October 2011

Centredale Manor Restoration Superfund Site - Section 404 (Clean Water Act) Wetlands and Floodplain Analysis

I. Introduction

This analysis focuses on adverse impacts to wetlands and floodplains by alternatives evaluated in the Detailed Analysis of the Feasibility Study for the Centredale Manor Restoration Superfund Site. This analysis includes an evaluation of how well each alternative addresses Section 404 of the Clean Water Act and wetlands/floodplain requirements. Four of the site's five cleanup areas are included in this analysis: 1. Source Area Soil; 2. Allendale Floodplain Soil; 3. Allendale Pond and Lyman Mill Pond Sediment; and 4. Lyman Mill Stream Sediment and Floodplain Soil (including the Oxbow Area). Groundwater, the fifth cleanup area, is not addressed in this analysis because this alternative was previously conducted as a removal action.[1]

A. Section 404/Wetlands Requirements

Under the Clean Water Act § 404(b)(1) Guidelines, no discharge of dredged or fill material is permitted if there is a practical alternative to the proposed discharge that would have less adverse impacts to the aquatic ecosystem so long as the alternative does not have other significant adverse environmental impacts (40 CFR § 230.10(a)). Under the Wetlands Executive Order 11990, adverse impacts to wetlands must be avoided wherever there is a practicable alternative to address contamination at a site. Wetlands requirements focus on avoiding to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

For purposes of the Centredale Site, where contamination is found above cleanup goals in wetland areas or navigable waters, EPA has determined that there is no practical alternative to doing work in these areas because this is where the contamination is located. In these cases, there are no practical alternatives to the discharge of dredged or fill material /destruction of wetland areas. As a result, EPA must evaluate alternatives to select the least damaging practicable alternative consistent with Clean Water Act requirements. EPA will minimize impacts to these areas in these circumstances in accordance with applicable law.

Wetland definitions vary depending on the jurisdiction, but are generally recognized as wet habitats where the land is wet for some period of time each year, but not necessarily permanently wet, and supports a predominance of plant species adapted to living in wet conditions. (*See* Figure 1-3, Section 2.3.10 of the 2010 Feasibility Study)

B. Floodplain Requirements

Under the Floodplain Executive Order 11988, floodplain requirements focus on avoiding to the extent practical the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. The establishment of temporary work areas and

[1] To the extent that this document is not consistent with the Interim Final Feasibility Study, Addendum or associated ARARs findings, this document will control.

access ramps will result in a temporary occupancy in floodplain areas but no modification of the floodplain. Other activities discussed below are located in the floodplain or could affect the floodplain.

Before an alternative that is located in or affects a floodplain can be selected, EPA must look at all of the other options for cleanup and make a determination that there is no practical alternative to taking this action except for the alternative that impacts the floodplain. For the purpose of this floodplain assessment, floodplain areas are defined as the area of water and land inundated during the highest point of the base, or 100-year, flood using maps prepared by the Federal Insurance Administration of the Federal Emergency Management Agency (Flood Insurance Rate Maps or Flood Hazard Boundary Maps). Should floodplains be impacted, EPA will minimize impacts to the floodplain including addressing flood storage impacts consistent with floodplain requirements.

II. Source Area Soil Cleanup Area

Contaminated soil has been identified in the Source Area. In the Source Area, specific wetland areas include riverbank wetlands as administered by RIDEM and potential federal jurisdictional wetlands that have or could become re-established along portions of Cap Area #3 (former mill tailrace located just east of the Centredale Manor apartment building). The Source Area is bounded to the north by the Brook Village apartment building and to the south by Cap Area #1. While this area is developed, approximately 85% of the area (approximately 7.6 acres) is located within the 100-yr floodplain.

The following Cleanup Alternatives were evaluated in the Detailed Analysis of the Interim Final Feasibility Study/Addendum (FS):

1 – No Action
3E – Targeted Excavation, Upgrade and Maintain Existing Surfaces, and Off-Site Disposal and/or Treatment
4E – Targeted Excavation, Convert to Caps Designed to Cover Hazardous Waste and Off-Site Disposal and/or Treatment

A. Source Area Alternatives Evaluation of Wetlands/Floodplain Requirements

1 – No Action Alternative. Because no response actions are taken under this alternative, wetlands and floodplain requirements are not triggered.

3E – Targeted Excavation, Upgrade and Maintain Existing Surfaces, and Off-Site Disposal and/or Treatment.

Two components of Alternative 3E would have impacts on wetlands/floodplains: excavation/backfill and upgrading existing surfaces.

Soil that presents an unacceptable risk /exceeds cleanup requirements is located in wetland areas. Targeted removal of soil (excavation) and upgrading existing surfaces by covering or capping will result

in the destruction of some wetlands. Because contamination above cleanup goals is located in these wetland areas, there is no practical alternative to conducting this work in these wetlands.

Because upgrading existing surfaces by covering or capping would result in a permanent modification and occupancy of floodplain areas, a determination would first need to be made that there is no other practicable alternative before doing this work in the floodplain. The only other active alternative that could be conducted to address this soil contamination, meet cleanup objectives, and avoid unacceptable floodplain impacts would be excavation of all of the soil in the Source Area. EPA has determined that this is not a practicable alternative because of unacceptable short-term impacts to residents that live on the Source Area.

4E—Targeted Excavation, Convert to Caps Designed to Cover Hazardous Waste and Off-Site Disposal and/or Treatment

Two components of Alternative 4E would have impacts on wetlands/floodplains: excavation/backfill and capping to cover hazardous waste.

Soil that presents an unacceptable risk /exceeds cleanup requirements is located in wetland areas. Targeted removal of soil (excavation) and capping to cover hazardous waste will result in the destruction of some wetlands. Because contamination above cleanup goals is located in wetland areas, there is no practical alternative to conducting this work in these wetlands.

Because capping to cover hazardous waste would result in a permanent modification and occupancy of floodplain areas, a determination would first need to be made that there is no other practicable alternative before doing this work in the floodplain. The only other active alternative that could be conducted to address this soil contamination, meet cleanup objectives, and avoid unacceptable floodplain impacts would be excavation of all of the soil in the Source Area. EPA has determined that this is not a practicable alternative because of unacceptable short-term impacts to residents that live on the Source Area.

B. Least Environmentally Damaging Practicable Alternative Analysis for Source Area Soil Alternatives.

The No Action Alternative is not a practicable alternative because it is not protective of human health and the environment and does not meet Remedial Action Objectives (RAOs) for the Site. Both Alternatives 3E and 4E have similar environmental impacts on the wetlands in that the area impacted will be essentially the same. Both alternatives provide for restoration/mitigation to address impacts. As a result, both active alternatives are the least damaging practicable alternatives for wetlands purposes.

III. Disposal Options

All of the cleanup alternatives (except for No Action) for Allendale Pond and Lyman Mill Pond Sediment; Allendale Floodplain Soil; and. Lyman Mill Stream Sediment and Floodplain Soil (including the Oxbow Area) include the following disposal options:

- Option A: on-site containment in an Upland Confined Disposal Facility (CDF)
- Option B: on-site containment in a Near Shore Confined Disposal Facility (CDF)
- Option D: on-site incineration; and
- Option E: off-site disposal and/or treatment

Allendale Pond and Lyman Mill Pond Sediment Alternative 11 includes a fifth disposal option:

- Option F – on-site consolidation

A. Disposal Options Evaluation of Wetlands/Floodplain Requirements

Upland CDF: There are three potential upland CDF locations. The location south of the abandoned channel contains low-quality wetlands at the center of its footprint. Although this location does not have sufficient disposal capacity for all of the excavated sediment, it may be selected in combination with one of the other potential locations. Selection of a location for the upland CDF that contains wetlands would require a determination that there is no other practicable alternative. However, EPA believes sufficient disposal capacity exists in the other two locations outside wetland areas so that wetlands would not be impacted under this disposal option beyond what would occur under a specific alternative (*See* Sections IV., V., and VI., below).

Near Shore CDF: Near Shore CDFs are constructed in open water, wetland or floodplain areas and are filled so that the top cover is above the normal water level. A permanent perimeter dike would be installed along the shoreline. Placement of the Near Shore CDF would result in the discharge of dredged or fill material to waters of the US and destruction of wetlands beyond what would occur under a specific alternative (*See* Sections IV., V., and VI., below). As a result, EPA must look at all of the other disposal options to see if a determination can be made that there is no practical alternative to taking this action. EPA has determined that there is a practicable alternative to the Near Shore disposal option. The Upland CDF disposal option provides greater overall effectiveness and protection at a reasonable cost without (most likely) impacting wetlands. (*See* discussion below re: *Least Environmentally Damaging Practicable Alternative Analysis*)

Because this disposal option would include placement of contamination and a structure (dike) on the existing floodplain as well as location of a structure (cap) in or affecting the floodplain, it would result in an occupancy and modification of the floodplain. Thus, a determination would first need to be made concluding that there is no other practicable alternative. EPA has determined that there is a practicable alternative to the Near Shore disposal option. The Upland CDF disposal option provides greater overall effectiveness and protection at a reasonable cost without resulting in the modification and occupancy of the floodplain and associated adverse impacts.

Incineration: There are no wetlands or floodplain impacts associated solely with this disposal option beyond what would occur under a specific alternative (*See* Sections IV., V., and VI., below).

Off-Site Disposal/Treatment: There are no wetlands or floodplain impacts associated solely with this disposal option beyond what would occur under a specific alternative (*See* Sections IV., V., and VI., below).

On-Site Consolidation: This disposal option would have wetlands and floodplain impacts similar to those of the Near Shore CDF. Consolidation would result in the discharge of dredged

or fill material to waters of the US. As a result, EPA must look at all of the other disposal options to see if a determination can be made that there is no practical alternative to taking this action. EPA has determined that there is a practicable alternative to the on-site consolidation option. The Upland CDF disposal option provides greater overall effectiveness and protection at a reasonable cost without (most likely) impacting wetlands. (*See* discussion below re: *Least Environmentally Damaging Practicable Alternative Analysis*)

This disposal option would include location of a structure (cap) in or affecting the floodplain.[2] A determination would first need to be made there is no other practicable alternative before this option can be selected. EPA has determined that there is a practicable alternative to the On-Site Consolidation disposal option. The Upland CDF disposal option provides greater overall effectiveness and protection at a reasonable cost without resulting in the modification and occupancy of the floodplain and associated adverse impacts.

B. Least Environmentally Damaging Practicable Alternative Analysis for Disposal Options

The Upland CDF, Incineration and Off-Site Treatment/Disposal Options have similar environmental impacts and therefore would be the least damaging practicable alternative. Between the Upland CDF, Near Shore CDF and On-site Consolidation, clearly the Upland CDF would have the smallest environmental impact.

IV. Allendale Floodplain Soil

Contaminated soil has been identified in the Allendale Floodplain Soil area. This area includes wetlands and is bounded by the normal water level of the Woonasquatucket River and is within 100-yr flood elevations.

The following Cleanup Alternatives were evaluated in the Detailed Analysis of the FS:

1 – No Action
5 – Excavation and Disposal and/or Treatment
- 5A: on-site containment in an Upland Confined Disposal
- 5B: on-site containment in a Near Shore Confined Disposal Facility;
- 5D: on-site incineration;
- 5E: off-site disposal and/or treatment.

A. Allendale Floodplain Soil Alternatives Evaluation of Wetlands/Floodplain Requirements

1 – No Action Alternative. Because no response actions are taken under this alternative, wetlands and floodplain requirements are not triggered.

5 – Excavation and Disposal and/or Treatment (Impacts to wetlands/floodplains from disposal options A-E are discussed separately above.)

[2] It should be noted that because of dam removal under Alternative 11, it is likely that floodplain impacts would be reduced.

One component of Alternative 5 would have an impact on wetlands/floodplain: excavation/backfill.

Soil that presents an unacceptable risk /exceeds cleanup requirements is located in wetland areas. Removal of soil (excavation) will result in the destruction of some wetlands. Because contamination above cleanup goals is located in wetland areas, there is no practical alternative to conducting this work in these wetlands. Replacement with clean fill (backfill) would not impact the floodplain as the amount of material replaced after excavation would not result in a net increase in fill material.

B. **Least Environmentally Damaging Practicable Alternative Analysis for Source Area Soil Alternatives.**

The No Action Alternative is not a practicable alternative because it is not protective of human health and the environment and does not meet RAOs for the Site. As a result, Alternative 5 is the least damaging practicable alternative for wetlands purposes. As to Disposal Options for Alternative 5, see Section III., above.

V. Allendale Pond and Lyman Mill Pond Sediment

Contaminated sediment is located in the open water area upstream of the Allendale and Lyman Mill Dams during normal river flow. The action area is bounded to the north by the Route 44 Bridge and to the south by Lyman Mill dam and is located within the 100-yr floodplain.

The following Cleanup Alternatives were evaluated in the Detailed Analysis of the FS:

1 – No Action
7 –Excavation and Disposal and/or Treatment
- 7A: on-site containment in an Upland CDF
- 7B: on-site containment in a Near Shore CDF;
- 7D: on-site incineration; and
- 7E: off-site disposal and/or treatment.

8 –Partial Excavation, Isolation Capping, and Disposal and/or Treatment
- 8A: on-site containment in an Upland CDF;
- 8B: on-site containment in a Near Shore CDF;
- 8D: on-site incineration; and
- 8E: off-site disposal and/or treatment.

10- Dam Replacement, Excavation and Disposal and/or Treatment
- 10A: on-site containment in an Upland CDF;
- 10B: on-site containment in a Near Shore CDF;
- 10D: on-site incineration; and
- 10E: off-site disposal and/or treatment.

11 – Dam Replacement, Partial Excavation, Isolation Capping, and Disposal and/or Treatment
- 11A: on-site containment in an Upland CDF;
- 11B: on-site containment in a Near Shore CDF;
- 11D: on-site incineration;
- 11E: off-site disposal and/or treatment; and
- 11F: on-site consolidation.

A. Allendale Pond and Lyman Mill Pond Sediment Evaluation of Wetlands/Floodplain Requirements

1 – No Action Alternative. Because no response actions are taken under this alternative, wetlands and floodplain requirements are not triggered.

7 – Excavation and Disposal and/or Treatment. (Impacts to wetlands/floodplains from disposal options A-E are discussed separately above.)

Three components of Alternative 7 would result in the discharge of dredged or fill material to the Woonasquatucket River: excavation, dewatering and possible placement of thin layer cover.

Assuming excavation and dewatering[3] would result in more than a *de minimis* discharge of dredged or fill material to navigable waters, Clean Water Act requirements would be triggered. In addition, the possible placement of a thin layer cover would also result in the discharge of dredged or fill material to navigable waters. Sediment that presents an unacceptable risk /exceeds cleanup requirements is located in the River. Because contamination above cleanup goals is located in sediment in the River, there is no practical alternative to conducting this work.

Possible placement of a thin layer cover would constitute occupancy but not modification of the floodplain. This is because significant excavation will be required under this alternative thereby increasing the depth of the Ponds. Possible use of the thin layer cap would result in replacement of significantly less fill material than what was excavated under this alternative and, therefore, would not result in a net increase of fill in the floodplain.

8 –Partial Excavation, Isolation Capping, and Disposal and/or Treatment (Impacts to wetlands/floodplains from disposal options A-E are discussed separately above)

Three components of Alternative 8 would result in the discharge of dredged or fill material to the Woonasquatucket River and floodplain impacts: excavation, dewatering and isolation capping.

Assuming excavation and dewatering[4] would result in more than a *de minimis* discharge of dredged or fill material to navigable waters, Clean Water Act requirements would be triggered. In addition, the placement of an isolation cap would also result in the discharge of dredged or fill material to navigable waters. Sediment that presents an unacceptable risk /exceeds cleanup requirements is located in the River. Because contamination above cleanup goals is located in sediment in the River, there is no practical alternative to conducting this work.

The isolation cap would be located in/affect the floodplain. Thus, a determination would first need to be made that there is no practicable alternative before this alternative could be selected. EPA has determined that there is a practicable alternative to Alternative 8. Alternative 7 (Options A, D and E) would not be located in/affect the floodplain and is a practicable alternative in that it provides greater reliability and overall protection at a reasonable cost.

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[3] Alternative 7B would not include dewatering.
[4] Alternative 8B would not include dewatering.

10 - Dam Replacement, Excavation and Disposal and/or Treatment (Impacts to wetlands/floodplains from disposal options A-E are discussed separately above.)

Four components of Alternative 10 would result in the discharge of dredged or fill material to the Woonasquatucket River and destruction of wetlands: excavation, dewatering, possible placement of thin layer cover, and dam replacement.

Assuming excavation and dewatering[5] would result in more than a *de minimis* discharge of dredged or fill material to navigable waters, Clean Water Act requirements would be triggered. In addition, the possible placement of a thin layer cover would also result in the discharge of dredged or fill material to navigable waters. Sediment that presents an unacceptable risk /exceeds cleanup requirements is located in the River. Because contamination above cleanup goals is located in sediment in the River, there is no practical alternative to conducting this work.

Wetland areas border parts of the Woonasquatucket River including areas located adjacent to the Allendale and Lyman Mill Dams. Along with anticipated beneficial effects on water quality and fish passage, dam removal or replacement may have long-term impacts such as a reduction in open water areas. Dam removal or replacement would also result in additional destruction of some bordering wetlands due to the lowering of the water table. A determination would first have to be made that there is no other practicable alternative to destroying/modifying these wetlands before this alternative can be selected. EPA has determined that there is a practicable alternative to dam replacement. Alternative 7 is a practicable alternative that would not result in the permanent destruction of these bordering wetlands as would occur due to the lowering of the water table under Alternative 10.

Possible placement of a thin layer cover would constitute occupancy but not modification of the floodplain. This is because significant excavation will be required under this alternative thereby increasing the depth of the Ponds. Possible replacement of some fill with a thin layer cap (occupancy) would result in placement of significantly less fill material than what is excavated under this alternative and, therefore, would not result in a net increase of fill in the floodplain (no modification). In addition, because of dam removal, it is likely that this alternative will lessen the floodplain impacts.

11 – Dam Replacement, Partial Excavation, Isolation Capping, and Disposal and/or Treatment (Impacts to wetlands/floodplains from disposal options A-F are discussed separately above)

Four components of Alternative 11 would result in the discharge of dredged or fill material to the Woonasquatucket River, destruction of wetlands, and floodplain impacts: excavation, dewatering, isolation capping and dam replacement.

Assuming excavation and dewatering[6] would result in more than a *de minimis* discharge of dredged or fill material to navigable waters, Clean Water Act requirements would be triggered. In addition, the placement of an isolation cap would also result in the discharge of dredged or fill material to navigable waters. Sediment that presents an unacceptable risk /exceeds cleanup requirements is located in the River. Because contamination above cleanup goals is located in sediment in the River, there is no practical alternative to conducting this work.

Wetland areas border parts of the Woonasquatucket River including areas located adjacent to the Allendale and Lyman Mill Dams. Along with anticipated beneficial effects on water quality and fish passage, dam removal or replacement may have long-term impacts such as a reduction in open water

[5] Alternative 10B would not include dewatering.
[6] Alternatives 11B and 11F would not include dewatering.

areas. Dam removal or replacement would also result in the destruction of some bordering wetlands due to the lowering of the water table. A determination would first have to be made that there is no other practicable alternative to destroying/modifying these wetlands before this alternative can be selected. EPA has determined that there is a practicable alternative to dam replacement. Alternative 7 is a practicable alternative that would not result in the destruction of these bordering wetlands due to the lowering of the water table under Alternative 11.

The isolation cap would be located in/affect the floodplain. However, because of dam removal, it is likely that this option will lessen the floodplain impacts.

B. Least Environmentally Damaging Practicable Alternative Analysis for Allendale Pond and Lyman Mill Pond Sediment Alternatives

The No Action Alternative is not a practicable alternative because it is not protective of human health and the environment and does not meet RAOs for the Site. Alternatives 10 and 11 would result in the destruction of some additional bordering wetlands due to the lowering of the water table that would not occur under Alternatives 7 and 8 and, as discussed above, there is a practicable alternative to Alternatives 10 and 11.[7] Alternatives 8 and 11 may require more erosion-resistant cover substrates than Alternatives 7 and 10. If the capping substrate required under Alternatives 8 and 11 was less favorable for recolonization by macroinvertebrates, the delay in the reestablishment of the base of the aquatic food web in the ponds would in turn delay the recovery of the fishery and wildlife populations. If this is the case, Alternative 7 is the least damaging practicable alternative for wetlands purposes. As to Disposal Options, *see* Section III., above.

VI. Lyman Mill Stream Sediment and Floodplain Soil (including the Oxbow) Cleanup Area

The Lyman Mill sediment and floodplain soil cleanup area includes the stream channel and old mill raceway connecting Allendale Pond and Lyman Mill Pond, the Oxbow Area, and riverbank and floodplain areas along Lyman Mill Pond. The Oxbow Area is a large forested wetland area below Allendale Dam. Contaminated sediment and soil are located throughout this area.

The following Cleanup Alternatives were evaluated in the Detailed Analysis of the FS:

1-No Action
3-Targeted Excavation, Enhanced Natural Recovery and Disposal and/or Treatment
- 3A: on-site containment in an Upland CDF;
- 3B: on-site containment in a Near Shore CDF;
- 3D: on-site incineration; and
- 3E: off-site disposal and/or treatment.

5-Partial Excavation, Enhanced Natural Recovery and Disposal and/or Treatment
- 5A: on-site containment in an Upland CDF;
- 5B: on-site containment in a Near Shore CDF;
- 5D: on-site incineration; and
- 5E: off-site disposal and/or treatment.

[7] It should be noted that new wetlands will be created by removing the dams.

A. Lyman Mill Stream Sediment and Floodplain Soil Evaluation of Wetlands/Floodplain Requirements

1 – No Action Alternative. Because no response actions are taken under this alternative, wetlands and floodplain requirements are not triggered.

3-Targeted Excavation, Enhanced Natural Recovery and Disposal and/or Treatment

Two components of Alternative 3 would result in the discharge of dredged or fill material/destruction of wetlands: excavation/backfill and enhanced natural recovery (placement of thin-layer cover).

Assuming excavation/backfill would result in more than a *de minimis* discharge of dredged or fill material to navigable waters, Clean Water Act requirements would be triggered. In addition, enhanced natural recovery (thin-layer cover) would also result in the discharge of dredged or fill material to navigable waters/wetlands. Sediment/floodplain soil that presents an unacceptable risk /exceeds cleanup requirements is located throughout this area. Because contamination above cleanup goals is located in sediment/floodplain soil, there is no practical alternative to conducting this work.

Enhanced natural recovery (thin-layer cover) would constitute occupancy but not modification of the floodplain. This is because significant excavation will be required under this alternative. Enhanced natural recovery (occupancy) would result in placement of less fill material than what was excavated under this alternative and, therefore, would not result in a net increase of fill in the floodplain (no modification).

5-Partial Excavation, Enhanced Natural Recovery and Disposal and/or Treatment

Two components of Alternative 5 would result in the discharge of dredged or fill material/destruction of wetlands: excavation/backfill and enhanced natural recovery (thin-layer cover).

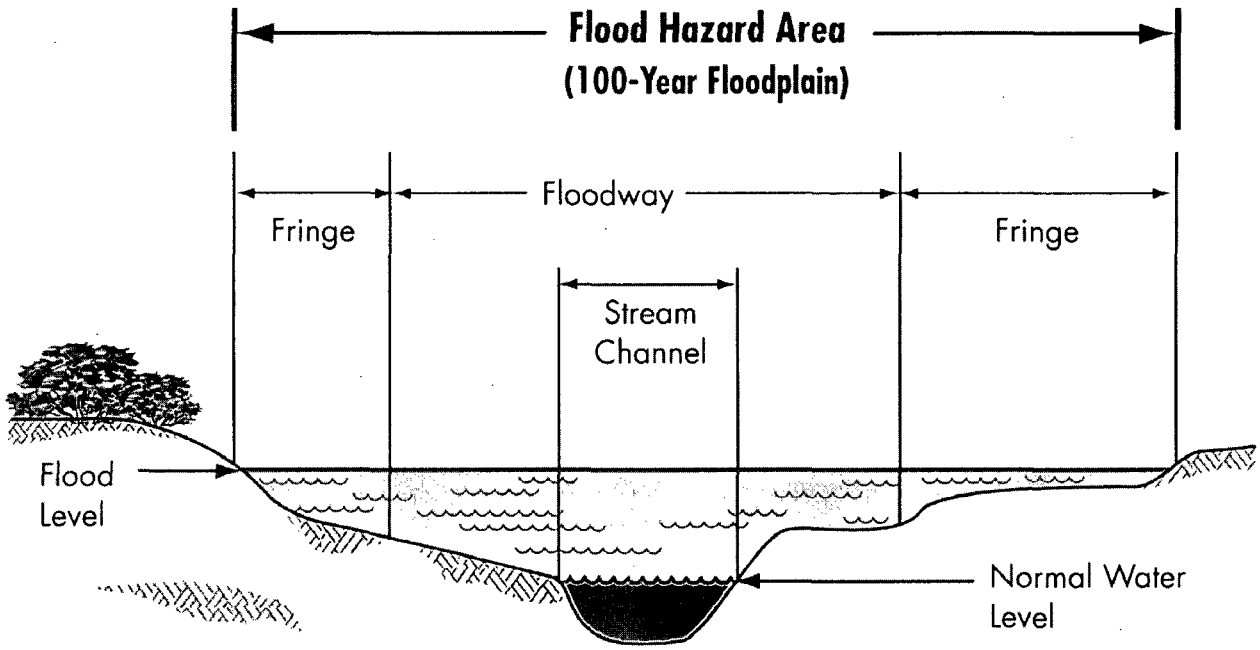
Assuming excavation/backfill would result in more than a *de minimis* discharge of dredged or fill material to navigable waters, Clean Water Act requirements would be triggered. In addition, enhanced natural recovery would also result in the discharge of dredged or fill material to navigable waters/wetlands. Sediment/floodplain soil that presents an unacceptable risk /exceeds cleanup requirements is located throughout this area. Because contamination above cleanup goals is located in sediment/floodplain soil, there is no practical alternative to conducting this work.

Enhanced natural recovery would constitute occupancy but not modification of the floodplain. This is because significant excavation will be required under this alternative. Enhanced natural recovery (occupancy) would result in replacement of less fill material than what was excavated under this alternative and, therefore, would not result in a net increase of fill in the floodplain (no modification).

B. Least Environmentally Damaging Practicable Alternative Analysis Lyman Mill Stream Sediment and Floodplain Soil

The No Action Alternative is not a practicable alternative because it is not protective of human health and the environment and does not meet RAOs for the Site. Both Alternatives 3 and 5 address essentially the same area of wetlands. However, because Alternative 5 requires that more wetlands be excavated (as opposed to a thin layer cover), there is greater damage to the wetlands. As a result, Alternative 3 is the least damaging practicable alternative for wetlands purposes. As to Disposal Options, *see* Section III., above.

FEMA Floodplain Materials



Riverine floodplains are comprised of the floodway and the flood fringe. The floodway is comprised of the channel and adjacent overbank areas necessary to effectively convey floodwaters. The flood fringe are lands outside the floodway that are at or below the BFE that store, but do not effectively convey, floodwaters. Lands that compose the flood fringe will be inundated during a 1% chance flood event but, due to physical characteristics of the floodplain, do not effectively convey floodwaters. The floodway and the Base Flood Elevation (BFE) of the 1% chance flood are determined using hydraulic modeling techniques.

Flood Fringe (or Floodway Fringe)
The portion of the floodplain located between the floodway and floodplain boundaries.

Floodplain
The area of water and land inundated during the highest point of the base, or 100-year, flood.

Floodway
The stream channel and that portion of the adjacent floodplain that must remain open (i.e., free of development) to allow conveyance of the 100-year flood.