

## **Appendix E**

### **Ecological Restoration Monitoring**

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## **E.1.0 Monitoring**

The attached tables present the data collected in 2007 for implementation monitoring of ecologically restored areas at the Fernald Preserve. Monitoring activities were conducted pursuant to project-specific Natural Resource Restoration Design Plans (NRRDPs) and as described in the Integrated Environmental Monitoring Plan (IEMP), Revision 5A, which is Attachment D of the Comprehensive Legacy Management and Institutional Controls Plan (LMICP) (DOE 2006). Construction of all ecological restoration projects were completed at site closure in late 2006. As a result, monitoring activities in 2007 involved all remaining restoration areas, including the Former Production Area, the Former Waste Pits Area, the Former Silos Area, the Borrow Area and a variety of “Non-Design Areas” (Figure E-1). Non-Design Areas are disturbed areas that were not included in a specific NRRDP; however they were graded and re-vegetated pursuant to general criteria that are consistent with other Fernald Preserve ecological restoration projects.

Monitoring activities in 2007 included woody vegetation survival and herbaceous cover estimates. Water quality data continued to be collected for the Phase II and Phase III wetland mitigation projects.

Previous ecological restoration monitoring reports included a summary of precipitation data; however, because this report is now included as Appendix E to the Site Environmental Report and the precipitation data is presented in Chapter 1 it will not be presented in this Appendix. Refer to Chapter 1 for 2007 precipitation data.

### **E.1.1 Woody Vegetation**

Woody vegetation survival data for the Former Production Area, the Former Waste Pits Area, the Former Silos Area, and a portion of the Borrow Area are presented in Table E-1.

All planted vegetation was surveyed pursuant to the methodology established in the 2002 Consolidated Monitoring Report (DOE 2003). The goal for restored areas is to achieve at least 80 percent survival for all trees and shrubs planted within a restoration project area. After at least one growing season, plants are evaluated and determined to be healthy or stressed. Stressed plants were assigned to one of three categories: vitality, re-sprout, or dead. The vitality category is used for plants that are alive, but with less than half of the expected canopy growing. Re-sprout plants have lost the entire top portion of the plant, but are regenerating through new stem growth at the base of the plant. Dead plants show no signs of life at all. The numbers of dead and stressed plants are compared against the design plant quantities to calculate percent survival.

In 2007, survival was at or near 80 percent for most areas. Area 3B (67 percent survival) and Area 4B (55 percent survival) did not meet this goal. The reduced survival can be attributed to a number of factors, including poor soil quality, compaction, small mammals, and drought conditions. Prior to closure a number of trees had to be relocated within Area 3B due to changes in the drainage needs in adjacent areas. These transplanted trees showed an increased rate of mortality. Also, during the final stages of remediation, re-grading was performed in the areas north of Area 4B for drainage purposes, which caused the final water levels to be higher than expected in some of the ponds located in Area 4B thus flooding the previously planted vegetation.

A number of volunteer recruits were observed in several areas. Cottonwood and sycamore trees have pioneered into the Former Silos Area and Former Waste Pits Area. Also, a large number of red cedars are establishing within the deer enclosure fence area in the Former Waste Pits Area. This finding suggests a continued benefit of deer enclosure fencing at the Fernald Preserve.

### **E.1.2 Herbaceous Cover**

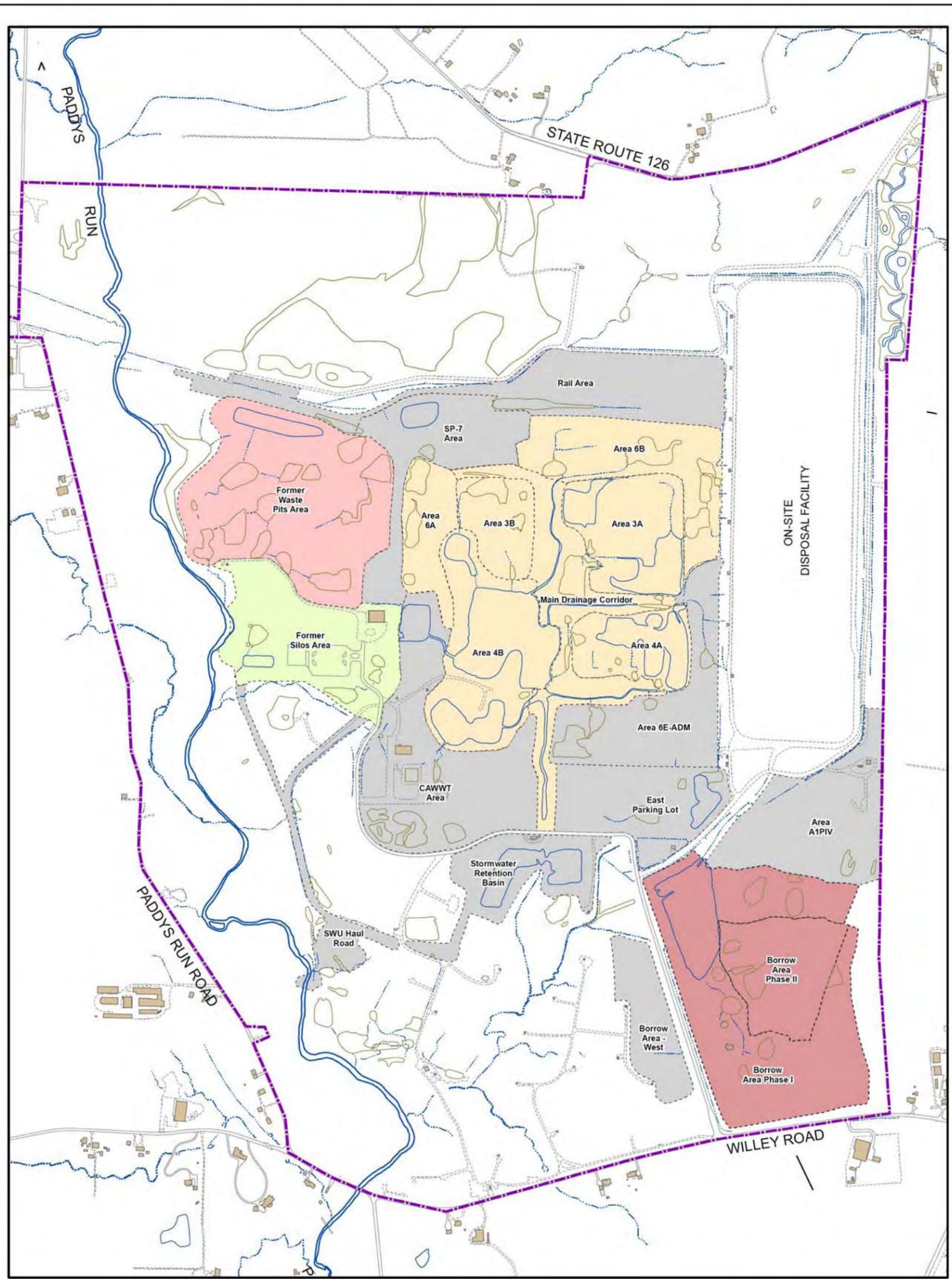
The herbaceous cover summary for all restoration areas is presented in Table E-2. Sub-area data tables are presented in Tables E-2A through E-2T. Again, the methodology established in the 2002 Consolidated Monitoring Report was used to collect field data. For 2007, five random quadrats were sampled in each sub-area. A sampling and analytical program (Visual Sample Plan) was used to randomize quadrat locations within each sub-area. Sample points were field-located as global positioning system waypoints.

Acceptance criteria for herbaceous cover include 90 percent total cover and at least 50 percent native species composition. To determine this, cover class categories are assigned to each quadrat. Species richness is then determined. Quadrat findings are then averaged (for cover class) and consolidated (for species composition). Both native species composition and relative frequency of native species is calculated for each sub-area.

The 2007 herbaceous cover results are mixed. Three of 20 sub-areas met or nearly met both acceptance criteria. Native species composition was achieved for the Borrow Area and the Former Production Area. However, several portions of the Former Silos Area, Former Waste Pits Area, and Non-Design Area have seen little or no progress in the establishment of native vegetation. Several potential reasons for this are discussed in more detail below.

The most important factor affecting grass establishment is the condition of the soil at the time of seeding. All of the areas evaluated in 2007 had undergone extensive excavation and disturbance through remediation, therefore no topsoil remained in these areas and the resulting subsoil was typically nothing more than compacted clay and gravel. Additionally, excess fill material was spread across some areas, which included geo-textile fabric and other construction materials mixed with the soil. Constant passes of heavy equipment left many of these areas very compacted. Restoration designs attempted to address these issues through the application of large amounts of soil amendments. Yard waste compost was spread across disturbed areas and incorporated into the soil with heavy equipment. The compost was used to add organic matter and nutrients; while at the same time, the mixing helped to reduce the compaction of the soil. In general, this approach proved effective. Most sub-areas within the Former Production Area met or nearly met the total cover goal and all of the sub-areas had over 50 percent native species composition. However, for the more recent projects, the amount of compost needed for total coverage was not available; therefore it was selectively placed on slopes in order to prevent erosion. The compost was also not always incorporated into the soil, but placed on top and seeded. Coverage in these areas was limited possibly due to the lack of soil contact. Topsoil was also used from an onsite source and in some areas a thin layer was used to help improve the soil conditions.

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- Legend**
- Borrow Area
  - Former Production Area
  - Former Waste Pits Area
  - Former Silos Area
  - Non-Design Area
  - Fernald Preserve Boundary
  - Building
  - Open Water
  - Wetland
  - Intermittent Stream
  - Road-paved
  - Road-gravel
  - Creek



Figure E-1. Herbaceous Areas

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Table E-1. Woody Vegetation Survival

Restoration Area	Monitoring Sub-Area	Planted	Vitality	Resprout	Dead	Percent Survival
Former Production Area	Area 3A/4A	900	4	15	148	81.4%
Former Production Area	Area 3B	450	4	11	134	66.9%
Former Production Area	Area 4B	281	0	2	124	55.2%
Silos Area	S1	541	3	9	23	93.5%
Silos Area	S2	421	3	7	27	91.2%
Silos Area	S3	313	0	11	25	88.5%
Waste Pits Area	WP1	666	22	21	93	79.6%
Waste Pits Area	WP2	431	0	4	21	94.2%
Waste Pits Area	WP3	178	3	2	32	79.2%
Borrow Area	Phase II	948	0	0	50	94.7%

Table E-2. Herbaceous Cover Summary

Restoration Area	Monitoring Sub-Area	Average Cover Class	Native Species Composition	Native Relative Frequency
Borrow Area	Borrow Area Phase I	5.6	57%	62%
Borrow Area	Borrow Area Phase II	3.2	50%	41%
Former Production Area	Area 4A	4.6	65%	79%
Former Production Area	Area 3A	5.4	86%	92%
Former Production Area	Main Drainage Corridor	2.2	53%	50%
Former Production Area	Area 3B	5.6	92%	97%
Former Production Area	Area 6A	4.0	50%	50%
Former Production Area	Area 4B	3.2	62%	65%
Former Production Area	Area 6B	3.6	63%	65%
Non Design Area	Stormwater Retention Basin	3.8	47%	48%
Non Design Area	East Parking Lot	2.6	42%	38%
Non Design Area	Area A1PIV	4.2	33%	37%
Non Design Area	Areas 6E-ADM	2.8	50%	46%
Non Design Area	Rail Area	2.6	29%	33%
Non Design Area	CAWWT Area	3.4	25%	40%
Non Design Area	Borrow Area - West	2.8	31%	31%
Non Design Area	SWU Haul Road Area	2.4	50%	52%
Non Design Area	SP-7 Area	4.0	30%	27%
Silos Area	Silos Area	3.0	18%	21%
Waste Pits Area	Waste Pits Area	2.2	40%	59%

Cover Class: 0 = 0% 1 = 2-4% 2 = 5-24% 3 = 25-49% 4 = 50-74% 5 = 75-89% 6 = 90-100%

Table E-2A. Herbaceous Cover Data Summary Borrow Area Phase I

Native Spp.: 12  
 Non-Native Spp.: 9  
 Percent Native: 57%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Alisma subcordatum</i>	southern water plantain	forb	2	0.20	4%
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.40	8%
<i>Andropogon gerardii</i>	Big bluestem	grass	5	0.20	4%
<i>Asclepias incarnata</i>	swamp milkweed	forb	4	0.20	4%
<i>Aster pilosus</i>	old field aster	forb	2	0.20	4%
<i>Carex frankii</i>	Frank's sedge	sedge	2	0.20	4%
<i>Carex vulpinoidea</i>	fox sedge	sedge	1	0.20	4%
<i>Conyza canadensis</i>	horseweed	forb	0	0.20	4%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.60	12%
<i>Eupatorium perfoliatum</i>	white boneset	forb	3	0.20	4%
<i>Juncus tenuis</i>	poverty rush	forb	1	0.20	4%
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.40	8%
<b><i>Cichorium intybus</i></b>	<b>chickory</b>	forb	0	0.20	4%
<b><i>Cirsium arvense</i></b>	<b>Canada thistle</b>	forb	0	0.20	4%
<b><i>Festuca sp.</i></b>	<b>Fescue sp.</b>	grass	0	0.20	4%
<b><i>Lolium multiflorum</i></b>	<b>annual rye</b>	grass	0	0.20	4%
<b><i>Plantago lanceolata</i></b>	<b>English plantain</b>	forb	0	0.20	4%
<b><i>Potentilla recta</i></b>	<b>rough-fruited cinquefoil</b>	forb	0	0.20	4%
<b><i>Rumex crispus</i></b>	<b>curly dock</b>	forb	0	0.20	4%
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.20	4%
<b><i>Trifolium repens</i></b>	<b>white clover</b>	forb	0	0.40	8%
<b>Native Species:</b>				3.2	62%
<b>Non-Native Species:</b>				2	38%

CC = Coefficient of Conservatism

Table E-2B. Herbaceous Cover Data Summary Borrow Area Phase II

Native Spp.: 7  
 Non-Native Spp.: 7  
 Percent Native: 50%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.40	7%
<i>Echinacea purpurea</i>	purple coneflower	forb	6	0.20	3%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	17%
<i>Oxalis stricta</i>	yellow wood sorrel	forb	0	0.20	3%
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	forb	0	0.20	3%
<i>Ratibida pinnata</i>	gray headed coneflower	forb	5	0.20	3%
<i>Verbena hastata</i>	blue vervain	forb	4	0.20	3%
<b><i>Chenopodium album</i></b>	<b>lamb's quarters</b>	forb	0	0.20	3%
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.40	7%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.60	10%
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.80	14%
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.60	10%
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.20	3%
<b><i>Trifolium repens</i></b>	<b>white clover</b>	forb	0	0.60	10%
<b>Native Species:</b>				2.40	41%
<b>Non-Native Species:</b>				3.40	59%

CC = Coefficient of Conservatism

Table E-2C. Herbaceous Cover Data Summary Former Production Area - Area 4A

Native Spp.: 17  
 Non-Native Spp. 9  
 Percent Native: 65%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	1.00	12%	
<i>Aster novae-angliae</i>	New England aster	forb	2	0.20	2%	
<i>Aster pilosus</i>	old field aster	forb	2	0.60	7%	
<i>Bidens frondosa</i>	Devil's beggar's tick	forb	2	0.40	5%	
<i>Carex hystericina</i>	bottlebrush sedge	sedge	5	0.20	2%	
<i>Conyza canadensis</i>	horseweed	forb	0	0.80	10%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.60	7%	
<i>Erigeron annuus</i>	Daisy fleabane	forb	0	0.20	2%	
<i>Panicum virgatum</i>	switchgrass	grass	4	0.20	2%	
<i>Polygonum pensylvanicum</i>	pinkweed	forb	0	0.20	2%	
<i>Populus deltoides</i>	cottonwood	tree	3	0.20	2%	
<i>Ratibida pinnata</i>	gray headed coneflower	forb	5	0.40	5%	
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.60	7%	
<i>Scirpus cyperinus</i>	woolgrass	sedge	1	0.20	2%	
<i>Solidago canadensis</i>	Canada goldenrod	forb	1	0.20	2%	
<i>Solidago rigida</i>	stiff goldenrod	forb	8	0.20	2%	
<i>Verbena hastata</i>	blue vervain	forb	4	0.40	5%	
<b><i>Cirsium vulgare</i></b>	<b>bull thistle</b>	forb	0	0.20	2%	
<b><i>Crepis capillaris</i></b>	<b>smooth hawk's beard</b>	forb	0	0.20	2%	
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.20	2%	
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.20	2%	
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.20	2%	
<b><i>Plantago major</i></b>	<b>common plantain</b>	forb	0	0.20	2%	
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.20	2%	
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.20	2%	
<b><i>Typha angustifolia</i></b>	<b>narrow leaved cattail</b>	forb	0	0.20	2%	
				<b>Native Species:</b>	6.60	79%
				<b>Non-Native Species:</b>	1.80	21%

CC = Coefficient of Conservatism

Table E-2D. Herbaceous Cover Data Summary Former Production Area - Area 3A

Native Spp.: 6  
 Non-Native Spp.: 1  
 Percent Native: 86%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.20	8%
<i>Bouteloua curtipendula</i>	side oats grama	grass	8	0.40	17%
<i>Conyza canadensis</i>	horseweed	forb	0	0.20	8%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	42%
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.20	8%
<i>Sorghastrum nutans</i>	Indian grass	grass	5	0.20	8%
<b>na</b>	<b>Regreen</b>	grass	0	0.20	8%
<b>Native Species:</b>				2.20	92%
<b>Non-Native Species:</b>				0.20	8%

CC = Coefficient of Conservatism

Table E-2E. Herbaceous Cover Data Summary Former Production Area - Main Drainage Corridor

Native Spp.: 8  
 Non-Native Spp.: 7  
 Percent Native: 53%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.20	4%
<i>Asclepias syriaca</i>	Milkweed	forb	1	0.20	4%
<i>Bouteloua curtipendula</i>	Side oats grama	grass	8	0.20	4%
<i>Conyza canadensis</i>	horseweed	forb	0	0.40	8%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.80	17%
<i>Helianthus grosseserratus</i>	sawtooth sunflower	forb	4	0.20	4%
<i>Verbena stricta</i>	hoary vervain	forb	3	0.20	4%
<i>Vernonia gigantea</i>	tall ironweed	forb	2	0.20	4%
<b><i>Chenopodium album</i></b>	<b>lamb's quarters</b>	forb	0	0.20	4%
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.60	13%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.40	8%
<b><i>Melilotus officinalis</i></b>	<b>yellow sweet clover</b>	forb	0	0.20	4%
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.20	4%
<b><i>Setaria sp.</i></b>	<b>foxtail species</b>	grass	0	0.40	8%
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.40	8%
<b>Native Species:</b>				2.40	50%
<b>Non-Native Species:</b>				2.40	50%

CC = Coefficient of Conservatism

Table E-2F. Herbaceous Cover Data Summary Former Production Area - Area 3B

Native Spp.: 12  
 Non-Native Spp.: 1  
 Percent Native: 92%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.60	10%
<i>Asclepias incarnata</i>	swamp milkweed	forb	4	0.20	3%
<i>Asclepias tuberosa</i>	butterfly weed	forb	4	0.60	10%
<i>Bouteloua curtipendula</i>	side oats grama	grass	8	0.40	7%
<i>Conyza canadensis</i>	horseweed	forb	0	0.40	7%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	17%
<i>Monarda fistulosa</i>	bergamot	forb	3	0.20	3%
<i>Panicum virgatum</i>	switchgrass	grass	4	0.60	10%
<i>Ratibida pinnata</i>	gray headed coneflower	forb	5	0.40	7%
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.40	7%
<i>Solidago canadensis</i>	Canada goldenrod	forb	1	0.60	10%
<i>Sorghastrum nutans</i>	Indian grass	grass	5	0.20	3%
<i>Verbena stricta</i>	hoary vervain	forb	3	0.20	3%
<b><i>Lolium multiflorum</i></b>	<b>annual rye</b>	grass	0	0.20	3%
<b>Native Species:</b>				5.60	97%
<b>Non-Native Species:</b>				0.20	3%

CC = Coefficient of Conservatism

Table E-2G. Herbaceous Cover Data Summary Former Production Area - Area 6A

Native Spp.: 9  
 Non-Native Spp.: 9  
 Percent Native: 50%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.80	10%
<i>Andropogon gerardii</i>	big bluestem	grass	5	0.20	3%
<i>Aster pilosus</i>	old field aster	forb	2	0.40	5%
<i>Bouteloua curtipendula</i>	side oats grama	grass	8	0.20	3%
<i>Conyza canadensis</i>	horseweed	forb	0	0.60	8%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	13%
<i>Helianthus grosseserratus</i>	sawtooth sunflower	forb	4	0.20	3%
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.40	5%
<i>Shizachyrium scoparium</i>	little bluestem	grass	5	0.20	3%
<b><i>Abutilon theophrasti</i></b>	<b>velvet leaf</b>	forb	0	0.20	3%
<b><i>Chenopodium album</i></b>	<b>lamb's quarters</b>	forb	0	0.80	10%
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.60	8%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.80	10%
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.20	3%
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.00	0%
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.60	8%
<b><i>Setaria sp.</i></b>	<b>foxtail species</b>	grass	0	0.40	5%
<b><i>Sida spinosa</i></b>	<b>prickly sida</b>	forb	0	0.40	5%
<b>Native Species:</b>				4.00	50%
<b>Non-Native Species:</b>				4.00	50%

CC = Coefficient of Conservatism

Table E-2H. Herbaceous Cover Data Summary Former Production Area - Area 4B

Native Spp.: 16  
 Non-Native Spp.: 10  
 Percent Native: 62%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Amaranthus albus</i>	tumbleweed	forb	0	0.20	3%	
<i>Andropogon gerardii</i>	big bluestem	grass	5	0.20	3%	
<i>Andropogon virginicus</i>	broom sedge	grass	3	0.20	3%	
<i>Conyza canadensis</i>	horseweed	forb	0	0.20	3%	
<i>Echinacea purpurea</i>	purple coneflower	forb	6	0.60	8%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.80	10%	
<i>Euphorbia nutans</i>	eyebane	forb	0	0.20	3%	
<i>Heliopsis helianthoides</i>	false sunflower	forb	5	0.20	3%	
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	forb	0	0.20	3%	
<i>Ratibida pinnata</i>	gray headed coneflower	forb	5	0.40	5%	
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.60	8%	
<i>Shizachyrium scoparium</i>	little bluestem	grass	5	0.20	3%	
<i>Solidago rigida</i>	stiff goldenrod	forb	8	0.20	3%	
<i>Verbena hastata</i>	blue vervain	forb	4	0.20	3%	
<i>Verbena stricta</i>	hoary vervain	forb	3	0.60	8%	
<i>Verbena urticifolia</i>	white vervain	forb	3	0.20	3%	
<b><i>Cirsium vulgare</i></b>	<b>bull thistle</b>	forb	0	0.20	3%	
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.20	3%	
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.40	5%	
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.20	3%	
<b><i>Melilotus officinalis</i></b>	<b>yellow sweet clover</b>	forb	0	0.20	3%	
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.60	8%	
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.40	5%	
<b><i>Setaria sp.</i></b>	<b>foxtail species</b>	grass	0	0.20	3%	
<b><i>Sida spinosa</i></b>	<b>prickly sida</b>	forb	0	0.20	3%	
<b><i>Trifolium repens</i></b>	<b>white clover</b>	forb	0	0.20	3%	
				<b>Native Species:</b>	5.20	65%
				<b>Non-Native Species:</b>	2.80	35%

CC = Coefficient of Conservatism

Table E-2I. Herbaceous Cover Data Summary Former Production Area - Area 6B

Native Spp.: 15  
 Non-Native Spp.: 9  
 Percent Native: 63%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Amaranthus albus</i>	tumbleweed	forb	0	0.20	3%
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	1.00	13%
<i>Andropogon gerardii</i>	big bluestem	grass	5	0.40	5%
<i>Aster novae-angliae</i>	New England aster	forb	2	0.20	3%
<i>Aster pilosus</i>	old field aster	forb	2	0.20	3%
<i>Chamaecrista fasciculata</i>	partridge pea	forb	3	0.40	5%
<i>Conyza canadensis</i>	horseweed	forb	0	0.40	5%
<i>Echinacea purpurea</i>	purple coneflower	forb	6	0.20	3%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.60	8%
<i>Helianthus grosseserratus</i>	sawtooth sunflower	forb	4	0.20	3%
<i>Monarda fistulosa</i>	bergamot	forb	3	0.20	3%
<i>Ratibida pinnata</i>	gray headed coneflower	forb	5	0.40	5%
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.20	3%
<i>Solidago canadensis</i>	Canada goldenrod	forb	1	0.40	5%
<i>Verbena stricta</i>	hoary vervain	forb	3	0.20	3%
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.60	8%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.60	8%
<b><i>Melilotus officinalis</i></b>	<b>yellow sweet clover</b>	forb	0	0.20	3%
<b><i>Plantago major</i></b>	<b>common plantain</b>	forb	0	0.20	3%
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.20	3%
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.20	3%
<i>Setaria sp.</i>	foxtail species	grass	0	0.40	5%
<i>Taraxum officinale</i>	dandelion	forb	0	0.20	3%
<i>Trifolium pratense</i>	red clover	forb	0	0.20	3%
<b>Native Species:</b>				5.20	65%
<b>Non-Native Species:</b>				2.80	35%

CC = Coefficient of Conservatism

Table E-2J. Herbaceous Cover Data Summary Non-Design Area - Stormwater Retention Basin

Native Spp.: 8  
 Non-Native Spp.: 9  
 Percent Native: 47%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Amaranthus albus</i>	postrate pigweed	forb	0	0.40	6%	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	1.00	16%	
<i>Bouteloua curtipendula</i>	Side oats grama	grass	8	0.20	3%	
<i>Calystegia sepium</i>	Hedge bind weed	forb	1	0.20	3%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.60	10%	
<i>Erigeron annuus</i>	daisy fleabane	forb	0	0.20	3%	
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	forb	0	0.20	3%	
<i>Ratibida pinnata</i>	gray headed coneflower	forb	5	0.20	3%	
<b><i>Centaureum pulchellum</i></b>	<b>branching centaury</b>	forb	0	0.20	3%	
<b><i>Cirsium arvense</i></b>	<b>Canada thistle</b>	forb	0	0.20	3%	
<b><i>Daucus carota</i></b>	<b>Queen Anne's lace</b>	forb	0	0.20	3%	
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.80	13%	
<i>Phleum pratense</i>	Timothy grass	grass	0	0.20	3%	
<i>Plantago lanceolata</i>	English plantain	forb	0	0.60	10%	
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.40	6%	
<b><i>Taraxum officinale</i></b>	<b>dandelion</b>	forb	0	0.20	3%	
<i>Trifolium repens</i>	white clover	forb	0	0.40	6%	
				<b>Native Species:</b>	3.00	48%
				<b>Non-Native Species:</b>	3.20	52%

CC = Coefficient of Conservatism

Table E-2K. Herbaceous Cover Data Summary Non-Design Area - East Parking Lot

Native Spp.: 5  
 Non-Native Spp.: 7  
 Percent Native: 42%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.20	3%	
<i>Conyza canadensis</i>	horseweed	forb	0	0.20	3%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	17%	
<i>Heliopsis helianthoides</i>	false sunflower	forb	5	0.20	3%	
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.60	10%	
<b><i>Chenopodium album</i></b>	<b>lamb's quarters</b>	forb	0	0.80	14%	
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.40	7%	
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.60	10%	
<b><i>Melilotus officinalis</i></b>	<b>yellow sweet clover</b>	forb	0	0.20	3%	
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	1.00	17%	
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.20	3%	
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.40	7%	
				<b>Native Species:</b>	2.20	38%
				<b>Non-Native Species:</b>	3.60	62%

CC = Coefficient of Conservatism

Table E-2L. Herbaceous Cover Data Summary Non-Design Area - Area A1PIV

Native Spp.: 4  
 Non-Native Spp.: 8  
 Percent Native: 33%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	1.00	14%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	14%
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	forb	0	0.40	6%
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.20	3%
<b><i>Chenopodium album</i></b>	<b>lamb's quarters</b>	forb	0	0.80	11%
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.40	6%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.80	11%
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.20	3%
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.80	11%
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.20	3%
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.80	11%
<b><i>Trifolium repens</i></b>	<b>white clover</b>	forb	0	0.40	6%
<b>Native Species:</b>				2.60	37%
<b>Non-Native Species:</b>				4.40	63%

CC = Coefficient of Conservatism

Table E-2M. Herbaceous Cover Data Summary Non-Design Area - Area 6E-ADM

Native Spp.: 6  
 Non-Native Spp.: 6  
 Percent Native: 50%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Amaranthus albus</i>	prostrate pigweed	forb	0	0.40	7%
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.20	4%
<i>Conyza canadensis</i>	horseweed	forb	0	0.40	7%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	18%
<i>Polygonum pensylvanicum</i>	pinkweed	forb	0	0.40	7%
<i>Ratibida pinnata</i>	gray headed coneflower	forb	5	0.20	4%
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.40	7%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.80	14%
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.40	7%
<b><i>Plantago lanceolata</i></b>	<b>English plantain</b>	forb	0	0.40	7%
<b><i>Plantago major</i></b>	<b>common plantain</b>	forb	0	0.20	4%
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.80	14%
<b>Native Species:</b>				2.60	46%
<b>Non-Native Species:</b>				3.00	54%

CC = Coefficient of Conservatism

Table E-2N. Herbaceous Cover Data Summary Non-Design Area - Rail Area

Native Spp.: 5  
 Non-Native Spp.: 12  
 Percent Native: 29%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Acer negundo</i>	boxelder	tree	3	0.20	3%	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.40	6%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	14%	
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	forb	0	0.60	8%	
<i>Solidago canadensis</i>	Canada goldenrod	forb	1	0.20	3%	
<b><i>Chenopodium album</i></b>	<b>lamb's quarters</b>	forb	0	0.40	6%	
<b><i>Cirsium arvense</i></b>	<b>Canada thistle</b>	forb	0	0.20	3%	
<b><i>Convolvulus arvensis</i></b>	<b>field bindweed</b>	forb	0	0.20	3%	
<b><i>Daucus carota</i></b>	<b>Queen Anne's lace</b>	forb	0	0.40	6%	
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.40	6%	
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.80	11%	
<b>na</b>	<b>Regreen</b>	grass	0	0.60	8%	
<b><i>Plantago lanceolata</i></b>	<b>English plantain</b>	forb	0	0.20	3%	
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.60	8%	
<b><i>Setaria sp.</i></b>	<b>foxtail species</b>	grass	0	0.20	3%	
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.40	6%	
<b><i>Trifolium repens</i></b>	<b>white clover</b>	forb	0	0.40	6%	
				<b>Native Species:</b>	2.40	33%
				<b>Non-Native Species:</b>	4.80	67%

CC = Coefficient of Conservatism

Table E-20. Herbaceous Cover Data Summary Non-Design Area - CAWWT Area

Native Spp.: 5  
 Non-Native Spp.: 14  
 Percent Native: 25%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Achillea millefolium</i>	yarrow	forb	1	0.60	7%	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	1.00	12%	
<i>Conyza canadensis</i>	horseweed	forb	0	0.40	5%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	12%	
<i>Panicum virgatum</i>	switchgrass	grass	4	0.20	2%	
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	forb	0	0.20	2%	
<b>Chenopodium album</b>	<b>lamb's quarters</b>	forb	0	0.20	2%	
<b>Cichorium intybus</b>	<b>chickory</b>	forb	0	0.20	2%	
<b>Cirsium arvense</b>	<b>Canada thistle</b>	forb	0	0.40	5%	
<b>Daucus carota</b>	<b>Queen Anne's lace</b>	forb	0	0.60	7%	
<b>Echinochloa crus-gali</b>	<b>barnyard grass</b>	forb	0	0.40	5%	
<b>Lonicera maackii</b>	<b>amur honeysuckle</b>	shrub	0	0.20	2%	
<b>Medicago lupulina</b>	<b>black medick</b>	forb	0	0.40	5%	
<b>Melilotus alba</b>	<b>white sweet clover</b>	forb	0	0.40	5%	
<b>Phleum pratense</b>	<b>Timothy grass</b>	grass	0	0.40	5%	
<b>Plantago lanceolata</b>	<b>English plantain</b>	forb	0	0.40	5%	
<b>Plantago major</b>	<b>common plantain</b>	forb	0	0.40	5%	
<b>Polygonum aviculare</b>	<b>prostrate knotweed</b>	forb	0	0.20	2%	
<b>Polygonum persicaria</b>	<b>spotted lady's thumb</b>	forb	0	0.20	2%	
<b>Trifolium pratense</b>	<b>red clover</b>	forb	0	0.60	7%	
				<b>Native Species:</b>	3.40	40%
				<b>Non-Native Species:</b>	5.00	60%

CC = Coefficient of Conservatism

Table E-2P. Herbaceous Cover Data Summary Non-Design Area - Borrow Area-West

Native Spp.: 5  
 Non-Native Spp.: 11  
 Percent Native: 31%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.60	9%	
<i>Cyperus esculentus</i>	yellow nut sedge	sedge	0	0.20	3%	
<i>Echinacea purpurea</i>	purple coneflower	forb	6	0.20	3%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.80	11%	
<i>Panicum virgatum</i>	switchgrass	grass	4	0.40	6%	
<b>Chenopodium album</b>	<b>lamb's quarters</b>	forb	0	0.20	3%	
<b>Echinochloa crus-gali</b>	<b>barnyard grass</b>	forb	0	0.40	6%	
<b>Medicago lupulina</b>	<b>black medick</b>	forb	0	0.40	6%	
<b>Melilotus alba</b>	<b>white sweet clover</b>	forb	0	0.40	6%	
<b>na</b>	<b>Regreen</b>	grass	0	0.40	6%	
<b>Plantago lanceolata</b>	<b>English plantain</b>	forb	0	0.40	6%	
<b>Plantago major</b>	<b>common plantain</b>	forb	0	0.20	3%	
<b>Polygonum aviculare</b>	<b>prostrate knotweed</b>	forb	0	0.20	3%	
<b>Polygonum persicaria</b>	<b>spotted lady's thumb</b>	forb	0	0.40	6%	
<b>Trifolium pratense</b>	<b>red clover</b>	forb	0	0.80	11%	
<b>Trifolium repens</b>	<b>white clover</b>	forb	0	1.00	14%	
				<b>Native Species:</b>	2.20	31%
				<b>Non-Native Species:</b>	4.80	69%

CC = Coefficient of Conservatism

Table E-2Q. Herbaceous Cover Data Summary Non-Design Area - SWU Haul Road Area

Native Spp.: 7  
 Non-Native Spp.: 7  
 Percent Native: 50%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Acer negundo</i>	boxelder	tree	3	0.20	4%	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.60	11%	
<i>Bidens frondosa</i>	Devil's beggar's tick	forb	2	0.40	7%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	19%	
<i>Polygonum pennsylvanicu</i>	Pennsylvania smartweed	forb	0	0.20	4%	
<i>Verbena stricta</i>	hoary vervain	forb	3	0.20	4%	
<i>Verbena urticifolia</i>	white vervain	forb	3	0.20	4%	
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.60	11%	
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.40	7%	
<b><i>Melilotus officinalis</i></b>	<b>yellow sweet clover</b>	forb	0	0.40	7%	
<b>na</b>	<b>Regreen</b>	grass	0	0.20	4%	
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.20	4%	
<b><i>Polygonum persicaria</i></b>	<b>spotted lady's thumb</b>	forb	0	0.20	4%	
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.60	11%	
				<b>Native Species:</b>	2.80	52%
				<b>Non-Native Species:</b>	2.60	48%

CC = Coefficient of Conservatism

Table E-2R. Herbaceous Cover Data Summary Non-Design Area - SP-7 Area

Native Spp.: 3  
 Non-Native Spp.: 7  
 Percent Native: 30%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.60	14%	
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.40	9%	
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.20	5%	
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.20	5%	
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.60	14%	
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.80	18%	
<b><i>Plantago lanceolata</i></b>	<b>English plantain</b>	forb	0	0.80	18%	
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	0.40	9%	
<b><i>Sonchus oleraceus</i></b>	<b>common sow thistle</b>	forb	0	0.20	5%	
<b><i>Trifolium repens</i></b>	<b>white clover</b>	forb	0	0.20	5%	
				<b>Native Species:</b>	1.20	27%
				<b>Non-Native Species:</b>	3.40	77%

CC = Coefficient of Conservatism

Table E-2S. Herbaceous Cover Data Summary Former Silos Area

Native Spp.: 2  
 Non-Native Spp.: 9  
 Percent Native: 18%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	1.00	17%
<i>Polygonum pennsylvanicum</i>	Pennsylvania smartweed	forb	0	0.20	3%
<b><i>Abutilon theophrasti</i></b>	<b>velvet leaf</b>	forb	0	0.20	3%
<b><i>Chenopodium album</i></b>	<b>lamb's quarters</b>	forb	0	0.80	14%
<i>Daucus carota</i>	Queen Anne's lace	forb	0	0.20	3%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	1.00	17%
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.40	7%
<b><i>Plantago lanceolata</i></b>	<b>English plantain</b>	forb	0	0.40	7%
<b><i>Plantago major</i></b>	<b>common plantain</b>	forb	0	0.20	3%
<b><i>Polygonum aviculare</i></b>	<b>prostrate knotweed</b>	forb	0	1.00	17%
<b><i>Trifolium pratense</i></b>	<b>red clover</b>	forb	0	0.40	7%
<b>Native Species:</b>				1.20	21%
<b>Non-Native Species:</b>				4.60	79%

CC = Coefficient of Conservatism

Table E-2T. Herbaceous Cover Data Summary Former Waste Pits Area

Native Spp.: 4  
 Non-Native Spp.: 6  
 Percent Native: 40%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Coryza canadensis</i>	horseweed	forb	0	0.60	18%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	0.80	24%
<i>Rudbeckia hirta</i>	black-eyed Susan	forb	1	0.40	12%
<i>Verbena hastata</i>	blue vervain	forb	4	0.20	6%
<b><i>Cirsium arvense</i></b>	<b>Canada thistle</b>	forb	0	0.20	6%
<b><i>Echinochloa crus-gali</i></b>	<b>barnyard grass</b>	forb	0	0.20	6%
<b><i>Medicago lupulina</i></b>	<b>black medick</b>	forb	0	0.40	12%
<b><i>Melilotus alba</i></b>	<b>white sweet clover</b>	forb	0	0.20	6%
<b><i>Melilotus officinalis</i></b>	<b>yellow sweet clover</b>	forb	0	0.20	6%
na	Regreen	grass	0	0.20	6%
<b>Native Species:</b>				2.00	59%
<b>Non-Native Species:</b>				1.40	41%

CC = Coefficient of Conservatism

Compost soil amendment created another issue in some areas because, due to the volume of material needed, unscreened compost was used. The unscreened compost contained a fair amount of material typically included in yard waste collection programs, including bits of plastic bags, yard toys and trash. Although this waste has not hindered vegetation establishment, it is not aesthetically pleasing. Fernald Preserve personnel continue to remove yard waste from these amended areas.

The timing of seeding activities is another factor resulting in poor germination. Several areas were seeded in the late fall/early winter, simply not allowing enough time for germination of cover grasses to take place before the end of the growing season. In addition, muddy conditions at the time of seeding prevented the use of a seed drill in some areas, so broadcast seeding was conducted in those areas. All broadcast seed locations were straw mulched. However, when combined with the issues discussed above, there was certainly an increased loss of seed due to erosion and predation.

Precipitation issues also contributed to the lack of vegetation establishment. The heavy precipitation in the fall of 2006 that hindered seeding efforts was followed by drought conditions during the summer and fall of 2007. The seeded areas simply did not receive enough water for proper germination and growth.

In the areas that did begin to germinate, goose grazing caused significant damage. The geese eat the tender shoots, thus inhibiting the establishment of the grasses.

Many of the issues discussed above will repair themselves over time. In previous restoration projects, the prudent course of action was to be patient. Poor seed germination within the first two years was followed by successful establishment of native grasses later. Freeze-thaw cycles and the accumulation of organic matter from weeds will build soil and incorporate the native grass and forb seeds into the soil, and will grow when the conditions are satisfactory. Eventually, all disturbed areas will recover. However, there is concern that some areas are too impacted to see any measurable improvement in herbaceous cover for some time; therefore, portions of the Former Waste Pits Area, Former Silos Area and Non-Design Areas may need to be re-seeded following extensive efforts to improve the soil conditions. The conventional process for seeding restored areas may need to be revisited as well, as some areas are eroding before the native vegetation can be established. Eroded areas can be repaired, but this leads to further soil disturbance and additional reseeded.

### **E.1.3 Wetland Mitigation Monitoring**

Wetland mitigation monitoring in 2007 consisted of water quality sampling in the Phase II Wetland Mitigation Project and in the Borrow Area. This information is presented in Table E-3. Many of the wetland basins were dry by early fall due to drought conditions. Data that were collected identify some continued high pH values, especially in Borrow Area Basin 3. This basin also had a much higher concentration of dissolved oxygen and turbidity. These findings are attributed to algae growth coupled with runoff from the Area 1, Phase IV Non-Design sub-area, which, as Table E-2 illustrates, was not sufficiently established with herbaceous cover. Water quality will continue to be evaluated in 2008.

Table E-3. Wetland Mitigation Water Quality Summary

Area	Date	Temperature (celsius)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Color	Depth (ft)
Phase II, Basin 1	7/18/2003	26.6	7.56	0.474	15	2.06	clear	2.5
	9/27/2003	dry	dry	dry	dry	dry	dry	dry
Phase II, Basin 2	7/18/2003	27.2	7.59	0.442	52	2.70	clear	1.5
	9/27/2003	dry	dry	dry	dry	dry	dry	dry
Phase II, Basin 3	7/18/2003	27.9	9.13	0.313	9	6.24	clear	1.1
	9/27/2003	dry	dry	dry	dry	dry	dry	dry
Borrow Area, Basin 3	7/22/2004	21.5	9.78	0.215	48	5.83	no data	no data
	9/27/2003	25	10.05	0.406	112	19.99	cloudy, some algae	1.5
Borrow Area, Basin 4	7/22/2003	21.8	9.90	0.278	85	7.45	no data	no data
	9/27/2003	25.4	7.88	0.537	61	7.42	clear	1.0
Borrow Area, Basin 8	7/22/2004	21.3	7.93	0.256	34	4.40	algae covered	no data
	9/27/2003	dry	dry	dry	dry	dry	dry	dry

The IEMP originally called for the Phase II project to be completed in 2007 with the conduct of a wetland delineation to determine the extent of wetlands created. However, given the drought in the summer and fall of 2007 along with continued impacts due to nuisance animals (deer and geese); DOE has decided to postpone the wetland delineation for at least one year.

#### E.1.4 Activities in 2008

Project specific design plans and subsequent requirements in the IEMP call for one year of implementation monitoring. However, given the poor herbaceous cover findings across portions of the Fernald Preserve, DOE has determined that herbaceous cover monitoring shall continue for the Former Waste Pits Area, the Former Silos Area, all Non-Design Areas, and the Main Drainage Corridor portion of the Former Production Area. Portions of these areas may be re-seeded as part of site preparation activities for the Fernald Preserve Visitors Center.

Wetland mitigation monitoring will also continue. DOE will determine the extent of additional monitoring following the review of data collected in 2008. Herbaceous cover of the onsite disposal facility cell cap 3 will be evaluated as well. Pursuant to the LMICP, this data will be provided as a separate report.

### E.2.0 References

DOE (U.S. Department of Energy), 2006a. *Comprehensive Legacy Management and Institutional Controls Plan*, 20013-PL-0001, Revision 1, Final, Fluor Fernald, DOE, Fernald Area Office, Cincinnati, Ohio, June.

DOE (U.S. Department of Energy), 2003. *2002 Consolidated Monitoring Report for Restored Areas at the Fernald Closure Project*, 20900-RP-0017, Draft, Revision B, Fluor Fernald, DOE, Fernald Area Office, Cincinnati, Ohio.

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