This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-96SR18500 with the U.S. Department of Energy.

DOE/EA-1563

ENVIRONMENTAL ASSESSMENT FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM STORM WATER COMPLIANCE ALTERNATIVES AT THE SAVANNAH RIVER SITE

November 2006

U. S. DEPARTMENT OF ENERGY
SAVANNAH RIVER OPERATIONS OFFICE
SAVANNAH RIVER SITE

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LIST OF ABBREVIATIONS/ACRONUMS

The following is an alphabetized list of the abbreviations and acronyms found within the text of this document:

AC	=	air conditioner
BMP	=	best management practice
CEQ	=	Council on Environmental Quality
CFR	=	Code of Federal Regulations
COE	=	Corps of Engineers
CWA	=	Clean Water Act
D&D	=	deactivation and demolition
DOE	=	Department of Energy
EA	=	environmental assessment
e.g.	=	such as
EIS	=	environmental impact statement
EPA	=	Environmental Protection Agency
ft	=	feet
FONSI	=	finding of no significant impact
LLW	=	low level waste
m/L	=	milligrams per liter
msl	=	mean sea level
MOX	=	mixed oxide
NEPA	=	National Environmental Policy Act
NPDES	=	National Pollutant Discharge Elimination System
PAR	=	P and R (reactors)
SCDHEC	=	South Carolina Department of Health and Environmental Control
SHPO	=	State Historic Preservation Officer
SRNL	=	Savannah River National Laboratory
SRARP	=	Savannah River Archaeological Research Program
T&E	=	threatened and endangered
TRU	=	transuranic
Uo	=	Udorthents

USFS-SR	=	United States Forest Service – Savannah River
WQS	=	water quality standard
WSRC	=	Washington Savannah River Company

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) prepared this environmental assessment (EA) to evaluate the potential environmental impacts associated with proposed and alternative actions to achieve water quality permit compliance at 38 storm water outfalls located at the Savannah River Site (SRS) (Figure 1-1). Effluent monitoring data indicates that some of these outfalls may not presently comply with new National Pollutant Discharge Elimination System (NPDES) Storm Water General Permit effluent standards that became effective July 1, 2005 (SCR000000). The NPDES permit requires that best management practices (BMPs) be implemented and maintained, as necessary, to ensure that storm water discharges at SRS do not cause or contribute to the contravention of applicable state water quality standards (WQS).

1.1 Background

The South Carolina Department of Health and Environmental Control (SCDHEC) issued a renewal of the NPDES General Permit for Storm Water Discharges Associated with Industrial Activity (SCR000000) on July 22, 2004. The *Basic Data Report for NPDES General Permit Compliance for SRS Storm Water Outfalls* (Gordon et al., 2006) identifies 39 outfalls possessing storm water discharges associated with industrial activity (Table 1-1). Effluent monitoring data acquired in 2004 and 2005 were used to evaluate the potential impacts of outfall discharges on receiving state waters (WSRC, 2005). The NPDES General Permit is silent on which WQS should be used and on how to determine when a noncompliance has occurred. In lieu of specific effluent limitations for storm water discharges, Washington Savannah River Company (WSRC) used selected water quality benchmark criteria developed by the Environmental Protection Agency (EPA) to determine compliance with WQS (USEPA 2005). Based on these benchmark criteria, the following 19 outfalls were found to possess potential water quality problems: A-08, C-01, E-03, E-04, E-06, F-3B, H-7A, K-01, K-02, K-04, N-01, N-02, N-2A, N-03, N-05, N-06, N-12, N-12A, and Y-01 (Table 1-1). Using the same benchmark criteria, the SCDHEC designated nine (9) of these 19 outfalls as requiring individual permit coverage under the Industrial Wastewater Permit (A-08, H-7A, K-02, N-01, N-2A, N-05, N-12, N-12A, and Y-01) (SCDHEC, 2006a, 2006b). It should be noted that some of these problematic storm water discharges may be due, in part, to naturally occurring high background metals concentrations (e.g., iron) found in certain SRS soils (Looney et al. 1990; Specht 2005; Halverson and Stinson 2006). The remaining storm water outfalls (excluding Outfall G-21, for which no effluent monitoring data presently exists) were determined to meet WQS and therefore require no corrective actions.

A project team consisting of environmental subject matter experts, outfall custodians, and site engineering leads was established by WSRC to identify, evaluate, and rank technically viable, cost-effective compliance options for the problematic storm water outfalls (Halverson and Stinson, 2006). Selected criteria used to evaluate and rank these compliance options included capital cost, operation and maintenance, technological effectiveness and flexibility, and potential environmental impact. A detailed description of the recommended outfall options and methodology utilized by the project team to

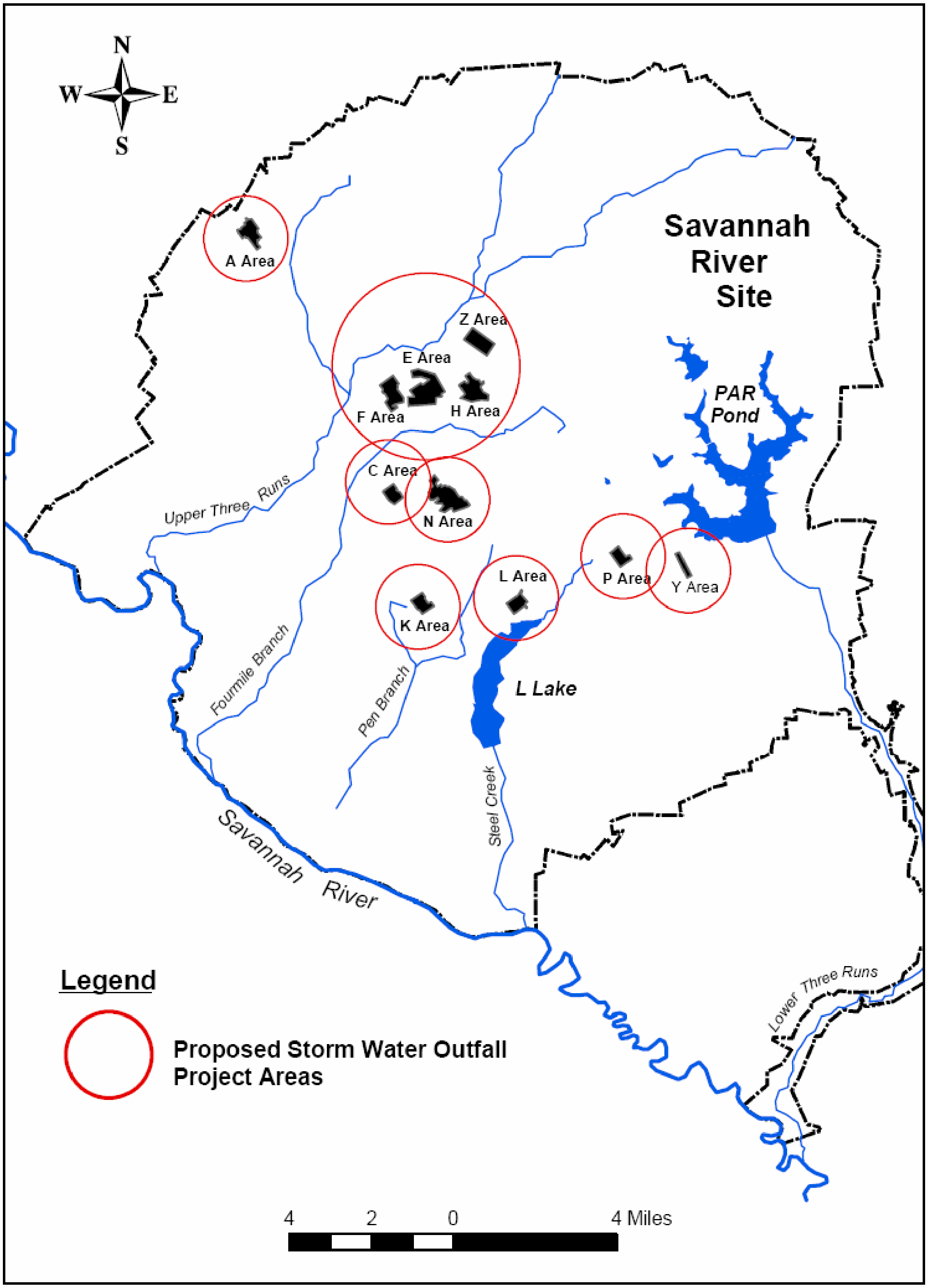

Figure 1-1. Location of Proposed Actions Within SRS.

Table 1-1. Summary of SRS Storm Water Outfalls Considered in This Environmental Assessment.

Outfall Designation	SRS Project Area	Receiving Stream	Proposed Action	Expected Outfall End-State Under Proposed Action
A-08[1]	A Area	Upper Three Runs	Divert flow into A-07 discharge channel via excavated ditch; outfall moved downstream along A-07 discharge channel.	Individual Industrial Wastewater Permit.
C-01	C Area	Fourmile Branch	Remove pollutant sources from drainage area.	Industrial Storm Water General Permit.
C-04	C Area	Fourmile Branch	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.	Compliant discharge not subject to regulation.
E-01	E Area	Fourmile Branch	No action; meets WQS.	Industrial Storm Water General Permit.
E-02	E Area	Upper Three Runs	No action; meets WQS.	Industrial Storm Water General Permit..
E-03	E Area	Upper Three Runs	Stabilize eroded areas and increase holding capacity of existing detention basin.	Industrial Storm Water General Permit.
E-04	E Area	Upper Three Runs	Install erosion control BMPs within drainage area.	Industrial Storm Water General Permit.
E-05	E Area	Fourmile Branch	No action; meets WQS.	Industrial Storm Water General Permit.
E-06	E Area	Upper Three Runs	Stabilize soil stock piles (BMPs), increase holding capacity of existing detention basin.	Industrial Storm Water General Permit.
F-3B[2]	F Area	Upper Three Runs	Divert flow to new MOX Pond 400; outfall is eliminated.	Outfall is eliminated.
FT-01	F Area	Fourmile Branch	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.	Compliant discharge not subject to regulation.
H-06	H Area	Upper Three Runs	No action; meets WQS.	Industrial Storm Water General Permit.
H-7A[1,2]	H Area	Upper Three Runs	Divert flow to H-07; outfall eliminated.	Outfall is eliminated.
H-7B	H Area	Upper Three Runs	No action.	Industrial Storm Water General Permit.
K-01	K Area	Pen Branch	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.	Compliant discharge not subject to regulation.
K-02[1]	K Area	Pen Branch	Disperse storm flow as sheet flow in forested area.	Individual Industrial Wastewater Permit.
K-04	K Area	Pen Branch	Remove from coverage under the Industrial Storm Water Permit.	Compliant discharge not subject to regulation.
L-03	L Area	Steel Creek	Implement sediment erosion control BMPs.	Industrial Storm Water General Permit.
L-09	L Area	Steel Creek	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.	Compliant discharge not subject to regulation.
L-13	L Area	Pen Branch	No action; meets WQS	Industrial Storm Water General Permit.

(1) Based upon its review of effluent monitoring data, SCDHEC has directed SRS to apply for an individual industrial wastewater permit for this storm water outfall.

(2) Implementation of the proposed action would result in the elimination of the outfall and is expected to negate the need for a permit.

Table 1-1 Continued. Summary of SRS Storm Water Outfalls Considered in This Environmental Assessment.

Outfall Designation	SRS Project Area	Receiving Stream	Proposed Action	Expected Outfall End-State Under Proposed Action
N-01[1]	N Area	Fourmile Branch	Consolidate flow with N-02, N-2A, N-03, and N-05 into a new retention basin.	Individual Industrial Wastewater Permit
N-02	N Area	Fourmile Branch	Consolidate flow with N-01, N-2A, N-03, and N-05 into a new retention basin.	Individual Industrial Wastewater Permit
N-2A[1]	N Area	Fourmile Branch	Consolidate flow with N-01, N-02, N-03, and N-05 into a new retention basin.	Individual Industrial Wastewater Permit.
N-03	N Area	Fourmile Branch	Consolidate flow with N-01, N-02, N-2A, and N-05 into a new retention basin.	Individual Industrial Wastewater Permit
N-05[1]	N Area	Fourmile Branch	Consolidate flow with N-01, N-02, N-2A, and N-03 into a new retention basin.	Individual Industrial Wastewater Permit.
N-06	N Area	Fourmile Branch	Install grass buffers around sand blast area and other pollutant sources.	Industrial Storm Water General Permit.
N-10	N Area	Pen Branch	Remove from coverage under the Industrial Storm Water Permit.	Compliant discharge not subject to regulation.
N-12[1]	N Area	Pen Branch	Clean discharge channel upstream of outfall; install erosion control BMPs and apply soil amendments.	Individual Industrial Wastewater Permit.
N-12A[1]	N Area	Pen Branch	Install erosion control BMPs and apply soil amendments within catchment; install infiltration well in flow path from salvage yard.	Individual Industrial Wastewater Permit.
N-14	N Area	Fourmile Branch	Move outfall downstream of present location; apply soil erosion control BMPs.	Industrial Storm Water General Permit.
N-15	N Area	Fourmile Branch	Implement erosion control BMPs.	Industrial Storm Water General Permit.
N-16	N Area	Fourmile Branch	No action; meets WQS.	Industrial Storm Water General Permit.
P-07	P Area	Steel Creek	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.	Compliant discharge not subject to regulation.
P-13	P Area	Steel Creek	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.	Compliant discharge not subject to regulation.
P-19	P Area	Lower Three Runs	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.	Compliant discharge not subject to regulation.

(1) Based upon its review of effluent monitoring data, SCDHEC has directed SRS to apply for an individual industrial wastewater permit for this storm water outfall.

Outfall Designation	SRS Project Area	Receiving Stream	Proposed Action	Expected Outfall End-State Under Proposed Action
Y-01[1,2]	Y Area	Steel Creek	Plug conveyance piping; route runoff to two small retention ponds; outfall is eliminated.	Outfall is eliminated.
Z-01	Z Area	Upper Three Runs	No action.	Industrial Storm Water General Permit
Z-03	Z Area	Upper Three Runs	Remove from coverage under the Industrial Storm Water Permit.	Compliant discharge not subject to regulation.

Table 1-1 Continued. Summary of SRS Storm Water Outfalls Considered in This Environmental Assessment.

(1) Based upon its review of effluent monitoring data, SCDHEC has directed SRS to apply for an individual industrial wastewater permit for this storm water outfall.
(2) Implementation of the proposed action would result in the elimination of the outfall and is expected to negate the need for a permit.

evaluate and rank these options can be found in Halverson and Stinson (2006). These options, along with the findings of this EA, will be considered by SRS management in their decision-making process regarding how to best achieve NPDES permit compliance.

Since publication of the Basic Data Report, additional SRS storm water outfalls have been identified which are not included within the scope of this EA. These outfalls include C-03, S-07, S-10, F-02, H-04, and H-08. Outfalls F-02, H-04, and H-08 are presently regulated as industrial wastewater discharges but are proposed to be reclassified as storm water outfalls due to the elimination of industrial wastewater from their discharges (DOE, 2005). There are presently no storm water effluent data available for any of these outfalls to determine their impact on receiving state waters. Once the necessary effluent studies have been performed, a separate NEPA review will be conducted for any proposed corrective actions deemed necessary to achieve regulatory compliance.

This document was prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended; the requirements of the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR Parts 1500-1508); and the DOE Regulations for implementing NEPA (10 CFR Part 1021, as amended). NEPA requires the assessment of potential consequences of Federal actions that may significantly impact or affect the quality of the human environment. Based on the potential for impacts described within this EA, DOE will either publish a finding of no significant impact (FONSI) or prepare an environmental impact statement (EIS).

1.2 Purpose and Need

Nineteen (19) industrial storm water outfalls have been identified at SRS which may not presently meet the new NPDES permit requirements. The purpose of the proposed and alternative actions considered in this EA is to ensure that these outfalls are brought into timely compliance with the new permit limitations in a technically reliable, cost-effective manner. DOE needs to achieve and maintain regulatory compliance with the renewed SRS NPDES General Storm Water Permit.

2.0 PROPOSED AND ALTERNATIVE ACTIONS

Proposed and alternative actions encompassing selected BMPs have been identified to ensure that industrial storm water discharges at SRS do not contravene applicable WQS in receiving state waters. In many instances, DOE has identified and evaluated multiple alternative actions for each outfall. This approach allows DOE flexibility should changing circumstances result in the preferred action for any given outfall no longer being the most desirable or viable action to implement. Figure 2-1 illustrates the general locations of the subject outfalls within SRS. Table 2-1 provides a overview of major outfall attributes (e.g., drainage area, land use). Table 2-2 identifies the storm water pollutant constituent(s) of concern (if applicable) for each outfall. Section 2.1 provides outfall-specific location maps, a brief characterization of each outfall's drainage area, and a discussion of proposed and alternative actions. Cost estimates provided for selected outfall options represent 'rough order of magnitude' estimates (i.e., +100% to -50%) based on pre-conceptual design information. A comprehensive description of each outfall can be found in Gordon et al. (2006). Section 2.2 describes the 'No Action' alternative.

2.1 Outfall-Specific Actions

2.1.1 Outfall A-08

The land area drained by Outfall A-08 encompasses approximately 105,660 ft^2 (2.4 acres) in A-Area in the general vicinity of Powerhouse 784-A (Figure 2-2). The dominant land cover within the drainage area is pavement and roofs (impermeable), followed by grass and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 362,443 gallons (Table 2-1). Storm water from the area flows through a common conveyance pipe to the outfall (Figure 2-3) which discharges into a previously impacted Carolina Bay. The Carolina Bay drains to Tim's Branch, a tributary of Upper Three Runs. Exposed pollutant sources within the drainage area include air conditioning (AC) units, metal and material storage areas, and impermeable surface areas (parking areas and facility roofs) (Figure 2-4). The storm water pollutant of concern at this outfall is zinc (Table 2-2).

Proposed and alternative actions considered for Outfall A-08 are described in Table 2-3. All options considered would divert flow from the receiving Carolina Bay to either a retention basin or alternative discharge channel. Both proposed and alternative actions 'A' and 'B' (respectively) would redirect storm flow from the A-08 drainage area to the Outfall A-07 engineered discharge channel via an excavated ditch or reinforced concrete pipeline (respectively) (Figure 2-5). Ash-contaminated sediments within the A-07 discharge channel would be removed and disposed of in a permitted land fill. Outfall A-08 would be relocated downstream along the A-07 discharge channel. Alternative action 'C' would redirect storm flow to a new retention basin (100 ft long x 100 ft wide x 6 ft deep) constructed within the catchment upstream of the existing outfall (Figure 2-6).

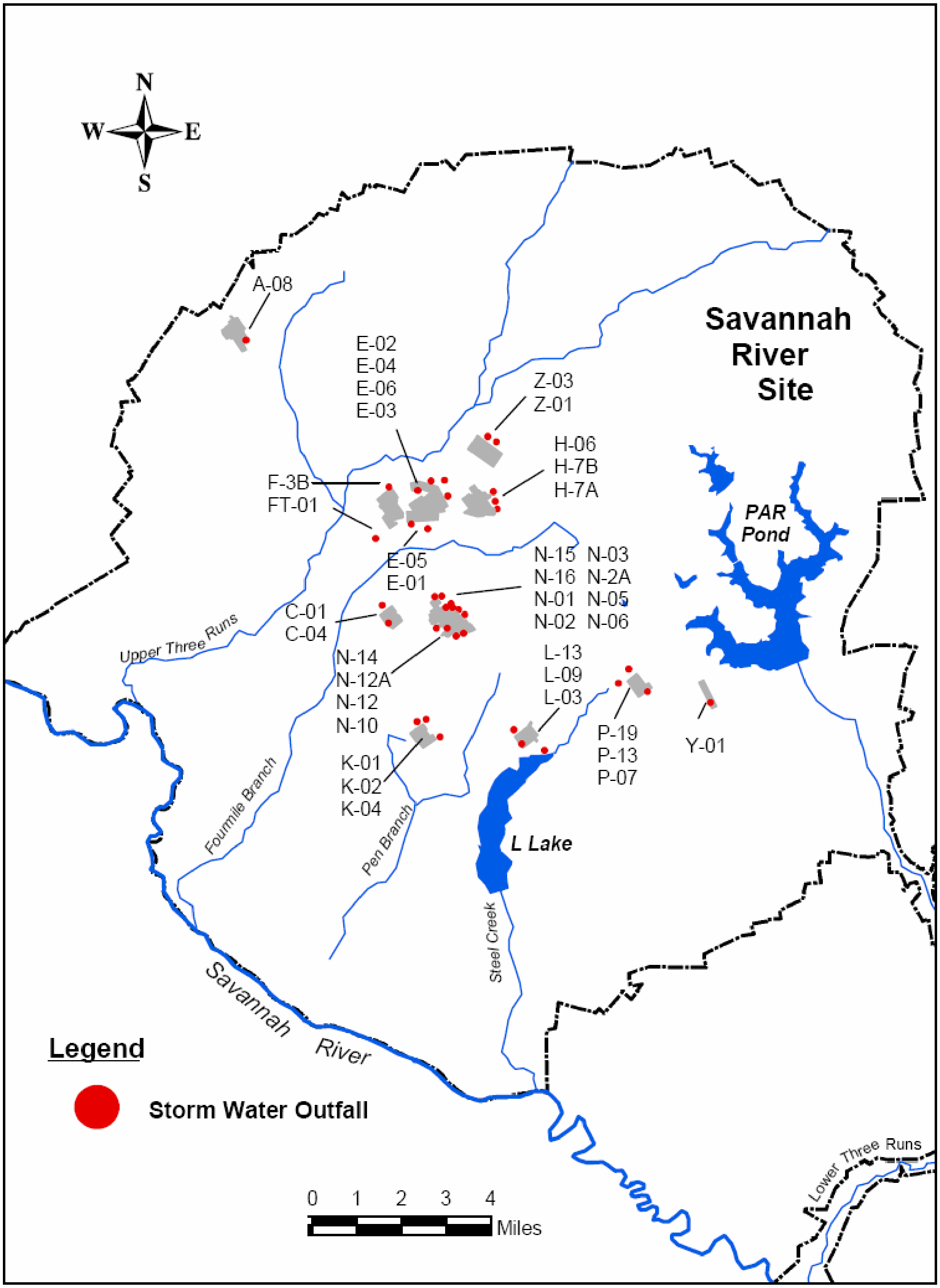

Figure 2-1. General Location Map of Outfall Projects Within SRS.

Table 2-1. Overview of Major Outfall Attributes

Outfall	Drainage Area (ft^2)						Total Drainage Area (ft^2)	Storm Event Discharge[1] (gal)
	Grass	Dirt	Gravel	Ditches	Roof/ Paved	Woods		
A-08	39,138	--	23,554	--	42,964	--	105,660	362,443
C-01	1,380,900	--	237,671		829,830	494,236	2,942,637	3,020,116
C-04	--	--	--	--	233,098	--	233,098	938,794
E-01	4,023,736	--	667,151	--	233,626	--	4,924,513	14,345,318
E-02	4,513,717	--	115,843	--	944,225	--	5,573,785	16,592,777
E-03	1,099,034	--	552,897	--	198,622	--	1,850,553	5,756,658
E-04	1,818,663	--	289,289	--	85,923	--	2,193,875	6,362,612
E-05	1,024,755	--	3,904	--	41,503	109,844	1,180,006	3,280,931
E-06	625,498	3,745	3,183	--	3,511	--	635,937	1,760,341
F-3B	1,173,498	--	326,253	--	525,269	--	2,025,020	6,471,654
FT-01	140,730	--	8,706	--	55,889	--	205,325	640,821
H-06	69,762	--	101,102	--	255,597	--	426,461	1,573,777
H-7A	12,139	--	208,660	--	266,855	--	489,654	1,848,743
H-7B	3,510	--	3,594	--	67,112	--	74,216	292,378
K-01	383,500	1,901	--	--	334,751	--	720,152	2,400,008
K-02	388,180	2,649	537	--	157,020	--	548,386	1,705,516
K-04	761,721	--	86,757	--	103,018	--	951,496	2,811,273
L-03	1,530,354	--	94,362	77,765	223,397	--	1,925,878	5,716,559
L-09	95,760	--	595	--	24,282	--	120,637	362,437
L-13	286,808	--	--	--	79,333	--	366,141	1,105,633
N-01	258,576	--	312,391	--	612,299	4,000	1,187,266	4,276,116
N-02	72,765	70,298	36,426	--	15,067	--	194,556	625,361
N-2A	421,454	--	620,105	--	978,106	--	2,019,665	7,263,585
N-03	35,083	--	93,995	--	46,247	--	175,325	612,341
N-05	12,722	--	606,047	--	22,429	--	641,198	2,256,918
N-06	189,109	--	278,560	--	346,522	248,411	1,062,602	3,515,922
N-10	280,510	--	590,880	--	48,465	93,164	1,013,019	3,277,124
N-12	368,438	--	410,490	--	407,342	75,245	1,261,515	4,277,459
N-12A	169,887	--	180,859	--	179,672	12,720	543,138	1,854,517
N-14	761,249	--	606,480	--	714,164	40,132	2,122,025	7,185,055
N-15	654,625	--	112,873	--	716,898	460,679	1,945,075	6,232,574
N-16	385,825	--	104,706	--	414,631	49,577	954,739	3,213,964
P-07	899,376	47,436	42,032	--	260,692	--	1,249,536	3,822,055
P-13	575,863	--	58,471	--	339,365	--	973,699	3,145,337
P-19	74,837	--	26,163	--	367,232	--	468,232	1,773,358
Y-01	236,232	--	63,782	--	65,868	--	365,882	1,136,644
Z-01	887,625	174,221	263,689	--	440,133	440,411	2,206,079	6,831,944
Z-03	282,410	122,091	72,290	--	77,227	1,168,820	1,722,838	4,729,953

[1] Shedrow 2006.

Table 2-2. Mean Storm Water Outfall Effluent Monitoring Data (mg/L) [1, 2, 3]

Outfall	EPA Storm Water Benchmark Criteria									
	TSS	As	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Zn
	100 mg/L	0.15 mg/L	0.0021 mg/L	1.8 mg/L	0.014 mg/L	1.00 mg/L	0.10 mg/L	0.47 mg/L	0.082 mg/L	0.120 mg/L
A-08	27	0.007	0.001	0.0	0.013	0.454	0.030	0.0	0.002	0.313
C-01	59	0.007	0.0	0.0	0.001	1.162	0.299	0.046	0.002	0.209
C-04	no valid data	no valid data	no valid data	no valid data	no valid data	no valid data	no valid data	no valid data	no valid data	no valid data
E-01	55	0.008	0.002	0.0	0.0	0.439	0.036	0.0	0.002	0.033
E-02	1	0.0	no data	0.0	0.0	0.623	0.017	0.0	0.0	0.0
E-03	no data	0.011	0.0	0.0	0.0	2.51	0.042	0.0	0.0	0.028
E-04	165	0.005	no data	0.0	0.0	2.106	0.077	0.0	0.003	0.0
E-05	12	0.0	no data	0.0	0.0	0.358	0.021	0.0	0.002	0.0
E-06	673	0.008	no data	0.0	0.0	1.617	0.155	0.0	0.004	0.22
F-3B	no data	0.012	0.005	0.0	0.009	1.016	0.046	0.0	0.020	0.320
FT-01	88	no data	no data	0.035	0.0	0.464	0.0	0.054	0.0	0.081
H-06	13	0.006	0.0	0.0	0.009	0.588	0.021	0.0	0.001	0.086
H-7A	18	0.006	0.001	0.005	0.026	0.911	0.075	0.0	0.004	0.312
H-7B	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
K-01	no data	0.011	0.001	0.0	0.012	0.249	0.036	0.0	0.002	0.307
K-02	6	0.009	0.002	0.0	0.002	0.264	0.033	0.0	0.0	0.195
K-04	9	0.008	0.002	0.0	0.016	0.645	0.045	0.0	0.0	0.095
L-03	no data	no data	no data	no data	0.0	1.122	no data	no data	no data	0.033
L-09	no data	no data	no data	no data	0.001	0.388	no data	no data	no data	0.105
L-13	no data	no data	no data	no data	0.0	0.141	no data	no data	no data	0.025
N-01	no data	0.005	0.002	0.004	0.006	1.611	0.081	0.0	0.007	0.230
N-02	78	0.014	0.001	0.006	0.005	3.372	0.101	0.0	0.040	0.104
N-2A	no data	0.007	0.001	0.011	0.008	3.352	0.239	0.014	0.018	0.475
N-03	9	0.009	0.002	0.014	0.005	4.922	0.295	0.008	0.007	0.064
N-05	no data	0.011	0.001	0.024	0.026	12.752	0.745	0.033	0.023	0.336
N-06	53	0.012	0.0	0.004	0.003	1.858	0.115	0.0	0.007	0.087
N-10	no data	0.007	0.001	0.0	0.004	1.326	0.072	0.0	0.005	0.115
N-12	no data	0.011	0.001	0.014	0.013	5.875	0.262	0.015	0.010	0.124
N-12A	84	0.008	0.004	0.011	0.051	4.040	0.118	0.013	0.030	0.297
N-14	7	0.005	no data	0.0	0.0	1.295	0.030	0.0	0.002	0.035
N-15	no data	no data	no data	no data	0.0	1.198	no data	no data	no data	0.096
N-16	no data	no data	no data	no data	0.0	0.678	no data	no data	no data	0.028
P-07	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
P-13	no data	0.014	0.0	0.0	0.0	0.557	0.054	0.0	0.003	0.012
P-19	no data	no data	no data	no data	0.0	0.477	no data	no data	no data	0.014
Y-01	30	0.015	0.003	0.0	0.076	1.391	0.223	0.0	0.004	0.193
Z-01	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
Z-03	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data

NOTE: Effluent data which exceed benchmark criteria are shaded.

(1) Gordon et al., 2006.

(2) Stinson, 2006.

(3) Values for Outfall N-03 reflect effluent data collected following implementation of BMPs in 2005.

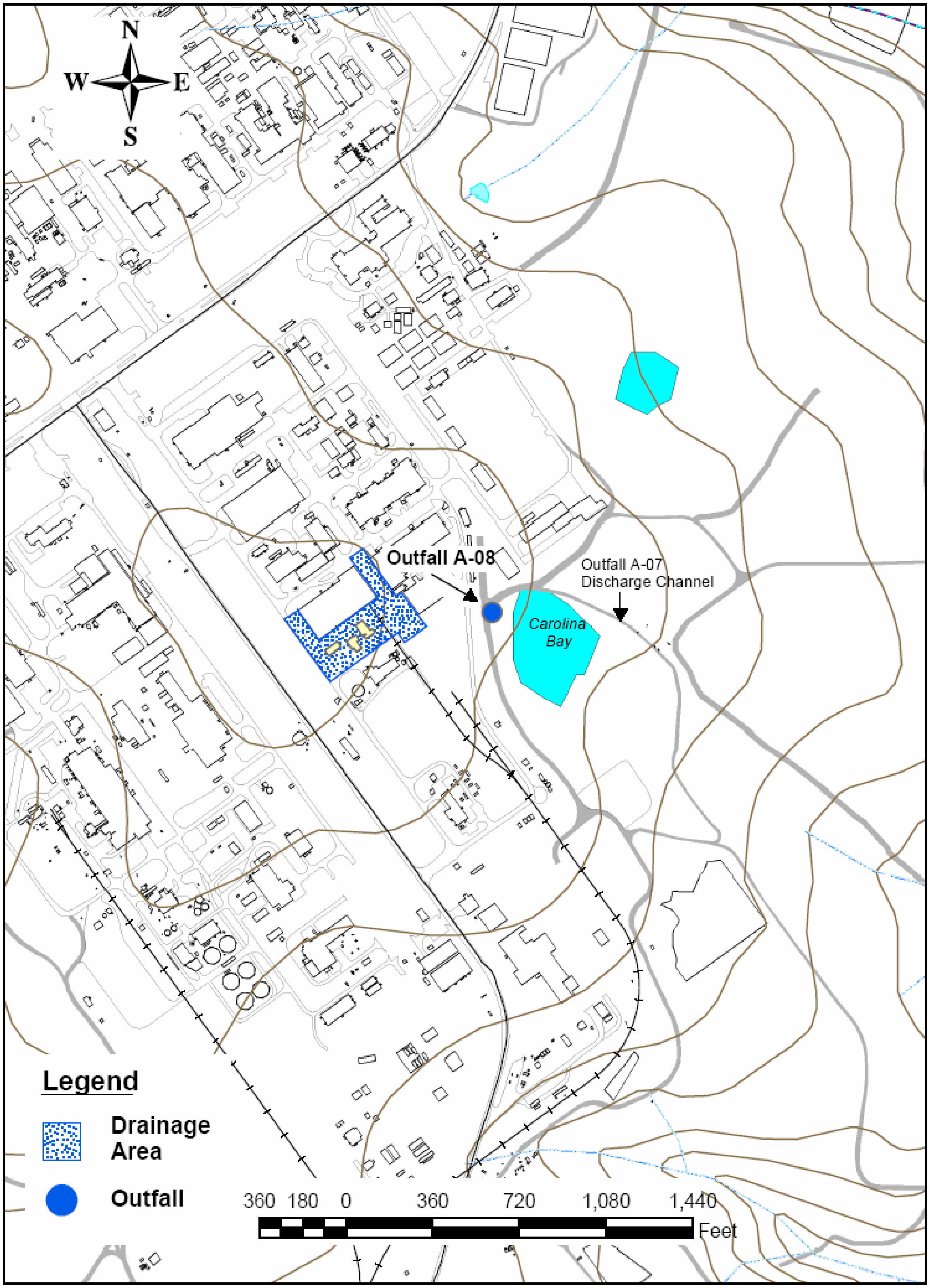

Figure 2-2. Location of Storm Water Outfall A-08 and Associated Drainage Area.

Figure 2-3. View of Storm Water Outfall A-08.

Figure 2-4. Representative View of Drainage Area for Storm Water Outfall A-08.

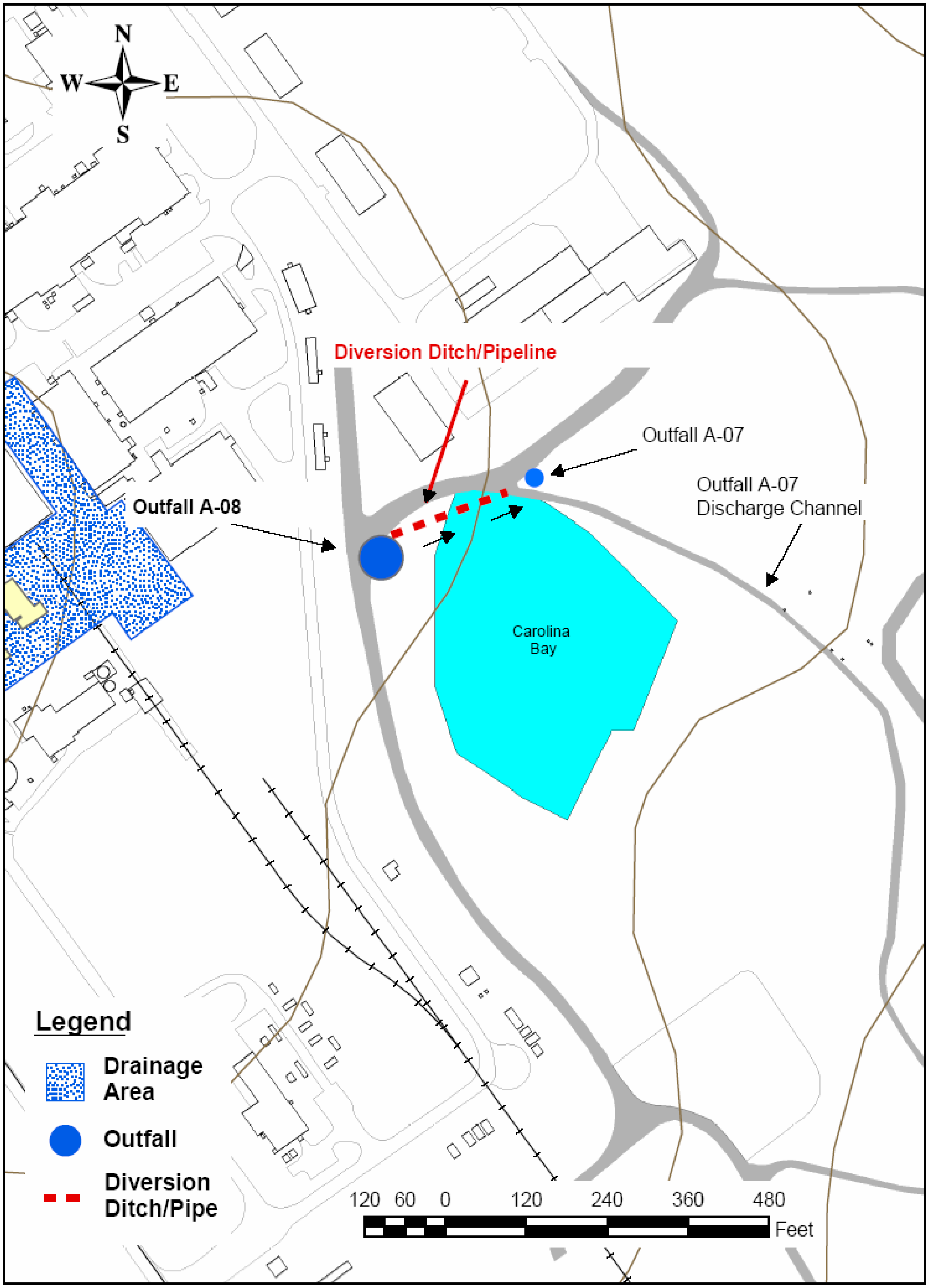

Figure 2-5. Outfall A-08, Options A and B: Divert Flow to Outfall A-07 Discharge Channel.

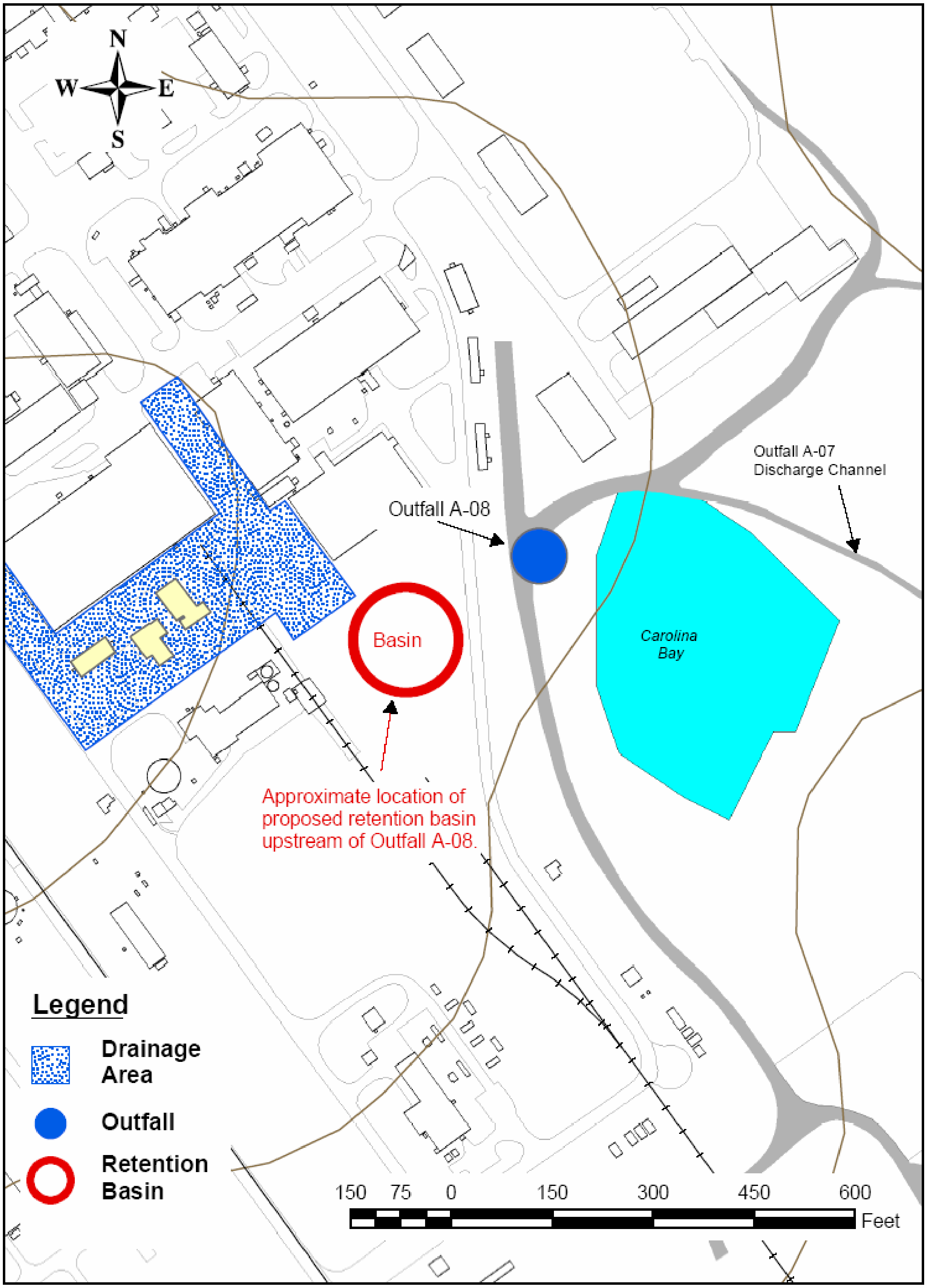

Figure 2-6. Outfall A-08, Option C: Retention Basin Upstream of Outfall.

Under this option, the existing Outfall A-08 would be used to monitor emergency overflow from the new basin. Alternative action 'D' would direct storm flow from the outfall's catchment to the existing A-10 Coal Pile Runoff Basin (Figure 2-7). Implementation of this option would require installing 1500 ft of concrete pipe and increasing the existing basin's holding capacity (i.e., increase height of the basin's embankments approximately 4 ft). The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for Outfall A-08. The expected end-state for Outfall A-08 under options 'A', 'B', and 'C' would be regulation as an individually permitted outfall under the Industrial Wastewater Permit. The proposed end-state for Outfall A-08 under option 'D' would be its elimination, therefore negating the need for regulation. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-3. Outfall A-08: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)	Alternative Action (C)	Alternative Action (D)
Redirect flow from Outfall A-08 to Outfall A-07 discharge channel via excavated ditch; Outfall A-08 would be relocated downstream along the A-07 discharge channel. Cost = $114K - $456K	Redirect flow from Outfall A-08 to Outfall A-07 discharge channel via pipeline; Outfall A-08 would be relocated downstream along the A-07 discharge channel. Cost = $135K – $540K	Redirect storm flow to new retention basin upstream of Outfall A-08; the existing outfall would be used to monitor emergency overflow from the basin. Cost = $412K – $1,648K	Redirect flow from Outfall A-08 catchment to the existing A-10 Coal Pile Runoff Basin; increase holding capacity of existing basin; Outfall A-08 would be eliminated. Cost = $904K - $3,616K

2.1.2 Outfall C-01

The land area drained by Outfall C-01 encompasses approximately 2,942,637 ft^2 (67.6 acres) in C-Area (Figure 2-8). The dominant land cover within the drainage area is grass, followed by impermeable (pavement/roofs), forested, and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 3,020,116 gallons (Table 2-1). Storm water from the area is directed via drainage ditches to the outfall (Figure 2-9) which discharges to an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include AC units, equipment hangers and supports, metal roofing, guard rails, and various materials stored without benefit of cover (e.g., metals, steam line insulation, deteriorating fences, and railroad ties and rails) (Figure 2-10). The storm water pollutants of concern at this outfall are iron, manganese, and zinc (Table 2-2).

Proposed and alternative actions considered for Outfall C-01 are described in Table 2-4. The proposed action 'A' would remove pollutant sources (temporary storage/laydown areas and the C-Reactor outer perimeter chain link fence) from the outfall's drainage area. Alternative action 'B' would clear, reshape, and establish defined, grassed discharge channels within the catchment. Riprap and check dams would also be installed in the catchment's flow paths. The expected end-state for Outfall C-01 under all options considered would be its continued regulation under the Industrial Storm Water General

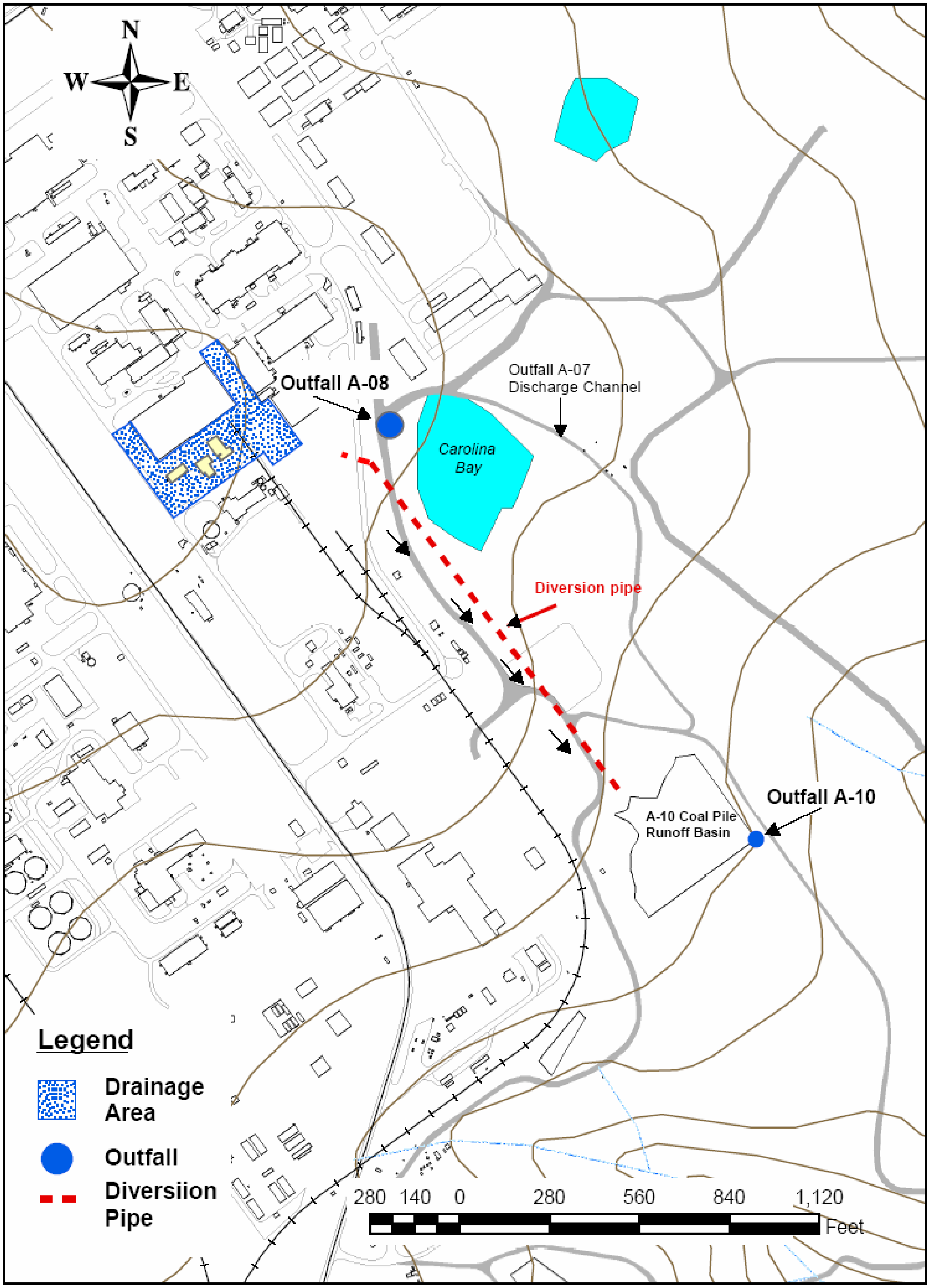

Figure 2-7. Outfall A-08, Option D: Divert Flow to A-10 Coal Pile Runoff Basin.

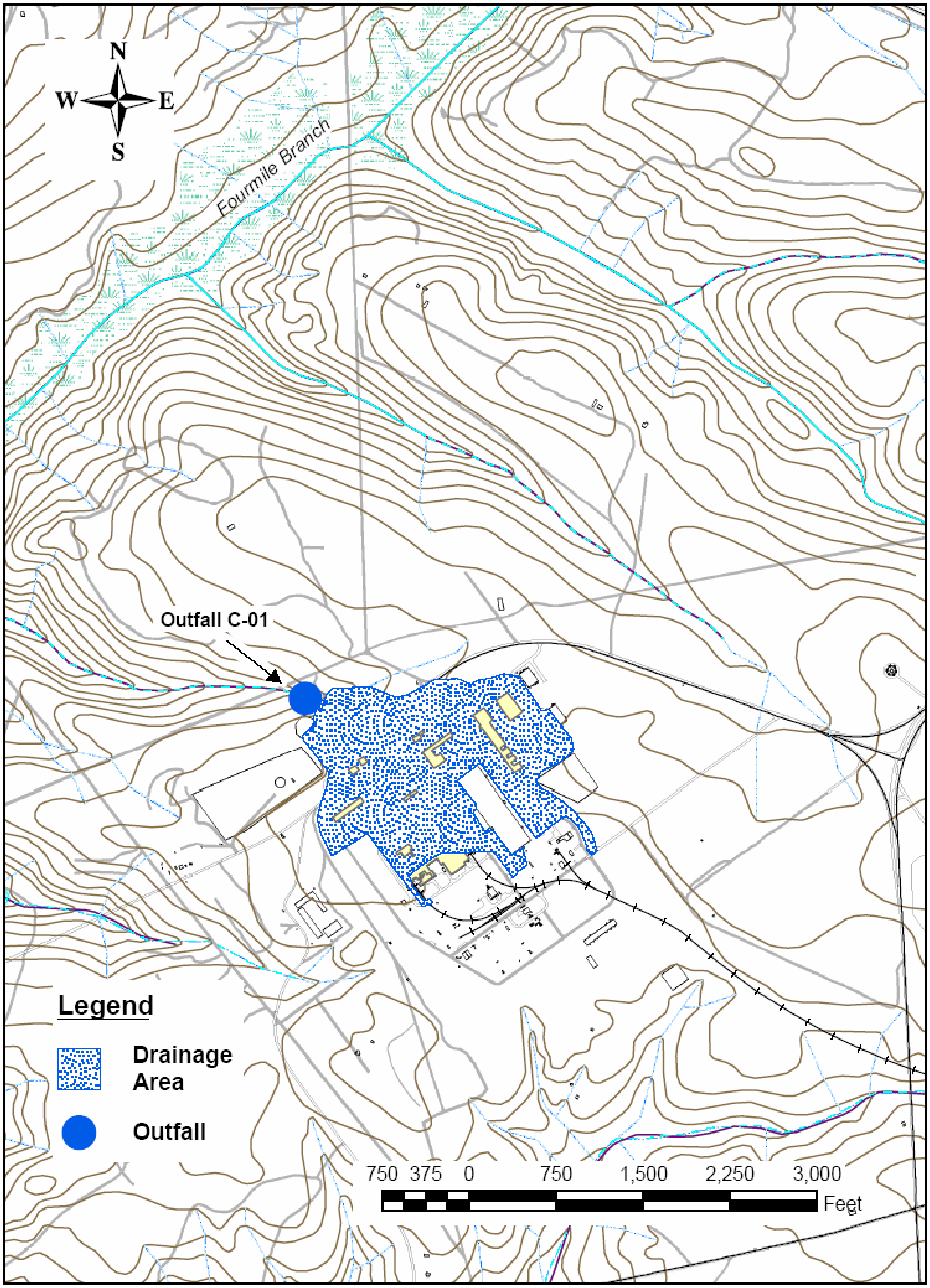

Figure 2-8. Location of Storm Water Outfall C-01 and Associated Drainage Area.

Figure 2-9. View of Storm Water Outfall C-01.

Figure 2-10. Representative View of Drainage Area for Storm Water Outfall C-01.

Permit. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-4. Outfall C-01: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)
Remove pollutant sources (e.g., temporary storage/laydown areas, chain link fence) from drainage area. Cost = \$139K - \$554K	Clear existing vegetation/debris from drainage ditches; reshape and establish defined, grass-lined channels; install riprap and check dams in main discharge channels. Cost = \$370K - \$1,480K

2.1.3 Outfall C-04

Outfall C-04 drains rainwater collected in Cooling Water Reservoir 186-C in C-Area (Figure 2-11). The approximate surface area of this concrete basin is 233,098 ft^2 (5.4 acres) (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 938,794 gallons (Table 2-1). Storm water collected in the reservoir flows via conduit, through a diversion box, to the outfall (Figure 2-12) which discharges to an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include metal platforms, walkways, guard rails and stairs, and exposed piping (Figure 2-13). Although storm water data for this outfall indicate iron to be problematic, these data are not believed to be valid because they were collected downstream of the outfall in a wetland area possessing environmental conditions not representative of the outfall's catchment.

There are no longer any industrial-related activities within the outfall's drainage area. The proposed action is to remove Outfall C-04 from coverage under the Industrial Storm Water General Permit (Table 2-5). Under this option, Outfall C-04 would be a compliant discharge not subject to regulation. A detailed description of this option can be found in Halverson and Stinson (2006).

Table 2-5. Outfall C-04: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit; maintain erosion control BMPs in drainage area.	None.

2.1.4 Outfall E-01

The land area drained by Outfall E-01 encompasses approximately 4,924,513 ft^2 (113 acres) in the southern portion of the burial ground complex (Figure 2-14). The dominant land cover within the drainage area (following completion of the current capping program) is grass, followed by gravel and impermeable (pavement/roof) surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 14,345,318 gallons (Table 2-1). Several storm water ditches, catch basins,

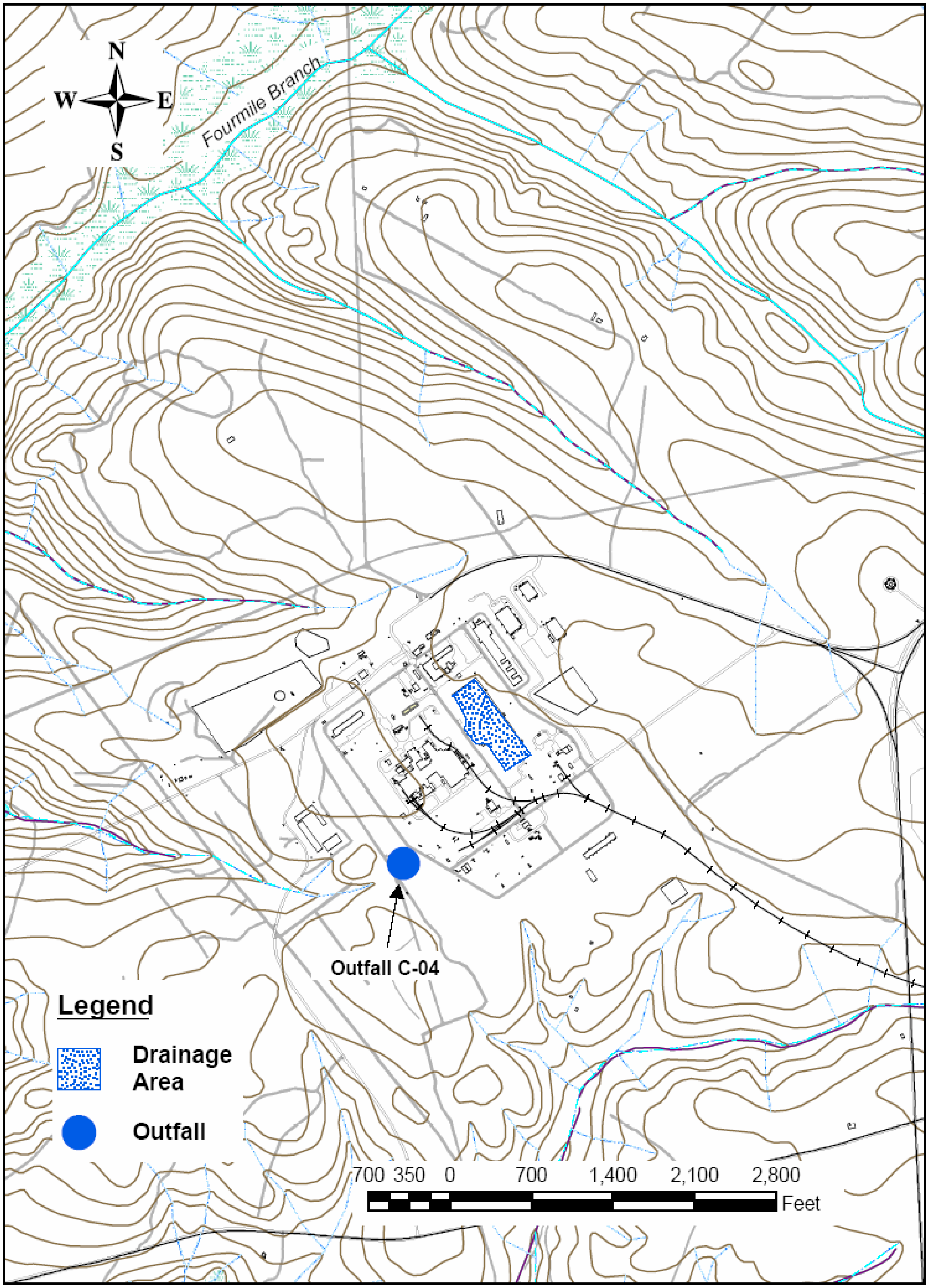

Figure 2-11. Location of Storm Water Outfall C-04 and Associated Drainage Area.

Figure 2-12. View of Storm Water Outfall C-04.

Figure 2-13. Representative View of Drainage Area for Storm Water Outfall C-04.

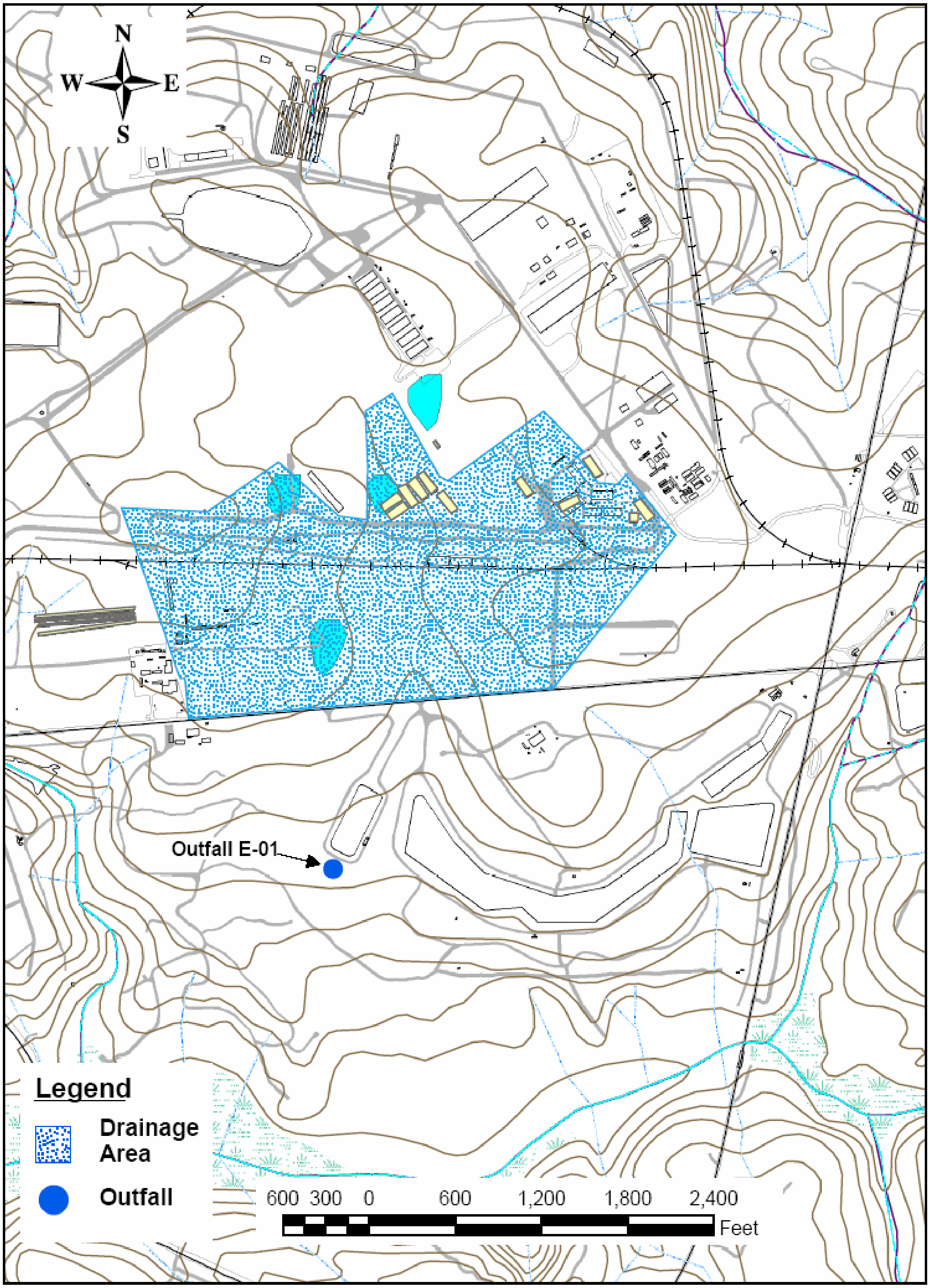

Figure 2-14. Location of Storm Water Outfall E-01 and Associated Drainage Area.

and conveyance pipes funnel area runoff into the Mixed Waste Management Facility South Sedimentation Basin. This basin is designed to overflow via a standpipe (Figure 2-15) into an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include metal surfaces of solvent storage tanks, transuranic (TRU) waste containers (mostly concrete) and low level waste (LLW) drums on storage pads, inactive solvent storage tanks (grouted and closed), stored cross-ties, and deteriorating fences (Figure 2-16). Review of effluent sampling data indicates no potential water quality problems (Table 2-2).

The proposed action for Outfall E-01 would be the 'No Action' alternative (Table 2-6). The expected end-state for Outfall E-01 under this option would be its continued regulation under the Industrial Storm Water General Permit.

Table 2-6. Outfall E-01: Proposed and Alternative Actions.

Proposed Action	Alternative Action
No Action.	None.

2.1.5 Outfall E-02

The drainage area for Outfall E-02 encompasses approximately 5,573,785 ft^2 (128 acres) in the central-northern portion of the burial ground complex (Figure 2-17). The dominant land cover within the drainage area is grass, followed by impermeable (pavement/roofs) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 16,592,777 gallons (Table 2-1). Storm water from the area currently flows into a sedimentation basin from which it can overflow, via the outfall (Figure 2-18), into an unnamed tributary of Upper Three Runs. Exposed pollutant sources within the drainage area include sealed TRU waste containers on storage pads, rusting metal parts/equipment, potential plutonium contamination from an old remediated spill, solvent waste tanks, and deteriorating fences (Figure 2-19). Review of effluent sampling data indicates no potential water quality problems (Table 2-2).

The proposed action for Outfall E-02 would be the 'No Action' alternative (Table 2-7). The expected end-state for Outfall E-02 under this option would be its continued regulation under the Industrial Storm Water General Permit.

Table 2-7. Outfall E-02: Proposed and Alternative Actions.

Proposed Action	Alternative Action
No Action.	None.

2.1.6 Outfall E-03

The drainage area for Outfall E-03 encompasses approximately 1,850,553 ft^2 (42.5 acres) in the lower eastern portion of the burial ground complex (Figure 2-20). The dominant

Figure 2-15. View of Storm Water Outfall E-01.

Figure 2-16. Representative View of Drainage Area for Storm Water Outfall E-01.

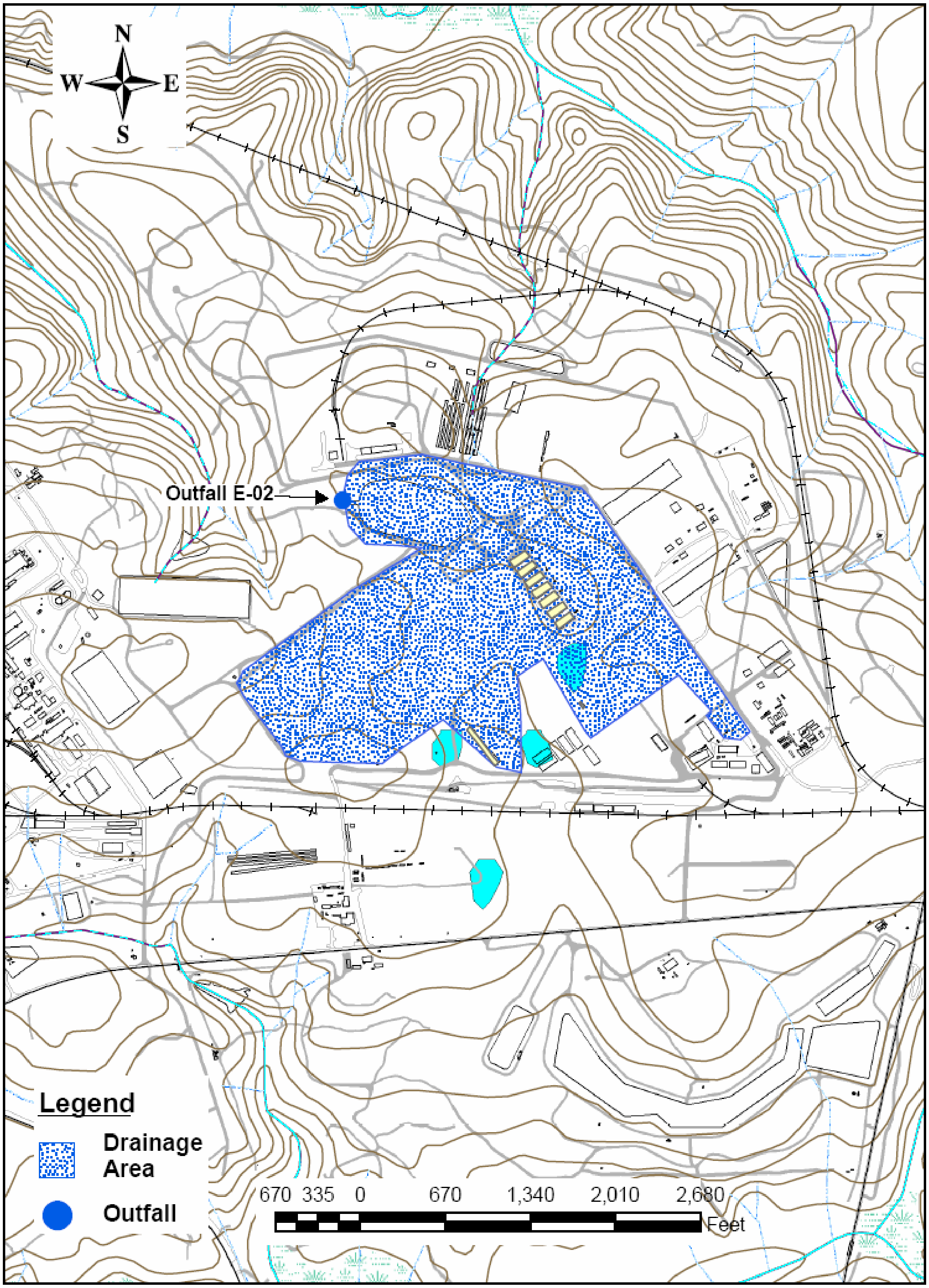

Figure 2-17. Location of Storm Water Outfall E-02 and Associated Drainage Area.

Figure 2-18. View of Storm Water Outfall E-02.

Figure 2-19. Representative View of Drainage Area for Storm Water Outfall E-02.

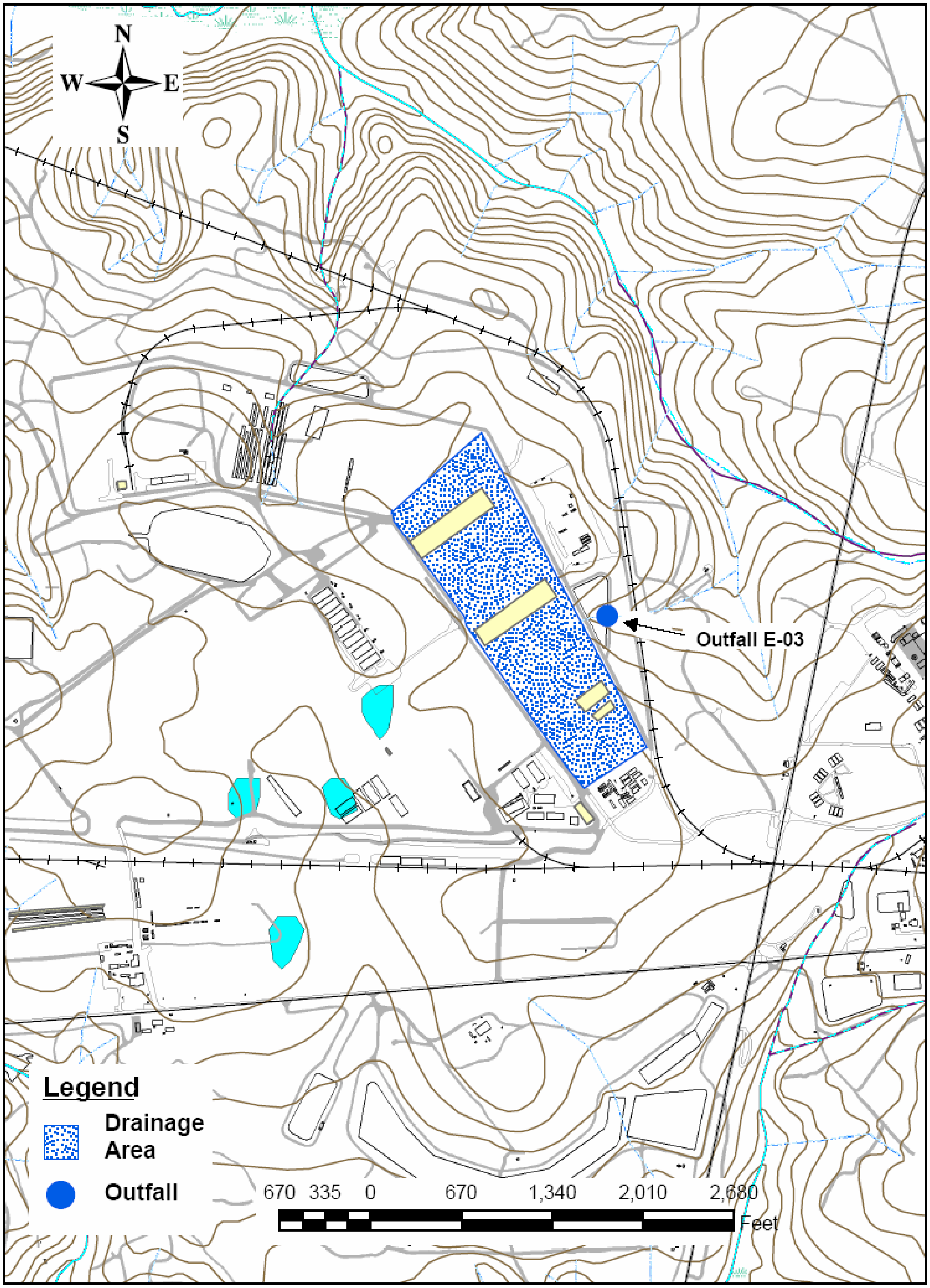

Figure 2-20. Location of Storm Water Outfall E-03 and Associated Drainage Area.

land cover within the drainage area is grass, followed by impermeable (pavement/roofs) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 5,756,658 gallons (Table 2-1). Storm water from the area is directed to a sedimentation basin which overflows, via a standpipe (Figure 2-21), into an unnamed tributary of Crouch Branch (Upper Three Runs drainage). Exposed pollutant sources within the drainage area include AC units on office trailers, B-25 boxes, sealand containers, TRU waste containers, empty drums, and deteriorating fences (Figure 2-22). The storm water pollutant of concern at this outfall is iron (Table 2-2).

The proposed action for Outfall E-03 would stabilize eroded channel areas within the catchment (e.g., install grass sod) and dredge accumulated sediments from the receiving South Sedimentation Basin (904-2E) to increase its holding capacity and residence time (Table 2-8). The expected end-state for Outfall E-03 would be its continued regulation under the Industrial Storm Water General Permit. A detailed description of this option can be found in Halverson and Stinson (2006).

Table 2-8. Outfall E-03: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Stabilize eroded areas and dredge sedimentation basin to increase holding time. Cost = $298K - $1,192K	None.

2.1.7 Outfall E-04

The drainage area of Outfall E-04 encompasses approximately 2,193,875 ft^2 (50.4 acres) in the northern central portion of the burial ground complex (Figure 2-23). The dominant land cover within the drainage area is grass, followed by impermeable (pavement/roofs) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 6,362,612 gallons (Table 2-1). Storm water from the area is directed to a sedimentation basin which overflows, via a standpipe (Figure 2-24), into an unnamed tributary of Crouch Branch (Upper Three Runs drainage). Exposed pollutant sources within the drainage area include rusting buildings, sealand containers, large equipment stored without benefit of cover, waste containers on pads and in slit trenches, and deteriorating fences (Figure 2-25). The storm water pollutants of concern at this outfall are iron and total suspended solids (Table 2-2).

The proposed action for Outfall E-04 would stabilize soil stockpiles created by trench excavations and implement erosion control BMPs within the drainage area to minimize sediment loading in storm water runoff. Also, accumulated sediments would be dredged from the receiving sedimentation basin (904-1E) to increase its holding capacity and residence time (Table 2-9). The expected end-state for Outfall E-04 would be its continued regulation under the Industrial Storm Water General Permit. A detailed description of the proposed action can be found in Halverson and Stinson (2006).

Figure 2-21. View of Storm Water Outfall E-03.

Figure 2-22. Representative View of Drainage Area for Storm Water Outfall E-03.

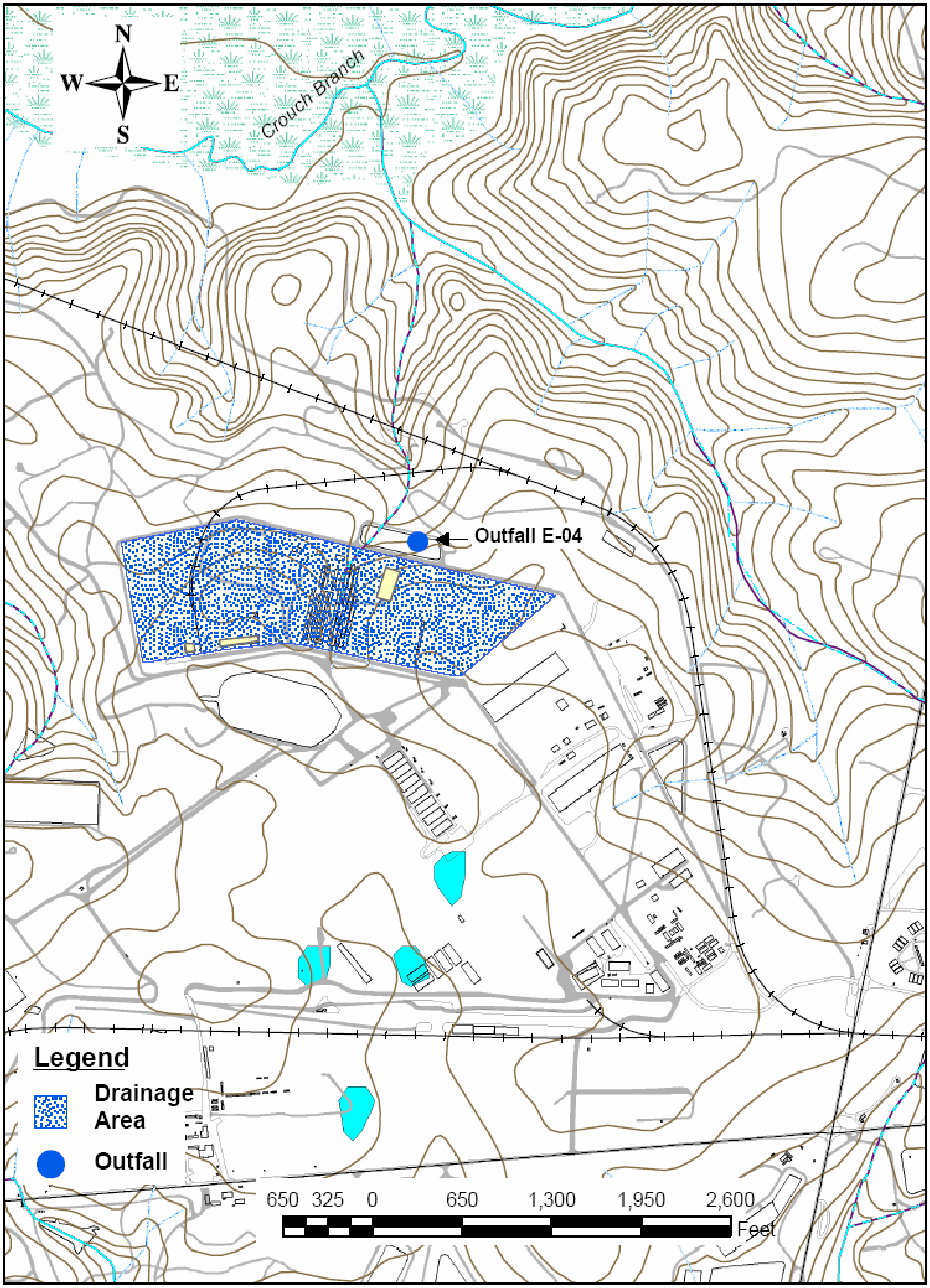

Figure 2-23. Location of Storm Water Outfall E-04 and Associated Drainage Area.

Figure 2-24. View of Storm Water Outfall E-04.

Figure 2-25. Representative View of Drainage Area for Storm Water Outfall E-04.

Table 2-9. Outfall E-04: Proposed and Alternative Actions.	
Proposed Action	Alternative Action
Stabilize soil stockpiles, implement erosion control BMPs within drainage area to minimize sediment loading in runoff; dredge sedimentation basin to increase holding time. Cost = $660K - $2,640K	None.

2.1.8 Outfall E-05

Outfall E-05 receives runoff from approximately 1,180,006 ft^2 (27 acres) in the southwest portion of the Old Radioactive Waste Burial Ground (Figure 2-26). The dominant land cover within the drainage area is grass, followed by forested, impermeable (pavement/roofs), and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 3,280,931 gallons (Table 2-1). Storm water from the area is directed via drainage ditches, a delaying basin, and conveyance piping to a sedimentation basin from which overflow discharges through the outfall (Figure 2-27) into an unnamed tributary of Fourmile Branch. Other than sediment and spray-irrigated tritiated water, there are no exposed pollutant sources within the drainage area (Figure 2-28). Review of effluent sampling data indicates no potential water quality problems (Table 2-2).

The proposed action for Outfall E-05 would be the ‘No Action’ alternative (Table 2-10). The expected end-state for Outfall E-05 would be its continued regulation under the Industrial Storm Water General Permit.

Table 2-10. Outfall E-05: Proposed and Alternative Actions.	
Proposed Action	Alternative Action
No Action.	None.

2.1.9 Outfall E-06

Outfall E-06 receives runoff from the Controlled Clean Soil Disposal Area, an approximately 635,937 ft^2 (14.6 acres) parcel located on the east side of the burial ground complex (Figure 2-29). The dominant land cover within this drainage area is grass, followed by exposed soil, impermeable (pavement/roofs), and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,760,341 gallons (Table 2-1). Storm water from the area is directed to a sedimentation basin which may discharge, via standpipe (Figure 2-30), into an unnamed tributary of Crouch Branch (Upper Three Runs drainage). The only exposed pollutant source within the drainage area is a potentially low-level radioactive soil pile (Figure 2-31). The storm water pollutants of concern at this outfall are iron, total suspended solids, manganese, and zinc (Table 2-2).

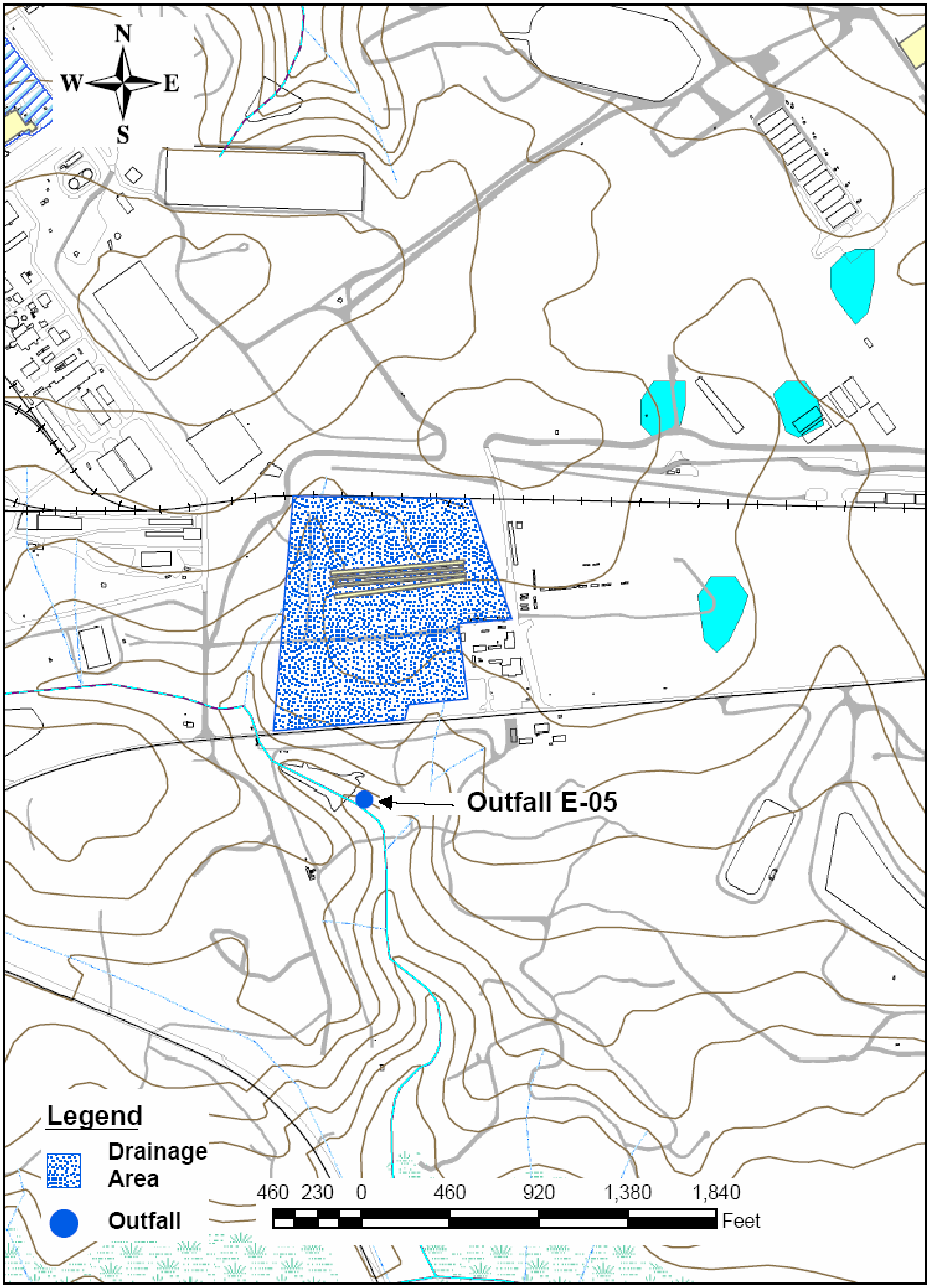

Figure 2-26. Location of Storm Water Outfall E-05 and Associated Drainage Area.

Figure 2-27. View of Storm Water Outfall E-05.

Figure 2-28. Representative View of Drainage Area for Storm Water Outfall E-05.

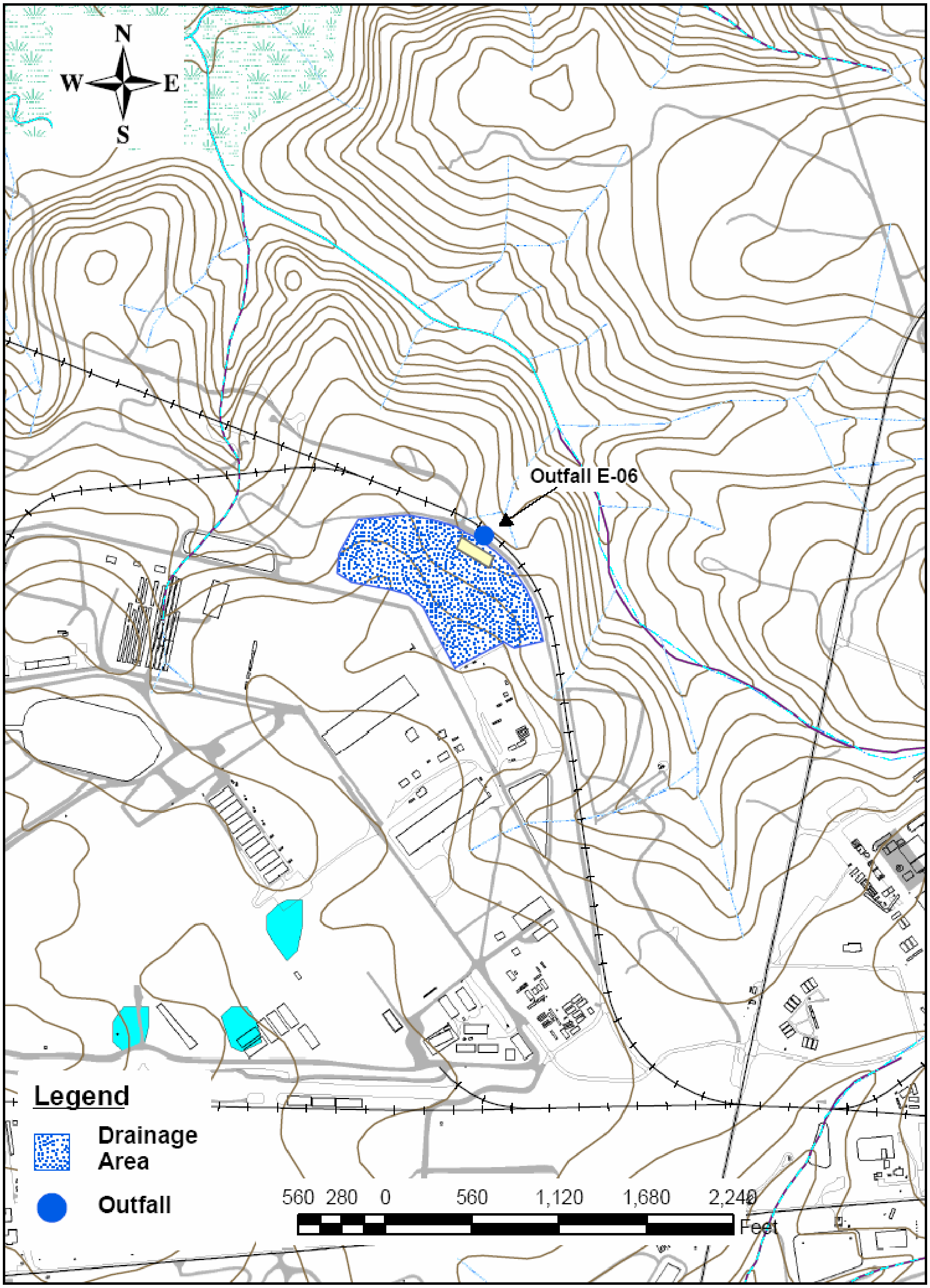

Figure 2-29. Location of Storm Water Outfall E-06 and Associated Drainage Area.

Figure 2-30. View of Storm Water Outfall E-06.

Figure 2-31. Representative View of Drainage Area for Storm Water Outfall E-06.

The proposed action for Outfall E-06 would regrade and stabilize soil stockpiles created by trench excavations and implement erosion control BMPs within the drainage area (e.g., reshaping, installing grass sod and silt fences) to minimize sediment loading in storm water runoff (Table 2-11). Additionally, accumulated sediments would be dredged from the receiving sedimentation basin to increase its holding capacity and residence time. The expected end-state for Outfall E-06 under this option would be its continued regulation under the Industrial Storm Water General Permit. A detailed description of this option can be found in Halverson and Stinson (2006).

Table 2-11. Outfall E-06: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Stabilize soil stockpiles, implement erosion control BMPs within drainage area to minimize sediment loading in runoff; dredge sedimentation basin to increase holding time. Cost = $779K - $3,114K	None.

2.1.10 Outfall F-3B

The land area drained by Outfall F-3B encompasses approximately 2,025,020 ft^2 (46.5 acres) in the northeastern sector of F-Area (Figure 2-32). The dominant land cover within the drainage area is grass, followed by impermeable (pavement/roofs) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 6,471,654 gallons (Table 2-1). Storm water from the area is directed via drainage ditches and conveyance piping to the outfall (Figure 2-33) which discharges to an unnamed tributary of Upper Three Runs. Exposed pollutant sources within the drainage area include rusted storm drain lids, AC units, rusting dumpsters and B-12 boxes, galvanized buildings, and deteriorating fences (Figure 2-34). The storm water pollutants of concern at this outfall are cadmium, iron, and zinc (Table 2-2).

The proposed action for Outfall F-3B would divert flow from the catchment into the new MOX Pond 400 retention basin (Table 2-12). The proposed end-state for Outfall F-3B would be its elimination. A detailed description of this option can be found in Halverson and Stinson (2006).

Table 2-12. Outfall F-3B: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Divert flow from catchment to the new MOX Pond 400 retention basin; Outfall F-03B would be eliminated.	None.

2.1.11 Outfall FT-01

The drainage area of Outfall FT-01 encompasses approximately 205,325 ft^2 (4.7 acres) in the northern half of the F-Area Groundwater Treatment Unit (Figure 2-35). The

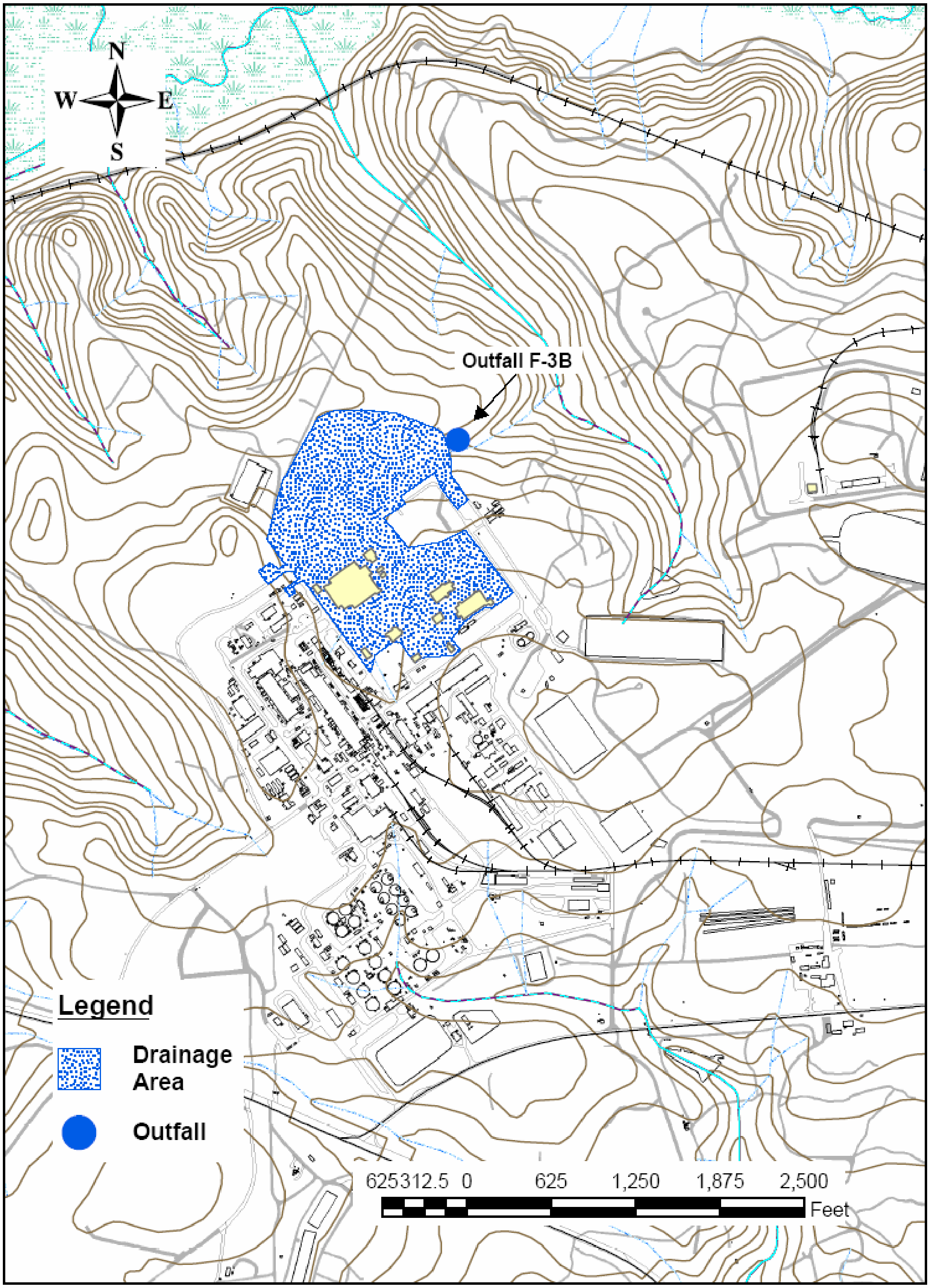

Figure 2-32. Location of Storm Water Outfall F-3B and Associated Drainage Area.

Figure 2-33. View of Storm Water Outfall F-3B.

Figure 2-34. Representative View of Drainage Area for Storm Water Outfall F-3B.

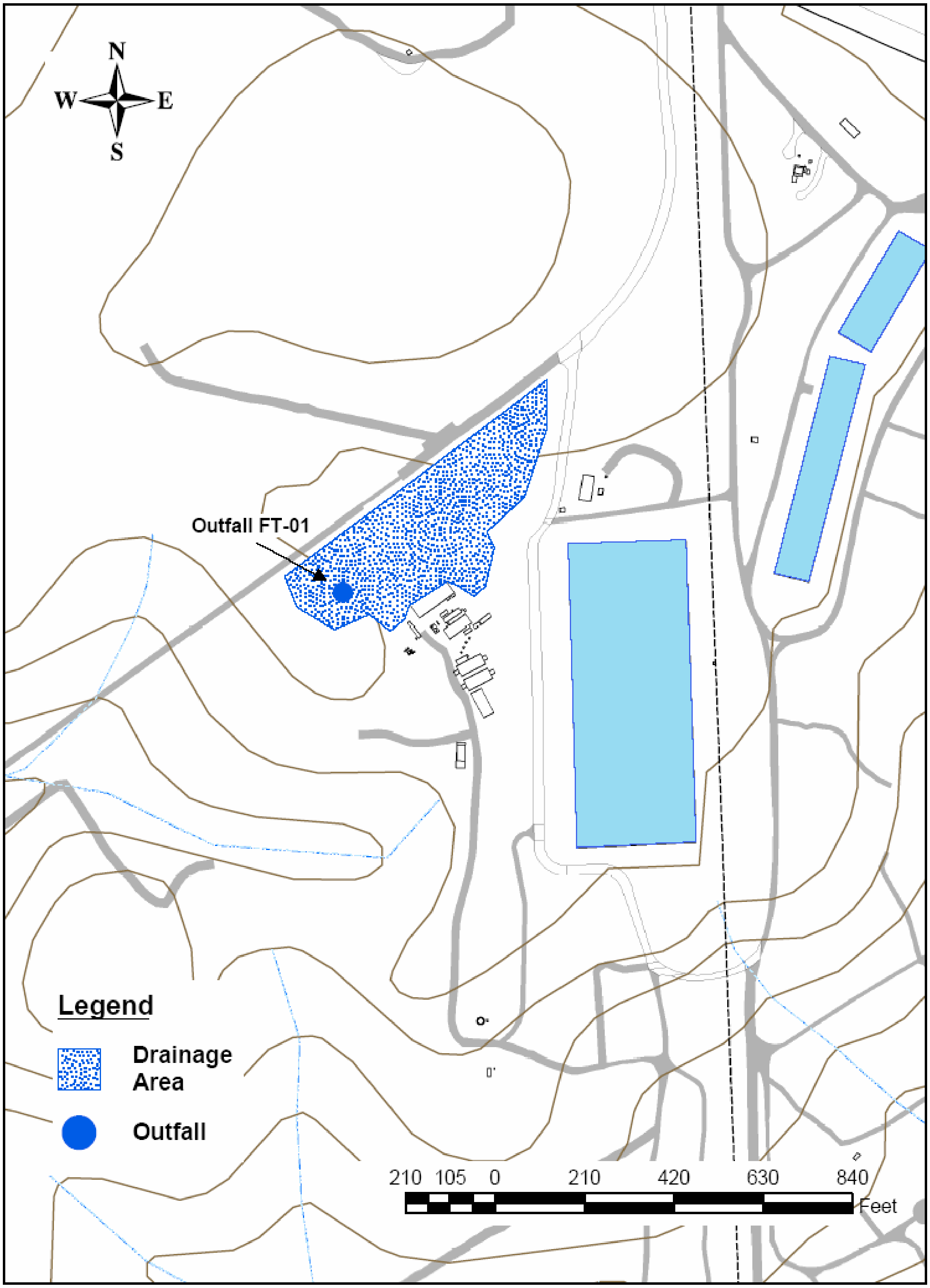

Figure 2-35. Location of Storm Water Outfall FT-01 and Associated Drainage Area.

dominant land cover within the area is grass, followed by impermeable (pavement/roofs) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 640,821 gallons (Table 2-1). Storm water from the area is channeled via a drainage ditch to the outfall (Figure 2-36) which discharges to an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include metal building roofs and equipment stored outside without benefit of cover (Figure 2-37). Review of effluent sampling data for this outfall indicates no potential water quality problems (Table 2-2).

There are no longer any industrial-related activities within the outfall's drainage area. The expected action is to remove Outfall FT-01 from coverage under the Industrial Storm Water General Permit (Table 2-13). Under this option, Outfall FT-01 would be a compliant discharge not subject to regulation.

Table 2-13. Outfall FT-01: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit.	None.

2.1.12 Outfall H-06

Outfall H-06 receives runoff from an area of approximately 426,461 ft^2 (9.8 acres) in the southeastern sector of H-Area (vicinity of H-Canyon) (Figure 2-38). The dominant land cover within the drainage area is impermeable pavement and roofs, followed by gravel and grass surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,573,777 gallons (Table 2-1). Storm water from the area is directed via drainage ditches and conveyance piping to the outfall (Figure 2-39) which discharges, via concrete ditch, to McQueen Branch (Upper Three Runs drainage). Exposed pollutant sources within the drainage area include rusting metal (e.g., pipes, sealand containers, dumpsters, iron grates, guard rails), galvanized buildings, tanks, corrugated buildings, and deteriorating fences (Figure 2-40). In March 2005, WSRC completed the implementation of selected storm water BMPs within the drainage area (i.e., clearing drainage ditch, channel grading, and constructing a gravel laydown area). A review of subsequent effluent monitoring data indicates no potential water quality problems at this outfall (Table 2-2).

The proposed action for Outfall H-06 would be the 'No Action' alternative (Table 2-14). The expected end-state for Outfall H-06 under this option would be its continued regulation under the Industrial Storm Water General Permit.

Table 2-14. Outfall H-06: Proposed and Alternative Actions.

Proposed Action	Alternative Action
No Action.	None.

Figure 2-36. View of Storm Water Outfall FT-01.

Figure 2-37. Representative View of Drainage Area for Storm Water Outfall FT-01.

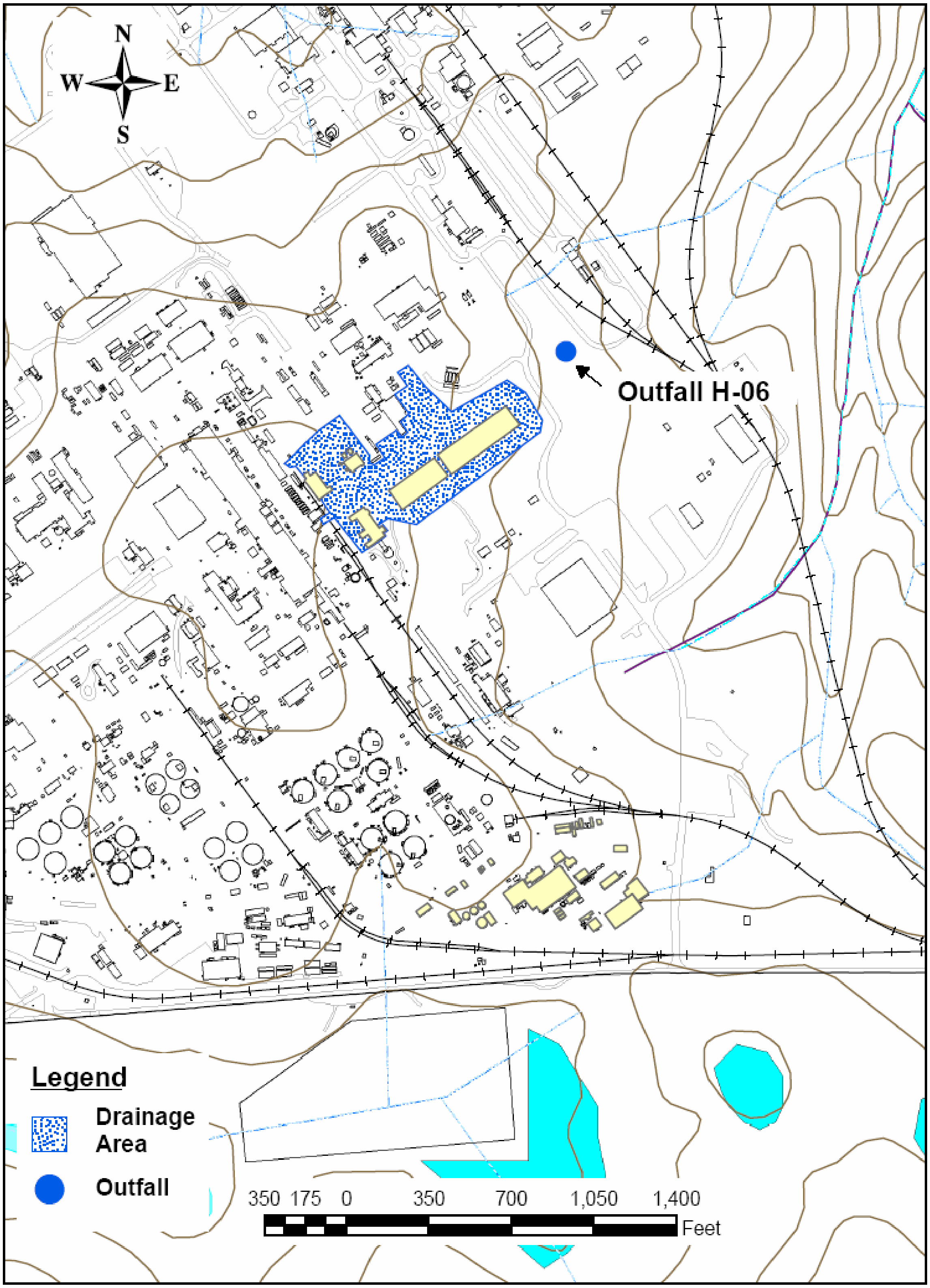

Figure 2-38 Location of Storm Water Outfall H-06 and Associated Drainage Area.

Figure 2-39. View of Storm Water Outfall H-06.

Figure 2-40. Representative View of Drainage Area for Storm Water Outfall H-06.

2.1.13 Outfall H-7A

Outfall H-7A receives runoff from an area of approximately 489,654 ft^2 (11.2 acres) in the southeastern sector of H-Area (Figure 2-41). The dominant land cover within the drainage area is impermeable pavement and roofs, followed by gravel and grass surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,848,743 gallons (Table 2-1). Storm water from the area flows via conveyance piping and concrete-lined ditches to the outfall which discharges, via a discharge channel (Figure 2-42), to McQueen Branch (Upper Three Runs drainage). Exposed pollutant sources within the drainage area include AC units, rusting metal (e.g., dumpsters, sealand containers, air compressor cooling tower), deteriorating fences, transformers, galvanized handi-houses, a laydown yard, and cooling water towers (Figure 2-43). The storm water pollutants of concern for this outfall are copper and zinc (Table 2-2).

Proposed and alternative actions considered for Outfall H-7A are described in Table 2-15. Proposed action 'A' would redirect flow from Outfall H-7A to Outfall H-07 via a concrete pipeline (Figure 2-44). Implementation of this option would eliminate the subject outfall. Alternative action 'B' would consolidate runoff from both the Outfall H-7A drainage area and the H-Tank Farm laydown yard and redirect it, via concrete pipeline, to a new retention basin (140 ft long x 140 ft wide x 12 ft deep) (Figure 2-45). The outfall would be relocated downstream of the basin's emergency spillway. A drainage channel (300 ft long x 4 ft wide x 3 ft deep) would be excavated to direct flow from the laydown yard to the retention basin. Alternative action 'C' would redirect Outfall H-7A discharge to Outfall H-07 via concrete pipeline and install six stone-filled infiltration wells (6 ft diameter x 50 ft deep) to intercept storm flow from the H-Tank Farm laydown yard (Figure 2-46). Outfall H-7A would be relocated downstream of the infiltration wells. SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for this outfall. Implementation of option 'A' would eliminate the Outfall H-7A and the discharge would be regulated under the Industrial Wastewater Permit (Outfall H-07). The regulatory end-state for Outfall H-7A under options 'B' and 'C' is presently unknown. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-15. Outfall H-7A. Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)	Alternative Action (C)
Redirect Outfall H-7A flow to Wastewater Outfall H-07 via concrete pipeline; Outfall H-7A would be eliminated. Cost = \$288K - \$1,150K	Consolidate storm runoff from Outfall H-7A catchment and H-Tank Farm laydown yard and redirect to a new retention basin; Outfall H-07A would be relocated downstream of basin's emergency spillway. Cost = \$743K - \$2,970K	Redirect Outfall H-7A flow to Wastewater Outfall H-07 via concrete pipeline; install six infiltration wells to intercept flow from the H-Tank Farm Lay Down Yard; relocate Outfall H-7A downstream of infiltration wells. Cost = \$560K - \$2,238K

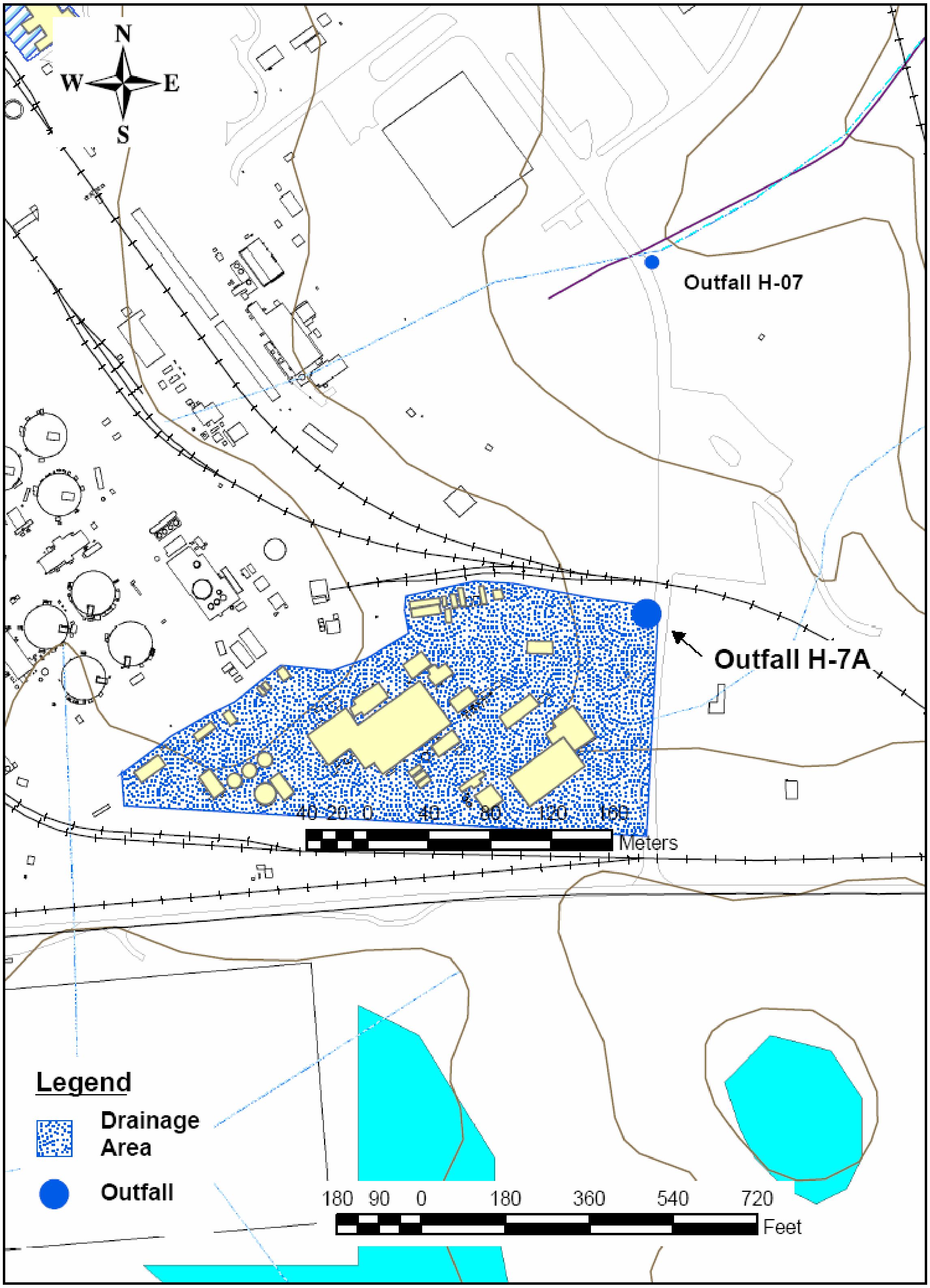

Figure 2-41. Location of Storm Water Outfall H-7A and Associated Drainage Area.

Figure 2-42. View of Storm Water Outfall H-7A.

Figure 2-43. Representative View of Drainage Area for Storm Water Outfall H-7A.

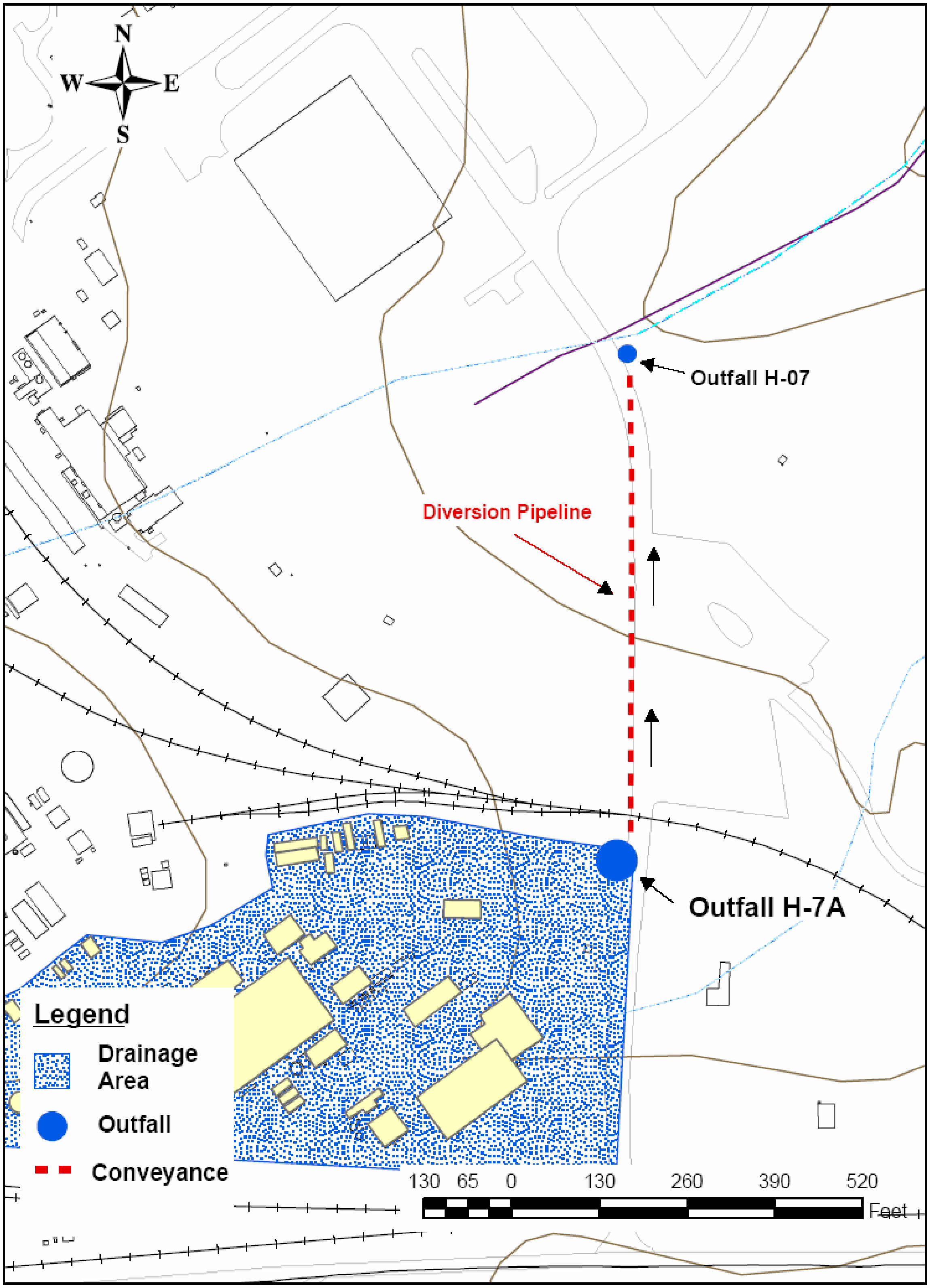

Figure 2-44. Outfall H-7A, Option A: Diversion of Flow to Outfall H-07.

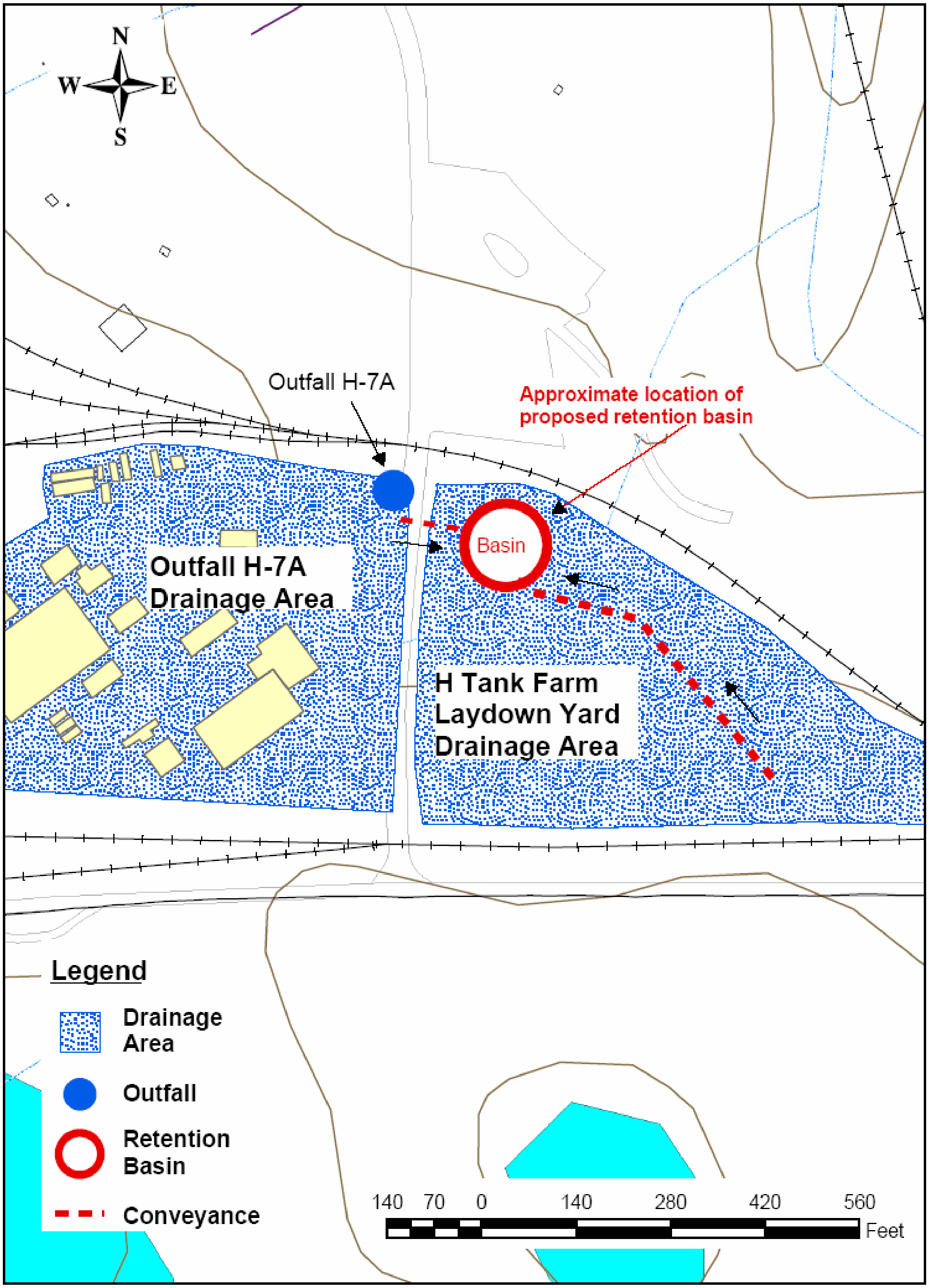

Figure 2-45. Outfall H-7A, Option B: Consolidate Outfall H-7A and H-Tank Farm Laydown Yard Stormflow into Retention Basin.

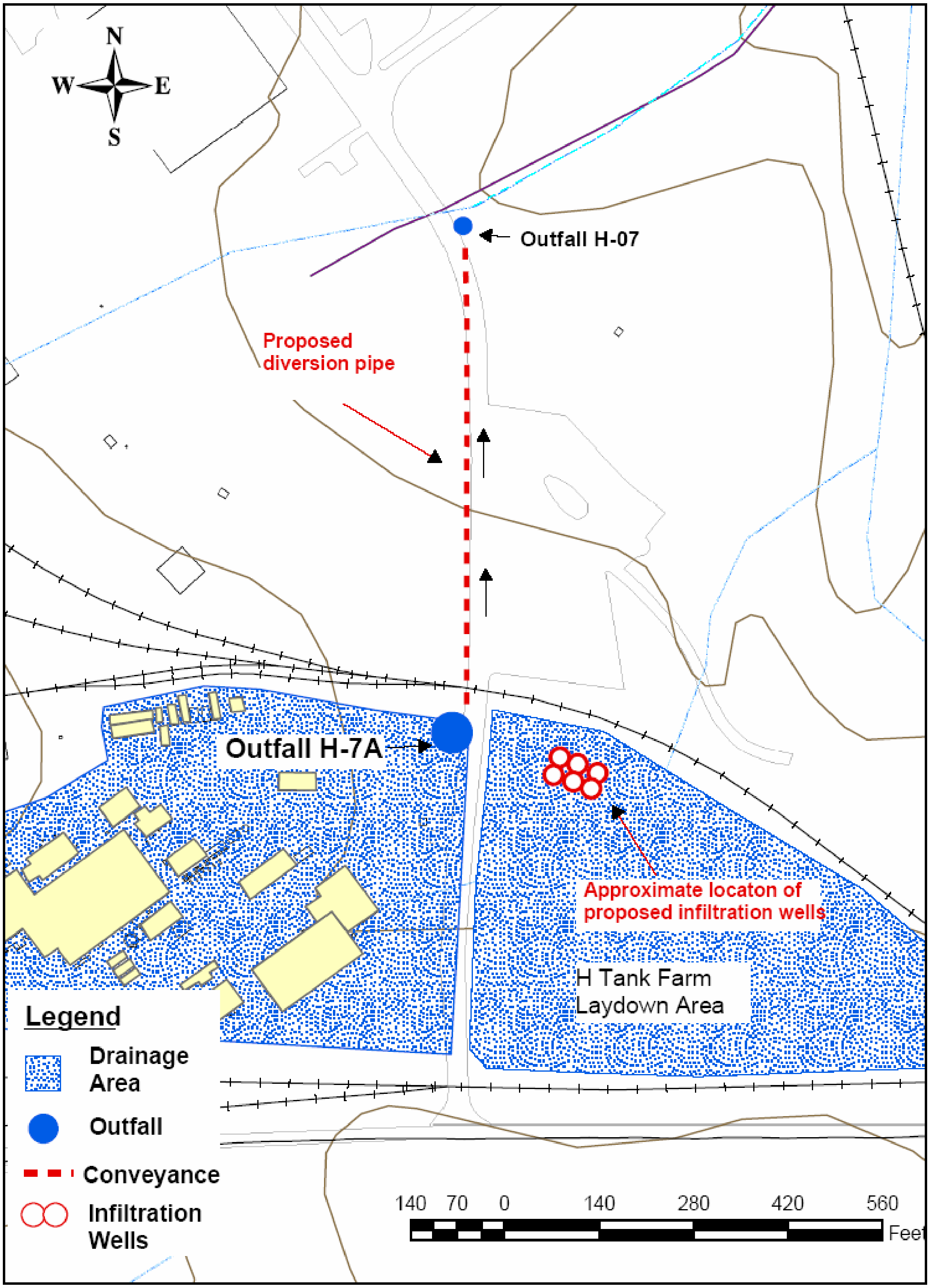

Figure 2-46. Outfall H-7A, Option C: Diversion of Flow to Outfall H-07 and Install Infiltration Wells for Laydown Yard Drainage.

2.1.14 Outfall H-7B

Outfall H-7B receives runoff from approximately 74,216 ft^2 (1.7 acres) in H-Area (Figure 2-47). Encompassed within this drainage area is an abandoned coal pile storage yard for Powerhouse 284-H. The dominant land cover within the drainage area is pavement and roofs (impermeable), followed by gravel, and grass surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 292,378 gallons (Table 2-1). Storm water from the area would flow via catch basins and conveyance piping to a coal pile runoff basin located just upstream of the outfall. It is not believed that this retention basin would overflow during a 25-year storm event. Any potential discharges from the outfall (Figure 2-48) would flow into McQueens Branch, a tributary to Upper three Runs. The only exposed pollutant sources within the drainage area is residual coal dust present in the abandoned coal storage yard (Figure 2-49). Due to the lack of discharges from this outfall, no effluent sampling data were collected.

The proposed action for Outfall H-7B would be the 'No Action' alternative (Table 2-16). The expected end-state for Outfall H-7B under this option would be its continued regulation under the Industrial Storm Water General Permit.

Table 2-16. Outfall H-7B: Proposed and Alternative Actions.

Proposed Action	Alternative Action
No Action.	None.

2.1.15 Outfall K-01

Outfall K-01 receives runoff from an area of approximately 720,152 ft^2 (16.5 acres) in the northern sector of K-Area (Figure 2-50). The dominant land cover within the drainage area is grass, followed by impermeable (pavement and roofs) and exposed soil surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 2,400,008 gallons (Table 2-1). Storm water from the outfall (Figure 2-51) flows via a drainage ditch into Indian Grave Branch, a tributary to Pen Branch. Exposed pollutant sources within the drainage area include condensate (AC, ice machine, and air compressor units), roof drains, galvanized conduit, metal covering on steam lines, and galvanized fences (Figure 2-52). There are no industrial-related activities within the outfall's catchment. The storm water pollutant of concern at this outfall is zinc (Table 2-2).

Proposed and alternative actions considered for storm water outfall K-01 are described in Table 2-17. Proposed action 'A' would remove Outfall K-01 from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within the outfall's catchment. Alternative action 'B' would route storm flow from the drainage area down an extended discharge channel to increase its run to state waters (Figure 2-53). The outfall would be relocated downstream of its present location along the extended discharge channel. Alternative action 'C' would route storm flow from K-01's catchment, via an extended discharge channel, into a new retention basin

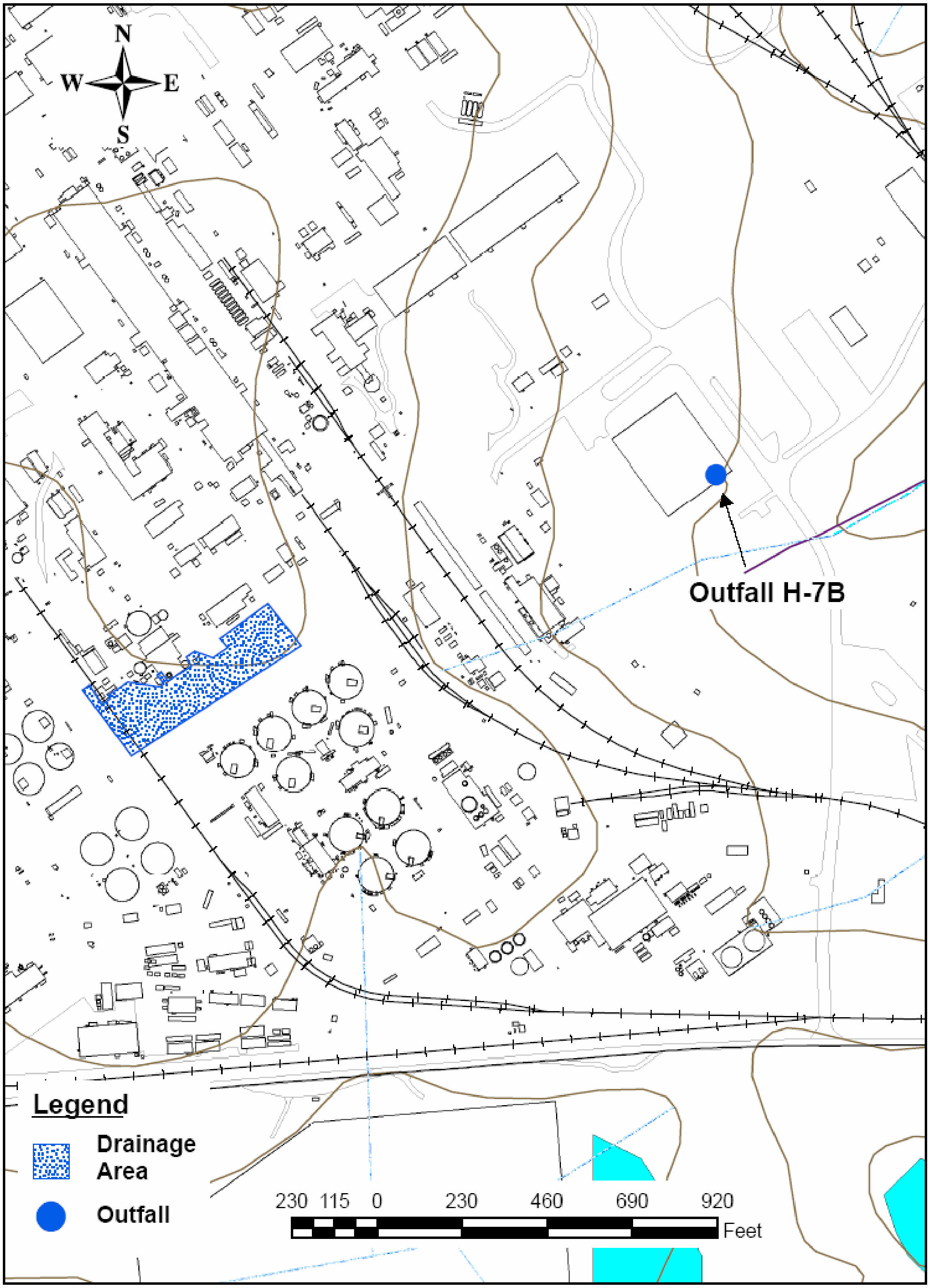

Figure 2-47. Location of Stormwater Outfall H-7B and Associated Drainage Area.

Figure 2-48. View of Storm Water Outfall H-7B.

Figure 2-49. Representative View of Drainage Area for Storm Water Outfall H-7B.

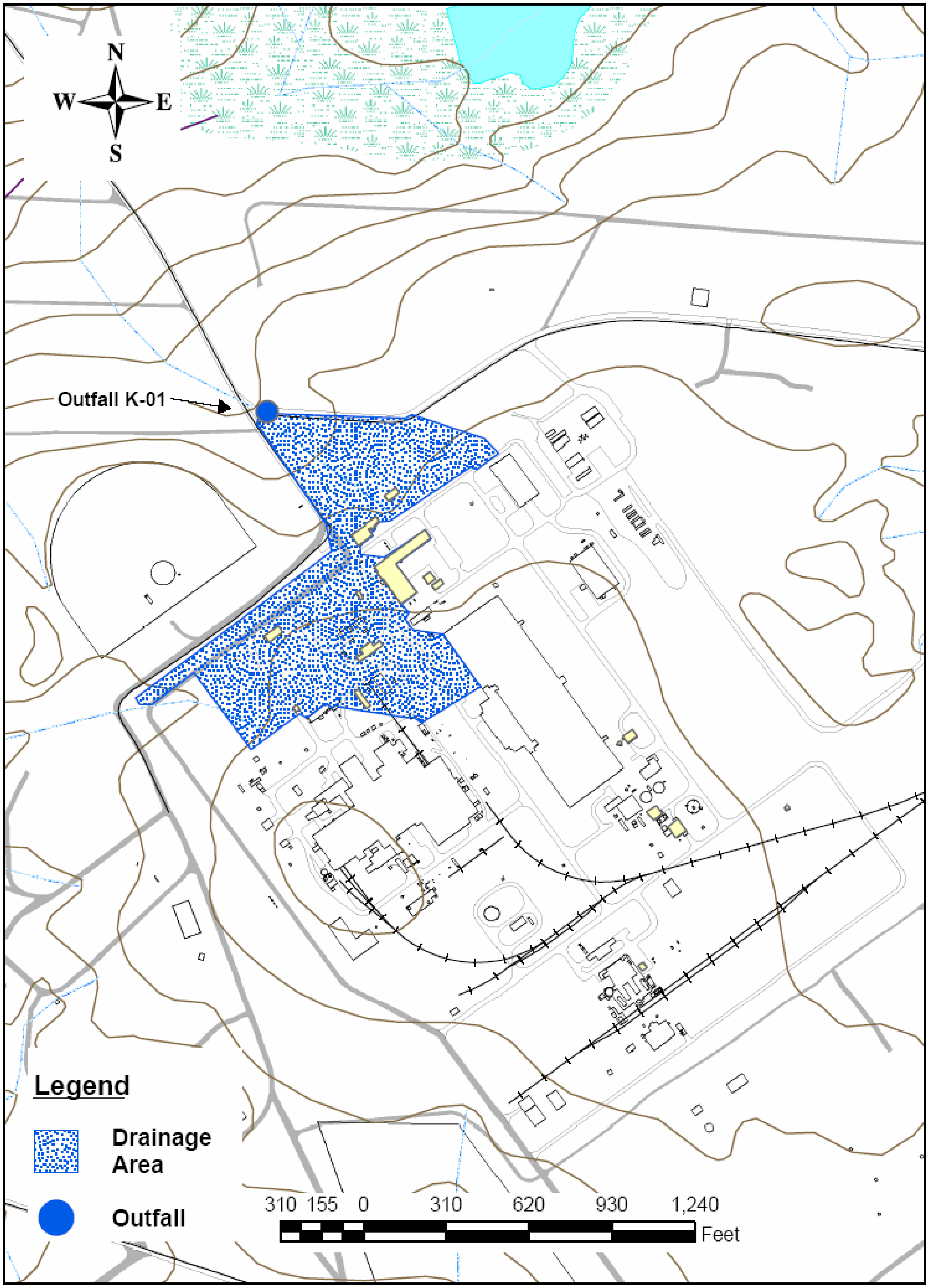

Figure 2-50. Location of Storm Water Outfall K-01 and Associated Drainage Area.

Figure 2-51. View of Storm Water Outfall K-01.

Figure 2-52. Representative View of Drainage Area for Storm Water Outfall K-01.

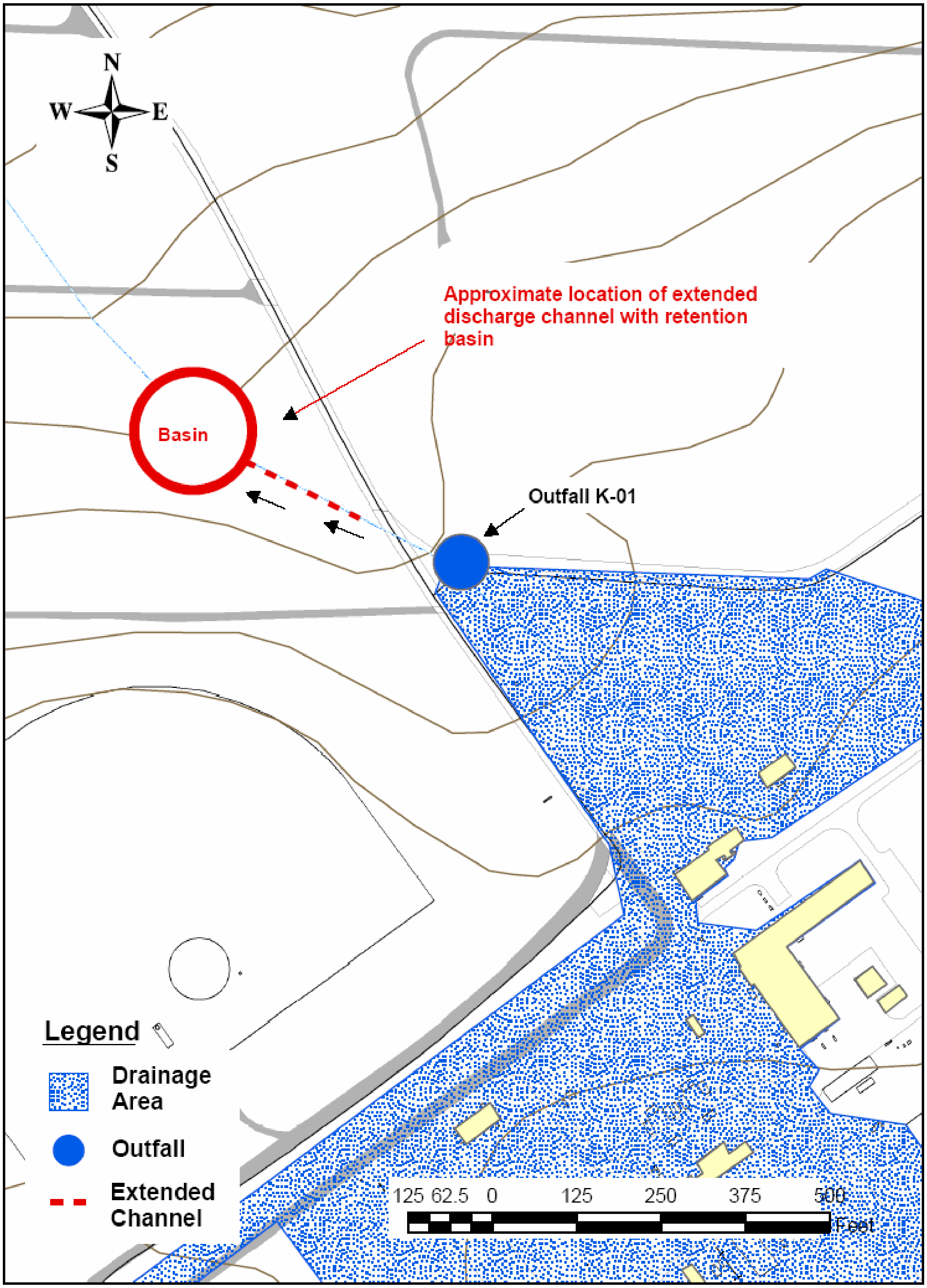

Figure 2-53. Outfall K-01, Options B and C: Extended Outfall Discharge Channel with Retention Basin.

(180 ft long x 180 ft wide x 10 ft deep) (Figure 2-53). The outfall would be relocated downstream of the new basin's emergency spillway. Alternative action 'D' would involve the strategic application of soil amendments within the drainage area upstream of the outfall to facilitate the sequestration of pollutant constituents (e.g., zinc) within the soil matrix. It is estimated that approximately five acres would be affected by this treatment. The expected end-state for Outfall K-01 under option 'A' would be a compliant discharge not subject to regulation. The expected end-state for all other actions considered (options 'B', 'C', and 'D') would be the outfall's continued regulation under the Industrial Storm Water General Permit. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-17. Outfall K-01: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)	Alternative Action (C)	Alternative Action (D)
Remove outfall from coverage under the Industrial Storm Water General Permit	Route flow from drainage area through an extended discharge channel to increase its run to state waters; relocate outfall downstream of present location along extended discharge channel. Cost = $164K - $656K	Route flow from drainage area into an extended discharge channel with new retention basin; Outfall K-01 would be relocated downstream of the basin's emergency spillway. Cost = $902K – $3,606K	Apply soil amendments within drainage area upstream of outfall to sequester pollutant constituents (e.g., zinc) within the soil matrix. Cost = $60K - $238K

2.1.16 Outfall K-02

Outfall K-02 receives runoff from an area of approximately 548,386 ft^2 (12.6 acres) in the northeastern portion of K-Area (Figure 2-54). The dominant land cover within the drainage area is grass, followed by impermeable (pavement and roofs), exposed soil, and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,705,516 gallons (Table 2-1). Outfall K-02 discharges into a concrete channel (Figure 2-55) which feeds a ditch that ultimately flows into Indian Grave Branch (Pen Branch drainage). Exposed pollutant sources within the drainage area include AC units, a metals laydown yard, skid pans containing recycled and salvageable materials, and deteriorating fences (Figure 2-56). The storm water pollutant of concern for this outfall is zinc (Table 2-2).

Proposed and alternative actions considered for storm water outfall K-02 are described in Table 2-18. Proposed action 'A' would redirect storm flow from the catchment, via new conveyance piping and an extended discharge channel, into a forested area where it would be dispersed as a diffuse sheet flow. The outfall would be relocated at the end of the discharge channel. It is anticipated that the storm flow would infiltrate into the soil column before reaching state waters (Pen Branch). Alternative action 'B' would divert flow, via an extended discharge channel, from the drainage area into a new retention basin (145 ft long x 145 ft wide x 10 ft deep) (Figure 2-57). Outfall K-02 would be relocated downstream of the basin's emergency spillway. Alternative action 'C' would

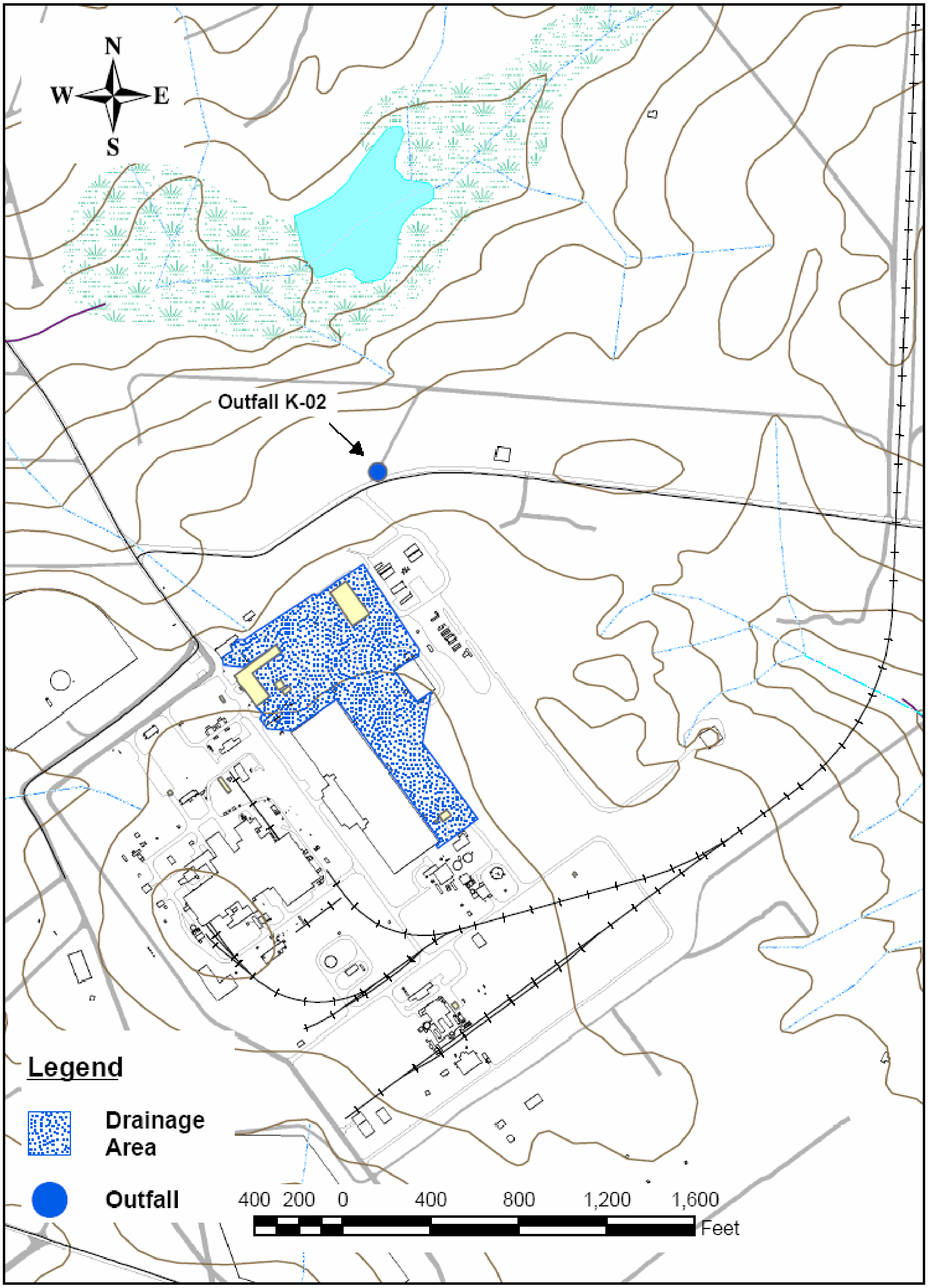

Figure 2-54. Location of Storm Water Outfall K-02 and Associated Drainage Area.

Figure 2-55. View of Storm Water Outfall K-02.

Figure 2-56. Representative View of Drainage Area for Storm Water Outfall K-02.

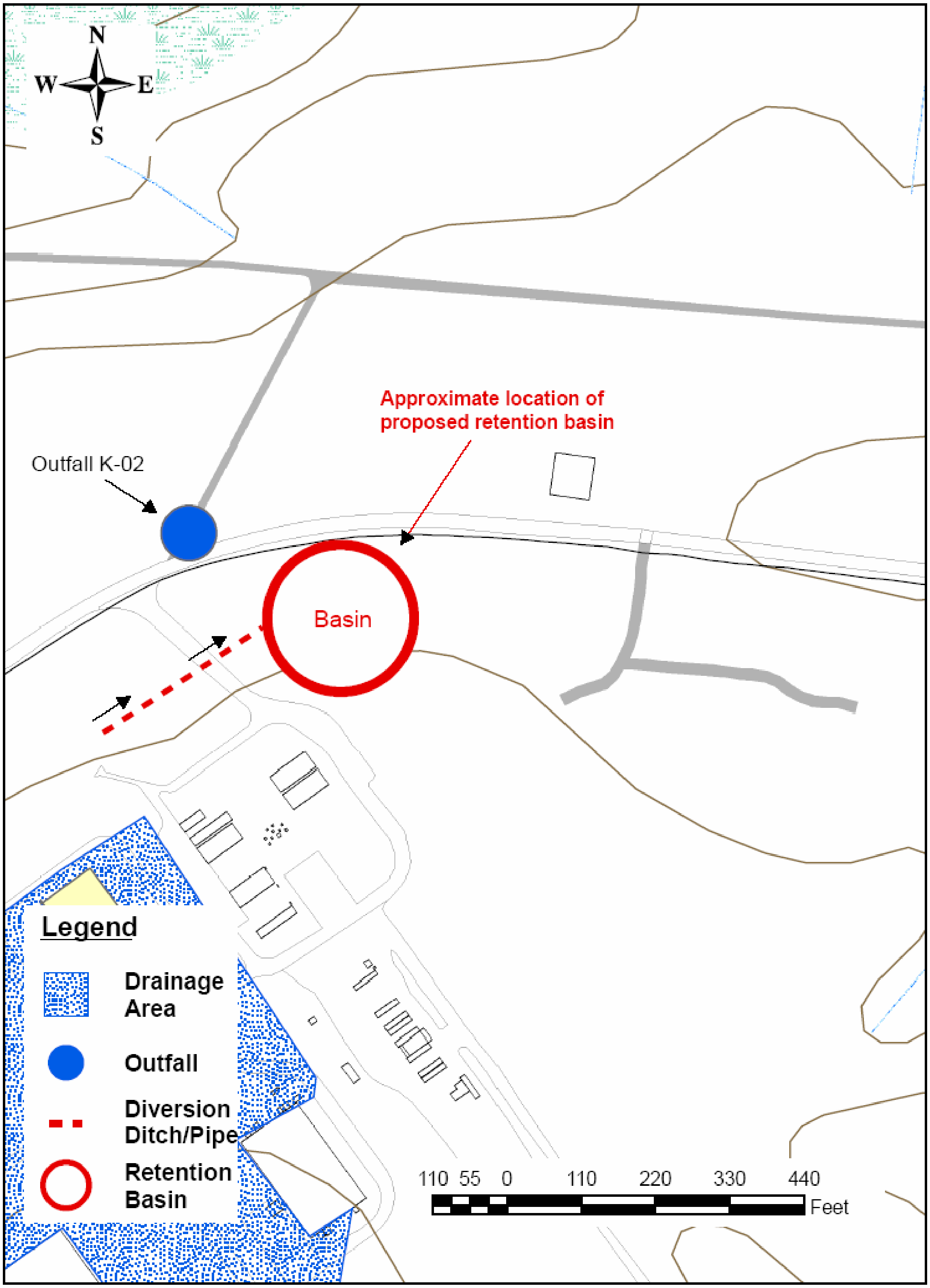

Figure 2-57. Outfall K-02, Option B: Extended Outfall Channel With Retention Basin.

involve the strategic application of soils amendments within the outfall's catchment to facilitate the sequestration of pollutant constituents within the soil matrix. It is estimated that approximately five acres within the drainage area would be affected by this treatment. The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for this outfall. The expected end-state for Outfall K-02 under all options considered would be its regulation as an individually permitted outfall under the Industrial Wastewater Permit. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-18. Outfall K-02: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)	Alternative Action (C)
Redirect flow via new piping and extended discharge channel to a forested area for dispersion as diffuse sheet flow; Outfall K-02 would be relocated at end of channel. Cost = \$232K - \$926K	Divert flow from drainage area, via an extended discharge channel, into a new retention basin; Outfall K-02 would be relocated downstream of basin's emergency spillway. Cost = \$713K – \$2,852K	Apply soil amendments within drainage area upstream of outfall to facilitate sequestration of metal contaminants within soil matrix. Cost = \$60K - \$238K

2.1.17 Outfall K-04

Outfall K-04 receives runoff from an area of approximately 951,496 ft^2 (21.8 acres) in the southeastern portion of K-Area (Figure 2-58). The dominant land cover within the drainage area is grass, followed by impermeable (pavement and roofs) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 2,811,273 gallons (Table 2-1). Outfall K-04 discharges into a drainage ditch (Figure 2-59) which flows toward Pen Branch. However, it is not believed that this storm flow reaches state waters (Osteen and Nelson, 2006). Exposed pollutant sources within the drainage area include AC and air compressor condensate, two storage areas for steel and used filters, flush water from two production wells, domestic water tank drainage, and deteriorating fences (Figure 2-60). The storm water pollutant of concern for this outfall is copper (Table-2).

Proposed and alternative actions considered for storm water outfall K-04 are described in Table 2-19. The proposed action 'A' would remove the outfall from coverage under the Industrial Storm Water General Permit. Alternative action 'B' would clear vegetation and other debris from the existing discharge channel and relocate the outfall approximately 1500 feet downstream of its present location. Alternative action 'C' would regrade a portion of the existing discharge channel, fertilize selected areas to facilitate vegetative growth, and strategically apply soil amendments within the catchment to sequester pollutant constituents within the soil column. The expected end-state for Outfall K-04 under option 'A' would be a compliant discharge not subject to regulation. The outfall's expected end-state under options 'B' and 'C' would be its continued regulation under the Industrial Storm Water General Permit. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

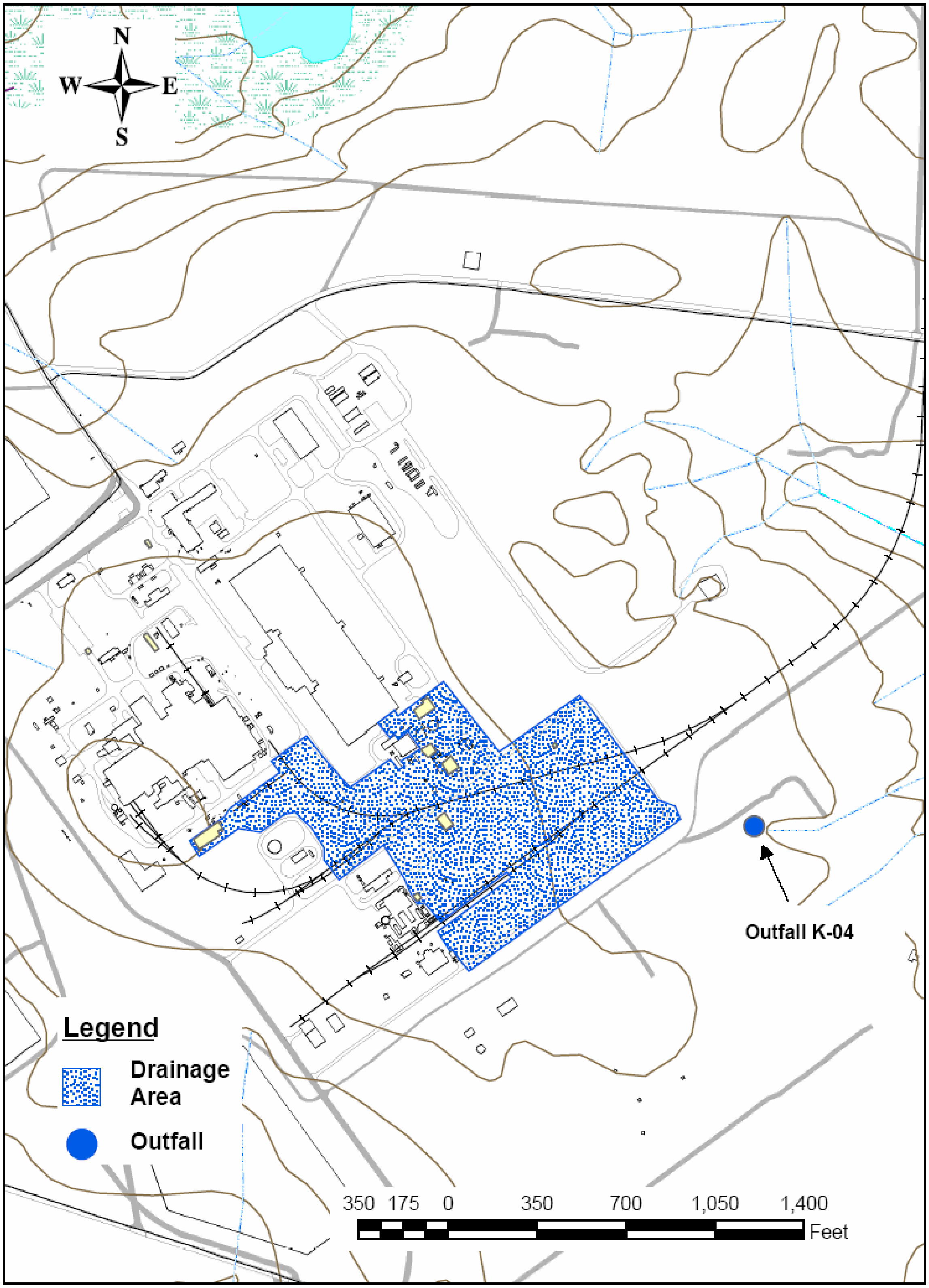

Figure 2-58. Location of Storm Water Outfall K-04 and Associated Drainage Area.

Figure 2-59. View of Storm Water Outfall K-04.

Figure 2-60. Partial View of Drainage Area for Storm Water Outfall K-04.

Table 2-19. Outfall K-04: Proposed and Alternative Actions.		
Proposed Action (A)	Alternative Action (B)	Alternative Action (C)
Remove outfall from coverage under the Industrial Storm Water General Permit	Remove existing vegetation and other debris from the discharge channel; relocate the outfall approximately 1500 ft downstream of its present location. Cost = $71 K - $284 K	Regrade approximately 200 feet of discharge channel; strategically apply soil amendments and fertilizer within catchment. Cost = $64 K - $256 K

2.1.18 Outfall L-03

Outfall L-03 receives runoff from an area of approximately 1,925,878 ft^2 (44.2 acres) in the eastern portion of L-Area (Figure 2-61). The dominant land cover within the drainage area is grass, followed by impermeable (pavement and roofs), gravel, and ditched surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 5,716,559 gallons (Table 2-1). Storm water from the area flows via drainage ditches (Figure 2-62) into L Lake. Exposed pollutant sources within the catchment include abandoned facilities, guardrails, production well flush water, and deteriorating fences (Figure 2-63). The storm water pollutant of concern for this outfall is iron (Table 2-2).

The proposed action for Outfall L-03 would implement erosion control BMPs (e.g., silt fences, grass sod, hay bales) to minimize the transport of iron-ladden soil in storm water runoff from the drainage area (Table 2-20). The expected end-state for the outfall under this option would be its continued regulation under the Industrial Storm Water General Permit. A detailed description of the proposed action can be found in Halverson and Stinson (2006).

Table 2-20. Outfall L-03: Proposed and Alternative Actions.	
Proposed Action	Alternative Action
Maintain good housekeeping and erosion control BMPs within the outfall's drainage area.	None.

2.1.19 Outfall L-09

Outfall L-09 receives runoff from an area of approximately 120,637 ft^2 (2.8 acres) in the southwestern section of L-Area (Figure 2-64). The dominant land cover within the drainage area is grass, followed by impermeable (pavement and roofs) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 362,437 gallons (Table 2-1). Storm water from the area is directed to the outfall (Figure 2-65) via a catch basin and conveyance piping. Discharges from the outfall flow freely through a wooded area toward L Lake. Exposed pollutant sources within the drainage area include AC units, guardrails, metal roofing, and deteriorating fences (Figure 2-66). Review of effluent sampling data indicates no water quality problems associated with storm water outfall L-09 (Table 2-2).

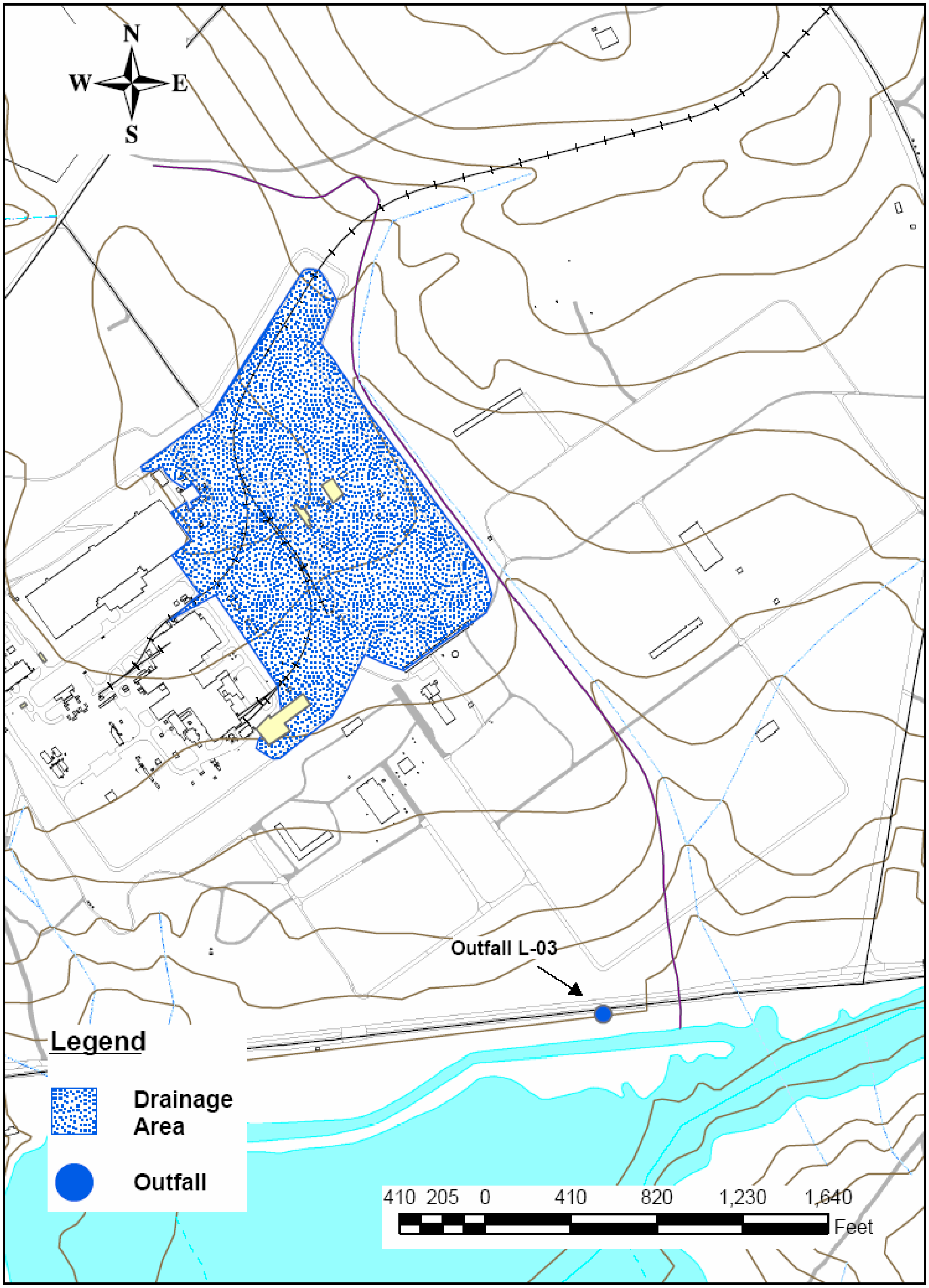

Figure 2-61. Location of Storm Water Outfall L-03 and Associated Drainage Area.

Figure 2-62. View of Storm Water Outfall L-03.

Figure 2-63. Representative View of Drainage Area for Storm Water Outfall L-03.

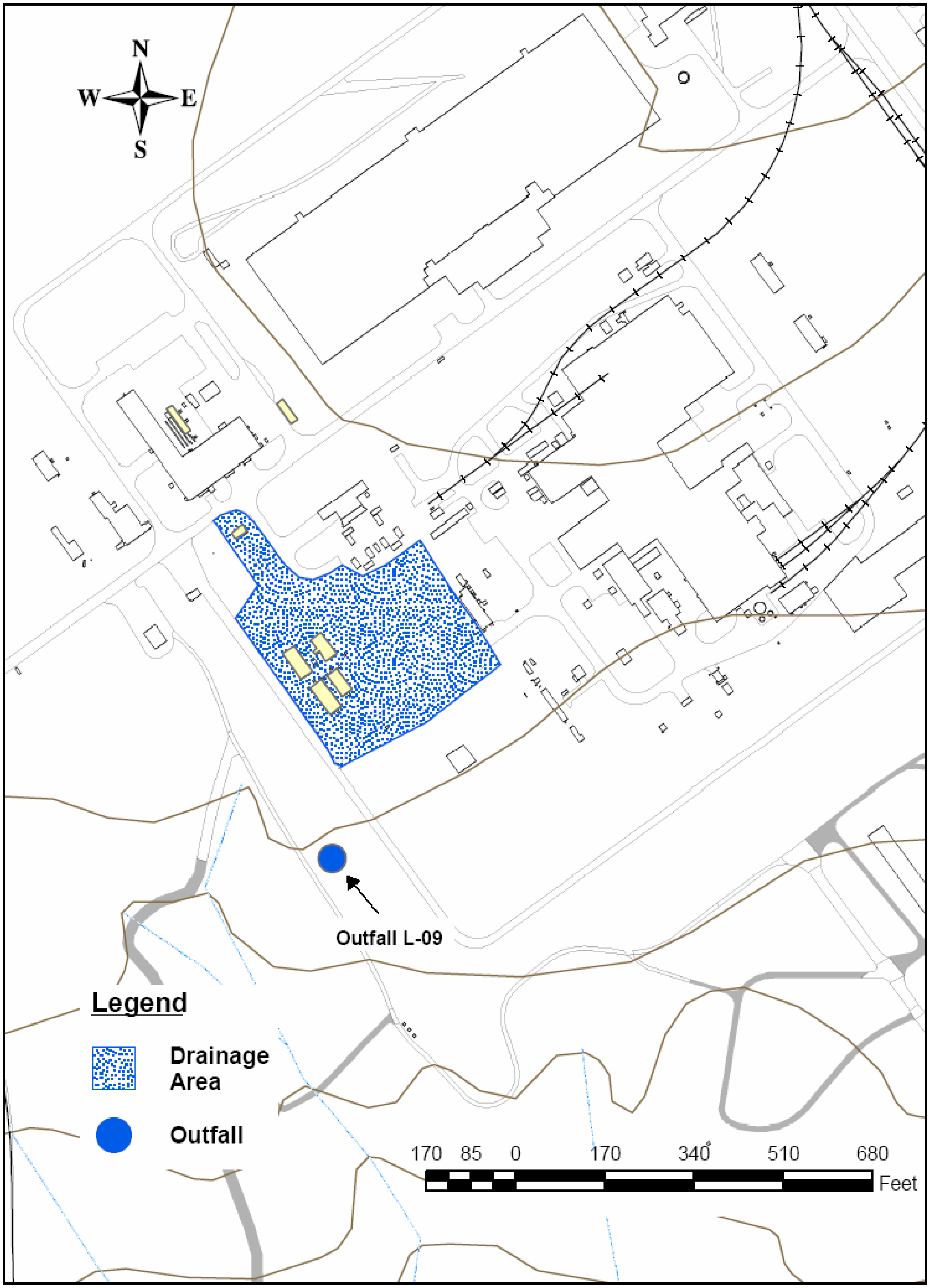

Figure 2-64. Location of Storm Water Outfall L-09 and Associated Drainage Area.

Figure 2-65. View of Storm Water Outfall L-09.

Figure 2-66. Representative View of Drainage Area for Storm Water Outfall L-09.

There are no longer any industrial-related activities within the outfall's drainage area. The proposed action is to remove Outfall L-09 from coverage under the Industrial Storm Water General Permit (Table 2-21). Under this option, Outfall L-09 would be a compliant discharge not subject to regulation.

Table 2-21. Outfall L-09: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit.	None.

2.1.20 Outfall L-13

Outfall L-13 receives runoff from an area of approximately 366,141 ft^2 (8.4 acres) in the northern portion of L-Area (Figure 2-67). The dominant land cover within the drainage area is grass, followed by impermeable (pavement and roofs) surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,105,633 gallons (Table 2-1). Storm water from the area is directed to the outfall via a series of catch basins and conveyance piping. Discharges from the outfall (Figure 2-68) flow through a wooded area toward Pen Branch. Exposed pollutant sources within the drainage area include AC units, a gas station, metal roofs, guard rails, openly stored materials (e.g., pipes, scrap metals, ammo boxes, and waste containers on pads and in laydown yards), and deteriorating fences (Figure 2-69). Review of effluent sampling data indicates no water quality problems associated with storm water outfall L-13 (Table 2-2).

The proposed action for Outfall L-13 would be the 'No Action' alternative (Table 2-22). The expected end-state for Outfall L-13 under this option would be its continued regulation under the Industrial Storm Water General Permit.

Table 2-22. Outfall L-13: Proposed and Alternative Actions.

Proposed Action	Alternative Action
No Action.	None.

2.1.21 Outfall N-01

Outfall N-01 receives runoff from an area of approximately 1,187,266 ft^2 (27.3 acres) near the center of N-Area (Figure 2-70). The dominant land cover within the drainage area is pavement and roofs (impermeable), followed by gravel, grass, and forested surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 4,276,116 gallons (Table 2-1). Discharges from the outfall (Figure 2-71) flow through a wooded area to an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include AC units, rusting vehicles and sealand containers, metal roofs, deteriorating fences, and a storm ditch

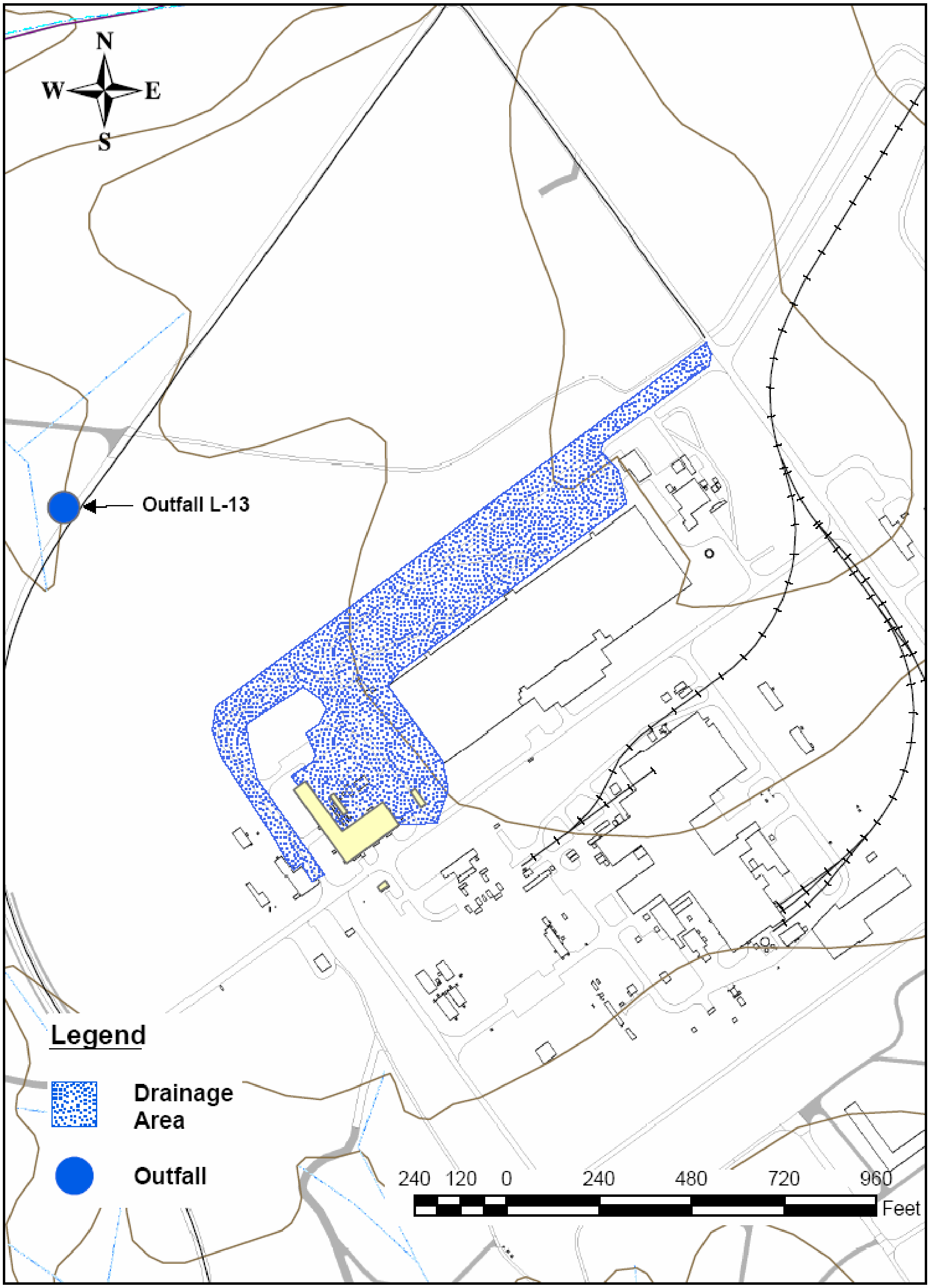

Figure 2-67. Location of Storm Water Outfall L-13 and Associated Drainage Area.

Figure 2-68. View of Storm Water Outfall L-13.

Figure 2-69. Representative View of Drainage Area for Storm Water Outfall L-13.

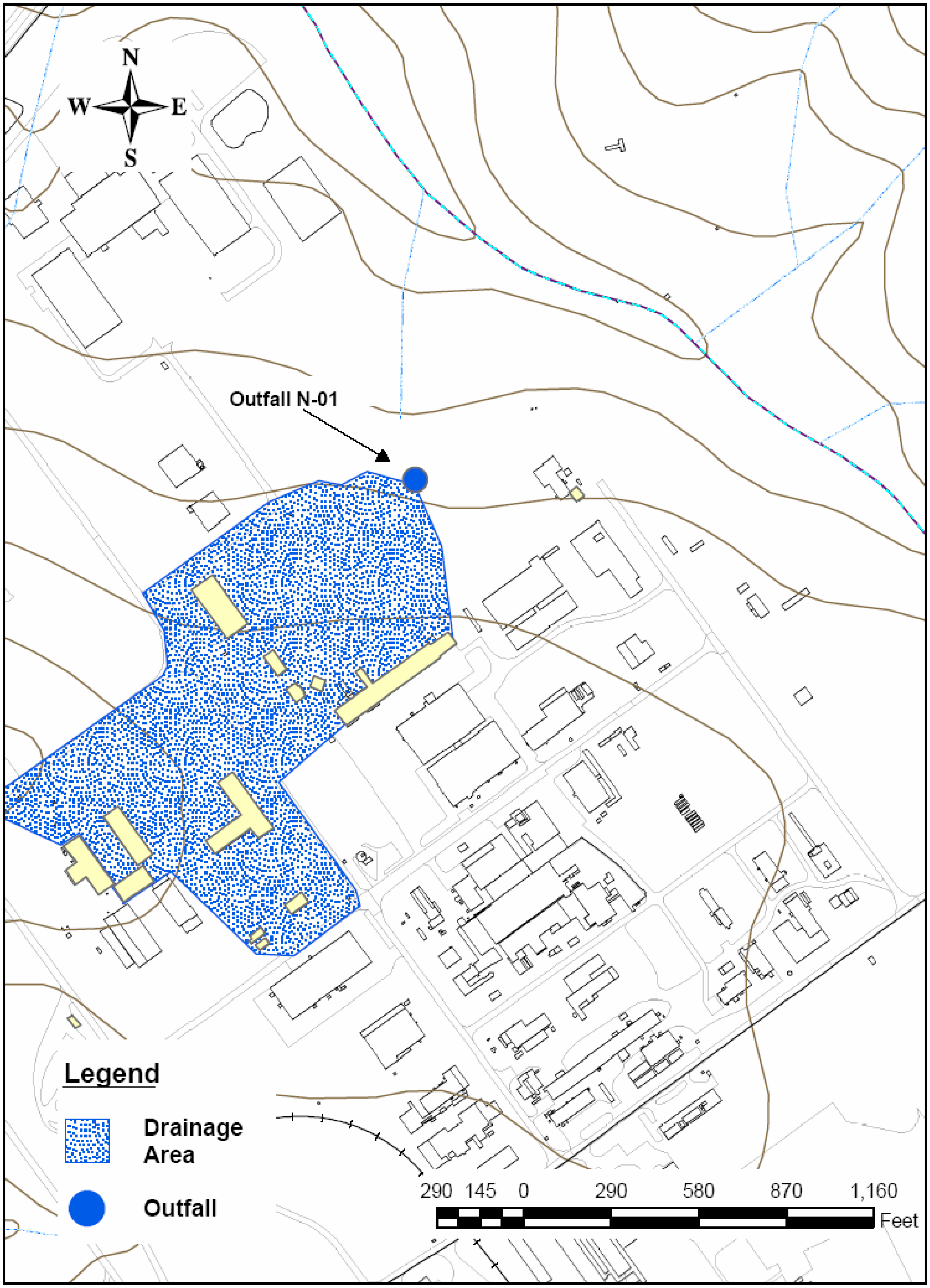

Figure 2-70. Location of Storm Water Outfall N-01 and Associated Drainage Area.

Figure 2-71. View of Storm Water Outfall N-01.

Figure 2-72. Representative View of Drainage Area for Storm Water Outfall N-01.

designated as a site evaluation area (Figure 2-72). The storm water pollutants of concern at this outfall are iron and zinc (Table 2-2).

Proposed and alternative actions considered for storm water Outfall N-01 are described in Table 2-23. Proposed action ‘A’ and alternative actions ‘B’ and ‘D’ would divert flow from the outfall’s catchment into either a new retention basin or to an alternative outfall. Alternative action ‘C’ would apply erosion control BMPs (e.g., riprap and check dams in catchment flow paths) and soil amendments within the outfall’s catchment. Proposed action ‘A’ would consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 via a system of excavated, grassed drainage ditches into a new retention basin (395 ft long x 395 ft wide x 12 ft deep) (Figure 2-73). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin’s emergency spillway. Alternative action ‘B’ would install grass buffers within the catchment and divert flow, via existing and new drainage ditches, to Outfall N-02. Additionally, grassed swales, riprap and check dams would be installed within catchment flow paths. Option ‘D’ would consolidate flows from both Outfalls N-01 and N-02 via an excavated, grassed drainage ditch into a new retention basin (245 ft long x 245 ft wide x 10 ft deep). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin’s emergency spillway. The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for Outfall N-01. The expected end-state for Outfall N-01 under option ‘C’ would be its regulation as an individually permitted outfall under the Industrial Wastewater Permit. The regulatory end-state of the outfall created under options ‘A’ and ‘D’ is presently unknown. The expected end-state for Outfall N-01 under option ‘B’ would be its elimination. The regulatory end-state of Outfall N-02 under option ‘B’ is presently unknown. Depending upon the designation of the outfall created by options ‘A’ and ‘D’, Outfall N-01 may be eliminated. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-23. Outfall N-01: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)	Proposed Action (C)	Alternative Action (D)
Consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 into a new retention basin; install new outfall downstream of the basin’s emergency spillway (designation currently unknown); Outfall N-01 may be eliminated. Cost = $2,397K - $9,588K	Install grass buffers within drainage area; divert flow from Outfall N-01 to Outfall N-02 via new and existing drainage ditches; install swales, riprap and check dams in area flow paths; apply soil amendments within drainage; Outfall N-01 would be eliminated. Cost = $376K - $1,502K	Install grass buffers on both sides of existing discharge channel; clean debris from ditch; install swales, riprap and check dams in flow path upstream of outfall; apply soil amendments and install grass within drainage. Cost = $254K - $1,014K	Consolidate flows from Outfalls N-01 and N-02 into a new retention basin; a new outfall would be installed downstream of the basin’s emergency spillway (designation currently unknown); Outfall N-01 may be eliminated. Cost = $903K - $3,610K

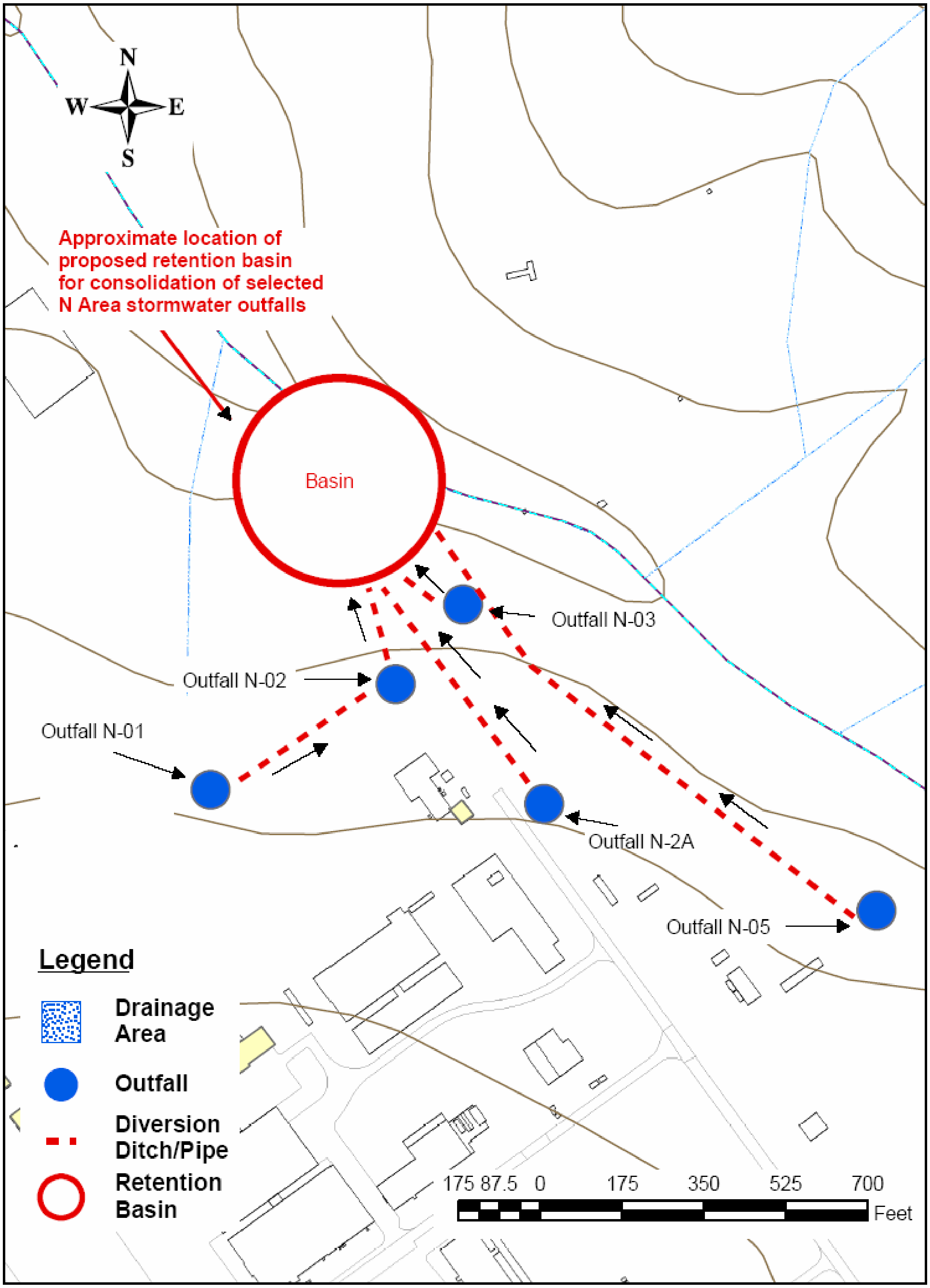

Figure 2-73. Approximate Location of Retention Basin for Consolidation of Outfalls N-01, N-02, N-2A, N-03, and N-05.

2.1.22 Outfall N-02

Outfall N-02 receives runoff from an area of approximately 194,556 ft^2 (4.5 acres) in the northeast corner of N-Area (Figure 2-74). The dominant land cover within the drainage area is grass, followed by exposed soil, gravel, and impermeable (roofs and pavement) surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 625,361 gallons (Table 2-1). Discharges from the outfall (Figure 2-75) flow into an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include rock and soil storage areas, a storm ditch designated as a site evaluation area, and deteriorating fences (Figure 2-76). The storm water pollutants of concern for this outfall are iron and manganese (Table 2-2).

Proposed and alternative actions considered for storm water Outfall N-02 are described in Table 2-24. Proposed action 'A' and alternative actions 'B' and 'D' would divert flow from the outfall's catchment into either a new retention basin or to an alternative outfall. Alternative action 'C' would clear debris from the drainage ditches, apply erosion control BMPs (e.g., check dams in flow path) and soil amendments within the catchment, and remove pollutant sources (i.e., soil and rock stock piles). Proposed action 'A' would consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 via a system of excavated, grassed drainage ditches into a new retention basin (395 ft long x 395 ft wide x 12 ft deep) (Figure 2-73). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. Alternative action 'B' would install grass buffers within the catchment and divert flow from Outfall N-01, via existing and new drainage ditches, to Outfall N-02. Additionally, grassed swales, riprap and check dams would be installed within catchment flow paths. Option 'D' would consolidate flows from both Outfalls N-01 and N-02 via an excavated, grassed drainage ditch into a new retention basin (245 ft long x 245 ft wide x 10 ft deep). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. The expected end-state for Outfall N-02 under option 'C' would be its continued regulation under the Industrial Storm Water General Permit. The regulatory end-state of the outfall created under options 'A' and 'D' is presently unknown. The regulatory end-state of Outfall N-02 under option 'B' is presently unknown. Depending upon the designation of the new outfall created by options 'A' and 'D', Outfall N-02 may be eliminated. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

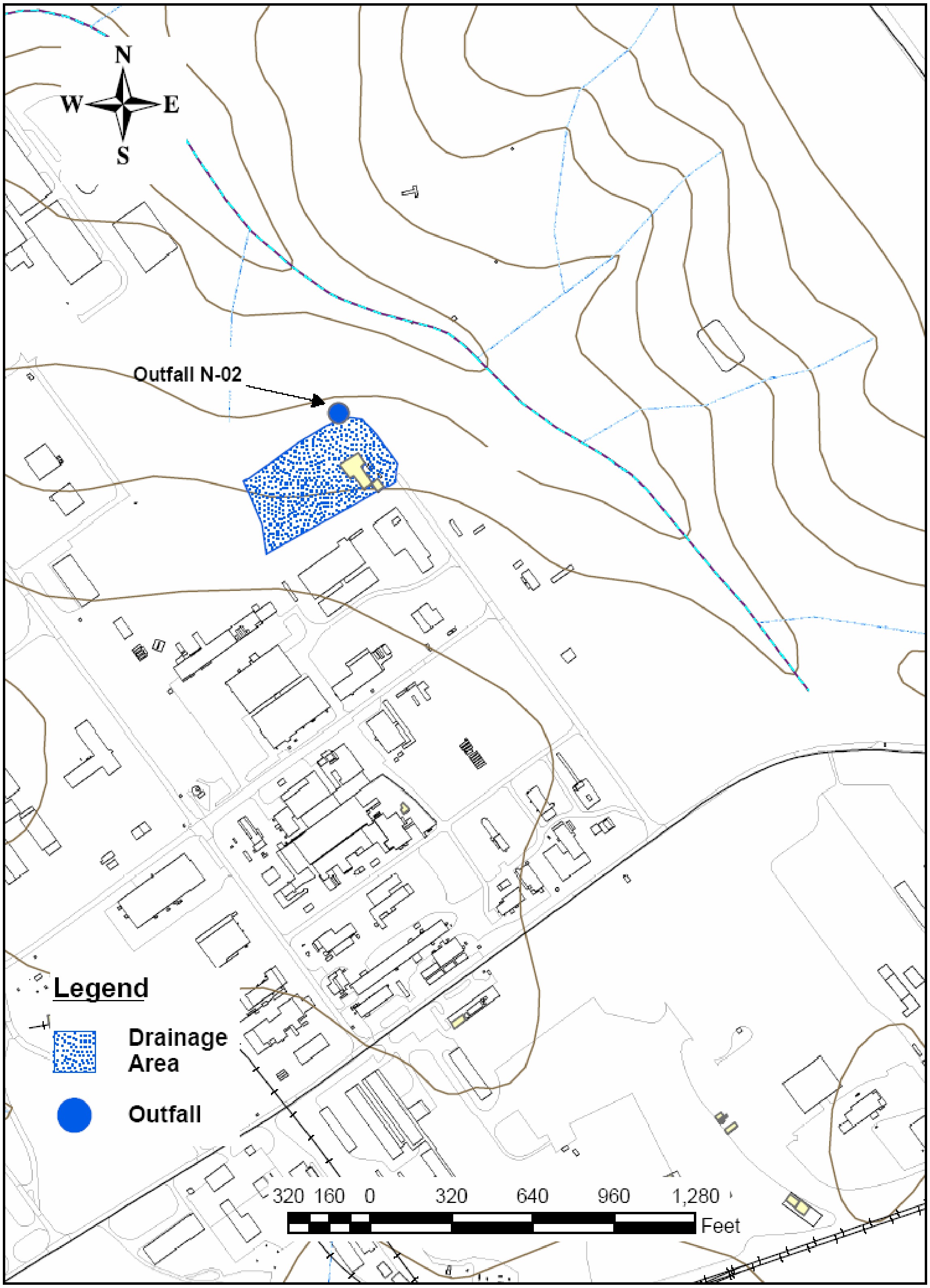

Figure 2-74. Location of Storm Water Outfall N-02 and Associated Drainage Area.

Figure 2-75. View of Storm Water Outfall N-02.

Figure 2-76. Representative View of Drainage Area for Storm Water Outfall N-02.

Table 2-24. Outfall N-02: Proposed and Alternative Actions.			
Proposed Action (A)	Alternative Action (B)	Alternative Action (C)	Alternative Action (D)
Consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 into a new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-02 may be eliminated. Cost = $2,397K - $9,588K	Install grass buffers within drainage area; divert flow from Outfall N-01 to Outfall N-02 via new and existing drainage ditch; install swales, riprap and check dams in area flow paths; apply soil amendments within drainage; Outfall N-01 would be eliminated. Cost = $376K - $1,502K	Install grass buffers and apply soil amendments within and along flow paths upstream of the outfall; remove soil and rock stock piles; clean debris from ditches and install check dams in flow path. Cost = $162K - $646K	Consolidate flows from Outfalls N-01 and N-02 into a new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-02 may be eliminated. Cost = $903K - $3,610K

2.1.23 Outfall N-2A

Outfall N-2A receives runoff from an area of approximately 2,019,665 ft^2 (46.4 acres) near the middle of N-Area (Figure 2-77). The dominant land cover within the drainage area consists of pavement and roofs (impermeable), followed by gravel and grass surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 7,263,585 gallons (Table 2-1). Discharges from the outfall (Figure 2-78) flow into an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include several material storage areas (e.g., rebar storage), a lead melting operation, a concrete form yard, rusting storm water conveyance piping, metal roofs, and deteriorating fences (Figure 2-79). The storm water pollutants of concern at this outfall are iron, manganese, and zinc (Table 2-2).

Proposed and alternative actions considered for storm water outfall N-2A are described in Table 2-25. Both the proposed and alternative actions 'A' and 'B' would divert flow from the Outfall N-2A drainage area into a new retention basin. Proposed action 'A' would consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05, via a system of excavated, grassed drainage ditches, into a new retention basin (395 ft long x 395 ft wide x 12 ft deep) (Figure 2-73). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. Alternative action 'B' would consolidate flows from Outfall N-2A, N-03, and N-05, via a system of excavated, grassed drainage ditches, into a new retention basin (320 ft long x 320 ft wide x 12 ft deep). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for Outfall N-2A. The regulatory end-state for the new outfall created under both options 'A' and 'B' is presently unknown. Depending upon the designation of the outfall created by the proposed and alternative actions, Outfall N-2A may be eliminated. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

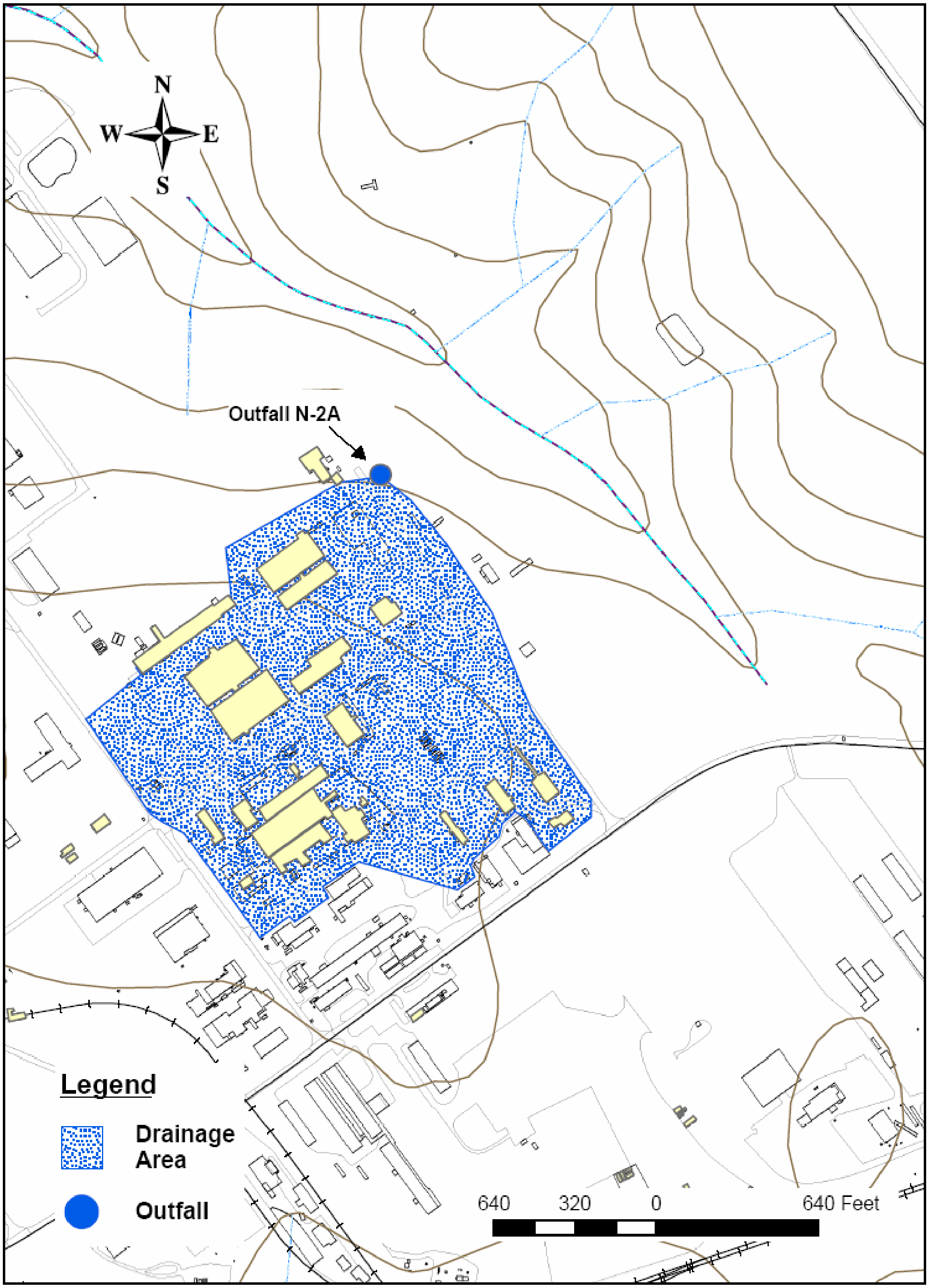

Figure 2-77. Location of Storm Water Outfall N-2A and Associated Drainage Area.

Figure 2-78. View of Storm Water Outfall N-2A.

Figure 2-79. Representative View of Drainage Area for Storm Water Outfall N-2A.

Table 2-25. Outfall N-2A: Proposed and Alternative Actions.	
Proposed Action (A)	Alternative Action (B)
Consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 into a new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-2A may be eliminated. Cost = $2,397K - $9,514K	Consolidate flow from Outfall N-2A with flows from Outfalls N-03 and N-05 into new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-2A may be eliminated. Cost = $1,901K - $7,602K

2.1.24 Outfall N-03

Outfall N-03 receives runoff from an area of approximately 175,325 ft^2 (4 acres) in the northeastern corner of N-Area (Figure 2-80). The dominant land cover within the drainage area is gravel, followed by impermeable (roofs and pavement) and grass surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 612,341 gallons (Table 2-1). Discharges from the outfall (Figure 2-81) flow into an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include scrap metal items, excess equipment and furniture in a lay down yard, and deteriorating fences (Figure 2-82). In early 2005, WSRC completed the implementation of selected storm water BMPs within the outfall's drainage area (e.g., regrade flow paths, install rip-rap). A review of subsequent monitoring data finds that the storm water pollutants of concern at this outfall are iron and manganese (Table 2-2).

Proposed and alternative actions considered for storm water outfall N-03 are described in Table 2-26. Proposed action 'A' would consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 via a system of excavated, grassed drainage ditches into a new retention basin (395 ft long x 395 ft wide x 12 ft deep) (Figure 2-73). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. Alternative action 'B' would consolidate flows from Outfall N-2A, N-03, and N-05 via a system of excavated, grassed drainage ditches into a new retention basin (320 ft long x 320 ft wide x 12 ft deep). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. The regulatory end-state for the new outfall created under both options 'A' and 'B' is presently unknown. Depending upon the designation of the outfall created by the proposed and alternative actions, Outfall N-03 may be eliminated. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

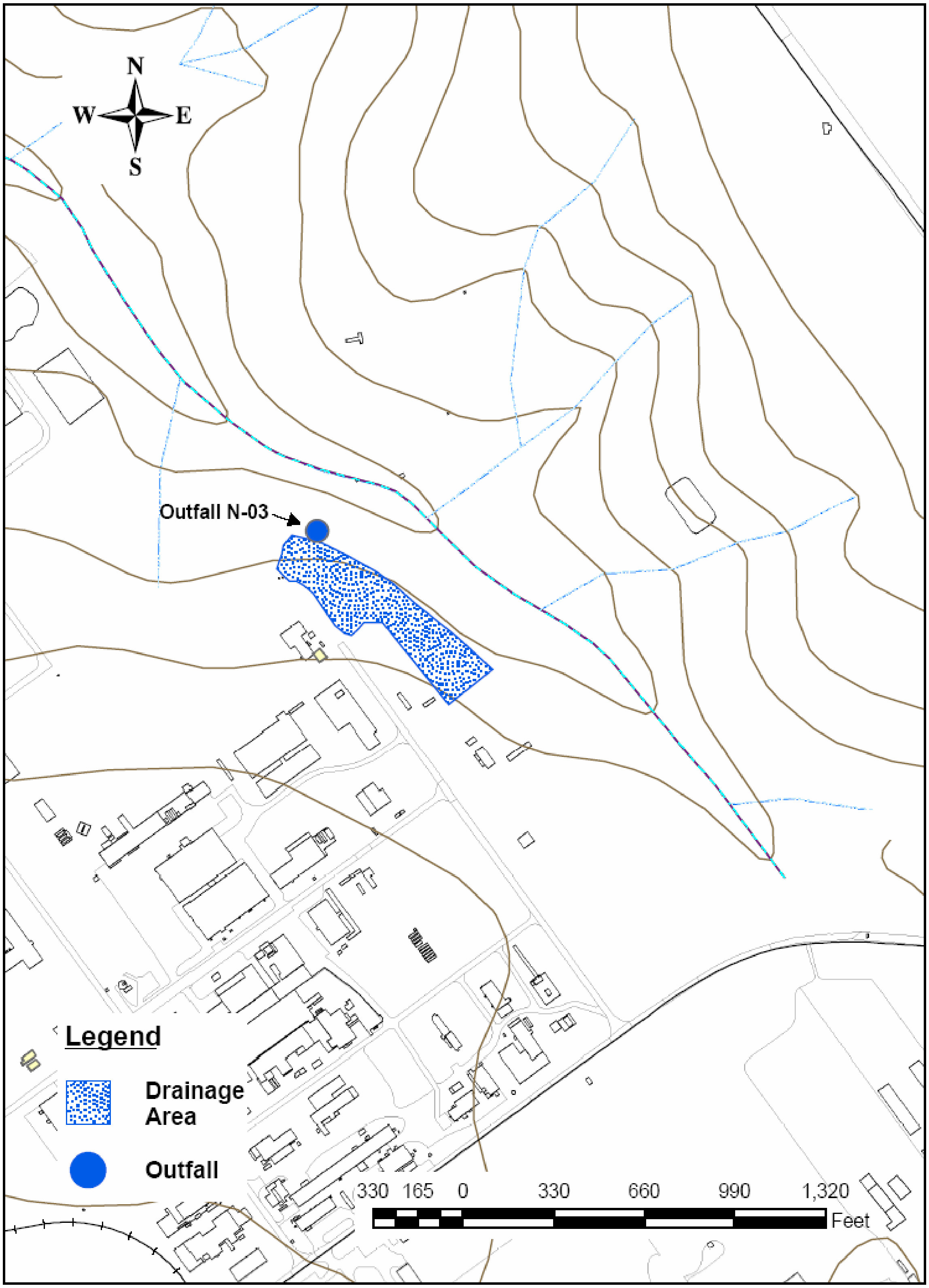

Figure 2-80. Location of Storm Water Outfall N-03 and Associated Drainage Area.

Figure 2-81. View of Storm Water Outfall N-03.

Figure 2-82. Representative View of Drainage Area for Storm Water Outfall N-03.

Table 2-26. Outfall N-03: Proposed and Alternative Actions.	
Proposed Action (A)	Alternative Action (B)
Consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 into a new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-03 may be eliminated. Cost = $2,379K - $9,588K	Consolidate flows from Outfalls N-2A, N-03, and N-05 into a new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-03 may be eliminated. Cost = $1,981K - $7,922K

2.1.25 Outfall N-05

Outfall N-05 receives runoff from an area of approximately 641,198 ft^2 (14.7 acres) in the lower central section of N-Area (Figure 2-83). The dominant land cover within the drainage area is gravel, followed by impermeable (roofs and pavement) and grass surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 2,256,918 gallons (Table 2-1). Discharges from the outfall (Figure 2-84) flow into a wetland in the headwaters of Fourmile Branch. Exposed pollutant sources within the drainage area include old scrap metal, furniture and equipment stored in a laydown area, and metal storage buildings (Figure 2-85). The storm water pollutants of concern at this outfall are copper, iron, manganese, and zinc (Table 2-2).

Proposed and alternative actions considered for storm water outfall N-05 are described in Table 2-27. The proposed action 'A' would consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 via a system of excavated, grassed drainage ditches into a new retention basin (395 ft long x 395 ft wide x 12 ft deep) (Figure 2-73). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. Alternative action 'B' would consolidate flows from Outfall N-2A, N-03, and N-05 via a system of excavated, grassed drainage ditches into a new retention basin (320 ft long x 320 ft wide x 12 ft deep). A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. Alternative action 'C' would install grass buffers and apply soil amendments within and along catchment flow paths upstream of the outfall. Additionally, erosion control BMPs (e.g., silt fences) would be applied and excess equipment and material removed from lay down areas within the catchment. The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for Outfall N-05. The expected end-state for Outfall N-05 under option 'C' would be its regulation as an individually permitted outfall under the Industrial Wastewater Permit. The regulatory end-state of the outfall created under options 'A' and 'B' is presently unknown. Depending upon the designation of the outfall created by options 'A' and 'B', Outfall N-05 may be eliminated. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

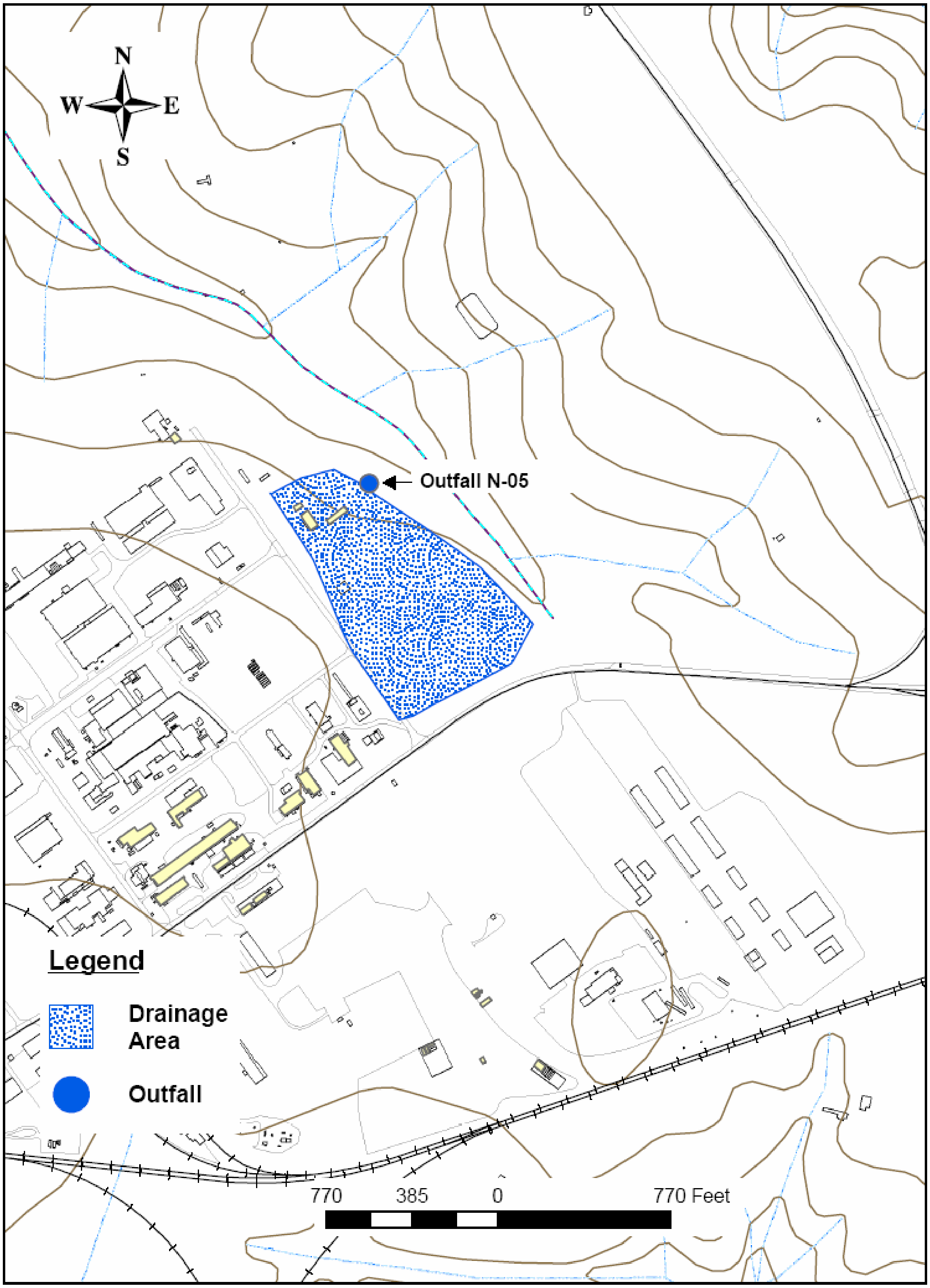

Figure 2-83. Location of Storm Water Outfall N-05 and Associated Drainage Area.

Figure 2-84. View of Storm Water Outfall N-05.

Figure 2-85. Representative View of Drainage Area for Storm Water Outfall N-05.

Table 2-27. Outfall N-05: Proposed and Alternative Actions.		
Proposed Action (A)	Alternative Action (B)	Alternative Action (C)
Consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 into a new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-05 may be eliminated. Cost = $2,379K - $9,514K	Install grass buffers and apply soil amendments within and along flow paths upstream of outfall; consolidate flows from Outfalls N-2A, N-03, and N-05 into a new retention basin; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-05 may be eliminated. Cost = $1,981K - $7,922K	Install grass buffers and apply soil amendments in and along flow paths upstream of outfall; remove excess equipment and material from laydown area and apply soil erosion control BMPs. Cost = $134K - $534K

2.1.26 Outfall N-06

Outfall N-06 receives runoff from an area of approximately 1,062,602 ft^2 (24.4 acres) in the southeastern sector of N-Area (Figure 2-86). The dominant land cover within the drainage area consists of roofs and pavement (impermeable), followed by gravel and grass surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 3,515,922 gallons (Table 2-1). Discharges from the outfall (Figure 2-87) flow into a wetland in the headwaters of Fourmile Branch. Exposed pollutant sources within the drainage area include a sandblasting operation, assorted material storage areas (e.g., equipment, treated lumber) rusting metal drums, AC units, and deteriorating fences (Figure 2-88). The storm water pollutants of concern for this outfall are iron and manganese (Table 2-2).

The proposed action for Outfall N-06 would isolate the sandblasting area with silt fences, establish grass buffers around excess equipment and material storage areas, and strategically apply soil amendments to bind pollutant constituents within the soil column (Table 2-28). The expected end-state for Outfall N-06 would be its continued regulation under the Industrial Storm Water General Permit. A detailed description of the proposed action can be found in Halverson and Stinson (2006).

Table 2-28. Outfall N-06: Proposed and Alternative Actions.	
Proposed Action	Alternative Action
Isolate the 725-1N sandblast area with additional silt fences and grass buffers; establish grass buffers around excess equipment and material storage area; strategically apply soil amendments within catchment. Cost = $96K - $382K	None.

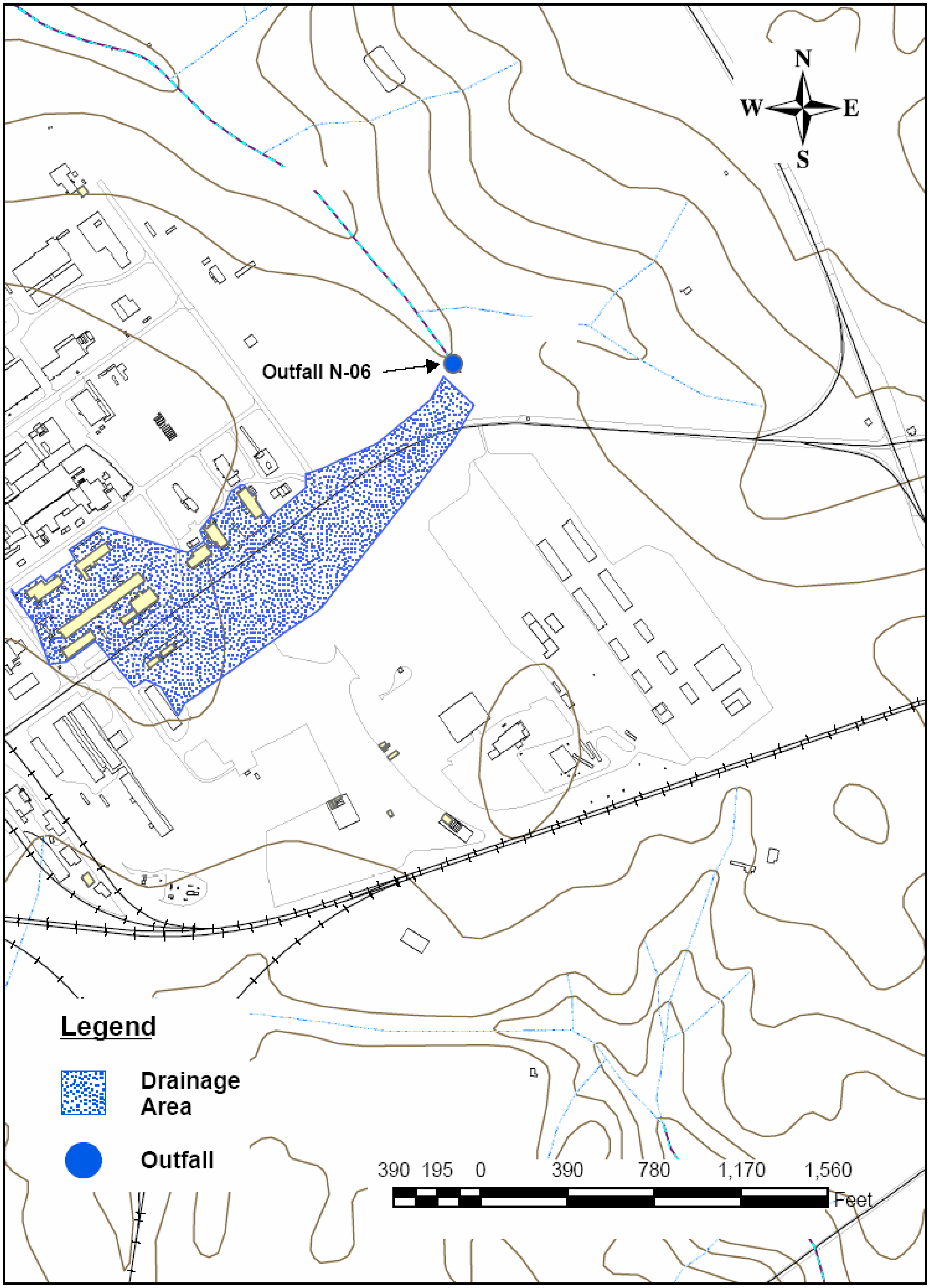

Figure 2-86. Location of Storm Water Outfall N-06 and Associated Drainage Area.

Figure 2-87. View of Storm Water Outfall N-06.

Figure 2-88. Representative View of Drainage Area for Storm Water Outfall N-06.

2.1.27 Outfall N-10

Outfall N-10 receives runoff from an area of approximately 1,013,019 ft^2 (23.3 acres) in the southern sector of N-Area (Figure 2-89). The dominant land cover within the drainage area is gravel, followed by grass, forested, and impermeable (roofs and pavement) surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 3,277,124 gallons (Table 2-1). The outfall (Figure 2-90) discharges toward Pen Branch, but this flow does not reach state waters (Osteen and Nelson 2006). Exposed pollutant sources within the drainage area include creosote pole and miscellaneous equipment storage areas, rigging materials and associated equipment, sealand containers, and skid pans (Figure 2-91). The storm water pollutant of concern at this outfall is iron (Table 2-2).

Discharges from this outfall do not reach state waters. The proposed action for Outfall N-10 is to remove it from coverage under the Industrial Storm Water General Permit (Table 2-29). Under this option, Outfall N-10 would be a compliant discharge not subject to regulation. A detailed description of this option can be found in Halverson and Stinson (2006).

Table 2-29. Outfall N-10: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit.	None.

2.1.28 Outfall N-12

Outfall N-12 receives runoff from an area of approximately 1,261,515 ft^2 (29 acres) in the southeastern section of N-Area (Figure 2-92). The dominant land cover within the drainage area is gravel, followed by impermeable (roofs and pavement), grass, and forested surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 4,277,459 gallons (Table 2-1). Runoff discharged from this outfall (Figure 2-93) flows into Pen Branch. Exposed pollutant sources within the drainage area include rusted conveyance piping and deteriorating fences (Figure 2-94). The storm water pollutants of concern at this outfall are iron, manganese, and zinc (Table 2-2).

Proposed and alternative actions considered for storm water Outfall N-12 are described in Table 2-30. The proposed action ‘A’ would clear and reshape approximately 1000 ft of the drainage channel upstream of the outfall. Sod, riprap, and check dams would also be installed within and along the channel. Additionally, pollutant sources (i.e., the crane boom storage area and excess galvanized fencing) would be moved away from the flow path and erosion control BMPs and soil amendments would be applied within the catchment. Alternative action ‘B’ would consolidate flows from Outfalls N-12 and N-12A via a system of excavated, grassed drainage ditches and conveyance piping into a

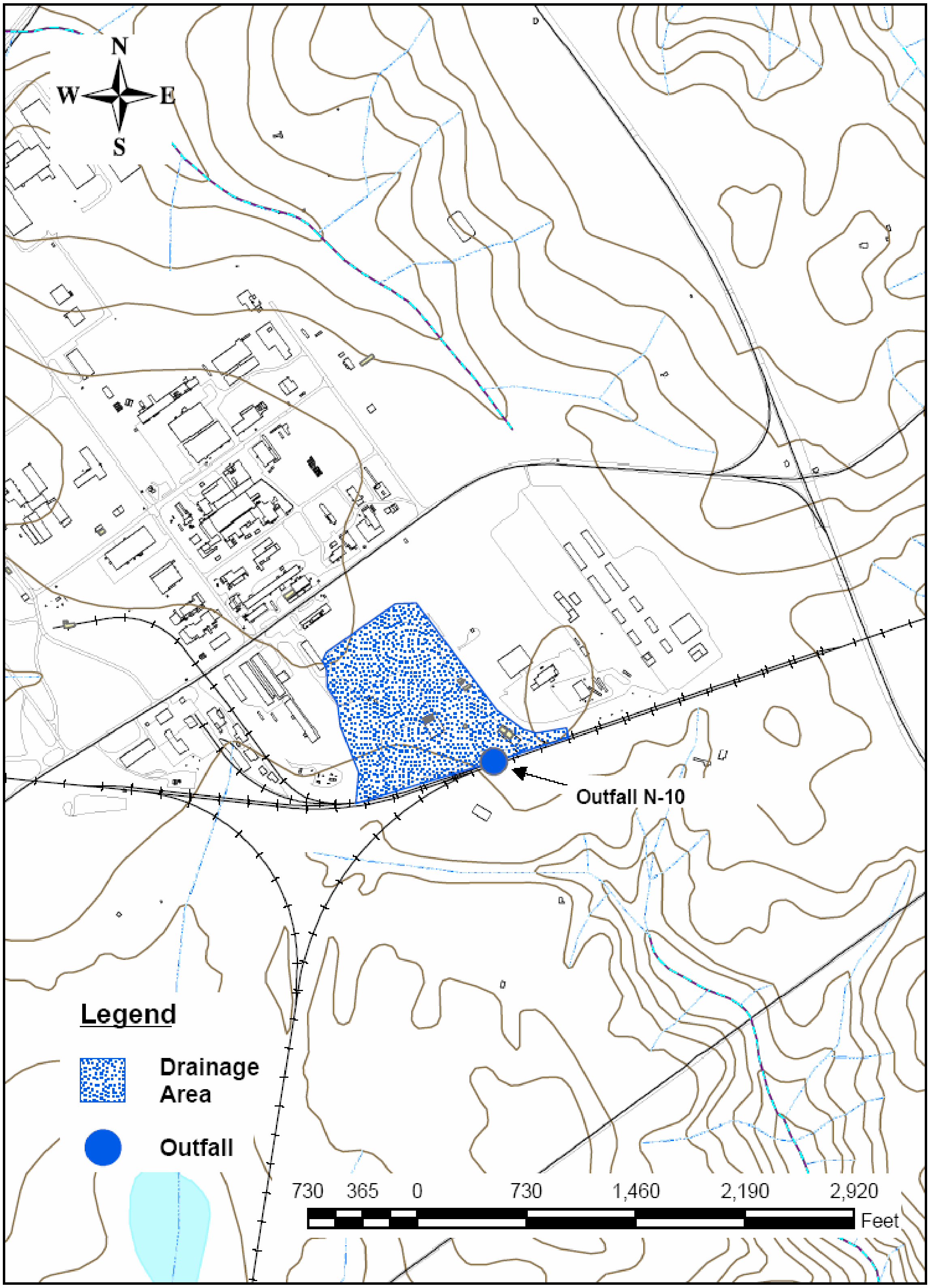

Figure 2-89 Location of Storm Water Outfall N-10 and Associated Drainage Area.

Figure 2-90. View of Storm Water Outfall N-10.

Figure 2-91. Representative View of Drainage Area for Storm Water Outfall N-10.

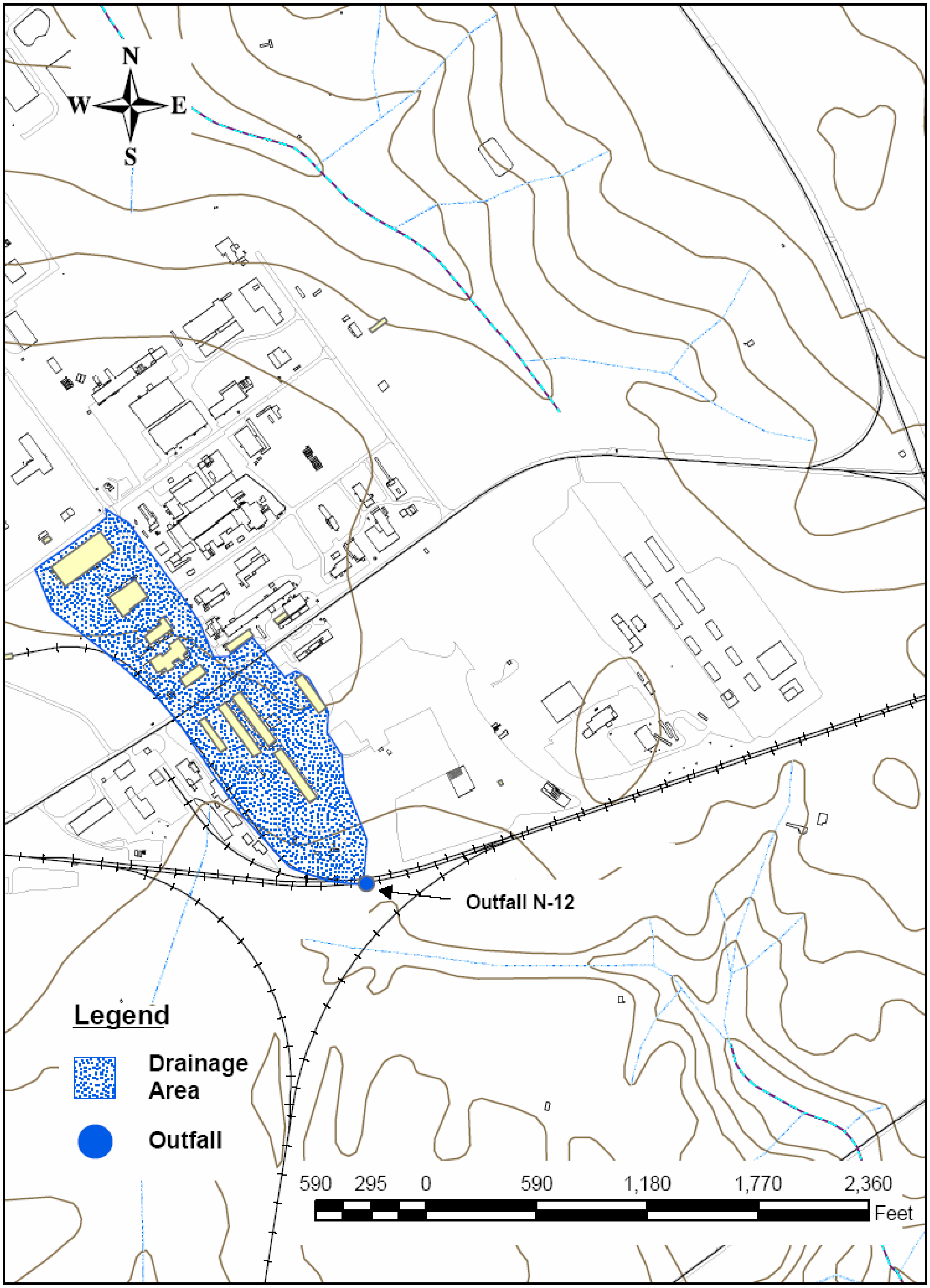

Figure 2-92. Location of Storm Water Outfall N-12 and Associated Drainage Area.

Figure 2-93. View of Storm Water Outfall N-12.

Figure 2-94. Representative View of Drainage Area for Storm Water Outfall N-12.

new retention basin (355 ft long x 355 ft wide x 7 ft deep) (Figure 2-95). Erosion control BMPs and soil amendments would also be strategically applied within the drainage. A new outfall monitoring station (designation currently unknown) would be installed downstream of the basin's emergency spillway. The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for Outfall N-12. The proposed end-state for Outfall N-12 under both options 'A' and 'B' would be regulation as an individually permitted outfall under the Industrial Wastewater Permit. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-30. Outfall N-12: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)
Clear and reshape drainage channel; install sod and check dams in flow path; apply soil amendments and erosion control BMPs within catchment; move crane boom storage area and excess galvanized fencing away from flow path. Cost = $247K - $988K	Consolidate flows from Outfalls N-12 and N-12A into a new retention basin; apply soil amendments and erosion control BMPs within catchment; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-12 may be eliminated. Cost = $1,398K - $5,592K

2.1.29 Outfall N-12A

Outfall N-12A receives runoff from an area of approximately 543,138 ft^2 (12.5 acres) in the southwestern portion of N-Area (Figure 2-96). The dominant land cover within the drainage area is gravel, followed by impermeable (roofs and pavement), grass, and forested surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,854,517 gallons (Table 2-1). Discharges from Outfall N-12A (Figure 2-97) eventually flow into Pen Branch. Exposed pollutant sources within the drainage area include out-of-service transformers, miscellaneous metals storage areas (e.g., scrap wire and metal, used drums, brass and copper items, empty gas cylinders, port-o-lets), old and damaged office furniture stored without benefit of cover, skid pans, AC units, and old cranes (Figure 2-98). The storm water pollutants of concern at this outfall are cadmium, copper, iron, manganese, and zinc (Table 2-2).

Proposed and alternative actions considered for storm water outfall N-12A are described in Table 2-31. The proposed action 'A' would apply erosion control BMPs (e.g., grass buffers) and strategically apply soil amendments within the outfall's catchment. Three stone-filled infiltration wells (6 ft diameter x 50 ft deep) would be installed in the flow path draining the salvage yard to reduce pollutant/hydrologic loadings to the outfall (Figure 2-99). Alternative action 'B' would consolidate flows from Outfalls N-12 and N-12A into a new retention basin (355 ft long x 355 ft wide x 7 ft deep) via a system of excavated drainage ditches and conveyance piping (Figure 2-95). Sediment erosion control BMPs and soil amendments would also be strategically applied within the catchment to reduce sediment and pollutant loading in surface runoff. A new outfall monitoring station (designation currently unknown) would be constructed downstream of the basin's emergency spillway. Alternative action 'C' would route storm flow from the

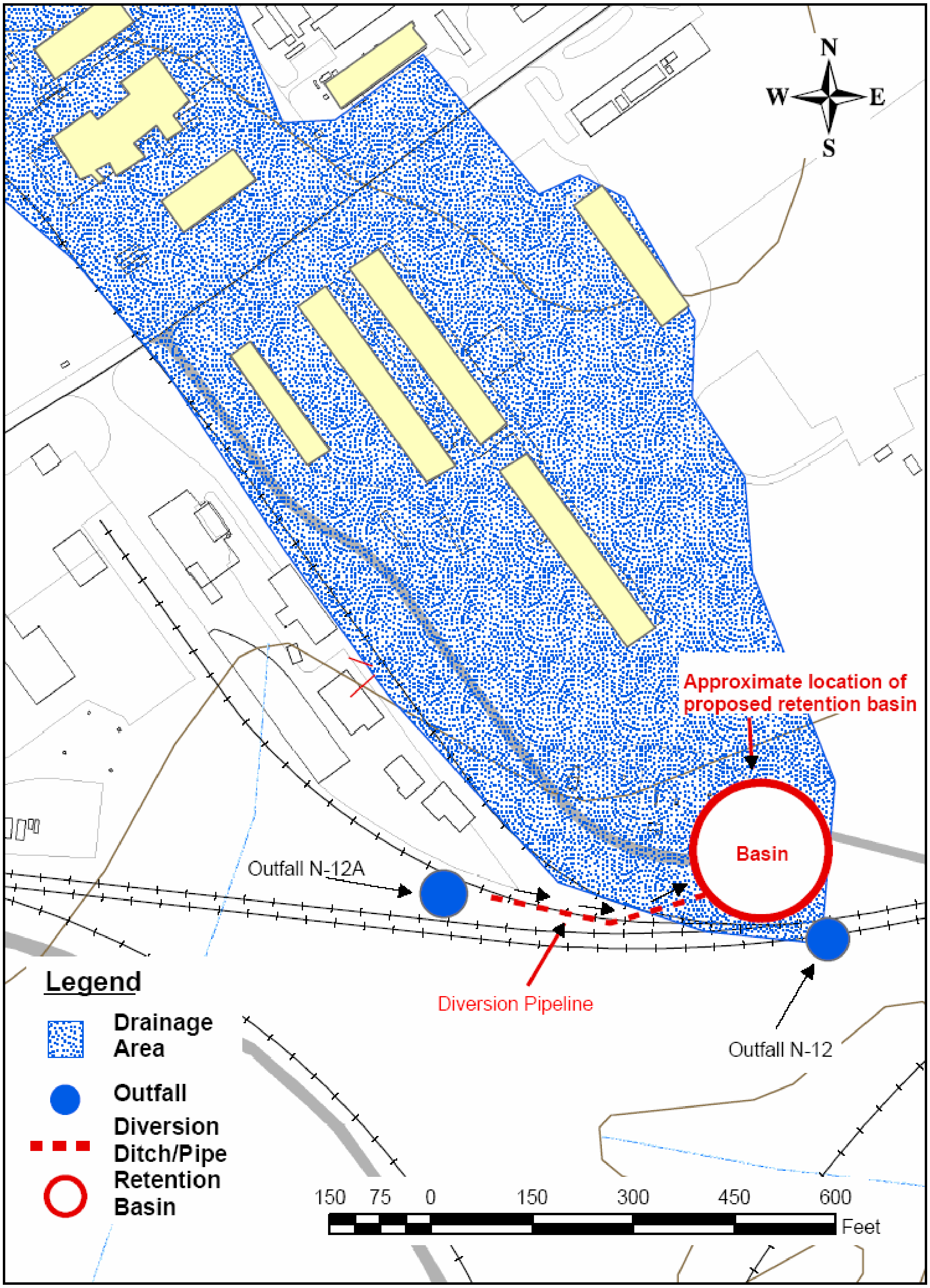

Figure 2-95. Outfall N-12, Option B: Consolidation of Outfalls N-12 and N-12A into a Retention Basin.

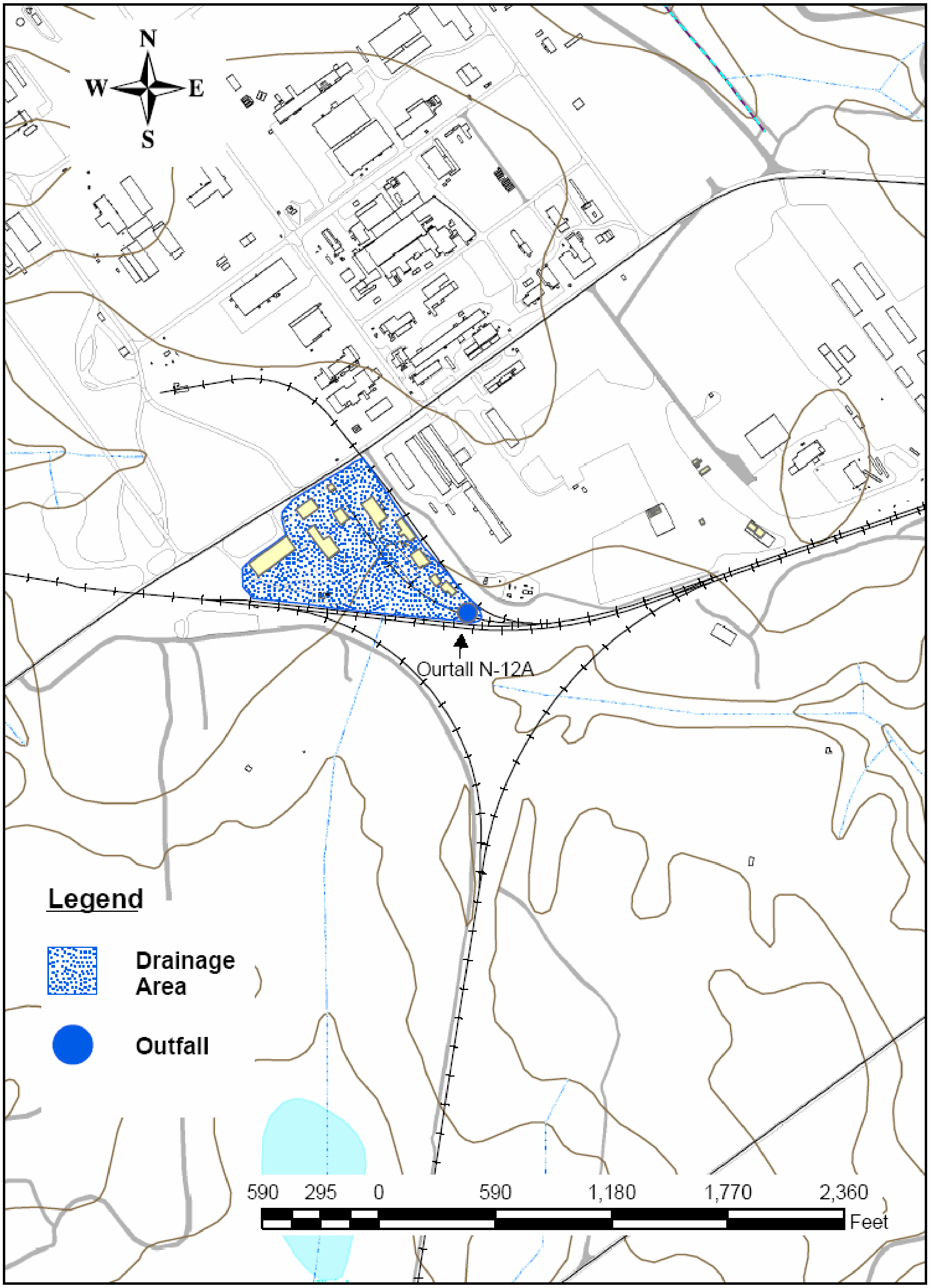

Figure 2-96. Location of Storm Water Outfall N-12A and Associated Drainage Area.

Figure 2-97. View of Storm Water Outfall N-12A.

Figure 2-98. Representative View of Drainage Area for Storm Water Outfall N-12A.

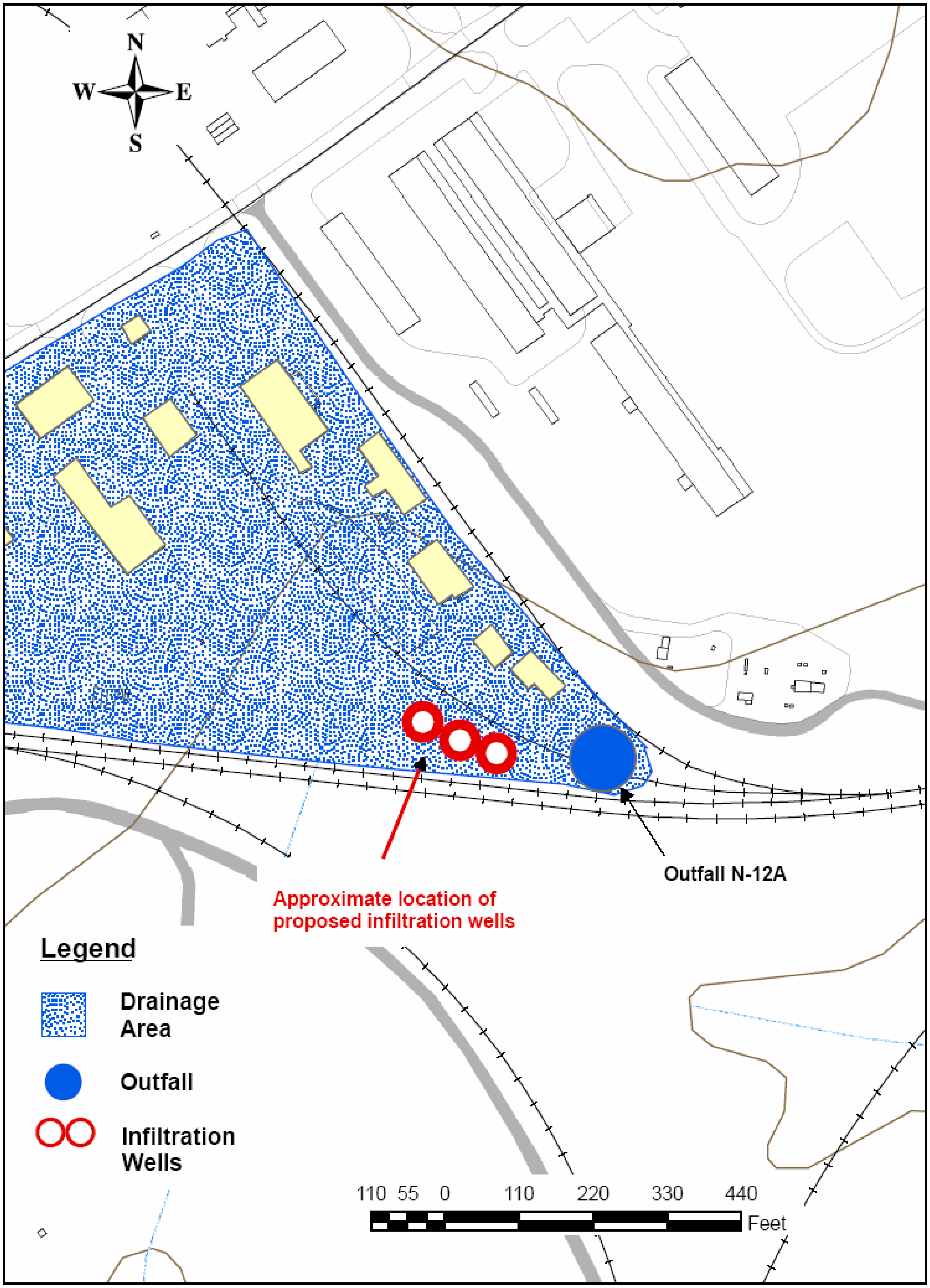

Figure 2-99. Outfall N-12A, Option A: Install Infiltration Wells Upstream of Outfall.

drainage area into a new retention basin (Figure 2-100). Outfall N-12A would be relocated downstream of the new basin's emergency spillway. The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for Outfall N-12A. The expected end-state for Outfall N-12A under options 'A' and 'C' and the outfall created under option 'B' would be regulation as an individually permitted outfall under the Industrial Wastewater Permit. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-31. Outfall N-12A: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)	Alternative Action (C)
Install grass buffers and apply erosion control BMPs and soil amendments within the catchment; install three (3) infiltration well in flow path from salvage yard. Cost = $195K - $780K	Consolidate flows from Outfalls N-12 and N-12A into a new retention basin; apply soil amendments and erosion control BMPs within the catchment; a new outfall would be installed downstream of the basin's emergency spillway (designation currently unknown); Outfall N-12 may be eliminated. Cost = $1,398K - $5,592K	Route flow from Outfall N-12A into a new retention basin; install erosion control BMPs within the catchment; Outfall N-12A would be relocated downstream of the basin's emergency spillway. Cost = $453K - $1,812K

2.1.30 Outfall N-14

Outfall N-14 receives runoff from an area of approximately 2,122,025 ft^2 (48.7 acres) on the southwestern corner of N-Area (Figure 2-101). The dominant land cover within the catchment is grass, followed by impermeable (roofs and pavement), gravel, and forested surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 7,185,055 gallons (Table 2-1). Discharges from this outfall (Figure 2-102) flow into an unnamed tributary located in the headwaters of Fourmile Branch. Exposed pollutant sources within the drainage area include a storage area for sign posts and guard rails, AC units, oil and grease spots in the Portable Equipment Commodity Management Center yard, stored B-25 boxes, aluminum and galvanized scaffolding, galvanized pipe, and stockpiles of rock and sand (Figure 2-103). The storm water pollutant of concern at this outfall is iron (Table 2-2).

The proposed action for Outfall N-14 is to apply erosion control BMPs (e.g., silt fences, establishing grass sod, hay bales) within the drainage area to minimize the loss of iron-laden sediment in surface runoff (Table 2-32). The expected end-state for this outfall would be its continued regulation under the Industrial Storm Water General Permit. A detailed description of this option can be found in Halverson and Stinson (2006).

Table 2-32. Outfall N-14: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Maintain good housekeeping and erosion control BMPs within drainage area.	None.

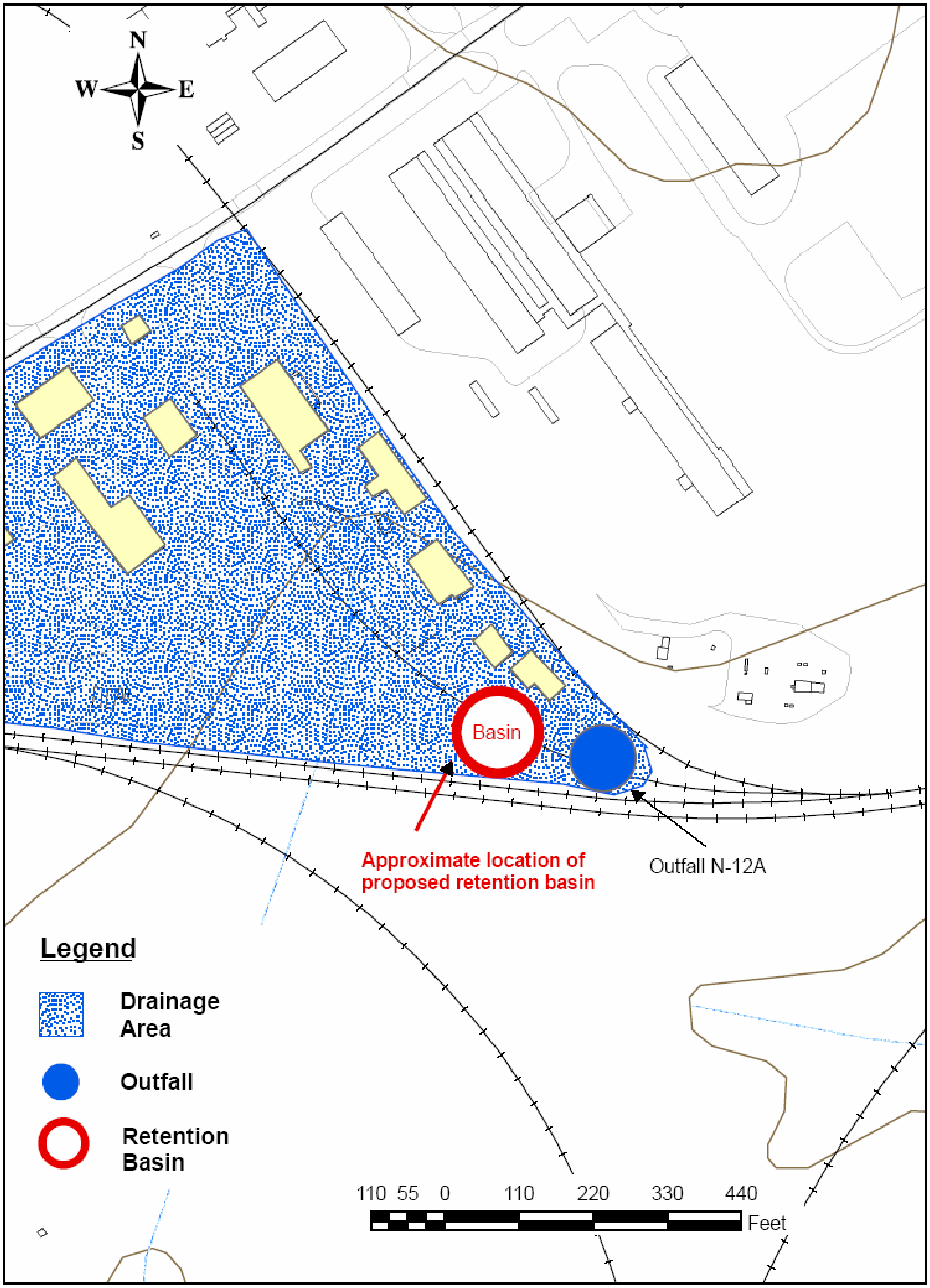

Figure 2-100. Outfall N-12A, Option C: Install Retention Basin Upstream of Outfall.

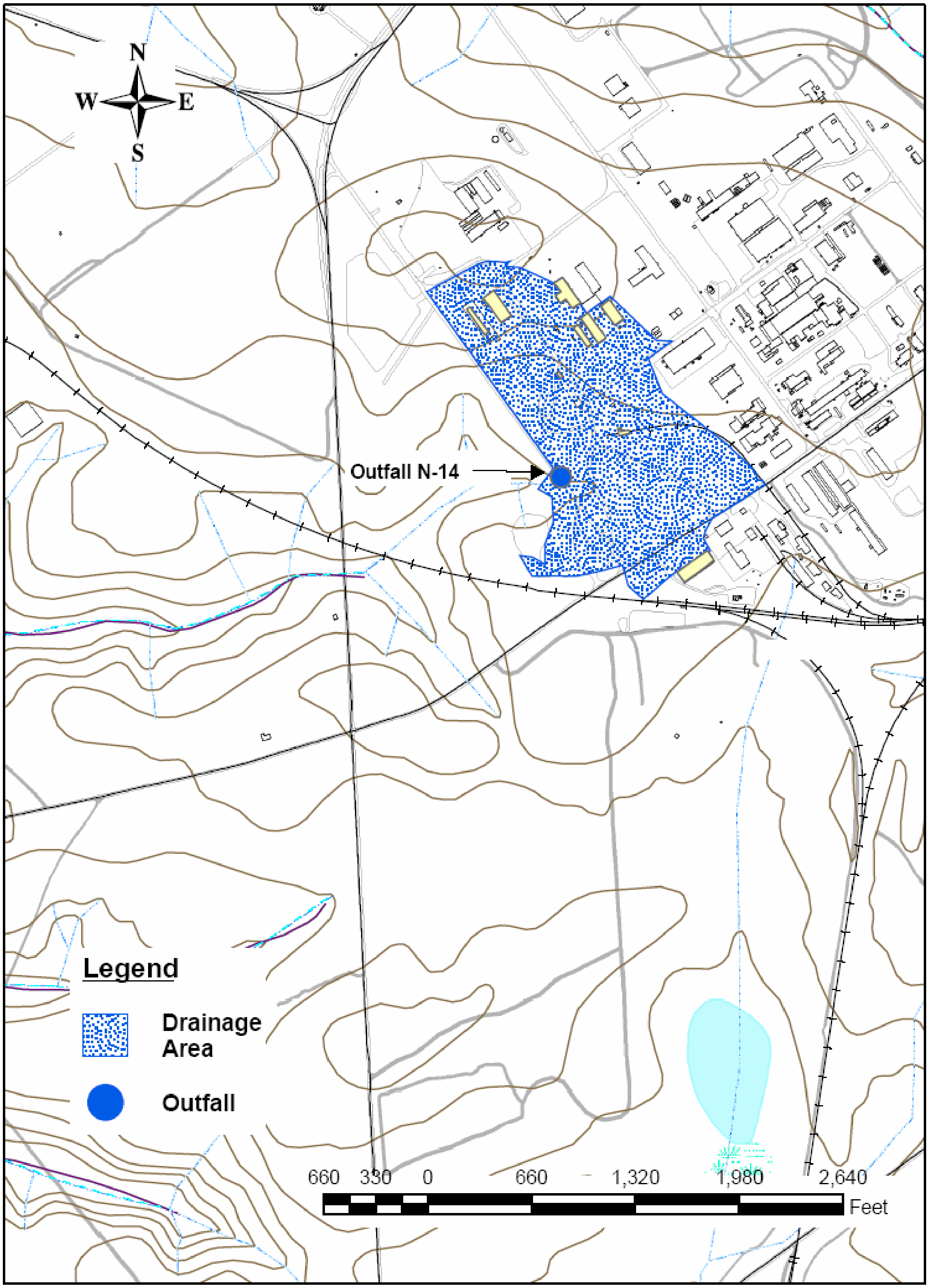

Figure 2-101. Location of Storm Water Outfall N-14 and Associated Drainage Area.

Figure 2-102. View of Storm Water Outfall N-14.

Figure 2-103. Representative View of Drainage Area for Storm Water Outfall N-14.

2.1.31 Outfall N-15

Outfall N-15 receives runoff from an area of approximately 1,945,075 ft^2 (44.7 acres) in the northwestern sector of N-Area (Figure 2-104). The dominant land cover within the drainage area is pavement and roofs (impermeable), followed by grass, forested, and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 6,232,574 gallons (Table 2-1). Storm water from the area flows through a series of drainage ditches and conveyance piping into a retention basin. A standpipe within this basin directs any overflow to the outfall (Figure 2-105) which discharges to an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include AC units, rusting roofs, and deteriorating fences (Figure 2-106). The storm water pollutant of concern at this outfall is iron (Table 2-2).

The proposed action for Outfall N-15 is to maintain good housekeeping practices and erosion control BMPs (e.g., silt fences, grass sod, hay bales) within the drainage area to minimize the loss of iron-ladden sediment in surface runoff (Table 2-33). The expected end-state for this outfall would be its continued regulation under the Industrial Storm Water General Permit. A detailed description of this option can be found in Halverson and Stinson (2006).

Table 2-33. Outfall N-15: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Maintain good housekeeping practices and erosion control BMPs in drainage area.	None.

2.1.32 Outfall N-16

Outfall N-16 receives runoff from an area of approximately 954,739 ft^2 (22 acres) in the northeastern sector of N-Area (Figure 2-107). The dominant land cover within the drainage area is pavement and roofs (impermeable), followed by grass, gravel, and forested surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 3,213,964 gallons (Table 2-1). Storm water from the area is directed, via drainage ditches and conveyance piping, into a retention basin. Any overflow from this basin discharges through the outfall (Figure 2-108) into an unnamed tributary of Fourmile Branch. Exposed pollutant sources within the drainage area include AC units, assorted rusting metals (e.g., a bulk gas storage tank, sealand containers, cylinders, furniture), and deteriorating fences (Figure 2-109). Review of effluent sampling data indicates no water quality problems associated with storm water outfall N-016 (Table 2-2).

The proposed action for Outfall N-16 would be the ‘No Action’ alternative (Table 2-34). The expected end-state for Outfall N-16 under this option would be its continued regulation under the Industrial Storm Water General Permit.

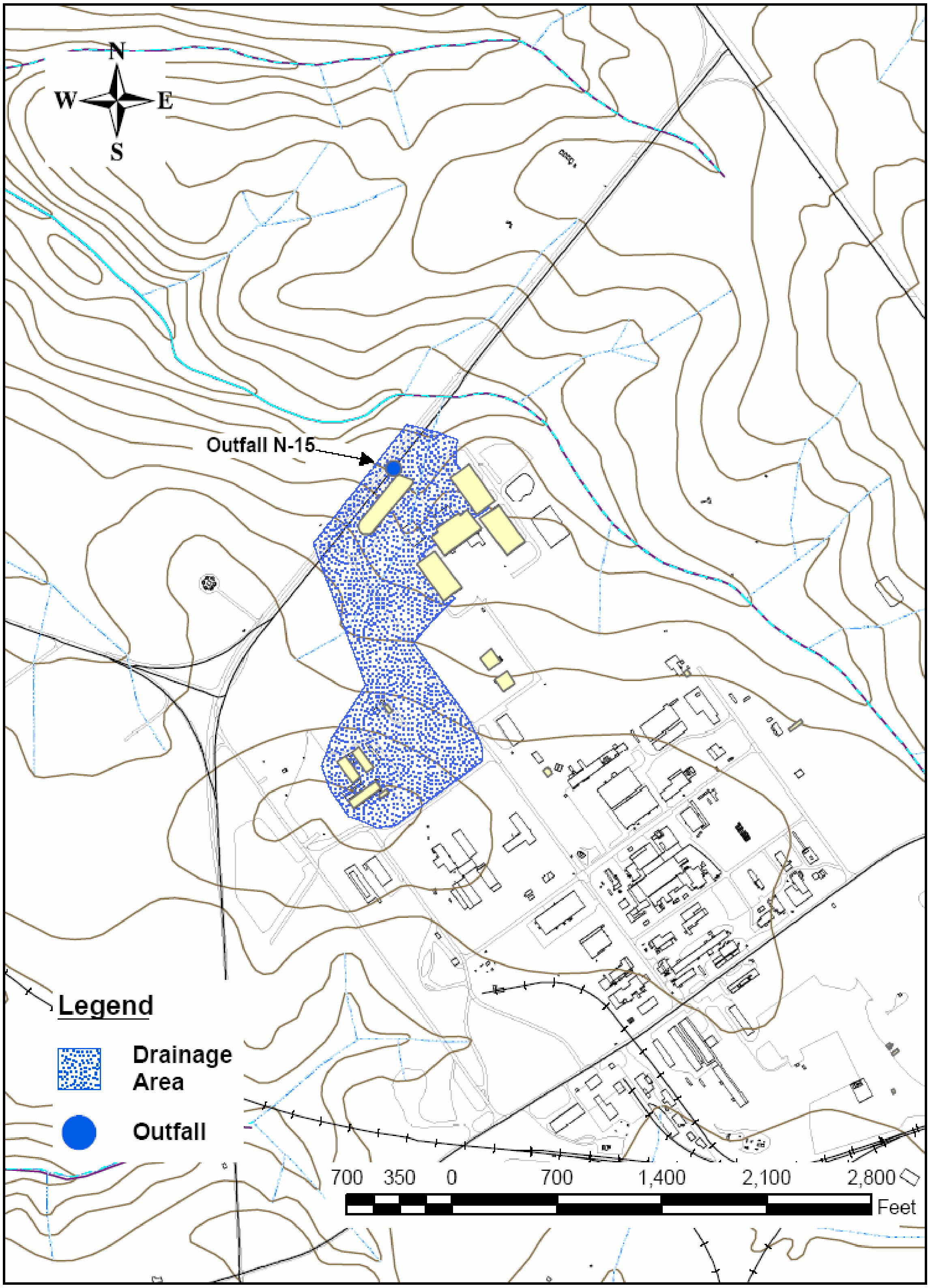

Figure 2-104. Location of Storm Water Outfall N-15 and Associated Drainage Area.

Figure 2-105. View of Storm Water Outfall N-15.

Figure 2-106. Representative View of Drainage Area for Storm Water Outfall N-15.

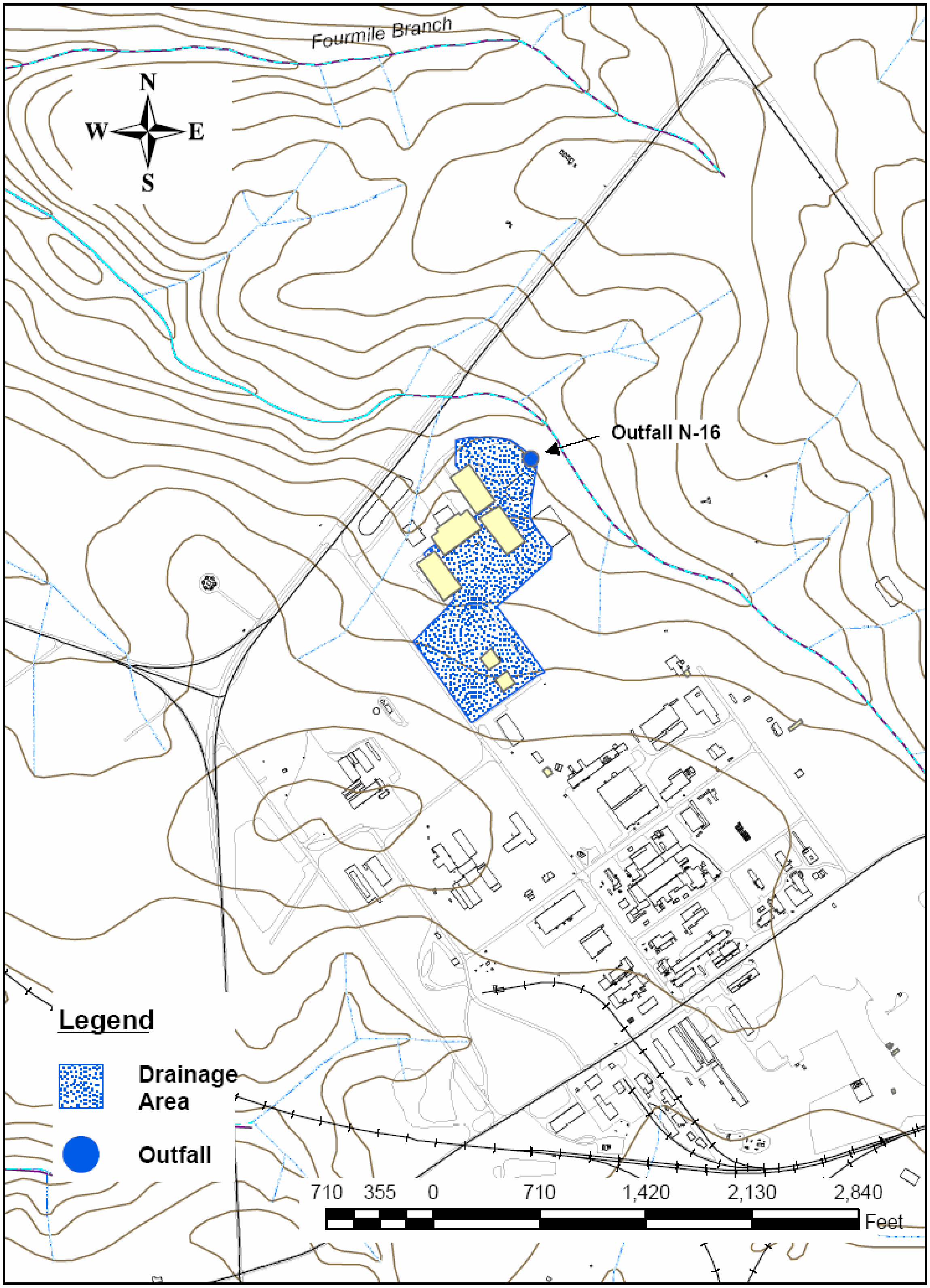

Figure 2-107. Location of Storm Water Outfall N-16 and Associated Drainage Area.

Figure 2-108. View of Storm Water Outfall N-16.

Figure 2-109. Representative View of Drainage Area for Storm Water Outfall N-16.

Table 2-34. Outfall N-16: Proposed and Alternative Actions.	
Proposed Action	Alternative Action
No Action.	None.

2.1.33 Outfall P-07

Outfall P-07 receives runoff from an area of approximately 1,249,536 ft^2 (28.7 acres) on the south side of P-Area (Figure 2-110). The dominant land cover within the drainage area is grass, followed by impermeable (roofs and pavement), exposed soil, and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 3,822,055 gallons (Table 2-1). Storm water from the area is directed via drainage ditches and conveyance piping to the outfall (Figure 2-111). Discharges from this outfall flow through a wooded area towards Myers Branch (Steel Creek drainage). It is not believed that this storm flow reaches state waters due to the vast expanse of vegetated area that it must traverse before reaching Myers Branch. Exposed pollutant sources within the drainage area include railroad ties and rails, galvanized fences, guard rails, roof drains, equipment hangers and supports, steam line insulation, and metal ventilation ductwork (Figure 2-112). No effluent sampling data was collected for this outfall.

There are no longer any industrial-related activities within this outfall's drainage area. The proposed action is to remove Outfall P-07 from coverage under the Industrial Storm Water General Permit (Table 2-35). Under this option, Outfall P-07 would be a compliant discharge not subject to regulation.

Table 2-35. Outfall P-07: Proposed and Alternative Actions.	
Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit.	None.

2.1.34 Outfall P-13

Outfall P-13 receives runoff from an area of approximately 973,699 ft^2 (22.4 acres) in the northern sector of P-Area (Figure 2-113). The dominant land cover within the drainage area is grass, followed by impermeable (roofs and pavement) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 3,145,337 gallons (Table 2-1). Storm water from the area is directed by drainage ditches, catch basins, and conveyance piping to the outfall, which discharges into Effluent Canal 904-90G (Steel Creek drainage) (Figure 2-114). Exposed pollutant sources within the drainage area include waste materials generated by deactivation and demolition (D&D) activities, galvanized fencing, pole transformers, electrical wiring, steel piping and supports, steam line insulation, metal buildings and trailers, railroad ties and rails, and roof drains (Figure 2-115). Review of effluent sampling data indicates no water quality problems associated with this outfall P-013 (Table 2-2).

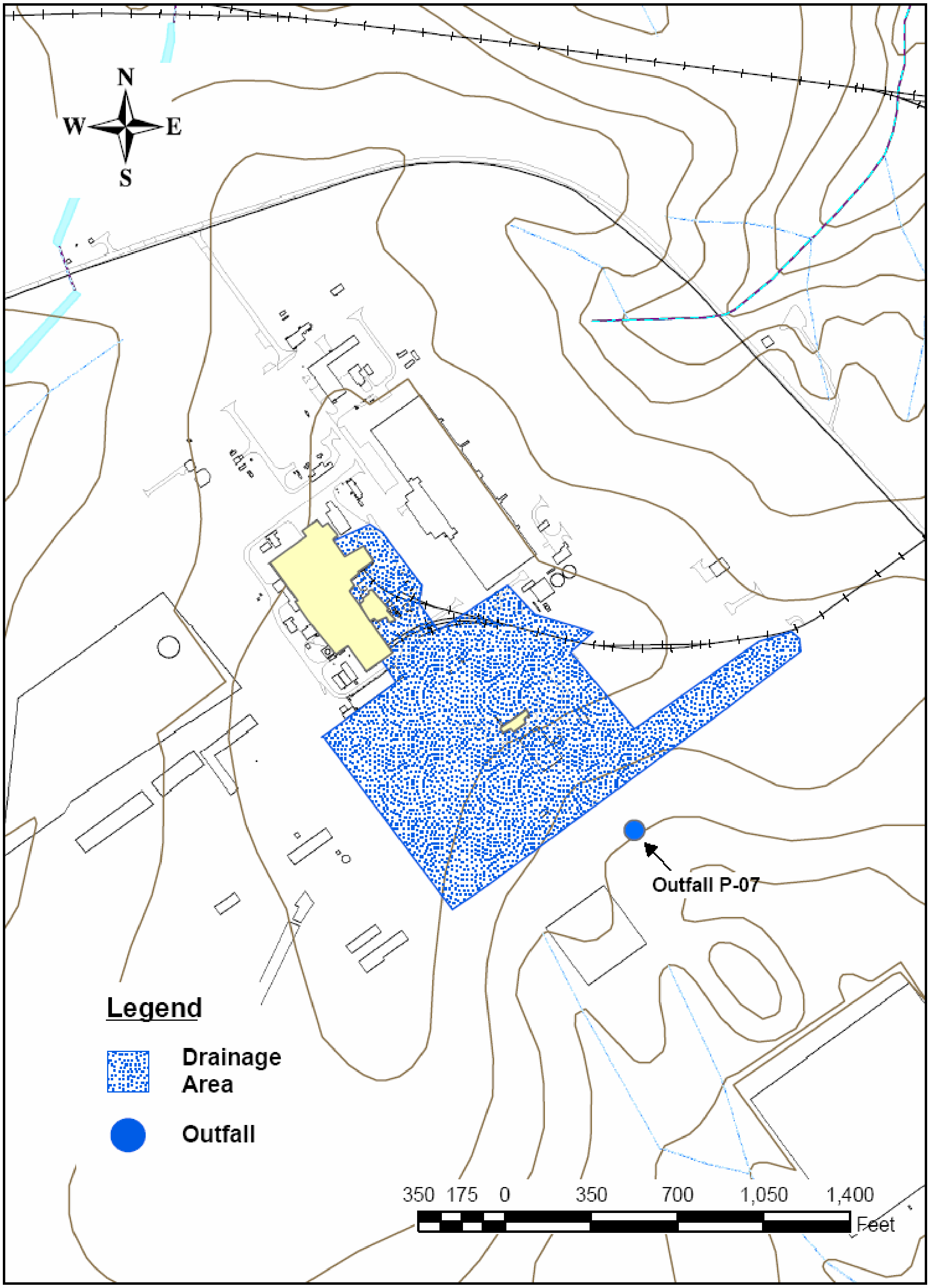

Figure 2-110. Location of Storm Water Outfall P-07 and Associated Drainage Area.

Figure 2-111. View of Storm Water Outfall P-07.

Figure 2-112. Representative View of Drainage Area for Storm Water Outfall P-07.

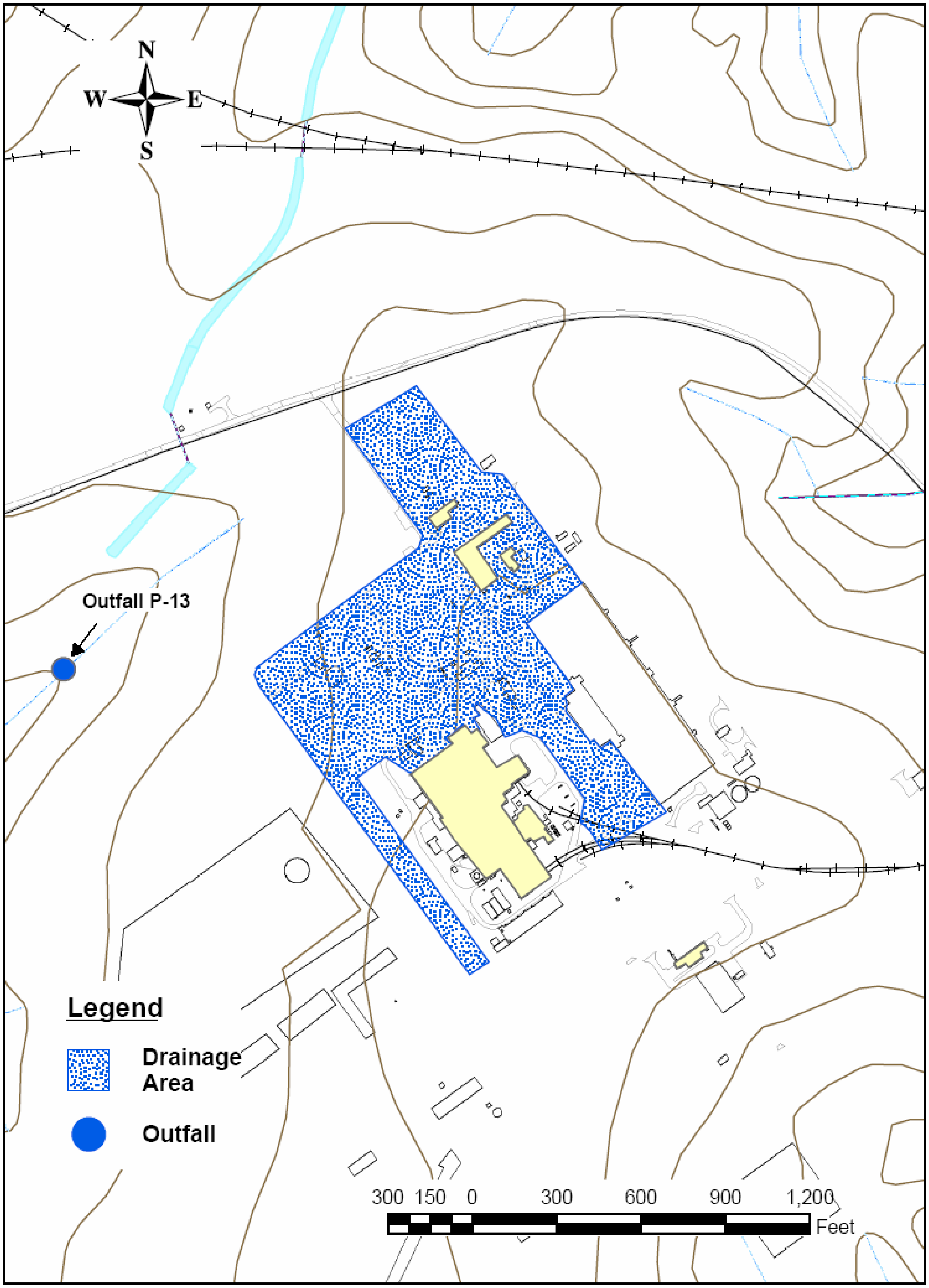

Figure 2-113. Location of Storm Water Outfall P-13 and Associated Drainage Area.

Figure 2-114. View of Storm Water Outfall P-13.

Figure 2-115. Representative View of Drainage Area for Storm water Outfall P-13.

There are no longer any industrial-related activities within the outfall's drainage area. The proposed action is to remove Outfall P-13 from coverage under the Industrial Storm Water General Permit (Table 2-36). Under this option, Outfall P-13 would be a compliant discharge not subject to regulation.

Table 2-36. Outfall P-13: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit.	None.

2.1.35 Outfall P-19

Outfall P-19 receives runoff from an area of approximately 468,232 ft^2 (10.7 acres) in the southwestern section of P-Area (Figure 2-116). The dominant land cover within the drainage area is roofs and pavement (impermeable), followed by grass and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,773,358 gallons (Table 2-1). Storm water from the area is directed via a system of diversion boxes and catch basins to the outfall (Figure 2-117) which discharges into Pond 2 (Lower Three Runs drainage). Exposed pollutant sources within the drainage area include waste materials generated by deactivation and demolition (D&D) activities, galvanized fencing, pole transformers, electrical wiring, steel piping and supports, steam line insulation, metal buildings and trailers, railroad ties and rails, and roof drains (Figure 2-118). Review of effluent sampling data indicates no water quality problems associated with this outfall (Table 2-2).

There are no any industrial-related activities within this outfall's drainage area. The proposed action is to remove Outfall P-19 from coverage under the Industrial Storm Water General Permit (Table 2-37). Under this option, Outfall P-19 would be a compliant discharge not subject to regulation.

Table 2-37. Outfall P-19: Proposed and Alternative Actions.

Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit.	None.

2.1.36 Outfall Y-01

Outfall Y-01 receives runoff from an area of approximately 365,882 ft^2 (8.4 acres) in the southwestern section of Y-Area (i.e., Railroad Classification yard) (Figure 2-119). The dominant land cover within the drainage area is grass, followed by impermeable (roofs and pavement) and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 1,136,644 gallons (Table 2-1). Storm water from the area is directed via drainage ditches and conveyance piping to the outfall (Figure 2-120) which discharges into a drainage ditch that flows into Steel Creek.

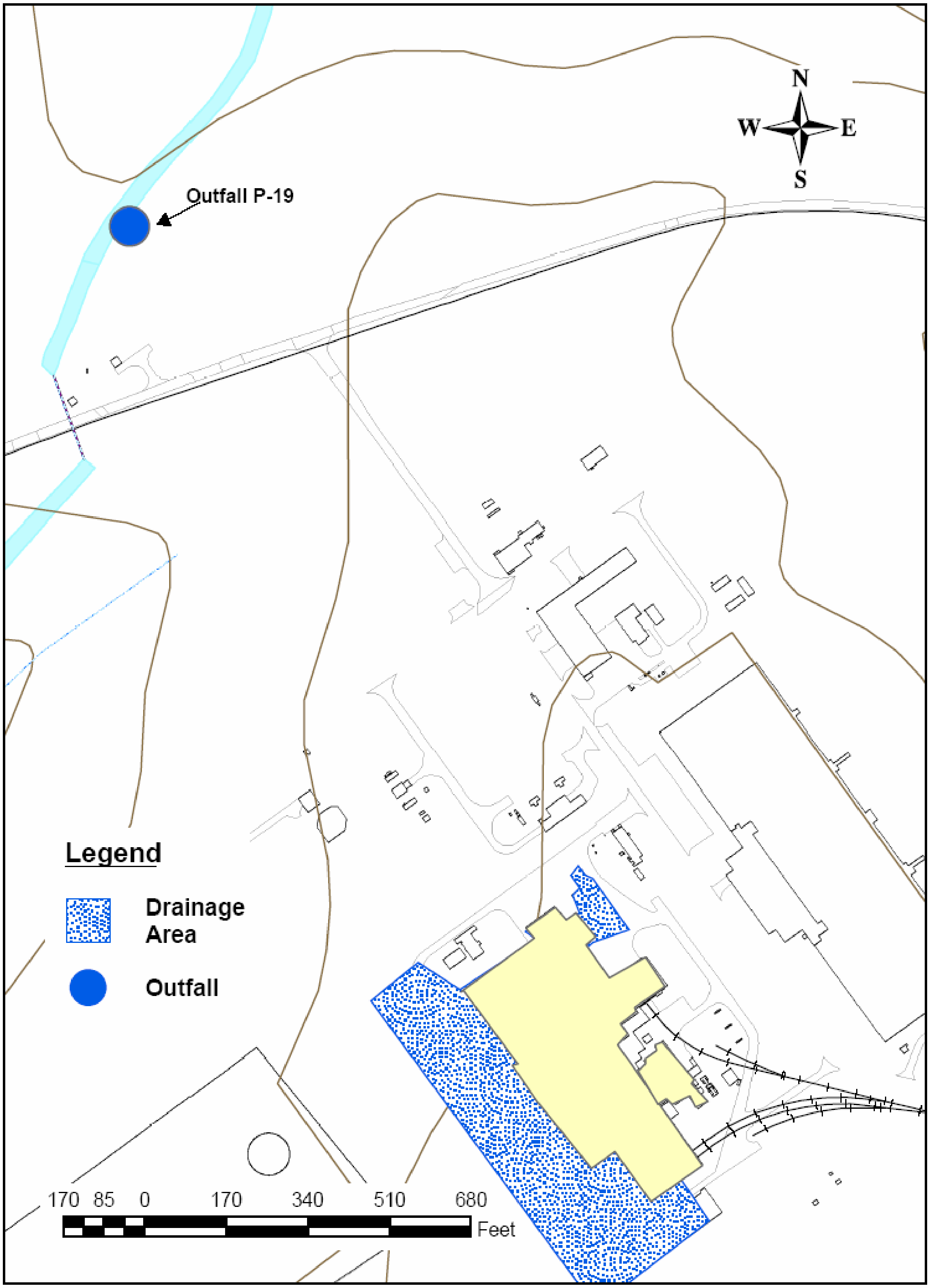

Figure 2-116. Location of Storm Water Outfall P-19 and Associated Drainage Area.

Figure 2-117. View of Storm Water Outfall P-19.

Figure 2-118. Representative View of Drainage Area for Storm Water Outfall P-19.

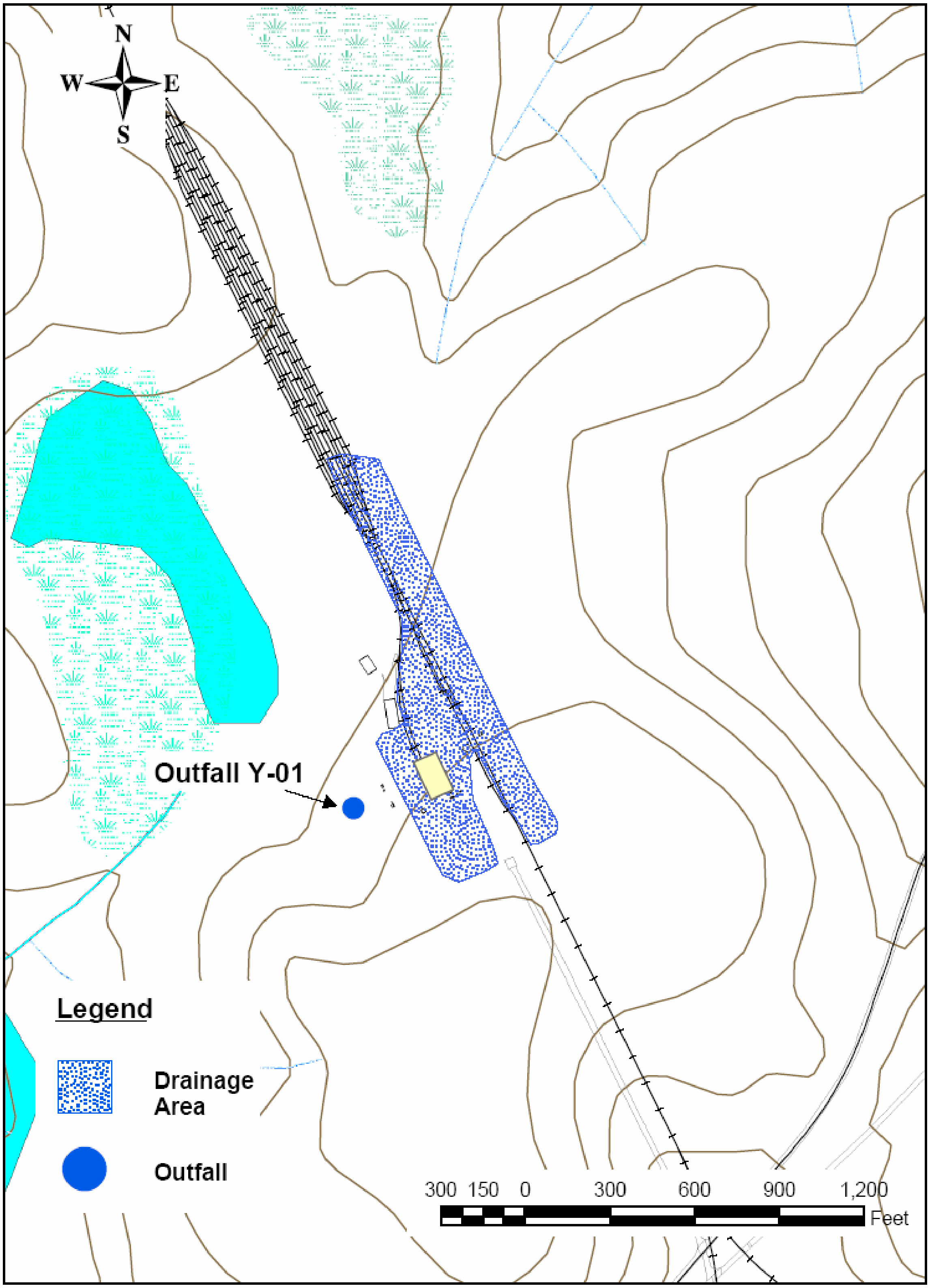

Figure 2-119. Location of Storm Water Outfall Y-01 and Associated Drainage Area.

Figure 2-120. View of Storm Water Outfall Y-01.

Figure 2-121. Representative View of Drainage Area for Storm water Outfall Y-01.

Exposed pollutant sources within the drainage area include AC units, in-service railroad rails and ties, and broken portable equipment awaiting repair (Figure 2-121). The storm pollutants of concern at this outfall are cadmium, copper, iron, manganese, and zinc (Table 2-2).

Proposed and alternative actions considered for storm water outfall Y-01 are described in Table 2-38. With the exception of alternative action ‘D’, all options considered would involve plugging existing conveyance piping at all inlet locations, implementation of erosion control BMPs (e.g., grading, installing grassed swales, applying soil amendments), excavating drainage trenches, and routing runoff to a retention basin or infiltration well. Specifically, proposed action ‘A’ would route runoff via excavated drainage channels to two new retention basins (105 ft long x 65 ft wide x 3.5 ft deep and 100 ft long x 60 ft wide x 3.5 ft deep, respectively) located within the rail yard (Figure 2-122). Alternative action ‘B’ would route runoff via excavated drainage channel to a new retention basin (100 ft long x 60 ft wide x 3.5 ft deep) within the rail yard and a stone-filled infiltration well (6 ft diameter x 25 ft deep) that would be installed at the outlet to the existing outfall (Figure 2-123). The discharge channel would be bermed off just downstream of the infiltration well to prevent flow to state waters. Alternative action ‘C’ would install a new retention basin (160 ft long x 160 ft wide x 7 ft deep) at the outlet to the existing outfall (Figure 2-124). The outfall would be relocated downstream of the basin’s emergency spillway. Alternative action ‘D’ would remove all pollutant sources (e.g., chemical-filled drums and equipment storage areas) from the outfall’s catchment. Additionally, all outside industrial-related activities within the catchment would be relocated to N Area. The SCDHEC has directed SRS to apply for an individual Industrial Wastewater Permit for Outfall Y-01. The expected end-state for the outfall under options ‘A’ and ‘B’ would be its elimination. This would negate the need for regulation. The expected end-state for the outfall under option ‘C’ would be its regulation as an individually permitted outfall under the Industrial Wastewater Permit. The proposed end-state for the outfall under option ‘D’ would be to apply for a “no exposure exclusion” exemption under the Industrial Storm Water General Permit. A detailed description and comparative analysis of the respective outfall options can be found in Halverson and Stinson (2006).

Table 2-38. Outfall Y-01: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)	Alternative Action (C)	Alternative Action (D)
Plug conveyance piping and divert runoff to two small retention basins; establish grass cover along flow paths; Outfall Y-01would be eliminated. Cost = $447K - $1,786K	Plug conveyance piping and divert runoff to a small retention basin and an infiltration well; Outfall Y-01 would be eliminated. Cost = $314K - $1,256K	Plug conveyance piping and divert runoff to a new retention basin; Outfall Y-01 would be relocated downstream of the basin’s emergency spillway. Cost = $646K - $2,584	Remove all pollutant sources from the catchment; discontinue outside industrial-related activities (locomotive engine repair work is protected from outside exposure).

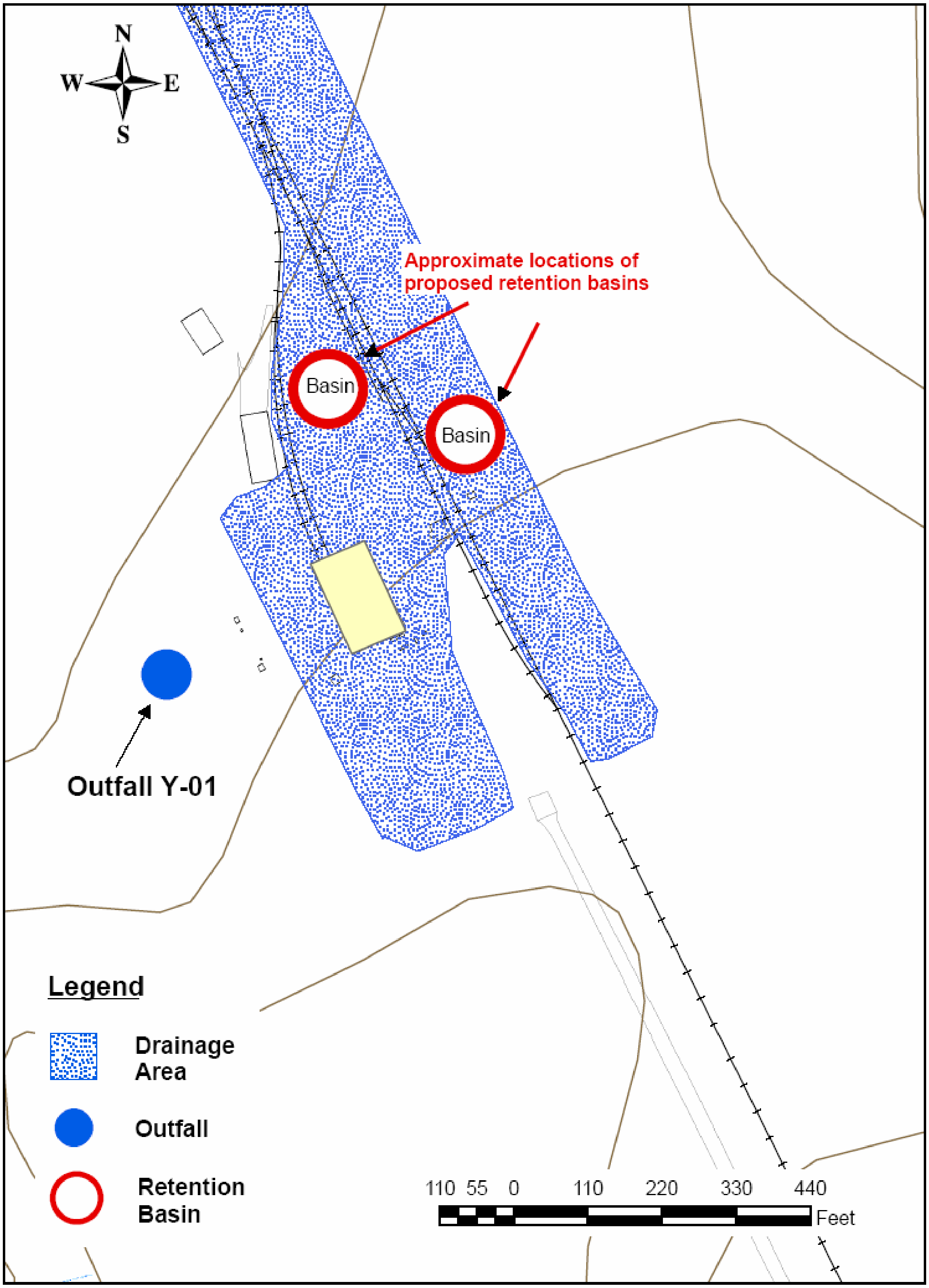

Figure 2-122. Outfall Y-01, Option A: Dispose Stormflow via Sheet Flow and Retention Basins.

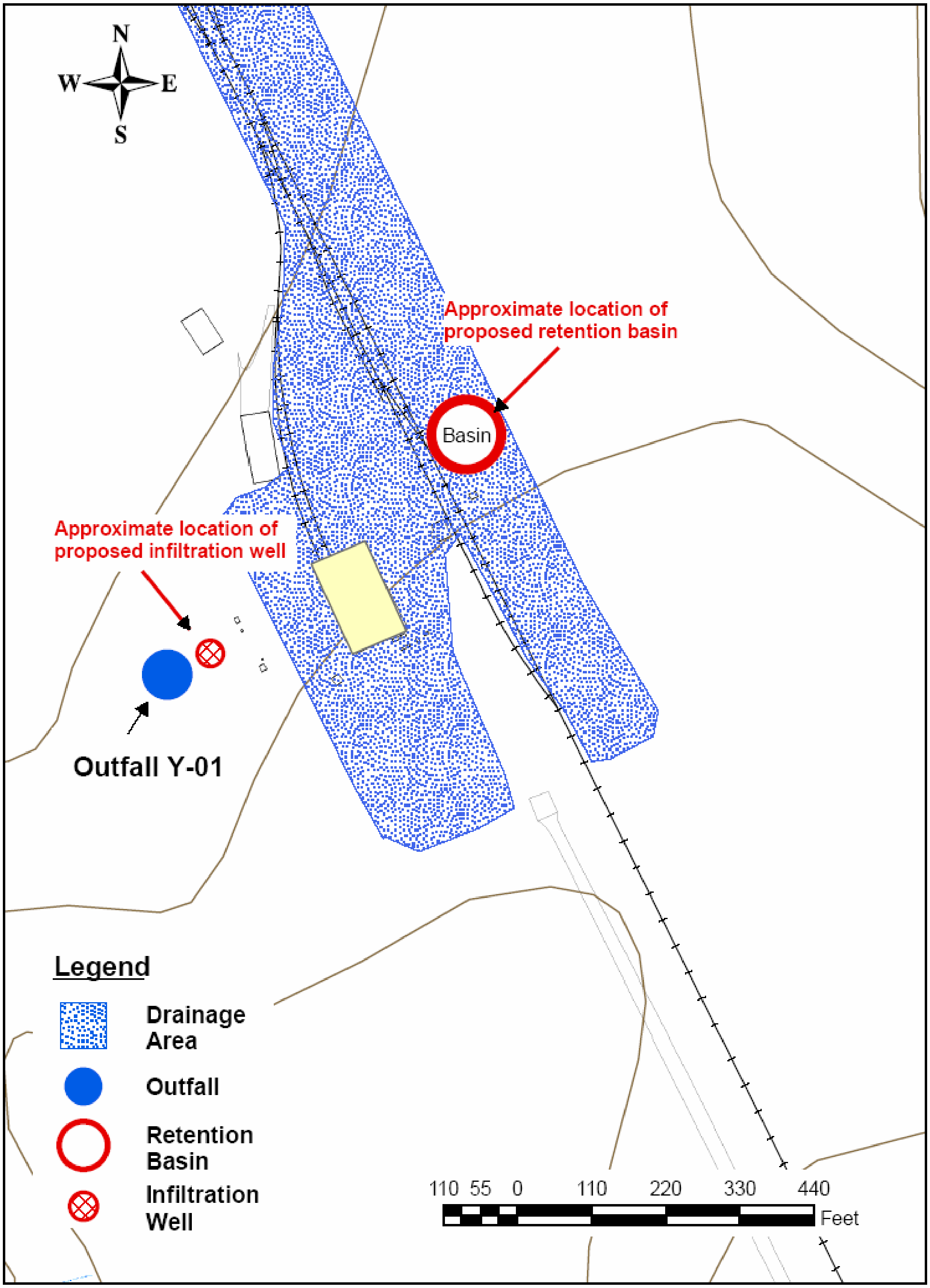

Figure 2-123. Outfall Y-01, Option B: Dispose Stormflow via Retention Basin and Infiltration Well.

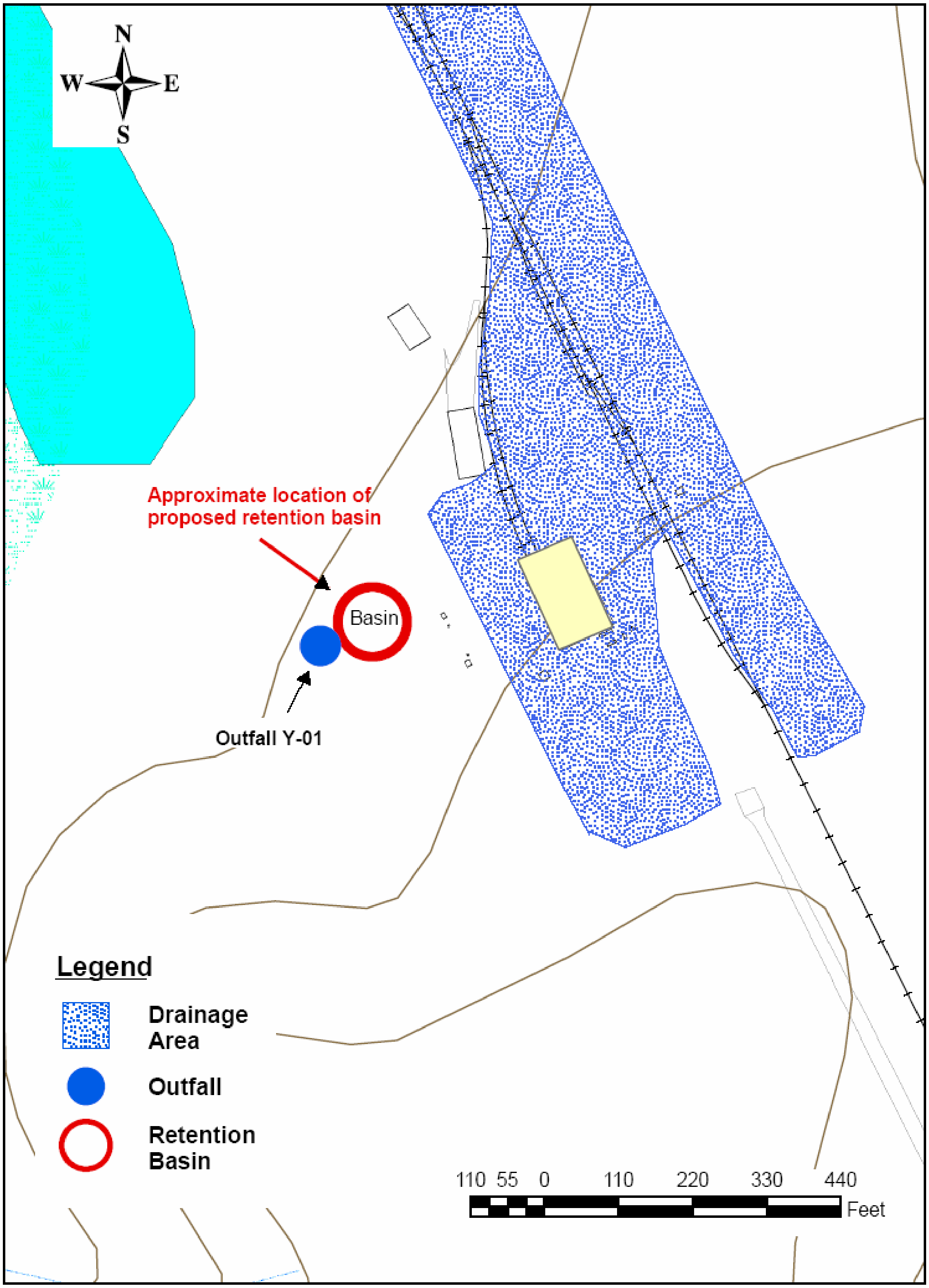

Figure 2-124 Outfall Y-01, Option C: Route Stormflow to Retention Basin.

2.1.37 Outfall Z-01

Outfall Z-01 receives runoff from an area of approximately 2,206,079 ft^2 (50.6 acres) in the southern portion of Z-Area (Figure 2-125). The dominant land cover within the drainage area is grass, followed by wooded, impermeable (pavement and roofs), gravel, and exposed soil surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 6,831,944 gallons (Table 2-1). Storm water from the area is directed to a sedimentation basin via drainage ditches and conveyance piping, Any overflow from this basin would be discharged through the outfall (Figure 2-126) to McQueen Branch. However, engineering studies indicate that this basin would probably not overflow during a 25-year storm event. Exposed pollutant sources within the drainage area include AC units, rusting pipes and equipment, a galvanized building, construction debris (e.g., piping, racks, wood, stockpiled soil, sheet metal, and rebar), and deteriorating fences (Figure 2-127). No effluent sampling data was collected for this outfall.

The proposed action for Outfall Z-01 would be the ‘No Action’ alternative (Table 2-39). The expected end-state for Outfall Z-01 under this option would be its continued regulation under the Industrial Storm Water General Permit.

Table 2-39. Outfall Z-01: Proposed and Alternative Actions.

Proposed Action	Alternative Action
No action.	None.

2.1.38 Outfall Z-03

Outfall Z-03 receives runoff from an area of approximately 1,722,838 ft^2 (39.6 acres) in the northern section of Z-Area (Figure 2-128). The dominant land cover within the drainage area is forest, followed by grass, exposed soil, impermeable (pavement and roofs), and gravel surfaces (Table 2-1). Estimated surface runoff generated by a 25-year storm event (24-hour duration) is approximately 4,729,953 gallons (Table 2-1). Storm water from the area is channeled to the outfall via storm ditches (Figure 2-129), but discharges from the outfall never reach state waters (McQueen Branch). Exposed pollutant sources within the drainage area include AC units, rusting metal, construction debris (e.g., piping, racks, wood, stockpiled soil, sheet metal, and rebar), portable light poles, and deteriorating fences (Figure 2-130). No effluent sampling data was collected for this outfall.

The proposed action for Outfall Z-03 is to remove it from coverage under the Industrial Storm Water General Permit (Table 2-40). The expected end-state Outfall Z-03 under this option would be a compliant discharge not subject to regulation.

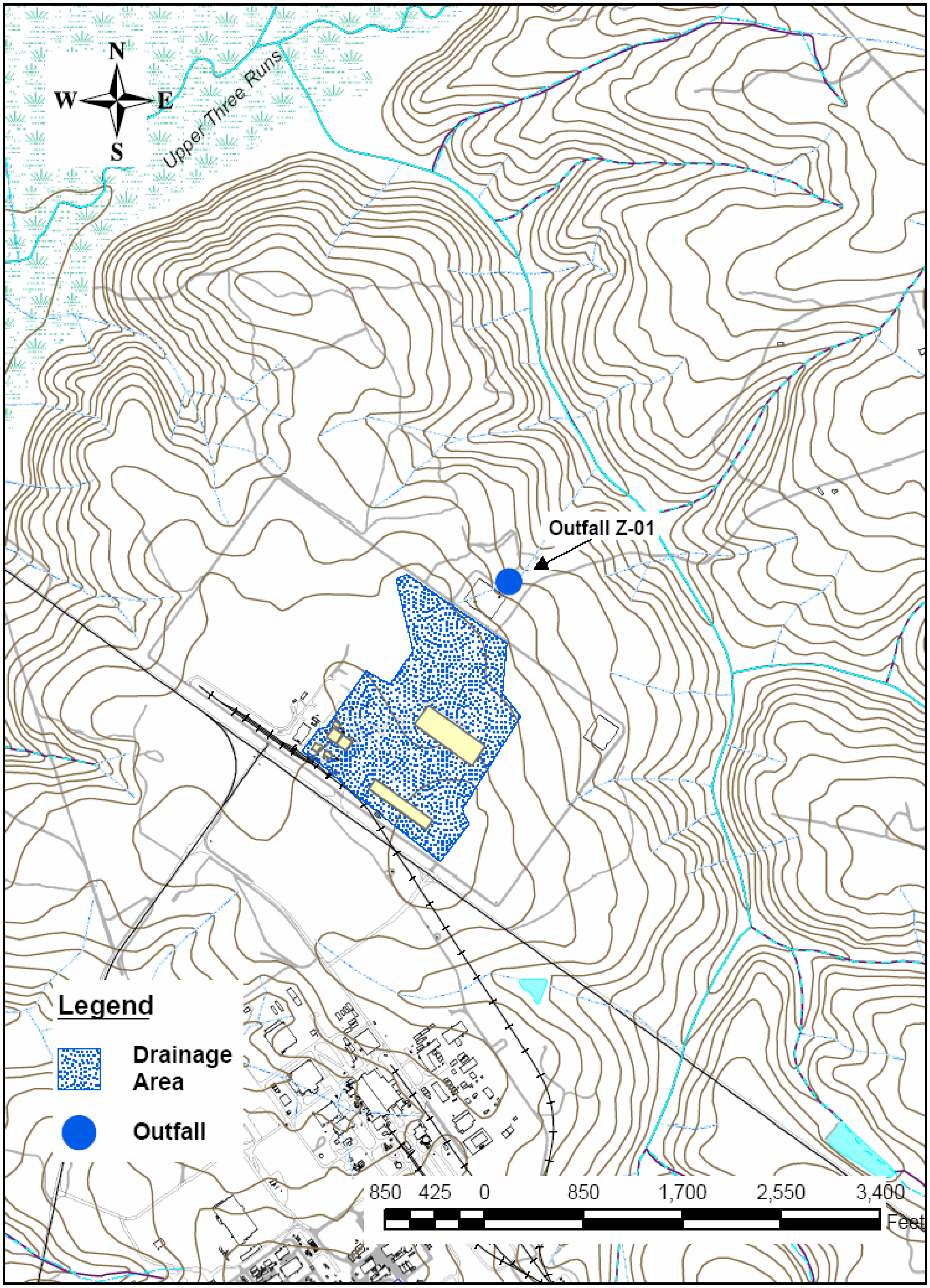

Figure 2-125. Location of Storm Water Outfall Z-01 and Associated Drainage Area.

Figure 2-126. View of Storm Water Outfall Z-01.

Figure 2-127. Representative View of Drainage Area for Storm Water Outfall Z-01.

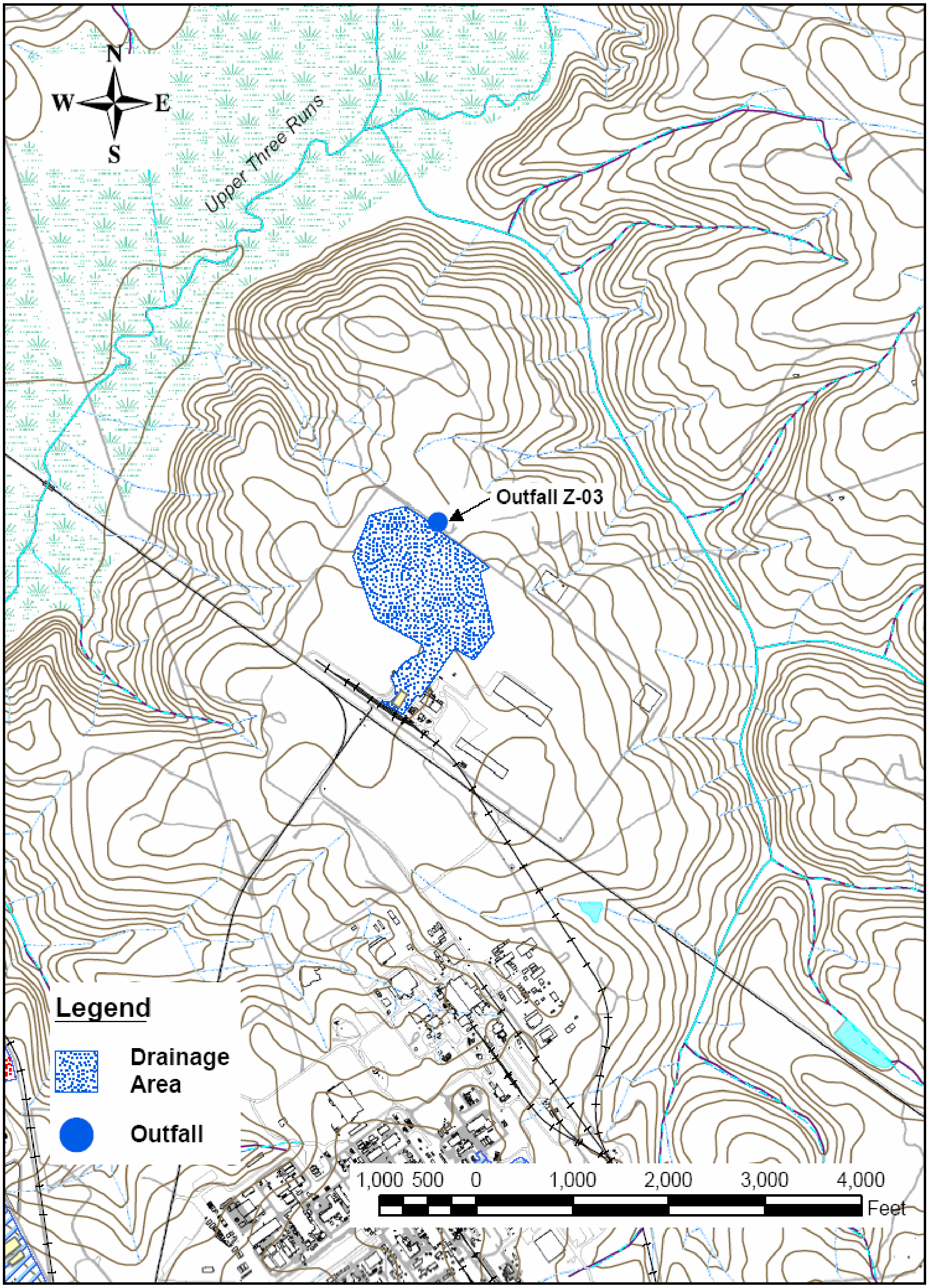

Figure 2-128. Location of Storm Water Outfall Z-03 and Associated Drainage Area.

Figure 2-129. View of Storm Water Outfall Z-03.

Figure 2-130. Representative View of Drainage Area for Storm Water Outfall Z-03.

Table 2-40. Outfall Z-03: Proposed and Alternative Actions.	
Proposed Action	Alternative Action
Remove from coverage under the Industrial Storm Water General Permit.	None.

2.2 No Action Alternative

The 'No Action' Alternative would consist of DOE continuing to discharge from any given outfall with no changes in effluent quality. If no action is taken for those outfalls identified as possessing potential water quality problems, DOE may not be in compliance with the requirements of the renewed NPDES permit. For those outfalls with no identified water quality problems, no corrective action is required and implementation of the 'No Action' alternative would not adversely impact the human environment.

3.0 AFFECTED ENVIRONMENT

The Savannah River Site is a 310-square miles federal reservation located along the Savannah River in southwestern South Carolina (Figure 1-1). The site is approximately 25 miles southeast of Augusta, Georgia and 20 miles south of Aiken, South Carolina. SRS's original mission was the production of strategic radioactive isotopes (e.g., plutonium-239 and tritium) in support of the national defense program. However, with the end of the Cold War, the site's primary mission changed to environmental cleanup and restoration. Following is a brief description of selected environmental components of SRS's affected (existing) environment. Characterization of the affected environment is important because it provides a baseline for assessing the potential impacts of implementing the proposed and alternative actions considered in this EA.

3.1 Land Use

Forestland (mostly southern pine plantation) is the dominant land use at SRS (covers approximately 80 percent of land area), with the remainder consisting of aquatic habitats and developed areas (Wike et al 2006)). The developed landscapes consist primarily of roadways, administrative, and industrialized areas that are continually exposed to high levels of human activity and disturbance (Noah 1995). The proposed and alternative actions considered in this EA would occur within administrative/industrial areas drained by the subject storm water outfalls (e.g., A, N, and H Areas) or in contiguous transitional zones (the interface between heavily developed and relatively undeveloped areas). The discharge channels for most of these outfalls run through upland forests (predominantly loblolly pine [*Pinus taeda*] and oaks [*Quercus* spp.) until their confluence with state waters.

3.2 Meteorology and Climatology

The SRS region possesses a humid subtropical climate characterized by relatively short, mild winters and extended, hot summers. Summer-like weather conditions typically last from May through September, with July and August normally being the hottest months. January and February are typically the coldest months. Due to its proximity to the sea, the region can be significantly impacted by maritime weather conditions (e.g., hurricanes). Precipitation in the region averages in excess of 47 inches per year (Kilgo and Blake 2005). Generally, the spring and autumn seasons tend to be drier than the winter and summer seasons. Spring and summer thunderstorms can be intense. Specht (2005) observed that rainwater samples collected at SRS contained detectable levels of iron, manganese, and zinc and therefore could be a source of metals loading in storm water runoff. More detailed information regarding SRS meteorology and climatology can be found in Bauer et al. (1989). The general meteorological and climatological data reported for SRS would be representative of conditions present in the respective outfall project areas.

3.3 Geology and Soils

The physiography of SRS is comprised of two major physiographic components: the Aiken Plateau and the alluvial terraces of the Savannah River. The Aiken Plateau is a dissected, sandy plain situated between the Savannah and Congaree Rivers on the Upper Atlantic Coastal Plain of South Carolina. Its sandy sediments dominate the SRS landscape and range in elevation from 250 to 400 feet above mean sea level (msl). The alluvial terraces of the Savannah River occur below 250 feet msl. The respective outfall project areas considered in this EA lie on the Aiken Plateau physiographic component (Sassaman and Gillam 1997).

Seven soil associations are represented within SRS (Rogers 1990). Generally, sandy soils occupy the uplands and ridges and are less fertile than the loamy-clayey soils of the stream terraces and floodplains (Rogers 1990). Dominant soils in the developed catchments drained by the subject storm water outfalls are mapped primarily as Udorthent. Udorthents consist of mostly well drained, heterogeneous soil materials that are the spoil or refuse from excavations and major construction activities and are often heavily compacted (Rogers 1990). A review of Looney et al. (1990) finds that Udorthents possess higher concentrations or aluminum, iron, chromium, and copper than other soil types at SRS. These metals are absorbed to particulates (e.g., clays, organic debris) that are eroded and transported by surface runoff during storm events and can be a major contributor to pollutant loadings (i.e., particulates, metals) in storm water discharges.

3.4 Surface Hydrology and Water Quality

The Savannah River forms the western boundary of SRS and receives drainage from five major tributaries which originate on or drain through the site. These tributaries are Upper Three Runs, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs. There are also two major surface water impoundments on SRS (PAR Pond and L Lake) (Figure 1-1). The receiving streams for the respective storm water outfalls considered in this EA are listed in Table 1-1.

Specht (2005) reviewed stream water quality samples collected during storm events from Upper Three Runs (UTR) and Fourmile Branch (FMB) upstream of any SRS industrial-related storm water discharges and found increased concentrations of arsenic, iron, manganese, and zinc relative to base flow conditions (Tables 3-1 and 3-2, respectively). In many instances, there was a significant positive correlation between elevated metals concentrations and total suspended solids (TSS) concentrations. It should be noted that the mean iron concentration observed at FMB (1.608 mg/L) exceeds the EPA storm water benchmark criterion for that constituent (1.00 mg/L). These data demonstrate that drainage from undeveloped catchment areas can contribute significantly to pollutant loadings (e.g., iron) in SRS storm water discharges. Additional information regarding SRS surface hydrology can be found in Wike et al (2006).

Table 3-1. Water Quality Data From Upper Three Runs Collected During Storm Events (mg/L)[1]

Metal	N	Minimum	Maximum	Mean
Arsenic	2	<0.005	0.0063	0.0056
Cadmium	2	<0.0001	0.0005	0.0003
Chromium	2	<0.005	<0.005	<0.005
Copper	2	<0.005	<0.005	<0.005
Iron	2	0.3457	0.6598	0.5028
Manganese	2	0.0162	0.0556	0.0359
Nichel	2	<0.01	<0.01	<0.01
Lead	2	<0.002	0.003	0.002
Zinc	2	<0.01	<0.01	<0.01

[1] total metals (unfiltered)

Table 3-2. Water Quality Data From Upper Three Runs Collected During Storm Events (mg/L)[1]

Metal	N	Minimum	Maximum	Mean
Arsenic	2	<0.005	0.0074	0.006
Cadmium	2	0.0004	0.0002	0.0003
Chromium	2	<0.005	<0.005	<0.005
Copper	2	<0.005	<0.005	<0.005
Iron	2	1.506	1.709	1.608
Manganese	2	0.0751	0.1624	0.119
Nichel	2	<0.01	<0.01	<0.01
Lead	2	<0.002	<0.002	<0.002
Zinc	2	<0.01	0.013	0.0115

[1] total metals (unfiltered)

3.5 Ecological Resources

Since 1951, when the U.S. Government created SRS, natural resource management practices and natural succession outside of the developed administrative and industrial areas have resulted in increased ecological complexity and diversity on the site. As noted in Section 3.1, SRS's terrestrial habitat is primarily comprised of forestland. However, over 20 percent of the SRS's surface area is covered by water, including wetlands, bottomland hardwoods, cypress-tupelo swamp forests, two large cooling water reservoirs

(PAR Pond and L Lake), creeks and streams, and over 300 isolated upland Carolina Bays and wetland depressions (Davis and Janecek 1997; Wike et al 2006). The areas into which the subject outfalls discharge are generally dominated by lowland mixed pine-hardwood and bottomland forests. These habitats are dominated by mixtures of pine and hardwoods suited to moist to wet poorly-drained soil conditions (Imm 2004; Nelson 2006). As discussed in Section 4.0, a number of alternative actions considered for selected N Area outfalls (i.e., N-01, N-02, N-2A, N-03, and N-05) could impact floodplain hydrology and associated wetland resources.

SRS has seven Federally-listed species which are afforded protection under the Endangered Species Act of 1973 (Hyatt 1994). These include the bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria Americana*), red-cockaded woodpecker (*Picoides borealis*), smooth purple coneflower (*Echinacea laevigata*), and pondberry (*Lindera melissifolia*). No Federally-listed threatened and endangered (T&E) species are known to occur in or near the proposed outfall project areas (Ray 2006). Additional information regarding the ecological characteristics of SRS can be found in Wike et al (2006).

3.6 Cultural Resources

Through a cooperative agreement, DOE and the South Carolina Institute of Archaeology and Anthropology of the University of South Carolina conduct the Savannah River Archaeological Research Program (SRARP) to provide services required by Federal law for the protection and management of archaeological resources. To facilitate the management of these resources, SRS is divided into three archaeological zones based on an area's potential for containing sites of historical or archaeological significance (DOE 1995). Zones 1, 2, and 3 represent areas possessing high, moderate, and low potential for significant archaeological or historical resources (respectively).

The developed areas (i.e., industrial and administrative areas) drained by the respective outfalls possess a low archaeological potential or sensitivity because it is likely that any resources that may have originally been present were destroyed during construction-related activities. However, it is possible that the undisturbed stream corridors into which the subject outfalls discharge could possess archaeological or historical resources of significance. Archaeological surveys of the proposed outfall project areas have been conducted by the SRARP and no potential sites of interest identified (Stephenson 2006).

4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTIONS AND ALTERNATIVES

The scope of this EA encompasses proposed and alternative actions designed to facilitate compliance with applicable storm water permit requirements. The implementation of many of these actions involve common activities which can be grouped for purposes of analysis (e.g., construction-related and soil-disturbing activities). Section 4.1 provides an analysis of the potential environmental impacts associated with the implementation of these common activities. Section 4.2 provides a more outfall-specific analysis of potential environmental impacts associated with project implementation. Table 4-1 presents a summary impact matrix for all outfalls considered based upon implementation of the proposed actions.

4.1 Assessment of Common Activities and Related Impacts

4.1.1 Construction-Related and Soil-Disturbing Activities

Numerous proposed and alternative actions would involve construction-related or soil disturbing activities within previously developed administrative or industrial areas and contiguous transition areas. Representative activities include relocating outfall sampling stations, installing erosion control measures (e.g., silt fences, riprap, check dams, and grass sod), surface grading, access road construction, excavating drainage ditches or laying conveyance pipe, removing pavement, and constructing retention basins. These activities would be short-lived, cause little or no disruption to facility or area operations, and be conducted using appropriate BMPs (e.g., storm water and sediment erosion control measures, fugitive dust controls). No known waste sites or contaminated soils would be disturbed. Any resultant construction debris (e.g., removed vegetation or pavement, building materials) or excess excavated soils would be disposed of in an approved landfill. Air emissions associated with these construction-related activities (e.g., equipment emissions, fugitive dust) would be short-lived, minimal, and not require permitting. The potential for these activities to significantly impact the human environment (e.g., air, aquatic, terrestrial, and biotic resources) would be negligible.

4.1.2 Human Health

Impacts to worker health and safety would be negligible due to the use of appropriate safety practices, personal protective clothing and equipment, and the provision of a safe and healthful workplace as required by federal regulations.

4.1.3 Environmental Justice

A detailed discussion of the racial and income characteristics of the SRS region of interest can be found in the Savannah River Site Waste Management Environmental Impact Statement (DOE 1995). With the exception of improved surface water quality, any potential environmental impacts associated with project implementation would be short-lived, limited to specific geographic areas within the SRS, and not be evidenced beyond the site boundary. There would be no disproportionately high and adverse human health or environmental effects on minority and low income populations in the SRS region of interest.

4.1.4 Socioeconomic Resources

Workforce requirements and project costs associated with implementation of the proposed outfall projects would be minimal when compared to the total SRS budget and

Table 4-1. Outfall Summary Impact Matrix.

Environmental Attribute	Outfall Designations												
	A-08	C-01	C-04	E-01	E-02	E-03	E-04	E-05	E-06	F-3B	FT-01	H-06	H-7A
Water Quality	**improve**	**improve**	no change	no change	no change	**improve**	**improve**	no change	**improve**	**improve**	no change	no change	**improve**
Floodplain Hydrology	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
Wetland Resources	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
Disturb Contaminated Soils	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
Air Quality	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
T&E Species / Migratory Birds	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
Cultural Resources	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
Human Health	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
Disrupts Area Operations	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact
Socioeconomics	no impact	no impact	no change	no change	no change	no impact	no impact	no change	no impact	no impact	no change	no change	no impact

improve = improved environmental conditions
adverse = potential significant adverse environmental impact
no change = no change in existing environmental conditions
no impact = no significant environmental impact.

Table 4-1 Continued. Outfall Summary Impact Matrix.

Environmental Attribute	Outfall Designations												
	H-7B	**K-01**	**K-02**	**K-04**	**L-03**	**L-09**	**L-13**	**N-01**	**N-02**	**N-2A**	**N-03**	**N-05**	**N-06**
Water Quality	no change	no change	**improve**	no change	**improve**	no change	no change	**improve**	**improve**	**improve**	**improve**	**improve**	**improve**
Floodplain Hydrology	no change	no change	no impact	no change	no impact	no change	no change	**adverse**	**adverse**	**adverse**	**adverse**	**adverse**	no impact
Wetland Resources	no change	no change	no impact	no change	no impact	no change	no change	**adverse**	**adverse**	**adverse**	**adverse**	**adverse**	no impact
Disturb Contaminated Soils	no change	no change	no impact	no change	no impact	no impact	no change	no change	no change	no change	no change	no change	no impact
Air Quality	no change	no change	no impact	no change	no impact	no change	no change	no change	no change	no change	no change	no change	no impact
T&E Species / Migratory Birds	no change	no change	no impact	no change	no impact	no change	no change	no impact	no impact	no impact	no impact	no impact	no impact
Cultural Resources	no change	no change	no impact	no change	no impact	no change	no change	no change	no change	no change	no change	no change	no impact
Human Health	no change	no change	no impact	no change	no impact	no change	no change	no change	no change	no change	no change	no change	no impact
Disrupts Area Operations	no change	no change	no impact	no change	no impact	no change	no change	no change	no change	no change	no change	no change	no impact
Socioeconomics	no change	no change	no impact	no change	no impact	no change	no change	no change	no change	no change	no change	no change	no impact

improve = improved environmental conditions
adverse = potential significant adverse environmental impact
no change = no change in existing environmental conditions
no impact = no significant environmental impact.

Table 4-1 Continued. Outfall Summary Impact Matrix.												
Environmental Attribute	**Outfall Designations**											
	N-10	**N-12**	**N-12A**	**N-14**	**N-15**	**N-16**	**P-07**	**P-13**	**P-19**	**Y-01**	**Z-01**	**Z-03**
Water Quality	no change	**improve**	**improve**	**improve**	**improve**	no change	no change	no change	no change	**improve**	no change	no change
Floodplain Hydrology	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
Wetland Resources	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
Disturb Contaminated Soils	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
Air Quality	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
T&E Species / Migratory Birds	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
Cultural Resources	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
Human Health	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
Disrupts Area Operations	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change
Socioeconomics	no change	no impact	no impact	no impact	no impact	no change	no change	no change	no change	no impact	no change	no change

improve = improved environmental conditions
adverse = potential significant adverse environmental impact
no change = no change in existing environmental conditions
no impact = no significant environmental impact.

employment (approximately $1.15 billion per year and 10,000 personnel, respectively). Section 2.0 provides cost estimates for selected proposed and alternative actions considered in this EA. The socioeconomic impact(s) associated with implementation of the respective outfall projects would be negligible.

4.1.5 Archaeological and Cultural Resources

All of the proposed outfall projects are located in previously developed areas (i.e., administrative or industrial landscapes) which possess a low potential for significant archaeological or cultural resources. The potential for the proposed and alternative actions to significantly impact archaeological or cultural resources at SRS would be negligible (Stephenson 2006).

4.1.6 Threatened and Endangered Species and Floodplain/Wetland Resources

Seven Federally-listed species are known to occur on SRS (Kilgo and Blake 2005). These species include the smooth purpose coneflower (*Echinacea laevigata*), pondberry (*Lindera melissifolia*), shortnose sturgeon (*Acipenser brevirostrum*), American alligator (*Alligator mississippiensis*), wood stork (*Mycteria Americana*), red-cockaded woodpecker (*Picoides borealis*), and bald eagle (*Haliaeetus leucocephalus*). A recent biological evaluation (BE) confirmed that there would be no effect on the population status of these sensitive species within the proposed project areas or on a sitewide level (Ray 2006) (Appendix A). Although American alligators are known to occur in the vicinity of Outfalls L-03, N-15, and N-16, the implementation of BMPs within the respective outfall drainage areas would not adversely impact this population, either individually or collectively. With the exception of selected proposed and alternative actions associated with Outfalls N-01, N-02, N-2A, N-03, and N-05 (see Section 4.2), none of the proposed outfall projects would significantly impact floodplain hydrology or associated wetland resources (Nelson 2006) (Appendix B). Additionally, none of the proposed or alternatives actions considered in this EA would be expected to have a measurable impact on any migratory avian species.

4.2 Outfall-Specific Impact Assessment

A comparative review of this EA and the Storm Water Outfall Alternatives Study Report finds minor differences in the identification of pollutants of concern at selected storm water outfalls. This variance in problem definition is attributable to a difference in assessment methodologies used in the respective documents. This variance is not environmentally significant because both documents are in sync with respect to problematic outfalls identified and mitigative actions recommended. Regardless of how the problem is initially defined within either document, it is believed that implementation of the proposed or alternative actions considered in this EA would mitigate any identified water quality problem areas.

4.2.1 Outfall A-08

Outfall A-08 currently discharges into a Carolina Bay which is part of the Metallurgical Laboratory Hazardous Waste Management Facility (WSRC 2006) (Figure 2-2). The storm water pollutant of concern for this outfall is zinc (Table 2-2). Implementation of the proposed action would involve construction-related and soil-disturbing activities in a previously developed, administrative/industrial landscape (see Section 4.1.1). All options considered would divert storm water away from the receiving Carolina Bay. However, this diversion of flow would not have a significant impact on the bay's surface hydrology or associated wetlands and not disturb any contaminated bottom sediments (Nelson 2006). The proposed routing of discharges from Outfall A-08 into the Outfall A-07 discharge channel (options 'A' and 'B'; Figure 2-5) would not adversely impact hydrology or wetlands within receiving state waters (Nelson 2006). Excess excavated soil generated by construction of the proposed retention basin (option 'C'; Figure 2-6) or diversion ditch (option 'A') would be disposed of in an approved landfill as nonhazardous material. The amount of terrestrial habitat lost to natural production due to construction of the proposed retention basin or installing conveyance pipeline would be minimal (options 'C' and 'D', respectively) (Figure 2-7). Soil required to raise the embankments of the A-10 Coal Pile Runoff Basin to increase its holding capacity (option 'D') would be acquired from an onsite borrow pit (e.g., Central Shops Borrow Pit). The exfiltration of storm water out of the proposed or existing retention basin into the underlying water table aquifer (options 'C' and 'D') is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Ash-contaminated sediments dredged from the A-07 discharge channel would be disposed of in a permitted land fill. Bottom sediments dredged from the proposed or existing retention basin during routine maintenance would be disposed of in an approved landfill as nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the existing or proposed retention basins (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored (options 'A' and 'B') to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.2 Outfall C-01

Outfall C-01 currently discharges into an unnamed tributary of Fourmile Branch (Figure 2-8). The storm water pollutants of concern for this outfall are iron, manganese, and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil-disturbing activities in a previously developed, industrial landscape (see Section 4.1.1). Option 'A' would remove pollutant sources from the drainage area while option 'B' would clear debris from area flow paths and implement selected BMPs (e.g., install grass sod, riprap and check dams in the main drainage channels, reshape drainage ditches, etc.) within the outfall's catchment. Debris generated by implementation of option 'A' would be disposed of in an approved landfill as nonhazardous waste. The installation of checkdams within the main drainage channels (option 'B') is not expected to adversely impact floodplain hydrology or wetlands within receiving state waters (Nelson 2006). No new chemical or operational hazards would be introduced with implementation of either the proposed or alternative action. Following project implementation, outfall discharges would be monitored (options 'A' and 'B') to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.3 Outfall C-04

Outfall C-04 discharges into an unnamed tributary of Fourmile Branch (Figure 2-11). The proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within it's drainage area. Implementation of the proposed option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (Table 4-1).

4.2.4 Outfall E-01

Outfall E-01 discharges into an unnamed tributary of Fourmile Branch (Figure 2-14). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is the 'No Action' alternative. Implementation of the proposed action would not impact existing environmental conditions (see Table 4-1).

4.2.5 Outfall E-02

Outfall E-02 discharges into an unnamed tributary of Upper Three Runs (Figure 2-17). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is the 'No Action' alternative. Implementation of the proposed action would not impact existing environmental conditions (see Table 4-1).

4.2.6 Outfall E-03

Outfall E-03 discharges into an unnamed tributary of Crouch Branch (Upper Three Runs drainage) (Figure 2-20). The storm water pollutant of concern for this outfall is iron (Table 2-2). Implementation of the proposed action would involve construction-related and soil-disturbing activities in a previously developed industrial landscape (see Section 4.1.1). The proposed action would stabilize eroded drainage channel areas and increase the holding capacity and residence time of the receiving sedimentation basin by dredging accumulated bottom sediments. The proposed reduction in storm water flow to the headwaters of Crouch Branch is not expected to adversely impact floodplain hydrology or associated wetland resources (Nelson 2006). The exfiltration of storm water out of the sedimentation basin into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the sedimentation basin during routine maintenance would be disposed of in an approved landfill as nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the sedimentation basin (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed action. Following project implementation, any outfall discharges from the retention basin would be monitored to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within the receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.7 Outfall E-04

Outfall E-04 discharges into an unnamed tributary of Crouch Branch (Upper Three Runs drainage) (Figure 2-23). The storm water pollutants of concern for this outfall are TSS and iron (Table 2-2). Implementation of the proposed action would involve construction-related and soil-disturbing activities in a previously developed, industrial landscape (see Section 4.1.1). The proposed action would stabilize soil stockpiles by implementing selected erosion control BMPs and increase the holding capacity of the receiving sedimentation basin by dredging accumulated bottom sediments. The application of erosion control BMPs would reduce the loading of sediments and associated pollutants (e.g., iron) in surface runoff. The proposed reduction in storm water flow to the headwaters of Crouch Branch is not expected to adversely impact floodplain hydrology or associated wetland resources within the receiving drainage. The exfiltration of storm water out of the sedimentation basin into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the sedimentation basin during routine maintenance would be disposed of in an approved landfill as nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the sedimentation basin (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed action. Following project implementation, any outfall discharges from the basin would be monitored to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.8 Outfall E-05

Outfall E-05 discharges into an unnamed tributary of Fourmile Branch (Figure 2-26). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is the ‘No Action’ alternative. Implementation of the proposed action would result in no change in existing environmental conditions (see Table 4-1).

4.2.9 Outfall E-06

Outfall E-06 discharges into an unnamed tributary of Crouch Branch (Upper Three Runs drainage) (Figure 2-29). The storm water pollutants of concern for this outfall are TSS, iron, manganese, and zinc (Table 2-2). Implementation of the proposed action would involve construction-related and soil-disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action would regrade and stabilize soil stockpiles and implement selected erosion control BMPs (e.g., install grass sod, silt fences) within the drainage area. The application of erosion control BMPs would reduce sediment loading and associated pollutants (e.g., iron, zinc) in surface runoff. Also, the holding capacity of the receiving sedimentation basin would be increased by dredging accumulated bottom sediments. The proposed reduction in storm water flow to the headwaters of Crouch Branch is not expected to adversely impact floodplain hydrology or associated wetland resources within the receiving drainage (Nelson 2006). The exfiltration of storm water out of the sedimentation basin into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the sedimentation basin during routine maintenance would be disposed of in an approved landfill as nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the sedimentation basin (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed action. Following project implementation, any outfall discharges from the basin would be monitored to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.10 Outfall F-3B

Outfall F-3B discharges into an unnamed tributary of Upper Three Runs (Figure 2-32). The storm water pollutants of concern for this outfall are cadmium, iron, and zinc (Table 2-2). Implementation of the proposed action would involve construction-related and soil-disturbing activities (e.g., excavating drainage channels, installing conveyance pipeline) within a previously developed industrial landscape (see Section 4.1.1). The proposed action would divert flow from the outfall's catchment into the new MOX Pond 400 retention basin. The potential impacts associated with constructing, operating, and maintaining the MOX Pond 400 retention basin are addressed in DOE/EIS-0283. The proposed reduction in storm water flow to the headwaters of Upper Three Runs is not expected to adversely impact floodplain hydrology or associated wetland resources within the receiving drainage. No new chemical or operational hazards would be introduced with implementation of the proposed action. Following project implementation, any outfall discharges would be monitored to determine the efficacy of applied BMP.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.11 Outfall FT-01

Outfall FT-01 discharges into an unnamed tributary of Fourmile Branch (Figure 2-35). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within the it's drainage area. Implementation of the proposed option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1).

4.2.12 Outfall H-06

Outfall H-06 discharges into McQueen Branch, a tributary of Upper Three Runs (Figure 2-38). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is the 'No Action' alternative. Implementation of proposed action would result in no change in existing environmental conditions (see Table 4-1).

4.2.13 Outfall H-7A

Outfall H-7A discharges into McQueen Branch, a tributary of Upper Three Runs (Figure 2-41). The storm water pollutants of concern for this outfall are copper and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil-disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action 'A' would route storm flow from Outfall H-7A to Outfall H-07 (Figure 2-44). Alternative action 'B' would consolidate runoff from both Outfall H-7A and the H-Tank Farm laydown yard into a new retention basin (Figure 2-45). A 300 ft long discharge channel would be excavated to divert flow from the laydown yard to the retention basin. Alternative action 'C' would route storm flow from Outfall H-7A to Outfall H-07 and divert flow from the H-Tank Farm laydown yard into a series of stone-filled infiltration wells (Figure 2-46). The proposed diversion of storm flow to an alternative outfall (options 'A' and 'C'), retention basin (option 'B'), or infiltration wells (options 'C') would not significantly impact floodplain hydrology or associated wetland resources within the receiving drainage (Nelson 2006). The exfiltration of storm water out of the retention basin or infiltration wells into the underlying water table aquifer (options 'B' and 'C') is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Excess soil generated by the excavation of the proposed retention basin, infiltration wells, or conveyance channels/pipelines (options 'A', 'B', 'C') would be disposed of in an approved landfill as nonhazardous waste. Embankment (soil) material required for constructing a new retention basin (option 'B') would be acquired from an onsite borrow pit (e.g., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of a retention basin or conveyance channels/pipelines would be minimal (options 'A', 'B', and 'C'). Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the retention basin or infiltration wells (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored (options 'A' and 'C') to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.14 Outfall H-7B

It is not believed that the coal pile runoff basin upstream of Outfall H-7B would discharge during a 25-year storm event (Figure 2-47). Consequently, the proposed action for this outfall is the 'No Action' alternative. Implementation of this option would result in no change in existing environmental conditions (see Table 4-1).

4.2.15 Outfall K-01

Outfall K-01 currently discharges into Indian Grave Branch, a tributary to Pen Branch (Figure 2-50). The storm water pollutant of concern for this outfall is zinc (Table 2-2). The proposed action 'A' is to remove Outfall K-01 from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within its catchment. Implementation of this option would result in no change in existing environmental conditions. Implementation of the alternative actions considered would involve construction-related and soil disturbing activities (e.g., excavation of discharge channels and construction of a retention basin) within a previously developed industrial landscape and contiguous transition zone (see Section 4.1.1). Alternative action 'B' would route storm flow from the outfall's drainage area into an extended discharge channel. It is believed that the increased exposure of storm flow to bottom sediments and vegetation within this extended discharge channel would reduce pollutant loadings (due to pollutant absorption on soil and/or assimilation by vegetation) prior to its reaching state waters. Alternative action 'C' would route storm flow into a new retention basin constructed along an extended discharge channel (Figure 2-53). Alternative action 'D' would apply soil amendments (e.g., apatite, lime, zeolite) within the drainage area upstream of the outfall to facilitate the sequestration of pollutant constituents (i.e., metals) within the soil column. The proposed diversion of storm flow to the proposed retention basin (option 'C') is not expected to adversely impact floodplain hydrology or associated wetlands within the receiving stream (Nelson 2006). The amount of terrestrial habitat lost to natural production due to construction of a retention basin or extended discharge channel would be minimal (options 'B' and 'C'). Excess soil resulting from excavation of the proposed basin or extended discharge channel would be disposed of in an approved landfill as a nonhazardous waste. Embankment (soil) material required for constructing the proposed retention basin (option 'C') would be acquired from an onsite borrow pit (e.g., Central Shops Borrow Pit). The exfiltration of storm water out of the proposed retention basin into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed retention basin and discharge channel (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the alternative actions considered. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to sequester storm water pollutant constituents (metals) within the soil column is currently being investigated by the Savannah River National Laboratory (SRNL).

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.16 Outfall K-02

Outfall K-02 currently discharges into an unnamed tributary to Indian Grave Branch (Pen Branch drainage) (Figure 2-54). The storm water pollutant of concern for this outfall is zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities (e.g., excavation of drainage ditches, basin construction) within a previously developed industrial landscape and contiguous transition/forested area (see Section 4.1.1). The proposed action ‘A’ would convey storm flow from the outfall’s catchment through an extended discharge channel to a forested area where it would be dispersed as a diffuse sheet flow. It is believed that the absorption/assimilation of pollutant constituents by forest floor soils and vegetation would reduce pollutant loadings within the storm flow. It is not expected that any of this storm flow would reach state waters due to its infiltration into the soil column. Alternative action ‘B’ would redirect outfall discharges into a new retention basin constructed along an extended discharge channel (Figure 2-57). Alternative action ‘C’ would strategically apply soil amendments (e.g., apatite, lime, zeolite) within the drainage area upstream of the outfall to facilitate the sequestration of pollutant constituents (i.e., metals) within the soil column. The infiltration of storm flow into the forest floor (option ‘A’) or the exfiltration of storm water out of the proposed retention basin (option ‘B’) into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. The proposed routing of storm flow into the proposed retention basin is not expected to adversely impact floodplain hydrology or associated wetland resources within the receiving stream (Nelson 2006). The amount of terrestrial habitat lost to natural production due to construction of a retention basin, installation of conveyance pipeline, or excavation of an extended discharge channel would be minimal. Excess soil generated by the excavation of the extended discharge channel and the proposed retention basin would be disposed of in an approved landfill as a nonhazardous waste. Any embankment (soil) material required for constructing the proposed retention basin (option ‘B’) would be acquired from an onsite borrow pit (e.g., Central Shops Borrow Pit). Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed retention basin or discharge channel (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored (options 'A' and 'C') to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents (metals) within the soil column is currently being investigated by the SRNL.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.17 Outfall K-04

It is not believed that discharges from Outfall K-04 reach state waters. Consequently, the proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit. Implementation of this option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1). Implementation of alternative actions 'B' and 'C' would involve construction-related and soil disturbing activities within a previously developed industrial landscape (see Section 4.1.1). Alternative action 'B' would clear the outfall's discharge channel of vegetation and other debris. Alternative action 'C' would regrade approximately 200 feet of the existing discharge channel. Grass sod would be installed to stabilize all regraded areas. The application of erosion control BMPs, fertilizer to enhance vegetative growth, and soil amendments to sequester pollutant constituents within the soil column would reduce the loading of sediment and associated pollutants (e.g., copper) in surface runoff. Debris collected from the discharge channel and any excess soil generated by grading activities would be disposed of in an approved landfill as nonhazardous waste. No new chemical or operational hazards would be introduced with implementation of the alternative actions considered. Following project implementation, outfall discharges would be monitored (options 'B' and 'C') to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents (metals) within the soil column is currently being investigated by the SRNL.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.18 Outfall L-03

Outfall L-03 currently discharges via a system of drainage ditches into L Lake (Figure 2-61). The storm water pollutant of concern for this outfall is iron (Table 2-2). Project implementation would involve soil-disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action would install selected erosion control BMPs (e.g., grass sod, hay bales, silt fences) to reduce the loading of sediment and associated pollutants in storm runoff. No new chemical or operational hazards would be introduced with implementation of the proposed action. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within the receiving stream would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.19 Outfall L-09

Discharges from Outfall L-09 currently flow through a forested area toward L-Lake (Figure 2-64). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within the it's drainage area. Implementation of the proposed option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1).

4.2.20 Outfall L-13

Discharges from Outfall L-13 currently flow through a forested area toward Pen Branch (Figure 2-67). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is the 'No Action' alternative. Implementation of the proposed action would result in no change in existing environmental conditions (see Table 4-1).

4.2.21 Outfall N-01

Outfall N-01 currently discharges through a forested area into an unnamed tributary to Fourmile Branch (Figure 2-70). The storm water pollutants of concern for this outfall are iron and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities within a previously developed industrial landscape and contiguous transition area (see Section 4.1.1). The proposed action 'A' would consolidate flows from Outfalls N-01, N-02, N-2A, N-03, and N-05 into a new retention basin via a system of excavated, grassed drainage ditches (Figure 2-73). Alternative action 'B' would divert storm flow from Outfall N-01 to Outfall N-02 via new and existing drainage ditches. Grassed swales, riprap and check dams would be installed within these flow paths and soil amendments strategically applied within the catchment. Alternative action 'C' would install erosion control BMPs along and within the outfall's existing drainage channel (e.g., grass swales, sod, check dams, riprap), and strategically apply soil amendments within the catchment to sequester pollutant constituents. Option 'D' would consolidate the discharges from Outfalls N-01 and N-02 into a new retention basin via an excavated, grassed ditch line. The application of soil erosion control BMPs (all options) and soil amendments (options 'B' and 'C') would reduce the loading of sediment and associated pollutants (e.g., iron) in storm runoff. The proposed consolidation of flow from five outfalls into a new retention basin (option 'A') would significantly impact downstream floodplain hydrology and associated wetland resources (Nelson 2006). This complex of outfalls provides critical hydrology for a slope wetland that forms the headwaters for an unnamed tributary to Fourmile Branch. Although implementation of option 'A' would not reqiure a Corps of Engineers (COE) permit (no jurisdictional wetlands involved), the resultant wetland loss would require mitigative measures (e.g., wetland creation, restoration, or enhancement) to satisfy DOE's 'no net loss' policy (Nelson 2006). The consolidation of flows from Outfalls N-01 and N-02 into a common discharge channel (option 'B') or proposed retention basin (option 'D') would not adversely impact downstream floodplain hydrology or associated wetland resources. Debris removed from discharge channels and excess soil generated by grading activities and the excavation of a new retention basin or drainage ditches (options 'A', 'B', and 'D') would be disposed of in an approved landfill as nonhazardous waste. Embankment (soil) material required for constructing the proposed retention basin (options 'A' and 'D') would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of the proposed retention basin or drainage ditches would be minimal. The exfiltration of storm water out of the proposed retention basin into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column (options 'A' and 'D'). Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazdous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed retention basin or discharge channels (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents (metals) within the soil column is currently being investigated by the SRNL.

Implementation of the proposed action 'A' could adversely impact downstream floodplain hydrology or associated wetland resources. However, the mitigation of any resultant wetland losses would minimize impacts within receiving state waters. The potential for alternative options 'B', 'C', and 'D' to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible. Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.22 Outfall N-02

Outfall N-02 currently discharges into an unnamed tributary of Fourmile Branch (Figure 2-74). The storm water pollutants of concern for this outfall are iron and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities within a previously developed industrial landscape and contiguous transition area (see Section 4.1.1). The proposed action 'A' would consolidate flows from five outfalls (N-01, N-02, N-2A, N-03, and N-05) into a new retention basin via a system of excavated, grassed drainage ditches (Figure 2-73). Alternative action 'B' would divert storm flow from Outfall N-01 to Outfall N-02 via new and existing drainage ditches. Grassed swales, riprap and check dams would also be installed within these flow paths and soil amendments strategically applied within the catchment to sequester pollutant constituents. Alternative action 'C' would install BMPs in and along the drainage channel upstream of the outfall (e.g., grass sod, check dams, and soil amendments), dredge debris from flow paths, and remove pollutant sources (i.e., soil and rock stock piles) from the catchment. Option 'D' would consolidate the discharges from Outfalls N-01 and N-02 into a new retention basin via an excavated, grassed drainage ditch. The application of soil erosion BMPs (all options) and soil amendments (options 'B' and 'C') would reduce the loading of sediment and associated pollutants (e.g., iron) in storm runoff. The proposed consolidation of flow from five outfalls into a new retention basin (option 'A') would significantly impact downstream floodplain hydrology and associated wetlands (Nelson 2006). This complex of outfalls provides critical hydrology for a slope wetland that forms the headwaters for an unnamed tributary to Fourmile Branch. Although implementation of this option would not require a COE permit (no jurisdictional wetlands involved), the resultant wetland loss would require mitigative measures (e.g., wetland creation, restoration, or enhancement) to satisfy DOE's 'no net loss' policy (Nelson 2006). The consolidation of flows from Outfalls N-01 and N-02 into a common discharge channel (option 'B') or new retention basin (option 'D') would not adversely impact downstream floodplain hydrology or associated wetland resources. Debris removed from discharge channels and excess soil generated by construction of a new retention basin or drainage ditches (options 'A', 'B', and 'D') would be disposed of in an approved landfill as nonhazardous waste. Any soil material required for constructing the proposed retention basin (options 'A' and 'D') would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of the proposed retention basin or drainage ditches would be minimal (options 'A', 'B', and 'D'). The exfiltration of storm water out of the proposed retention basin into the underlying water table aquifer (options 'A' and 'D') is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed retention basin or discharge channels (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents (metals) within the soil column is currently being investigated by the SRNL.

Implementation of the proposed action 'A' could adversely impact downstream floodplain hydrology or associated wetland resources. However, the mitigation of any resultant wetland losses would minimize impacts within receiving state waters. The potential for alternative options 'B', 'C', and 'D' to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible. Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.23 Outfall N-2A

Outfall N-2A currently discharges into an unnamed tributary of Fourmile Branch (Figure 2-77). The storm water pollutants of concern for this outfall are iron, manganese, and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities within a previously developed industrial landscape and contiguous transition area (see Section 4.1.1). The proposed action 'A' would consolidate flows from five outfalls (N-01, N-02, N-2A, N-03, and N-05) into a new retention basin via a system of excavated, grassed drainage ditches (Figure 2-73). The alternative action 'B' would consolidate flows from Outfalls N-2A, N-03, and N-05 into a new retention basin via a system of excavated, grassed drainage ditches. The proposed and alternative actions to consolidate flows from the respective outfalls into a new retention basin would adversely impact downstream floodplain hydrology or associated wetland resources (Nelson 2006). This is because the outfalls involved (particularly Outfall N-05) provide critical hydrology for a slope wetland that forms the headwaters for an unnamed tributary to Fourmile Branch. Although implementation of either of these actions would not require a COE permit (there are no jurisdictional wetlands involved), the resultant wetland loss would require mitigative measures (e.g., wetland creation, restoration, or enhancement) to satisfy DOE's 'no net loss' policy (Nelson 2006). Any excess soil generated by the excavation of a new retention basin or drainage ditches (both options) would be disposed of in an approved landfill as nonhazardous waste. Embankment (soil) material required for constructing the new retention basin would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of the proposed retention basin or drainage ditches would be minimal. The exfiltration of storm water out of a retention basin into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed retention basin or discharge channels (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, any outfall discharges would be monitored to determine the efficacy of applied BMPs.

Implementation of either the proposed or alternative action could adversely impact downstream floodplain hydrology or associated wetland resources. However, the mitigation of any resultant wetland losses would minimize impacts within receiving state waters. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.24 Outfall N-03

Outfall N-03 currently discharges into an unnamed tributary of Fourmile Branch (Figure 2-80). The storm water pollutants of concern for this outfall are iron and manganese (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities within a previously developed industrial landscape and contiguous transition area (see Section 4.1.1). The proposed action 'A' would consolidate flows from five outfalls (N-01, N-02, N-2A, N-03, and N-05) into a new retention basin via a system of excavated, grassed drainage ditches (Figure 2-35). Alternative action 'B' would consolidate flows from Outfalls N-2A, N-03, and N-05 into a new retention basin via a system of excavated, grassed drainage ditches. The application of soil erosion control BMPs (both options) would reduce the loading of sediment and associated pollutants (e.g., iron) in surface runoff. The consolidation of flows from the respective outfalls into a new retention basin (both options) would significantly impact downstream floodplain hydrology and associated wetland resources (Nelson 2006). This is because the outfalls involved (particularly Outfall N-05) provide critical hydrology for a slope wetland that forms the headwaters for an unnamed tributary to Fourmile Branch. Although implementation of either option would not necessitate a COE permit (no jurisdictional wetlands involved), the resultant wetland loss would require mitigative measures (e.g., wetland creation, restoration, or enhancement) to satisfy DOE's 'no net loss' policy (Nelson 2006). Any excess soil generated by the excavation of a new retention basin or drainage ditches would be disposed of in an approved landfill as nonhazardous waste. Embankment (soil) material required for constructing the new retention basin would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of the retention basin or drainage ditches would be minimal. The exfiltration of storm water out of the proposed retention basin into the underlying groundwater aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the new retention basin or drainage channels (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs.

Implementation of either the proposed or alternative action could adversely impact downstream floodplain hydrology or associated wetland resources. However, the mitigation of any resultant wetland losses would minimize impacts within receiving state waters. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.25 Outfall N-05

Discharges from Outfall N-05 currently flow into a wetland in the headwaters of Fourmile Branch (Figure 2-83). The storm water pollutants of concern for this outfall are copper, iron, manganese, and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related or soil disturbing activities within a previously developed industrial landscape and contiguous transition area (see Section 4.1.1). The proposed action ‘A’ would consolidate flows from five outfalls (N-01, N-02, N-2A, N-03, and N-05) into a new retention basin via a system of excavated, grassed drainage ditches (Figure 2-73). Alternative action ‘B’ would consolidate discharges from Outfalls N-2A, N-03, and N-05 into a new retention basin via a system of excavated, grassed drainage ditches. Also, erosion control BMPs and soil amendments would be strategically applied within the outfall’s catchment. Alternative action ‘C’ would install BMPs in and along the outfall’s flow path upstream of the outfall (e.g., install grass sod) and remove pollutant sources (i.e., excess equipment in laydown areas) from the drainage area. Additionally, soil amendments (e.g., apatite, lime, zeolite) would be strategically applied within the catchment area upstream of the outfall to facilitate the sequestration of pollutant constituents (i.e., metals) within the soil column. The application of erosion control BMPs within the drainage area (all options) would reduce the loading of sediment and associated pollutants (e.g., iron) in surface runoff. The consolidation of flows from the respective outfalls into a new retention basin (options ‘A’ and ‘B’) would significantly impact downstream floodplain hydrology and associated wetland resources (Nelson 2006). This is because the outfalls involved (particularly Outfall N-05) provide critical hydrology for a slope wetland that forms the headwaters for an unnamed tributary to Fourmile Branch. Although implementation of options ‘A’ and ‘B’ would not necessitate a COE permit (there are no jurisdictional wetlands involved), the resultant wetland loss would require mitigative measures (e.g., wetland creation, restoration, or enhancement) to satisfy DOE’s ‘no net loss’ policy (Nelson 2006). Any excess soil generated by the excavation of a new retention basin or drainage ditches (options ‘A’ and ‘B’) would be disposed of in an approved landfill as nonhazardous waste. Any soil required for constructing a new retention basin would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of the proposed retention basin and drainage ditches would be minimal (options ‘A’ and ‘B’). The exfiltration of storm water out of the proposed retention basin into the underlying groundwater aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column (options ‘A’ and ‘B’). Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the new retention basin or drainage channels (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions considered. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents (metals) within the soil column is currently being investigated by the SRNL (option ‘A’).

Implementation of either the proposed action “A’ or alternative action ‘B’ could adversely impact downstream floodplain hydrology or associated wetland resources. However, the mitigation of any resultant wetland losses would minimize impacts within receiving state waters. The potential for option ‘C’ to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible. Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.26 Outfall N-06

Discharges from Outfall N-06 currently flow into a wetland in the headwaters of Fourmile Branch (Figure 2-86). The storm water pollutants of concern for this outfall are iron and manganese (Table 2-2). Implementation of the proposed action would involve soil disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action is to isolate the sand blast operation and excess equipment/material storage areas from area flow paths by applying BMPs such as grass buffers and silt fences. The application of erosion control BMPs would reduce the loading of sediment and associated pollutants (e.g. iron and manganese) in surface runoff. Soil amendments (e.g., apatite, lime, zeolite) would also be strategically applied within the catchment to bind pollutant constituents within the soil column. No new chemical or operational hazards would be introduced with implementation of the proposed action. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents within the soil column is currently being investigated by the SRNL.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.27 Outfall N-10

Discharges from Outfall N-10 currently flow toward Pen Branch but it has been determined that discharges from this outfall do not reach state waters (Osteen and Nelson 2006) (Figure 2-89). The storm water pollutant of concern for this outfall is iron (Table 2-2). The proposed action would remove Outfall N-10 from coverage under the Industrial Storm Water General Permit. Implementation of this action would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1).

4.2.28 Outfall N-12

Discharges from Outfall N-10 currently flow into Pen Branch (Figure 2-92). The storm water pollutants of concern for this outfall are iron, manganese, and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action ‘A’ would clear and reshape the drainage channel and install BMPs within and along the flow path upstream of the outfall (e.g., grass sod, riprap, check dams). Sediment erosion control BMPs and soil amendments would also be strategically applied within the drainage area. Alternative action ‘B’ would consolidate flows from Outfalls N-12 and N-12A into a new retention basin via a system of excavated, grassed drainage ditches and conveyance piping (Figure 2-95). Erosion control BMPs and soil amendments would also be strategically applied within the catchment. The application of erosion control BMPs (both options) would reduce the loading of sediment and associated pollutants in surface runoff. The proposed diversion of outfall flows into a retention basin (option ‘B’) is not expected to adversely impact downstream floodplain hydrology or associated wetland resources. Any excess soil generated by the excavation of the new retention basin or drainage ditches/conveyance pipelines (option ‘B’) would be disposed of in an approved landfill as nonhazardous waste. Embankment (soil) material required for constructing the proposed new retention basin would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of a retention basin and drainage ditches/conveyance piping would be minimal (option ‘B’). The exfiltration of storm water out of the proposed retention basin into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed retention basin and drainage ditches (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents within the soil column is currently being investigated by the SRNL.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.29 Outfall N-12A

Discharges from Outfall N-12A eventually flow into Pen Branch (Figure 2-96). The storm water pollutants of concern for this outfall are copper, iron, manganese, and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action 'A' would apply erosion control BMPs (e.g., grass sod, hay bales, etc.) and soil amendments within the outfall's catchment and install three infiltration wells in the flow path from the salvage yard (Figure 2-99). Alternative action 'B' would consolidate flows from Outfalls N-12 and N-12A into a new retention basin via a system of excavated drainage ditches and conveyance piping (Figure 2-95). Erosion control BMPs and soil amendments would also be strategically applied within the catchment. Alternative action 'C' would route flow from Outfall N-12A into a new retention basin and install erosion control BMPs within the outfall's drainage area (Figure 2-100). The installation of erosion control BMPs (all options) would reduce the loading of sediment and associated pollutants in surface runoff. The strategic application of soil amendments within the catchment (options 'A' and 'B') would sequester pollutant constituents (metals) within the soil column. Although implementation of the proposed or alternative actions would reduce storm water influx to the headwaters of Pen Branch, this reduction in flow is not expected to adversely impact hydrology or associated wetland resources within receiving state waters (Nelson 2006). Any excess soil generated by the excavation of the proposed retention basin, infiltration wells, or drainage ditches/conveyance pipelines would be disposed of in an approved landfill as a nonhazardous waste. Embankment (soil) material required for constructing the proposed retention basin (options 'B' and 'C') would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of the proposed infiltration wells, retention basin and drainage ditches/conveyance piping would be minimal. The exfiltration of storm water out of the proposed infiltration well(s) (option 'A') or retention basin (options 'B' and 'C') into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the retention basin during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed infiltration wells, retention basin, and drainage ditches (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind storm water pollutant constituents within the soil column (options 'A' and 'B') is currently being investigated by the SRNL.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.30 Outfall N-14

Discharges from Outfall N-14 currently flow into an unnamed tributary to Fourmile Branch (Figure 2-101). The storm water pollutant of concern for this outfall is iron (Table 2-2). Implementation of the proposed action would involve construction-related and soil disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action would install erosion control BMPs (e.g., grass sod, hay bales, etc.) and maintain good housekeeping practices within the outfall's catchment. The application of erosion control BMPs would reduce the loading of sediment and associated pollutants in surface runoff. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within the receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.31 Outfall N-15

Any discharges from Outfall N-15 currently flow into an unnamed tributary to Fourmile Branch (Figure 2-104). The storm water pollutant of concern for this outfall is iron (Table 2-2). Implementation of the proposed action would involve construction-related or soil disturbing activities within a previously developed industrial landscape (see Section 4.1.1). The proposed action would maintain good housekeeping and erosion control BMPs within the outfall's catchment (e.g., grass sod, hay bales, etc.). The implementation of this action would reduce the loading of sediment and associated pollutants in surface runoff. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within the receiving stream would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.32 Outfall N-16

Any discharges from Outfall N-16 flow into an unnamed tributary of Fourmile Branch (Figure 2-107). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is the 'No Action' alternative. Implementation of this option would result in no change in existing environmental conditions (see Table 4-1).

4.2.33 Outfall P-07

Discharges from Outfall P-07 flow through a forested area towards Myers Branch, a tributary of Steel Creek (Figure 2-110). It is not believed that this storm flow reaches state waters. No effluent sampling data was collected for this outfall. The proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within its drainage area. Implementation of the proposed option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1).

4.2.34 Outfall P-13

Outfall P-13 discharges via an effluent canal into Steel Creek (Figure 2-113). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within its drainage area. Implementation of the proposed option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1).

4.2.35 Outfall P-19

Outfall P-19 discharges into Pond 2, a waterbody within the Lower Three Runs drainage (Figure 2-116). Review of effluent sampling data indicates no potential water quality problems (Table 2-2). The proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit due to the lack of industrial-related activities within the it's drainage area. Implementation of the proposed option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1).

4.2.36 Outfall Y-01

Outfall Y-01 discharges into a ditch which flows into Steel Creek (Figure 2-119). The storm water pollutants of concern for this outfall are copper, iron, manganese, and zinc (Table 2-2). Implementation of the proposed and alternative actions would involve construction-related and soil disturbing activities within a previously developed industrial landscape and contiguous transition zone (see Section 4.1.1). Proposed and alternative actions 'A' and 'C' would route runoff from the catchment into new retention basins (Figures 2-122 and 2-124, respectively). Alternative action 'B' would route runoff into both a retention basin and an infiltration well (Figure 2-123). Alternative action 'D' would remove all pollutant sources and industrial-related activities (excluding the locomotive engine repair shop) from the outfall's drainage area. The proposed diversion of runoff to an infiltration well or retention basin(s) is not expected to adversely impact floodplain hydrology or wetlands within the receiving stream (Nelson 2006). Excess soil generated by the excavation of the proposed retention basin, infiltration well, and drainage ditches (options 'A', 'B', and 'C') would be disposed of in an approved landfill as a nonhazardous waste. Any soil material required for constructing the proposed retention basin(s) (options 'A', 'B', and 'C') and berm line (option 'C') would be acquired from an onsite borrow pit (i.e., Central Shops Borrow Pit). The amount of terrestrial habitat lost to natural production due to construction of the retention basin(s), infiltration well, and drainage ditches/conveyance piping would be minimal. The exfiltration of storm water out of the proposed retention basin(s) or infiltration well (options 'A', 'B', and 'C') into the underlying water table aquifer is not expected to adversely impact groundwater quality due to the absorption of metals within the soil column. Soil dredged from the retention basin(s) during routine maintenance would be disposed of in an approved landfill as a nonhazardous waste. Prior to its disposition, this material would be analyzed to ensure that it is nonhazardous. Any dredge spoil found to be contaminated (e.g., with oil) would be bioremediated or disposed of in an approved landfill. Activities associated with the eventual closure of the proposed retention basin(s), infiltration well, and drainage ditches (e.g., fill and cap) are not expected to significantly impact the environment. No new chemical or operational hazards would be introduced with implementation of the proposed or alternative actions. Following project implementation, outfall discharges would be monitored to determine the efficacy of applied BMPs. The efficacy of applying soil amendments to bind pollutant constituents (metals) within the soil column is currently being investigated by the SRNL.

The potential for project implementation to significantly impact the human environment (e.g., human health, environmental justice, ecological and socioeconomic resources, archaeological or cultural resources) would be negligible (see Section 4.1). Water quality impacts within receiving state waters would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.37 Outfall Z-01

Any discharges from Outfall Z-001 would flow into McQueen Branch, a tributary to Upper Three Runs (Figure 2-125). However, engineering studies have determined that the sedimentation basin upstream of this outfall would probably not overflow during a 25-year storm event. Consequently, no effluent sampling data was collected for this outfall. The proposed action for this outfall is the 'No Action' alternative. Implementation of this option would result in no change in existing environmental conditions (see Table 4-1).

4.2.38 Outfall Z-03

Discharges from Outfall Z-03 do not reach state waters (i.e., McQueen Branch within the Upper Three Runs drainage) (Figure 2-128). No effluent sampling data was collected for this outfall. The proposed action for this outfall is to remove it from coverage under the Industrial Storm Water General Permit. Implementation of the proposed option would result in a compliant discharge not subject to regulation. There would be no change in existing environmental conditions (see Table 4-1).

4.3 Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations define cumulative impact as an impact on the human environment that results when the incremental effects of a proposed action are added to the impacts of other past, present, proposed, and other reasonably foreseeable future actions within given spatial and temporal boundaries (CEQ 1987). Construction-related activities associated with implementation of the proposed outfall projects would be short-lived and the potential for any resulting air emissions (e.g., equipment emissions, fugitive dust) to interact with other SRS pollutant sources or have a cumulative impact on criteria air pollutants would be negligible. Also, the disposition of excess soils generated by construction and maintenance of retention basins and associated drainage ditches would be easily accommodated by existing approved landfill capacity. Excluding the proposed action for Outfalls N-01, N-02, N-2A, N-03, and N-05 where the respective flows would be consolidated into a common retention basin (see Sections 4.2.21 – 4.2.25), DOE expects that the potential incremental and cumulative impacts of the actions considered in this EA on the various resource areas of the human environment would be minimal. If DOE decides to implement the proposed action for Outfalls N-01, N-02, N-2A, N-03, and N-05, the incremental and cumulative effects on downstream hydrology and wetland resources would be minimized by the application of mitigative actions designed to compensate for any resultant wetland loss or damage (Nelson 2006). In summary, the implementation of the proposed and alternative actions considered in this EA would allow DOE to comply with NPDES permit requirements and is expected to result in a cumulative improvement in surface water quality.

5.0 REGULATORY AND PERMITTING REQUIREMENTS CONSIDERED

DOE policy is to conduct its operations in compliance with all applicable federal, state, and local laws and regulations, and Federal executive orders. Following is a listing of selected statutes, regulations, and executive orders that are applicable to the proposed and alternative actions considered within this EA.

5.1 National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 et seq.)

The National environmental Policy Act of 1969 requires Federal agencies to evaluate the effect of proposed actions on the quality of the human environment. NEPA review should be conducted during the planning and decision-making stages of a project and be completed prior to project implementation. DOE has prepared this EA in accordance with the requirements of NEPA, as implemented by CEQ and DOE NEPA regulations (40 CFR Parts 1500 – 1508 and 10 CFR Part 1021, respectively).

5.2 Federal Clean Water Act, as amended (33 USC 1251 et seq.)

The objectives of the Clean Water Act (CWA) are to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The CWA prohibits the "discharge of toxic pollutants in toxic amounts to navigable waters of the United States". The Act also establishes guidelines and limitations for discharges from point-sources and a permitting program known as the National Pollutant Discharge Elimination System (NPDES). The Environmental Protection Agency (EPA) has delegated primary enforcement authority for the CWA and the NPDES permitting program to the South Carolina Department of Health and Environmental Control (SCDHEC) for waters in South Carolina.

5.3 South Carolina Pollution Control Act (SC Code Section 48-1-10 et seq., 1976) (SCDHEC Regulation 61-9.122 et seq.)

The State of South Carolina has designated the South Carolina Department of Health and Environmental Control (SCDHEC) as the agency authorized to issue, deny, revoke, suspend, or modify permits (Pollution Control Act, South Carolina Code Section 48-1-50(5), *Powers of the Department*). Under the authority of this Act, Regulation 610-9.122, and the CWA, the SCDHEC issued to SRS NPDES General Permit for Storm Water Discharges (SC000000). This permit was recently renewed with more stringent heavy metals requirements which xx industrial storm water outfalls at SRS currently may not meet. The proposed and alternative actions considered in this EA are meant to ensure that DOE achieves and maintains regulatory compliance with the renewed SRS NPDES industrial storm water permit.

5.4 South Carolina Standards for Storm Water Management and Sediment Reduction (SCDHEC Regulation R.72-300)

This SCDHEC regulation requires that storm water management and sediment control plans must be approved by the state prior to engaging in any land disturbing activity related to residential, commercial, industrial, or institutional land use not otherwise exempted or waived. This approval authority has been delegated to SRS. Construction-related activities associated with the proposed and alternative actions considered in this EA would be conducted in accordance with these regulations.

5.5 Endangered Species Act, as amended (16 USC 1531 et seq.)

The Endangered Species Act is intended to prevent the further decline of endangered and threatened species and to restore these species and their habitats. The Act also promotes biodiversity of genes, communities, and ecosystems. None of the proposed outfall projects considered in this EA would adversely impact these species of concern (see Appendix A).

5.6 National Historic Preservation Act, as amended (16 USC 470 et seq.)

The National Historic Preservation Act provides that sites possessing significant national historic value be placed on the National Register of Historic Places. If a particular Federal action impacts a historic property, consultation with the Advisory Council on Historic Preservation is required which will usually lead to a Memorandum of Agreement (MOA) containing mitigative actions that must be followed to minimize adverse impacts. Coordination with the State Historic Preservation Officer (SHPO) also ensures that potentially significant sites are properly identified and appropriate mitigation actions implemented. None of the proposed outfall projects considered in this EA would adversely impact historic sites.

5.7 Integrated Safety Management System (48 CFR 970.5223-1)

The Safety Management System ("System") requires that work be performed safely and that there is adequate protection for employees, the public, and the environment. The System requires that hazards associated with the work to be performed are identified and evaluated and that administrative and engineering controls are put in place to prevent or mitigate such hazards and to prevent accidents or unplanned releases or exposures.

5.8 Executive Order 11988 (Floodplain Management)

Executive Order 11988, "Floodplain Management", directs Federal agencies to establish procedures to ensure that the potential effects of flood hazards and floodplain management are considered for any action undertaken. Impacts to floodplains are to be avoided to the extent practicable. None of the proposed outfall projects would be subject to flood hazards or involve floodplain management issues.

5.9 Executive Order 11990 (Protection of Wetlands)

Executive Order 11990, "Protection of Wetlands", requires Federal agencies to avoid short- and long-term adverse impacts to wetland whenever a practicable alternative exists. The implementation of selected alternative actions associated with Outfalls N-01, N-02, N-02A, N-03, and N-05 would significantly impact floodplain hydrology and wetlands and would require mitigative action (see Appendix B).

5.10 Executive Order 12898 (Environmental Justice)

Executive Order 12898 requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, or actions on minority and low-income populations. None of the proposed outfall projects considered in this EA would adversely impact these sensitive populations.

5.11 Executive Order 13186 (Protection of Migratory Birds)

Executive Order 13186 requires Federal agencies to assess and mitigate the impacts of their actions on migratory birds and promote the conservation of migratory bird populations and their habitat. None of the proposed outfall projects considered in this EA would adversely impact these species of concern.

6.0 AGENCIES AND PERSONS CONSULTED

The United States Department of Agriculture Forest Service-Savannah River (USFS-SR), United States Fish and Wildlife Service, the University of South Carolina's Savannah River Archaeological Research Program (SRARP), and the Savannah River National Laboratory (SRNL) were consulted during the preparation of this EA.

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APPENDIX A

Biological Evaluation for Selected National Pollutant Discharge Elimination System (NPDES) Storm Water Permit Compliance Alternatives at the Savannah River Site

1.0 INTRODUCTION

On July 22, 2004, the South Carolina Department of Health and Environmental Control renewed Savannah River Site's (SRS's) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Industrial Activity (SCR000000). This permit authorizes the continued discharge of storm water effluents into state surface waters for the next five years. The *Basic Data Report for NPDES General Permit Compliance for Savannah River Site Storm Water Outfalls* (Gordon et al., 2005) identified 39 outfalls possessing storm water discharges associated with industrial activity. Effluent monitoring data indicate that 19 of these storm water outfalls present potential water quality problems and may not meet new permit requirements. A study team established by the Washington Savannah River Company has developed and recommended technically viable, cost-effective compliance alternatives for these problematic outfalls (Halverson and Stinson 2006). A National Environmental Policy Act (NEPA) review of these compliance alternatives (*Draft Environmental Assessment for the National Pollutant Discharge Elimination System (NPDES) Storm Water Compliance Alternatives at the Savannah River Site*) is presently being conducted (DOE 2006).

The objective of this biological evaluation (BE) is to assess the potential impact(s) of proposed NPDES storm water outfall compliance alternatives on threatened and endangered (T&E) species and/or their associated critical habitat at SRS. Threatened and endangered species are plant and animal species which are designated by the U.S. Fish and Wildlife Service (USFWS), protected under the Endangered Species Act of 1973 (P.L. 93-205, Sec. 3), and identified in the USFWS list of T&E wildlife and plant species (50 CFR Parts 17.11 and 17.12). 'Threatened' species include taxa that are likely to become endangered within all or a significant portion of their range. 'Endangered' species are those taxa that are in danger of extinction throughout all or a significant portion of their range.

2.0 DESCRIPTION OF PROJECT AREA HABITATS

The general locations and brief descriptions of the 38 proposed storm water outfall projects considered in this BE (excludes Outfall G-21) can be found in Figure 2-1 and Table 2-1, respectively. These project areas primarily encompass developed administrative/industrial landscapes (e.g., A, N and H areas) and contiguous transitional zones (the interface between heavily developed and relatively undeveloped areas). The species composition of flora within each project area is primarily a function of disturbance history and the intensity and frequency of ongoing human activity. The discharge channels associated with many of the subject outfalls run through upland forests until their confluence with state waters.

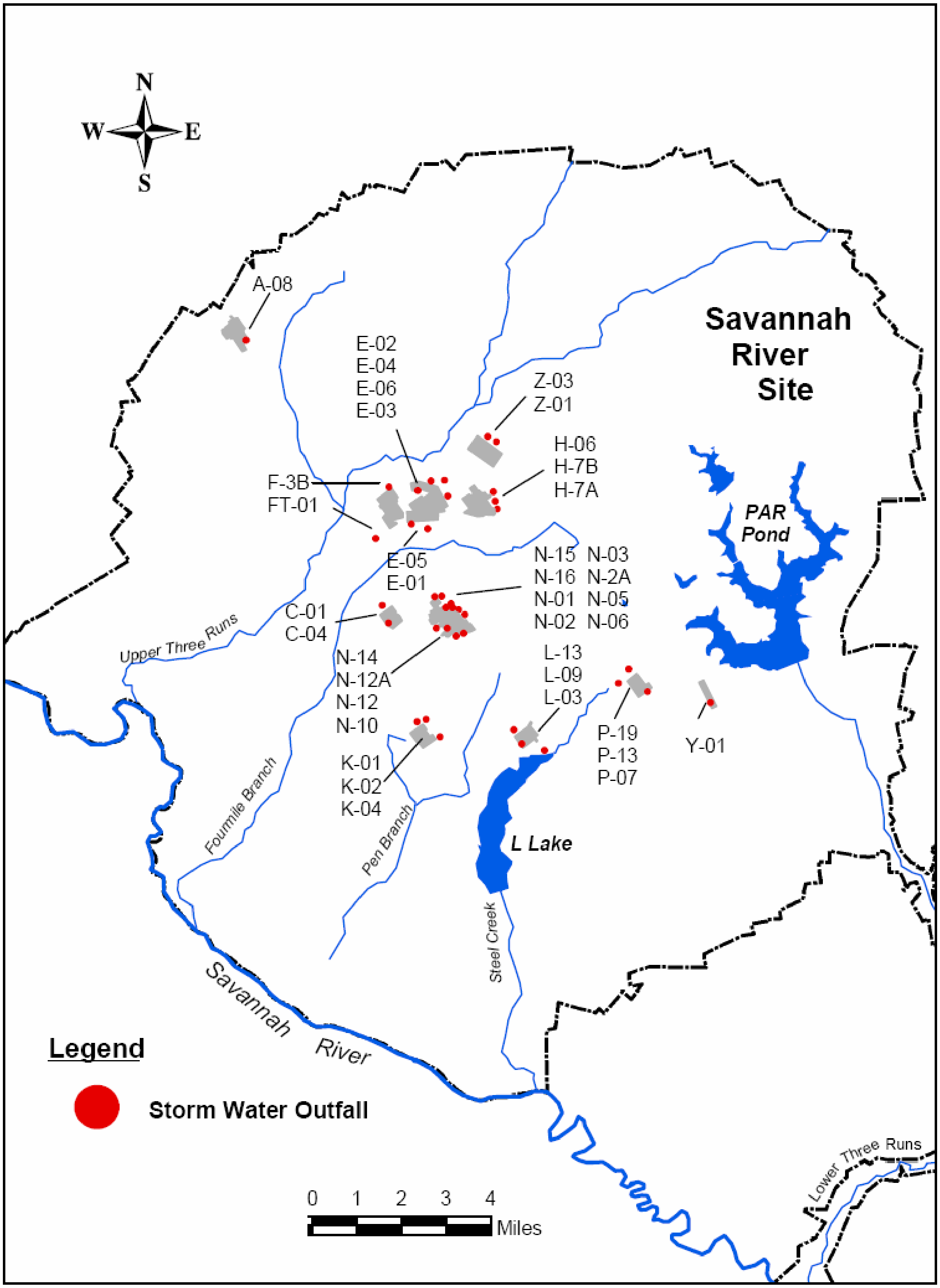

Figure 2-1. General Location Map of Outfall Projects Within SRS.

Table 2-1. Summary of SRS Storm Water Outfalls Considered in This Biological Evaluation.

Outfall Designation	SRS Project Area	Receiving Stream	Proposed Action
A-08	A Area	Upper Three Runs	Divert flow into A-07 discharge channel via excavated ditch; outfall moved downstream along A-07 discharge channel.
C-01	C Area	Fourmile Branch	Remove pollutant sources from drainage area.
C-04	C Area	Fourmile Branch	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.
E-01	E Area	Fourmile Branch	No action; meets WQS.
E-02	E Area	Upper Three Runs	No action; meets WQS.
E-03	E Area	Upper Three Runs	Stabilize eroded areas and increase holding capacity of existing detention basin.
E-04	E Area	Upper Three Runs	Install erosion control BMPs within drainage area.
E-05	E Area	Fourmile Branch	No action; meets WQS.
E-06	E Area	Upper Three Runs	Stabilize soil stock piles (BMPs), increase holding capacity of existing detention basin.
F-3B(2)	F Area	Upper Three Runs	Divert flow to new MOX Pond 400; outfall is eliminated.
FT-01	F Area	Fourmile Branch	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.
H-06	H Area	Upper Three Runs	No action; meets WQS.
H-7A(2)	H Area	Upper Three Runs	Divert flow to H-07; outfall eliminated.
H-7B	H Area	Upper Three Runs	No action.
K-01	K Area	Pen Branch	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.
K-02	K Area	Pen Branch	Disperse storm flow as sheet flow in forested area.
K-04	K Area	Pen Branch	Remove from coverage under the Industrial Storm Water Permit.
L-03	L Area	Steel Creek	Implement sediment erosion control BMPs.
L-09	L Area	Steel Creek	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.
L-13	L Area	Pen Branch	No action; meets WQS
N-01	N Area	Fourmile Branch	Consolidate flow with N-02, N-2A, N-03, and N-05 into a new retention basin.
N-02	N Area	Fourmile Branch	Consolidate flow with N-01, N-2A, N-03, and N-05 into a new retention basin.
N-2A	N Area	Fourmile Branch	Consolidate flow with N-01, N-02, N-03, and N-05 into a new retention basin.
N-03	N Area	Fourmile Branch	Consolidate flow with N-01, N-02, N-2A, and N-05 into a new retention basin.
N-05	N Area	Fourmile Branch	Consolidate flow with N-01, N-02, N-2A, and N-03 into a new retention basin.
N-06	N Area	Fourmile Branch	Install grass buffers around sand blast area and other pollutant sources.
N-10	N Area	Pen Branch	Remove from coverage under the Industrial Storm Water Permit.
N-12	N Area	Pen Branch	Clean discharge channel upstream of outfall; install erosion control BMPs and apply soil amendments.
N-12A	N Area	Pen Branch	Install erosion control BMPs and apply soil amendments within catchment; install infiltration well in flow path from salvage yard.
N-14	N Area	Fourmile Branch	Move outfall downstream of present location; apply soil erosion control BMPs.
N-15	N Area	Fourmile Branch	Implement erosion control BMPs.

(2) Implementation of the proposed action would result in the elimination of the outfall.

Table 2-1 Continued. Summary of SRS Storm Water Outfalls Considered in This Biological Evaluation.			
Outfall Designation	**SRS Project Area**	**Receiving Stream**	**Proposed Action**
N-16	N Area	Fourmile Branch	No action; meets WQS.
P-07	P Area	Steel Creek	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.
P-13	P Area	Steel Creek	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.
P-19	P Area	Lower Three Runs	Remove from coverage under the Industrial Storm Water Permit; no industrial activity.
Y-01(2)	Y Area	Steel Creek	Plug conveyance piping; route runoff to two small retention ponds; outfall is eliminated.
Z-01	Z Area	Upper Three Runs	No action.
Z-03	Z Area	Upper Three Runs	Remove from coverage under the Industrial Storm Water Permit.

(2) Implementation of the proposed action would result in the elimination of the outfall.

Vegetative cover outside of the developed outfall catchments tend to be dominated by early successional species. These natural areas are managed by the U.S. Forest Service for timber production and wildlife management purposes. These habitats include pine plantations, old fields, ditches, and forest/right-of-way interface areas. Tree species common to these undeveloped areas include Sweetgum (*Liquidambar styraciflua*), black cherry (*Prunus serotina*), southern red oak (*Quercus falcata*), water oak (*Q. nigra*), loblolly pine (*Pinus taeda*), winged sumac (*Rhus copallina*), sassafras (*Sassafras albidum*) and persimmon (*Diospyros virginiana*). Common shrubs and vines include; raspberries and dewberries (*Rubus* spp.), Chickasaw plum (*Prunus angustifolia*), wax myrtle (*Morella cerifera*), Japanese honeysuckle (*Lonicera japonica*), muscadine (*Vitis rotundifolia*), and bamboo vine (Salix laurifolia). Grasses and forbs include; bahia (Paspalum notatum), crab grass (*Digitaria* sp.), broomsedge (*Andropogon virginicus*), bluestems (*Andropogon* spp.), little bluestem (*Schizachyrium scoparium*), witch grasses (*Dichanthelium* spp.), panic grasses (*Panicum* spp.), poverty grass (*Aristida tuberculosa*), dog-fennel (*Eupatorium capillifolium*), yankee-weed (*Eupatorium compositifolium*), horse-weed (*Conyza canadensis*), annual fleabane (*Erigeron annuus*), woolly ragwort (*Packera tomentosa*), goldenrods (*Solidago* spp.), partridge-pea (*Cassia* spp.), beggars-ticks (*Desmodium* spp.), Korean lespedeza (*Kummerowia sitpulacea*), as well as other native and non-native lespedeza's (*Lespedeza* spp.).

3.0 METHODS

Outfall locations were reviewed by first referencing the Forest Service T&E Species database, followed by a physical field inspection of the respective project areas for species occurrence. Outfall A-08 received a peripheral survey due to presence of contaminated soils within the receiving Carolina Bay which prevented entry into the area.

4.0 STATUS OF T&E SPECIES AND HABITAT IN VICINITY OF OUTFALL PROJECT AREAS

Seven federally-listed threatened and endangered species are known to occur on SRS (Kilgo and Blake 2005). These are smooth purple coneflower (*Echinacea laevigata*), pondberry (*Lindera melissifolia*), shortnose sturgeon (*Acipenser brevirostrum*), American alligator (*Alligator mississippiensis*), wood stork (*Mycteria americana*), red-cockaded woodpecker (*Picoides borealis*), and bald eagle (*Haliaeetus leucocephalus*). Few federally-listed species are known to be present in the project areas or their general vicinities. Shortnose sturgeon and wood stork are not specifically addressed in this BE because suitable habitat for these species would not be affected by the proposed outfall projects (Johnston 2006 unpublished data, Kilgo and Blake 2005).

The red-cockaded woodpecker (RCW) is not reported within or around the project areas and habitat conditions for this species are predominately unsuitable. Additionally, the project areas are located outside of the designated RCW Management Area (DOE 2005). Activities to create and maintain suitable conditions for this specie are unlikely to occur within the project areas.

The bald eagle is known to have four nesting sites on SRS (DOE 2005; Wike et al 2006). Two of these nests were located in Timber Compartment 60 on the east side of Par Pond. Two additional nests were located along Pen Branch, in Timber Compartment 38. All proposed outfall mitigation activity will occur outside of eagle protection zones. Additionally, outfall work will not occur in known eagle foraging or roosting areas.

The American alligator is known to occur at three locations near, or in the vicinity of, the proposed outfall work. These locations are at L-03, N-15, and N-16 (Figures 4-1, 4-2, and 4-3, respectively). During a survey conducted on May 9, 2006, a single alligator was observed in a settling pond on the north side of N-Area along Road 5. This pond is near outfall N-15. An additional alligator was observed in the settling pond adjacent to the N-16 outfall. No alligators were observed in the vicinity of L-03 during the May 9 survey but alligators frequent that portion of L-Lake which is adjacent to L-03.

Pondberry is a deciduous shrub that inhabits a variety of open to semi-wooded seasonally flooded wetland habitats in the southeastern United States (DeLay 1993, Kilgo and Blake 2005). On SRS it is known to occur at a single location on the margin of a wooded Carolina bay in the southern part of the site. This location is not near any of the proposed outfall project areas. Although no new populations were observed during field surveys, suitable habitat may occur in the vicinity of Outfall A-08. This outfall is located in A Area near the north end of a highly degraded Carolina Bay (i.e., Metallurgical Laboratory Hazardous Waste Management Facility) (Figure 4-4). Although this taxa was not found within the general vicinity (approximately 100 ft) of the outfall, the entire area of potentially suitable habitat was not surveyed due to the presence of contaminated soils associated with the waste management unit.

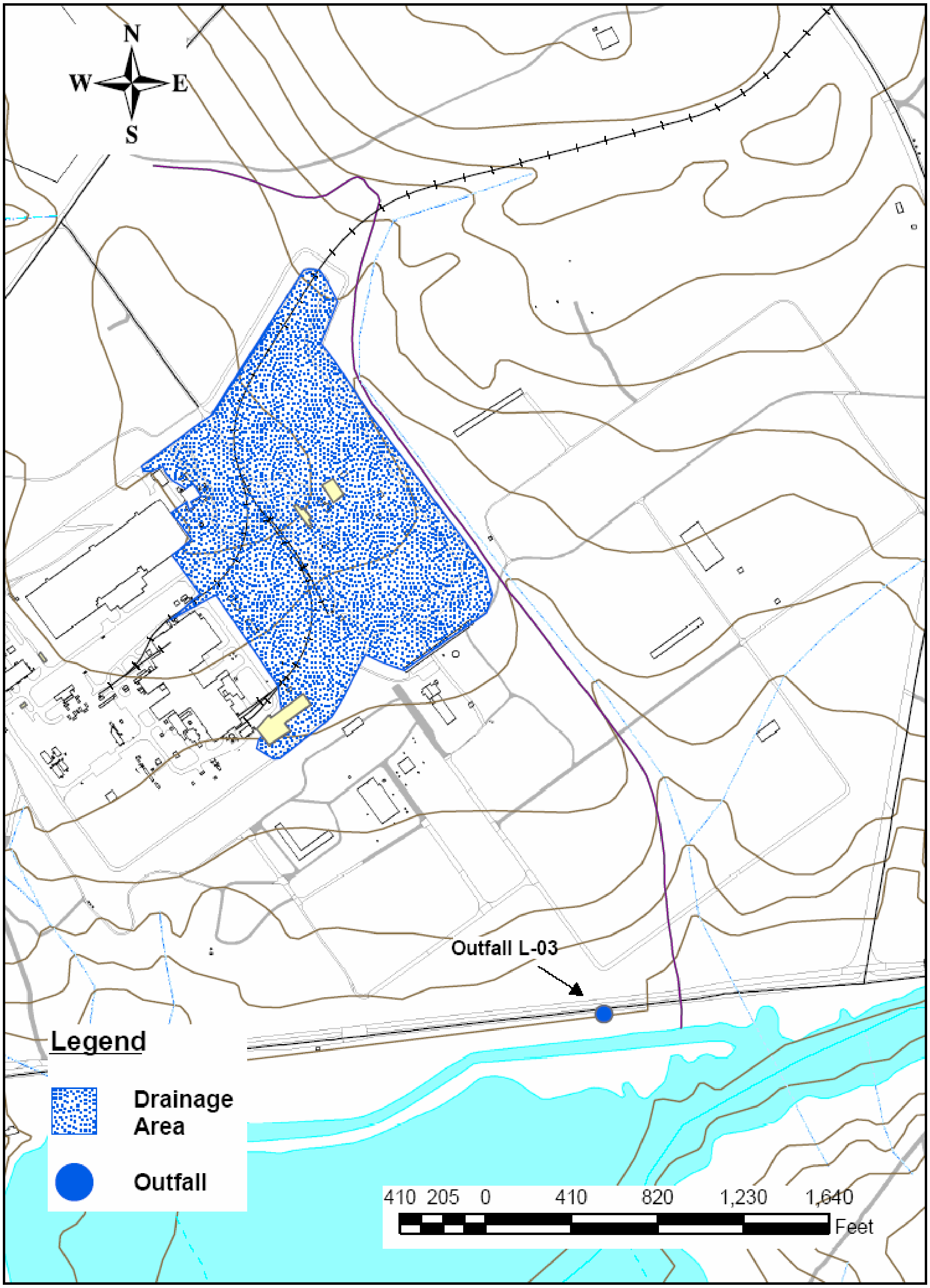

Figure 4-1. Location of Storm Water Outfall L-03 and Associated Drainage Area.

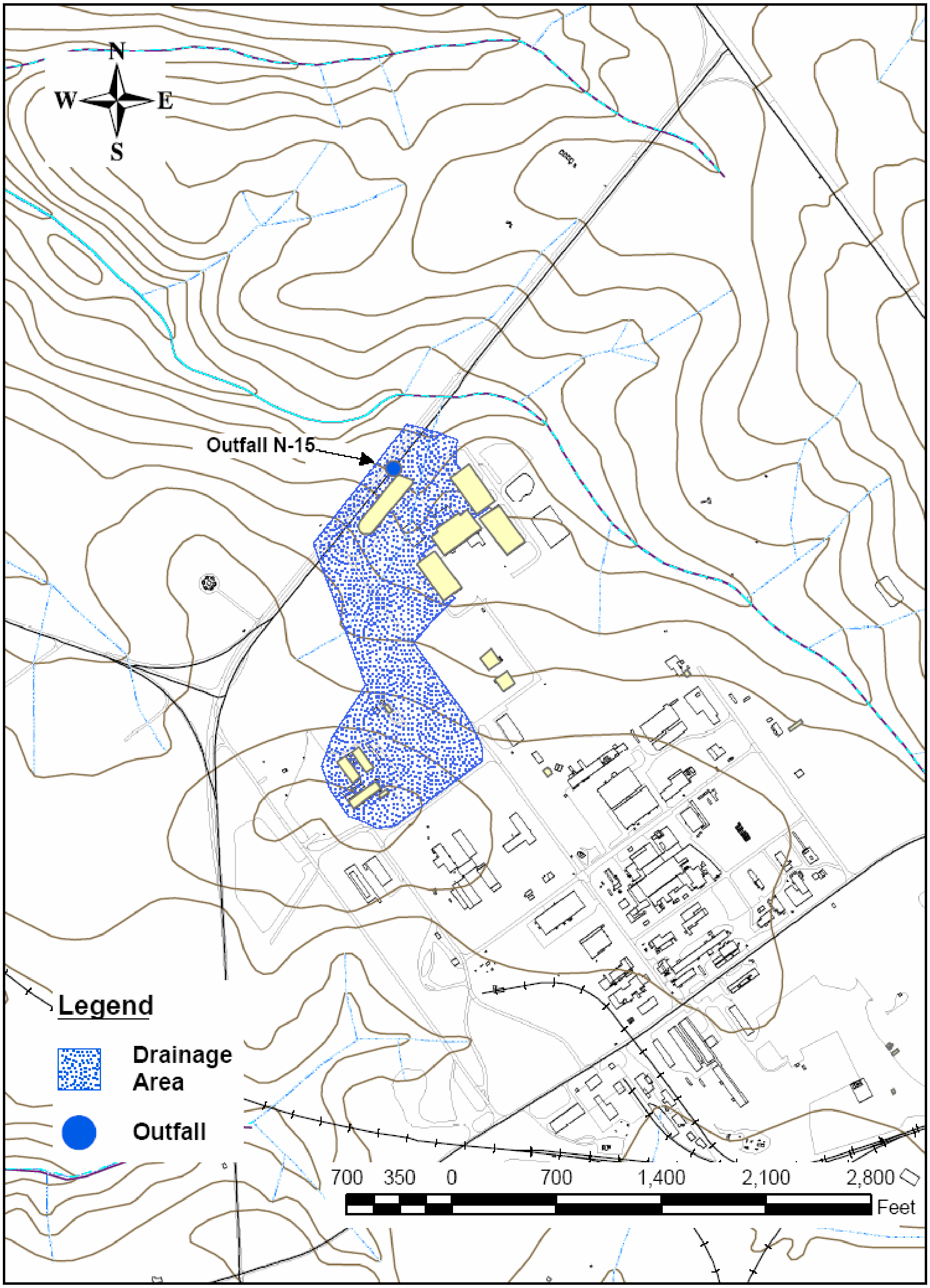

Figure 4-2. Location of Storm Water Outfall N-15 and Associated Drainage Area.

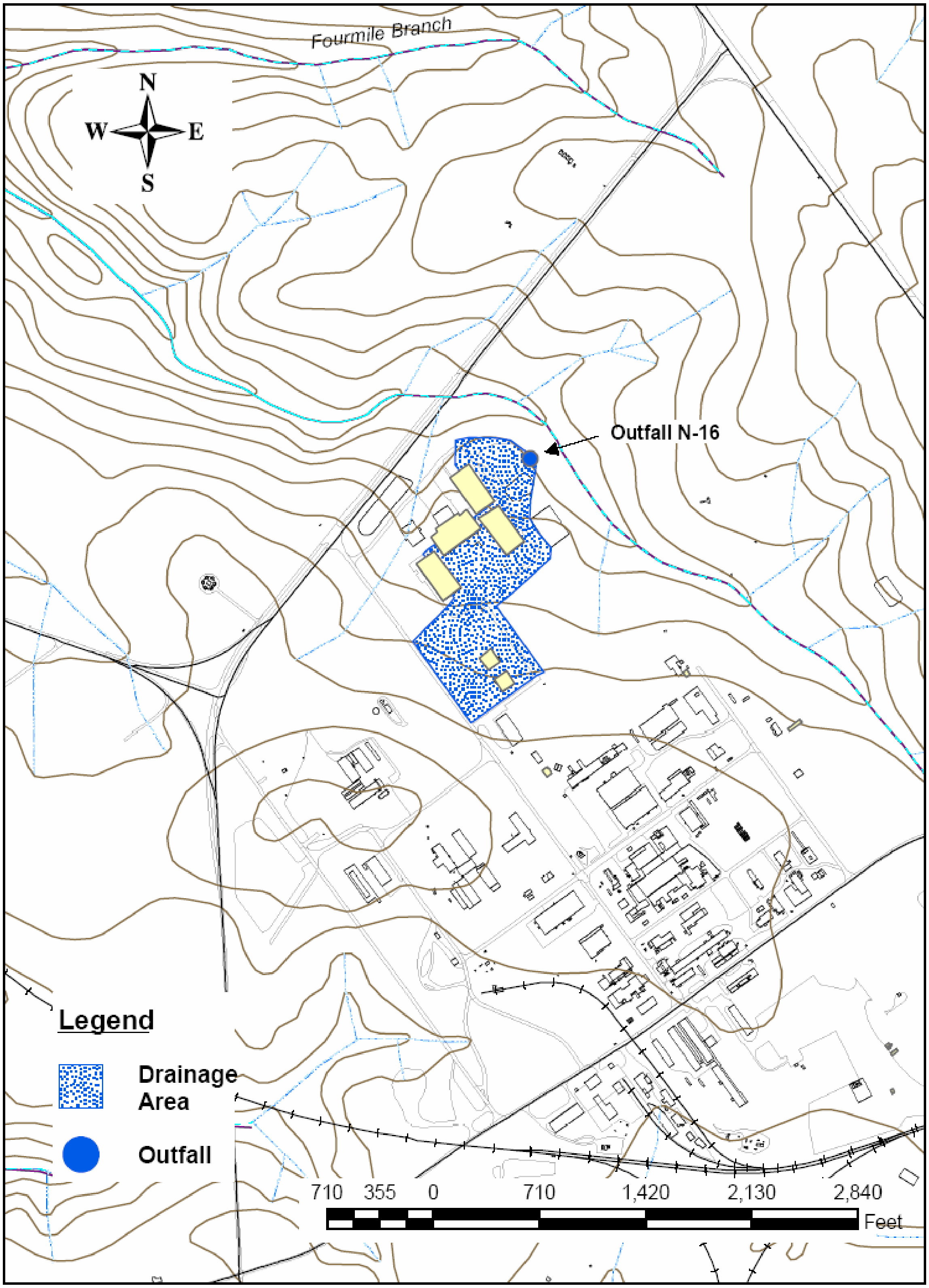

Figure 4-3. Location of Storm Water Outfall N-16 and Associated Drainage Area.

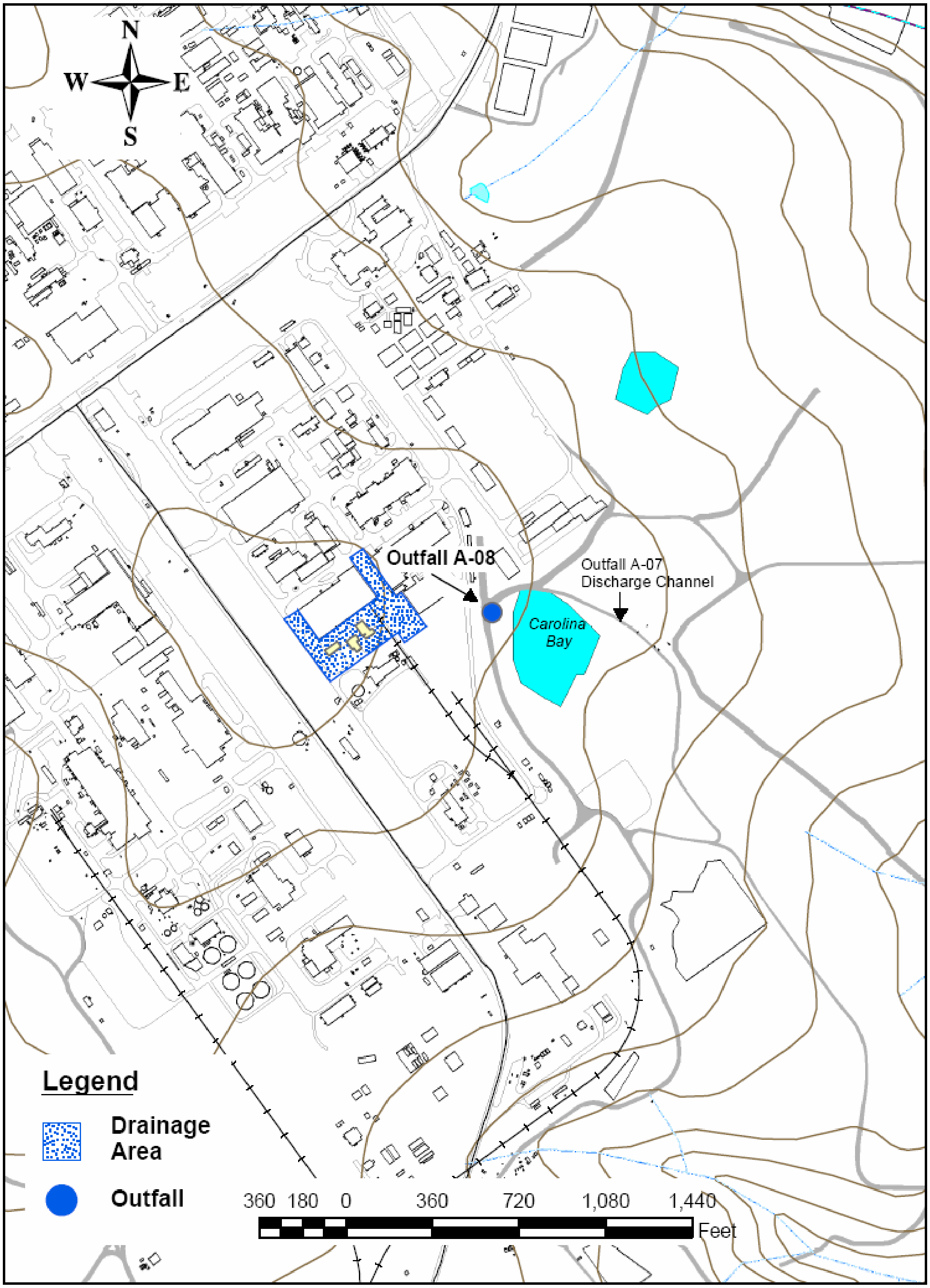

Figure 4-4. Location of Storm Water Outfall A-08 and Associated Drainage Area.

Smooth purple coneflower occurs in open dry oak woodlands, prairies, and along rights of way associated with these habitats (Kilgo and Blake 2005). There are three populations of smooth purple coneflower on SRS. These populations are all at least one mile away from the proposed outfall project areas. No new populations or suitable habitat were observed during field surveys of the project areas.

5.0 POTENTIAL EFFECTS ON T&E SPECIES AND THEIR HABITATS

Red-Cockaded Woodpecker - Suitable habitat conditions do not exist within the immediate project areas or their general vicinities. The proposed outfall project areas generally encompass developed administrative/industrial landscapes and do not occur within the primary Red-Cockaded Woodpecker Management Area (DOE 2005). The proposed outfall projects would not adversely affect the population status or management of this species at SRS.

Bald Eagle - Known to have four nesting sites on SRS (DOE 2005). Outfall work will not occur in any known eagle foraging, nesting, or roosting areas. The 38 project areas surveyed are predominately within and adjacent to developed administrative/industrial landscapes. Typically, bald eagles have a low tolerance for human disturbance which would likely preclude eagle activity in the proposed project areas. In addition to high levels of human activity in the vicinity of the outfall projects, habitat (foraging, roosting, nesting, etc.) conditions are not favorable for bald eagles. This is due to lack of mature trees for nesting and roosting and the lack of large bodies of water for foraging. The subject outfall projects would not adversely affect the population status or management of this species at SRS.

American alligator - Known to occur near, or in the vicinity of, three outfall locations (i.e., N-15, N-16, and L-03) (Ray unpublished data). Alligators observed in the vicinity of outfalls N-15 and N-16 were the only two observed during the May 9, 2006 field survey. There are potentially more alligators in the general vicinity of these outfalls. Settling ponds at N-15 and N-16 are land-locked except during periods of heavy rainfall which allows for the emigration and immigration of alligators in ephemeral and intermittent streams. No alligators were observed in the vicinity of L-03 during the May 9 survey, but alligators frequent that portion of L-Lake adjacent to L-03. Work occurring in the N-15, N-16, and L-03 project areas may have short-term adverse impacts on a few individual alligators but the viability of this species on SRS will not be adversely affected.

Pondberry is not known to occur in the vicinity of the 38 outfalls in considered in this BE. Potentially suitable habitat was identified near the Outfall A-08. Although potentially suitable, this habitat has been significantly altered/impacted by various non-native invasive species and past anthropogenic activities. Due to these prior impacts, this area is unlikely to support a population of pondberry. No impact on pondberry is expected as a result of project implementation.

Smooth purple coneflower is not known to occur in the vicinity of the 38 project areas and no suitable habitat was identified during field surveys. Therefore no impact to smooth purple coneflower is expected as a result of activities associated with project implementation..

5.0 DETERMINATION OF EFFECTS SUMMARY

No Effect: No long-term effect is expected on the smooth purple coneflower, pondberry, red-cockaded woodpecker, American alligator, bald eagle, shortnose sturgeon, or wood stork populations within the selected project areas or on a site-wide level.

6.0 CONSULTATIONS

United States Fish and Wildlife Service.

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APPENDIX B

Floodplain/Wetlands Assessment for Selected National Pollutant Discharge Elimination System (NPDES) Storm Water Permit Compliance Alternatives at the Savannah River Site, Rev. 1

1.0 PROJECT DESCRIPTION

This Floodplain/Wetlands Assessment is prepared in compliance with 10 CFR Part 1022 as an Appendix to the Environmental Assessment for the National Pollutant Discharge Elimination System (NPDES) Storm Water Compliance Alternatives at the Savannah River Site (DOE/EA-1563). This action is required to meet more restrictive conditions of the reissued NPDES permit. Most affected storm water outfalls have several alternatives under consideration. No activity would actually occur within wetlands or the 100 year floodplain. However, since some of the alternatives considered for selected outfalls would impact hydrology that discharges into downstream floodplains and wetlands, this assessment was prepared.

2.0 FLOODPLAIN OR WETLAND IMPACTS

Depending upon the alternatives chosen, project implementation at selected outfalls (i.e., A-08, C-01, E-03, E-06, H-06, H-07A, K-01, K-02, N-01, N-02, N-02A, N-03, N-05, N-12, N-12A, and Y-01) could potentially impact floodplain/wetland resources. Most of these outfalls discharge into excavated ditches that run through upland vegetation (predominantly loblolly pine [*Pinus taeda*] and upland oaks [*Quercus* spp.]) until their confluence with state waters. Soils within these drainages are typically sandy and erodable. Following is an outfall-specific assessment of potential environmental impacts associated with project implementation. Throughout the discussion, Alternative A is always the proposed action in the EA, and Alternatives B, C, D, etc are alternatives to the proposed action. In some instances, groups of storm water outfalls are discussed since their actions are tied together, and the impact would be to the same floodplain or wetland system. Outfalls discussed in the Basic Data Report (WSRC-TR-2005-00221) and not mentioned here were evaluated and found to have no possible floodplain/wetland impact. All outfalls in that report were physically walked to identify and evaluate the confluence of their discharges with Waters of the State (Osteen and Nelson 2006). That field work served as the preliminary evaluation for this assessment

2.1 Outfall A-08, Alternatives A, B, C, and D

The land area drained by Outfall A-08 encompasses approximately 105,660 ft^2 in A-Area in the general vicinity of Powerhouse 784-A (Figure 2-1). Proposed and alternative actions A and B (respectively) would reroute the outfall flow to a new discharge point in the existing A-07 discharge channel (Figure 2-2). Alternative action C would route the flow to a new retention basin (Figure 2-3), while alternative action D would route the flow to an existing retention basin (A-10 Coal Pile Runoff Basin) (Figure 2-4). Each of

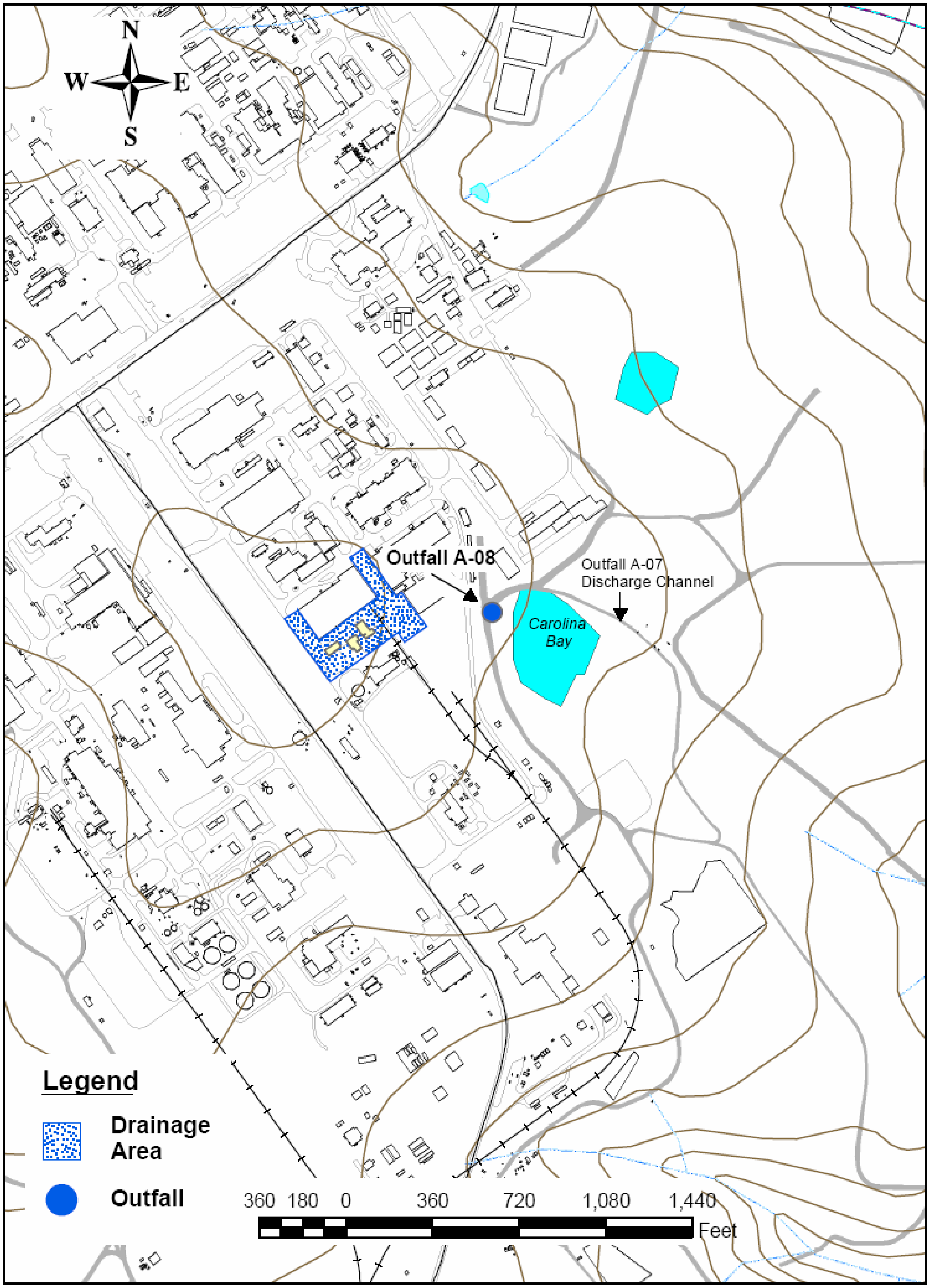

Figure 2-1. Location of Storm Water Outfall A-08 and Associated Drainage Area.

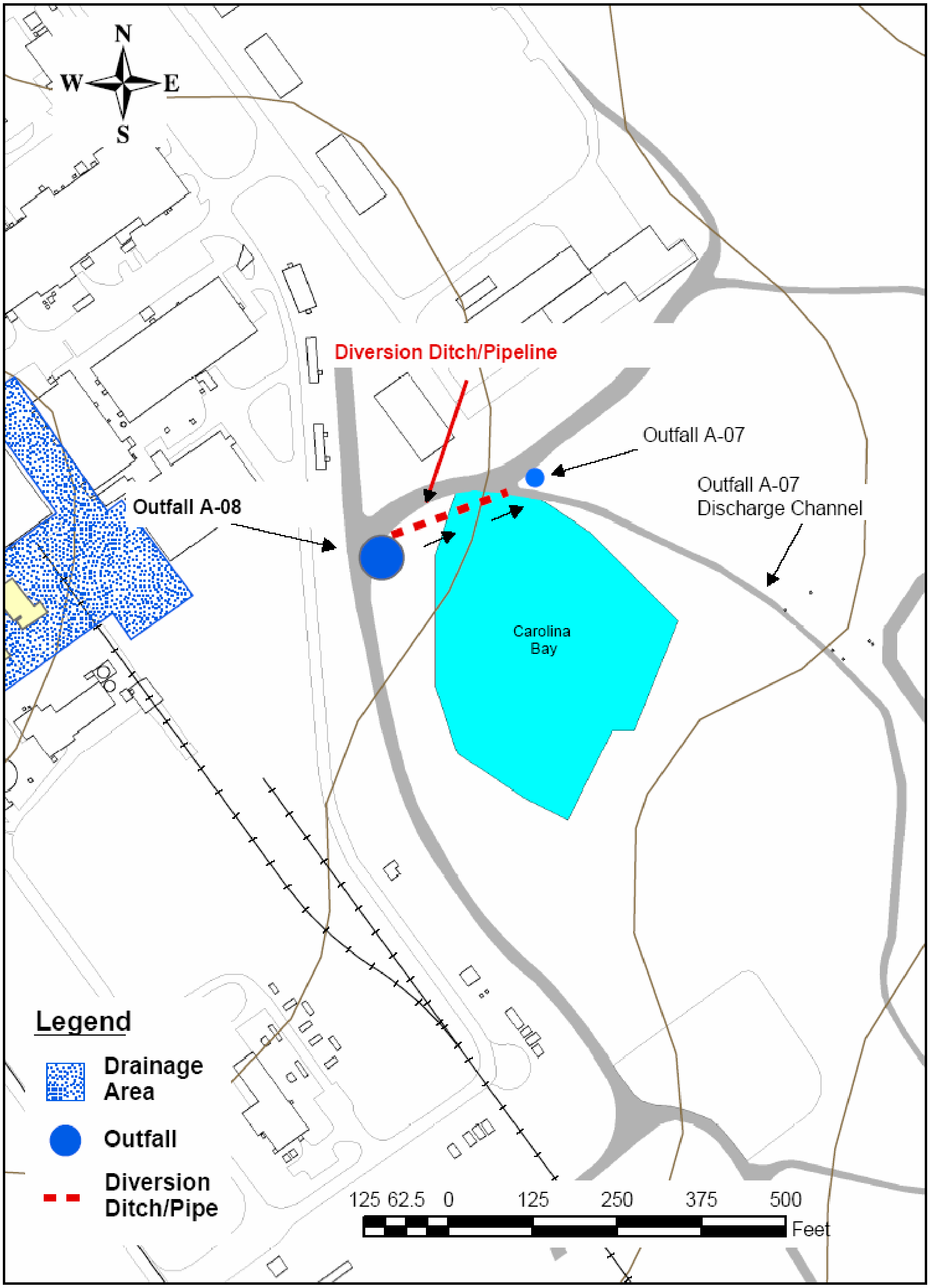

Figure 2-2. Outfall A-08, Options A and B: Divert Flow to Outfall A-07 Discharge Channel.

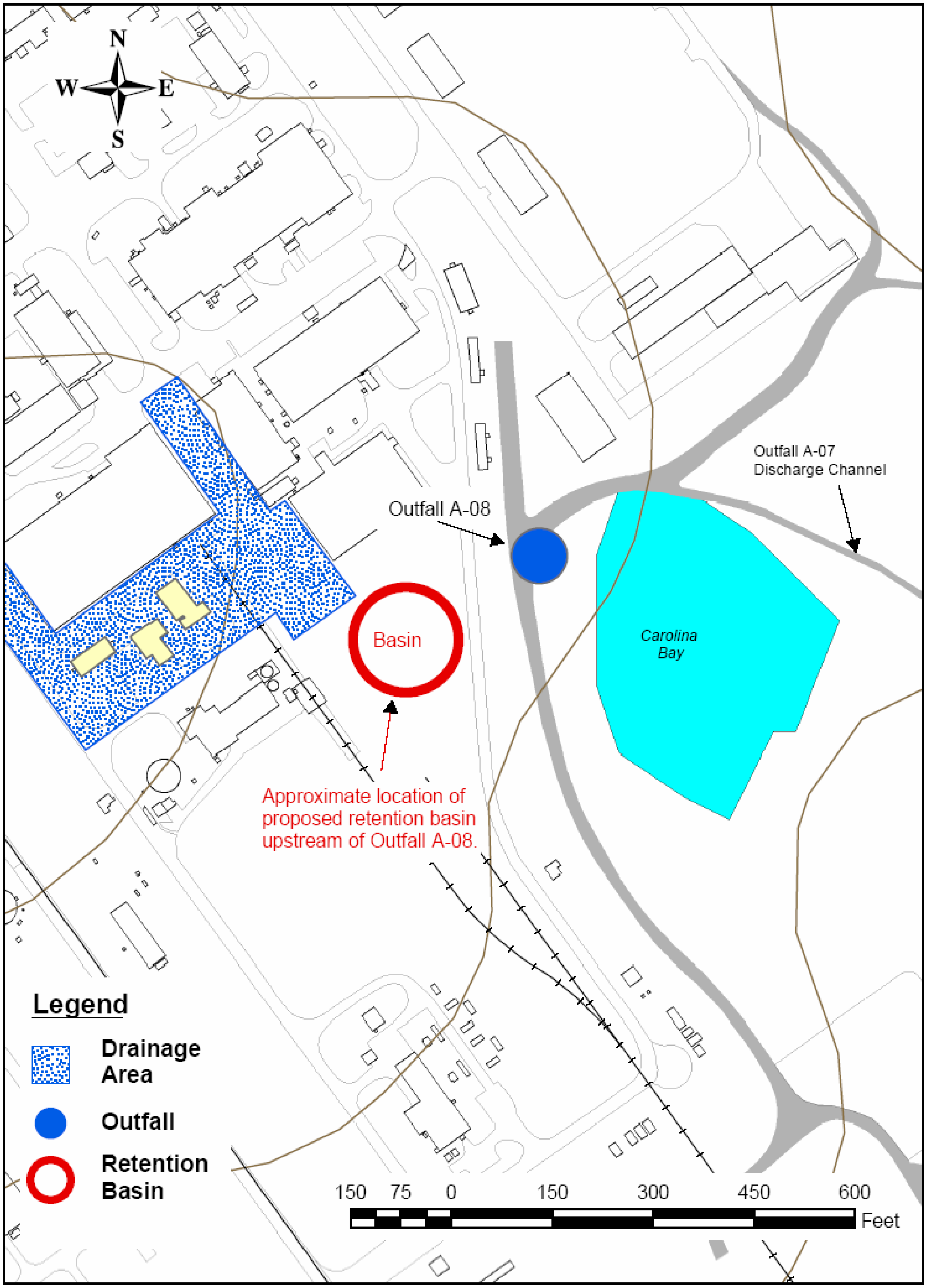

Figure 2-3. Outfall A-08, Option C: Retention Basin Upstream of Outfall.

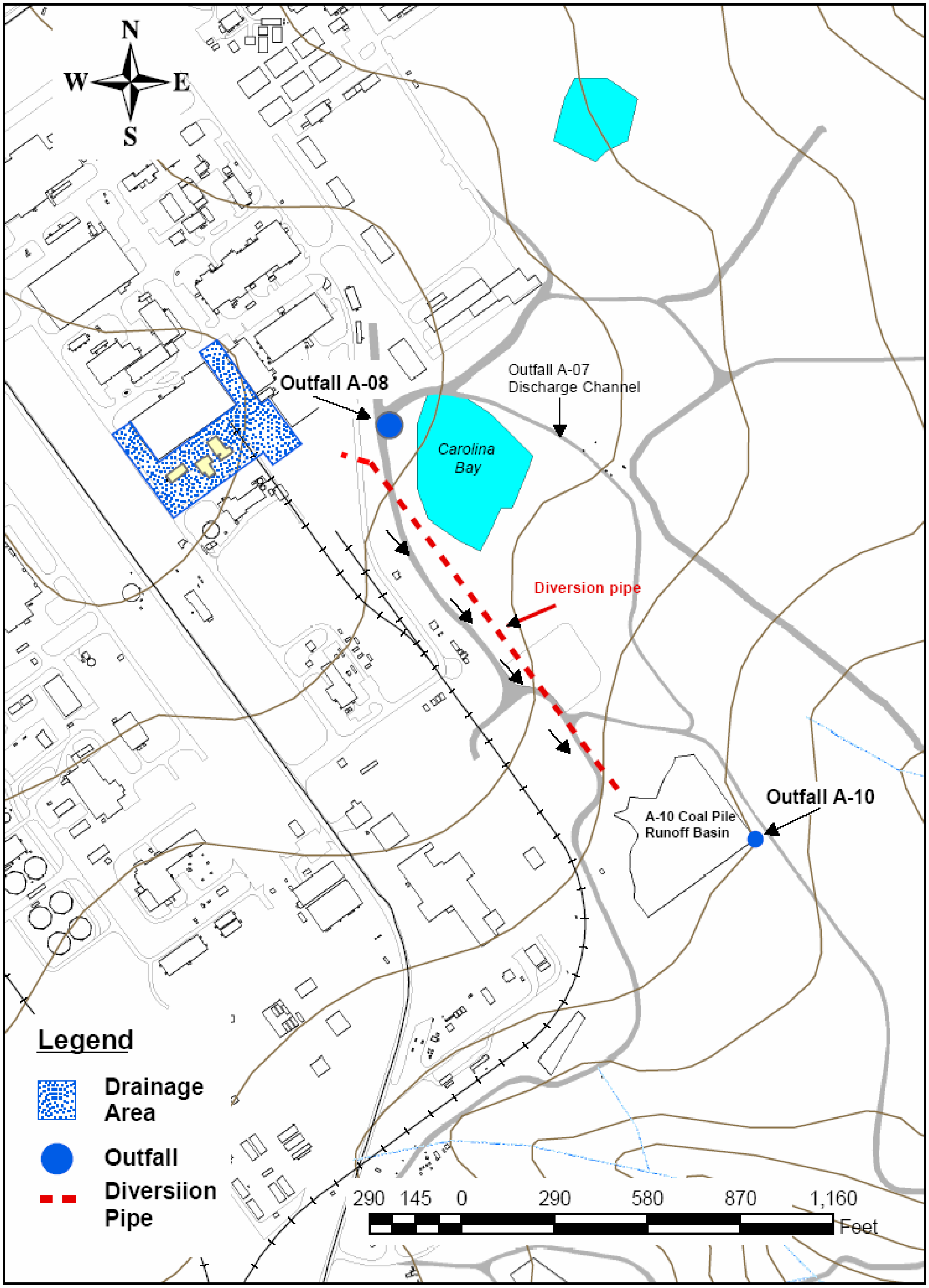

Figure 2-4. Outfall A-08, Option D: Divert Flow to A-10 Coal Pile Runoff Basin.

these alternatives would eliminate the flow from A-08 into a Carolina Bay which is part of the Metallurgical Laboratory Hazardous Waste Management Facility. This waterbody, which has characteristics that distinguish it as a wetland, is drained by two large culverts. Discharges from A-08 into the bay therefore possess a very short residence time before they are channeled out of the system. While removal of this water source will affect the hydrology entering the bay, the culverts that drain the bay have a much greater impact on the hydrology of the wetland. Unless the waste site designation requires the bay to be drained, hydrology of the wetland could be improved by elevating the culverts to allow water to remain in the bay for a longer period of time. This hydrologic improvement would occur even if flow from A-08 was diverted from the Carolina Bay. Impacts to the wetland caused by the alternatives considered for this outfall are minor in comparison to the installed drainage. Removal of the outfall discharge will therefore have only minimal impact on the wetland because of the overwhelming effect of the installed drainage.

2.2 Outfall C-01, Alternative B

The land area drained by Outfall C-01 encompasses approximately 2,942,637 ft^2 in C-area (Figure 2-5). Alternative action B would install check dams in the discharge ditch of this outfall to slow the discharge and allow additional contact time with surface soils and rocks to reduce metal concentrations in the effluent. This option would slightly reduce the initial peak flow volume from a storm event and allow it to discharge over a longer period of time. This alternative would have very little effect on the total discharge volume and therefore would have no effect on the floodplain it discharges into. Removal of this portion of the hydrology would not impact the wetland areas that are downstream of the discharge location. Much of the wetland hydrology is supplied by groundwater seepage along the flow path that would be unaffected by any activity at the storm water outfall.

2.3 Outfalls E-03 and E-06, Alternative A

The drainage areas for Outfalls E-03 and E-06 encompass approximately 1,850,553 ft^2 and 635,937 ft^2 (respectively) in E-Area (Figures 2-6 and 2-7, respectively). Alternative action A would result in all discharges from the outfalls being collected into enlarged existing retention basins. Discharges from these existing basins only occur on an infrequent basis after large storm events. Enlargement of these basins would eliminate discharges from these outfalls except in the case of an extreme storm event. Discharge from both outfalls flow through ditches across upland habitat until they reach the floodplain of Upper Three Runs. This floodplain is supplied by many hydrological sources and the proportion of flow contributed by these outfalls is extremely small. Enlargement of the basins to remove discharge from these outfalls would have no impact on the overall hydrology of the floodplain.

2.4 Outfall H-07A, Alternatives A, B, and C

Outfall H-07A receives runoff from an area of approximately 489,654 ft^2 in the southeastern sector of H-Area (Figure 2-8). Alternative action A would result in all

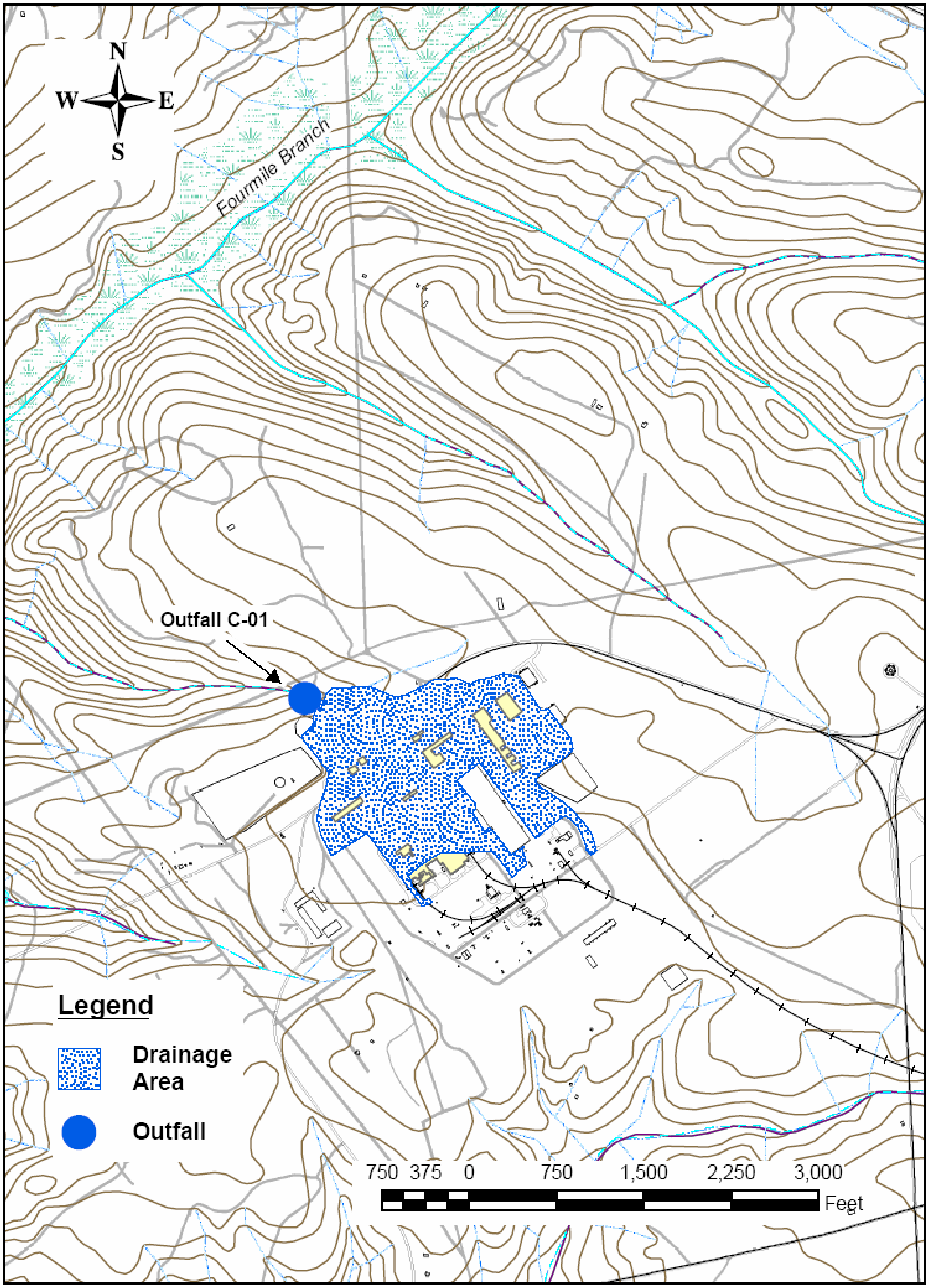

Figure 2-5. Location of Storm Water Outfall C-01 and Associated Drainage Area.

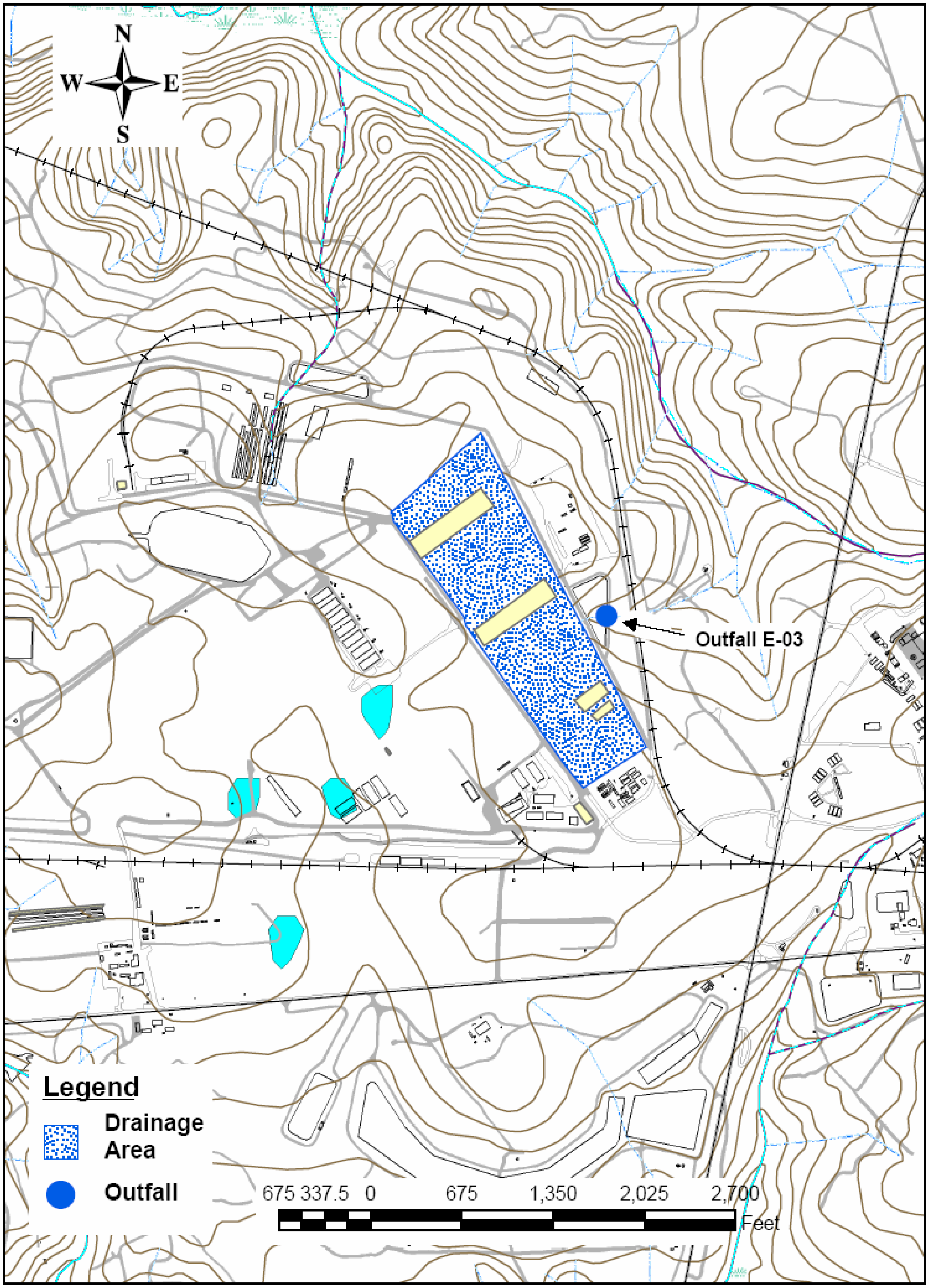

Figure 2-6. Location of Storm Water Outfall E-03 and Associated Drainage Area.

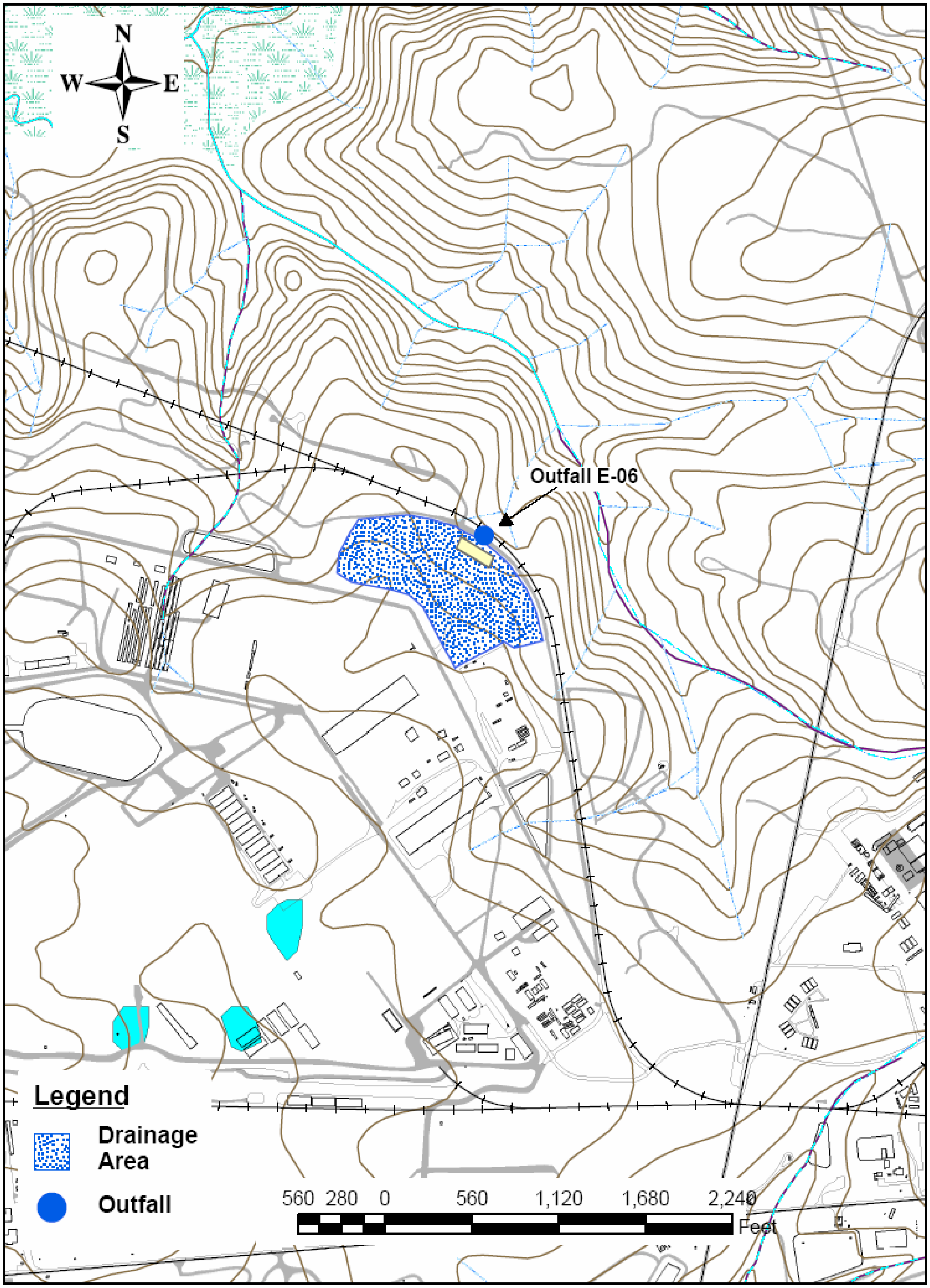

Figure 2-7. Location of Storm Water Outfall E-06 and Associated Drainage Area.

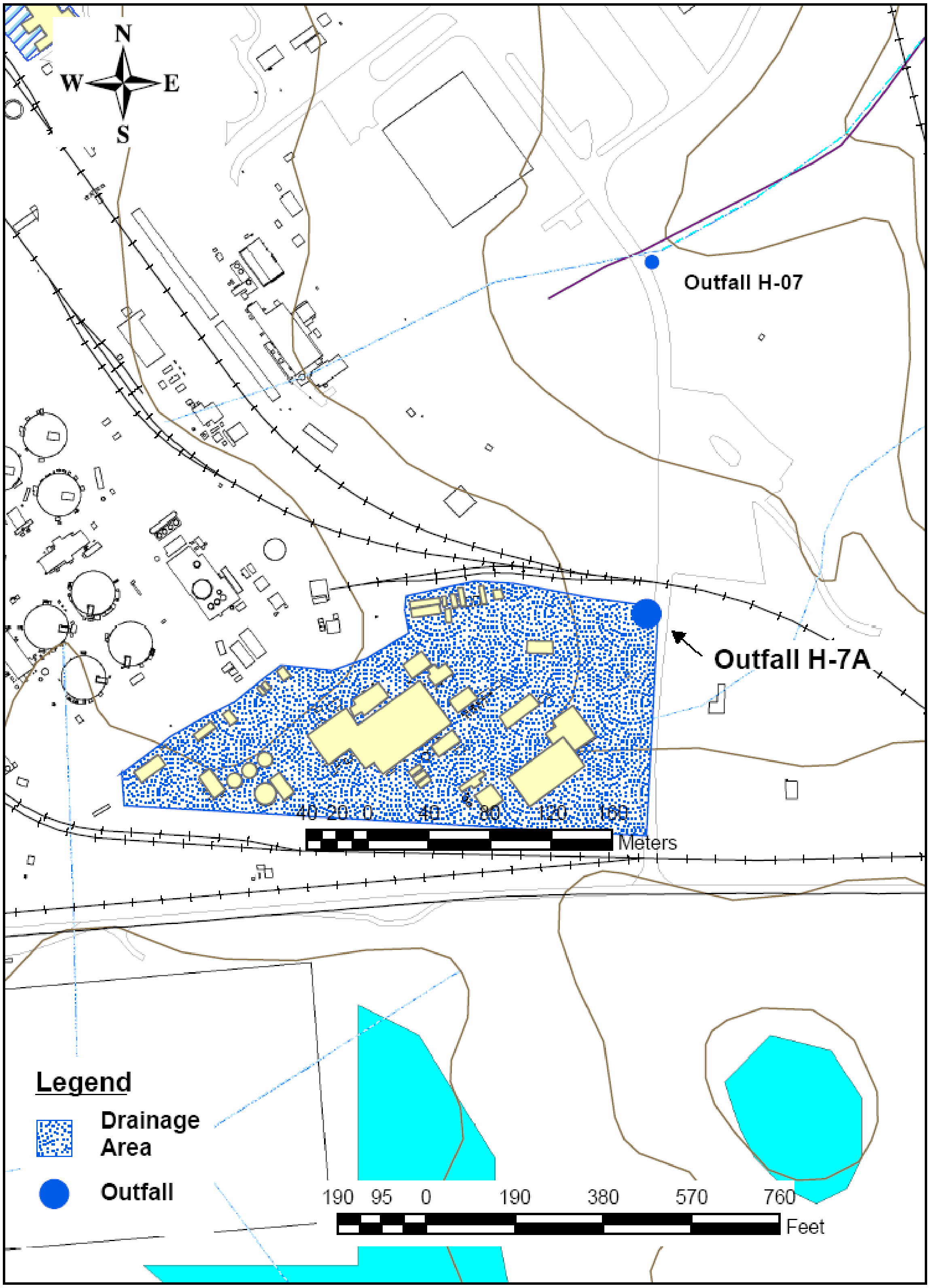

Figure 2-8. Location of Storm Water Outfall H-7A and Associated Drainage Area.

discharges from the existing outfalls being diverted to a different outfall (H-07) (Figure 2-9). Alternative B would route outfall discharge to a new retention basin (Figure 2-10), and alternative C would install infiltration wells along the flow path of the discharge from the H Tank Farm laydown area while diverting flow from H-07A to H-07 (Figure 2-11). Each of these alternatives would reduce the volume of discharge into a wetland that forms the headwaters of McQueens Branch. This wetland area is above the location where flow from Outfall H-07 enters the drainage. Alternative A would discharge the storm water into the same wetland at a lower point in the watershed, while alternatives B and C would reduce the flow into the headwater wetland. This headwater wetland area is supplied by a number of other groundwater outcroppings. The removal of the storm water source from H-07A would have very limited impact to the overall hydrology of this wetland.

2.5 Outfalls K-01 and K-02, Alternatives C and B (respectively)

Outfall K-01 receives runoff from an area of approximately 720,152 ft^2 in the northern sector of K-Area (Figure 2-12). Outfall K-02 receives runoff from an area of approximately 548,386 ft^2 in the northeastern portion of K-Area (Figure 2-13). These alternative actions would result in all discharges from the existing outfalls being routed into a new sediment basin via extended discharge channels (Figures 2-14 and 2-15, respectively). This option would greatly reduce the quantity of effluent reaching the floodplain/wetland of Indian Grave Branch. Both outfalls are routed by drainage ditches to the point they intersect the wetland into which they discharge. This wetland is hydrologically stable prior to the point of discharge, and storm water from these outfalls is a minor component of that overall hydrology. Elimination of these sources of water would have no impact on the hydrology of the receiving waters.

2.6 Outfalls N-01 and N-02, Alternative D

Outfall N-01 receives runoff from an area of approximately 1,187,266 ft^2 near the center of N-Area (Figure 2-16). Outfall N-02 drains an area of approximately 194,556 ft^2 in the northeast corner of N-Area (Figure 2-17). Alternative action D would consolidate the discharge from these two outfalls into a new retention basin and establish the outfall downstream of the basin’s emergency overflow structure. These outfalls are part of the hydrology for an unnamed tributary of Fourmile Branch. Discharges from both outfalls are channalized prior to their confluence with downstream wetlands which are supported primarily by groundwater recharge. The hydrology supplied to the wetland by these outfalls is minimal. Elimination of these sources of water would have little impact on the hydrology of the receiving waters.

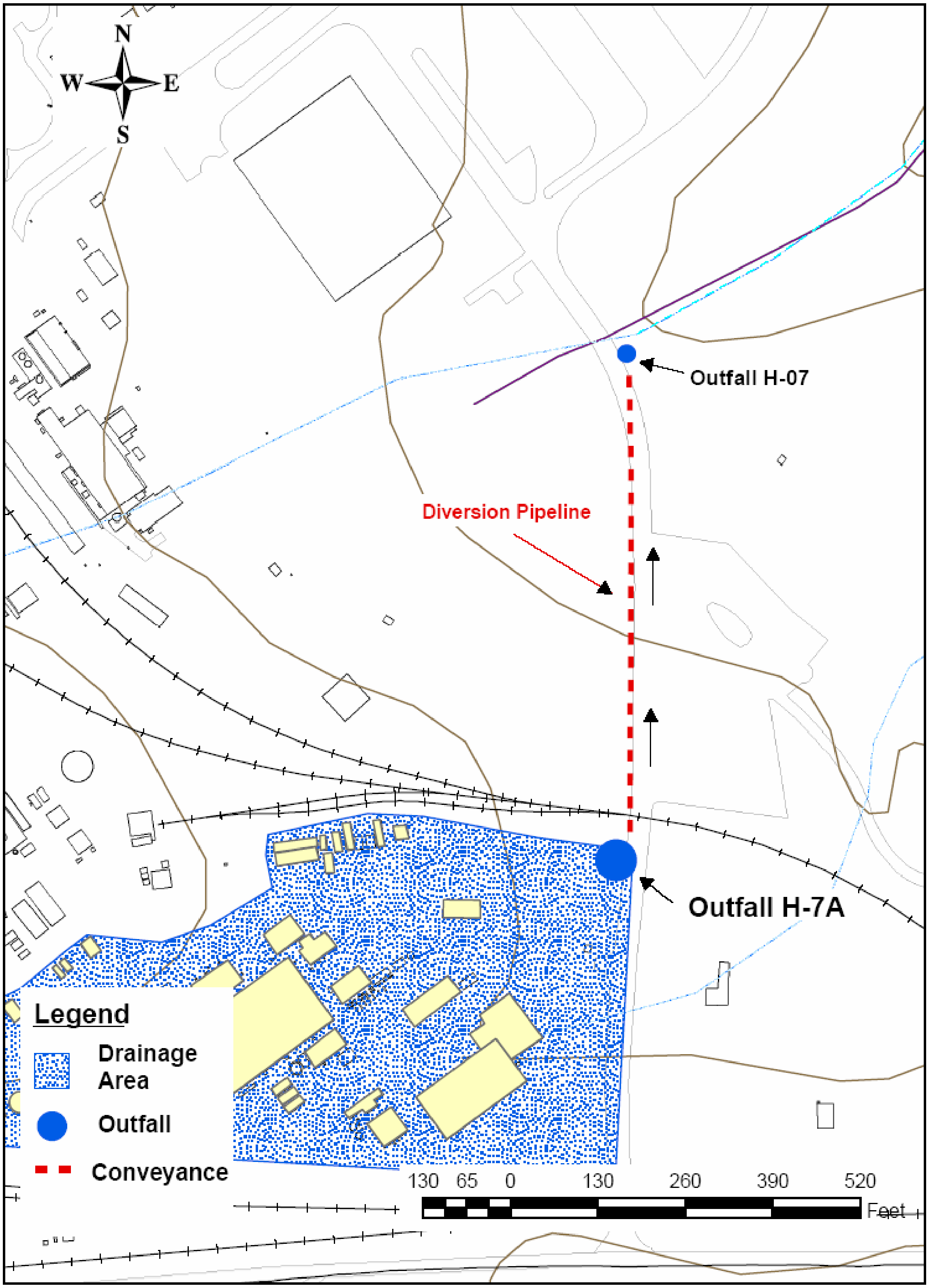

Figure 2-9. Outfall H-7A, Option A: Diversion of Flow to Outfall H-07.

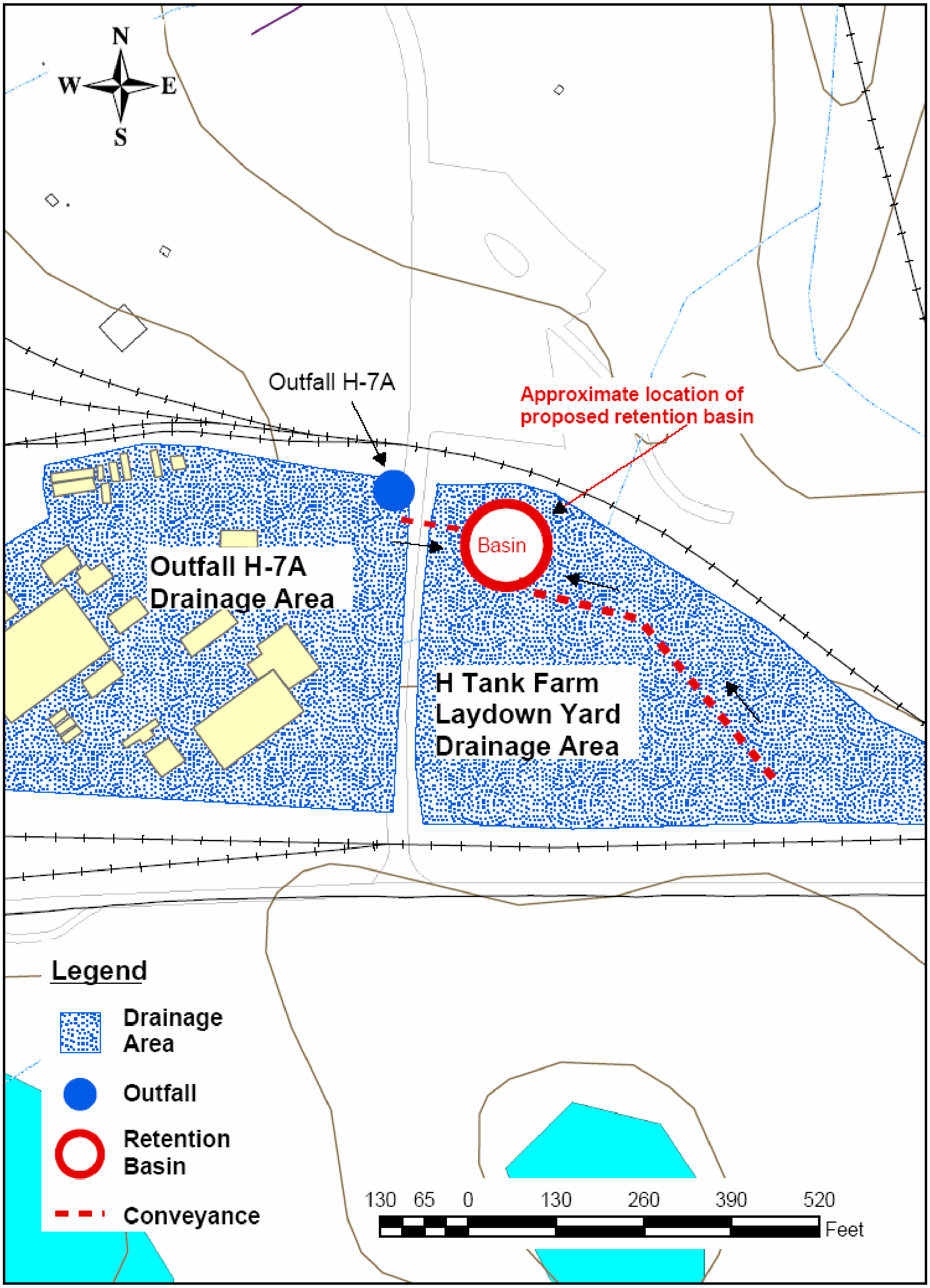

Figure 2-10. Outfall H-7A, Option B: Consolidate Outfall H-7A and H-Tank Farm Laydown Yard Stormflow into Retention Basin.

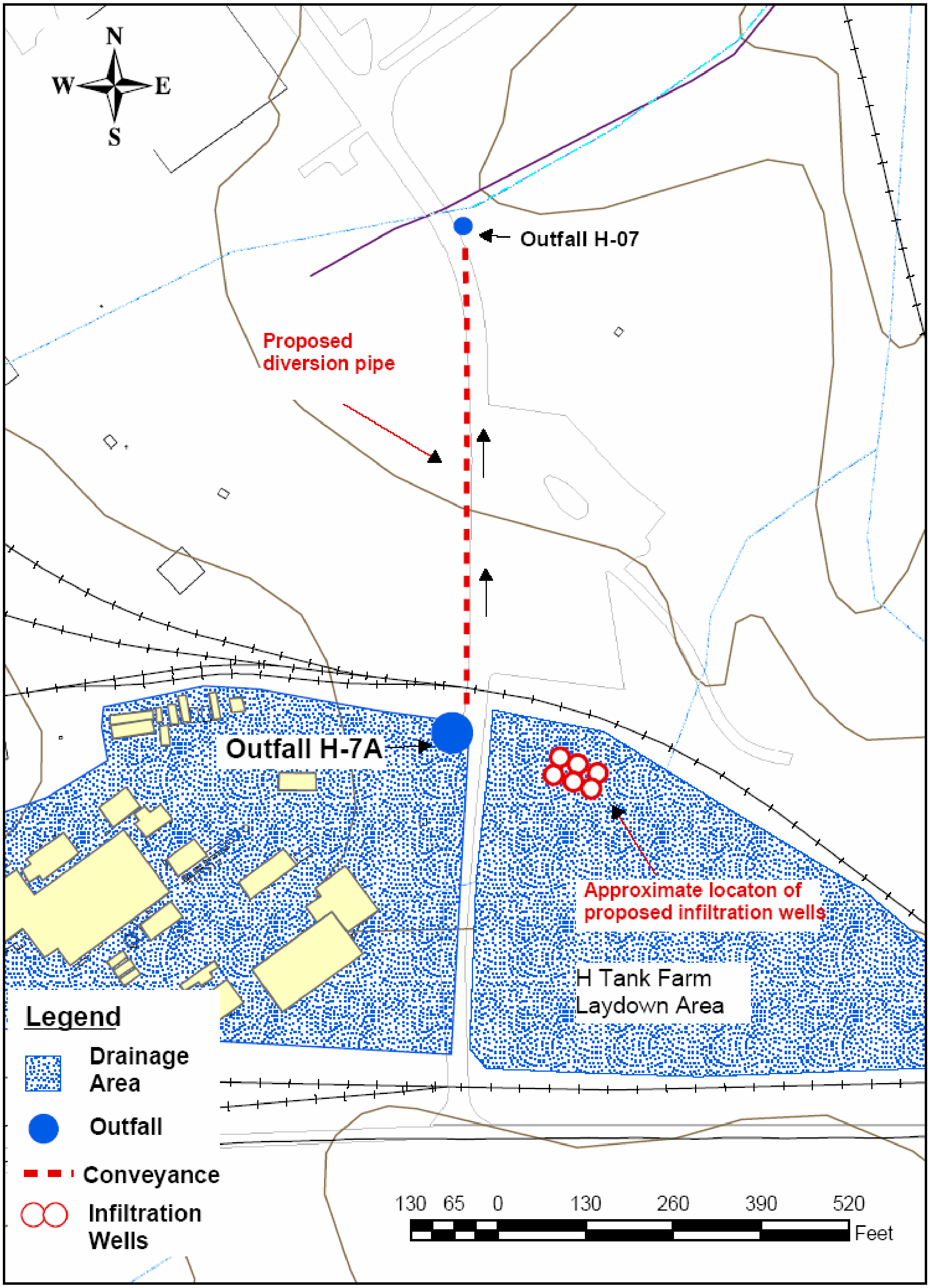

Figure 2-11. Outfall H-7A, Option C: Diversion of Flow to Outfall H-07 and Install Infiltration Wells for Laydown Yard Drainage.

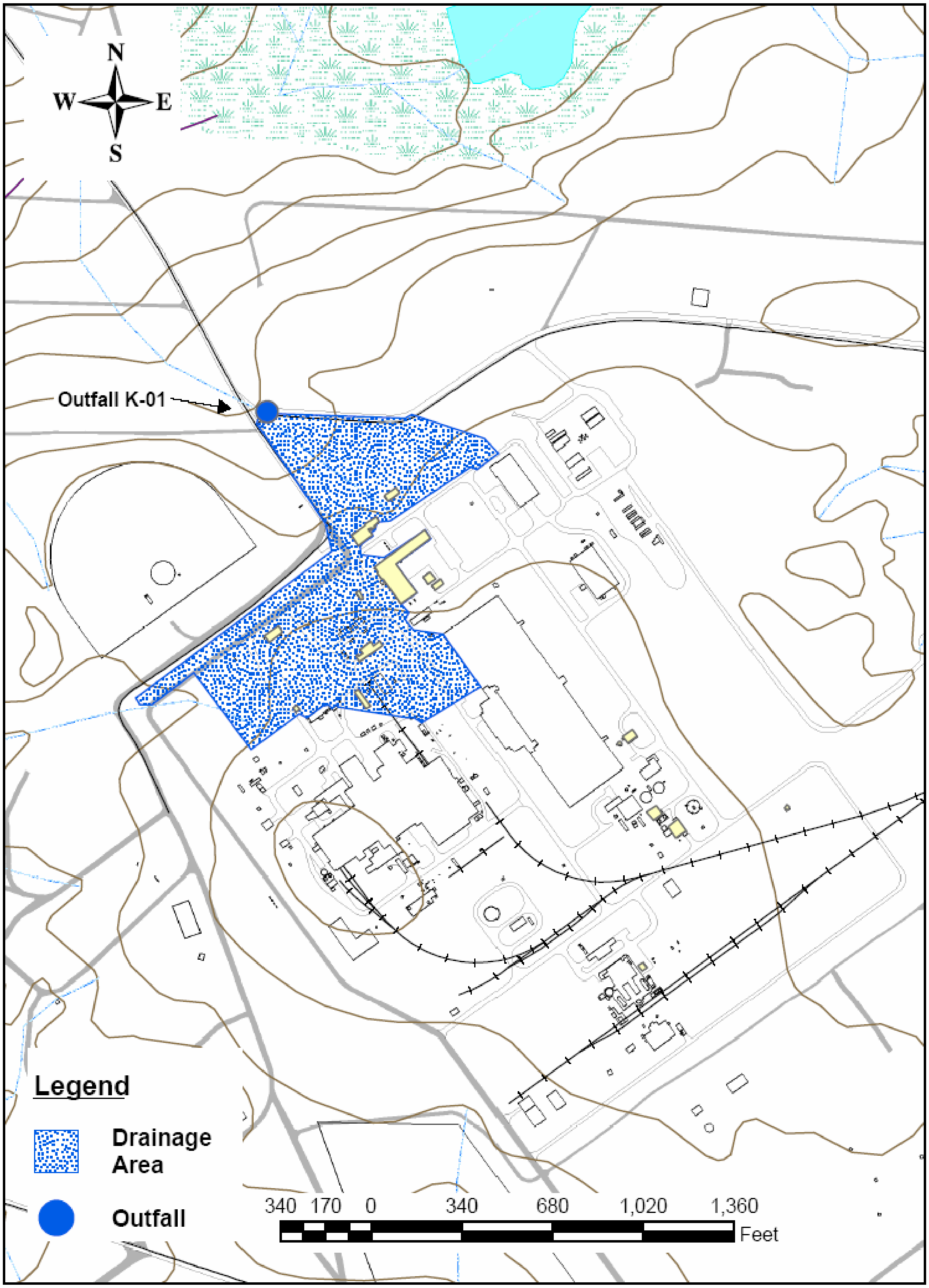

Figure 2-12. Location of Storm Water Outfall K-01 and Associated Drainage Area.

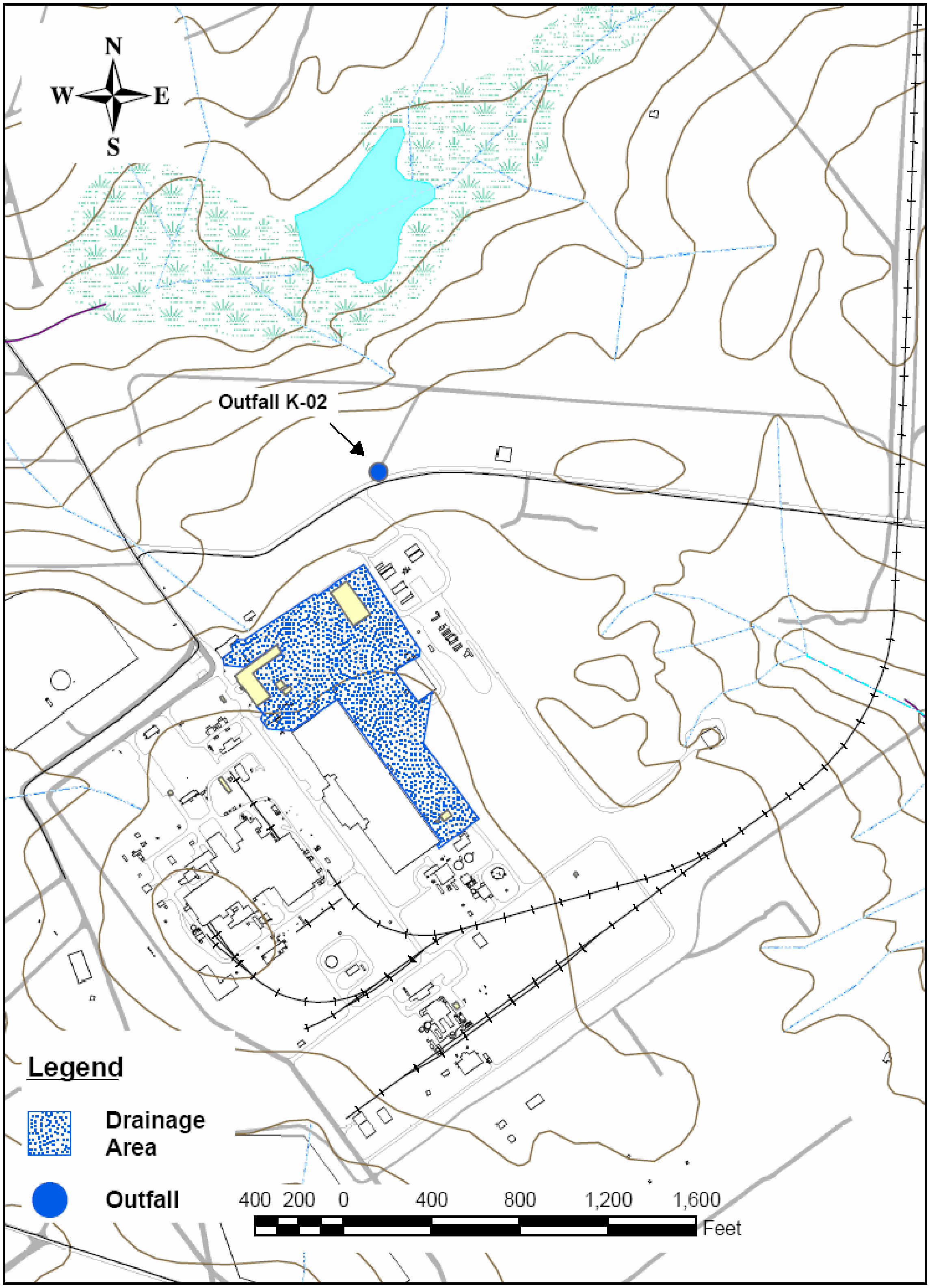

Figure 2-13. Location of Storm Water Outfall K-02 and Associated Drainage Area.

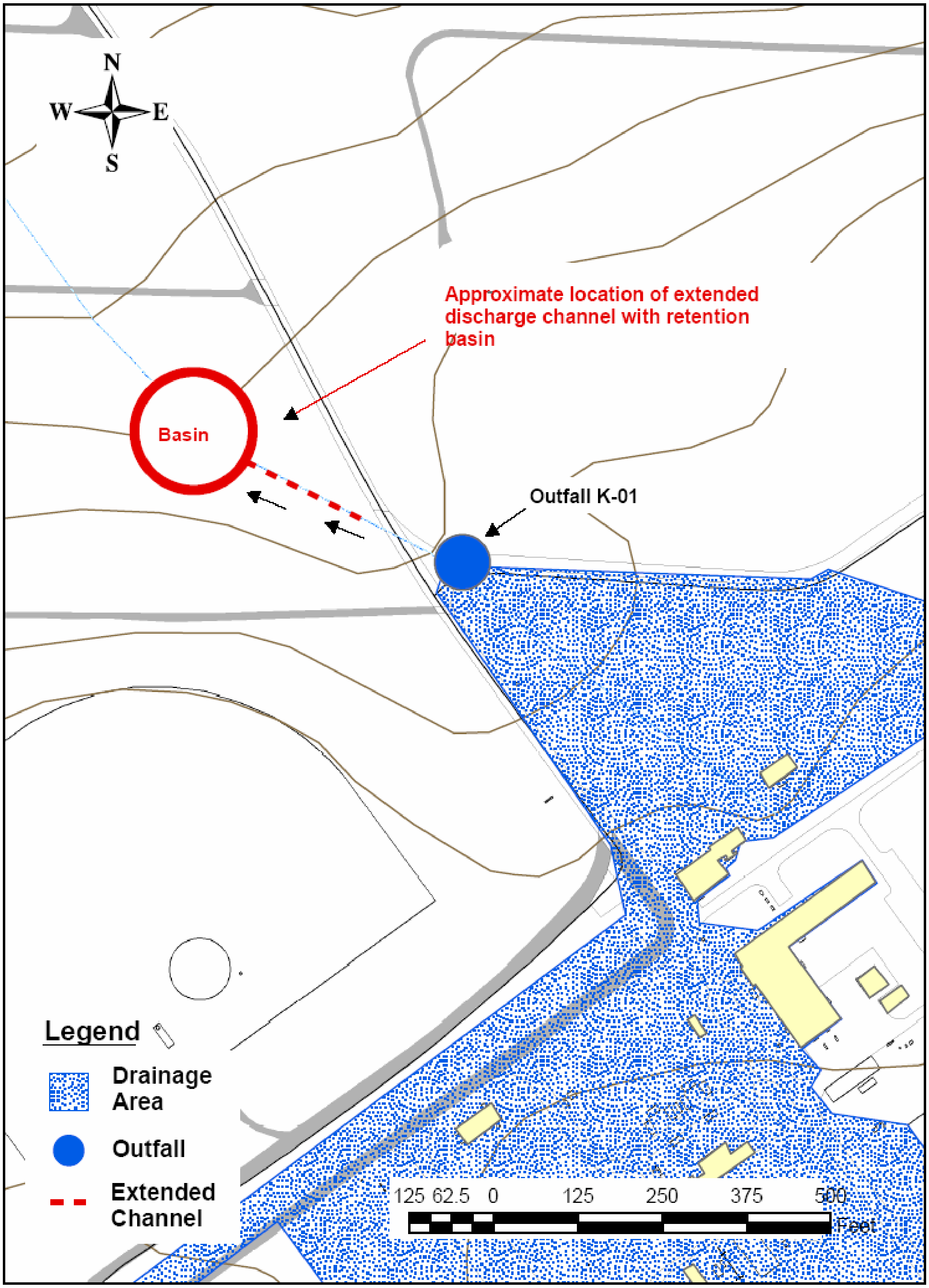

Figure 2-14. Outfall K-01, Option C: Extended Outfall Discharge Channel with Retention Basin.

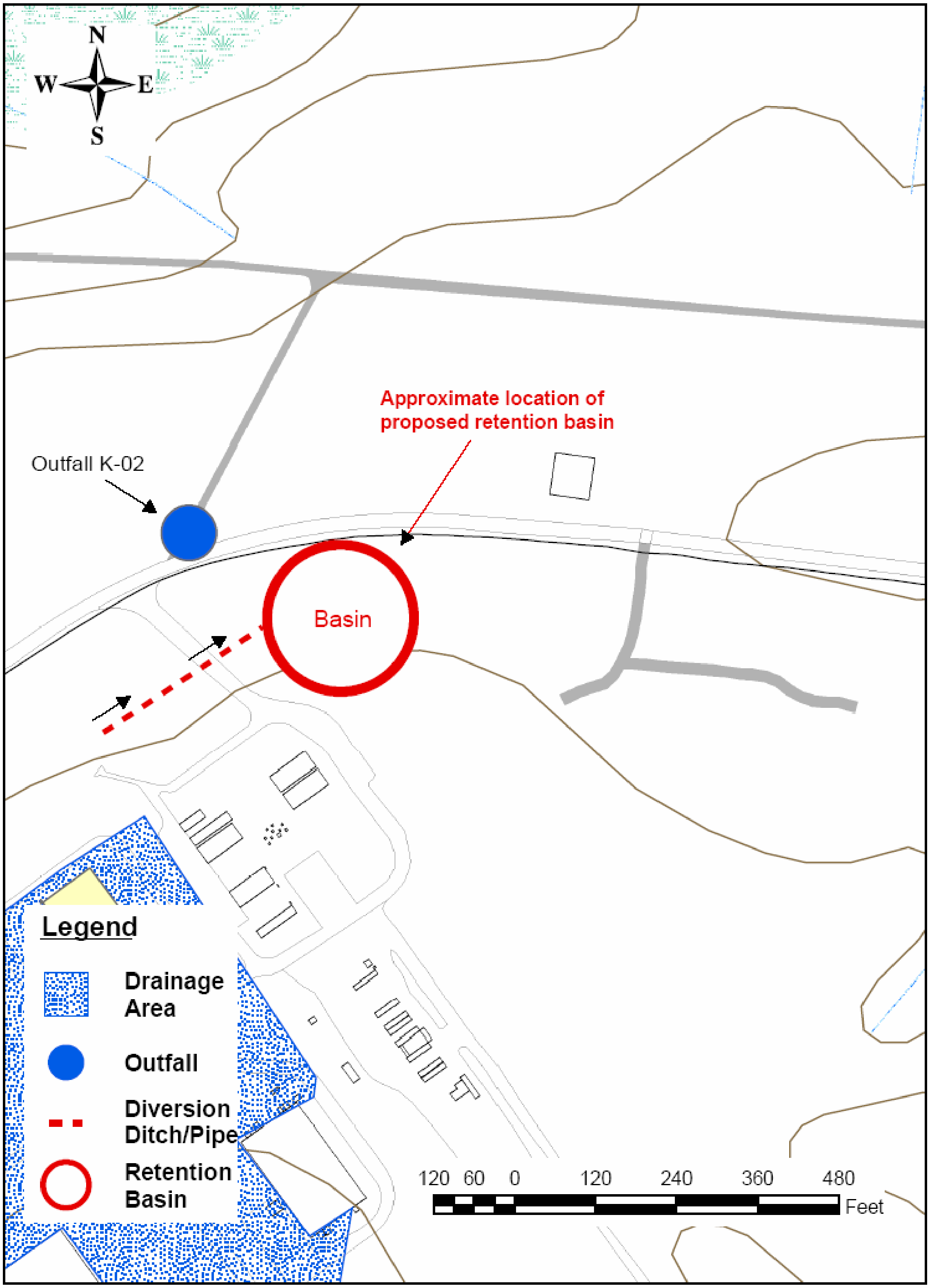

Figure 2-15. Outfall K-02, Option B: Extended Outfall Channel With Retention Basin.

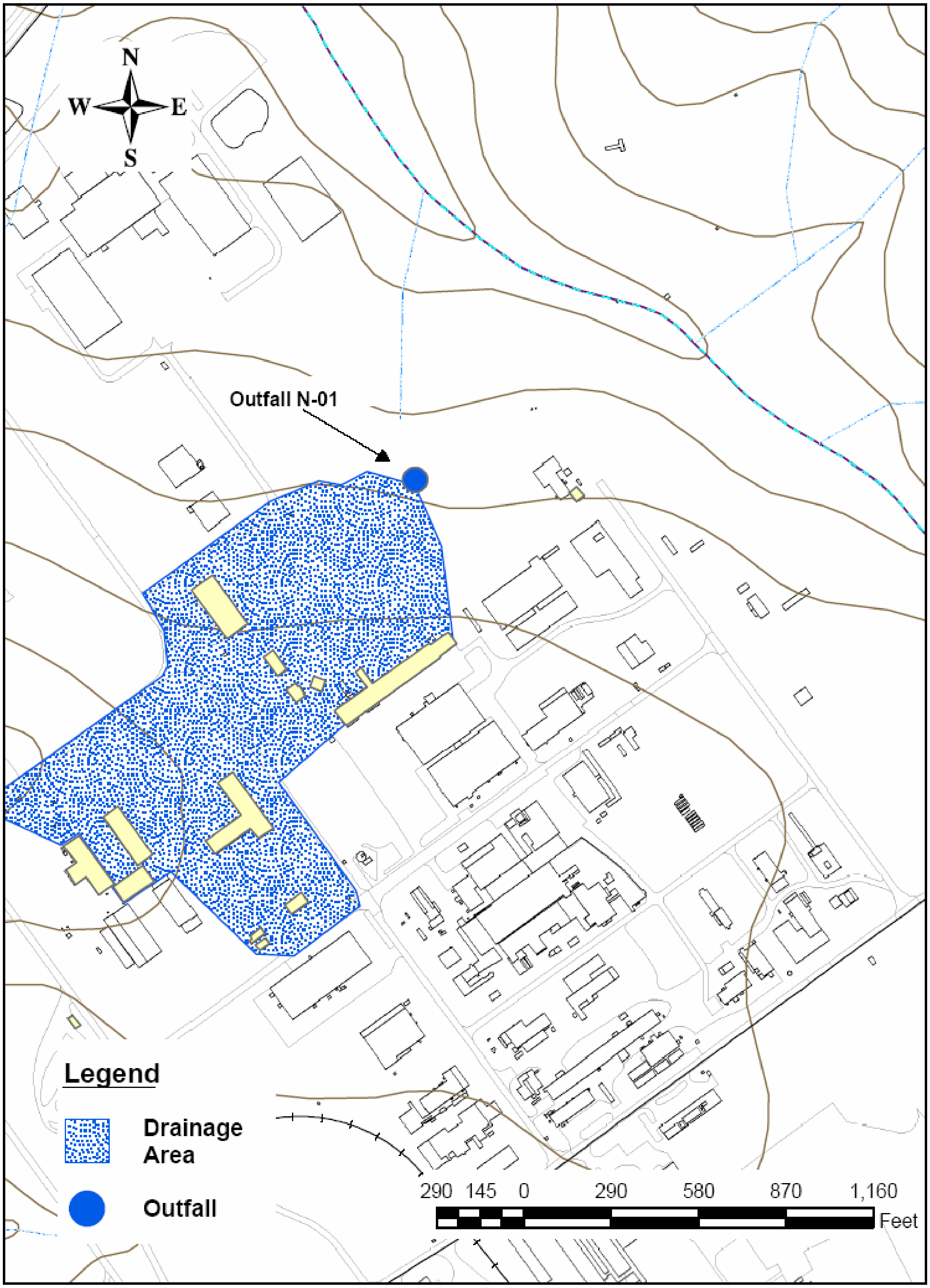

Figure 2-16. Location of Storm Water Outfall N-01 and Associated Drainage Area.

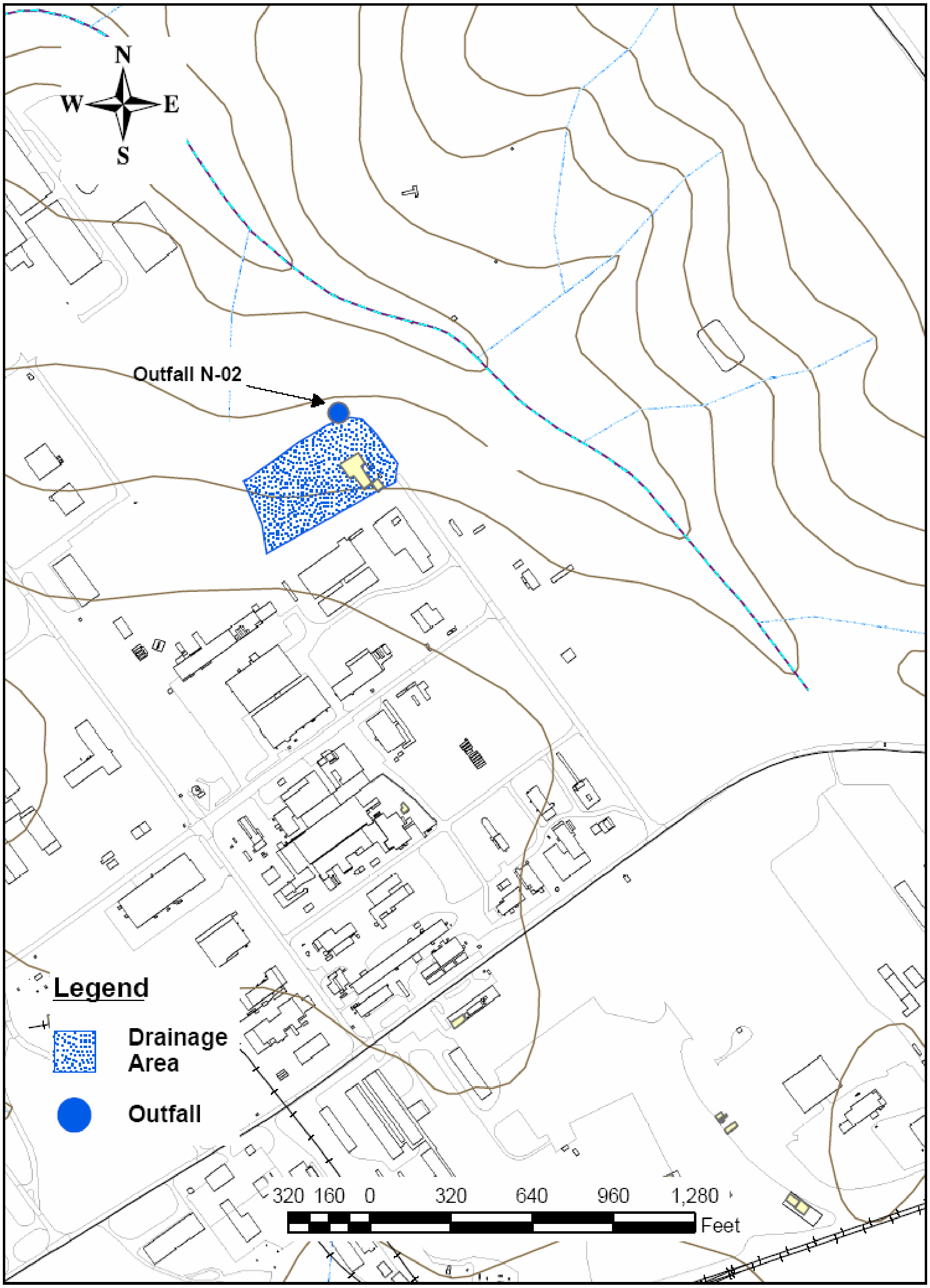

Figure 2-17. Location of Storm Water Outfall N-02 and Associated Drainage Area.

2.7 Outfalls N-01, N-02, N-02A, N-03 and N-05, Alternative A

Outfall N-02A receives runoff from an area of approximately 2,019,665 ft^2 near the middle of N-Area (Figure 2-18). Outfall N-03 drains an area of approximately 175,325 ft^2 in the northeastern corner of N-Area (Figure 2-19). Outfall N-05 receives runoff for an area of approximately 641,198 ft^2 in the lower central section of N-Area (Figure 2-20). Alternative action A would consolidate the discharges from these outfalls into a new retention basin (Figure 2-21). This complex of outfalls provides hydrology for a slope wetland that becomes the headwater of an unnamed tributary of Fourmile Branch. Outfalls N-01, N-02, N-02A, and N-03 are conveyed by drainage ditches to the floodplain. Outfall N-05 is in the upper portion of the drainage and the confluence of its discharge with the wetland is near the outfall location. Historic photography indicates that this is a natural drainage that was present prior to site construction. The construction of the N-Area and the Barrow Pit has channelized much of the normal hydrology of the area into the storm water outfalls. Soils of the area are classified as Ochlockonee loamy sand and Fluvaquents, both of which are typically hydric soils. Overstory vegetation in the wetland is predominantly water oak and laurel oak (*Quercus nigra* and *Q. laurifolia*), sweetgum (*Liquidambar styraciflua*) and loblolly pine (*Pinus taeda*). The area is a jurisdictional wetland and much of the hydrology is currently supplied by the storm water outfalls. Selection of this alternative is expected to significantly alter the quantity of water flowing to the wetland, and therefore cause it to become considerably drier. If the basin has no discharge, this entire component of the hydrology to the wetland would be removed. Under this situation, the wetland would likely loose many of its wetland characteristics. No permitting of this alternative would be required through the Corp. of Engineers. However, since the SRS operates under a ‘no net loss’ policy for wetland, mitigation would be required. If this alternative is selected, a wetland delineation of the area would be needed to determine the acreage that would be affected, and a mitigation plan formulated to address the wetland impact. Typical mitigation choices would be wetland creation, restoration or enhancement, preservation, or use of Wetland Mitigation Bank credits.

2.8 Outfalls N-02A, N-03 and N-05, Alternative B

This alternative action would combine the discharges of the three outfalls into a new retention basin and create a new outfall below the emergency release of the basin. As indicated in section 2.7, the discharge from Outfall N-05 is important to the entire upper complex the wetlands in the area. Diverting and eliminating this hydrological source would impact the wetland characteristic of the area and potentially result in wetland loss. As noted in the previous discussion, selection of this alternative would likely require mitigation.

2.9 Outfall N-12, Alternative A

Outfall N-12 receives runoff from an area of approximately 1,261,515 ft^2 in the southeastern section of N-Area (Figure 2-22). Alternative action A is to install check

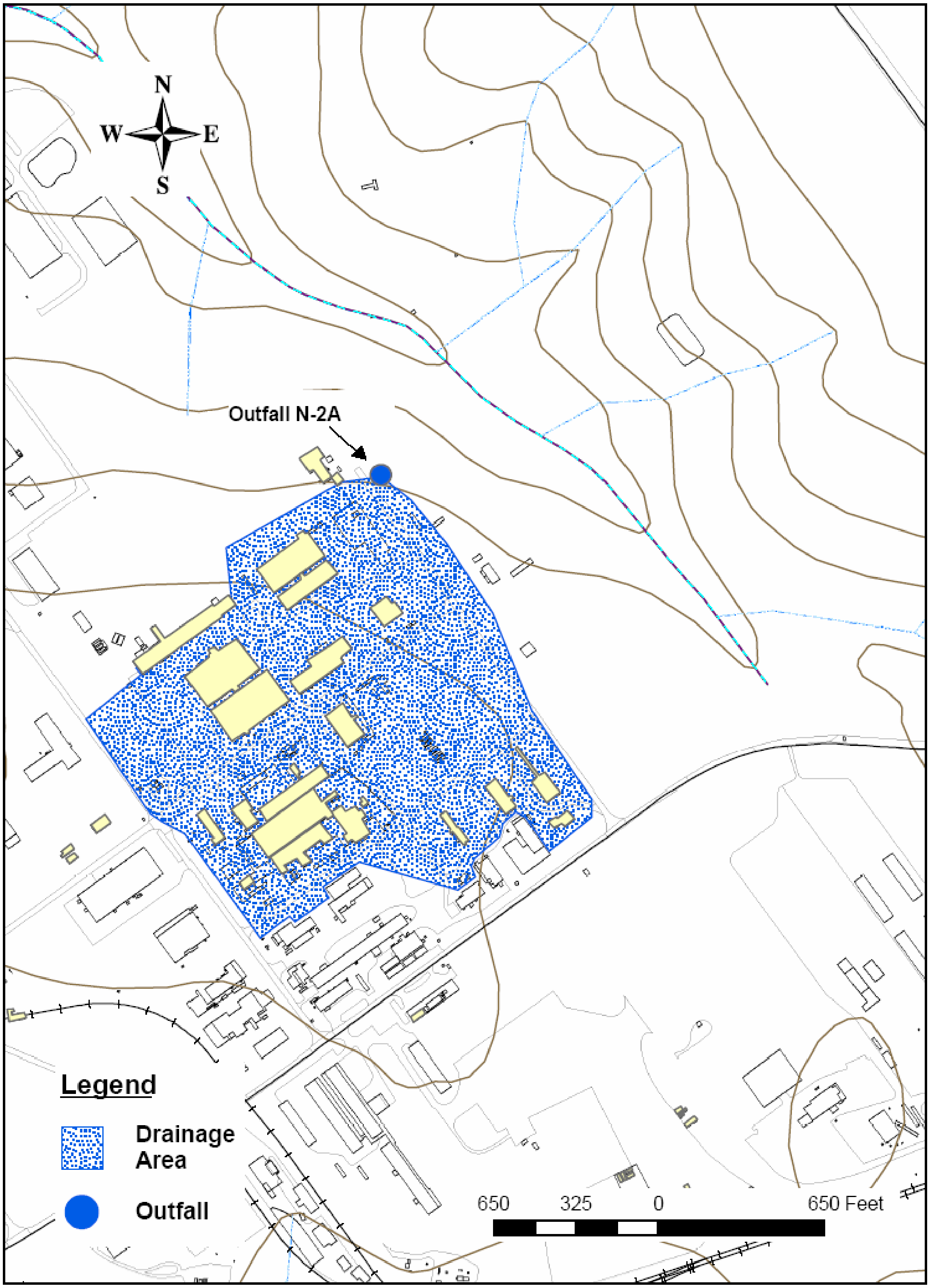

Figure 2-18. Location of Storm Water Outfall N-2A and Associated Drainage Area.

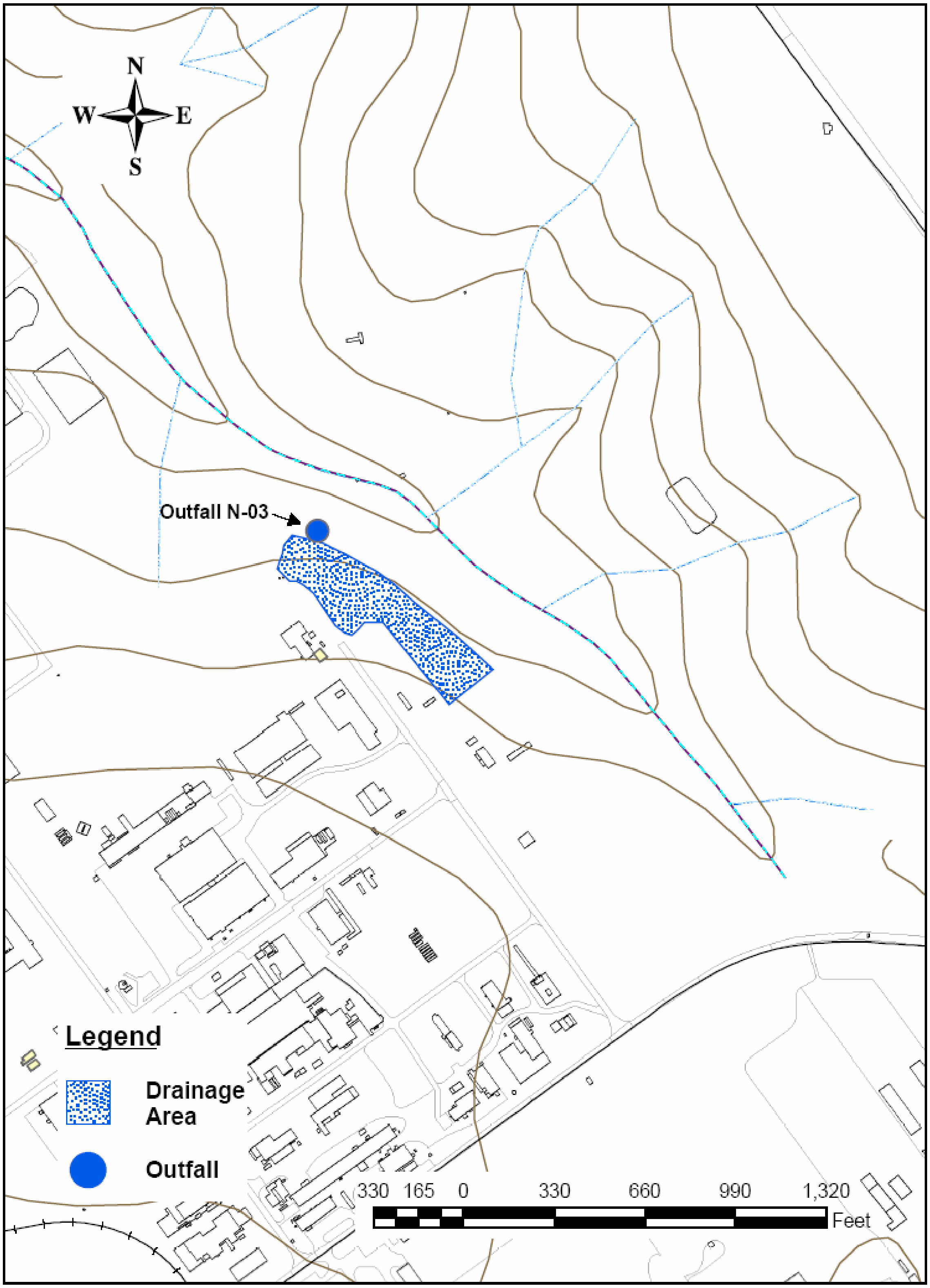

Figure 2-19. Location of Storm Water Outfall N-03 and Associated Drainage Area.

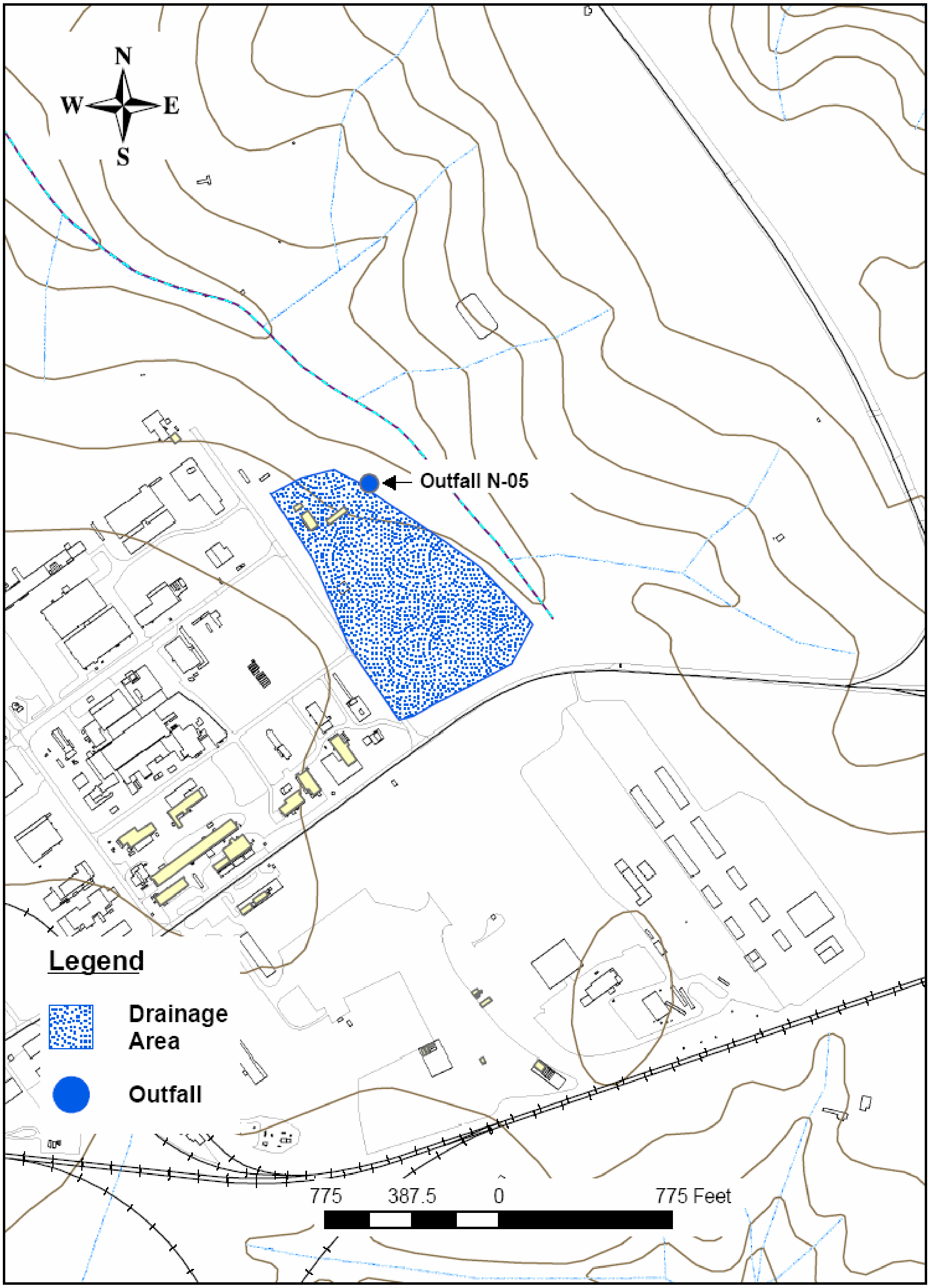

Figure 2-20. Location of Storm Water Outfall N-05 and Associated Drainage Area.

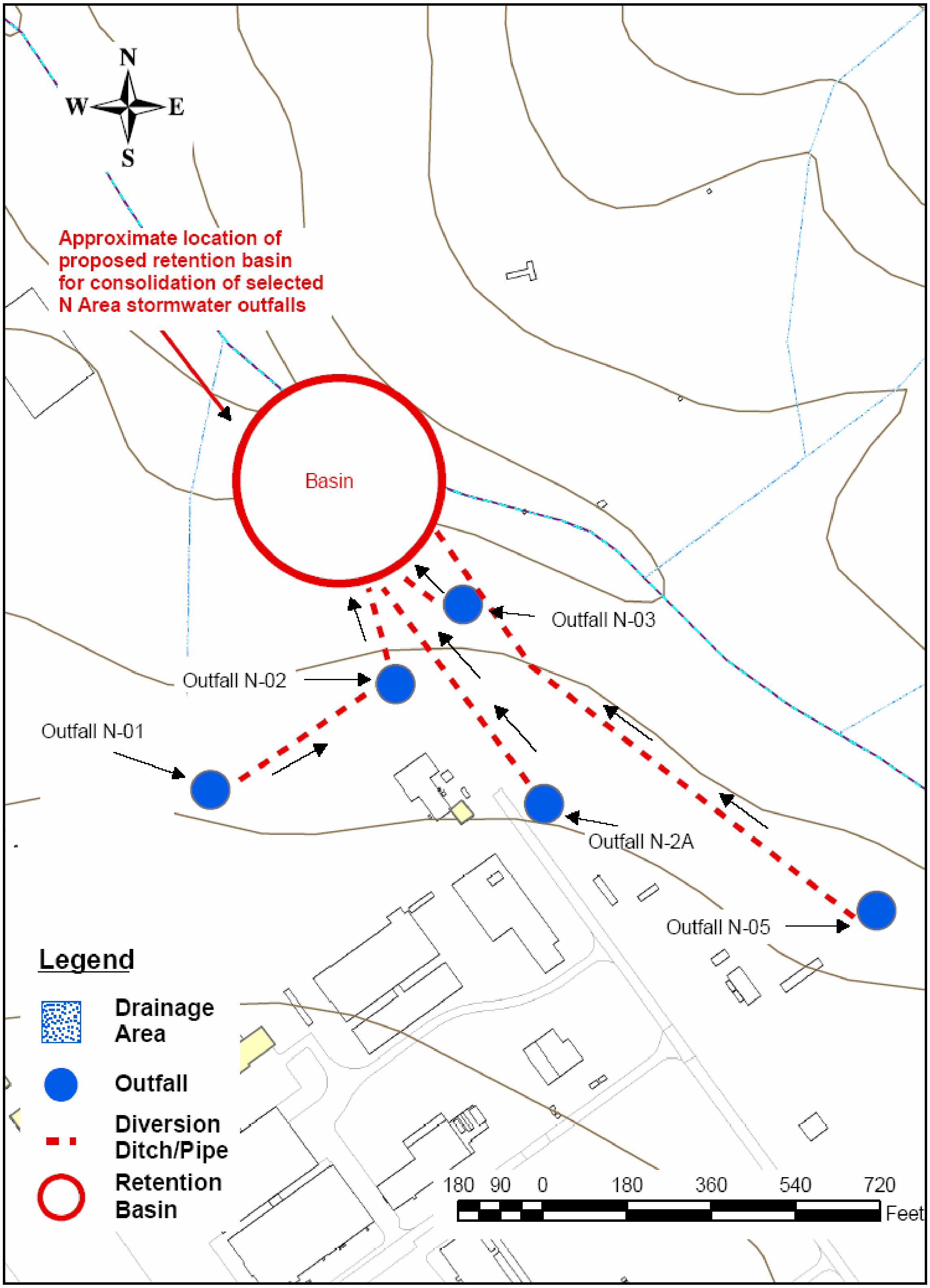

Figure 2-21. Approximate Location of Retention Basin for Consolidation of Outfalls N-01, N-02, N-2A, N-03, and N-05.

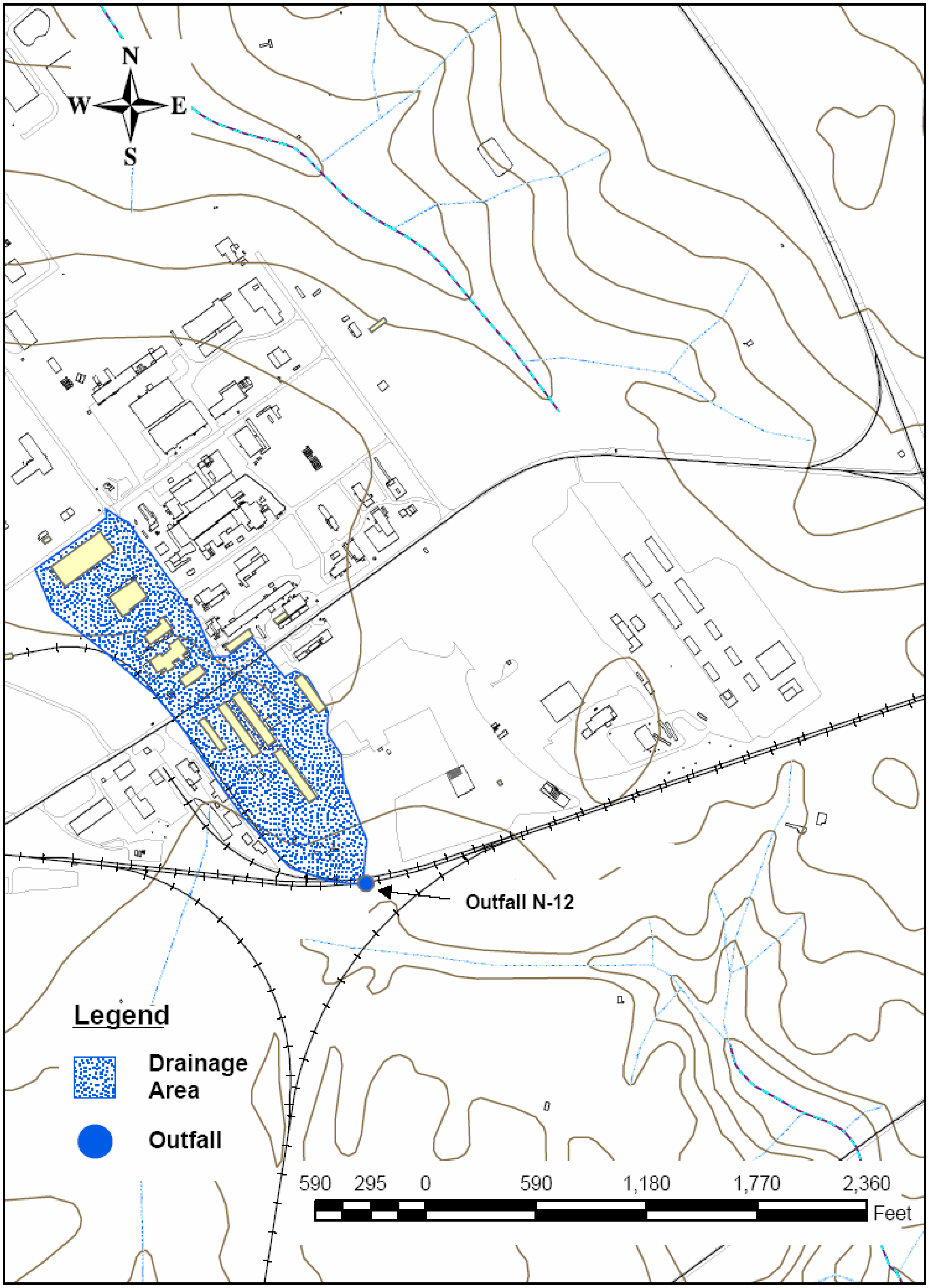

Figure 2-22. Location of Storm Water Outfall N-12 and Associated Drainage Area.

dams in the discharge ditch of this outfall to slow the discharge and allow additional contact time with surface soils and rocks to reduce metal concentrations in the effluent. This outfall is drained by a ditch for approximately a hundred meters prior to flowing into a drainage from an old Carolina Bay. The final discharge is into an unnamed tributary of Pen Branch. This option would slightly reduce the initial peak flow volume from a storm event and allow it to discharge over a longer period of time. This alternative would have very little effect on the total discharge volume and therefore would have no effect on the floodplain it discharges into.

2.10 Outfalls N-12 and N-12A, Alternative B

Outfall N-12A receives runoff from an area of approximately 543,138 ft^2 in the southwestern portion of N-Area (Figure 2-23). This alternative action would result in all discharges from the existing outfalls being consolidated into new retention basin (Figure 2-24). This alternative would greatly reduce the quantity of effluent reaching the floodplain/wetland of Pen Branch through an unnamed tributary. Both outfalls are routed by ditches to the point they intersect the wetland into which they discharge. Discharge from N-12A flows into a historical Carolina Bay that has been ditched. N-12 joins this drainage further down gradient. This wetland is hydrologically stable at the point of discharge of N-12A into it, and storm water from these outfalls is a minor component of that overall hydrology. Elimination of these sources of water would have no impact on the hydrology of the receiving waters.

2.11 Outfall N-12A, Alternative A

Alternative action A would install infiltration wells along the flow path upstream of the outfall (Figure 2-25). As noted in section 2.10, the flow of this storm water outfall is not critical to the wetland into which it discharges. The removal of flow by infiltration wells would therefore not adversely impact the hydrology of the receiving waters.

2.12 Outfall Y-01, Alternatives A, B, and C

Outfall Y-01 drains an area of approximately 365,882 ft^2 in the southwestern section of Y-Area (Figure 2-26). Alternative action A would divert the discharge to two small retention basins and eliminate the outfall (Figure 2-27). Alternative action B would divert the discharge to a small retention basin and install infiltrations wells along the flow path to eliminate the outfall (Figure 2-28), and alternative action C would route the discharge to a new retention basin and eliminate the outfall (Figure 2-29). Each of these alternatives would greatly reduce or eliminate hydrological discharge from this outfall to one of the headwaters of Meyers Branch. The discharge is conveyed by a ditch to the point where groundwater emerges to form a headwater of Meyers Branch. This area is a moderately large flat expanse that has considerable groundwater seeping into it. The contribution of storm water from the outfall into this slope wetland is a minor component. Removal of this hydrology would not impact the wetland that receives it.

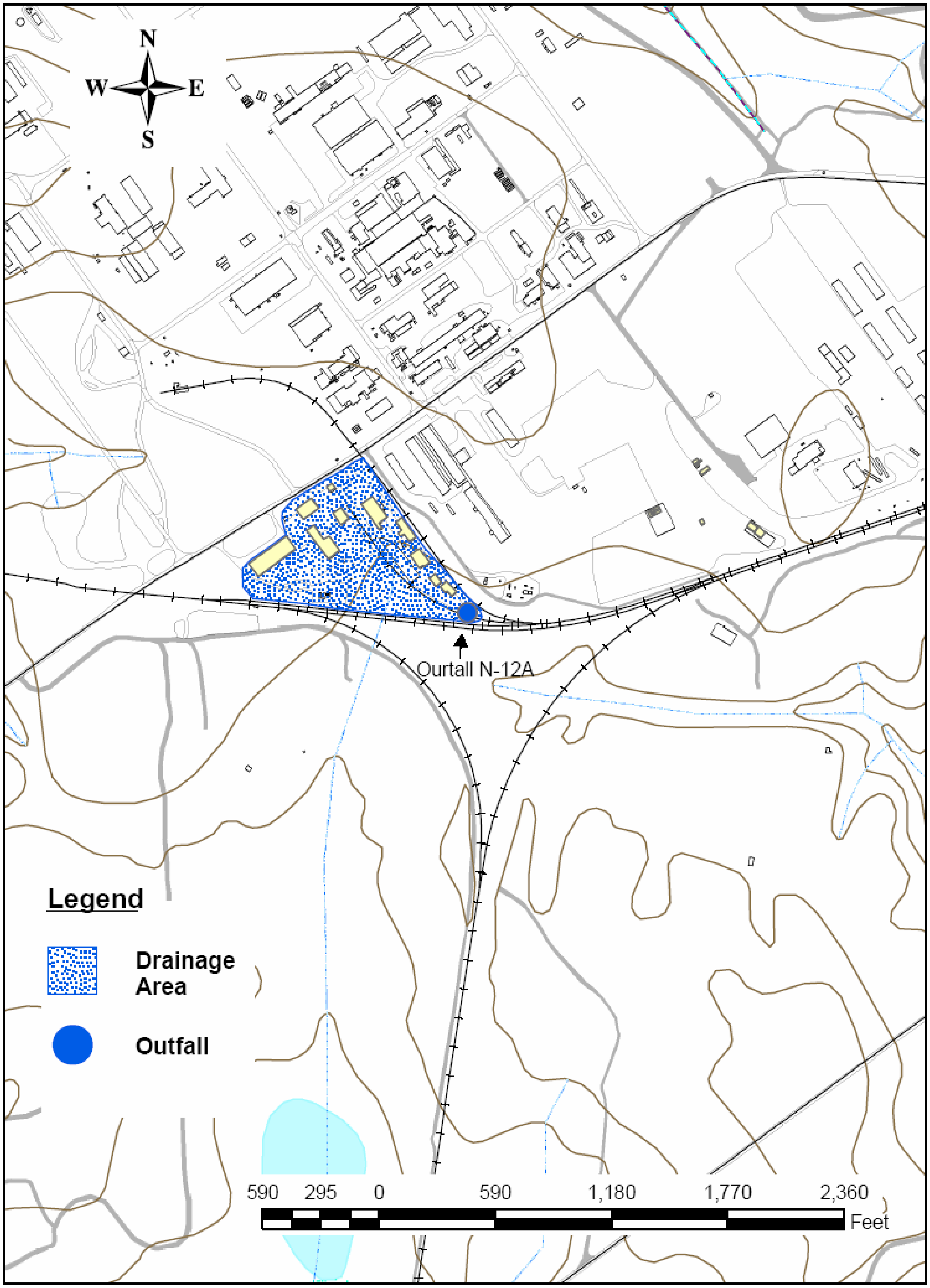

Figure 2-23. Location of Storm Water Outfall N-12A and Associated Drainage Area.

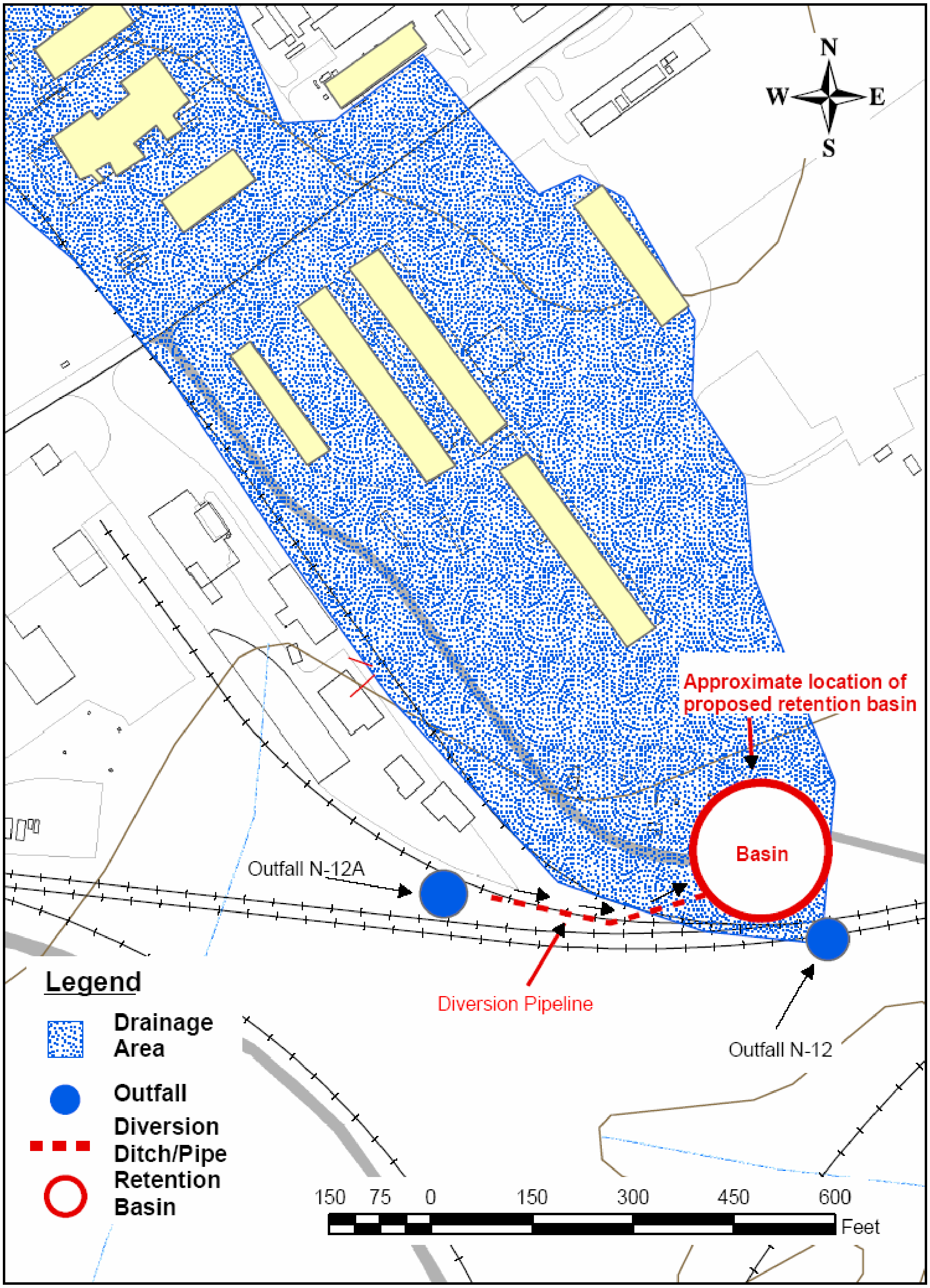

Figure 2-24. Outfalls N-12 and N-12A, Option B: Consolidation of Outfalls N-12 and N-12A into a Retention Basin.

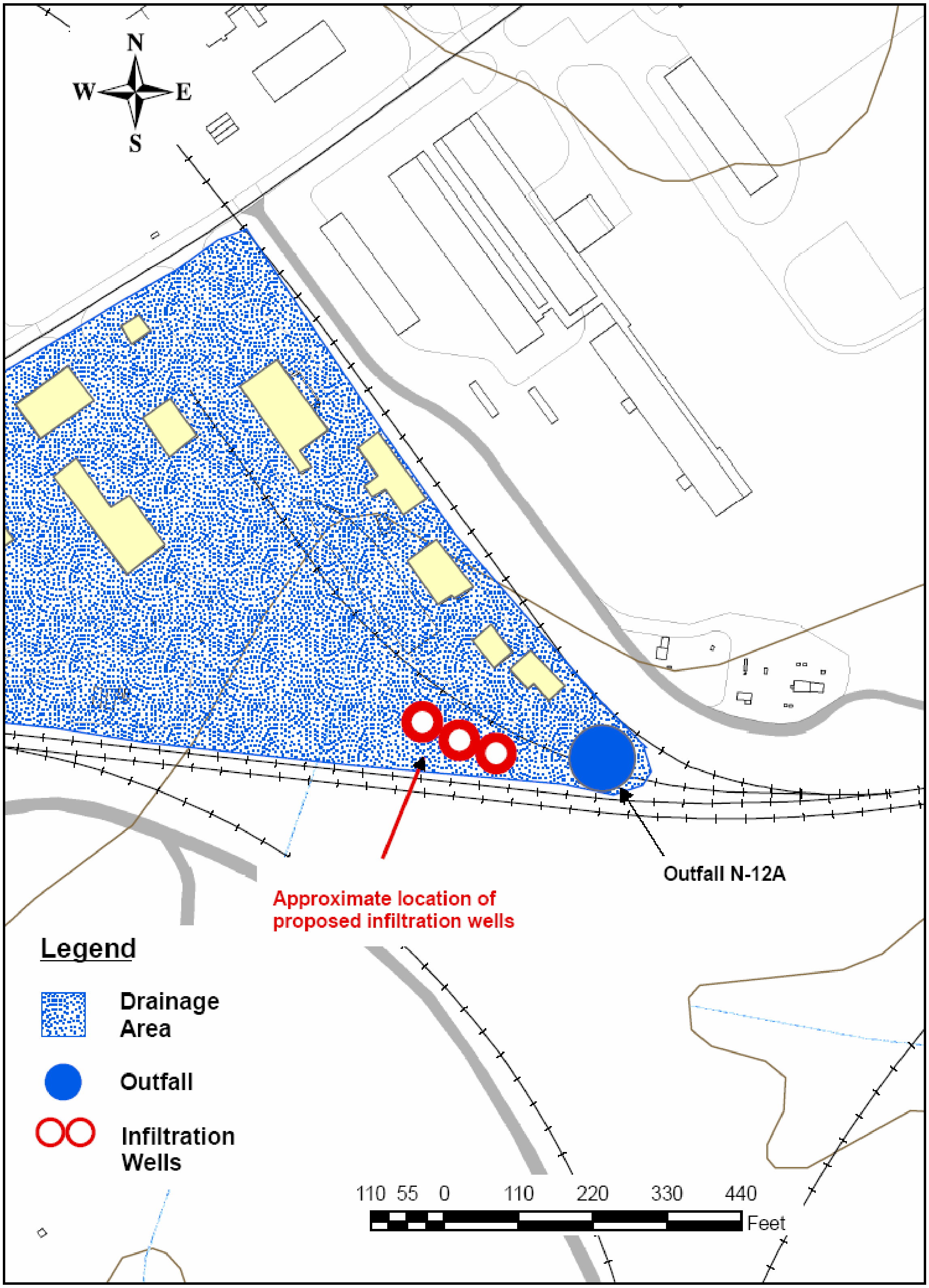

Figure 2-25. Outfall N-12A, Option A: Install Infiltration Wells Upstream of Outfall.

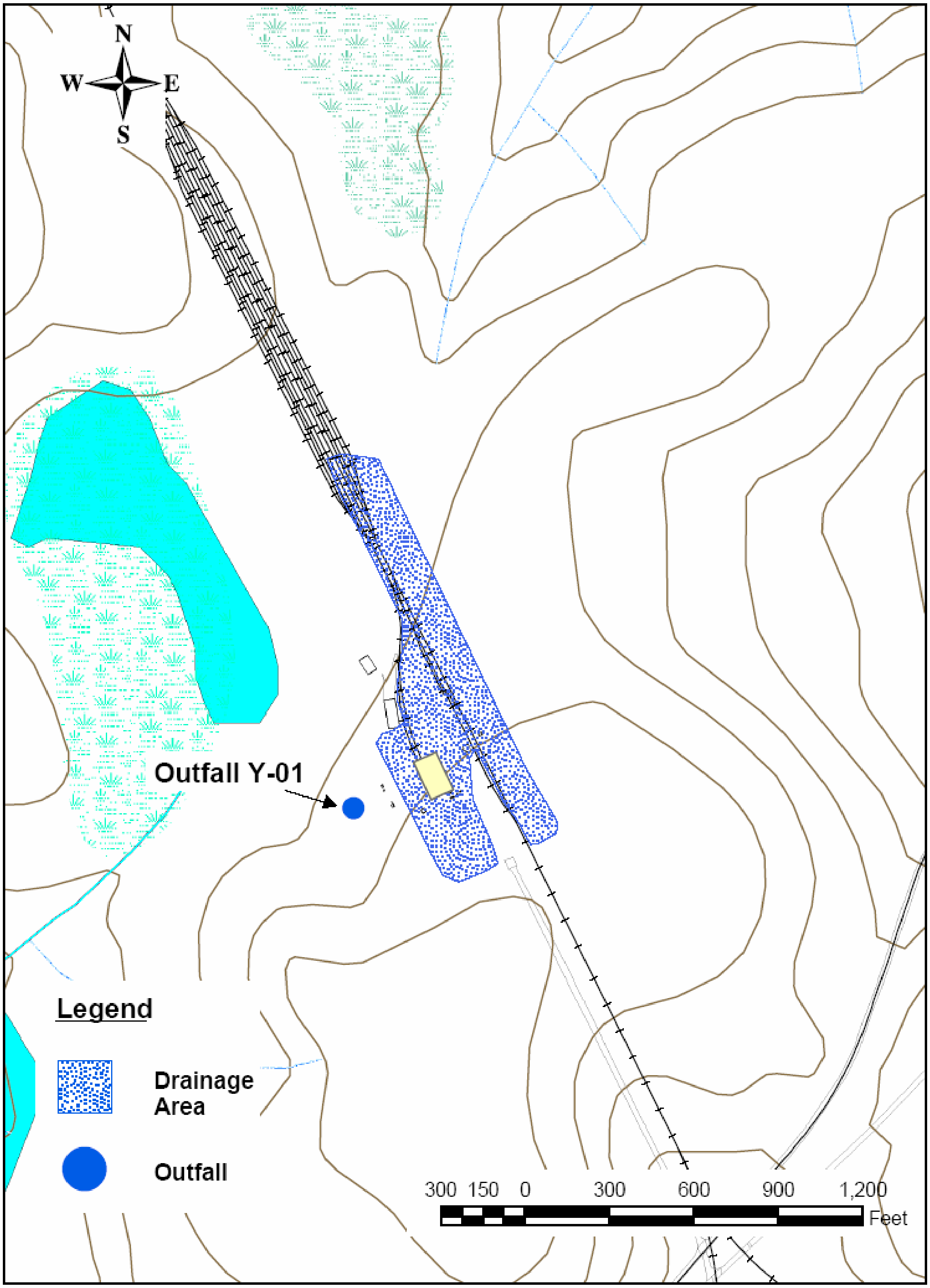

Figure 2-26. Location of Storm Water Outfall Y-01 and Associated Drainage Area.

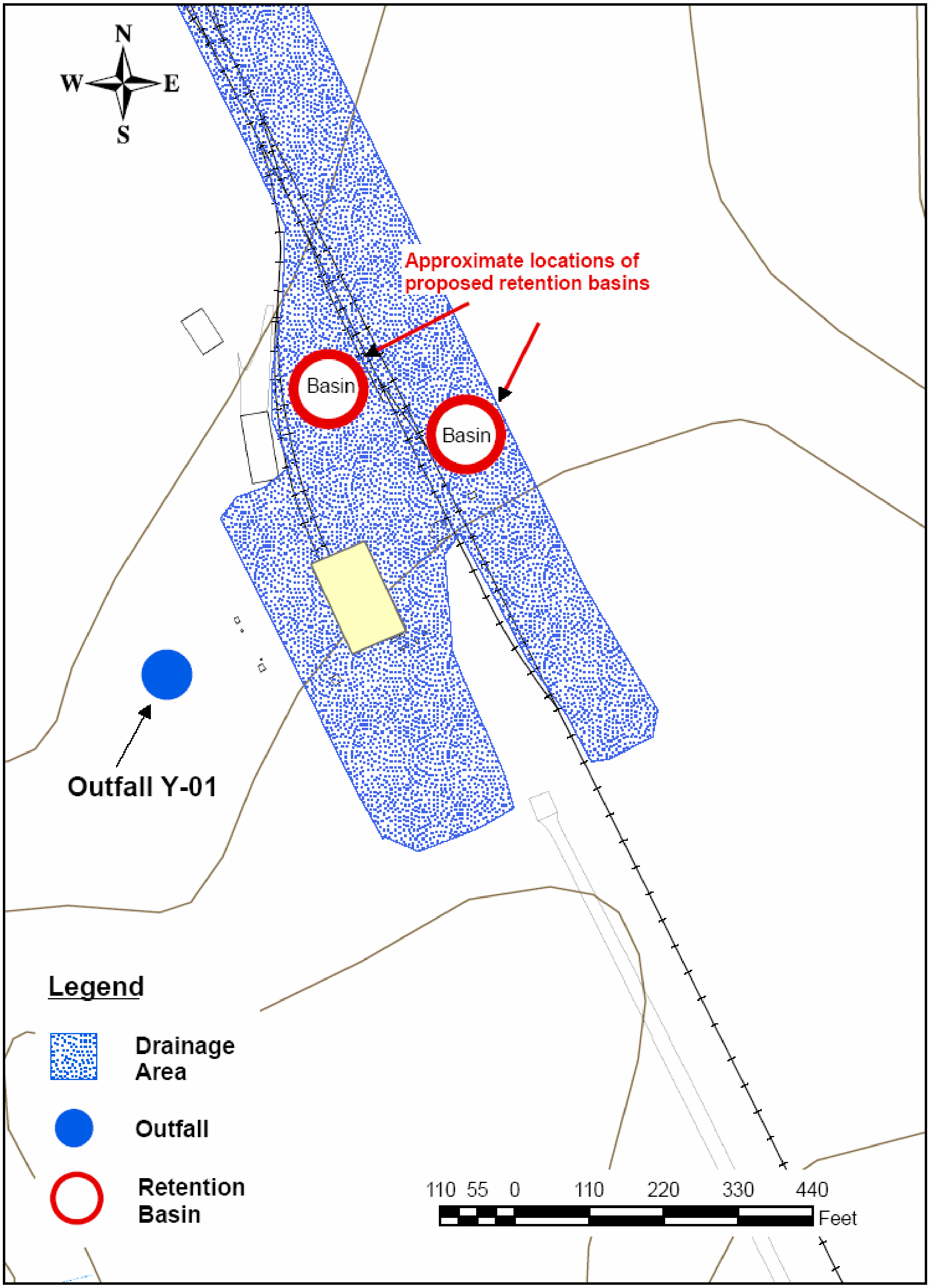

Figure 2-27. Outfall Y-01, Option A: Dispose Stormflow via Sheet Flow and Retention Basins.

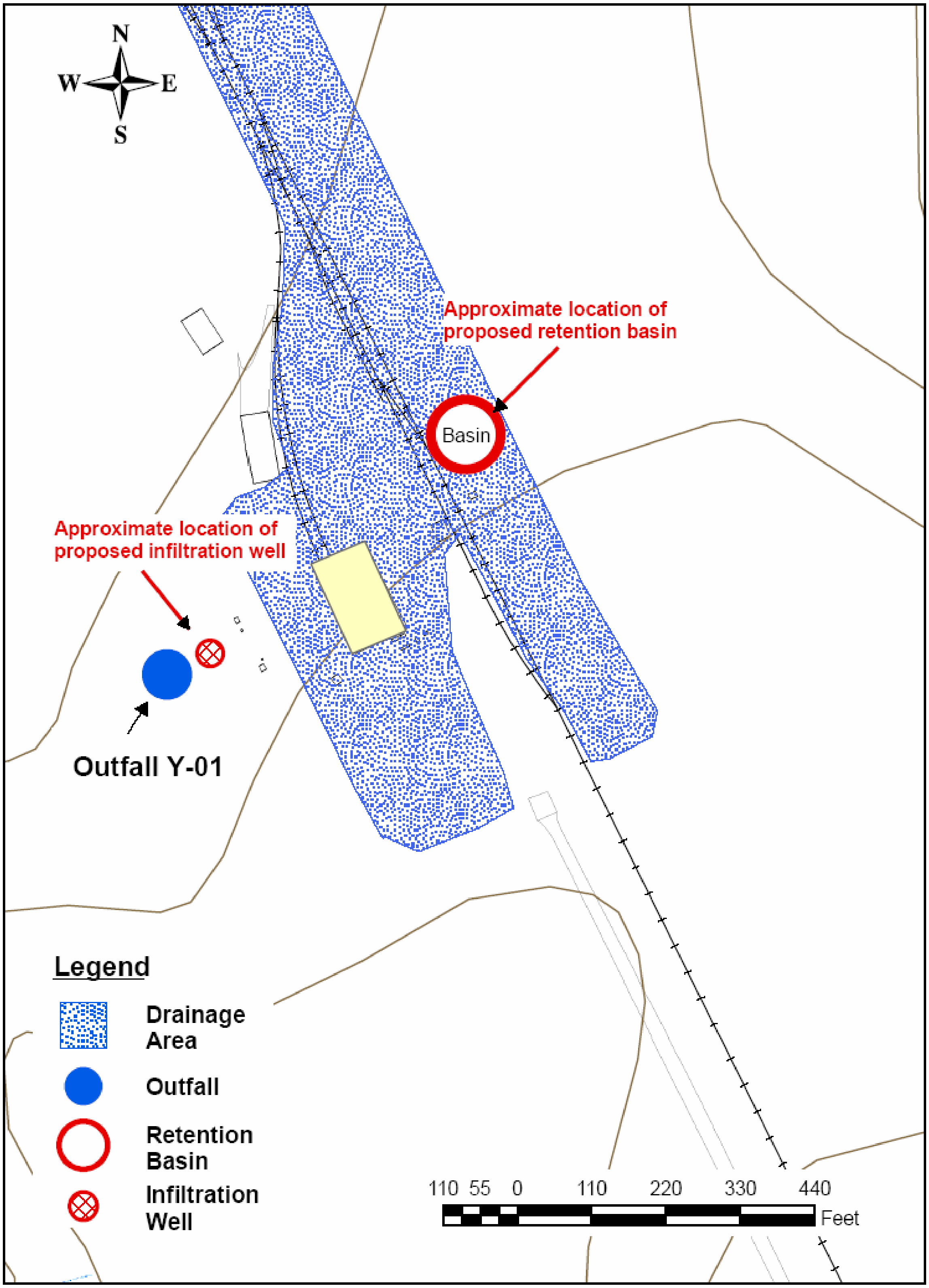

Figure 2-28. Outfall Y-01, Option B: Dispose Stormflow via Retention Basin and Infiltration Well.

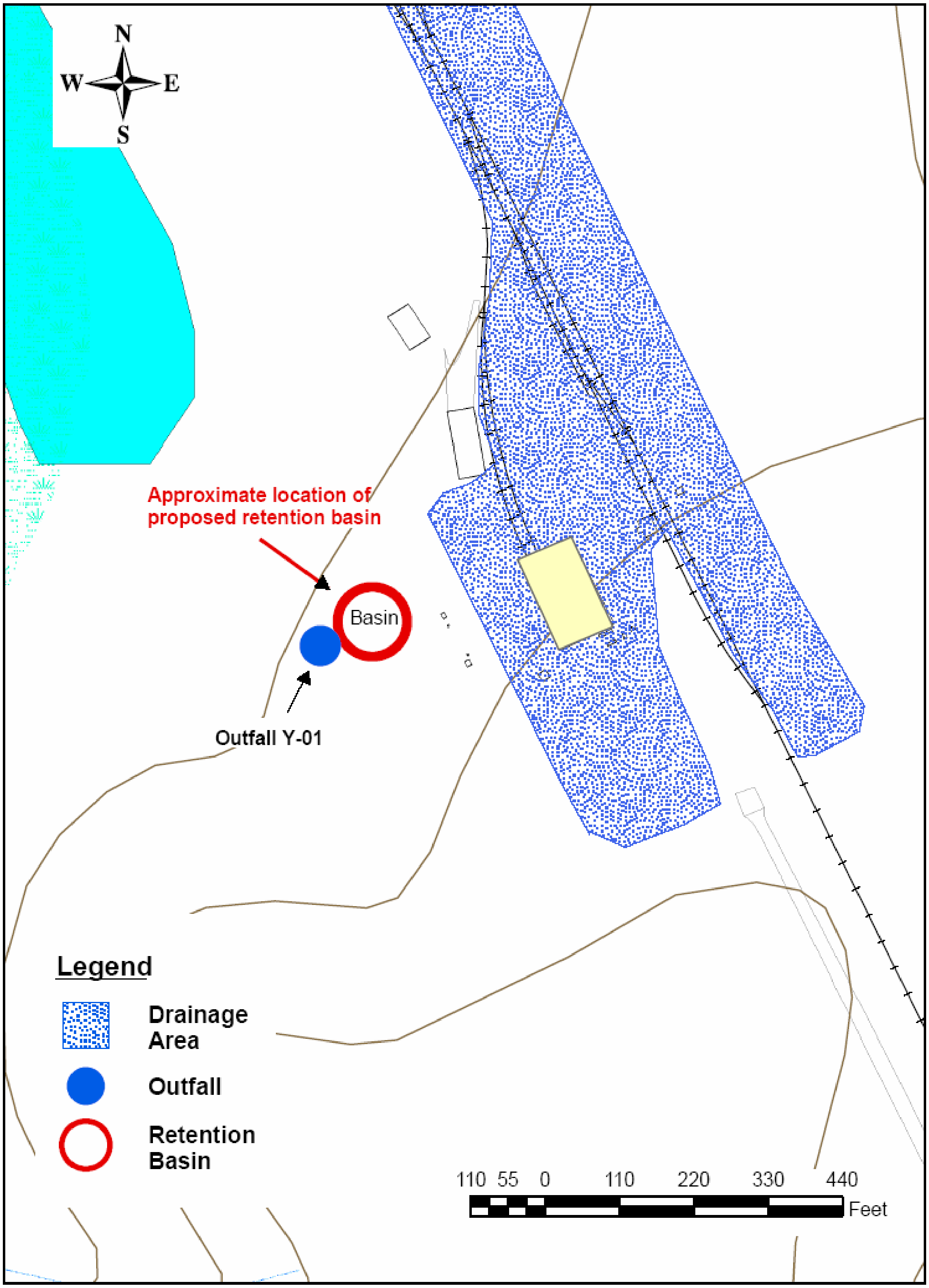

Figure 2-29 Outfall Y-01, Option C: Route Stormflow to Retention Basin.

2.13 General Construction Activity

Operation of construction equipment off the existing roads would be minimized during construction-related activities. Silt fences and other erosion control structures as needed would be installed to ensure there is no deposition in the downslope floodplain or wetland areas. Additionally, an erosion control plan for each outfall activity would be developed in accordance with applicable state and local floodplain protection standards and followed to ensure that no additional impacts to wetlands would occur due to erosion and sedimentation. No drilling materials would be deposited in wetland areas. The proposed activity to install alternatives is expected to not require a U.S. Army Corp of Engineers Section 404 Permit. Best management practices would be employed during any remediation activities associated with these proposed actions. These actions should minimize short-term impacts to the wetlands and floodplain and no significant long-term impacts are foreseen.

3.0 ALTERNATIVES CONSIDERED

Proposed and alternative compliance actions are covered in the Environmental Assessment for the NPDES Storm Water Compliance Alternatives at the Savannah River Site (DOE 2006). No floodplain/wetland impacts, except where noted in the discussions, are expected for the proposed or designated primary alternative actions considered within the scope of this EA. Where impacts are expected, appropriate mitigation plans will be formulated to compensate for the impacts.

4.0 REFERENCES

DOE (U.S. Department of Energy). 2006). Draft Environmental Assessment for the National Pollutant Discharge Elimination System (NPDES) Storm Water Compliance Alternatives at the Savannah River Site, DOE/EA-1563. Savannah River Site, Aiken, South Carolina.

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Osteen, D.V. and E.A. Nelson. 2006. Storm Water Outfalls: Waters of the State Determination. WSRC-RP-2006-00590. Washington Savannah River Company. Aiken, South Carolina.