The Commonwealth of Massachusetts
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CAROLE CORNELISON
COMMISSIONER

DCAM PIP Meeting of
Medfield State Hospital Environmental Draft Final MCP Documents
March 22, 2012
Medfield Town Hall
7:00 PM – 9:00 PM

Meeting Purpose:

The purpose of tonight's meeting is to present the Draft Final Phase II Comprehensive Site Assessment and the Draft Final Phase III for the C&D Area Remedial Action Plan. These documents were made available to the public on March 15, 2012.

Agenda

• Welcome and Introductions	Sandra Duran	**7:00 PM**
• Draft Final Phase II Comprehensive Site Assessment Summary/Conclusions	Frank Ricciardi/ Diane Silverman	**7:05 PM**
Questions & Answers on Phase II	All	**7:25 PM**
• Draft Final Phase III Remedial Action Plan Summary/Conclusions	Ileen Gladstone/ Jason Bobowski	**7:45 PM**
Questions & Answers on Phase III	All	**8:25 PM**
• Schedule for Comments/Final MCP Submissions	Sandra Duran	**8:50 PM**
• Next steps	Sandra Duran	**8:55 PM**
• Adjourn	Sandra Duran	**9:00 PM**

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DCAM Medfield State Hospital
DRAFT/Preliminary Public Document Schedule
March 22, 2012

Clay Containment RAM Completion/RAO-p

Submitted/Presented to PIP:	December 8, 2011
PIP Comments Due:	January 27, 2012
Final to DEP	February 24, 2012

IRA Modification (Assessment only) Plan

Submitted/Presented to PIP	December 8, 2011
PIP Comments Due	January 27, 2012
Final to DEP	February 24, 2012

Supplemental Phase II CSA (Method 3 Risk)

Submitted/Presented to PIP	January 12, 2012
PIP Comments Due (extension Granted)	February 8, 2012
TO BE PART OF FINAL PHASE II	SEE SCHEDULE BELOW

Supplemental Phase II SOW

Submitted/Presented to Public	January 12, 2012
PIP Comments due	February 1, 2012
TO BE PART OF FINAL PHASE II	SEE SCHEDULE BELOW

Draft Final Phase II Comprehensive Site Assessment Report

Submitted to PIP	March 15, 2012
Presented to PIP	March 22, 2012
PIP Comments due to DCAM	April 4, 2012
Final to DEP	April 15, 2012

Draft Revised C&D Phase III Remedial Evaluation

Submitted to PIP	March 15, 2012
Presented to PIP	March 22, 2012
PIP Comments due to DCAM	April 4, 2012
Final to DEP	April 15, 2012

Final SPD and Power Plant Phase III Remedial Evaluation

Presented to PIP	September 8, 2011
PIP comments due to DCAM	November 14, 2011
Final to DEP	February 29, 2012

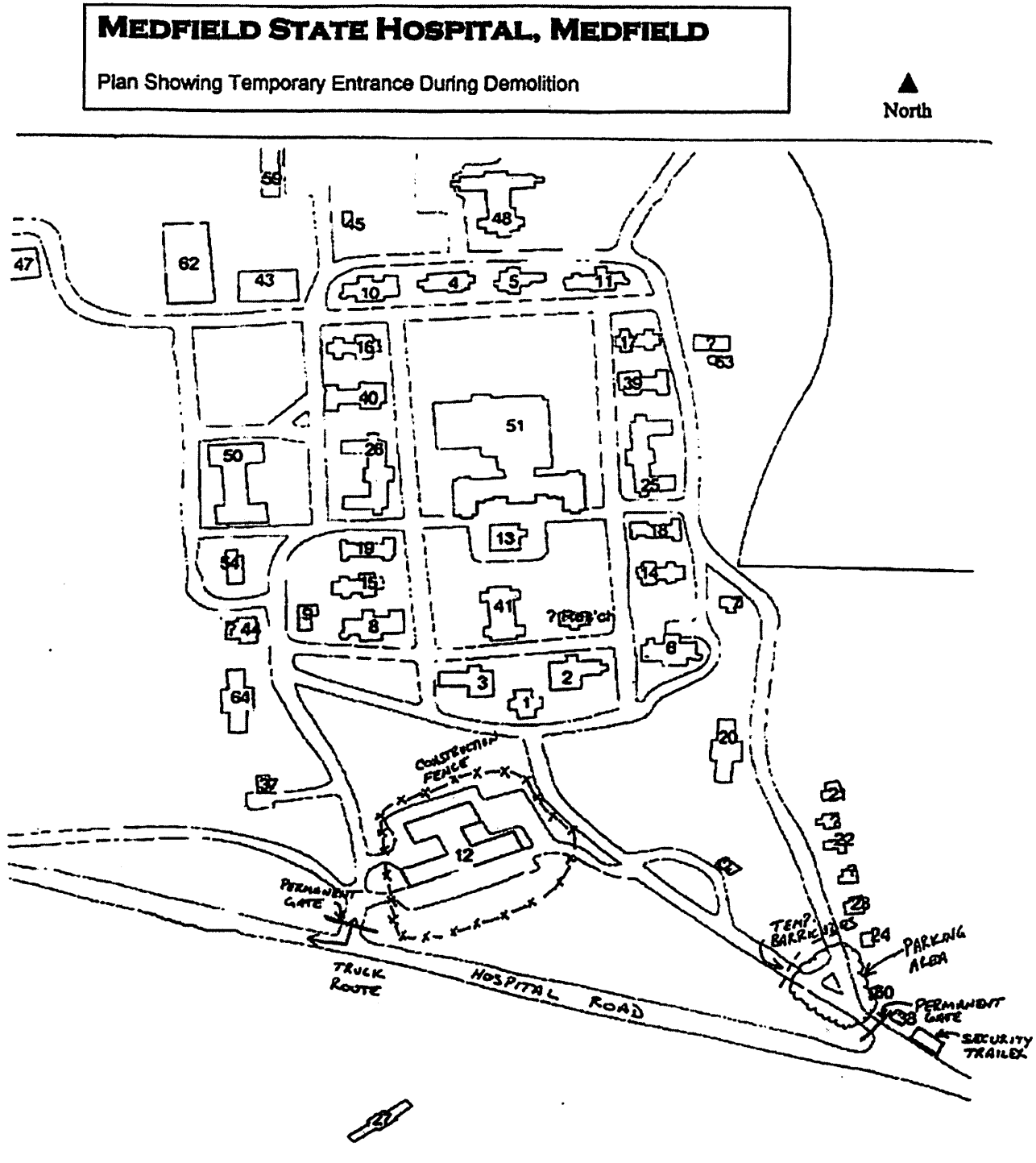
Draft C&D Area Phase IV Remedy Implementation Plan

Submitted to PIP	April 12, 2012
Presented to PIP	April 12, 2012
PIP comments due to DCAM	May 2, 2012
Final to DEP	May 22, 2012

Draft Power Plant and SPD Area Groundwater Phase IV Remedy Implementation Plan

Submitted to PIP	August 1, 2012
Presented to PIP	August 9, 2012
PIP comments due to DCAM	August 21, 2012
Final to DEP	October 21, 2012

- Newly Implemented Traffic Flow Pattern
- New Parking Area
- New Security Checkpoint and Gate



Medfield State Hospital

DRAFT FINAL
Phase II Comprehensive Site Assessment and Phase III C&D Area Remedial Action Plan

Former Medfield State Hospital
Medfield Massachusetts
March 22, 2012

Frank Ricciardi, PE, LSP – Weston & Sampson
Diane Silverman – TRC
Ileen Gladstone, PE, LSP – GEI

San Timothy - $97

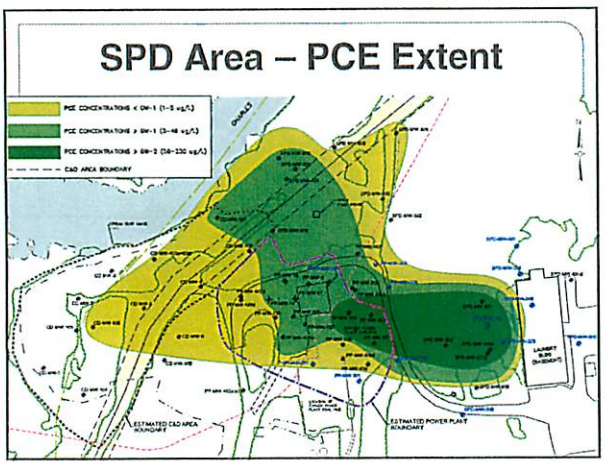
Agenda

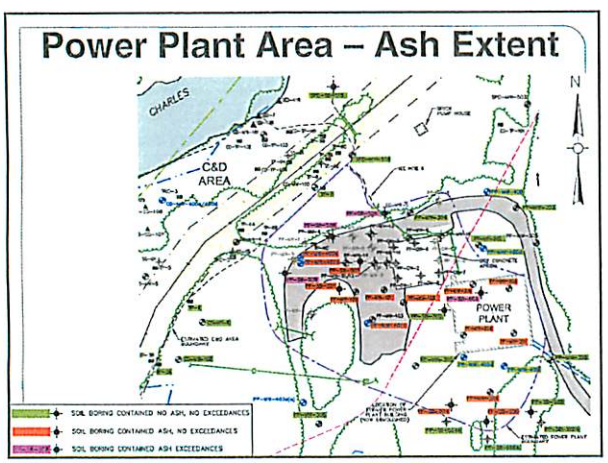
- Updated Phase II CSA
  - Additional Data Collected
    - SPD Area GW
    - Power Plant – Ash Extent
    - C&D – Data Gaps
- C&D Phase III RAP

Additional Delineation

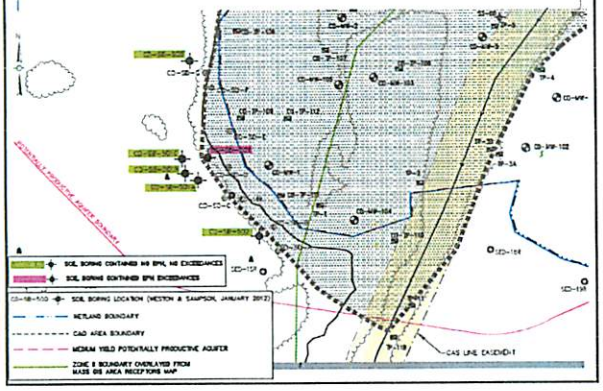
- 27 Soil Borings
  - **11 SPD: PCE Delineation**
    - VOC 8260 (10 borings at water table)
    - EPH w/ PAH & CAM 14 Metals (2 borings at 1-3 ft)
  - **10 PP: Ash Deposit Delineation**
    - EPH w/ PAH & CAM 14 Metals (10 borings at 1-3 ft)
    - EPH w/ PAH & CAM 14 Metals (3 borings at 3-8 ft)
  - **6 C&D: Wetland Delineation**
    - EPH w/ PAH & CAM 14 Metals (3 Borings)
    - EPH w/ PAH (3 Confirmatory Borings)
- 10 C&D: River Monitoring
  - VOC 8260 (10 borings into clay (up to 3'))


POWER PLANT AREA
SALVAGE YARD AREA
CLAY CONTAINMENT AREA
FORMER SEWER SIDE AREA


SPD Area – PCE Extent
PCE CONCENTRATIONS < GW-1 (1–5 ug/L)
PCE CONCENTRATIONS > GW-1 (5–48 ug/L)
PCE CONCENTRATIONS > GW-2 (58–330 ug/L)
C&D AREA BOUNDARY
CHARLES
ESTIMATED C&D AREA BOUNDARY
ESTIMATED POWER PLANT BOUNDARY

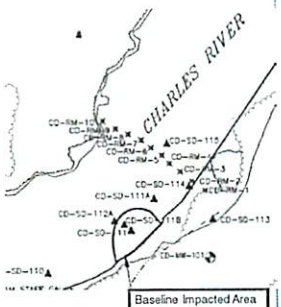

Power Plant Area – Ash Extent
CHARLES
C&D AREA
POWER PLANT
N
SOIL BORING CONTAINED NO ASH, NO EXCEEDANCES
SOIL BORING CONTAINED ASH, NO EXCEEDANCES
SOIL BORING CONTAINED ASH EXCEEDANCES

C&D Area - Wetland Extent



River Monitoring

- Borings advanced into underlying clay
- Petroleum not observed at any location
- VOC samples collected
- Trace levels PCE detected
- Data incorporated into Risk Characterization

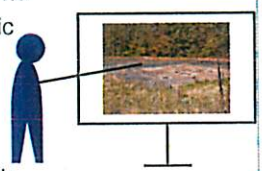


Human Health Risk Characterization Results/Update

Objectives

Discuss supplemental data and impact on risk results

- Sediment volatile organic compound (VOC) data
- December 2011 and January 2012 groundwater data
- C&D Area perimeter soils
- Power Plant Area fill soils

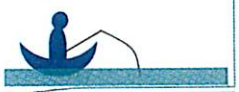


River Sediment Data

- Ten samples collected for VOCs
  - 6 were in deep water (not accessible)
  - 4 were accessible (CD-RM-1, -2, -9, -10)
- Low levels of tetrachloroethene (PCE) and trichloroethene (TCE) detected
  - Used maximum detected concentrations to estimate risk

Risk Characterization Results - River

Exposed Population	Risk without VOC Data	Risk with VOC Data	Risk Contributors
Current trespasser exposed to sediment and surface water	Acceptable	Acceptable	None
Current and future recreational visitor exposed to sediment and surface water	Acceptable	Acceptable	None



Groundwater Data

- December 2011 VOC data
  - Used to update temporal averages
  - Maximum temporal averages used for risk estimation
- January 2012 VOC data for newly installed wells (SPD-MW-500 to -509)
  - Added to data set to evaluate drinking water and direct contact exposures

C&D Area Perimeter Soil Data

- 24 samples collected from 17 locations outside the defined C&D area
  - 17 - 0-3' samples
  - 7 samples from greater than 3' below the surface
  - Analyzed for metals and EPH/PAHs (14) or VOCs (10)
- All but one sample eliminated as beyond the disposal site boundary
  - Metal/PAHs < background
  - VOCs and EPH less than Method 1 S-1 standards
  - Used CD-SB-501 (1-3')

Risk Characterization Results – C&D Area

Current Exposed Population	Risk without Soil Data	Risk with Soil Data	Primary Risk Contributors
Current trespasser exposed to surface soil (inside fence)	Acceptable	Acceptable	None
Current recreational visitor exposed to surface soil (outside fence)	Acceptable	Acceptable	None

Risk Characterization Results – C&D Area

Future Exposed Population	Risk without Soil Data	Risk with Soil Data	Primary Risk Contributors
Recreational visitor exposed to soil	Unacceptable	Unacceptable	Metals in soil
Commercial worker exposed to soil and indoor air	Acceptable	Acceptable	None
Resident exposed to soil, groundwater and indoor air	Unacceptable	Unacceptable	Metals in soil; VOCs in groundwater
Construction worker exposed to soil and groundwater	Unacceptable	Unacceptable	Lead in soil
Utility worker exposed to soil and groundwater	Acceptable	Acceptable	None

*Mitigation of unacceptable risk will be further discussed in the Phase III presentation that follows.

Power Plant Area Fill Soil Data

- 13 samples collected from 10 locations
  - Ten 0-3' samples; three 3-8' samples
  - Analyzed for metals and EPH/PAHs
- One 0-3' sample eliminated as no evidence of fill or petroleum
  - PP-SB-505
  - Beyond disposal site boundary

Risk Characterization Results – Power Plant Area

Exposed Population	Risk without Soil Data	Risk with Soil Data	Primary Risk Contributors
Current recreational visitor exposed to surface soil	Not Evaluated	Acceptable	None
Future recreational visitor exposed to soil	Acceptable	Acceptable	None
Future commercial worker exposed to soil and indoor air	Unacceptable	Unacceptable	PCE in groundwater
Resident exposed to soil, groundwater and indoor air	Unacceptable	Unacceptable	VOCs in groundwater
Construction worker exposed to soil and groundwater	Acceptable	Acceptable	None

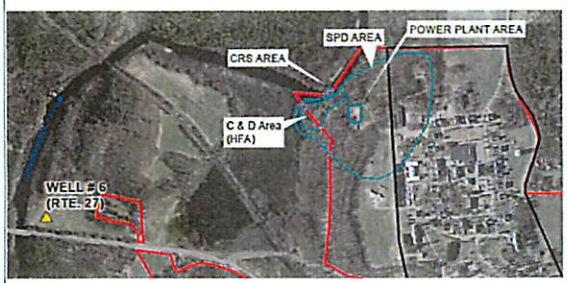
DRAFT FINAL
Phase III: Remedial Action Plan

Former Medfield State Hospital
Medfield Massachusetts
March 24, 2011

Frank Ricciardi, PE, LSP – Weston & Sampson
Ileen Gladstone, PE, LSP, LEED AP – GEI Consultants
Jason Bobowski, RLA, LEEP AP – Bioengineering Group

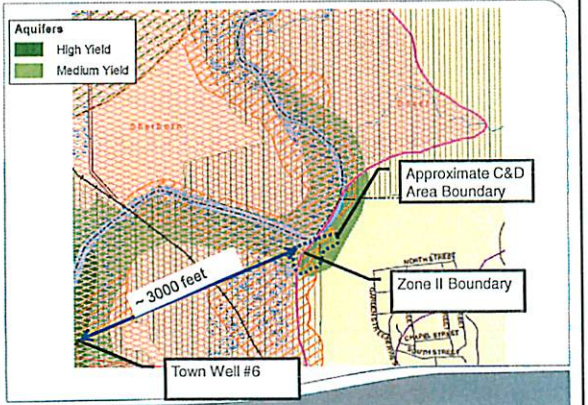
Construction and Demolition Area (C&D)

- Two Operable Units:
  - Historic Fill Area (HFA)
    - Fill thickness ranges from 0 to 15 feet over 3.2 acres;
    - Concrete, asphalt, ash, miscellaneous glass, crockery, and metal;
    - Metals, polycyclic aromatic hydrocarbons (PAHs), and petroleum hydrocarbons.
    - Asbestos Containing Materials (ACM);
    - Hydrophobic fill that has not significantly affected the groundwater.
  - Charles River Sediment (CRS)



Stakeholder Concerns

- Completely remove debris from HFA and return to background;
- Remove debris from within the Zone II of the Town of Medfield Well #6
- Remove contaminated sediment from the Charles River minimizing resource disturbance; and
- Minimize armoring of the River bank.



Risk Characterization Conclusions

Exposed Population	Acceptable Risks	Unacceptable Risks	Risk Contributor(s)
Current Trespasser/ Recreational Visitors	✓		
Future Park Visitor		✓	Lead in soil
Future Commercial Worker	✓		
Future Excavation Worker		✓	Lead in soil
Future Utility Worker	✓		
Future Resident		✓	Metals in soil; volatile compounds in drinking water and via vapor intrusion

Remedial Goals

Remedial Goal	Location	Remedial Goal Description	Exposure Media	Primary COCs
1	HFA	Mitigate direct contact	Soil	Lead
2	HFA	Mitigate potential inhalation exposure	Indoor Air	Chlorinated VOCs
3	HFA	Mitigate ingestion of groundwater	Groundwater	Chlorinated VOCs
4	CRS	Mitigate "readily apparent harm"	Sediment	Petroleum
5	CRS	Mitigate toxicity to benthic organisms	Sediment	Petroleum

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Site Specific Characteristics

- Historic Fill Area
  - Steep slopes along the Charles River embankment;
  - Wetlands;
  - ACM in the fill material;
  - River flow velocities;
  - The presence of the natural gas line;
  - Fill material below the groundwater table.
- Charles River Sediment
  - Steep slopes along the Charles River embankment;
  - Shallow water; and
  - Proximity of contaminated sediment to river bank

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Evaluation Criteria

- Initial Screening
  - Achieve a Permanent or Temporary Solution, and
  - Individuals with the expertise.
- Detailed Evaluation
  - Effectiveness
  - Reliability
  - Implementation Difficulties
  - Costs
  - Risk
  - Benefits
  - Timeliness
  - Non-Pecuniary Interests

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HFA: Initial Screening of Alternatives

Identified Technologies	Retained for Detailed Analysis
Institutional Controls	yes
Full Removal	yes
Partial Removal to western edge of gas line easement	yes
Partial Removal along bank of Charles River and southern wetlands	yes
Removal from Zone II including below the groundwater table	yes
No Removal	no
In-Situ Stabilization	no
Off-Site disposal of fill material	yes
Relocation of fill material outside of the HFA at the MSH	no
Relocation of fill material within the HFA	no
No Cover	no
Flexible Membrane Liner (FML) Cover	yes
Soil Cover	yes
Stone riprap	no
Articulated concrete block	no
Biostabilization using brush layering	yes
Log Walls	no
Soil stone mix	yes

HFA: Develop and Screen RAAs

- RAA-1: Full Removal with off-Site disposal.
- RAA-2: Partial Fill Removal to western edge gas line easement, off-Site disposal and FML Cover.
- RAA-3: Partial Fill Removal along bank of Charles River and wetlands, off-Site disposal and FML/Soil Cover.
- RAA-4: Removal of fill from Zone II, including below groundwater, off-Site disposal and FML/Soil Cover.

Biostabilization and soil stone mix are components of all of the RAAs. Institutional controls component of all except RAA-1.

HFA: Risk Reduction

All four RAAs:

- Achieve a Permanent Solution.
- Eliminate risk by removing direct contact exposure.
- Allow for unrestricted use on top the cap or restored grade.

HFA: Comparison Results

Remedial Action Alternatives	Score
RAA-3: Partial Fill Removal along bank of Charles River and wetlands, off-Site disposal, and FML/Soil Cover	57
RAA-4: Removal of fill from Zone II, including below groundwater, off-Site disposal, and FML/Soil Cover	54
RAA-2: Partial Fill Removal to western edge gas line easement, off-Site disposal, and FML Cover	53
RAA-1: Full Removal with off-Site disposal	47

HFA: Selected Alternative

RAA-3: Partial Fill Removal along bank of Charles River and wetlands, off-Site disposal and FML/Soil Cover, biostabilization, soil stone mix and an AUL

- The remedy will result in a condition of NSR for current and potential future receptors.
- A Permanent Solution will be achieved for the HFA.
- The alternative achieved the best cumulative score when compared to the other feasible alternatives based on the eight detailed evaluation criteria specified by the MCP.

HFA: Feasibility of Achieving Background

- Potential to interrupt utility service to a large number of customers.
- Additional costs to remediate beyond NSR more than 20 percent of the cost to remediate to NSR.

Remedial Action Alternatives	Cost (Millions)
RAA-3: Partial Fill Removal along bank of Charles River and wetlands, off-Site disposal, and FML/Soil Cover	$3.4 – 3.9
RAA-4: Removal of fill from Zone II, including below groundwater, off-Site disposal, and FML/Soil Cover	$4.5 – 5.1
RAA-2: Partial Fill Removal to western edge gas line easement, off-Site disposal, and FML Cover	$6.5 – 7.4
RAA-1: Full Removal with off-Site disposal	$16.6 – 19

CRS: Initial Screening of Alternatives

Identified Technologies	Retained for Detailed Analysis
No Action	no
In-Situ Sediment Cover	yes
Hydraulic Removal	yes
Mechanical Removal	yes
Off-Site Disposal of Sediment	yes
Sediment Amendment and In-Situ Stabilization	no

CRS: Develop and Screen RAAs

- RAA-1: In-Situ Sediment Cover
- RAA-2: Hydraulic Removal and Off-Site Disposal
- RAA-3: Mechanical Removal and Off-Site Disposal

CRS: Comparison Results

Remedial Action Alternatives	Score
RAA-3: Mechanical Removal and Off-Site Disposal	79
RAA-2: Hydraulic Removal and Off-Site Disposal	71
RAA-1: In-Situ Sediment Cover	48

CRS: Selected Alternative

RAA-3: Mechanical Removal and Off-Site Disposal

- The remedy will result in a condition of NSR for current and potential future receptors.
- A Permanent Solution will be achieved for the HFA.
- The alternative achieved the best cumulative score when compared to the other feasible alternatives based on the eight detailed evaluation criteria specified by the MCP.

CRS: Feasibility of Achieving Background

- Additional costs to remediate beyond NSR more than 20 percent of the cost to remediate to NSR.

Remedial Action Alternatives	Cost (Millions)
RAA-1: In-Situ Sediment Cover	$0.96 – $1.1
RAA-2: Hydraulic Removal and Off-Site Disposal	$0.28 – $0.32
RAA-3: Mechanical Removal and Off-Site Disposal	$0.08 – $0.09

Biostabilization Evaluation and Recommendations

Purpose:

1. Verify the validity of the hydraulic calculations
2. Propose refinements for the riverbank biostabilization with the following goals:
   a. Increase bank stability through bioengineering
   b. Diversify native plant species
   c. Accelerate plant establishment period
   d. Increase riparian habitat types

Purpose:

1. Verify the validity of the hydraulic calculations
2. Propose refinements for the riverbank biostabilization with the following goals:
   a. Increase bank stability through bioengineering
   b. Diversify native plant species
   c. Accelerate plant establishment period
   d. Increase riparian habitat types

Verified Calculations:

	Bioengineering Group	Weston & Sampson
1. Top of Bank:	114.6	114.9
2. Slope:	.000171 ft/ft	.000175 ft/ft
3. Velocity:	2.81 ft/sec	3.20 ft/sec
4. Runoff Volume:	2,491 cfs	2,450 cfs

Finding: Weston & Sampson's calculations are verified

Performed Additional Calculations:

1. Maximum shear stress in near bank location:
   .072 lb/sq ft.
2. Maximum scour depth:
   3.2 feet below existing sediment surface levels

Performed Plant Community Assessment:

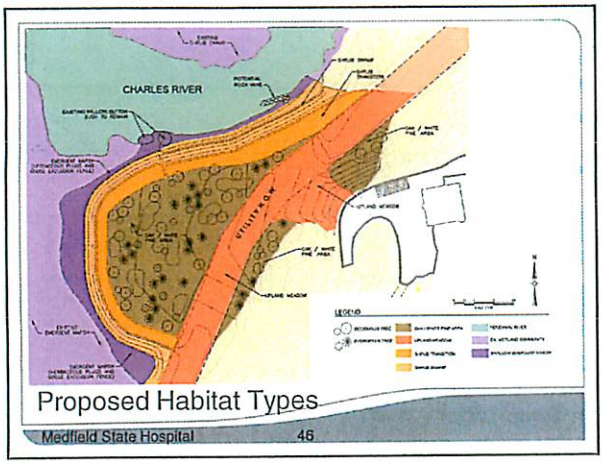
1. On-site evaluation of existing species
2. Recommendations for protection, salvage and reuse, and new complimentary plantings

Purpose:

1. Verify the validity of the hydraulic calculations
2. Propose refinements for the riverbank biostabilization with the following goals:
   a. Increase bank stability through bioengineering
   b. Diversify native plant species
   c. Accelerate plant establishment period
   d. Increase riparian habitat types

Recommendations:

1. Wider, higher vegetated riparian bench
2. Launched stone toe
3. Toe composition: soil mixed with stone
4. Incorporate a coir fascine
5. Plant live poles within the soil/stone toe
6. Mix of live cuttings and containerized shrubs with an erosion control blanket on the 3:1 bank



Proposed Habitat Types

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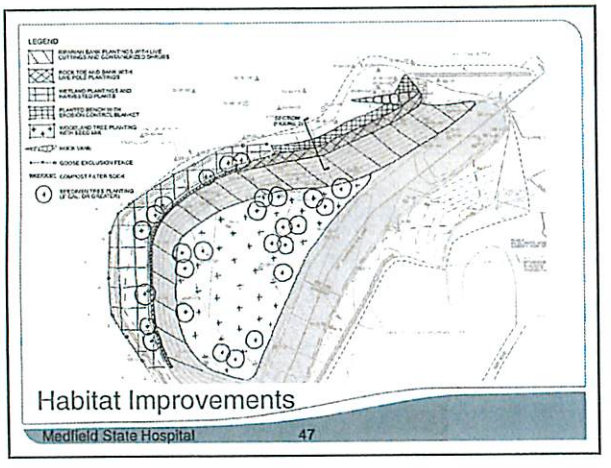

Habitat Improvements

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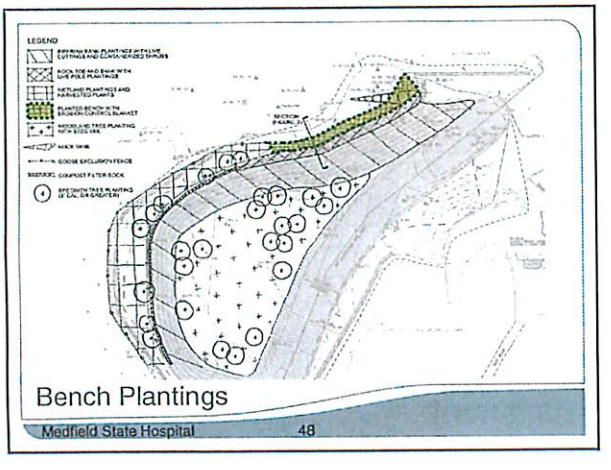

Bench Plantings

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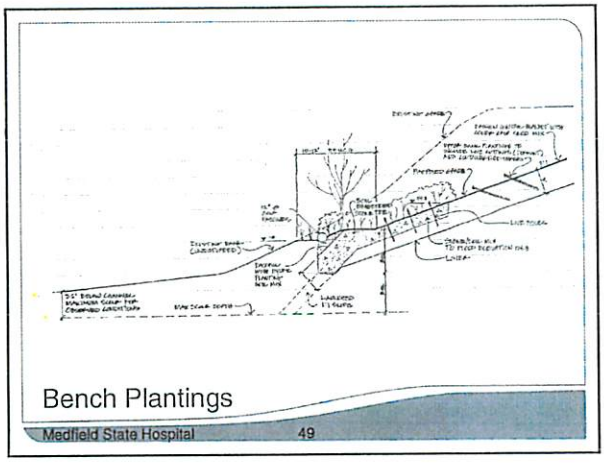
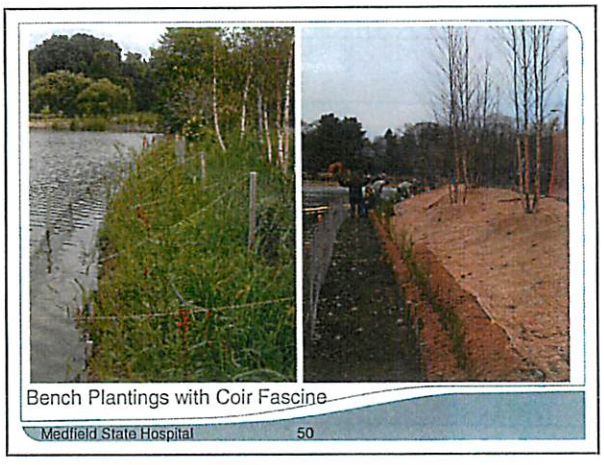


Bench Plantings

Medfield State Hospital 49



Bench Plantings with Coir Fascine

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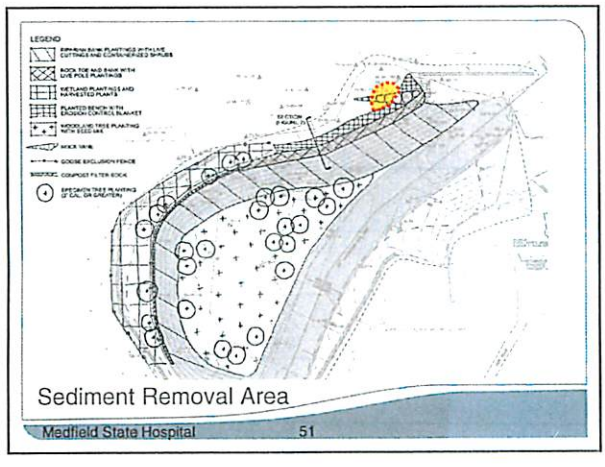


Sediment Removal Area

Medfield State Hospital 51

Rock Vane: defined

-in-stream features (composed of native boulders) that are used to redirect stream flows away from banks

-located on the outside of the stream bend and directed upstream

-slopes from the bank down to the stream bed

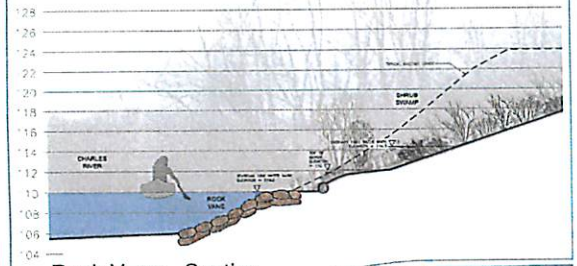
Rock Vane: benefits

-protect the bank both upstream and downstream by redirecting flows toward the channel center

-result in desirable sorting of riverbed materials

-provide physical diversity to bank habitats

-offer egress points for wildlife



Rock Vane - Section

Rock Vane Examples

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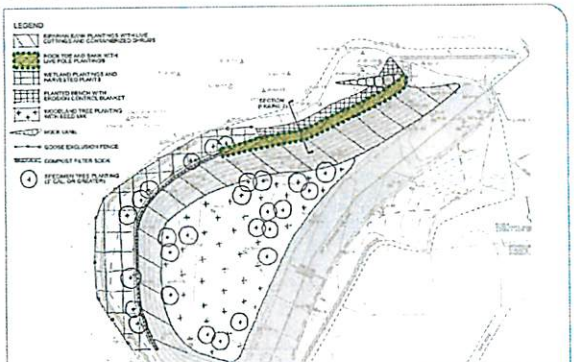

Rock Toe with Live Poles

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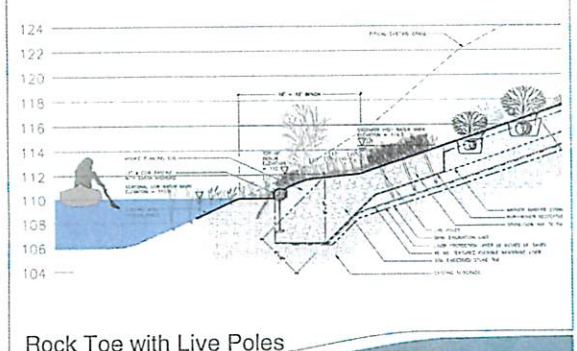

Rock Toe with Live Poles

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Live Pole/Stake Planting

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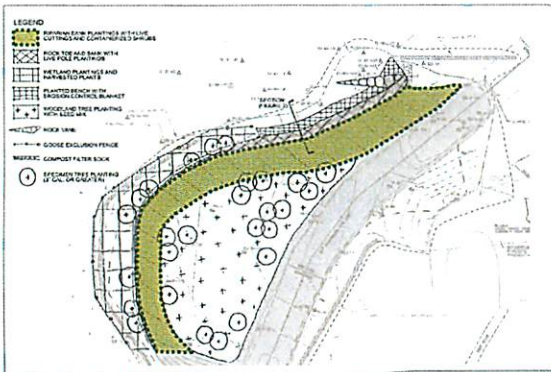

3:1 Bank Plantings

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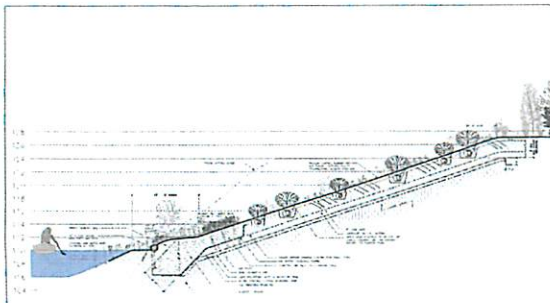
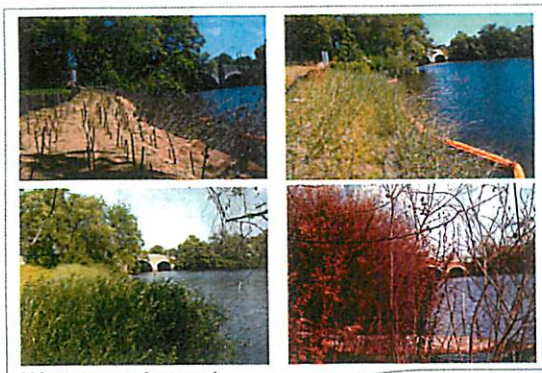


3:1 Bank Planting

Medfield State Hospital 60

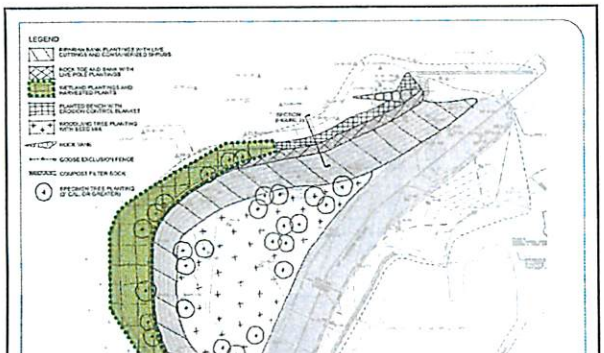
3:1 Bank Planting (2-3 Years)

Medfield State Hospital 61



Watertown Arsenal

Medfield State Hospital 62



Emergent Wetland Planting

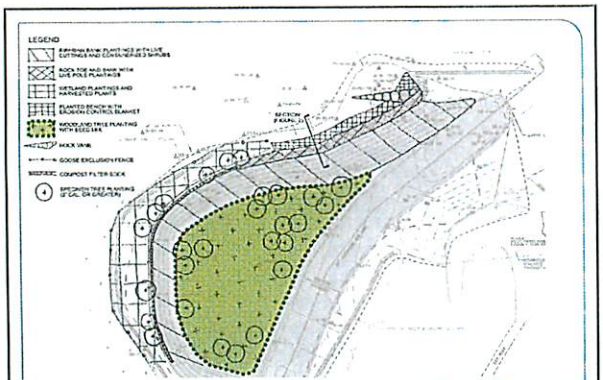
Medfield State Hospital 63

Wetland Plug Planting

Medfield State Hospital 64

Goose Protection Fencing

Medfield State Hospital 65



Upland Woodland

Medfield State Hospital 66

Existing Conditions

Medfield State Hospital 67

(2-3 Years after Planting)

Medfield State Hospital 68

(10 Years after Planting)

Medfield State Hospital 69

Conclusions:

1. Weston & Sampson's calculations are verified
2. Recommended improvements offer the following benefits:
   a. Bank stability is increased through bioengineering
   b. Existing riparian resources are more fully preserved, as well as restored and expanded
   c. Habitat quality and biodiversity are improved
   d. Aesthetics are improved, with surrounding bank profiles and plant communities visually matched

Next Steps

Phase IV Remedy Implementation Plan (RIP)

- List of project contacts
- Goals of the remedial action
- Update of new data/information or changes in the Site
- Description of the environmental media to be treated/managed
- Relevant design parameters including plans and specifications
- Environmental protection measures to be implemented during construction
- Soil/sediment disposal details
- Discussion of the construction's effect on the surrounding environment
- Construction observation activities
- Post-construction monitoring activities

Questions?