DOE/EA-1513

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

April 2005

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

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LIST OF ABBREVIATIONS/ACRONYMS

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

AHU	-	air handling unit
BaB	-	Blanton sand
BE	-	biological evaluation
CEQ	-	Council on Environmental Quality
CFR	-	Code of Federal Regulations
CSWTF	-	Central Sanitary Waste Treatment Facility

LIST OF ABBREVIATIONS/ACRONYMS Cont.

DOE	-	U.S. Department of Energy
DOE-SR	-	U.S. Department of Energy – Savannah River Operations Office
EA	-	environmental assessment
EIS	-	environmental impact statement
ETP	-	Effluent Treatment Project
Fa	-	Fluvaquent soils
FONSI	-	finding of no significant impact
gpd	-	gallons per day
L	-	liter
msl	-	mean sea level
MOX	-	mixed oxide fuel
NEPA	-	National Environmental Policy Act
NPDES	-	National Pollutant Discharge Elimination System
OSHA	-	Occupational Safety and Health Act
SCDHEC	-	South Carolina Department of Health and Environmental Control
SRARP	-	Savannah River Archaeological Research Program
SRNL	-	Savannah River National Laboratory
SRS	-	Savannah River Site
T&E	-	Threatened and Endangered Species
TuE	-	Troup and Lucy sand
Uo	-	Udorthent soils
USFS-SR	-	United States Department of Agriculture Forest Service – Savannah River
VaB	-	Vaucluse sands
VeC	-	Vaucluse-Ailey Complex soils
WER	-	Water Effects Ratio
WSRC	-	Westinghouse Savannah River Company

CONVERSIONS USED

1 gallon	=	3.785 liters
1 inch	=	2.54 centimeters
3.3 feet	=	1 meter
1 mile	=	1.609 kilometers
1 square mile	=	2.59 square kilometers

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 permit compliance at selected industrial wastewater outfalls located at the Savannah River Site (SRS) (Figure 1-1). Effluent monitoring data indicates that these outfalls may not presently comply with new National Pollutant Discharge Elimination System (NPDES) permit effluent limits. These problematic outfalls are currently operating under negotiated compliance schedules which authorize their continued discharge under interim limits until superceded by final permit limits at specified dates.

1.1 Background

On December 1, 2003, the South Carolina Department of Health and Environmental Control (SCDHEC) renewed SRS's NPDES permit #SC0000175. This permit authorizes the continued discharge of industrial wastewater effluents into State surface waters for the next five years. Effluent monitoring data indicates that 10 of the 25 permitted SRS industrial wastewater outfalls may not presently meet extremely low heavy metals limits imposed by the new permit. The problematic outfalls are A-11, F-01, F-02, F-05, F-08, H-02, H-04, H-08, H-12, and S-04. Interim compliance schedules were negotiated with SCDHEC for each of these outfalls to allow DOE sufficient time to develop and implement technical strategies to achieve regulatory compliance.

A study team consisting of subject matter experts, outfall custodians, and site engineering leads was established by Westinghouse Savannah River Company (WSRC) to develop and screen technically viable, cost-effect compliance options for each of the subject outfalls (Gordon 2004). The study team identified 35 proposed and alternative actions. Major criteria used to evaluate and rank these actions were capital cost, operation and maintenance, technology, and land use. A detailed description of the recommended outfall options and the methodologies utilized by the study team to evaluate and rank these options can be found in Shipman and Bugher (2004). These options, along with the findings of this EA, will be considered by site management in their decision-making processes regarding how to best achieve NPDES permit compliance.

This document was prepared in compliance with the National Environment 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).

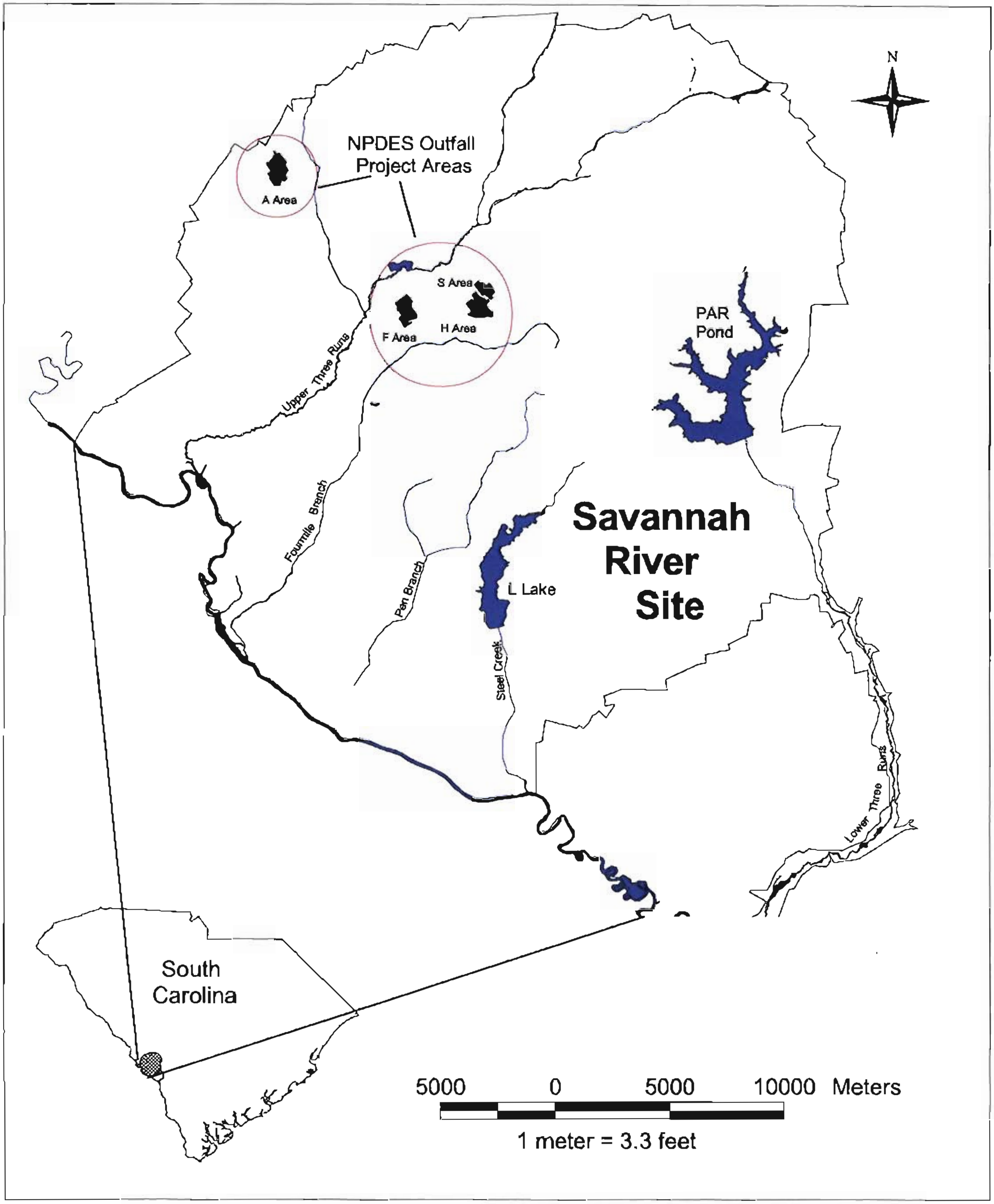

Figure 1-1. Location of Proposed Actions Within SRS.

1.2 Purpose and Need for Proposed Actions

Ten industrial wastewater outfalls have been identified at SRS which may not presently meet the new NPDES permit requirements. The purpose of the proposed and alternative actions is to ensure that these problematic 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 industrial wastewater permit.

2.0 PROPOSED ACTIONS AND ALTERNATIVES

Thirty-five proposed and alternative actions have been identified to ensure compliance with the new NPDES permit limits. With the exception of Outfall F-01, 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. Figure 2-1 shows the general locations of the subject outfalls within SRS. Table 2-1 provides a summary of major outfall attributes. Section 2.1 provides outfall-specific location maps and a brief description of each outfall and its proposed and alternative actions. A comprehensive description of each outfall (i.e., physical and functional descriptions, process flow sheets, effluent characterization data) and detailed discussion of its proposed and alternative actions can be found in Gordon and Calta (2004) and Shipman and Bugher (2004), respectively. Section 2.2 describes the 'No Action' alternative.

2.1 Outfall-Specific Actions

2.1.1 Outfall A-11

This outfall receives 12 contributing waste streams and currently discharges an estimated continuous flow of 3.32 x 10^6 liters (878,400 gallons) per day into an ephemeral tributary of Tim's Branch (Upper Three Runs drainage) (Figures 2-2 and 2-3). The largest contributing streams are storm water, cooling water, and steam condensate from Powerhouse 784-A, overflow from service water tank 782-A, batch discharges from the Chemical Feed Building 780-1A sump, and discharge from the M-Area groundwater stripper (Outfall M-05). The proposed and alternative actions for Outfall A-11 are described in Table 2-2.

The proposed action 'A' would eliminate selected contributing streams (by source elimination), reroute other contributing streams to Outfall A-01 for treatment in the existing constructed wetlands, and continue discharging the remaining source streams through the existing outfall (Figure 2-4). The alternative actions 'B', 'C', and 'G' present a range of options which include the elimination of stream sources or rerouting contributing streams to other facilities for treatment and/or final disposition (e.g., Central Sanitary Waste Treatment Facility [CSWTF] and/or service water tank 782-A). The

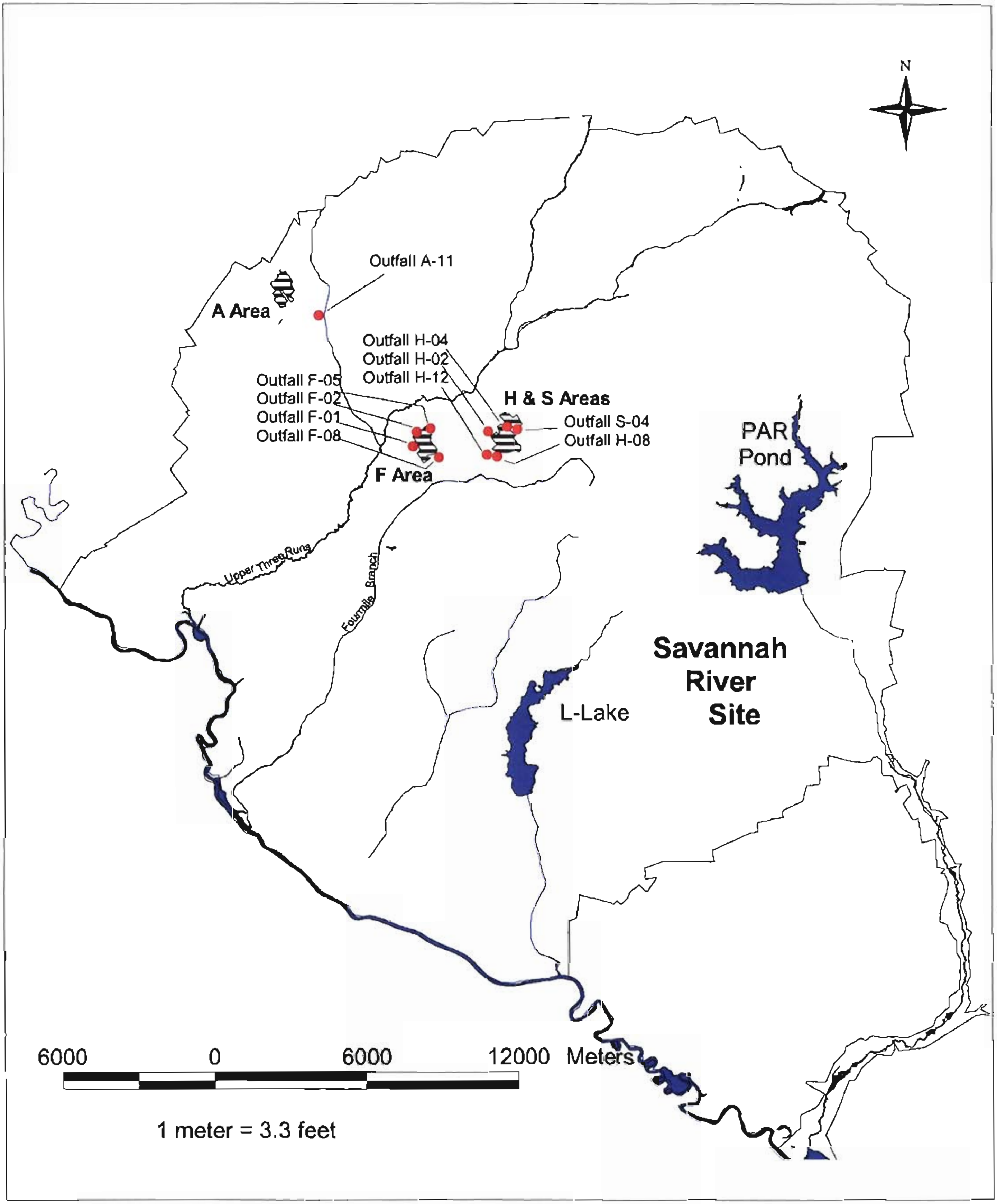

Figure 2-1. General Location Map of Outfalls Within SRS.

Table 2-1. Summary of Major Outfall Attributes.

Outfall	Location	Receiving Stream	Estimated Flow	Largest Contributing Source Stream Types	Proposed Action	Cost Estimate ($ x 10^3)	Outfall End-state	Approx. End-state Flow (gpd)
A-11	A Area	Upper Three Runs	3.32 x 10^6 L (878,400 gpd)	Storm and cooling water discharges, steam condensate, M-Area groundwater stripper discharge.	Eliminate/treat 5 streams; 7 streams still flow to outfall.	395	Storm water	2.33 x 10^6 L 616,000 gpd
F-01	F Area	Upper Three Runs	65 x 10^3 L (17,280 gpd)	Steam condensate.	Eliminate 5 streams; 1 stream still flows to outfall.	none	Storm water	38 x 10^3 L 10,000 gpd
F-02	F Area	Upper Three Runs	622 x 10^3 L (164,448 gpd)	Dehumidifier condensate and cooling water discharges.	Eliminate/treat 11 streams; 2 streams still flow to outfall.	66	Storm water	189 x 10^3 L 50,000 gpd
F-05	F Area	Upper Three Runs	121 x 10^3 L (32,040 gpd)	Cooling water discharges.	Relocate outfall downstream; all 6 streams still flow to outfall.	28	Waste water	121 x 10^3 L 32,000 gpd
F-08	F Area	Fourmile Branch	2.95 x 10^6 L (781,493 gpd)	Cooling tower blowdown and segregated cooling water basin discharges.	Relocate outfall downstream; all 16 streams still flow to outfall.	34	Waste water	2.95 x 10^6 L 781,000 gpd
H-02	H Area	Upper Three Runs	235 x 10^3 L (62,208 gpd)	Sump, cooling water, and steam pot discharges.	Construct wetlands treatment facility; all 22 streams still flow to outfall.	1,354	Waste water	234 x 10^3 L 62,000 gpd
H-04	H Area	Upper Three Runs	19 x 10^3 L (5,040 gpd)	Steam condensate.	Eliminate/treat 2 streams; 4 streams still flow to outfall.	154	Storm water	variable
H-08	H Area	Fourmile Branch	812 x 10^3 L (214,560 gpd)	Cooling water and sump discharges, water tank overflow, and storm water.	Recycle/eliminate/divert 13 streams; 4 streams still flow to outfall.	829	Storm water	5 x 10^3 L 1,400 gpd
H-12	H Area	Fourmile Branch	79 x 10^3 L (21,000 gpd)	Cooling water discharges and cooling tower blowdown.	Relocate outfall downstream; construct peat bed treatment facility; all 12 streams still flow to outfall.	251	Waste water	79 x 10^3 L 21,000gpd
S-04	S Area	Upper Three Runs	71 x 10^3 L (18,720 gpd)	Cooling tower blowdown.	Treat 4 streams; eliminate outfall.	52	Eliminate	0 L 0 gpd

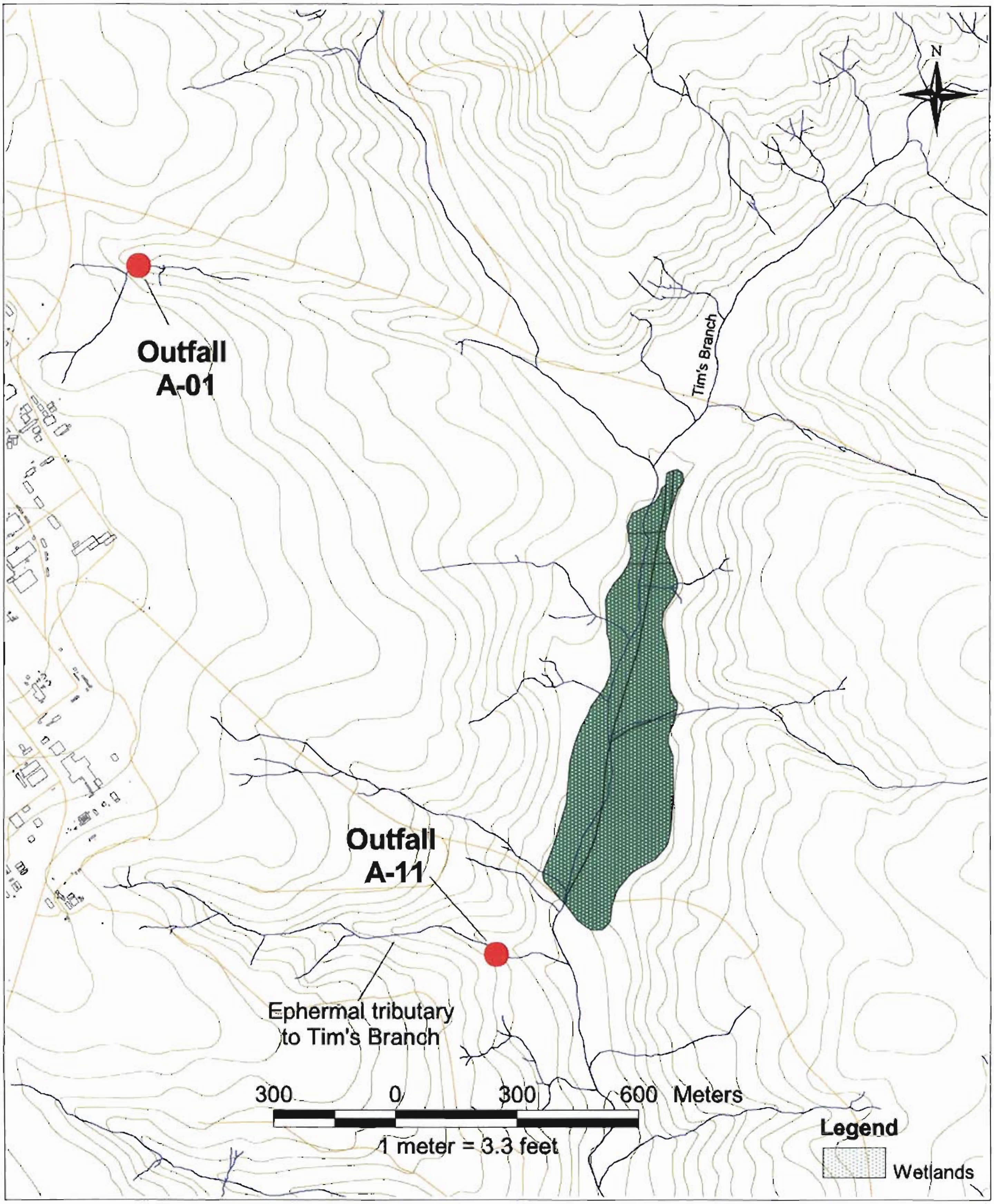

Figure 2-2. Location of Outfall A-11.

Figure 2-3. View of Outfall A-11.

Figure 2-4. View of Constructed Wetlands Treatment Facility Downstream of Outfall A-01.

Table 2-2. Outfall A-11: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (C)[1]	Alternative Action (B)	Alternative Action (G)
Reclassify A-11 as a storm water outfall. Disposition of contributing streams: • 3 streams routed to outfall A-01 • 2 streams eliminated • 7 streams still flow to A-11 • Estimated cost = $394,772	Reclassify A-11 as a storm water outfall. Disposition of contributing streams: • 1.5 streams routed to service water tank • 1.5 streams routed to CSWTF • 2 streams eliminated • 7 streams still flow to A-11 • Estimated cost = $353,000	Reclassify A-11 as a storm water outfall. Disposition of contributing streams: • 3 streams routed to service water tank • 2 streams eliminated • 7 streams still flow to A-11 • Estimated cost = $700,384	Reclassify A-11 as a storm water outfall. Disposition of contributing streams: • 2 streams routed to CSWTF • 1 stream routed to service water tank • 2 stream eliminated • 7 streams still flow to A-11 • Estimated cost = $353,000

[1] designated primary alternative to the Proposed Action.

remaining source streams would continue to be discharged through the existing outfall. All alternative actions considered would involve some construction-related activities. The proposed end state for A-11 would be reclassification as a storm water outfall. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.2 Outfall F-01

This outfall receives six contributing streams and discharges an estimated continuous flow of 65 x 10^3 liters (17,289 gallons) per day into an ephemeral tributary of Upper Three Runs (Figures 2-5 and 2-6). The largest contributing streams to this outfall include air handling unit (AHU) atmospheric and steam condensate from the south steam station and FB-Line. The proposed action for Outfall F-01 is described in Table 2-3. No alternative action has been identified for this outfall.

The proposed action 'B' would eliminate five of six contributing streams through deactivation of selected F Area facilities and administrative controls, leaving the remaining source stream (storm water runoff) to continue discharging through the existing outfall. The proposed end state for F-01 would be reclassification as a storm water outfall.

2.1.3 Outfall F-02

This outfall receives 13 contributing streams and discharges an estimated continuous flow of 622 x 10^3 liters (164,448 gallons) per day into an ephemeral tributary of Upper Three Runs (Figures 2-7 and 2-8). The largest contributing streams to this outfall include dehumidifier condensate from a production control facility and cooling water from

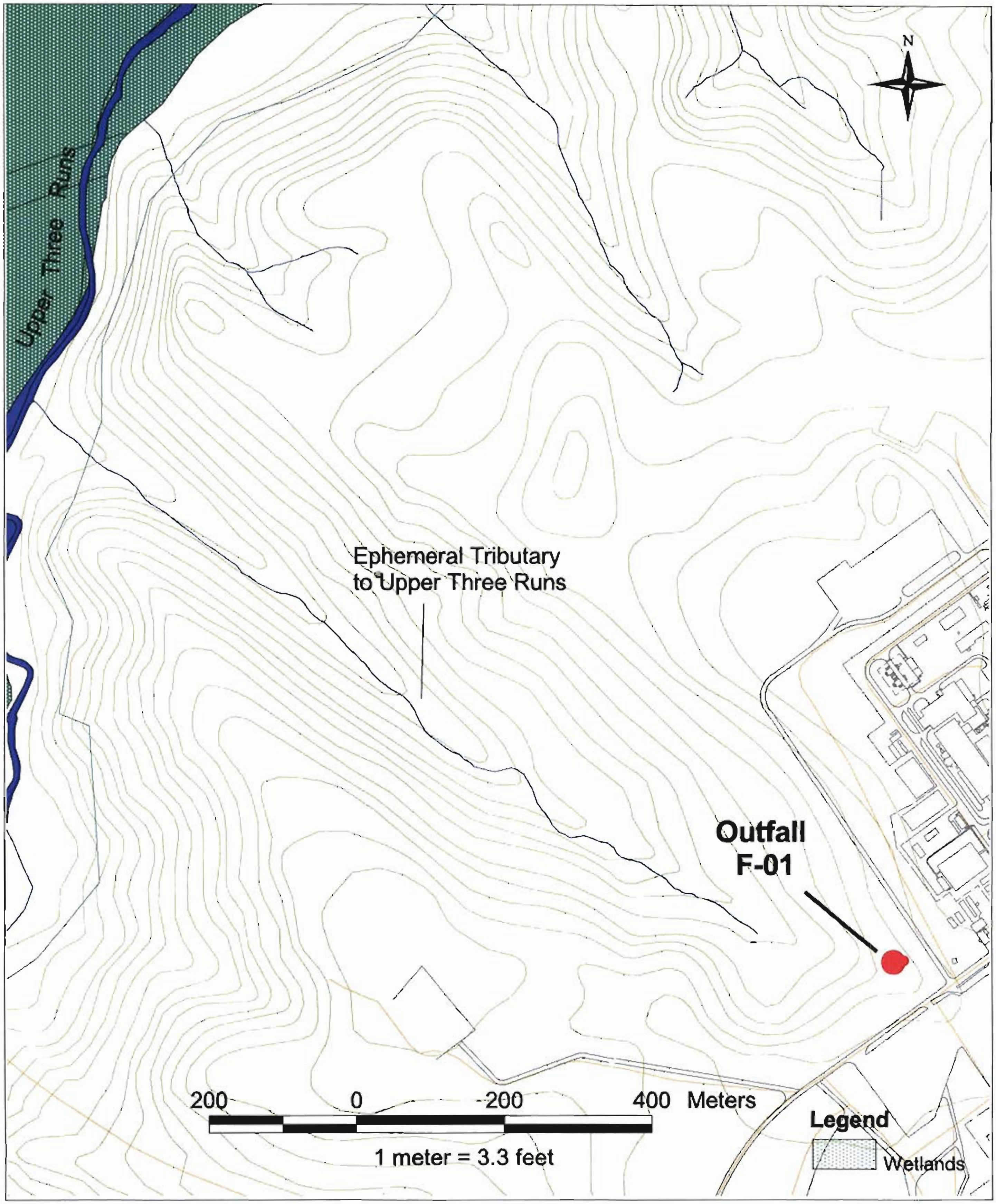

Figure 2-5. Location of Outfall F-01.

Figure 2-6. View of Outfall F-01.

Table 2-3. Outfall F-01: Proposed Action.

Proposed Action (B)	Alternative Action
Reclassify F-01 as a storm water outfall. Disposition of contributing streams: • 5 streams eliminated • 1 stream (storm water) still flows to F-01 • Estimated cost = none	None Identified.

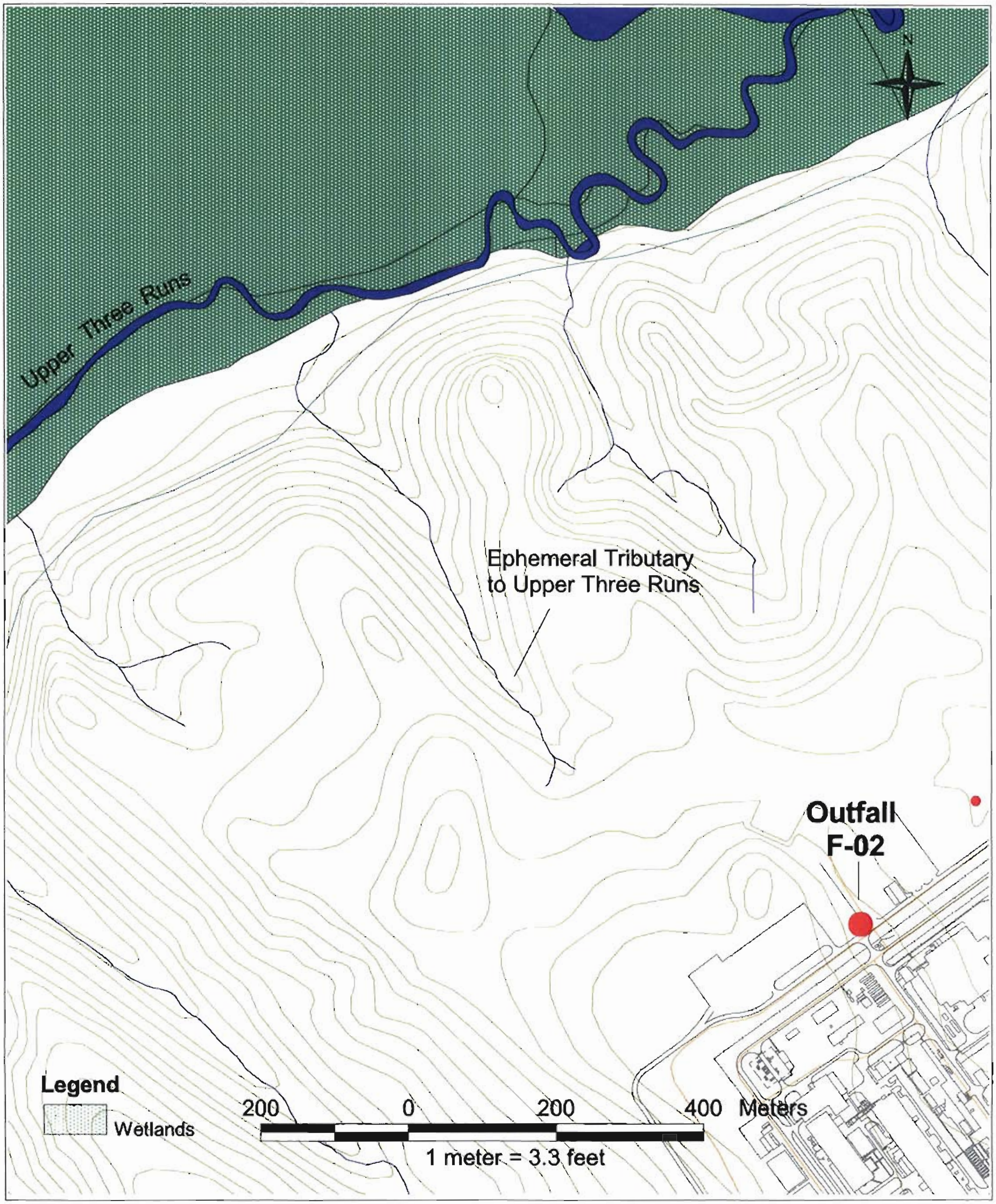

Figure 2-7. Location of Outfall F-02.

Figure 2-8. View of Outfall F-02.

Table 2-4. Outfall F-02: Proposed and Alternative Actions.

Proposed Action (G)	Alternative Action (F)[1]	Alternative Action (A)	Alternative Action (E)
Reclassify F-02 as a storm water outfall. Disposition of contributing streams: • 6 streams routed to CSWTF • 5 streams eliminated • 2 streams still flow to F-02 • Estimated cost = $65,956	Reclassify F-02 as a storm water outfall. Disposition of contributing streams • 5 streams eliminated • 2 streams routed to floor sumps • 6 streams still flow to F-02 • Estimated cost = $136,000	Reclassify F-02 as a storm water outfall. Disposition of contributing streams: • 2 streams routed to French drains • 5 streams eliminated • 6 streams still flow to F-02 • Estimated cost = $69,000	F-02 remains a wastewater outfall. Outfall relocated downstream to location of 'old Outfall F-02'. Disposition of contributing streams: • 13 streams still flow to F-02 • Estimated cost = $8,000

[1] designated primary alternative to the proposed action.

FB-Line and Building 707-1F. The proposed and alternative actions for Outfall F-02 are described in Table 2-4.

The proposed action 'G' would eliminate selected source streams through deactivation of facilities in F Area, reroute other contributing streams to the CSWTF for treatment and final disposition, and continue discharging the remaining source streams through the existing outfall. Implementation of the proposed action would involve some construction-related activities (e.g., laying pipeline for facility tie-ins) in a previously disturbed industrialized area (F Area). Alternative actions 'F' and 'A' would eliminate selected source streams through F Area facility deactivation, reroute other contributing streams to floor sumps and French drains for final disposition, and continue discharging the remaining source streams through the existing outfall. Under alternative action 'E', influent flows would be left intact, but the outfall would be moved downstream to an earlier location. Implementation of this latter action would involve limited construction related activities (e.g., construction of sampling platform, access stairs) in a previously disturbed location. With the exception of alternative action 'E', the proposed end state for F-02 would be reclassification as a storm water outfall. Under alternative action 'E', F-02 would retain its wastewater outfall designation. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.4 Outfall F-05

This outfall receives six contributing streams and discharges an estimated continuous flow of 121 x 10^3 liters (32,040 gallons) per day into a perennial tributary of Upper Three Runs (Figures 2-9 and 2-10). The predominant contributing stream to this outfall is cooling water from the Metallurgical Building. The proposed and alternative actions for Outfall F-05 are described in Table 2-5.

The proposed action 'B' would relocate the outfall downstream of a retention basin (Pond 400) which is to be built in support of the future mixed oxide fuel fabrication facility mission. Contributing flows would be routed to this basin prior to their release and subsequent discharge through the relocated outfall. Under the proposed action, Outfall F-05 would retain its designation as a wastewater outfall. Alternative actions 'D' and 'G' encompass a range of options, including the elimination of selected contributing streams (i.e., source elimination or routing to French drains) and routing selected streams to CSWTF for treatment and final disposition. Both alternative actions would continue to discharge the remaining source streams through the existing outfall. Actions 'B' and 'G' would involve limited construction-related activities (e.g., facility tie-ins, relocating outfall structure) in previously disturbed areas. The proposed end state for F-05 under the alternative actions would be reclassification as a storm water outfall. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.5 Outfall F-08

This outfall receives 16 contributing streams and discharges an estimated continuous flow of 2.95 x 10^6 liters (781,493 gallons) per day into a perennial tributary of Fourmile Branch (Figures 2-11 and 2-12). Major contributing streams to F-08 include cooling tower blowdown from Buildings 285-4F and 241-20F and discharges from the segregated cooling water basin (281-5F). The proposed and alternative actions for Outfall F-08 are described in Table 2-6.

Proposed and alternative actions 'A' and 'D' (respectively) would relocate the outfall approximately 455 meters (1500 feet) downstream of its present location but leave

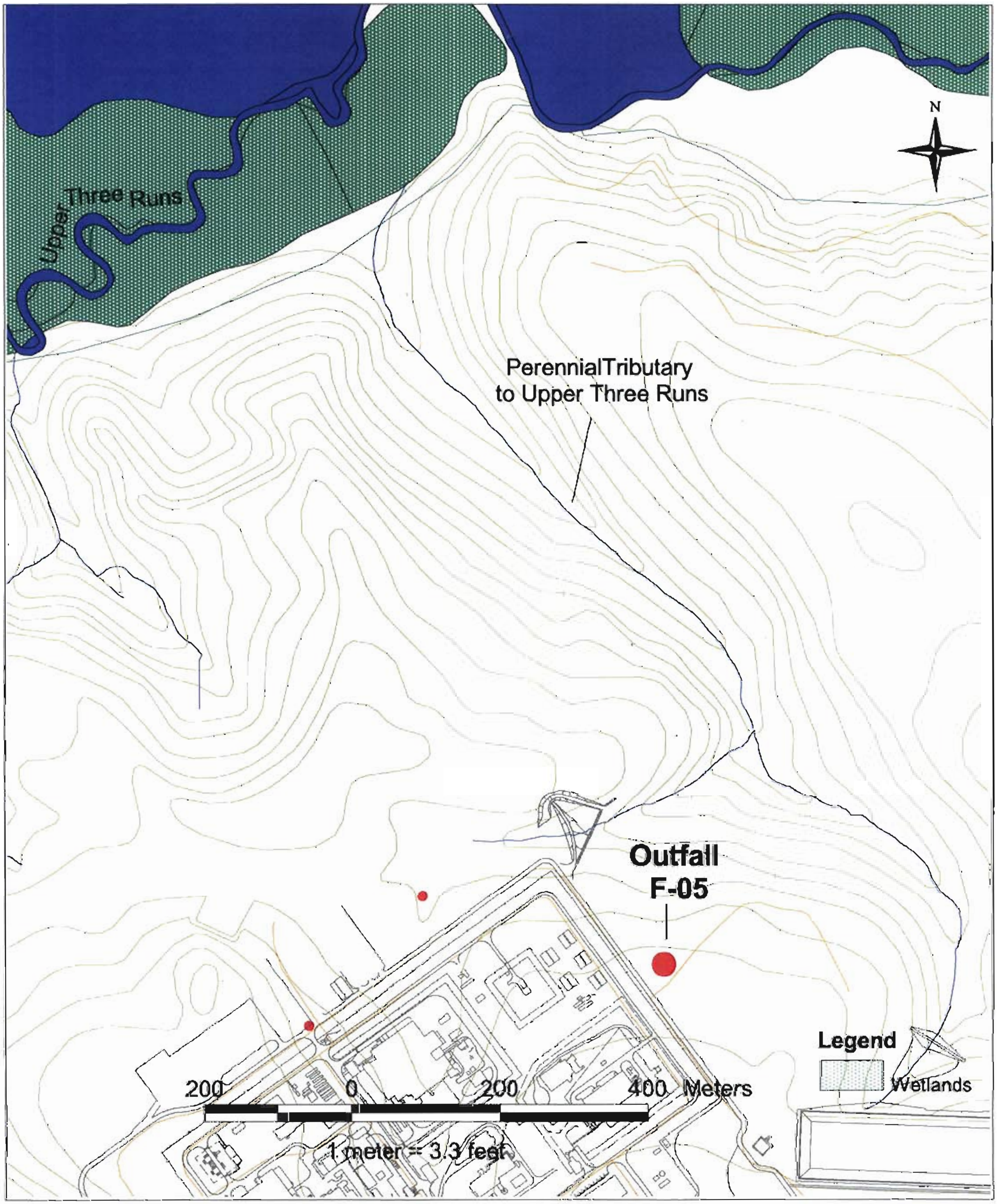

Figure 2-9. Location of Outfall F-05.

Figure 2-10. View of Outfall F-05.

Table 2-5. Outfall F-05: Proposed and Alternative Actions.

Proposed Action (B)	Alternative Action (D)[1]	Alternative Action (G)
F-05 remains a wastewater outfall. Relocate outfall downstream of present site. Disposition of contributing streams: • 6 streams still flow to F-05 • Estimated cost = $28,000	Reclassify F-05 as a storm water outfall. Disposition of contributing streams: • 1 stream eliminated • 2 streams routed to French drains • 3 streams still flow to F-05 • Estimated cost = $26,000	Reclassify F-05 as a storm water outfall. Disposition of contributing streams: • 3 streams routed to CSWTF • 3 streams still flow to F-05 • Estimated cost = $146,000

[1] designated primary alternative to the proposed action.

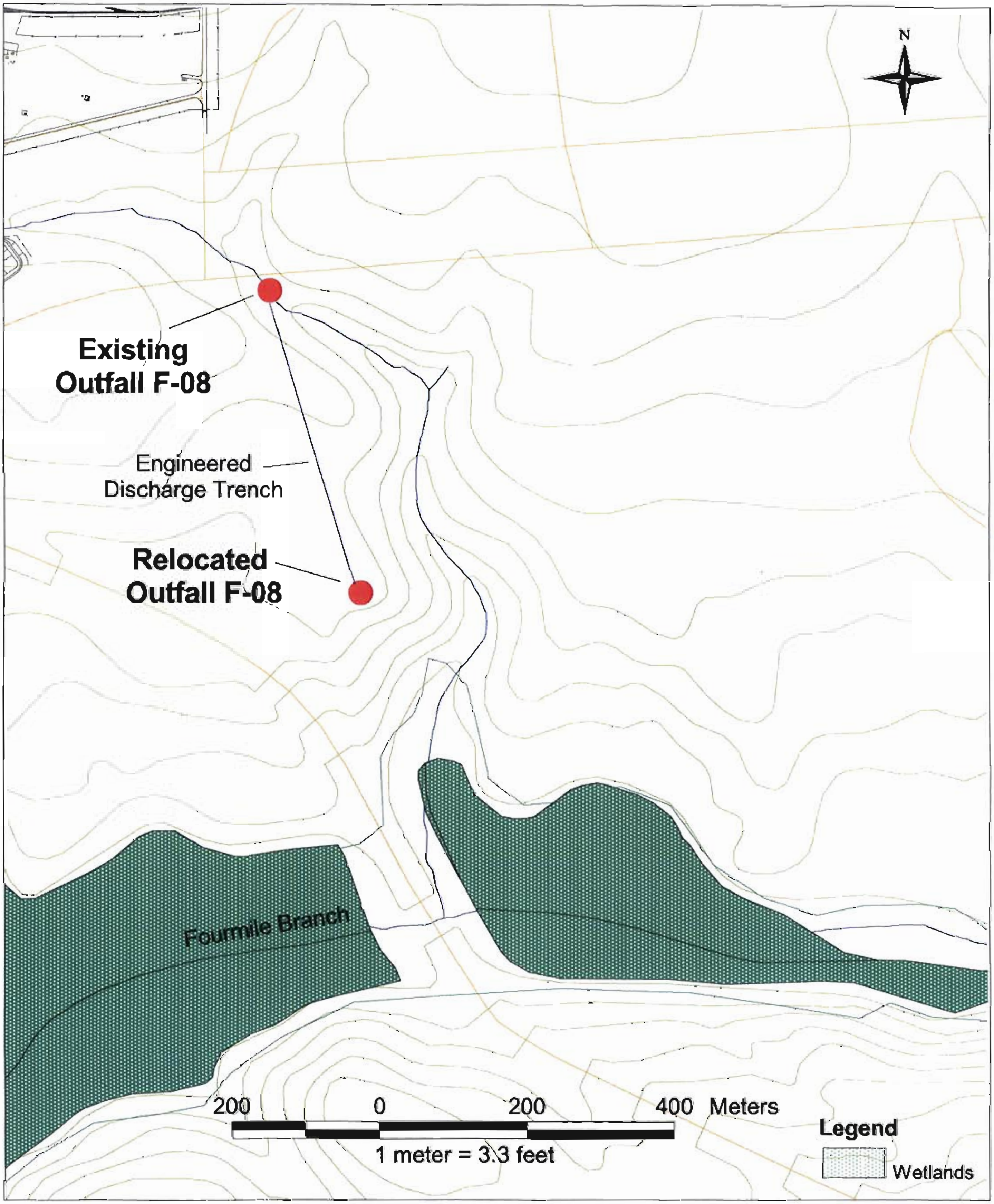

Figure 2-11. Location of Outfall F-08.

Figure 2-12. View of Existing Outfall F-08.

Figure 2-13. View of Proposed New Location for Outfall F-08 at Downstream Sheet Pile Dam.

Table 2-6. Outfall F-08: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (E)[1]	Alternative Action (C)	Alternative Action (D)
F-08 remains a wastewater outfall. Relocate outfall downstream of present site. Disposition of contributing streams: • 16 streams still flow to F-08 • Estimated cost = $34,000	F-08 remains a wastewater outfall. Disposition of contributing streams: • 5 streams routed to CSWTF • 2 streams routed to small ETP basin • 3 streams eliminated • 6 streams still flow to F-08 • Estimated cost = $227,000	F-08 remains a wastewater outfall. Description of contributing streams: • 4 streams routed through ion exchange units • 4 streams eliminated • 2 streams routed to ETP • 6 streams still flow to F-08 • Estimated cost = $1,078,753	F-08 remains a wastewater outfall. Relocate outfall downstream of present site. Pipe effluent to Fourmile Branch. Description of contributing streams: • 16 streams still flow to F-08 • Estimated cost = $1,125,000

[1] designated primary alternative to the proposed action.

influent flows intact (Figure 2-13). Alternative action 'D' would pipe effluent from the relocated outfall location directly to Fourmile Branch. Alternative actions 'E' and 'C' present a range of options, including elimination of selected source streams through deactivation of facilities in F Area, rerouting contributing streams to the CSWTF, Effluent Treatment Project (ETP), and ion exchange units for treatment and final disposition, and continuing to discharge the remaining source streams through the existing outfall. All options considered would involve construction-related activities, the most extensive associated with implementation of action 'D' (constructing pipeline to Fourmile Branch). F-08 would retain its wastewater outfall designation. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.6 Outfall H-02

This outfall receives 22 contributing streams and discharges an estimated 235 x 10^3 liters (62,208 gallons) per day into Crouch Branch, a perennial tributary of Upper Three Runs (Figures 2-14 and 2-15). The largest contributing streams to this outfall include miscellaneous sump discharges, breathing air compressor cooling water, and steam pot discharges. The proposed and alternative actions for Outfall H-02 are described in Table 2-7.

The proposed action 'H' would route all contributing flows through an expanded retention basin and constructed wetlands treatment facility prior to discharge through the existing outfall (Figure 2-16). Implementation of this action would also require completion of a successful Water Effects Ratio (WER). A WER is developed by measuring the toxicity value of the effluent in receiving stream water and dividing it by the toxicity value of the effluent measured in laboratory water. A ratio greater than one demonstrates that the effluent is less toxic in the natural environment and provides a basis

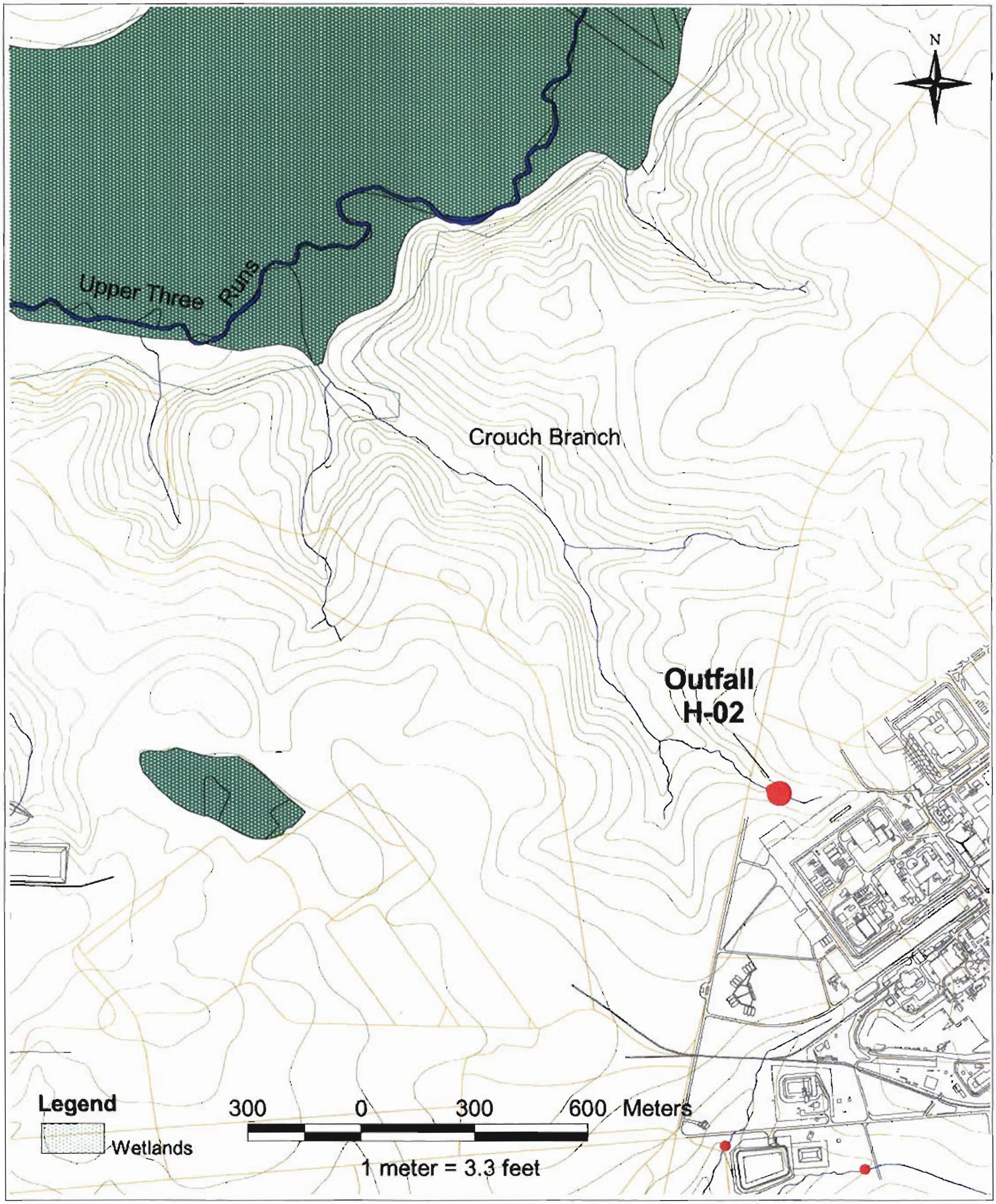

Figure 2-14. Location of Outfall H-02.

Figure 2-15. View of Outfall H-02.

Figure 2-16. View of Existing Retention Basin and Site of Proposed Constructed Wetlands Treatment Facility Upstream of Outfall H-02.

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

Proposed Action (H)	Alternative Action (A)[1]	Alternative Action (D)	Alternative Action (E)	Alternative Action (F)	Alternative Action (G)
H-02 remains a wastewater outfall (includes storm water). Expand existing retention basin and construct wetlands treatment facility upstream of outfall. Complete successful WER to increase metals limits. Disposition of contributing streams: • 22 streams still flow to H-02 • Estimated cost = $1,354,161	Reclassify H-02 as a storm water outfall. Disposition of contributing streams: • 6 streams routed to ETP • 10 streams routed to CSWTF • 1 stream routed to French drain • 1 stream recycled • 4 streams still flow to H-02 • Estimated cost = $981,436	H-02 remains a wastewater outfall. Disposition of contributing streams: • 2 streams routed to ETP • 1 stream recycled • 3 streams routed to CSWTF • 1 stream routed to French drain • 4 streams still flow to H-02 • 11 streams routed through ion exchange units • Estimated cost = $1,416,944	H-02 remains a wastewater outfall. Pipe streams to Upper Three Runs (with storm water discharge). Disposition of contributing streams: • 22 streams still flow to H-02 • Estimated cost = $4,340,680	H-02 remains a wastewater outfall. Pipe streams to existing retention basin and then to Upper Three Runs (without storm water). Disposition of contributing streams: • 21 streams still flow to relocated H-02 • 1 stream to newly designated storm water outfall • Estimated cost = $5,887,500	H-02 remains a wastewater outfall; Pipe streams to existing retention basin and then to constructed wetlands treatment facility (without storm water); Disposition of contributing streams: • 22 streams still flow to H-02 • Estimated cost = $2,062,515

[1] designated primary alternative to the proposed action.

for petitioning the State for higher (less stringent) permit effluent limits. Alternative action 'G' would route contributing streams, excluding storm water, through the existing retention basin and a constructed wetlands treatment facility before discharge through the existing outfall. Alternative actions 'A' and 'D' present a range of options which include the elimination of stream sources (e.g., recycling, routing to French drains); diverting contributing streams to ETP, CSWTF, and ion exchange units for treatment and final disposition; and continue discharging the remaining streams through the existing outfall. Alternative action 'E' would pipe all contributing streams from the existing outfall directly to Upper Three Runs. Alternative action 'F' would route all contributing streams, except storm water, through the existing retention basin and relocated H-02 outfall before piping them directly to Upper Three Runs. Storm water would continue to discharge through the old H-02 outfall, which would be renamed and redesignated as a storm water outfall. Implementation of all outfall options would involve construction-related activities. Construction associated with actions 'H', 'A', 'D', and

'G' (e.g., expanding the retention basin, facility tie-ins, construction of wetlands and ion exchange treatment facilities) would occur in previously disturbed areas. The proposed pipeline construction associated with options 'E' and 'F' would occur in previously undisturbed areas of the Crouch Creek stream corridor. Under actions 'H', 'D', 'E', 'F', and 'G', Outfall H-02 would retain its wastewater designation. The proposed end state for H-02 under action 'A' would be reclassification as a storm water outfall. Also, as part of action 'F', a 'new' storm water outfall would be created. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.7 Outfall H-04

This outfall receives six contributing streams and discharges approximately 19 x 10^3 liters (5,040 gallons) per day into an ephemeral tributary of Upper Three Runs (Figures 2-17 and 2-18). The largest contributing stream to this outfall is condensate for the south steam station. The proposed and alternative actions for Outfall H-04 are described in Table 2-8.

The proposed action 'A' would route selected contributing streams to CSWTF and French drains for treatment and final disposition. The remaining source streams would continue to be discharged through the existing outfall. Alternative actions 'C' and 'B' incorporate a range of activities, including routing selected source streams to ETP, basin 281-55, and French drains for treatment and final disposition. Both of these alternatives would continue to discharge the remaining contributing streams through the existing outfall. All actions considered would involve construction-related activities in a previously disturbed area (H Area). The proposed end state for H-04 under all options considered is reclassification to a storm water outfall. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.8 Outfall H-08

This outfall receives 17 contributing streams and discharges an estimated 812 x 10^3 liters (214,560 gallons) per day into an ephemeral tributary of Fourmile Branch (Figures 2-19 and 2-20). The largest contributing streams to this outfall include Gatehouse 701-1H cooling water discharges, overflow from service water tank 282-H, service water pump deck sump discharges (Building 282-H), and storm water. The proposed and alternative actions for Outfall H-08 are described in Table 2-9.

The proposed and alternative actions ('A' and 'B', respectively) would reduce flows to the outfall by diverting selected contributing streams to Outfall H-12, elimination and recycling of other source streams, and rerouting selected contributing streams to Ash Basin 288-H for final disposition. The remaining contributing streams would continue to be discharged through the existing outfall. Both the proposed and alternative actions would involve limited construction-related activities (e.g., facility tie-ins) in a previously

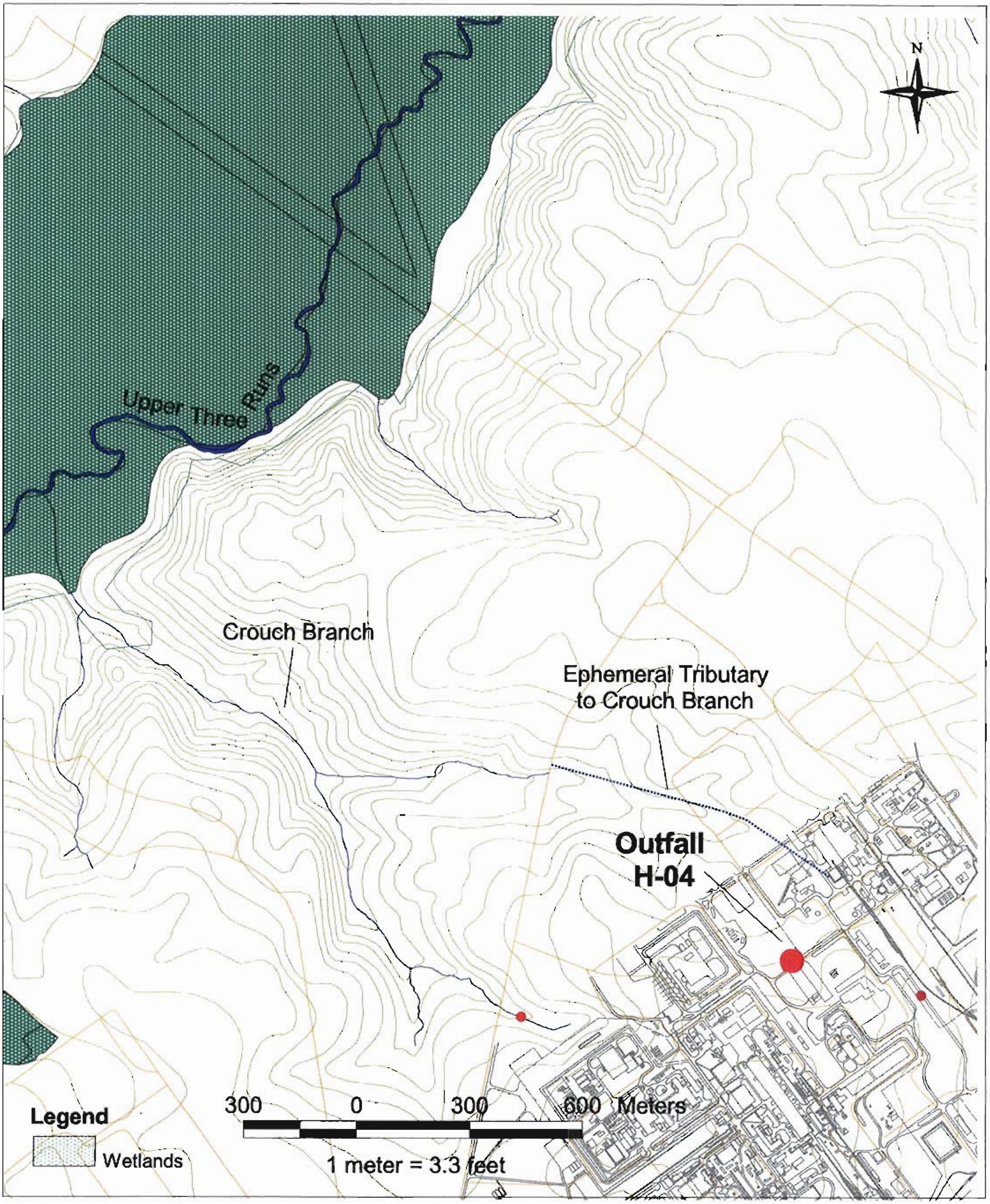

Figure 2-17. Location of Outfall H-04.

Figure 2-18. View of Outfall H-04.

Table 2-8. Outfall H-04: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (C)[1]	Alternative Action (B)
Reclassify H-04 as a storm water outfall. Disposition of contributing streams: • 1 stream routed to CSWTF • 1 stream routed to French drain • 4 streams still flow to H-04 • Estimated cost = $154,000	Reclassify H-04 as a storm water outfall. Disposition of contributing streams: • 1 stream routed to ETP • 1 stream routed to French drain • 4 streams still flow to H-04 • Estimated cost = $197,000	Reclassify H-04 as a storm water outfall. Disposition of contributing streams: • 1 stream routed to basin 281-5H • 1 stream routed to French drain • 4 streams still flow to H-04 • Estimated cost = $194,000

[1] designated primary alternative to the proposed action.

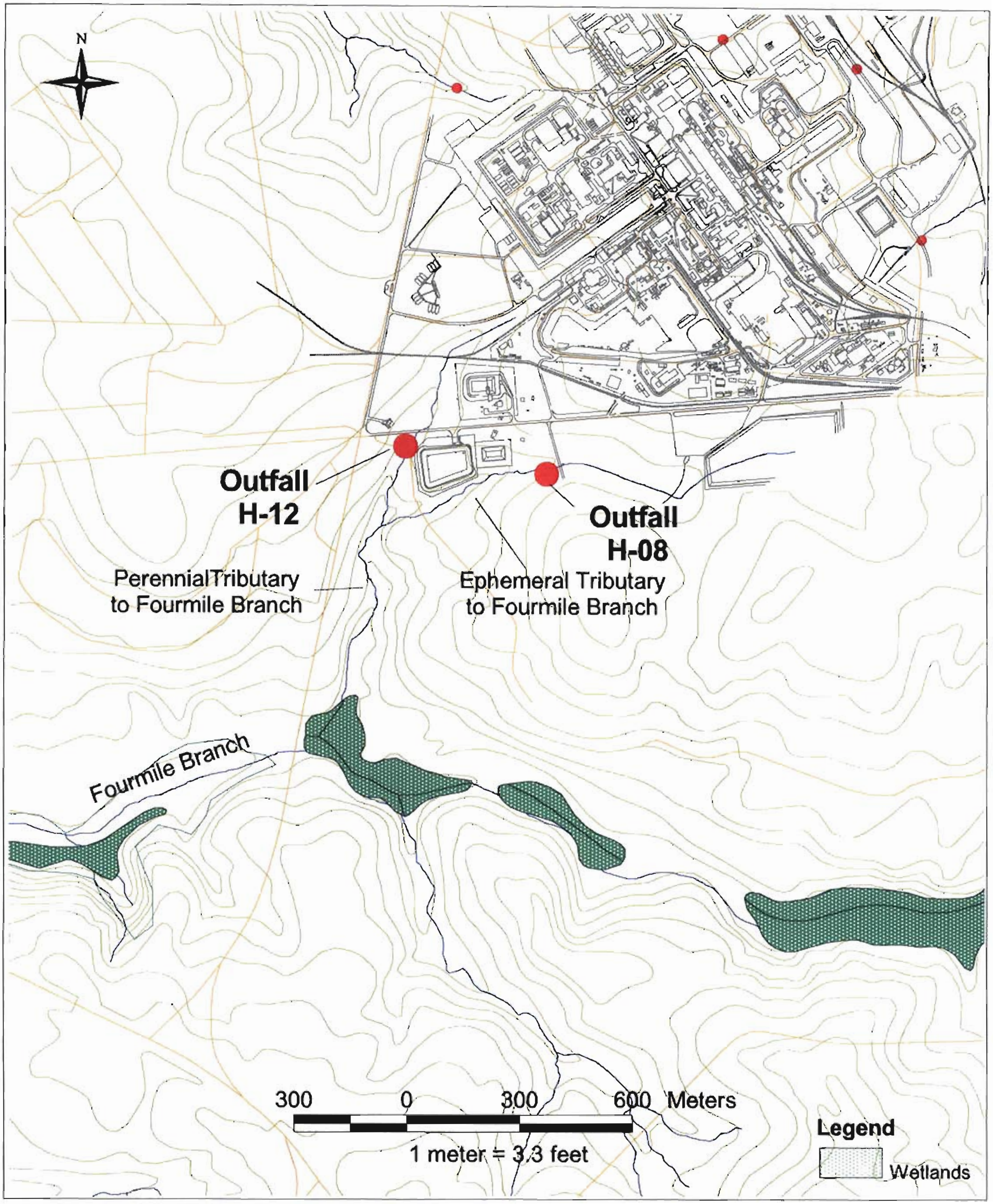

Figure 2-19. Location of Outfalls H-08 and H-12.

Figure 2-20. View of Outfall H-08.

Table 2-9. Outfall H-08: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (B)[1]
Reclassify H-08 as a storm water outfall. Disposition of contributing streams: • 5 streams routed to outfall H-12 • 2 streams eliminated • 2 streams recycled • 4 streams routed to Ash Basin 288-H • 4 streams still flow to H-08 • Estimated cost = $829,407	Reclassify H-08 as a storm water outfall. Disposition of contributing streams: • 4 streams to outfall H-12 • 3 streams eliminated • 2 streams recycled • 4 streams routed to Ash Basin 288-H • 4 streams still flow to H-08 • Estimated cost = $1,171,854

[1] designated primary alternative to the proposed action.

disturbed area (H Area). The proposed end state for H-08 under both options is reclassification to a storm water outfall. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.9 Outfall H-12

This outfall receives 12 contributing streams and discharges an estimated 79 x 10^3 liters (21,000 gallons) per day into a perennial tributary of Fourmile Branch (Figures 2-19 and 2-21). The largest contributing streams to this outfall include process pump cooling water and cooling tower blowdown (Buildings 241-13H and 285-10H). The proposed and alternative actions for Outfall H-12 are described in Table 2-10.

Proposed and alternative actions 'A' and 'C' (respectively) would relocate the outfall downstream of its present location and install a peat bed for side-stream treatment of influent. Implementation of these actions may also require the successful completion of a WER to increase metals limits. Proposed action 'A' would continue to discharge all contributing flows through the outfall. Alternative action 'C', however, would reduce flow to the outfall by rerouting selected source streams to ETP and CSWTF for treatment and final disposition, recycling other source streams, and diverting one contributing stream (production well flush water) to a nearby storm water outfall. The remaining contributing streams would be discharged through the outfall. Alternative action 'D' would reduce flow to the outfall in the same manner as alternative action 'C', but would pipe the remaining contributing streams from the existing outfall directly to Fourmile Branch. All actions considered would involve construction-related activities (e.g., installation of peat beds, facility tie-ins), the most extensive associated with implementation of action 'D' (installation of pipeline to Fourmile Branch). Under all options considered, H-12 would retain its designation as a wastewater outfall. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.1.10 Outfall S-04

This outfall receives four contributing streams and discharges an estimated 71 x 10^3 liters (18,720 gallons) per day into an ephemeral tributary of Upper Three Runs (Figures 2-22 and 2-23). The largest contributing stream to this outfall is cooling tower blowdown (Building 981-S). The proposed and alternative actions for Outfall S-04 are described in Table 2-11.

The proposed action 'H' would eliminate the outfall by diverting all contributing streams to CSWTF for treatment and final disposition. Alternative actions 'B' and 'C' would install a peat bed and ion exchange treatment facilities (respectively) and continue to discharge all contributing streams through the existing outfall. Alternative actions 'E' and 'G' would relocate the outfall downstream beyond the S-03 basin and continue discharging all contributing streams. Whereas action 'E' would require completion of a successful WER to increase metals limits, action 'G' would install a peat bed treatment system to remove these constituents of concern. All actions considered would involve construction-related activities (e.g., facility tie-in, construction of peat beds and ion exchange units, relocating outfall structures) in a previously developed area (S Area). The end state for actions 'B', 'C', 'E', and 'G' would be for S-04 to retain its designation

Figure 2-21. View of Outfall H-12.

Table 2-10. Outfall H-12: Proposed and Alternative Actions.

Proposed Action (A)	Alternative Action (C)[1]	Alternative Action (D)
H-12 remains a wastewater outfall. Relocate outfall downstream of present site. Install peat bed for side-stream treatment. Complete successful WER as necessary to increase metals limits. Disposition of contributing streams: • 12 streams still flow to H-12 • Estimated cost = $251,108	H-12 remains a wastewater outfall. Relocate outfall downstream of present site. Install peat bed for side-stream treatment. Complete successful WER as necessary to increase metals limits. Disposition of contributing streams: • 2 streams routed to ETP • 2 streams routed to CSWTF • 2 streams recycled • 1 stream routed to nearest storm water outfall • 5 streams still flow to H-12 • Estimated cost = $828,515	H-12 remains a wastewater outfall. Pipe effluent to Fourmile Branch. Disposition of contributing streams: • 2 streams routed to ETP • 2 streams routed to CSWTF • 2 streams recycled • 1 stream routed to storm water outfall • 5 streams still flow to H-12 • Estimated cost = $773,610

[1] designated primary alternative to the proposed action.

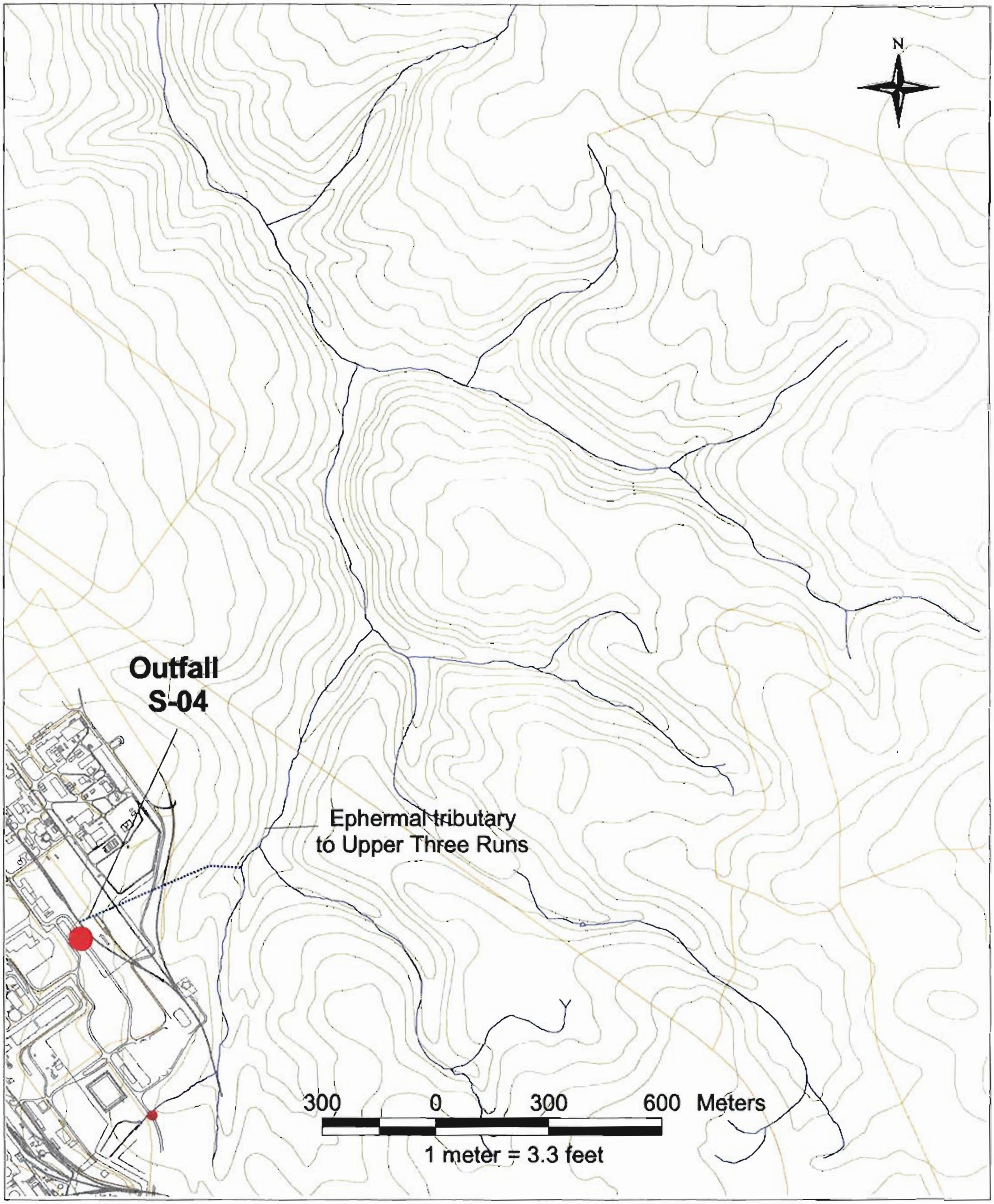

Figure 2-22. Location of Outfall S-04

Figure 2-23. View of Outfall S-04.

Table 2-11. Outfall S-04: Proposed and Alternative Actions.

Proposed Action (H)	Alternative Action (B)[1]	Alternative Action (C)	Alternative Action (E)	Alternative Action (G)
S-04 is eliminated; Disposition of contributing streams: • 4 streams routed to CSWTF • Estimated cost = $51,938	S-04 remains a wastewater outfall; Install peat bed upstream of outfall; • 4 streams still flow to S-04 • Estimated cost = $1,171,854	S-04 remains a wastewater outfall; Install ion exchange units upstream of outfall; • 4 streams still flow to S-04 • Estimated cost = $246,704	S-04 remains a wastewater outfall; Relocate outfall further downstream past S-03 basin; Complete successful WER to increase limits; • 4 streams still flow to S-04 • Estimated cost = $19,599	S-04 remains a wastewater outfall; Relocate outfall further downstream past S-03 basin; Install peat bed upstream of outfall; • 4 streams still flow to S-04 • Estimated cost = $183,973

[1] designated primary alternative to the proposed action.

as a wastewater outfall. A comparative analysis and relative ranking of the respective outfall options can be found in Shipman and Bugher (2004).

2.2 No Action Alternative

The No Action Alternative would consist of DOE continuing to discharge from the outfalls with no changes in effluent quality other than that resulting from the elimination of contributing streams due to the deactivation of F Area. If no action is taken, DOE may not be in compliance with the requirements of the renewed NPDES wastewater permit.

3.0 AFFECTED ENVIRONMENT

SRS is a 803 square kilometers (310-square miles) Federal reservation located along the Savannah River in southwestern South Carolina (Figure 1-1). The site is approximately 40 kilometers (25 miles) southeast of Augusta, Georgia and 32 kilometers (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 national defense. However, with the end of the Cold War, the site's primary mission has 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 environmental impacts of 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 (approximately 80 percent of land area), with the remainder consisting of aquatic habitats and developed areas (Halverson et al. 1997). The developed landscapes consist primarily of roadways, administrative, and industrialized areas that are continually exposed to high levels of human disturbance (Noah 1995). The majority of proposed and alternative actions considered in this EA (including the No Action alternative) would occur either within existing developed areas (i.e., F, H, and S Areas) or in contiguous transitional zones (the interface between a heavily-developed area and relatively undeveloped woodlands). The exceptions would be selected actions associated with Outfalls F-08, H-12, and H-02 which would involve pipeline construction in the relatively undisturbed floodplains of tributary streams to Fourmile Branch and Upper Three Runs, respectively.

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 120 centimeters (47 inches) per year (Workman and McLeod 1990). Generally, the spring and autumn seasons tend to be drier than the winter and summer seasons. Spring and summer thunderstorms can be intense.

More detailed information regarding SRS meteorology and climatology can be found in Bauer et al. (1989).

3.3 Geology and Soils

The physiography of SRS is comprised of two major 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 in the Upper Atlantic Coastal Plain of South Carolina. Its sandy sediments dominate the SRS landscape and range in elevation from 76-121 meters (250-400 feet) above mean sea level (msl). The alluvial terraces of the Savannah River occur below the 76 meters (250 feet) msl. The outfall project areas lie just north of the interface between these two physiographic components (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 previously developed or disturbed areas where the existing outfalls are located are mapped as Udorthents (Uo; 0 – 6 percent slope). Soils along the H-12 discharge ditch are mapped as Fluvaquents (Fa; 0 – 1 percent slope) and Vaucluse-Ailey Complex (VeC; 6 – 10 percent slope). Soils downstream of H-02 within the Crouch Creek stream corridor are mapped as Vaucluse sand (VaB; 2 – 6 percent slope), Fluvaquents (Fa; 0 – 1 percent slope), Troup and Lucy sands (TuE; 15 – 25 percent slope), and Blanton sand (BaB; 0 – 6 percent slope). Soils downstream of the sheet piling at the end of the F-08 discharge trench are mapped as Fluvaquents (Fa; 0 – 1 percent slope) (Rogers 1990).

3.4 Surface Hydrology

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 (PAR Pond and L Lake) on SRS (Figure 3-1). Outfalls A-11, F-01, F-02, F-05, H-02, H-04, and S-04 discharge to tributaries of Upper Three Runs (Figures 2-2, 2-5, 2-7, 2-9, 2-14, 2-17, and 2-22, respectively), while outfalls F-08, H-08, and H-12 discharge to tributaries of Fourmile Branch (Figures 2-11 and 2-19, respectively). Additional information regarding SRS surface hydrology can be found in Halverson et al. (1997).

3.5 Ecological Resources

Since 1951, when the U.S. Government acquired SRS, natural resource management practices and natural succession outside of the developed areas have resulted in increased ecological complexity and diversity on the site. As noted in Section 3.1, SRS's terrestrial

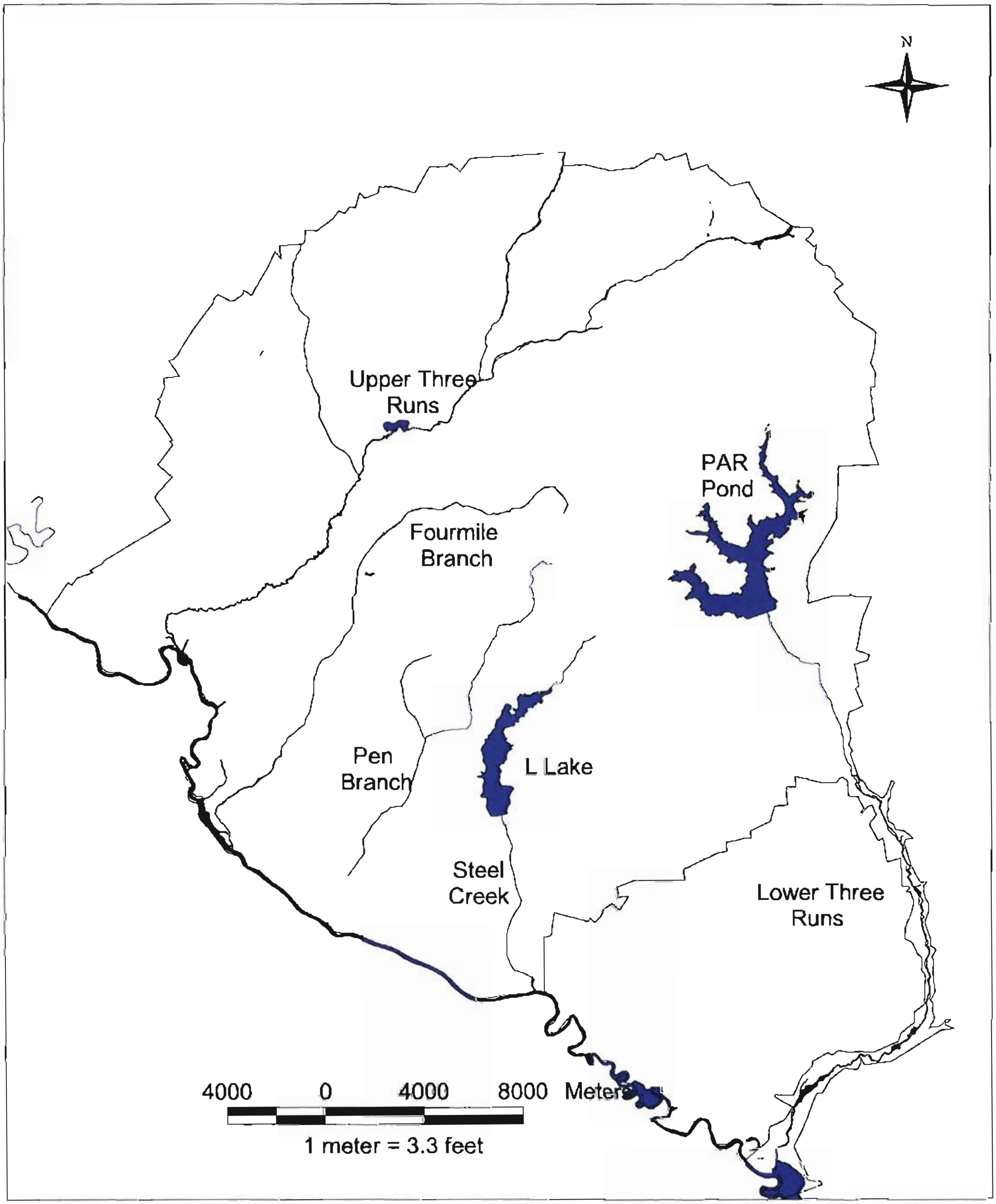

Figure 3-1. Savannah River Site Surface Hydrology.

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; Halverson et al. 1997). The areas into which the subject outfalls discharge are generally dominated by lowland mixed pine-hardwood and bottomland forest. These habitats are dominated by mixtures of pine and hardwoods suited to moist to wet poorly-drained soil conditions (Imm 2004; Nelson 2004). As discussed in Section 4.0, a number of alternative actions associated with outfalls H-02 and F-08 could impact floodplain hydrology and jurisdictional wetlands.

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*), American alligator (*Alligator mississippiensis*), shortnose sturgeon (*Acipenser brevirostrum*), 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 outfall project areas (Imm 2004). Additional information regarding the ecological characteristics of SRS can be found in Halverson et al. (1997).

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). Zone 1 represents areas with the greatest potential for having significant resources; Zone 2 possesses areas with moderate potential; and Zone 3 represents areas of low archaeological significance.

Industrialized areas of SRS possess a low archaeological sensitivity because it is likely that any resources that may have been originally present were destroyed during construction-related activities. However, any undisturbed stream corridors into which the subject outfalls discharge would possess greater archaeological potential. Archaeological surveys of the project areas associated with Outfalls F-8 and H-12 have been conducted by the SRARP and no potential sites of interest identified (Sassaman and Gillam, 1993). As discussed in Section 4.2.6, a preliminary survey of the Outfall H-02 project area (Crouch Creek stream corridor) is currently being conducted. If any sites of interest are identified, and DOE chooses alternative action 'E' or 'F', the required consultation process would be initiated and the appropriate mitigation steps completed before project implementation.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTIONS AND ALTERNATIVES

The scope of this EA encompasses 35 proposed and alternative actions. A number of these actions involve common activities which can be grouped for purposes of analysis. Section 4.1 provides an analysis of the potential environmental impacts associated with implementation of these common activities. Also included in Section 4.1 is a discussion of activities which are included within the scope of this EA but are tiered to or contingent upon actions reviewed in other NEPA documents. Section 4.2 provides an analysis of actions which are outfall- or site-specific in their application and impact.

4.1 Assessment of Common and Tiered Activities

4.1.1 Utilization of CSWTF and ETP

A number of proposed and alternative actions would involve the routing of contributing outfall streams to the CSWTF and/or ETP for treatment and final disposition. The impacts of constructing and operating these facilities have been assessed in previous NEPA documents (DOE 1987, 1993). The potential impacts associated with the diversion of outfall streams to these facilities would be negligible and bounded by these previous NEPA reviews. Presently, there is an ongoing CSWTF treatability study to confirm that the proposed additional increases in hydrologic loading would not adversely impact that facility. If, after completion of the treatability study, it is determined that facility upgrades would be required to accommodate the additional loading, DOE would prepare the appropriate NEPA reviews.

4.1.2 Construction-Related and Soil Disturbing Activities

Numerous outfall actions would involve construction-related and soil disturbing activities within previously disturbed areas (e.g., constructing lift stations, laying pipe for facility tie-ins). These activities would be short-lived, cause minimal disruption to facility or area operations, and be conducted using best management practices (e.g., be compliant with applicable storm water and sediment erosion control regulations). Air emissions resulting from these activities (e.g., equipment emissions, fugitive dust) would be minimal and not require permitting. The potential for these activities to significantly impact the human environment (e.g., air, aquatic, and terrestrial resources, biota) would be negligible.

4.1.3 Deactivation of F Area Facilities

A number of outfall actions are viable because the pending deactivation of selected F Area facilities will result in the elimination of contributing waste streams. The environmental impacts associated with these deactivation activities have been reviewed in other NEPA documentation.

4.1.4 Human Health and Environmental Justice

Impacts to worker health and safety would be negligible due to the use of personal protective clothing and equipment and enforcement of Occupational Safety and Health Act (OSHA) compliant work conditions. With the exception of improved surface water quality, impacts associated with project implementation would be short-lived (unless otherwise noted in Section 4.2), limited to specific geographic areas within SRS, and not be evidenced beyond the site boundary. Therefore, the potential for significantly impacting public health and safety or engendering environmental justice issues would be negligible.

4.1.5 Socioeconomic Resources

Workforce requirements and costs associated with the proposed outfall projects would be minimal when compared to the total SRS budget and employment ($1.15 billion per year and 12,000 personnel, respectively) (Tables 2-1 through 2-11). Consequently, the potential for significant socioeconomic impacts would be negligible.

4.1.6 Archaeological and Cultural Resources

Many of the proposed and alternative actions would occur in areas possessing low archaeological sensitivity because they have been subjected to extensive land alterations, timber operations, or modern construction. Unless otherwise noted in Section 4.2, the potential for significantly impacting archaeological or cultural resources would be negligible (Sassaman and Gillam 1993).

4.1.7 Threatened and Endangered Species and Floodplain/Wetland Resources

None of the proposed or alternative outfall actions would occur in areas where Federally-listed T&E species are known to occur. A recent biological evaluation (BE) of proposed pipeline routes downstream of Outfalls F-08, H-02, and H-12 confirmed that there would be no effect on these sensitive species (Imm, 2004) (Appendix B). With the exception of selected actions associated with Outfalls F-08, H-02, and H-12 (see Section 4.2), none of the proposed outfall projects would significantly impact floodplain hydrology or jurisdictional wetlands (Nelson 2004) (Appendix A). None of the proposed actions or alternatives would be expected to have a measurable impact on any migratory avian species.

4.2 Outfall-Specific Impact Assessment

Following is an analysis of outfall-specific impacts associated with project implementation. Table 4-1 provides a summary impact matrix for all outfall actions considered.

Table 4-1. Outfall Summary Impact Matrix.

Environmental Attributes	Outfalls									
	A-11	F-01	F-02	F-05	F-08	H-02	H-04	H-08	H-12	S-04
Water Quality	(A)[1] (C)[2] (B) (G)	(B)[1]	(G)[1] (F)[2] (A) (E)	(B)[1] (D)[2] G	(A)[1] (E)[2] (C) (D)	(H)[1] (A)[2] (D) (E) (F) (G)	(A)[1] (C)[2] (B)	(A)[1] (B)[2]	(A)[1] (C)[2] (B)	(H)[1] (B)[2] (C) (E) (G)
Floodplain Hydrology					(D)					
Jurisdictional Wetlands					(D)	(E) (F)				
Disturb Contaminated Soils					(D)				(B)	
Air Quality										
T&E Species/Migratory Birds										
Cultural Resources						(E)[3] (F)[3]				
Human Health										
Disrupts Operations										
Socioeconomic Resources										

A-G designations indicate proposed and alternative actions
1 Proposed action
2 Designated primary alternative to proposed action
3 Ongoing field investigation by SRARP

[ ] No environmental impact

4.2.1 Outfall A-11

Project implementation would involve construction-related (e.g., lift station) and soil disturbing activities (e.g., trenching for pipeline) to facilitate tie-in to Outfall A-01. These activities would occur in a previously disturbed area (A Area) and would not adversely impact the human environment (see Sections 4.1.2 and 4.1.7). There are no known waste sites or areas of contaminated soil which would be disturbed by the proposed or alternative actions. The proposed routing of selected waste streams to the A-01 constructed wetlands treatment facility (proposed action 'A') and CSWTF (alternative actions 'C' and 'G') for treatment and final disposition would not adversely impact facility operations or performance (see Sections 4.1.1). The increase and reduction in hydrologic flows to Outfalls A-01 and A-11, respectively, is not expected to adversely impact floodplain hydrology or biota in the receiving streams (Figure 2-2).

The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). Water quality impacts would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.2 Outfall F-01

The proposed action involves the elimination of all contributing streams (except storm water) through the deactivation of selected F Area facilities and implementation of administrative controls (see Section 4.1.3). The only remaining contributing stream to the outfall would be storm water runoff originating from several catch basins. The reduced hydrologic loading to Outfall F-01 is not expected to adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-5).

The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). Water quality impacts would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.3 Outfall F-02

The proposed action 'G' and alternative actions 'F' and 'A' would involve the elimination of selected contributing streams through the deactivation of facilities (see Section 4.1.3). Implementation of the proposed action 'G' and alternative action 'E' would involve some construction-related and soil disturbing activities to facilitate tie-in to CSWTF and relocate the outfall to a previous site downstream of its present location (respectively) (Table 2-4). These activities would occur in previously disturbed areas and would not significantly impact the human environment (see Section 4.1.2). There are no known waste sites or areas of contaminated soil which would be disturbed by the proposed or alternative actions. The routing of selected waste streams to CSWTF for treatment and final disposition (proposed action 'G') would not adversely impact facility operations or performance (see Sections 4.1.1). The proposed reduction in flows to Outfall F-02 (actions 'A', 'F' and 'G') would not adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-7).

The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). Water quality impacts would be beneficial. A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.4 Outfall F-05

The proposed action 'B' involves the relocation of the outfall downstream of a yet to be constructed retention basin. Basin construction and associated drainage modifications are being assessed in a separate NEPA document and are not part of the scope of this EA. Relocation of the outfall downstream of the basin in a previously disturbed area would not significantly impact the human environment (see Section 4.1.2). Implementation of alternative action 'G' would involve some construction-related and soil disturbing activities to facilitate tie-in to CSWTF (see Table 2-5). These activities would occur in a previously disturbed area (F Area) and would not significantly impact the human environment (see Section 4.1.2). The routing of selected waste streams to CSWTF for treatment and final disposition is not expected to adversely impact facility operations and performance (Section 4.1.1). There are no known waste sites or areas of contaminated soil which would be disturbed by the proposed or alternative actions. The proposed reduction in flow to the outfall (alternative actions 'D' and 'G') is not expected to adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-9).

The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.5 Outfall F-08

Two outfall actions (proposed and alternative actions 'A' and 'D', respectively) would relocate the outfall structure approximately 455 meters (1500 feet) downstream at the site of the sheet pile dam in the F-08 discharge trench (Figure 4-1). Construction-related activities associated with relocating the outfall structure (e.g., sampling platform and stairs) would occur in a previously disturbed area and would not significantly impact the human environment (see Section 4.1.2). Whereas the proposed action 'A' would not divert flow from the existing drainage, action 'D' would pipe all discharges from the sheet pile dam to Fourmile Branch. Much of the construction activity associated with burying this pipe would occur within the 100-year floodplain, portions of which include jurisdictional wetlands. Portions of this floodplain, which have previously been impacted by the Mixed Waste Management Facility dam and irrigation system, contain

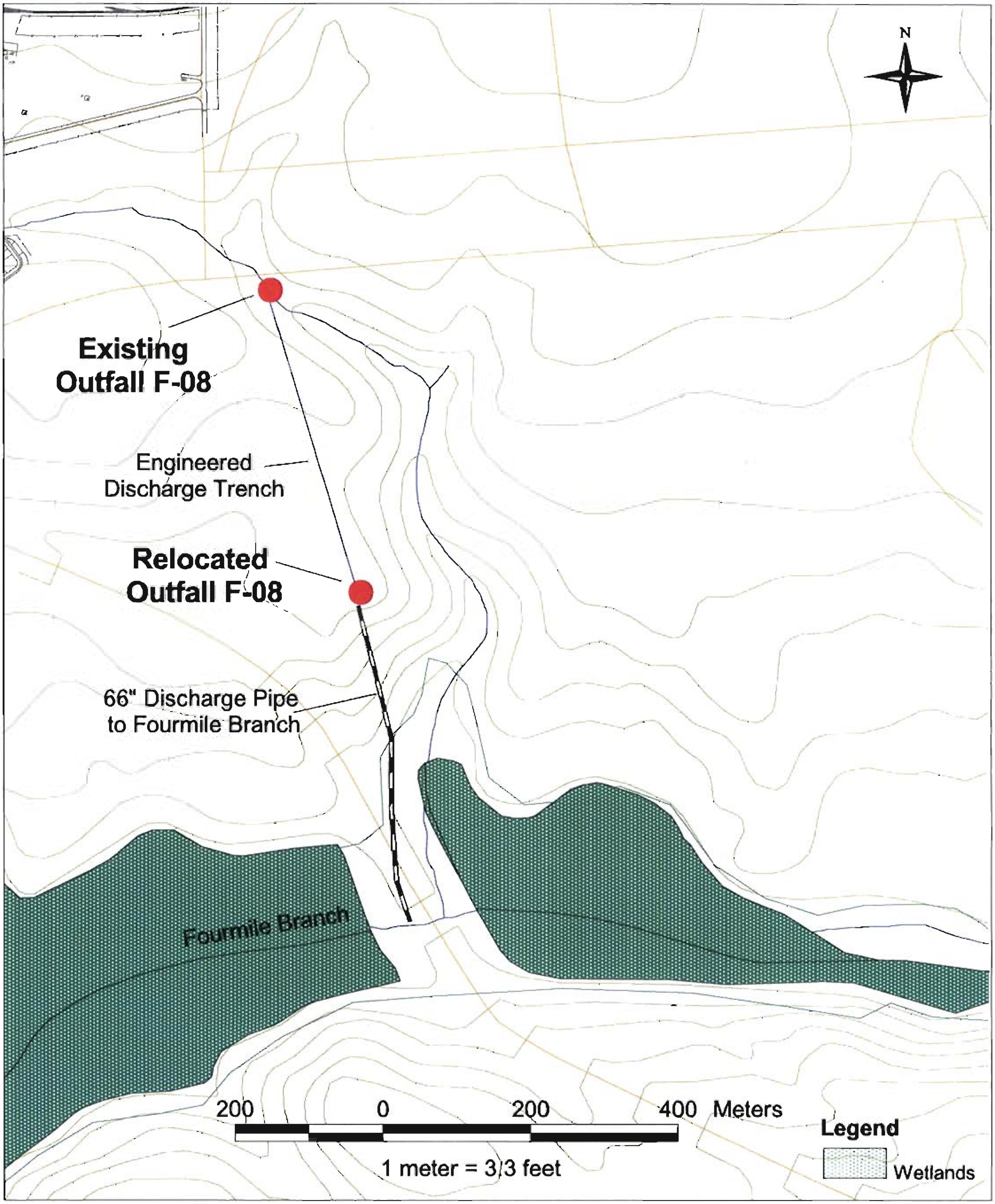

Figure 4-1. Outfall F-08, Alternative 'D'.

contaminated soils. Because of the diversion of normal drainage from the downstream wetlands by direct discharge into Fourmile Branch, the proposed pipeline would significantly impact floodplain hydrology. Action 'D' is therefore problematic because of the potential for adversely impacting jurisdictional wetlands and disturbing contaminated soils. Prior to implementing this alternative, issues regarding wetlands permitting, contaminated soils, and changes in floodplain hydrology would have to be resolved.

Implementation of actions 'E' and 'C' would involve some construction-related and soil disturbing activities to facilitate tie-in to CSWTF and ETP and build ion exchange units (see Table 2-6). These activities would occur in a previously disturbed area (F Area) and would not significantly impact the human environment (see Section 4.1.2). The routing of selected waste streams to CSWTF and ETP for treatment is not expected to adversely impact the operation or performance of either facility (see Section 4.1.1). The decision to employ ion exchange treatment technology (alternative action 'C') to remove selected metals from cooling tower blowdown is based on treatability studies, published literature, and best engineering judgement (Shipman and Bugher 2004). The efficacy of this treatment technology would be monitored to ensure that it achieves the required effluent limits. Chemicals used in the ion exchange units do not present a human health risk and spent resin would be regenerated offsite by the vendor. There are no known waste sites or areas of contaminated soil which would be disturbed by the implementation of actions 'A', 'C', or 'E'.

Actions 'C' and 'E' would involve the elimination of selected contributing streams through the deactivation of selected F Area facilities and implementation of administrative controls (see Section 4.1.3). The proposed reduction in flow to the outfall is not expected to adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-11).

The potential for impacting human health, ecological resources (other than discussed above), socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.6 Outfall H-02

Implementation of the proposed action 'H' and alternative actions 'A', 'D', and 'G' would involve some construction-related and soil disturbing activities (e.g., facilitate tie-in to CSWTF and ETP, build a wetlands treatment facility and ion exchange units, and expand the existing retention basin). These activities would occur in a previously disturbed area (H Area) and would not significantly impact the human environment (see Section 4.1.2). The routing of selected waste streams to CSWTF and ETP for treatment and final disposition is not expected to adversely impact the operation or performance of these facilities (see Section 4.1.1). The decision to employ ion exchange and constructed wetlands treatment technologies (actions 'D' and 'G', respectively) to remove selected metals from the effluent stream is based on treatability studies, published literature, and best engineering judgement (Shipman and Buger 2004; Halverson 2004). The efficacies of these treatment technologies would be monitored to ensure that they achieve the required effluent limits. Chemicals used in the ion exchange units do not present a human health risk and spent resin would be regenerated offsite by the vendor.

Two of the outfall actions ('E' and 'F') would pipe all discharges from the existing outfall directly to Upper Three Runs (Figure 4-2). The proposed route is approximately 2,000 meters (6600 feet) long and includes two stream crossings. Much of the construction activity associated with this 152 centimeter (60-inch) pipeline would occur within the 100-year floodplain, portions of which include jurisdictional wetlands. The soils on either side of the stream are mapped as TuE sands with 15 to 25 percent slope. Because of the steep nature and erodability of these sands, the proposed pipeline construction could significantly impact floodplain and wetlands resources. DOE does not believe that the diversion of upstream flows from the existing drainage to direct discharge into Upper Three Runs would significantly impact downstream floodplain hydrology due to groundwater influx. In summary, alternative actions 'E' and 'F' are problematic because of the potential for impacting jurisdictional wetlands. Prior to implementing either action, wetlands mitigation measures would need to be developed and permitting issues resolved. There are no known waste sites or areas of contaminated soil which would be disturbed by the implementation of these alternative actions. DOE does not believe that the proposed reduction in flow to the outfall (alternative actions 'A' and 'D') would adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-14).

A preliminary archaeological survey of the Crouch Creek drainage is currently being conducted by the SRARP. If potential sites of interest are identified, a consultation process would be initiated to ascertain the status of specific sites and to determine necessary and appropriate mitigation measures (DOE 2004). Any required mitigative action would be completed prior to the initiation of pipeline construction (actions 'E' and 'F').

The potential for significantly impacting human health, ecological resources (other than discussed above), socioeconomic resources, facility or area operations, or environmental justice would be negligible (see Section 4.1). A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.7 Outfall H-04

Implementation of all outfall options would involve some construction-related and soil disturbing activities (e.g., facilitate tie-ins to CSWTF, ETP, and basin 281-5H). These activities would occur in a previously disturbed area (H Area) and would not significantly impact the human environment (see Section 4.1.2). The routing of selected waste streams to CSWTF, ETP, and basin 281-5H for treatment and/or final disposition is not expected to adversely impact the operation or performance of these facilities (see Section 4.1.1). There are no known waste sites or areas of contaminated soil which would be disturbed by the implementation of these alternative actions. The proposed reduction in flow to the

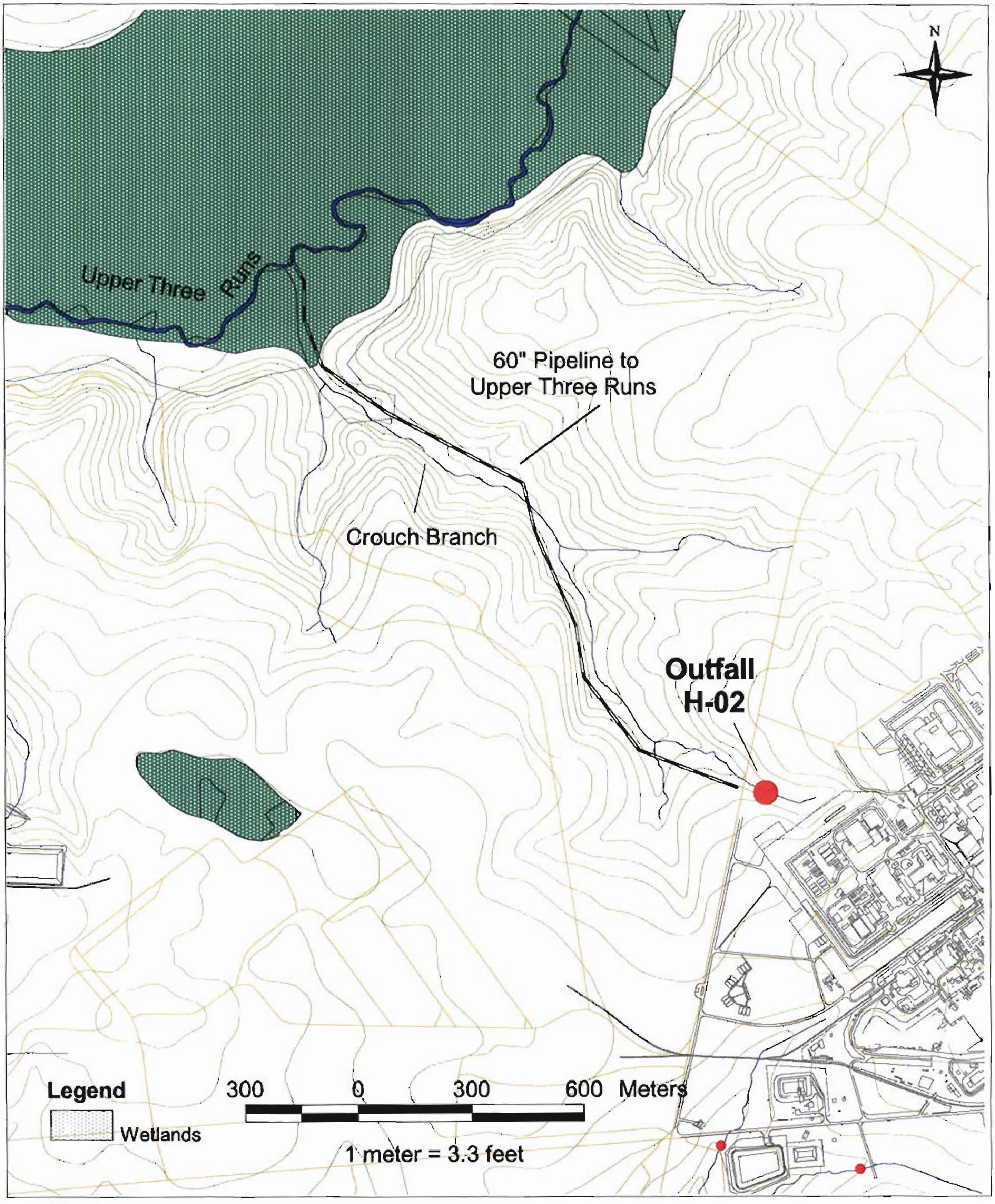

Figure 4-2. Outfall H-02, Alternatives 'E' and 'F'.

outfall is not expected to adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-17).

The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.8 Outfall H-08

Implementation of the proposed and alternative actions would involve some construction-related and soil disturbing activities (e.g., facilitate tie-ins to Outfall H-12 and Ash Basin 288-H). These activities would occur in a previously disturbed area (H Area) and would not significantly impact the human environment (see Section 4.1.2). The diversion of selected waste streams to Outfall H-12 for treatment and final disposition is not expected to significantly impact downstream floodplain hydrology or cause NPDES compliance issues for that outfall. There are no known waste sites or areas of contaminated soil which would be disturbed by the implementation of these alternative actions. The proposed reduction in flow to the outfall is not expected to adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-19).

The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.9 Outfall H-12

Implementation of the proposed and alternative actions 'A' and 'C' (respectively) would involve some construction-related and soil disturbing activities (e.g., outfall relocation, installation of peat beds, tie-ins to ETP and CSWTF). Facility tie-ins related to diverting flows to ETP and CSWTF (action 'C') would occur in a previously disturbed area (H Area), while construction related to outfall relocation and peat bed installation (actions 'A' and 'C') would occur in a relatively undisturbed area approximately 152 meters (500 feet) downstream of the present outfall location. These proposed construction activities are not extensive and would not significantly impact the human environment (see Section 4.1.2). The decision to employ peat bed technology to remove selected metals from the effluent is based on treatability studies, published literature, and best engineering judgement (Halverson 2004). The efficacy of this treatment technology would be monitored to ensure that it achieves the required effluent limits. Alternative action 'D' would reduce flow to the outfall by recycling selected streams and rerouting other source streams to ETP and CSWTF. The remaining contributing flows would be piped directly from the existing outfall, via buried 15.2-centimeter (six-inch) line, to Fourmile Branch (Figure 4-3). Downstream jurisdictional wetlands and floodplain hydrology would not be significantly impacted by temporary erosion resulting from pipeline construction

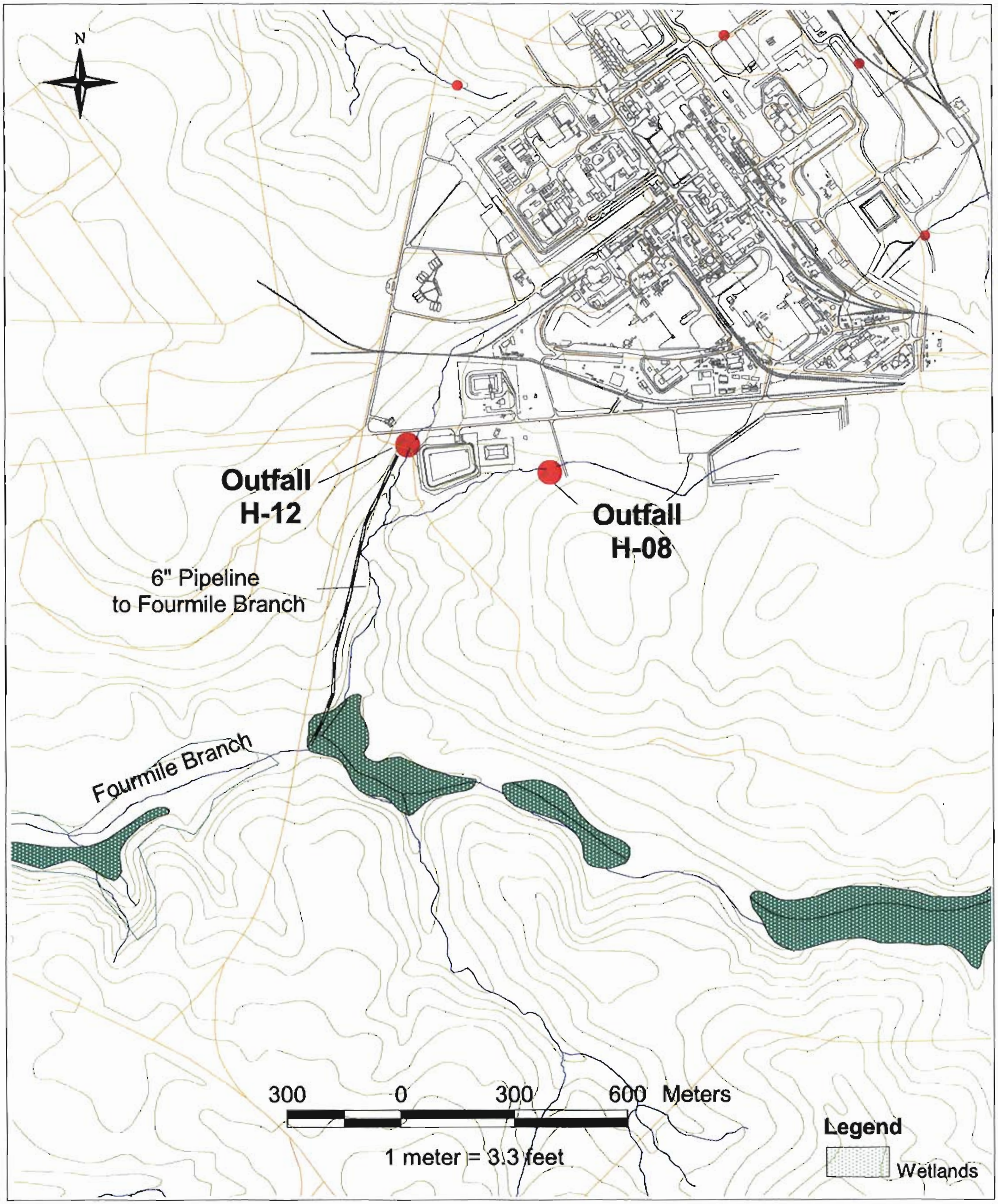

Figure 4-3. Outfall H-12, Alternative 'D'.

(assuming the application of best management practices), but the potential does exists for disturbing contaminated soils in the area of the confluence of the H-08 and H-12 discharge ditches. This area, which is contaminated with radionuclides, is scheduled to undergo remediation in fiscal year 2006. Pipeline construction in this area would need to be coordinated with this remediation effort.

The routing of selected waste streams to CSWTF and ETP for treatment and final disposition (actions 'C' and 'D') is not expected to adversely impact the operation or performance of these facilities (see Section 4.1.1). The resulting reduction in flow to the outfall is not expected to adversely impact floodplain hydrology or biota in the receiving stream (Figure 2-19). The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). A summary of impacts associated with project implementation can be found in Table 4-1.

4.2.10 Outfall S-04

Implementation of the proposed and alternative actions would involve some construction-related and soil disturbing activities (e.g., facilitate tie-ins to CSWTF, installation of peat beds and ion exchange units, relocation of the outfall). These activities would occur in a previously disturbed area (S Area) and would not significantly impact the human environment (see Section 4.1.2). The routing of selected waste streams to CSWTF for treatment and final disposition (proposed action 'H') is not expected to adversely impact the operation or performance of that facility (see Section 4.1.1). The resulting elimination of flow from the discharge ditch is not expected to adversely impact downstream floodplain hydrology or biota (Figure 2-22). The decision to employ ion exchange and peat bed treatment technologies to remove selected metals from the effluent (alternative actions 'B', 'C', and 'G') is based on treatability studies, published literature, and best engineering judgement (Shipman and Bugher 2004). The efficacies of these treatment technologies would be monitored to ensure they achieve the required effluent limits. Chemicals used in the ion exchange units do not present a human health risk and spent resin would be regenerated offsite by the vendor. There are no known waste sites or areas of contaminated soil which would be disturbed by the implementation of these alternative actions.

The potential for significantly impacting human health, ecological resources, socioeconomic resources, facility or area operations, cultural and archaeological resources, or environmental justice would be negligible (see Section 4.1). A summary of impacts associated with project implementation can be found in Table 4-1.

4.3 Cumulative Impacts

The CEQ regulations define cumulative impacts as impacts on the environment that result when the incremental impact of an action is added to the impacts of other past, present, and reasonably foreseeable future actions within a given spatial and/or temporal boundary. Excluding the potential loss of wetlands which could result from pipeline construction and operation below Outfalls F-8 (action 'D') and H-02 (actions 'E' and 'F'), the incremental impacts of the actions considered in this EA are so small that their potential contribution to a cumulative effect on an area- or sitewide basis would be negligible. The potential for the incremental impacts of the proposed and alternative actions to contribute to a cumulative effect is further minimized by the constantly improving quality of the SRS environment resulting from ongoing cleanup and restoration efforts. Even if DOE were to decide to implement the "pipeline" options associated with Outfalls F-8 and H-02, cumulative effects would be negligible because no threatened, endangered, or sensitive species would be impacted, the amount of terrestrial habitat lost to natural production would be minimal, and any wetlands loss or damage would be mitigated (see Appendices A and B). The actions taken would allow DOE to comply with NPDES permit requirements and result in improved 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 actions.

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 CRF 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 are to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The Clean Water Act 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. EPA has delegated primary enforcement authority for the Clean Water Act and the NPDES permitting program to 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 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 61-9.122, and the Clean Water Act, SCDHEC issued to SRS NPDES Permit SC0000175 in 1996. This permit was recently renewed with more stringent heavy metals requirements which 10 of the 25 industrial wastewater outfalls at SRS presently do 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 wastewater permit.

5.4 South Carolina Standards for Stormwater 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. Construction-related activities associated with the proposed actions 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 B).

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 containing mitigative actions that must be followed to minimize adverse impacts. Coordination with the State Historic Preservation Officer 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 Occupational Safety and Health Act of 1970, as amended (29 USC 651 et seq.)

The Occupational Safety and Health Act establishes standards to enhance safe and healthful working conditions in the workplace environment. Although a number of outfall actions would involve potentially hazardous construction-related and operational activities, impacts to worker health and safety would be negligible due to the use of personal protective clothing and equipment and enforcement of OSHA compliant work conditions.

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 wetlands whenever a practicable alternative exists. Selected actions associated with the F-08, H-02, and H-12 outfall projects would impact floodplain hydrology and jurisdictional wetlands (see Appendix A).

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, and activities on minority and low-income populations. None of the proposed outfall projects considered by 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, the University of South Carolina's SRARP, and the Savannah River National Laboratory were consulted during the preparation of this EA.

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APPENDIX A

Floodplain/Wetlands Assessment for Selected National Pollutant Discharge Elimination System Wastewater Permit Compliance Alternatives at the Savannah River Site

Floodplain/Wetlands Assessment for Selected National Pollutant Discharge Elimination System Wastewater Permit Compliance Alternatives at the Savannah River Site

1.0 PROJECT DESCRIPTION

On December 1, 2003, the South Carolina Department of Health and Environmental Control (SCDHEC) renewed Savannah River Site's (SRS) National Pollutant Discharge Elimination System (NPDES) permit #SC0000175. This permit authorizes the continued discharge of industrial wastewater effluents into State surface waters for the next five years. Effluent monitoring data indicates that 10 of the 25 permitted SRS industrial wastewater outfalls may not presently meet the more stringent heavy metals limits imposed by the new permit. A study team established by Westinghouse Savannah River Company has developed and recommended technically viable, cost-effective proposed actions and alternatives for the problematic outfalls. A National Environmental Policy Act review of these compliance alternatives is presently being conducted in the document Environmental Assessment for the National Pollutant Discharge Elimination System Wastewater Permit Compliance Alternatives at the Savannah River Site (DOE/EA-1513) (NPDES Permit Compliance Alternatives EA).

2.0 FLOODPLAIN OR WETLAND IMPACTS

Depending upon the action chosen, project implementation at selected outfalls (i.e., F-05, F-08, H-02, H-08, and H-12) could potentially impact floodplain/wetland resources. Following is an outfall-specific assessment of these potential environmental impacts.

2.1 Outfall F-05, Alternative Actions 'D' and 'G'

Alternative actions 'D' and 'G' would reduce flow through the outfall by recycling, eliminating, or diverting a number of contributing streams. Examination of the flow volumes involved and the downstream environment indicates that a reduction in outfall discharge would not adversely impact downstream floodplain hydrology or biota. Best management practices (BMPs) would be employed during construction activities related to the diversion of contributing streams (e.g., pipe construction) to avoid increased sediment loading in stormflow to Outfall F-05. Alternative action 'D' is designated a primary alternative action for Outfall F-05 in the NPDES Permit Compliance Alternatives EA.

2.2 Outfall F-08, Alternative Action 'D'

Alternative action 'D' would pipe effluent from the current sheet pile dam, through a buried 168 centimeters (66-inch) diameter pipeline, to Fourmile Branch (FMB). This pipeline would be approximately 455 meters (1500 feet) long and discharge into FMB approximately 30 meters (100 feet) east of the Road C bridge crossing. Soils in the project area are mapped as Fluvaquents and are listed as hydric soils of SRS. Vegetation along most of the pipeline right-of-way is bottomland hardwood with isolated pines. The overstory is dominated by sweetgum, red maple (*Acer rubrum*), laurel oak, and scattered sycamore and mulberry (*Morus rubra*). Understory species are reproduction of the dominants and holly, wax myrtle (*Myrica cerifera*), and red bay (*Persea borbonia*). The sparse herbaceous component consists of maiden cane (*Panicum hemitomon*), sensitive fern (*Onoclea sensibilis*), and yellow jassamine (*Gelsemium sempervirens*).

Most of the proposed pipeline would be located in the 100-year floodplain, portions of which include jurisdictional wetlands. These wetlands had previously been impacted by construction and operation of the Mixed Waste Management Facility dam and irrigation system. The diversion of flow from the receiving stream would alter floodplain hydrology and adversely impact wetlands. Activities associated with pipeline construction would also adversely impact bottomland vegetation and damage wetlands. Potential impacts to the floodplain (e.g., soil erosion and deposition, changes in floodplain hydrology) would need to be detailed and addressed. Operation of equipment in the wetland and floodplain areas would be minimized during project construction. An erosion and sediment control plan developed in accordance with applicable State and local floodplain protection standards would be implemented to minimize floodplain/wetland impacts. If necessary, merchantable timber would be salvaged from the 100-year floodplain. Because jurisdictional wetlands would be impacted, U.S. Army Corp of Engineers Section 404 Permit requirements and wetland remediation measures would need to be addressed. Alternative action 'D' is not a proposed or primary alternative action for Outfall F-08 in the NPDES Permit Compliance Alternatives EA.

2.3 Outfall H-02, Alternative Actions 'E' and 'F'

Alternative actions 'E' and 'F' would result in discharges from the existing outfall at Road 4 being routed directly to Upper Three Runs (UTR) through a 152-centimeter (60-inch) diameter pipe. This pipeline would be approximately 2000 meters (6600 feet) long and cross Crouch Branch twice along the proposed route. Soils in the project area adjacent to Crouch Branch are mapped as Fluvaquents and are listed as hydric soils of SRS. The soils on either side of the stream are mapped as Troup and Lucy sands with 15 to 25 percent slope. Much of the activity is within the 100-year floodplain, portions of which possess jurisdictional wetlands. The stream channel is deeply excised along much of its course due to stormwater flow from H Area and the erodable nature of the soils. Vegetation within the floodplain is predominantly mixed hardwoods (e.g., sweetgum, red maple, and red bay). Understory and herbaceous components are sparse throughout, with maiden cane, dog hobble (*Leucothoe* sp.), holly, and sensitive fern being the species encountered most frequently. Side slopes along the drainage are predominantly covered by mixed pine-hardwood stands (e.g., loblolly pine, sweetgum, and red oak [*Q. rubra*]). These areas are well drained and steeply sloped. Multiple additional landscape drainages combine with Crouch Branch as it flows towards UTR. Most of these are also deeply excised prior to joining the main stream channel. Slope wetlands were encountered in several locations along the drainage and were predominantly supplied hydrologically by groundwater outcrops. These areas possess jurisdictional wetlands.

Pipeline construction would occur primarily on the side slopes above the stream. Because of the steep grade and erodability of the soils, construction-related activities could potentially impact floodplain and jurisdictional wetland areas. Two stream crossings are included in the design plan which could potentially impact floodplain/wetlands resources at the crossing locations. Silt fences and other erosion control structures would be utilized to prevent siltation of downslope wetland areas. Operation of equipment in the wetland and floodplain areas would be minimized during project construction. Land clearing and excavation activities necessary to install the pipe along the floodplain would need to be carefully executed to reduce erosion and sedimentation of wetlands. An erosion and sediment control plan developed in accordance with applicable State and local floodplain protection standards would be implemented to minimize floodplain/wetland impacts. Following completion of pipeline construction, rapid soil stabilization measures would need to be implemented to prevent potential future floodplain/wetland impacts.

Selection of alternative actions 'E' or 'F' would require a detailed examination of the magnitude and nature of the potential floodplain/wetlands impacts and development of appropriate mitigation action plans. Because jurisdictional wetlands would be impacted, U.S. Army Corp of Engineers Section 404 Permit requirements and wetland remediation measures would need to be addressed. Post-construction surveillance of the project area would be required to monitor the effectiveness of mitigation measures and prevent additional wetland loss. Alternative actions 'E' and 'F' are not proposed or primary alternative actions for Outfall H-02 in the NPDES Permit Compliance Alternatives EA.

2.4 Outfall H-08, Proposed and Alternative Actions 'A' and 'B'

Proposed and alternative actions 'A' and 'B' (respectively) would reduce flow through the outfall by recycling, eliminating, and diverting a number of contributing streams. Examination of the flow volumes involved and the downstream environment indicates that the reduction in discharge would not adversely impact downstream floodplain hydrology or biota. BMPs would be employed during construction activities related to the diversion of contributing streams (e.g., laying pipe for routing of waste flow to Outfall H-12) to avoid increasing sediment loadings in stormflow to Outfall H-08.

2.5 Outfall H-12, Alternative Actions 'C' and 'D'

Alternative action 'C' would reduce flow through the outfall by recycling or diverting selected contributing streams for final disposition. Examination of the flow volume involved and the downstream environment indicates that this flow reduction would not adversely impact downstream floodplain hydrology or biota. Appropriate BMPs would be employed during construction activities related to the diversion of contributing streams (e.g., laying pipe for facility tie-in) to avoid increasing sediment loadings in stormflow to Outfall H-12.

Alternative action 'D' would pipe effluent from the existing outfall directly to FMB, thus diverting flow from the existing receiving stream. Conveyance of the effluent would be via a buried, 15 centimeter (6-inch) diameter pipeline running approximately 221 meters (730 feet) from the existing outfall to a new discharge point at FMB. Soils in the project area are mapped as Vaucluse-Ailey complex and are erodable. Topographic slope in the area is greater than ten percent. Vegetation in the area is mainly a mixed pine-hardwood overstory with mixed sapling understory. Predominant species include loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), white oak (*Quercus alba*), and American sycamore (*Platanus occidentalis*). Species in the understory were individual saplings of the overstory species as well as American holly (*Ilex opaca*) and laurel oak (*Q. laurifolia*). The herbaceous layer is scarce. The receiving stream for the existing discharge currently flows through a deeply excised gully.

Implementation of alternative action 'D' would not impact floodplain hydrology but may impact floodplain areas downstream of the outfall due to construction-related soil erosion and erosion at the pipe's discharge point. An erosion and sediment control plan developed in accordance with applicable State and local floodplain protection standards would be implemented to minimize floodplain/wetland impacts. The last 12 meters (40 feet) of the proposed pipeline right-of-way appears to be in a soil contamination area which is scheduled for remediation in FY 2006. Pipeline construction in this area would need to be coordinated with this remediation effort. It is not expected that implementation of this alternative action would result in any long-term floodplain/wetland impacts. Alternative action 'D' is not designated as a proposed or primary alternative action for Outfall H-12 in the NPDES Permit Compliance Alternatives EA.

3.0 ALTERNATIVES CONSIDERED

Proposed and alternative compliance actions are covered in the Environmental Assessment for the NPDES Wastewater Permit Compliance Alternatives at the Savannah River Site (DOE/EA-1513). No floodplain/wetland impacts are expected for the proposed or designated primary alternative actions considered within the scope of this EA.

APPENDIX B

Biological Evaluation for Selected National Pollutant Discharge Elimination System Wastewater Permit Compliance Alternatives at the Savannah River Site

Biological Evaluation for Selected National Pollutant Discharge Elimination System Wastewater Permit Compliance Alternatives at the Savannah River Site

1.0 INTRODUCTION

On December 1, 2003, the South Carolina Department of Health and Environmental Control renewed Savannah River Site's (SRS's) National Pollutant Discharge Elimination System (NPDES) permit #SC0000175. This permit authorizes the continued discharge of industrial wastewater effluents into State surface waters for the next five years. Effluent monitoring data indicates that 10 of the 25 permitted SRS industrial wastewater outfalls may not presently meet the more stringent heavy metals limits imposed by the new permit. A study team established by Westinghouse Savannah River Company has developed and recommended technically viable, cost-effective compliance alternatives for the problematic outfalls (Gordon 2004). A National Environmental Policy Act (NEPA) review of these compliance alternatives is presently being conducted (Environmental Assessment for the NPDES Wastewater Permit Compliance Alternatives at the SRS (DOE/EA-1513).

The objective of this biological evaluation (BE) is to assess the potential effects of compliance alternatives at NPDES outfalls (i.e. F-08, H-02, and H-12) where implementation might impact threatened and endangered (T&E) species. Threatened and endangered species are plant and animal species which are designated by the U.S. Fish and Wildlife Service (USFWS) and 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 includes 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 PROJECT DESCRIPTIONS

Project areas associated with Outfalls F-08, H-02, and H-12 were evaluated to assess their potential for adversely affecting T&E species and/or associated critical habitat. These outfalls were selected based on the potential for project implementation to impact previously undisturbed areas or undeveloped areas of SRS. Following is a brief description of the subject outfall projects.

Outfall F-08 is located south of F Area along Road E and discharges into a perennial tributary of Fourmile Branch (FMB). Alternative action 'D' for this outfall would pipe effluent from the existing sheet pile dam, through a buried 168 centimeter (66-inch) diameter pipeline, directly to FMB. This pipeline would be approximately 455 meters (1500 feet) long and discharge into FMB approximately 30 meters (100 feet) east of the Road C bridge crossing (Figure B-1). Alternative action 'D' is not a proposed or primary alternative action for Outfall F-08.

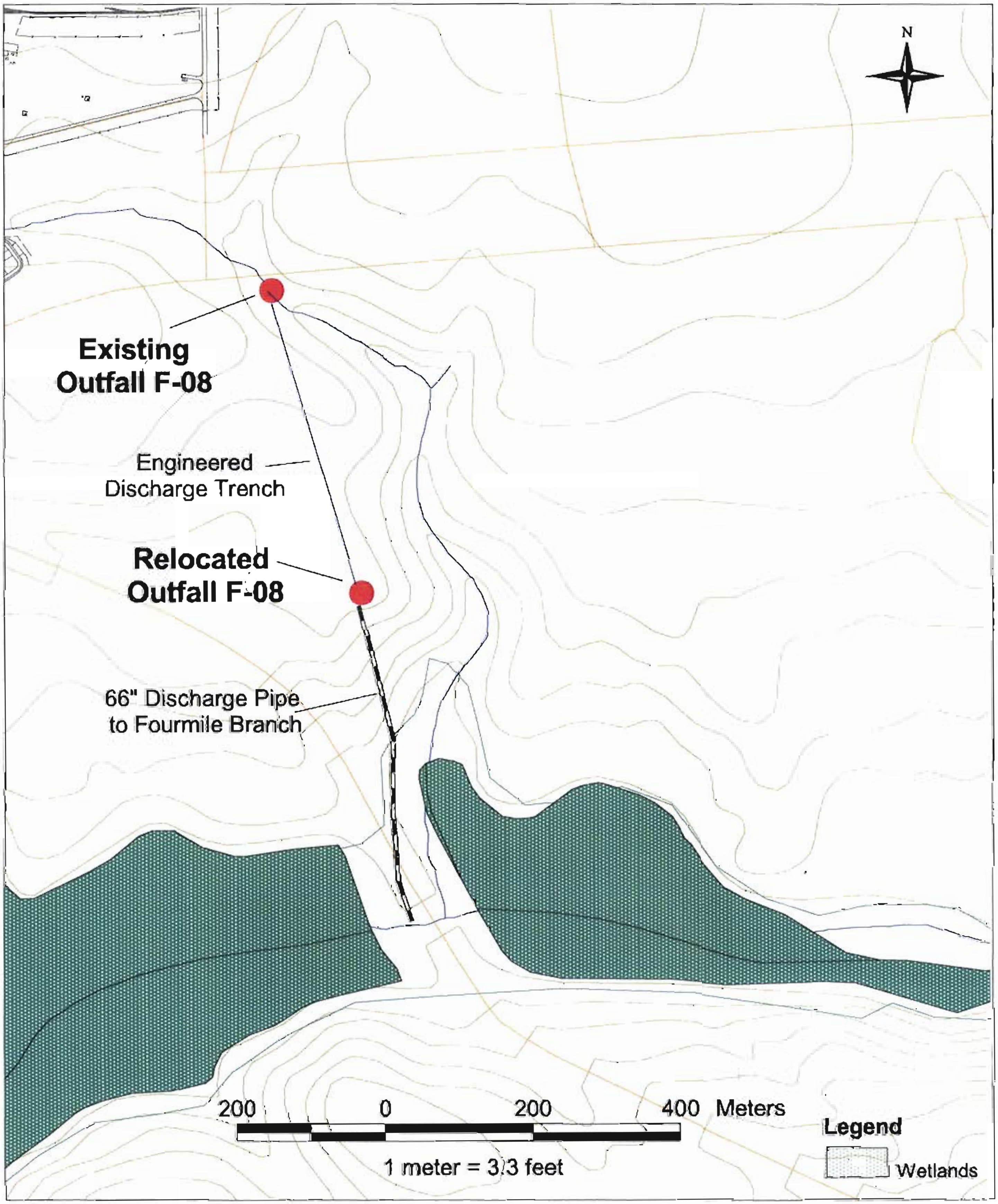

Figure B-1. Outfall F-08, Alternative 'D'.

Outfall H-02 is located west of H Area along Road 4 and discharges into Crouch Branch, a perennial tributary of Upper Three Runs (UTR). Two compliance alternatives considered for this outfall (actions 'E' and 'F') would pipe discharge from the existing outfall directly to UTR. The proposed pipeline right-of-way is approximately 2,000 meters (6600 feet) long and includes two stream crossings. Much of the pipeline would be located in the 100-year floodplain (Figure B-2). Alternative actions 'E' and 'F' are not proposed or primary alternative actions for Outfall H-02.

Outfall H-12 is located southwest of H Area near the juncture of Roads 4 and E and discharges into a perennial tributary of FMB. Alternative action 'D' for this outfall would pipe discharge from the outfall structure directly to FMB via a buried 15.2 centimeter (six-inch) line (Figure B-3). Alternative action 'D' is not the proposed or primary alternative action for Outfall H-12.

3.0 METHODS

This BE is based primarily on qualitative habitat surveys and evaluations, historical accounts, and the known habitat needs of T&E species. Documentation used in the preparation of this BE which describes the biology and status of T&E species on SRS is the most current available. Data relating to population locale and SRS habitat conditions are based on prior surveys conducted by United States Forest Service-Savannah River (USFS-SR) personnel and published and unpublished reports available from the Savannah River Ecology Laboratory (e.g., Batson et al. 1985, Bennett and McFarlane 1983, Coulter 1986, Knox and Sharitz 1990, Murphy 1980, Workman and McLeod 1990).

Surveys of the selected project areas were conducted during November 2004 by USFS-SR personnel. These surveys consisted of stratified transects within 80-meter-wide (264-feet) wide corridors established along the affected stream channels. As with any sampling method where the entire project area is not examined, individual representatives of biota can be overlooked. Animal use of habitats in an area can vary seasonally and qualitative visual and auditory pedestrian surveys of animals are not totally reliable in determining their presence or abundance. Also, because these surveys were conducted during the late autumn season, accurate identification of all plant species present in the area was difficult. However, the conjunctive use of stratified transects and qualitative habitat survey methods does focus limited sampling resources within a project area and is believed sufficient to determine that area's potential for supporting different biotic assemblages.

4.0 DESCRIPTION OF PROJECT AREA HABITATS

The Outfall F-08 project area possesses two general habitat types. The northern two-thirds of the project area is dominated by an existing discharge trench that includes areas of sheet piling and rip-rap for erosion control. The southern third of the project area extends from the end of the discharge trench to FMB and includes partially grassed

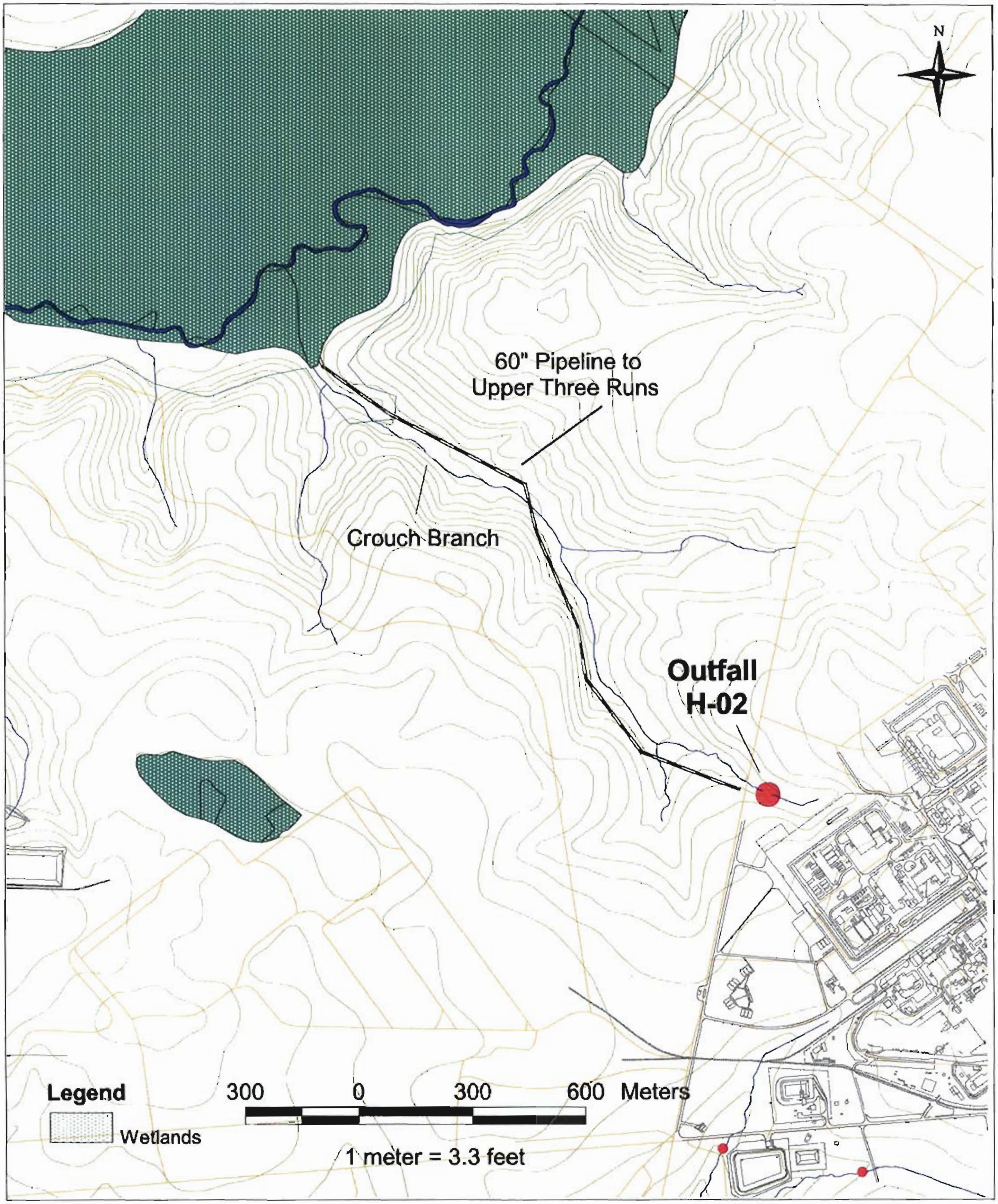

Figure B-2. Outfall H-02, Alternatives 'E' and 'F'.

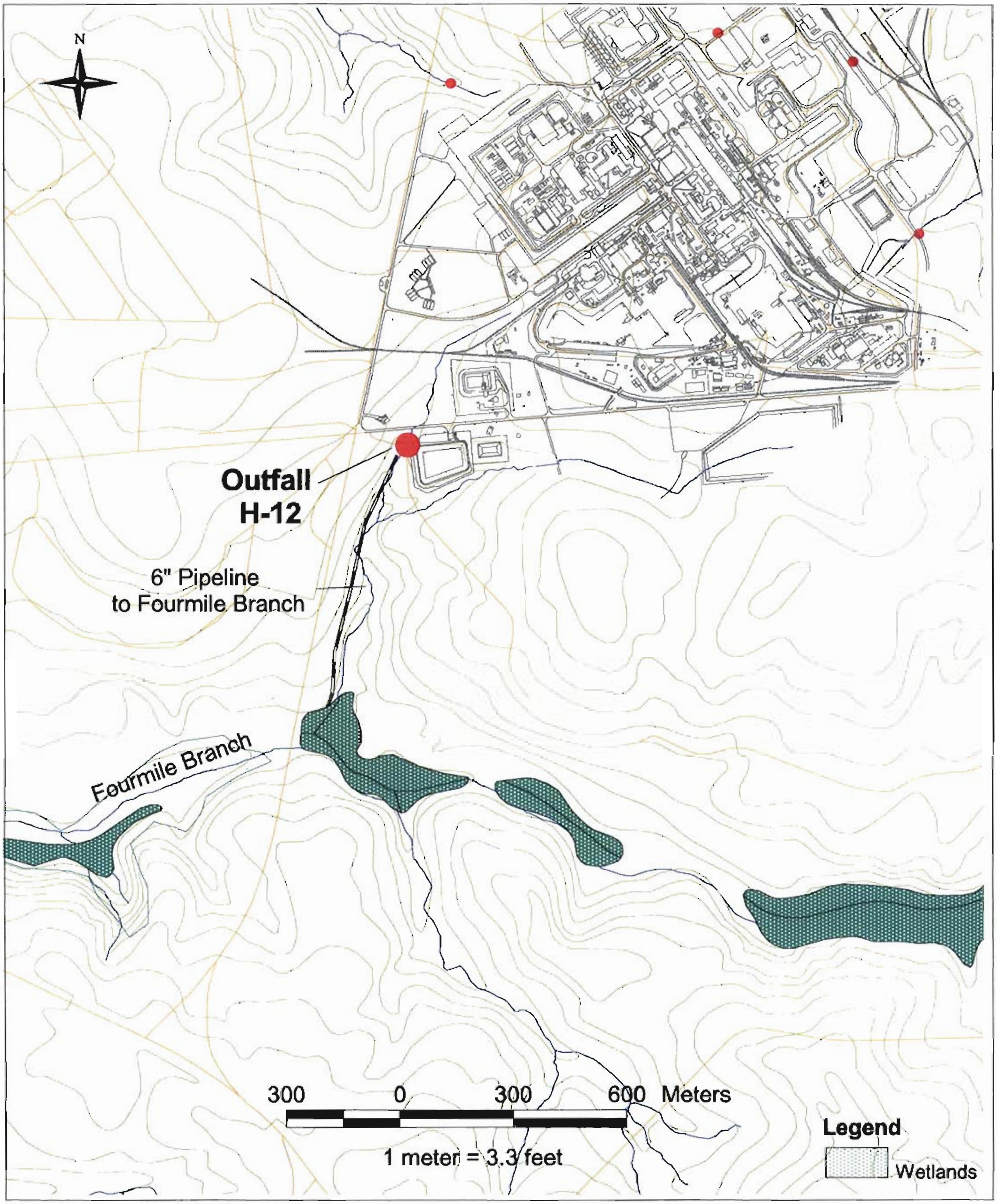

Figure B-3. Outfall H-12, Alternative 'D'.

areas with a few patches of scattered native open habitat plant species such as broomsedges (*Andropogon* spp.), panic grasses (*Panicum* spp.), horseweed (*Erigeron Canadensis*), dog-fennel (*Eupatorium capillifolium*), and other early successional species. In moister areas, species such as sedges (*Carex* spp.) are also present in and around the existing erosion control structures. The southern third of the project area includes a more diverse mixture of later successional species that occupy well drained or transitional areas (southern mixed hardwood forest) or poorly drained, wet areas (wet bottomland forest).

The Outfall H-02 project area is predominantly forested from Road 4 to UTR. Near Road 4, the area possesses a dense understory with scattered trees. Further west along the Crouch Branch stream corridor, the area has reduced shrub density and greater canopy coverage. Throughout the area, braided stream sections occur. Poorly drained areas are swampy with a hummocked forest floor dominated by mud flats and densely vegetated areas. Mature loblolly pines (*Pinus taeda*) occur in small groups along the bottomland sections of the stream corridor. These pine 'islands' possess an excessively shaded understory and heavily littered forest floor.

The Outfall H-12 project area possesses habitats similar to that of Outfall F-08. The northern section of the project area has clearly been managed for erosion control and possesses open controlled, grassed habitats. The southern section of the project area is partially forested with a mixed composition of scattered trees of various sizes. Some portions of the project area are dominated by wet bottomland forest, while others are better drained and transition to an upland southern mixed hardwood forest.

All three project areas possess similar forest compositions. The southern mixed hardwood and well drained bottomland forests are dominated by a near equal mixture of loblolly pine, sand laurel oak (*Q. hemisphaerica*), water oak (*Q. nigra*), southern red oak (*Q. falcata*), sweetgum (*Liquidambar styraciflua*), sycamore (*Plantanus occidentalis*), and red maple (*Acer rubrum*). Other tree species present included black cherry (*Prunus serotina*), sassafras (*Sassafras albinum*), black gum (*Nyssa sylvatica*), American holly (*Ilex opaca*), persimmon (*Diospyros virginiana*), mockernut (*Carya alba*), flowering dogwood (*Cornus florida*), and laurel cherry (*P. caroliniana*). Various shrubs and vines are also present, including deerberry (*Vaccinium stamineum*), highbush blueberry (*V. corymbosum*), blackhaws (*Viburnum* spp.), carolina holly (*Ilex ambiqua*), switch cane (*Arundinaria gigantea*), blackberries (*Rubus* spp.), muscadine grape (*Vitis rotundifolia*), poison ivy (*Toxicodendron radicans*), yellow jassamine (*Gelsenium sempervirens*), Virginia creeper (*Parthenocissus quinquefolia*), and greenbriers (*Smilax* spp.). Herbs include species such as panic grasses, wild ginger (*Hexastylis arifolia*), bloodroot (*Sanguinaria canadensis*), spotted wintergreen (*Chimaphila maculata*), partridge berry (*Mitchella repens*), bedstraw (*Galium* spp.), wild geranium (*Geranium carolinianum*), violets (*Viola* spp.), phlox (*Phlox* spp.), elephants foot (*Elephantopus tomentosus*), and various sedges. Because of the season of survey, most of the identified species are either persistent species or early spring ephemerals. A much richer flora is likely to be present during the warmer growing season.

Wet, poorly drained areas are dominated by swamp tupelo (*N. biflora*), red maple, sweetbay (*Magnolia virginiana*), loblolly pine, red bay (*Persea borbonea*), water oak, laurel oak, swamp chestnut oak (*Q. michauxii*), and sweetgum. Hollies and viburnums dominate the understory. Open sections are dominated by willows (*Salix* spp.) and buttonbush (*Cephalanthus occidentalis*). The understory varies between sections of dense shrubs with very few understory species to areas dominated by grasses and sedges. Still other areas are densely vegetated with dog-hobble (*Leucothoe racemosa*), netted chain fern (*Woodwardia areolata*), and chain fern (*Woodwardia virginica*). Recently flooded mud flats possess scattered rushes (*Juncus* spp.), sedges, nut-rush (*Rhynchospora* spp.), bulrush (*Scriprus* spp.), lizard-tail (*Saururus cernuus*), jack-in-the-pulpit (*Arisaema triphyllum*), marsh St. John's-wort (*Triadenum virginicum*), water penny-royal (*Hydrocotyle* spp.), Arrowhead (*Sagittaria* spp.), and golden-club (*Orontium aquaticum*).

5.0 Status of T&E Species and Habitat in Project Areas

Seven Federally-listed species are known to occur on SRS (Hyatt, 1994, D.W. Imm, unpublished data). These are the 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*). None of these Federally-listed species are known to be present in the project areas or their general vicinities. The pondberry, shortnose sturgeon, and American alligator are not specifically addressed in this BE because suitable habitat for these species would not be affected by the proposed outfall projects (DOE 1984, Murphy 1980, USFWS 1986).

The red-cockaded woodpecker (RCW) is not reported within or around the project areas and habitat conditions for this species are predominantly unsuitable. Additionally, the project areas are located outside of the designated RCW Management Area (Edwards et al. 2000). Therefore activities to create and maintain suitable conditions for this species are unlikely to occur within the project areas.

The smooth purple coneflower is not known to occur in the project areas (Halverson et al. 1997). This plant is found in dry open woodlands and meadows, including utility corridors (USFWS 1995). The smooth purple coneflower could potentially become established if upland openings were created along the margin of the project areas. However, a viable seed source does not exist near F or H Areas and it is unlikely that the fairly large seed of this species has been or would be easily dispersed to the project areas. Therefore, the proposed outfall projects would not impact the status of the smooth purple coneflower at SRS.

The bald eagle is known to have three nesting sites on SRS. The Eagle Bay site is located south of PAR Pond and two others are located west and east of L Lake (Halverson et al. 1997). The project areas range from 5 to 12 miles from these known nesting sites. Though the project areas are within the flight range of bald eagles, nesting eagles are much more likely to feed in the open water areas adjacent to their nesting sites. Therefore, the project areas would be of minimal, if any, value for feeding. Construction and operation-related activities associated with project implementation would impact small, linear areas and therefore would not likely influence bald eagle feeding behavior.

The wood stork is known to feed at a variety of locations on SRS, but none have been reported in the vicinity of UTR and FMB near F and H Areas. Wood storks typically feed in areas with shallow, receding water levels such as temporary ponds or swamps with varied water levels (Coulter 1986, Coulter and Bryan 1993). Such conditions do not normally exist in the project areas. Therefore, the wood stork would not be adversely impacted by project implementation.

6.0 POTENTIAL EFFECTS ON T&E SPECIES AND THEIR HABITATS

Red-Cockaded Woodpecker - Suitable habitat conditions do not exist in the immediate project areas or their vicinities. The three project areas are not located within areas designated for RCW recovery (Edwards et al. 2000). The subject outfall projects would not adversely affect the population status or management of this species.

Smooth Purple Coneflower - Even though suitable habitat could be created during project implementation, it is not expected that this species would become established within the project areas because of restricted seed movement. The subject projects would not affect the population status of this species.

Wood Stork - Though open wetland habitats could be marginally affected by project implementation, any potential loss of feeding habitat would be small and unlikely to affect the wood stork. The subject outfall projects would not affect the population status of this species of concern.

Bald Eagle - The bald eagle uses open wetland habitats for feeding. However, eagles generally feed at large water bodies near their nesting sites, as opposed to small sections of streams. The subject projects would not affect the population status of this species.

7.0 Determination of Effects Summary

<u>No Effect</u>: No effect is expected on the smooth purple coneflower, pondberry, red-cockaded woodpecker, American alligator, bald eagle, shortnose sturgeon (*Acipenser brevirostrum*), or wood stork (*Mycteria Americana*) populations status within the selected project areas or on a site-wide level.

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GLOSSARY

Terms in this glossary are defined based on the context in which they are used within the EA.

constructed wetlands treatment facility

> Constructed wetlands treatment facilities are engineered systems that are designed to utilize the natural functions of wetlands for treating wastewater. Metals in wastewater moving through a constructed wetlands system are removed by several mechanisms, including filtration of solids, sorption onto organic matter, chemical formation of insoluble carbonates or sulfides, reduction to immobile forms by bacterial activity, and uptake by the wetland vegetation. Constructed wetlands have significantly lower total lifetime costs and often lower capital costs than conventional wastewater treatment systems. Removal rates of greater than 90 percent for copper, lead and zinc have been demonstrated in operating wetland treatment systems.

peat beds

> Peat is a highly organic material formed by the accumulation and partial decomposition of aquatic plants in wetlands and bogs. Treatment systems made of peat beds remove particulate and dissolved metals from wastewater through the processes of physical filtration and adsorption. The fibrous structure of peat facilitates the physical removal or filtration of metal-laden particulate matter from the waste stream. The high ion exchange capacity of peat facilitates the adsorption of dissolved metals to its surface. Adsorption is the process by which the ions, atoms, or molecules of one substance are retained or held on the surface of another substance. Treatment of wastewater using organic peat beds can remove up to 95 percent of dissolved metals.

ion exchange units

> Ion exchange is a reversible chemical reaction where an ion in solution is exchanged for a similarly charged ion attached to an immobile solid particle or resin. An ion is an atom or molecule that has lost or gained an electron and thus acquired an electrical charge. Negative and positive ions are referred to as anions and cations, respectively. Special purpose ion-exchange resins are available that have extremely high affinities for particular metal ions (e.g., copper, lead, mercury, zinc). These resins attract and hold only the metal ions for which they are designed, while ignoring other ions in solution, even though they may exist at higher concentrations. After a resin's capacity has been exhausted, it can be regenerated for re-use. Ion exchange units consist of resin columns through which wastewater is passed and selected metal ions are removed via the process of ion exchange.