



BIOSOLIDS USE FOR SOIL RESTORATION

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*Metropolitan Water Reclamation District of Greater Chicago
Protecting Our Water Environment*

OVERVIEW OF MWRDGC

- Services Cook County Illinois Including City of Chicago and 124 Suburban Communities
- Operates Seven Water Reclamation Plants Handling Daily Flow of 1.5 Billion Gallons
- Produces 180,000 Tons (d.w.) of Biosolids Annually
- Beneficial Reuse (Land Application) Policy since 1967

SUMMARY OF MWRDGC BIOSOLIDS MANAGEMENT PROGRAM

- Farmland (40-50%)
- Landfill Daily Cover (5-20%)
- Landfill Final Cover (5-20%)
- Urban Reclamation/Use (5-30%)

POTENTIAL USE OF BIOSOLIDS IN THE CALUMET REGION

- Economic resource enabling *in situ* restoration of degraded soils
- Biosolids matrix (e.g. organic matter, Fe-oxide content) can provide effective reduction of bioavailability of legacy pollutants in contaminated soils
- Proposed for use in vegetative layer of final closure plan for Lake Calumet Cluster Site (IEPA Alternative 4)
- Proposed for restoration of 14 acres of prairie soil at 140-acre Indian Ridge Marsh site

BIOSOLIDS PROCESSING

Anaerobic Digester





Typical Biosolids Storage Lagoon at SWRP LASMA Facility
Size ~ 15 acres Max Storage Capacity 360,000 yd³



Centrifuge Cake Biosolids Aging in a Lagoon



Aged Centrifuge Cake Biosolids Being Out-Loaded to Trucks for Transport to Drying Cells



Lagoon-Aged Biosolids Being Mechanically Agitated During Air-Drying
On A Paved Drying Cell



Lagoon-Aged Biosolids Being Mechanically Agitated During Air-Drying On Paved Drying Cell At SWRP HASMA Facility



Windrowed Biosolids Resulting From Mechanical Agitation With Horizontal Auger (Brown Bear) During Air-Drying



Air-Dried Biosolids Stacked for Transport to Beneficial Use Sites

Morton West H.S.

Biosolids were spread by Bobcat and incorporated with “rock pickers” in preparation for planting turf to construct a soccer field.



USX SITE



USX SITE



USX PLOTS IN SEPTEMBER 2000



USX PLOTS IN SEPTEMBER 2000



USX DEMO PLOTS SUMMER 2003



MWRDGC INTEREST IN PRAIRIE RESTORATIONS

Native Prairie Landscape Conversion Lemont WRP



Native Prairie Landscape Conversion North Side WRP



Bluff Springs Fen





Bluff Springs Fen



Identifying Soils of Select Remnant Prairie Sites in Cook County

SITE	PRAIRIE TYPE	SOIL NO. (ASSOC.)	SOIL SEIRES	SOIL CLASSIFICATION
Glenbrook Prairie	BMP	232 (14)	Ashkum	Fine, mixed, mesic, Typic Haplaquolls
		531 (44)	Markham	Fine, illitic, mesic, Mollic Hapludalfs
James Woodworth Prairie	BMP	320B (45)	Frankfort	Fine, illitic, mesic, Udollic Ochraqualfs
Superior Street Prairie	DMSP, MSP, SM	741B (50)	Oakville	Mixed, mesic, Typic Udisamments
		49 (22)	Watseka	Sandy, mixed, mesic, Aquic Hapludolls
		201 (22)	Gilford	Course-loamy, mixed, mesic, Typic Haplaquoll
Markham Prairie	DMSP, MSP, SM WMP, BMP	172 (22)	Hoopeston	Course-loamy, mixed, mesic, Aquic Hapludolls
		125(21)	Selma	Fine-loamy, mixed, mesic, Typic Haplaquolls
		49 (22)	Watseka	Sandy, mixed, mesic, Aquic Hapludolls

BMP = black mesic prairie, DMSP = dry mesic sand prairie, MSP = mesic sand, SM = sedge meadow, WMP = wet mesic prairie,

Identifying Soils of Select Remnant Prairie Sites in Cook County (cont'd)

SITE	PRAIRIE TYPE	SOIL NO. (ASSOC.)	SOIL SEIRES	SOIL CLASSIFICATION
Bluff Springs Fen	BOS, F, SM, M, DGP, BMP	318C2 (20)	Lorenzo	Fine-loamy over sandy or sandy-skeletal, mixed, mesic, Typic Argiudolls
		343 (20)	Kane	Fine-loamy over sandy or sandy-skeletal, mixed, mesic, Aquic Argiudolls
		93 (20)	Rodman	Sandy-skeletal, mixed, mesic, Typic Hapludolls
		103 (25)	Houghton Muck	Euic, mesic, Typic Medisaprists
		865	gravel	
		107 (24)	Sawmill	Fine-silty, mixed, mesic, Cumulic Haplaquolls

BOS = Burr oak savannah, F = Fen, SM = Sedge meadow, M = Marsh, DGP = Dry gravel prairie, BMP = Black mesic prairie

SOIL PROPERTIES AT REMNANT PRAIRIE SITES IN COOK COUNTY (Soil Survey Reports)

Soil Series	Vegetation	Depth (A1/Ap) (inches)	Soil OC (%)	Soil Texture	pH
Ashkum	Wet Prairie or Marsh	11-15	4.7 (0-6) 3.7 (0-15)	sic-sicl	6.4-6.8
Markham	Forest	10	1.4	sil	
Frankfort	Prairie/Prairie-Forest	5-12	2.42	sil-sicl	5.8
Lorenzo	Prairie	8	1.7	l	
Kane	Prairie	14	2.3	sil	
Rodman	Forest/Prairie-Forest	7	1.7	gl, l	>7.0
Lorenzo	Prairie	8	1.7	l	
Houghton Muck gravel	Marsh Veg., Grasses	30-60+	37		
Sawmill	Prairie	32	2.6	sicl	
Oakville	Forest	7	0.6	fsl	
Watseka	Tall Grass Prairie	10	1.1	lfs	<6.0
Gilford	Marsh Grasses	12	2.6	fsl	
Hoopeston	Marsh Grasses	18	1.42	sil	
Selma	Prairie	16	2.85	l	
Watseka	Tall Grass Prairie	10	1.1	lfs	<6.0

SOIL PROPERTIES AT REMNANT PRAIRIE SITES IN COOK COUNTY (MWRDGC DATA)

Site	Vegetation Type	Sample Depth	Soil OC	pH	E.C.	TKN	Total P	Avail-P	Inorg-N
		inches	%		dS/m	mg/kg	mg/kg	mg/kg	mg/kg
Woodworth	Mesic/W-Mesic Prairie	0-6	5.5	6.8	0.18	5,170	498	15.2	14.3
		6-12	3.4	6.5	0.08	3,249	406	8.6	5.1
Woodworth	Sedge Meadow	0-6	4.7	6.8	0.27	5,043	460	22.1	6.5
Bluff S.F.	Fen	0-6	15.1	7.1	0.42	14,094	936	9.4	22.6
Superior St.	Sedge Meadow	0-6	4.4	5.7	0.11	3,298	503	20.4	3.7
		6-12	1.3	6.1	0.05	1,395	303	13.1	2.2
Superior St.	Sand Prairie Marsh	0-6	4.2	5.9	0.13	4,357	525	21.1	5.8
		6-12	2.2	6.3	0.15	2,435	387	22.9	0.8
Superior St.	Dry Sand Prairie	0-6	0.8	6.6	0.04	650	127	18.4	1.2
Superior St.	Dry-Mesic Sand Prairie	0-6	1.5	6.1	0.06	1,542	241	25.5	2.1
Markham	Mesic Prairie	0-6	5.6	5.5	0.08	3,670	549	54	21.9

SUMMARY

- **MWRD is interested in contributing to good land stewardship in the Calumet Region**
- **Biosolids use can provide an economic means for affecting soil restoration**
- **Biosolids have been demonstrated to be very effective in restoring brownfield and degraded urban soils**
- **MWRD believes that with proper design and site management, biosolids can be used safely and effectively in the Calumet Region**