
MW-A
MW-B
MW-D
MW-RA05
MW-RA03
RAW-28
MW-RA01
MW-RA02

RW-10
RW-9
HW # 11
MILL STREET
HW # 12
RW-17
RW-16
RW-12
STATE ROUTE 219
RW-8
TUNUNGWANT CREEK
HW # 1
RW-4
HW # 2
RW-15
RW-3
HW # 3
RW-2
RW-1
HW # 4
HW # 5
HW # 6
RW-14
CAWS-1
RW-1


STATE ROUTE 219
HOLLEY AVENUE
LINWOOD AVENUE
GLENWOOD AVENUE
WILLIS AVENUE
BOLIVAR RUN
TUNUNGWANT CREEK
KENDALL CREEK
GROUNDWATER
TREATMENT
FACILITY


BSSNV-01-01
BSSNV-01-02
RESB-21
RESB-22
RESB-12
SBSA-11
MILL STREET
STATE ROUTE 219
TCMR1
TUNUNGWANT CREEK
TCMR2
TCMR3
DBSB-06
TCMR4
TCMR5
ESI-21-5
ESI-21-4
ESI-21-1
ESI-21-3
ESI-21-2



LEGEND

PROPERTY BOUNDARY

0 APPARENT SPL THICKNESS CONTOUR (ft.)

MW-TF07 0.02 MONITORING WELL/PIEZOMETER LOCATION AND APPARENT SPL THICKNESS (ft.) (DEC. 17-19, 2003)

SPL-23 SPL AREA DESIGNATION

OXIDANT INJECTION WELL

figure 4.1

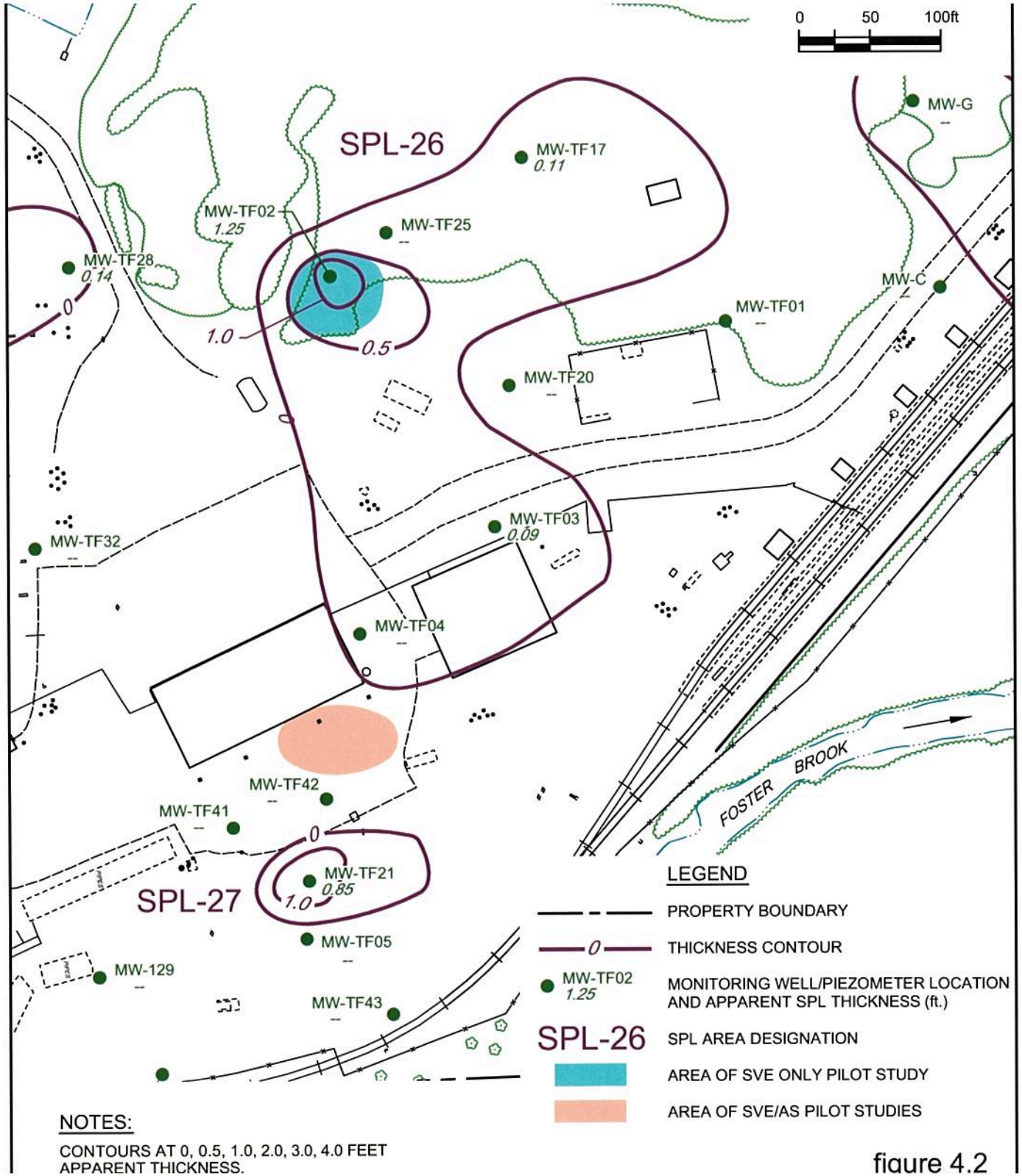

0 50 100ft
SPL-26
MW-TF17
0.11
MW-TF02
1.25
MW-TF25
MW-TF28
0.14
0
1.0
0.5
MW-G
MW-C
MW-TF01
MW-TF20
MW-TF03
0.09
MW-TF32
MW-TF04
MW-TF42
MW-TF41
0
MW-TF21
0.85
1.0
SPL-27
MW-TF05
MW-129
MW-TF43
FOSTER BROOK
LEGEND
PROPERTY BOUNDARY
0
THICKNESS CONTOUR
MW-TF02
1.25
MONITORING WELL/PIEZOMETER LOCATION AND APPARENT SPL THICKNESS (ft.)
SPL-26
SPL AREA DESIGNATION
AREA OF SVE ONLY PILOT STUDY
AREA OF SVE/AS PILOT STUDIES
NOTES:
CONTOURS AT 0, 0.5, 1.0, 2.0, 3.0, 4.0 FEET APPARENT THICKNESS.

figure 4.2

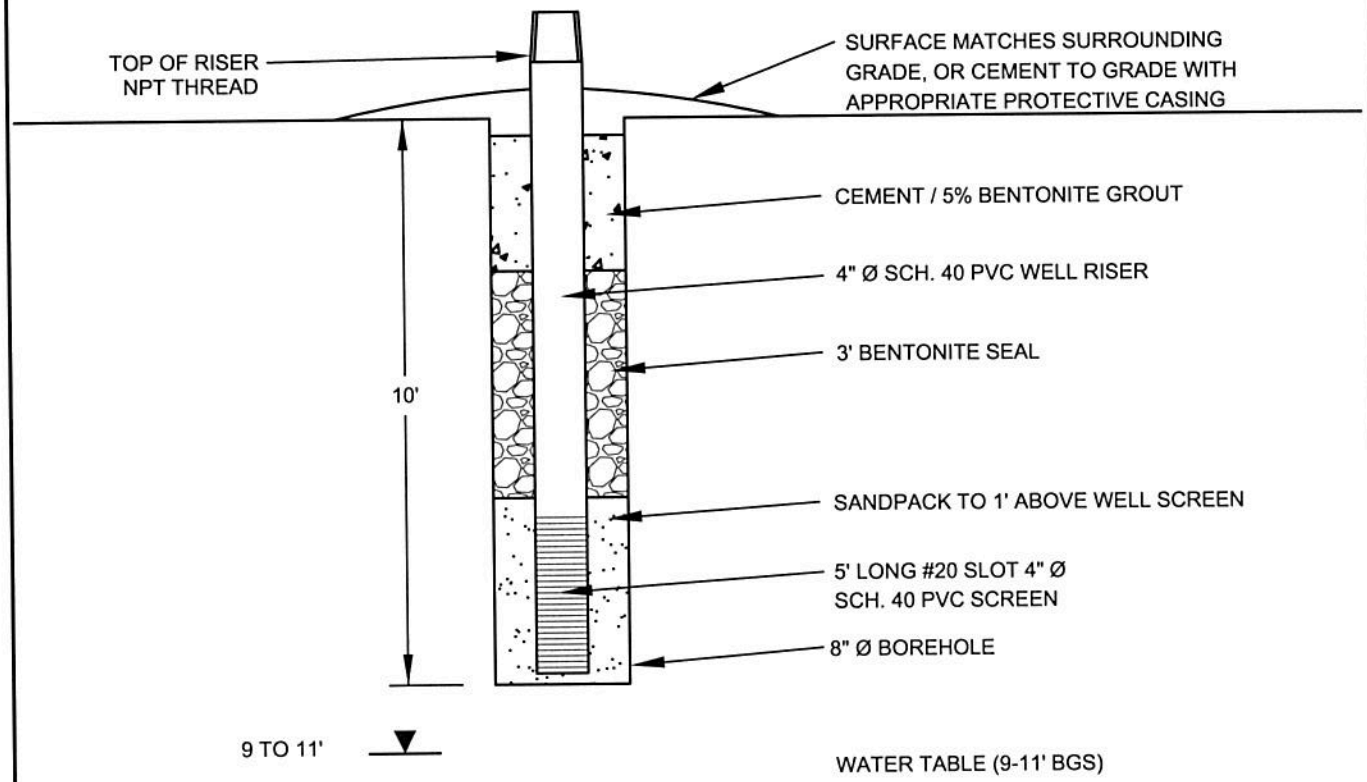

TOP OF RISER
NPT THREAD
SURFACE MATCHES SURROUNDING
GRADE, OR CEMENT TO GRADE WITH
APPROPRIATE PROTECTIVE CASING
CEMENT / 5% BENTONITE GROUT
4" Ø SCH. 40 PVC WELL RISER
3' BENTONITE SEAL
10'
SANDPACK TO 1' ABOVE WELL SCREEN
5' LONG #20 SLOT 4" Ø
SCH. 40 PVC SCREEN
8" Ø BOREHOLE
9 TO 11'
WATER TABLE (9-11' BGS)

figure 4.3

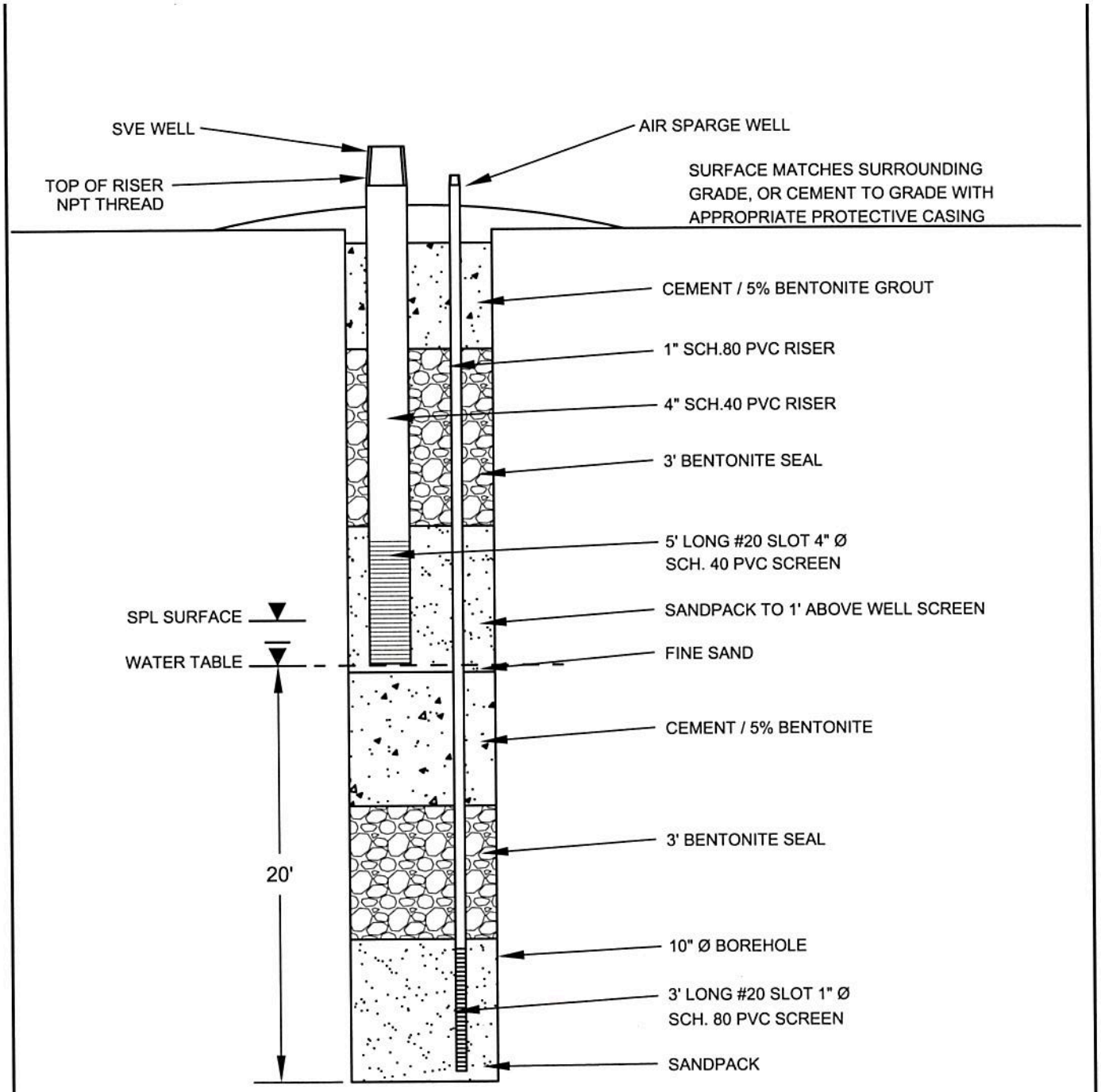

SVE WELL
AIR SPARGE WELL
TOP OF RISER
NPT THREAD
SURFACE MATCHES SURROUNDING
GRADE, OR CEMENT TO GRADE WITH
APPROPRIATE PROTECTIVE CASING
CEMENT / 5% BENTONITE GROUT
1" SCH.80 PVC RISER
4" SCH.40 PVC RISER
3' BENTONITE SEAL
5' LONG #20 SLOT 4" Ø
SCH. 40 PVC SCREEN
SPL SURFACE
SANDPACK TO 1' ABOVE WELL SCREEN
WATER TABLE
FINE SAND
CEMENT / 5% BENTONITE
3' BENTONITE SEAL
20'
10" Ø BOREHOLE
3' LONG #20 SLOT 1" Ø
SCH. 80 PVC SCREEN
SANDPACK

figure 4.4

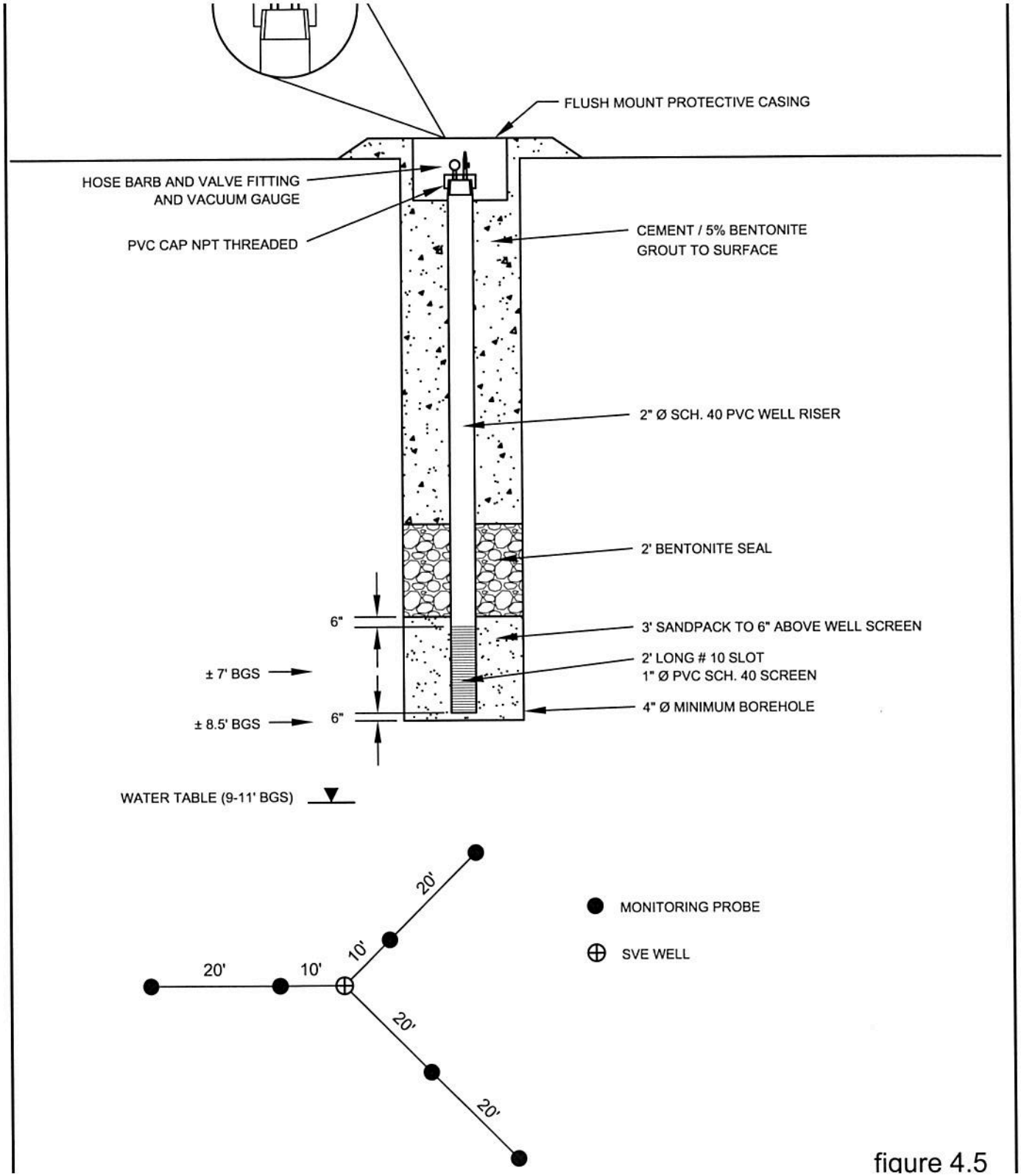
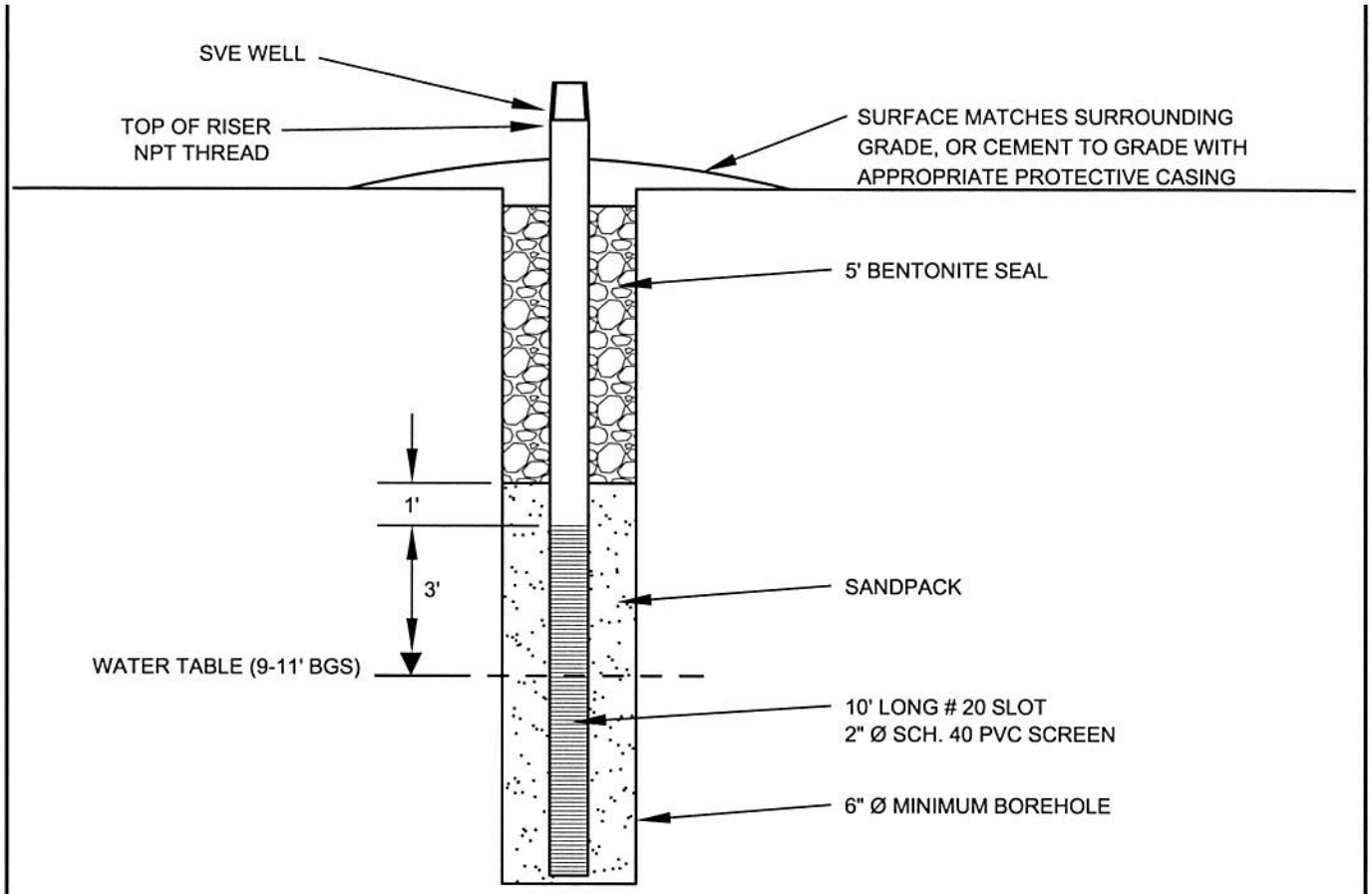

FLUSH MOUNT PROTECTIVE CASING
HOSE BARB AND VALVE FITTING AND VACUUM GAUGE
PVC CAP NPT THREADED
CEMENT / 5% BENTONITE GROUT TO SURFACE
2" Ø SCH. 40 PVC WELL RISER
2' BENTONITE SEAL
6"
3' SANDPACK TO 6" ABOVE WELL SCREEN
± 7' BGS
2' LONG # 10 SLOT 1" Ø PVC SCH. 40 SCREEN
4" Ø MINIMUM BOREHOLE
± 8.5' BGS
6"
WATER TABLE (9-11' BGS)
20'
10'
10'
20'
20'
20'
MONITORING PROBE
SVE WELL

figure 4.5


SVE WELL
TOP OF RISER
NPT THREAD
SURFACE MATCHES SURROUNDING
GRADE, OR CEMENT TO GRADE WITH
APPROPRIATE PROTECTIVE CASING
5' BENTONITE SEAL
1'
3'
SANDPACK
WATER TABLE (9-11' BGS)
10' LONG # 20 SLOT
2" Ø SCH. 40 PVC SCREEN
6" Ø MINIMUM BOREHOLE

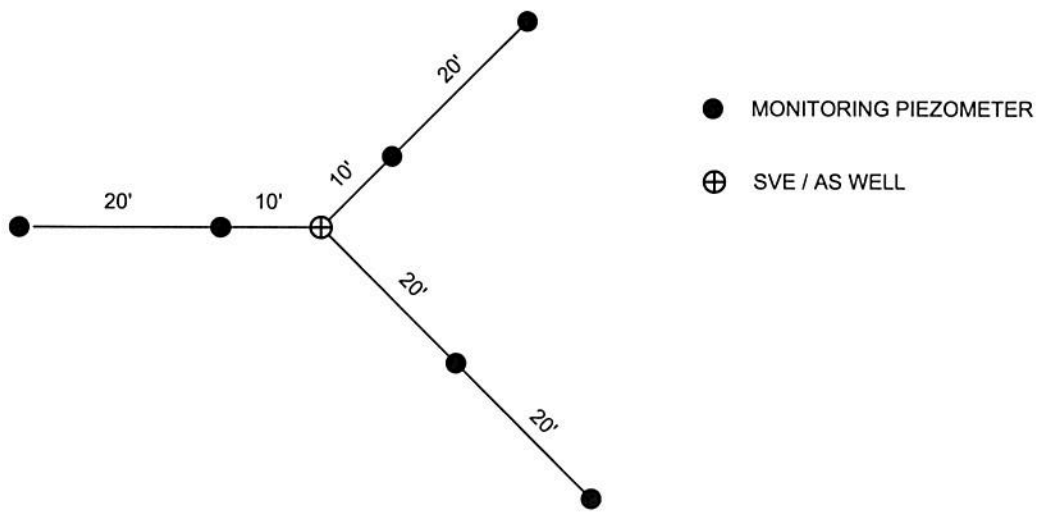

20'
10'
10'
20'
20'
20'
MONITORING PIEZOMETER
SVE / AS WELL

figure 4.6

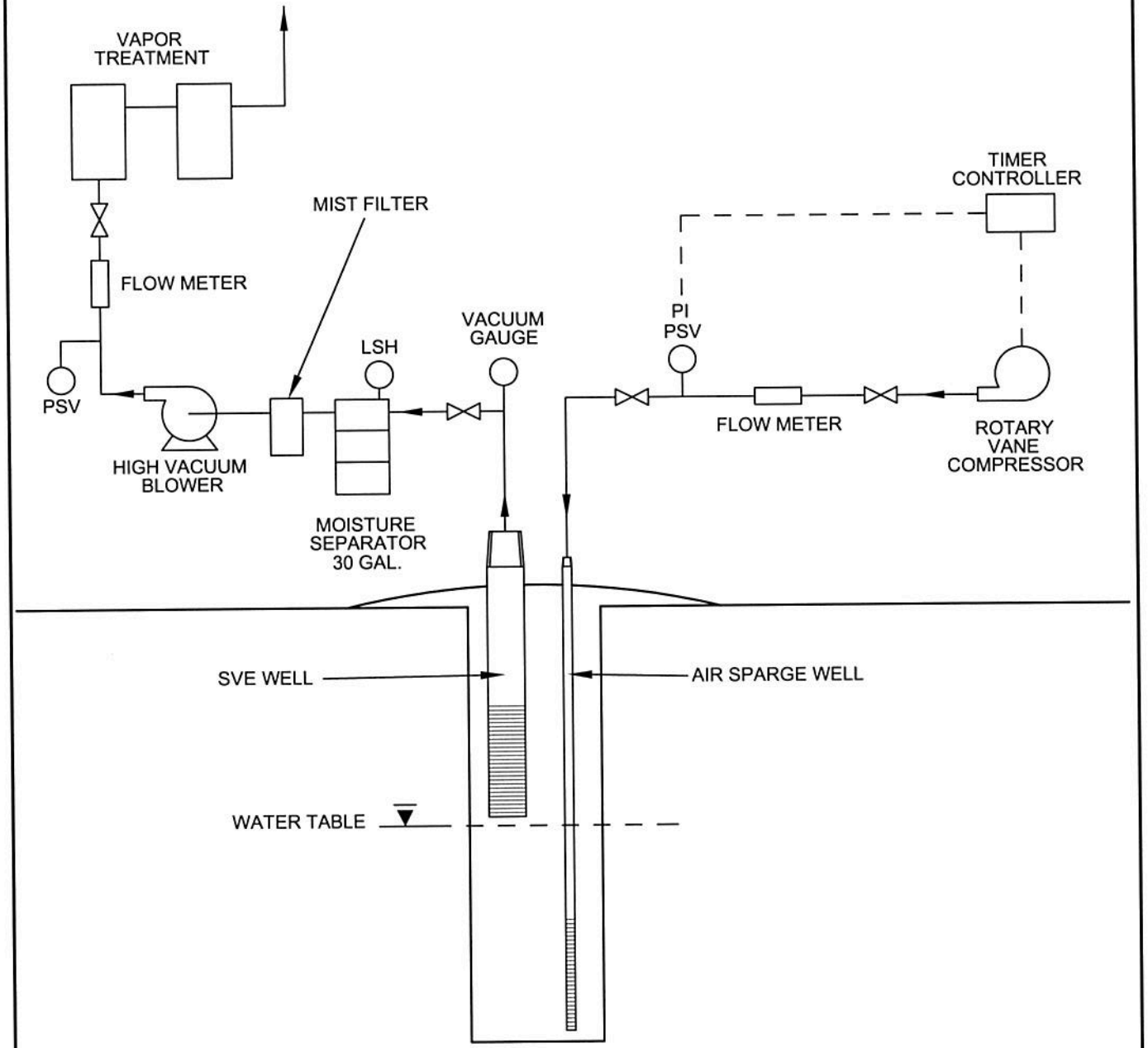
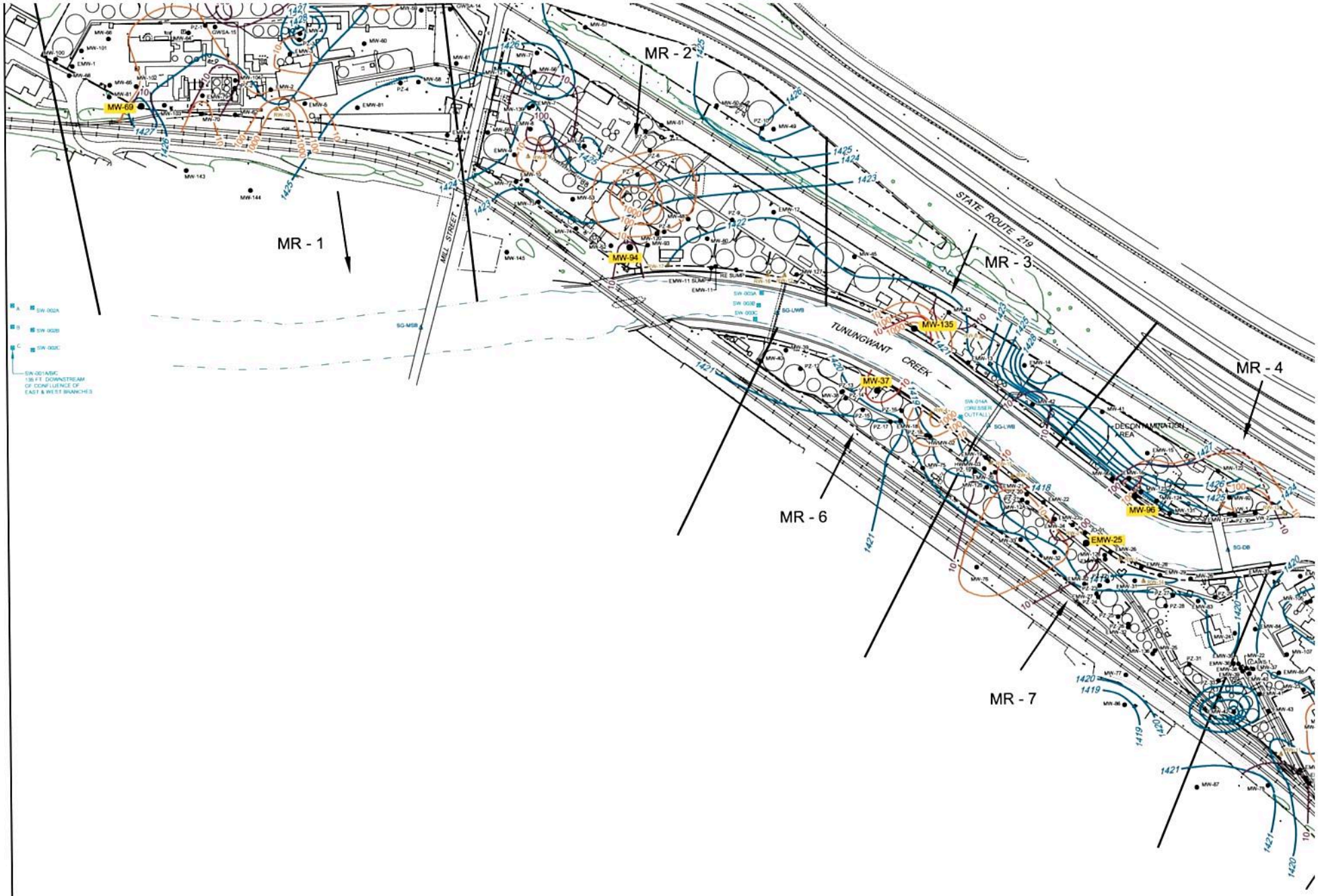
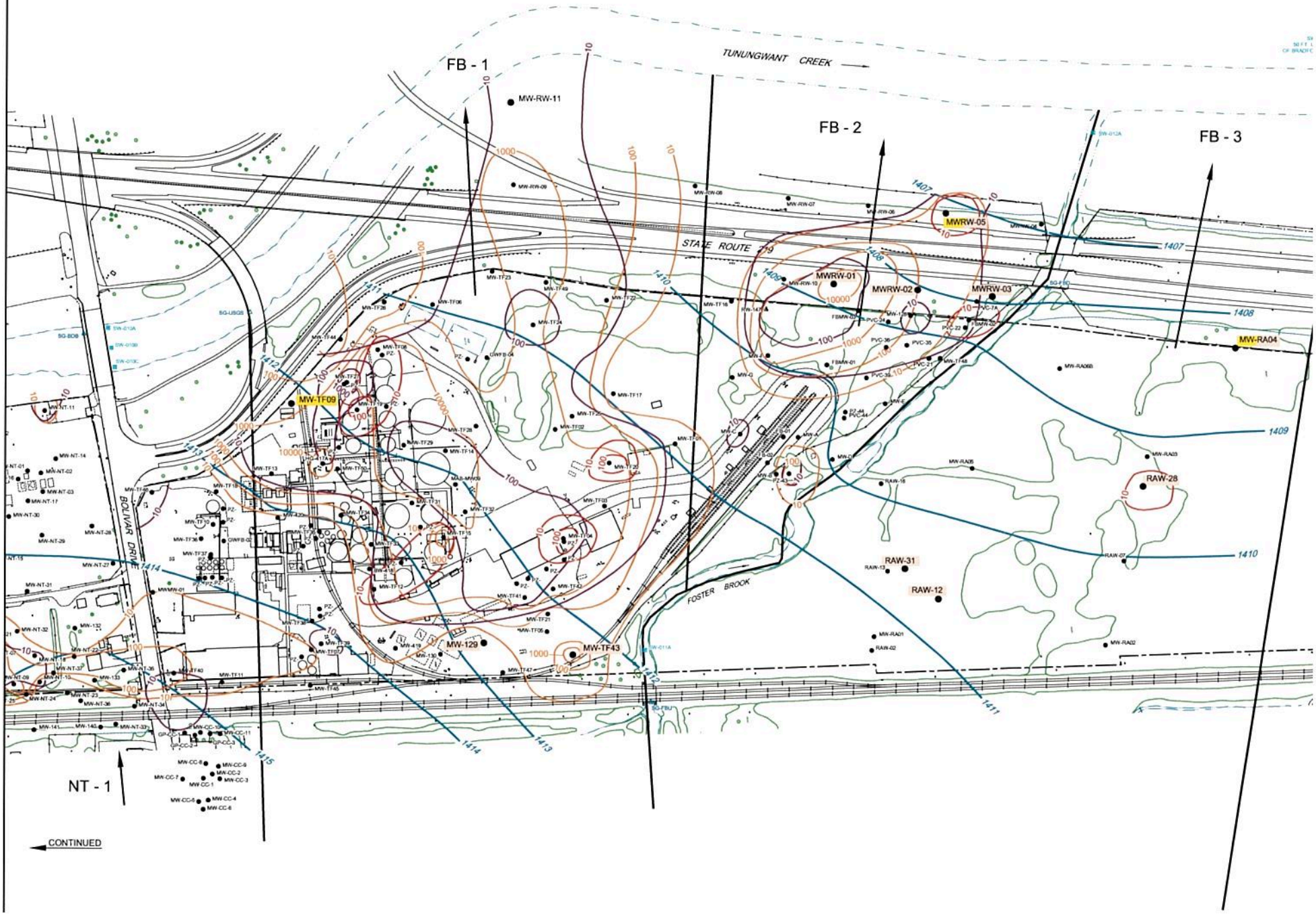
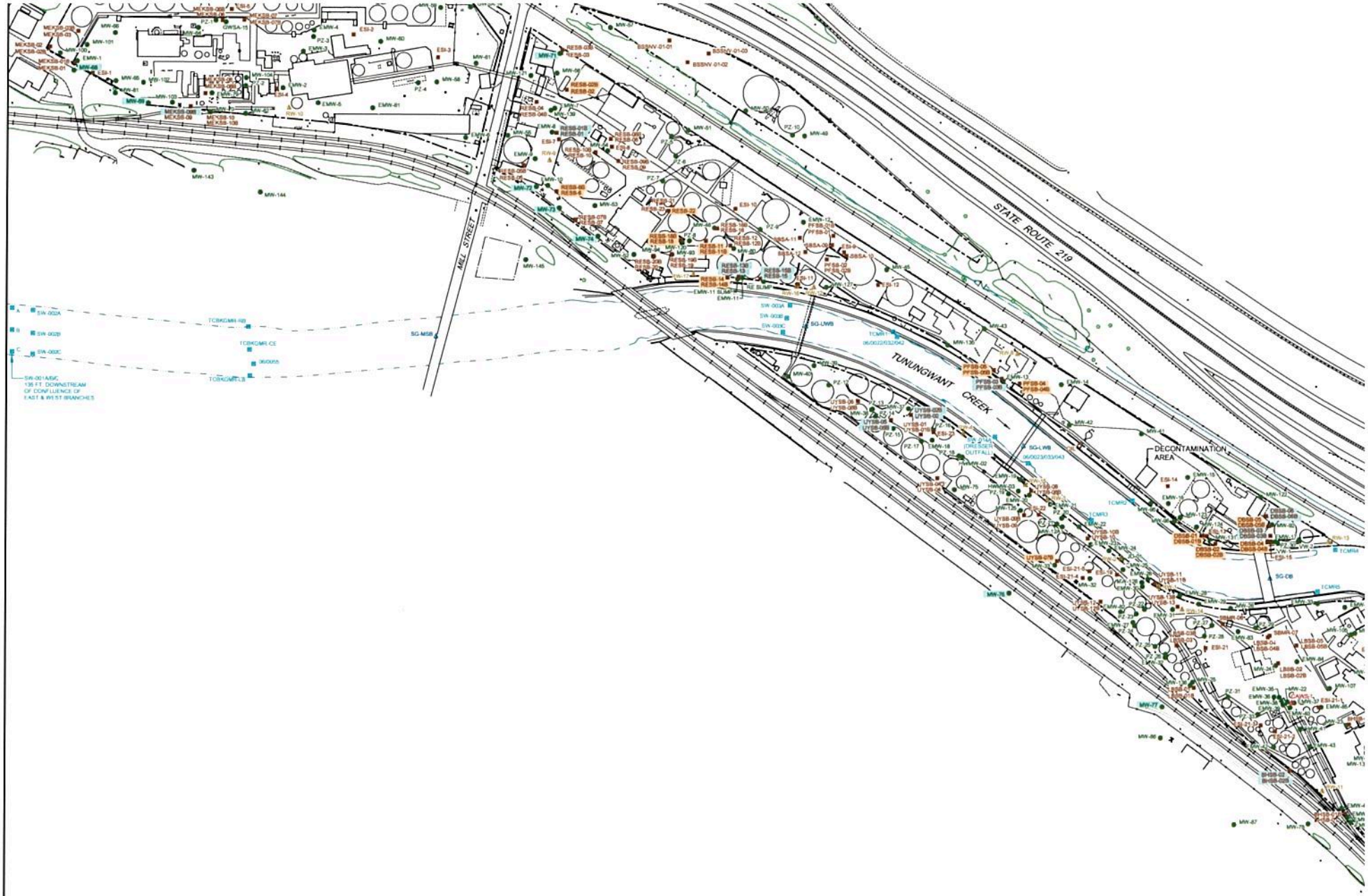

VAPOR
TREATMENT
FLOW METER
PSV
HIGH VACUUM
BLOWER
MIST FILTER
LSH
MOISTURE
SEPARATOR
30 GAL.
VACUUM
GAUGE
PI
PSV
FLOW METER
TIMER
CONTROLLER
ROTARY
VANE
COMPRESSOR
SVE WELL
AIR SPARGE WELL
WATER TABLE

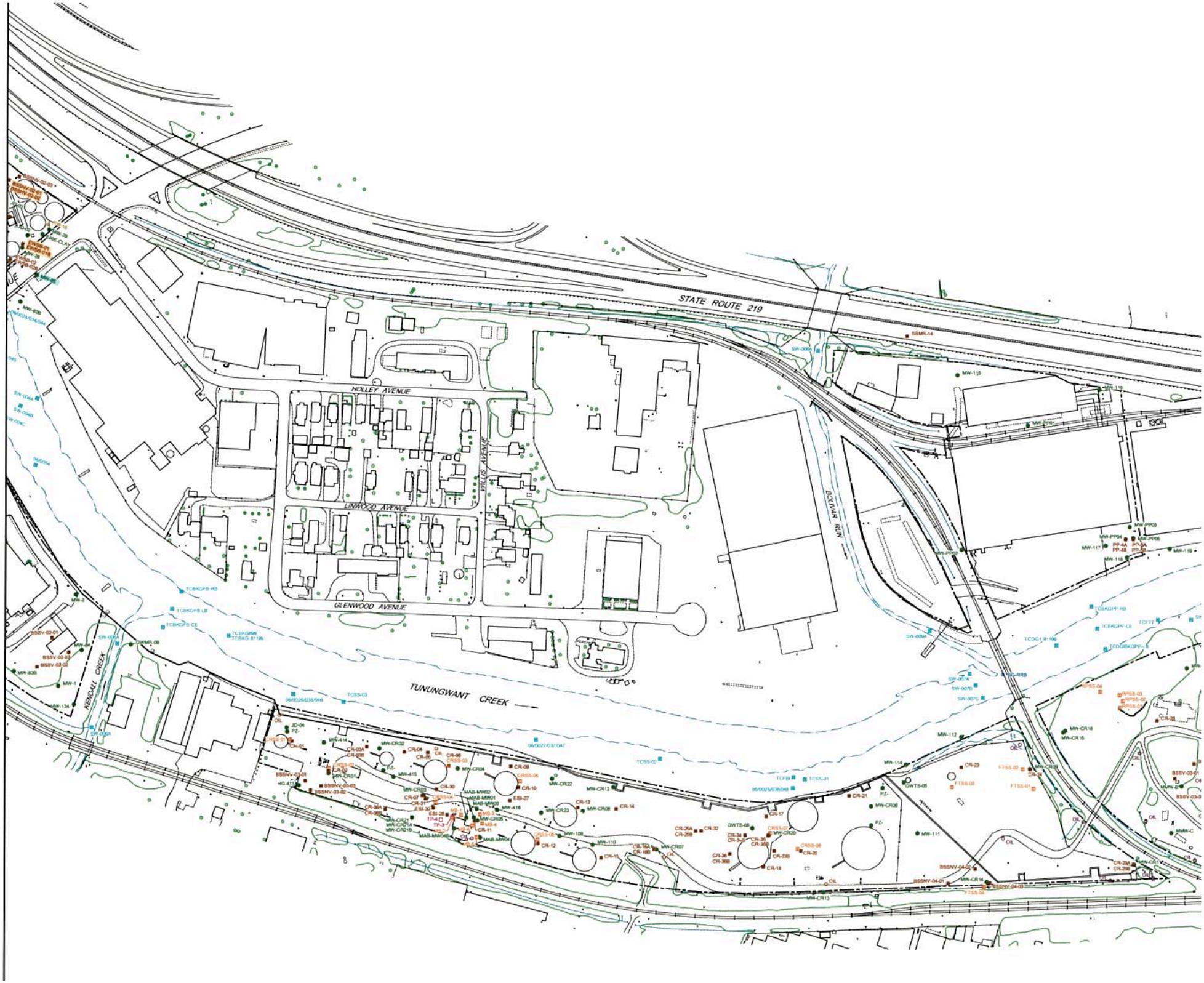
figure 4.7

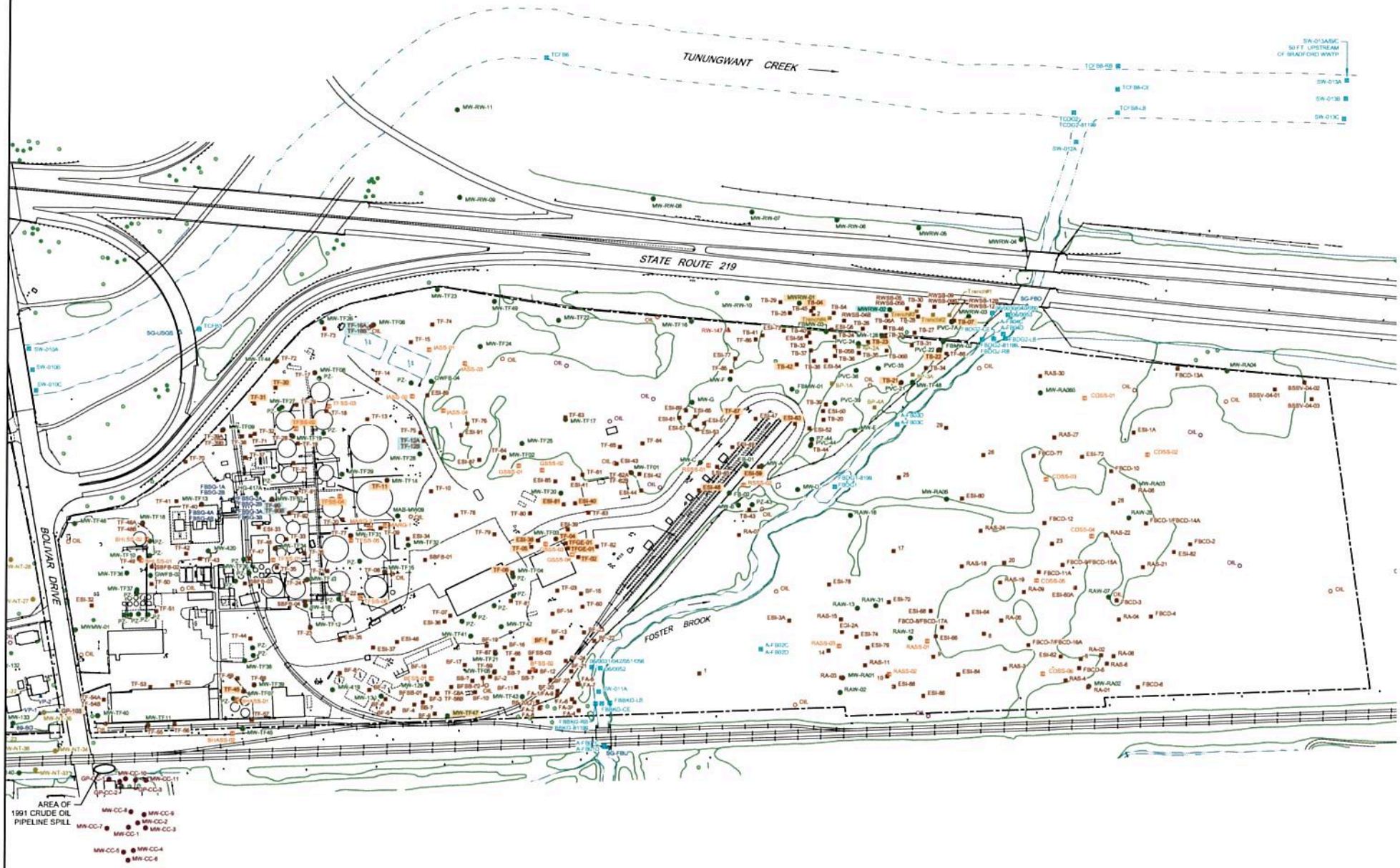

MR - 1
MR - 2
MR - 3
MR - 4
MR - 6
MR - 7
MR
MW-69
MW-94
MW-135
MW-37
MW-96
EMW-25
MILL STREET
STATE ROUTE 219
TUNUNGWANT CREEK
DECONTAMINATION AREA

STATE ROUTE 219
HOLLEY AVENUE
LINWOOD AVENUE
GLENWOOD AVENUE
VILLAS AVENUE
BOLIVAR RUN
TUNUNGWANT CREEK
KENDALL CREEK
PP - 1
MW-118
MW-114
MW-2
ADM - 1
CTF - 1
CONTINUED


FB - 1
FB - 2
FB - 3
NT - 1
TUNUNGWANT CREEK
STATE ROUTE 219
BOLIVAR DRIVE
FOSTER BROOK
MW-RW-11
MWRW-05
MWRW-01
MWRW-02
MWRW-03
MW-RA04
MW-TF09
MW-129
MW-TF43
RAW-28
RAW-31
RAW-12
1407
1408
1409
1410
1411
1412
1413
1414
1415
CONTINUED


STATE ROUTE 219
MILL STREET
TUNUNGWANT CREEK
DECONTAMINATION AREA


STATE ROUTE 219
HOLLEY AVENUE
LINWOOD AVENUE
GLENWOOD AVENUE
WILLOW AVENUE
BOLIVAR RUN
TUNUNGWANT CREEK
KENDALL CREEK


TUNUNGWANT CREEK
STATE ROUTE 219
BOLIVAR DRIVE
FOSTER BROOK
AREA OF
1991 CRUDE OIL
PIPELINE SPILL

ACTIVITY / DURATION	2007		2008												2009										
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A) • PREPARE SITE CLEANUP PLAN																									
• PADEP REVIEW																									
• ADDRESS PADEP COMMENTS																									
• PADEP REVIEW AND APPROVAL																									
B) SPL MANUAL RECOVERY																									
C) AS / SVE SYSTEM (SPL-22/24/26)																									
• INSTALL PILOT SYSTEM																									
• OPERATE PILOT SYSTEM																									
• DESIGN FULL-SIZE SYSTEM																									
• PADEP REVIEW																									
• ADDRESS PADEP COMMENTS																									
• PADEP REVIEW AND APPROVAL																									
• CONTRACTOR PROCUREMENT																									
• CONSTRUCT AS / SVE SYSTEM																									
• PREPARATION AND SUBMITTAL OF AS RECORDED DRAWINGS																									
• OPERATE SYSTEM																									
D) HORIZONTAL AND VERTICAL WELL SYSTEMS																									
a) HW-1 TO HW-7, HW-9 & HW-10, RW OPERATIONS																									
b) HW-11 & HW-12																									
• INSTALL COMPONENTS NEEDED TO BECOME OPERATIONAL																									
• OPERATIONS																									
c) OPERATE GROUNDWATER TREATMENT SYSTEM																									
E) IN-SITU OXIDATION (SPL-23)																									
• CONTRACTOR PROCUREMENT																									
• WELL INSTALLATION																									
• SOLUTION INJECTION																									
• MONITORING																									
F) COVER 5 FOSTER BROOK AREAS																									
• CONTRACTOR PROCUREMENT/ LETTER OF CONSISTENCY FOR E&SCP																									
• CONSTRUCTION																									
• PREPARATION AND SUBMITTAL OF AS RECORDED DRAWINGS																									
• INSPECTIONS GRADE >3% QUARTERLY (FOR 2 YEARS)																									
GRADE <3% SEMI-ANNUAL (FOR 2 YEARS)																									
• MONITORING																									
G) EXCAVATION (SPL-16)																									
• CONTRACTOR PROCUREMENT/ LETTER OF CONSISTENCY FOR E&SCP																									
• IMPLEMENTATION																									
• PREPARATION AND SUBMITTAL OF AS RECORDED DRAWINGS																									
H) INSTITUTION CONTROLS																									
a) ARG PROPERTY																									
• RECORDING OF DEED RESTRICTION																									
• CONTACT EASEMENT / ROW HOLDERS (2 MONTHS AFTER RECORDING)																									
• ANNUAL LETTERS TO HOLDERS																									
b) OFF-SITE PROPERTIES																									
• MEETING / DISCUSSIONS																									
- CITY OF BRADFORD																									
- McKEAN COUNTY																									
- GRAHAM PACKAGING																									
- PENN DOT																									
- B&P RAILROAD																									
- WERZALIT																									
- STROUSS																									
- ROBINSON																									
• INTERIM SEMI-ANNUAL INSPECTIONS (ALL LISTED PROPERTIES)																									
• ANNUAL LETTER TO PROPERTY OWNERS																									
c) EVALUATION OF IC EFFECTIVENESS																									
• ANNUAL - FIRST THREE YEARS																									
• BI-ENNUALLY - THEREAFTER UNTIL COA REQUIREMENTS ACHIEVED																									
I) QUARTERLY REPORTING																									
ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

(STARTUP AND TESTING)