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Expanded Environmental Notification Form (EENF)

Upper Van Horn Reservoir Dam Improvements Project Springfield, Massachusetts

October 28, 2022

GZA File No. 15.0167018.00

SUBMITTED TO:
Massachusetts Executive Office of Energy and Environmental Affairs (EEA)
Massachusetts Environmental Policy Act (MEPA) Office
100 Cambridge Street, Suite 900
Boston, MA 02114

PREPARED BY:
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SUBMITTED ELECTRONICALLY

October 28, 2022
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Secretary Bethany A. Card
Massachusetts Executive Office of Energy and Environmental Affairs (EEA)
Massachusetts Environmental Policy Act (MEPA) Office
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: Expanded Environmental Notification Form (EENF)
Upper Van Horn Reservoir Dam Improvements Project
Springfield, MA

Dear Secretary Card:

On behalf of the City of Springfield (City) Department of Parks, Buildings, and Recreation Management (DPBRM), GZA GeoEnvironmental, Inc. (GZA) is pleased to submit the enclosed Expanded Environmental Notification Form (EENF) for the Upper Van Horn Reservoir Dam Improvements Project in Springfield, MA (the Project).

The City is submitting an EENF, with the understanding that an Environmental Impact Report (EIR) will be required for the Project, but respectfully request that the scope for the EIR be limited in nature to those areas of potential impact from the Project. We also request that the Secretary allow the City to submit a Single Environmental Impact Report (SEIR) under 301 CMR11.06(8) of the MEPA Regulations.

Upper Van Horn Reservoir Dam (National Dam Inventory (NID) No. MA00574) is a Significant Hazard, Intermediate sized earthen embankment dam with a twin concrete box culvert spillway that discharges to a concrete spillway chute to the downstream Lower Van Horn Reservoir (which has a recently rehabilitated High hazard dam). The dam is owned and operated by the City of Springfield, through its Department of Parks, Buildings, and Recreation Management (DPBRM). The dam was reportedly constructed in the mid-1800s, with the last series of improvements ca. 1957 related to the spillway. The dam is currently rated as being in Poor condition, with deficiencies including significant erosion on the slopes, uncontrolled seepage, large trees and dense brush on the slopes, concrete condition issues, lack of a low-level outlet or provisions to lower the water level, uncontrolled discharges contributing to erosion near the dam, failure to meet current standards relative to seepage and stability, among others.

The Massachusetts Department of Conservation and Recreation (DCR) Office of Dam Safety (ODS) issued a "Certificate of Non-Compliance and Dam Safety Order" dated August 31, 2017, requiring follow-up inspections to be conducted at 6-month intervals until the dam is adequately repaired (currently being conducted), a Phase II Inspection and Investigation (completed in June 2020), and that repairs to the dam be completed. The City has diligently pursued the necessary work and sought funding to assist with this effort.

The proposed Project is a program of repairs/improvements to the existing dam to bring the dam into compliance with the ODS Dam Safety Order, Dam Safety Regulations, and accepted engineering

practices. Work will involve: tree and woody vegetation removal; seepage and stability improvements through widening of the embankments and addition of a stability berm and toe drain/seepage blanket with the rockfill/riprap along specific areas; concrete repairs and spillway chute replacement; siphon construction, and other associated repairs, as discussed in detail in this MEPA filing.

The City is pursuing this Project to comply with Dam Safety Regulations and to reduce downstream risks to life and property, to improve public safety, to preserve the reservoir for recreation, and to improve access for future inspection, operation, and maintenance of the dam. The City has been awarded two rounds of EEA Dam and Seawall Repair or Removal grant funding related to the Phase II Investigation and the design and permitting of this project. Design and outreach efforts are underway and continuing as the Project proceeds through MEPA. The City is pursuing funding to support the construction of the project and hopes to have it underway in 2024, provided that funding is available and permits have been obtained.

Should you have any questions regarding this EENF, please feel free to contact Jennifer Burke at 413-726-2117 or jennifer.burke@gza.com.

Very truly yours,
GZA GeoEnvironmental, Inc.

Jennifer R.M. Burke, P.E., CPSWQ
Senior Project Manager

Stephen L. Lecco, AICP, CEP
Consultant / Reviewer

Chad W. Cox, P.E.
Principal-in-Charge

Enclosure: Expanded Environmental Notification Form with attachments

Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act (MEPA) Office

Environmental Notification Form

For Office Use Only

EEA#: _____

MEPA Analyst: _____

The information requested on this form must be completed in order to submit a document electronically for review under the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name: **Upper Van Horn Reservoir Dam Improvements Project**		
Street Address: **625 Armory Street (approximate address)**		
Municipality: **Springfield**	Watershed: **Connecticut**	
Universal Transverse Mercator Coordinates: **18T 69879.00E, 4666592.05 N**	Latitude: **42.126017** Longitude: **-72.594747**	
Estimated commencement date: Spring/Summer 2024	Estimated completion date: Winter 2024/Spring 2025	
Project Type: **Dam Rehabilitation**	Status of project design: **30** %complete	
Proponent: **City of Springfield Department of Parks, Buildings, and Recreation Management**		
Street Address: **200 Trafton Road**		
Municipality: **Springfield**	State: **MA**	Zip Code: **01108**
Name of Contact Person: **Jennifer Burke**		
Firm/Agency: **GZA GeoEnvironmental, Inc**	Street Address: **1350 Main Street, Suite 1400**	
Municipality: **Springfield**	State: **MA**	Zip Code: **01103**
Phone: **413-726-2117**	Fax: **413-732-1249**	E-mail: **Jennifer.burke@gza.com**

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?
☒Yes ☐No

If this is an Expanded Environmental Notification Form (ENF) (see 301 CMR 11.05(7)) or a Notice of Project Change (NPC), are you requesting:

a Single EIR? (see 301 CMR 11.06(8))	☒Yes ☐No
a Rollover EIR? (see 301 CMR 11.06(13))	☐Yes ☐No
a Special Review Procedure? (see 301CMR 11.09)	☐Yes ☐No
a Waiver of mandatory EIR? (see 301 CMR 11.11)	☐Yes ☐No
a Phase I Waiver? (see 301 CMR 11.11)	☐Yes ☐No

(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)

GZA understands that no Greenhouse Gas (GHG) Emissions analysis is likely to be required with this Expanded ENF (EENF) or subsequent Environmental Impact Report (EIR) as described in the "Revised MEPA Greenhouse Gas Emissions Policy and Protocol" effective May 5, 2010, as dam repair is identified as a project type that may qualify for the *de minimis* exemption. As the Project will have no ongoing GHG emissions following construction, we request a de minimis exemption. Emissions will be limited to the temporary operation of equipment during construction and will not result in long-term effects. As such, we believe that the project should qualify for a *de minimis* exemption, similar to EEA's determination on other similar projects.

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?

- **301 CMR 11.03(3)(a)(1)(a) – Alteration of ten or more acres of any other wetland (note that impact calculations are inclusive of temporary drawdown of Upper Van Horn Reservoir (i.e., Land Under Water Bodies and Waterways) – threshold would not be exceeded without temporary drawdown area)**
- **301 CMR 11.03(3)(b)(1)(b) – Alteration of 500 or more linear feet of bank along a fish run or inland bank;**
- **301 CMR 11.03(3)(b)(1)(f) – Alteration of ½ or more acres of any other wetland (Land Under Water Bodies and Waterways)**

Which State Agency Permits will the project require?

- **Massachusetts Department of Environmental Protection (MassDEP) – Section 401 of the Clean Water Act, Individual Water Quality Certification**
- **Massachusetts Department of Conservation and Recreation (DCR), Office of Dam Safety (ODS) – Chapter 253 Dam Safety Permit**
- **MassDEP – Superseding Order of Conditions, if required, Wetlands Protection Act**

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:

To date, the City has received the following has received the following financial support for the Project:

Massachusetts Dam, Levee, and Seawall Repair and Removal Grant Program – 2019 award of $84,000 – grant completed for Phase II Engineering Evaluation and Alternatives Analysis

Massachusetts Dam, Levee, and Seawall Repair and Removal Grant Program – 2021/2022 award of $249,975 for design and permitting.

The City may also seek future state or federal funding to assist with construction.

Summary of Project Size & Environmental Impacts	Existing	Change	Total
LAND			
Total site acreage	15.2		
New acres of land altered		NA	
Acres of impervious area	1.4	0	1.4
Square feet of new bordering vegetated wetlands alteration		NA	
Square feet of new other wetland alteration		435,600*	
Acres of new non-water dependent use of tidelands or waterways		NA	

STRUCTURES			
Gross square footage	**NA**	**NA**	**NA**
Number of housing units	**NA**	**NA**	**NA**
Maximum height (feet)	**NA**	**NA**	**NA**
TRANSPORTATION			
Vehicle trips per day	**NA**	**NA**	**NA**
Parking spaces	**NA**	**NA**	**NA**
WASTEWATER			
Water Use (Gallons per day)	**NA**	**NA**	**NA**
Water withdrawal (GPD)	**NA**	**NA**	**NA**
Wastewater generation/treatment (GPD)	**NA**	**NA**	**NA**
Length of water mains (miles)	**NA**	**NA**	**NA**
Length of sewer mains (miles)	**NA**	**NA**	**NA**

Has this project been filed with MEPA before?
☐ Yes (EEA #_____) ☒No

Has any project on this site been filed with MEPA before?
☒ Yes (EEA # **14470**) ☐No

The City of Springfield previously filed an Environmental Notification Form for the Lower Van Horn Reservoir Dam Rehabilitation Project and received a Secretary's Certification on September 11, 2009. Both dams are part of the same park property.

*total other wetland alteration includes both temporary and permanent alteration.

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:

Describe the existing conditions and land uses on the project site:

Upper Van Horn Reservoir Dam (National Dam Inventory (NID) No. MA00574) is a Significant Hazard potential, Intermediate-sized embankment dam owned and operated by the City of Springfield through their Department of Parks, Buildings, & Recreation Management (referred to herein as "the City"). The hazard classification and size classification for the dam are based on the State's Dam Safety Regulations, as discussed in the more detailed narrative in Attachment 1.

The dam was constructed in the mid-1800s for water supply and the City of Springfield Water Department purchased the dam in 1873. Ownership was transferred to the Parks Department in 1909, and the reservoir was retired from the water supply system. Currently, the dam is used for recreation, as it forms the Upper Van Horn Reservoir.

The Upper Van Horn Reservoir Dam is an earthen embankment structure approximately 905 feet long with a structural height of just over 30 feet. The crest of the dam is situated along Armory Street and is approximately 50-feet wide with steep embankment slopes on both sides. The primary spillway is composed of twin 8-foot wide by 5-foot high box culverts, with upstream inverts at El. 167.4±, which control the normal pool elevation of the reservoir. These culverts discharge to a steeply-sloped concrete spillway chute which flows into the downstream Lower Van Horn Reservoir, which in turn outlets to a 48-inch diameter concrete pipe that is part of the City of Springfield's stormwater drainage system and ultimately discharges to the Connecticut River.

Upper Van Horn Reservoir Dam is located along Armory Street and within Van Horn Park in the Liberty Heights neighborhood in the northwest portion of the City of Springfield, in Hampden County, MA. The dam separates the Upper and Lower Van Horn Reservoirs and is also the roadway embankment for Armory Street, a significant local connector road, which runs along the crest of the dam. The drainage area to the Dam is 0.4 square miles and is primarily urban in character, with a high percentage of impervious surfaces and extensive stormwater collection and conveyance systems which feed the Reservoir. The Reservoir discharges to Lower Van Horn Reservoir which discharges flow through a culvert to its confluence with the Connecticut River approximately 1.5 miles downstream of Upper Van Horn Dam.

Upper Van Horn Reservoir is approximately 9.7 acres and is the keystone feature of Van Horn Park. The park is approximately 114-acres with developed park amenities to the east of the reservoir including tennis courts, parking, ball fields, and a playground. The remainder of the park (on both sides of Armory Street) is largely wooded with a paved access road which circumnavigates the Upper Reservoir. The Lower Van Horn Reservoir Dam impounds the Lower Van Horn Reservoir downstream of the Upper Van Horn Reservoir Dam, south of Armory Street. The remainder of the area south of Armory Street is primarily undeveloped, with the exception of the Upper and Lower Van Horn Reservoir Dams and their appurtenant structures.

A Locus Map of the dam area is included as Figure 1 and additional details of the existing conditions and dam deficiencies are included in Attachment 1 – EENF Narrative.

Describe the proposed project and its programmatic and physical elements:

To address the current dam safety deficiencies and improve safety for residents, the Project proposes to:

- **Remove all trees and woody vegetation along the embankment and develop a grass surface per the Office of Dam Safety (ODS) Policy on Trees on Dams (see Attachment 4);**
- **Modify the embankment slopes to improve stability and control seepage through:**
  - **Regrading the upstream and downstream slopes to a more stable slope;**
  - **Adding a stability berm and toe drain/blanket; and**
  - **Addressing existing erosion/scour issues from failed drainage system segments and repairing animal burrows;**
  - **Adding riprap along portions of the upstream and downstream slopes; and**
  - **Adding rockfill along the upstream slope.**
- **Repair concrete within the spillway box culverts and replace the degraded spillway chute;**
- **Re-culvert a portion of an intermittent stream (Bank resource) within a previously-failed culvert to minimize slope erosion immediately downstream of the dam and establish a new engineered outlet;**
- **Replace and improve a section of the drainage system associated with Armory Street along the dam with catch basins with higher capacity inlets and sumps, with controlled outfall locations within the spillway chute to prevent further erosion along the embankment portions of the dam;**
- **Install a new siphon to facilitate future drawdowns for maintenance or emergencies;**
- **Remove and grout a former non-functional outlet along the right side of the dam;**
- **Construct two new gated maintenance access drives to facilitate future operation and maintenance; and**
- **Construct improvements along Armory Street (roadway repaving, guardrail replacement, sidewalk repairs, safety fencing, access controls, and lighting).**

The Project is a water resources improvement project and will not change traffic or infrastructure demands. There is ample and unconstrained infrastructure available, as discussed further in this submittal.

Pending the completion of final design and receipt of all permits, it is anticipated that construction would commence in the Spring/Summer of 2024 and that the Project would be completed in Winter 2024/Spring 2025.

Specific Project impacts are discussed in this EENF form and the supporting documentation and narratives.

NOTE: The project description should summarize both the project's direct and indirect impacts (including construction period impacts) in terms of their magnitude, geographic extent, duration and frequency, and reversibility, as applicable. It should also discuss the infrastructure requirements of the project and the capacity of the municipal and/or regional infrastructure to sustain these requirements into the future.

Describe the on-site project alternatives (and alternative off-site locations, if applicable), considered by the proponent, including at least one feasible alternative that is allowed under current zoning, and the reasons(s) that they were not selected as the preferred alternative:
As the Project purpose is to address conditions related to the Upper Van Horn Reservoir Dam, use of an off-site location is not feasible and no other locations were evaluated.

The on-site alternatives evaluated are the following:

- **No Action**
- **Breach or Remove the Dam**
- **Repair/Rehabilitate the Dam (Preferred Alternative/Proposed Action)**

A complete discussion of each of these alternatives is included in Attachment 1 – EENF Narrative.

NOTE*: The purpose of the alternatives analysis is to consider what effect changing the parameters and/or siting of a project, or components thereof, will have on the environment, keeping in mind that the objective of the MEPA review process is to avoid or minimize damage to the environment to the greatest extent feasible. Examples of alternative projects include alternative site locations, alternative site uses, and alternative site configurations.*

Summarize the mitigation measures proposed to offset the impacts of the preferred alternative:

Proposed mitigation measures are discussed in detail in Attachment 1 – EENF Narrative.

If the project is proposed to be constructed in phases, please describe each phase:

The Project is proposed to be constructed in a single phase, with only one mobilization, due to the nature of the Project.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN:
Is the project within or adjacent to an Area of Critical Environmental Concern?
☐Yes (Specify_____)
☒No
if yes, does the ACEC have an approved Resource Management Plan? ___ Yes ___ No;
If yes, describe how the project complies with this plan.
_____
Will there be stormwater runoff or discharge to the designated ACEC? ___ Yes ___ No;
If yes, describe and assess the potential impacts of such stormwater runoff/discharge to the designated ACEC. _____

RARE SPECIES:
Does the project site include Estimated and/or Priority Habitat of State-Listed Rare Species? (see http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm)
☐Yes (Specify_____) ☒No

HISTORICAL /ARCHAEOLOGICAL RESOURCES:
Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?
☒Yes (Specify **SPR.976 – Van Horn Park**) ☐No
If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources? ☐Yes (Specify_____) ☒No

As described in the submitted Project Notification Form (Attachment 7), Van Horn Park is a state-listed resource; however, the proposed Project will not alter the character of or the amenities available in the park. The dam is located along the roadway separating the Upper and Lower sections of the park and reservoirs and no park amenities exist on the dam. No new construction is proposed beyond dam rehabilitation, nor will buildings or structures be demolished. The work is limited to the rehabilitation of the dam, which is protective of park resources such as the two reservoirs.

WATER RESOURCES:

Is there an Outstanding Resource Water (ORW) on or within a half-mile radius of the project site? ___Yes _**X**_ No; if yes, identify the ORW and its location. _____

(NOTE: Outstanding Resource Waters include Class A public water supplies, their tributaries, and bordering wetlands; active and inactive reservoirs approved by MassDEP; certain waters within Areas of Critical Environmental Concern, and certified vernal pools. Outstanding resource waters are listed in the Surface Water Quality Standards, 314 CMR 4.00.)

Are there any impaired water bodies on or within a half-mile radius of the project site? _**X**_ Yes ___No; if yes, identify the water body and pollutant(s) causing the impairment:.

Upper Van Horn Park Pond (MA34128) – Category 5 (Waters Require TMDL)
Water has not been assessed for any uses, but is identified as Category 5, Waters Requiring a TMDL, with impairments listed as Nutrient/Eutrophication Biological Indicators and Total Phosphorus. The source of these causes are identified as urban runoff/storm sewers and unknown sources.

Lower Van Horn Park Pond (MA34129) – Category 4C (Impairment not caused by a pollutant)
Water has not been assessed for any uses, but it is identified as being impaired by Water Chestnut.

Is the project within a medium or high stress basin, as established by the Massachusetts Water Resources Commission? ___Yes _**X**_ No **Connecticut River Basin is rated low stress at each assessed stream gage.**

STORMWATER MANAGEMENT:

Generally describe the project's stormwater impacts and measures that the project will take to comply with the standards found in MassDEP's Stormwater Management Regulations:

Stormwater runoff during rehabilitation and reconstruction of the dam will be managed with appropriate use of erosion and sedimentation controls and other Best Management Practices (BMPs) until the site is stabilized with permanent vegetation and/or surfacing materials. The existing discharge points from the drainage system along Armory Street have resulted in erosion of the dam embankment, with failing connections and outfall pipes. The drainage system along the dam will be replaced to address this erosion, with outlets directed into the reconstructed spillway chute replacement to provide for stable outfall locations, rather than on the erodible slope materials. The new system will include offline catch basins with deep sumps and hoods and its proposed discharge location will limit erosion. The Project will include filing a Notice of Intent for Limited Project status under the Wetland Protection Act, which includes the Massachusetts Stormwater Standards. The Project will seek to meet the redevelopment standards to the extent possible relative to stormwater, given the unique setting on a dam, which make treatment options such as infiltration infeasible.

MASSACHUSETTS CONTINGENCY PLAN:

Has the project site been, or is it currently being, regulated under M.G.L.c.21E or the Massachusetts Contingency Plan? Yes ___ No _**X**_ ; if yes, please describe the current status of the site (including Release Tracking Number (RTN), cleanup phase, and Response Action Outcome classification):_____

Is there an Activity and Use Limitation (AUL) on any portion of the project site? Yes ___ No _**X**_; if yes, describe which portion of the site and how the project will be consistent with the AUL: _____.

Are you aware of any Reportable Conditions at the property that have not yet been assigned an RTN? Yes ___ No _**X**_ ; if yes, please describe:_____

SOLID AND HAZARDOUS WASTE:

If the project will generate solid waste during demolition or construction, describe alternatives considered for re-use, recycling, and disposal of, e.g., asphalt, brick, concrete, gypsum, metal, wood:

See Attachment 1 for discussion of waste management.

(NOTE: Asphalt pavement, brick, concrete and metal are banned from disposal at Massachusetts landfills and waste combustion facilities and wood is banned from disposal at Massachusetts landfills. See 310 CMR 19.017 for the complete list of banned materials.)

Will your project disturb asbestos containing materials? Yes ___ No _**X**_ ;
if yes, please consult state asbestos requirements at http://mass.gov/MassDEP/air/asbhom01.htm

Describe anti-idling and other measures to limit emissions from construction equipment:

See Attachment 1 for discussion of construction-related emissions minimization.

DESIGNATED WILD AND SCENIC RIVER:

Is this project site located wholly or partially within a defined river corridor of a federally designated Wild and Scenic River or a state designated Scenic River? Yes ___ No _**X**_ ;
if yes, specify name of river and designation:

If yes, does the project have the potential to impact any of the "outstandingly remarkable" resources of a federally Wild and Scenic River or the stated purpose of a state designated Scenic River? Yes ___ No ___ ; if yes, specify name of river and designation: _____;
if yes, will the project will result in any impacts to any of the designated "outstandingly remarkable" resources of the Wild and Scenic River or the stated purposes of a Scenic River.
Yes ___ No ___ ;
if yes, describe the potential impacts to one or more of the "outstandingly remarkable" resources or stated purposes and mitigation measures proposed.

ATTACHMENTS:

1. List of all attachments to this document.
   See Table of Contents in Attachment 2
2. U.S.G.S. map (good quality color copy, 8-½ x 11 inches or larger, at a scale of 1:24,000) indicating the project location and boundaries.
   See Figure 1
3.. Plan, at an appropriate scale, of existing conditions on the project site and its immediate environs, showing all known structures, roadways and parking lots, railroad rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.
   See Attachment 2
4 Plan, at an appropriate scale, depicting environmental constraints on or adjacent to the project site such as Priority and/or Estimated Habitat of state-listed rare species, Areas of Critical Environmental Concern, Chapter 91 jurisdictional areas, Article 97 lands, wetland resource area delineations, water supply protection areas, and historic resources and/or districts.
   See Figure 2
5. Plan, at an appropriate scale, of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).
   See Attachment 2
6. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).
   See Attachment 3

7. List of permits and reviews required by the project, as applicable.
   See Attachment 1
8. Printout of output report from RMAT Climate Resilience Design Standards Tool, available here.
   See Attachment 6 and supporting Technical Memoranda
9. Printout from the EEA EJ Maps Viewer showing the project location relative to Environmental Justice (EJ) Populations located in whole or in part within a 1-mile and 5-mile radius of the project site.
   See Attachment 8-1
10. Sediment Sampling Data
   See Attachment 5
11. Correspondence with Massachusetts Historical Commission.
   See Attachment 7
12. Environmental Justice Discussion
   See Attachment 8 and supporting documentation
13. Office of Dam Safety Certificate of Non-Compliance and Pertinent Policies
   See Attachment 4
14. Photographic Log
   See Attachment 9

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to **land** (see 301 CMR 11.03(1)
___ Yes _**X**_ No; if yes, specify each threshold:

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

	Existing	Change	Total
Footprint of buildings	**0 ac**	**0 ac**	**0 ac**
Internal roadways	**1.4 ac**	**0 ac**	**1.4 ac**
Parking and other paved areas	**0 ac**	**0 ac**	**0 ac**
Other altered areas	**4.7 ac**	**0 ac**	**4.7 ac**
Undeveloped areas*	**9.7 ac**	**0 ac**	**9.7 ac**
Total: Project Site Acreage	**15.2 ac**	**0 ac**	**15.2 ac**

*** includes open water area**

B. Has any part of the project site been in active agricultural use in the last five years?
___ Yes _**X**_ No; if yes, how many acres of land in agricultural use (with prime state or locally important agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use?
___ Yes _**X**_ No; if yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a forest management plan approved by the Department of Conservation and Recreation:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? ___ Yes _**X**_ No; if yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction?
___ Yes _**X**_ No; if yes, does the project involve the release or modification of such restriction? ___ Yes ___ No; if yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? ___ Yes _**X**_ No; if yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? Yes ___ No _**X**_; if yes, describe:

III. Consistency

A. Identify the current municipal comprehensive land use plan
Title: **Springfield Opportunity Zones** Date **2020**
Title: **Open Space & Recreation Plan 2015-2022** Date: **2015**

B. Describe the project's consistency with that plan with regard to:
1) economic development

The Project is a water resources improvement project targeted at public safety improvements seeking to restore an existing dam to Good condition, as defined by the Massachusetts Dam Safety Standards and is not specifically meant to spur economic development, so this item is not directly applicable.

Baystate Health Systems is the largest employer in the City of Springfield with over

8,800 employees and is a keystone institution in the City's "Medical District." By upgrading Upper Van Horn Reservoir Dam to meet dam safety standards, the City is reducing risk of a dam failure upstream of the Baystate Medical Center. Further, the dam supports Armory Street, which is a main thoroughfare allowing for public school buses, ambulances, and normal traffic around the City.

2) adequacy of infrastructure

The Project site is in an urban area which has adequate infrastructure (utilities, transportation infrastructure) to support the construction process. The Project will make City-owned infrastructure (the dam) more resilient and will replace aging infrastructure that is failing (drainage system and spillway chute). The Project will improve public safety by seeking to bring the dam to Good condition and make the dam more resilient to climate change which is in line with public safety and climate change resilience goals. The Upper Van Horn Reservoir Dam requires modernization and safety improvements to meet standards for this type of infrastructure.

3) open space impacts

The dam footprint will expand within Van Horn Park to flatten the existing overly steep embankment slopes to for consistency with modern dam safety design standards; however, it is not anticipated to significantly alter the park characteristics or outdoor recreational opportunities. The Upper Van Reservoir will be temporarily drawn down to allow for safe access during the dam improvement work, but the water levels will be restored following project completion.

The Open Space and Recreation Plan has five broad goals, one of which is to "adequately and consistently manage open space to reduce public safety hazards, increase recreational opportunities and maximize protection for the city's natural resources". The Project's goals include reducing public safety hazards by improving the dam's resiliency and safety and addressing deficiencies and protecting and maintaining a significant open water natural resource and recreational asset in this area of Springfield.

4) compatibility with adjacent land uses

No land use change is proposed as part of this project.

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)
RPA: **Pioneer Valley Planning Commission**

Title: **Valley Vision 4: The Regional Land Use Plan for the Pioneer Valley** Date **2014**

D. Describe the project's consistency with that plan with regard to:
1) economic development

The project is a water resources improvement project and is not specifically meant to spur economic development, so this item is not directly applicable. The Valley Vision (VV) plan includes a goal to guide growth and development to existing city centers by utilizing existing infrastructure and promoting urban revitalization and infill. The VV further identifies revitalizing urban core areas and downtowns (Strategy #3) through improvements to urban parks. Given the site's location near a major employer, this park improvement complements ongoing strategies and efforts to encourage employees to live near their employer, shortening commutes and associated pollution while reinvigorating the city neighborhoods.

2) adequacy of infrastructure

A key goal of the VV plan is to implement land use actions that also support transportation needs as identified in the Regional Transportation Plan (RTP), adopted by the Pioneer Valley Metropolitan Planning Organization in 2012 to promote economic growth. The proposed dam safety improvements, paired with Armory Street improvements satisfy multiple goals and themes in these two documents including:

- **Preserving Open Space (VV) while repairing and maintaining existing transportation infrastructure (RTP); and**
- **Provide public access to parks and establish regional greenways, bikeways, and trails (VV) and supporting bikeways, and pedestrian trails.**

The proposed Project will improve the pedestrian access along Armory Street by improving sidewalk safety and investing in the repair of existing infrastructure (the dam) while preserving important green space within Van Horn Park.

3) open space impacts

The VV plan identifies preservation of open space and providing public access to parks and similar facilities for healthy exercise and recreation as goals. The proposed Project has been designed to maintain the existing outdoor recreational opportunities within Van Horn Park which include passive watercraft use and fishing on the reservoir as well as terrestrial healthy activities such as walking and biking in addition to the use of the existing playground and ball fields. Safety improvements to the existing overlook, as well as an improved viewshed from Armory Street will also enhance the open space. Dam improvements will help to maintain the open water resource of Upper Van Horn Reservoir for use by all.

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **rare species or habitat** (see 301 CMR 11.03(2))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

(NOTE: If you are uncertain, it is recommended that you consult with the Natural Heritage and Endangered Species Program (NHESP) prior to submitting the ENF.)

B. Does the project require any state permits related to **rare species or habitat**? ___ Yes _**X**_ No

C. Does the project site fall within mapped rare species habitat (Priority or Estimated Habitat?) in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes _**X**_ No.

D. If you answered "No" to all questions A, B and C, proceed to the **Wetlands, Waterways, and Tidelands Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes ___ No. If yes,

1. Have you consulted with the Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP)? ___Yes ___No; if yes, have you received a determination as to whether the project will result in the "take" of a rare species? ___ Yes ___ No; if yes, attach the letter of determination to this submission.

2. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, provide a summary of proposed measures to minimize and mitigate rare species impacts

3. Which rare species are known to occur within the Priority or Estimated Habitat?

4. Has the site been surveyed for rare species in accordance with the Massachusetts Endangered Species Act? ___ Yes ___ No

4. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? ___ Yes ___ No; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? ___ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, provide a summary of proposed measures to minimize and mitigate impacts to significant habitat:

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wetlands, waterways, and tidelands** (see 301 CMR 11.03(3))? _**X**_ Yes ___ No; if yes, specify, in quantitative terms:

- **301 CMR 11.03(3)(a)(1)(a) – Alteration of ten or more acres of any other wetland;**
- **301 CMR 11.03(3)(b)(1)(b) – Alteration of 500 or more linear feet of bank along a fish run or inland bank; and**
- **301 CMR 11.03(3)(b)(1)(f) – Alteration of ½ or more acres of any other wetland.**

B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? _**X**_ Yes ___ No; if yes, specify which permit:

Massachusetts Department of Environmental Protection – Section 401 of the Clean Water Act Water Quality Certification

Order of Conditions – Springfield Conservation Commission/MassDEP

C. If you answered "No" to both questions A and B, proceed to the **Water Supply Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? _**X**_ Yes ___ No; if yes, has a Notice of Intent been filed? __ Yes _**X**_ No; if yes, list the date and MassDEP file number: _____; if yes, has a local Order of Conditions been issued? ___ Yes ___ No; Was the Order of Conditions appealed? ___ Yes ___ No. Will the project require a Variance from the Wetlands regulations? ___ Yes __X_ No.

B. Describe any proposed permanent or temporary impacts to wetland resource areas located on the project site:

Please see Attachment 1 – EENF narrative for a complete discussion of impacts.

C. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

Coastal Wetlands	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Land Under the Ocean	**N/A**	**N/A**
Designated Port Areas	**N/A**	**N/A**
Coastal Beaches	**N/A**	**N/A**
Coastal Dunes	**N/A**	**N/A**
Barrier Beaches	**N/A**	**N/A**
Coastal Banks	**N/A**	**N/A**
Rocky Intertidal Shores	**N/A**	**N/A**
Salt Marshes	**N/A**	**N/A**
Land Under Salt Ponds	**N/A**	**N/A**
Land Containing Shellfish	**N/A**	**N/A**
Fish Runs	**N/A**	**N/A**
Land Subject to Coastal Storm Flowage	**N/A**	**N/A**

Inland Wetlands

Bank (lf)	**1,400 LF / 6,000 LF**	**Permanent / Temporary**
Bordering Vegetated Wetlands	**N/A**	**N/A**
Isolated Vegetated Wetlands	**N/A**	**N/A**
Land under Water	**52,270SF/ 373,670 SF**	**Permanent / Temporary**
Isolated Land Subject to Flooding	**N/A**	**N/A**
Bordering Land Subject to Flooding	**N/A**	**N/A**
Riverfront Area	**6,600 SF**	**Permanent**

**Note: The total LUW temporarily impacted by the drawdown is 9.7 acres; however, a portion of that area will also be permanently filled. To avoid duplicate alteration, this area is accounted for as a permanent impact only.*

D. Is any part of the project:

1. proposed as a **limited project**? _**X**_ Yes ___ No; if yes, what is the area (in sf)?
   485,770 SF
   The Project is anticipated to qualify as a limited project under 310 CMR 10.53(i): "*The maintenance, repair and improvement (but not substantial enlargement except where necessary to meet the Massachusetts Stream Crossing Standards) of structures, including dams and reservoirs and appurtenant works to such dams and reservoirs, buildings, piers, towers, headwalls, bridges, and culverts which existed on the effective date of 310 CMR 10.51 through 10.60 (April 1, 1983). When water levels are drawn down for the maintenance, repair, or improvement of dams or reservoirs or appurtenant works to such dams or reservoirs under 310 CMR 10.53(3)(i), water levels that existed immediately prior to such projects being undertaken shall be restored upon completion of the work , and a new Notice of Intent need not be filed for such restoration…"*
2. the construction or alteration of a **dam**? _**X**_ Yes ___ No; if yes, describe:
   The Project is a comprehensive program of rehabilitation of and improvements to the Upper Van Horn Reservoir Dam. See Attachment 1 for more details.
3. fill or structure in a **velocity zone** or **regulatory floodway**? ___ Yes _**X**_ No
4. dredging or disposal of dredged material? _**X**_ Yes ___ No; if yes, describe the volume of dredged material and the proposed disposal site:
   Sediments will be repositioned within the Upper Van Horn Reservoir immediately adjacent to the dam to the extent practical and excess sediment will be disposed offsite at a landfill. In total, approximately 2,500 cubic yards of sediment will be repositioned or disposed of offsite at a landfill.
5. a discharge to an **Outstanding Resource Water (ORW)** or an **Area of Critical Environmental Concern (ACEC)**? ___ Yes _**X**_ No
6. subject to a wetlands restriction order? ___ Yes _**X**_ No; if yes, identify the area (in sf):
7. located in buffer zones? _**X**_ Yes ___No; if yes, how much (in sf) **164,355 SF**

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? _**X**_ Yes ___ No
2. alter any federally-protected wetlands not regulated under state law? ___ Yes _**X**_ No; if yes, what is the area (sf)?

III. Waterways and Tidelands Impacts and Permits

A. Does the project site contain waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? ___ Yes _**X**_ No; if yes, is there a current Chapter 91 License or Permit affecting the project site? ___ Yes ___ No; if yes, list the date and license or permit number and provide a copy of the historic map used to determine extent of filled tidelands:

Upper and Lower Van Horn Reservoirs are not identified on the Massachusetts Great Ponds List.

C. Does the project require a new or modified license or permit under M.G.L.c.91? ___ Yes _**X**_ No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water-dependent use? Current ___ Change ___ Total ___

If yes, how many square feet of solid fill or pile-supported structures (in sf)?

C. For non-water-dependent use projects, indicate the following:

Area of filled tidelands on the site: **N/A**

Area of filled tidelands covered by buildings: **N/A**

For portions of site on filled tidelands, list ground floor uses and area of each use: **N/A**

Does the project include new non-water-dependent uses located over flowed tidelands? Yes ___ No **N/A**

Height of building on filled tidelands **N/A**

Also show the following on a site plan: Mean High Water, Mean Low Water, Water-dependent Use Zone, location of uses within buildings on tidelands, and interior and exterior areas and facilities dedicated for public use, and historic high and historic low water marks.

D. Is the project located on landlocked tidelands? ___ Yes _**X**_ No; if yes, describe the project's impact on the public's right to access, use and enjoy jurisdictional tidelands and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

E. Is the project located in an area where low groundwater levels have been identified by a municipality or by a state or federal agency as a threat to building foundations? ___Yes _**X**_ No; if yes, describe the project's impact on groundwater levels and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

F. Is the project non-water-dependent **and** located on landlocked tidelands **or** waterways or tidelands subject to the Waterways Act **and** subject to a mandatory EIR?

___ Yes _**X**_ No;

(NOTE: If yes, then the project will be subject to Public Benefit Review and Determination.)

G. Does the project include dredging? _**X**_ Yes ___ No; if yes, answer the following questions:

What type of dredging? Improvement _**X**_ Maintenance ___ Both ____

What is the proposed dredge volume, in cubic yards (cys) _**2,500 CY**__

What is the proposed dredge footprint **400** length (ft) **50** width (ft) **2-4** depth (ft);

Will dredging impact the following resource areas?

Intertidal Yes__ No _**X**_; if yes, ___ sq ft

Outstanding Resource Waters Yes__ No _**X**_; if yes, ___ sq ft

Other resource area (i.e. shellfish beds, eel grass beds) Yes__ No _**X**_; if yes __ sq ft

If yes to any of the above, have you evaluated appropriate and practicable steps to: 1) avoidance; 2) if avoidance is not possible, minimization; 3) if either avoidance or minimize is not possible, mitigation?

If no to any of the above, what information or documentation was used to support this determination?

The online MassGIS Tool, MassMapper, was used to confirm that the dredging area is not located within an Outstanding Resource Water and does not contain other resource areas. As the Project is located within an inland system, it is not intertidal.

Provide a comprehensive analysis of practicable alternatives for improvement dredging in accordance with 314 CMR 9.07(1)(b). Physical and chemical data of the sediment shall be included in the comprehensive analysis.

Please see Attachment 1 – EENF Narrative for a discussion of the

alternatives analyzed and Attachment 5 for sediment analysis information.

Sediment Characterization

Existing gradation analysis results? _**X**_ Yes ___No: if yes, provide results.
Existing chemical results for parameters listed in 314 CMR 9.07(2)(b)6?
_**X**__ Yes ____No; if yes, provide results.

The results of sediment characterization work are discussed in detail within Attachment 1 – EENF Narrative. Laboratory results are included in Attachment 5.

Do you have sufficient information to evaluate feasibility of the following management options for dredged sediment? If yes, check the appropriate option.

Beach Nourishment ___
Unconfined Ocean Disposal ___
Confined Disposal:
Confined Aquatic Disposal (CAD) ___
Confined Disposal Facility (CDF) ___
Landfill Reuse in accordance with COMM-97-001 ___
Shoreline Placement ___
Upland Material Reuse ____
In-State landfill disposal _**X**___
Out-of-state landfill disposal ____
(NOTE: This information is required for a 401 Water Quality Certification.)

IV. Consistency:

A. Does the project have effects on the coastal resources or uses, and/or is the project located within the Coastal Zone? ___ Yes _**X**_ No; if yes, describe these effects and the projects consistency with the policies of the Office of Coastal Zone Management:

B. Is the project located within an area subject to a Municipal Harbor Plan? ___ Yes _**X**_ No; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **water supply** (see 301 CMR 11.03(4))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **water supply**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Wastewater Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

II. Impacts and Permits

A. Describe, in gallons per day (gpd), the volume and source of water use for existing and proposed activities at the project site:

	Existing	Change	Total
Municipal or regional water supply	_____	_____	_____
Withdrawal from groundwater	_____	_____	_____
Withdrawal from surface water	_____	_____	_____
Interbasin transfer	_____	_____	_____

(NOTE: Interbasin Transfer approval will be required if the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged.)

B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No

C. If the project involves a new or expanded withdrawal from a groundwater or surface water source, has a pumping test been conducted? ___ Yes ___ No; if yes, attach a map of the drilling sites and a summary of the alternatives considered and the results. _____

D. What is the currently permitted withdrawal at the proposed water supply source (in gallons per day)? _____Will the project require an increase in that withdrawal? ___Yes ___No; if yes, then how much of an increase (gpd)? _____

E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? ___ Yes ___No. If yes, describe existing and proposed water supply facilities at the project site:

	Permitted Flow	Existing Avg Daily Flow	Project Flow	Total
Capacity of water supply well(s) (gpd)	_____	_____	_____	_____
Capacity of water treatment plant (gpd)	_____	_____	_____	_____

F. If the project involves a new interbasin transfer of water, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed?

G. Does the project involve:

1. new water service by the Massachusetts Water Resources Authority or other agency of the Commonwealth to a municipality or water district? ___ Yes ___ No
2. a Watershed Protection Act variance? ___ Yes ___ No; if yes, how many acres of alteration?
3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking

water supply for purpose of forest harvesting activities? ___ Yes ___ No

III. Consistency

Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities and services:

WASTEWATER SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wastewater** (see 301 CMR 11.03(5))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **wastewater**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Transportation -- Traffic Generation Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

II. Impacts and Permits

A. Describe the volume (in gallons per day) and type of disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00 for septic systems or 314 CMR 7.00 for sewer systems):

	Existing	Change	Total
Discharge of sanitary wastewater	_____	_____	_____
Discharge of industrial wastewater	_____	_____	_____
TOTAL	_____	_____	_____

	Existing	Change	Total
Discharge to groundwater	_____	_____	_____
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Discharge to municipal or regional wastewater facility	_____	_____	_____
TOTAL	_____	_____	_____

B. Is the existing collection system at or near its capacity? ___ Yes ___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

C. Is the existing wastewater disposal facility at or near its permitted capacity? ___ Yes___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

D. Does the project site currently contain a wastewater treatment facility, sewer main, or other wastewater disposal facility, or will the project involve construction of a new facility? ___ Yes ___ No; if yes, describe as follows:

	Permitted	Existing Avg Daily Flow	Project Flow	Total
Wastewater treatment plant capacity (in gallons per day)	_____	_____	_____	_____

E. If the project requires an interbasin transfer of wastewater, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or new?

(NOTE: Interbasin Transfer approval may be needed if the basin and community where wastewater will be discharged is different from the basin and community where the source of water supply is located.)

F. Does the project involve new sewer service by the Massachusetts Water Resources Authority (MWRA) or other Agency of the Commonwealth to a municipality or sewer district? ___ Yes ___ No

G. Is there an existing facility, or is a new facility proposed at the project site for the storage, treatment, processing, combustion or disposal of sewage sludge, sludge ash, grit, screenings, wastewater reuse (gray water) or other sewage residual materials? ___ Yes ___ No; if yes, what is the capacity (tons per day):

	Existing	Change	Total
Storage	_____	_____	_____
Treatment	_____	_____	_____
Processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

H. Describe the water conservation measures to be undertaken by the project, and other wastewater mitigation, such as infiltration and inflow removal.

III. Consistency

A. Describe measures that the proponent will take to comply with applicable state, regional, and local plans and policies related to wastewater management:

B. If the project requires a sewer extension permit, is that extension included in a comprehensive wastewater management plan? ___ Yes ___ No; if yes, indicate the EEA number for the plan and whether the project site is within a sewer service area recommended or approved in that plan:

TRANSPORTATION SECTION (TRAFFIC GENERATION)

I. Thresholds / Permit

A. Will the project meet or exceed any review thresholds related to **traffic generation** (see 301 CMR 11.03(6))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **state-controlled roadways**? __ Yes _**X** No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Roadways and Other Transportation Facilities Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	Existing	Change	Total
Number of parking spaces	_____	_____	_____
Number of vehicle trips per day	_____	_____	_____
ITE Land Use Code(s):	_____	_____	_____

B. What is the estimated average daily traffic on roadways serving the site?

Roadway	Existing	Change	Total
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____

C. If applicable, describe proposed mitigation measures on state-controlled roadways that the project proponent will implement:

D. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?

C. Is there a Transportation Management Association (TMA) that provides transportation demand management (TDM) services in the area of the project site? ____ Yes ____ No; if yes, describe if and how will the project will participate in the TMA:

D. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation facilities? ____ Yes ____ No; if yes, generally describe:

E. If the project will penetrate approach airspace of a nearby airport, has the proponent filed a Massachusetts Aeronautics Commission Airspace Review Form (780 CMR 111.7) and a Notice of Proposed Construction or Alteration with the Federal Aviation Administration (FAA) (CFR Title 14 Part 77.13, forms 7460-1 and 7460-2)?

III. Consistency

Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

TRANSPORTATION SECTION (ROADWAYS AND OTHER TRANSPORTATION FACILITIES)

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **roadways or other transportation facilities** (see 301 CMR 11.03(6))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **roadways or other transportation facilities**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Energy Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

II. Transportation Facility Impacts

A. Describe existing and proposed transportation facilities in the immediate vicinity of the project site:

B. Will the project involve any

1. Alteration of bank or terrain (in linear feet)? _____
2. Cutting of living public shade trees (number)? _____
3. Elimination of stone wall (in linear feet)? _____

III. Consistency -- Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **energy** (see 301 CMR 11.03(7))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **energy**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Air Quality Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	Existing	Change	Total
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

B. If the project involves construction or expansion of an electric generating facility, what are:

1. the facility's current and proposed fuel source(s)?
2. the facility's current and proposed cooling source(s)?

C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way? ___Yes ___No; if yes, please describe:

D. Describe the project's other impacts on energy facilities and services:

III. Consistency

Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **air quality** (see 301 CMR 11.03(8))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **air quality**? ___ Yes _**X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Solid and Hazardous Waste Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Air Quality Section below.

II. Impacts and Permits

A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)? ___ Yes ___ No; if yes, describe existing and proposed emissions (in tons per day) of:

	Existing	Change	Total
Particulate matter	_____	_____	_____
Carbon monoxide	_____	_____	_____
Sulfur dioxide	_____	_____	_____
Volatile organic compounds	_____	_____	_____
Oxides of nitrogen	_____	_____	_____
Lead	_____	_____	_____
Any hazardous air pollutant	_____	_____	_____
Carbon dioxide	_____	_____	_____

B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

A. Describe the project's consistency with the State Implementation Plan:

B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **solid or hazardous waste** (see 301 CMR 11.03(9))? ___ Yes _**X**_ No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **solid and hazardous waste**? __ Yes **X**_ No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Historical and Archaeological Resources Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of solid waste? ___ Yes ___ No; if yes, what is the volume (in tons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? ___ Yes ___ No; if yes, what is the volume (in tons or gallons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Recycling	_____	_____	_____
Treatment	_____	_____	_____
Disposal	_____	_____	_____

C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:

D. If the project involves demolition, do any buildings to be demolished contain asbestos? ___ Yes ___ No

E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency

Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Have you consulted with the Massachusetts Historical Commission? _**X**_ Yes ___ No; if yes, attach correspondence.

GZA submitted a Project Notification Form (PNF) to the Massachusetts Historical Commission (MHC) and received a statement that the Project is "unlikely to affect significant historic or archaeological resources" from MCH dated July 1, 2022. The reviewed PNF is included as Attachment 7.

For project sites involving lands under water, have you consulted with the Massachusetts Board of Underwater Archaeological Resources? ____Yes _**X**__ No; if yes, attach correspondence

The Project has not been coordinated with the Massachusetts Board of Underwater Archaeological Resources (BUAR) to date, but they are included on the Distribution List for this EENF.

B. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? _**X**_ Yes __ No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? ___ Yes _**X**_ No; if yes, please describe:

The Van Horn Park (SPR.976) is identified in the historic inventory for the State. The proposed Project will rehabilitate the dam, which is located along the Armory Street roadway separating the upper and lower portions of the Van Horn Park. The dam does not support park amenities, and no loss of park amenities, change in character, or demolition of structures is proposed.

C. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes _**X**_ No; if yes, does the project involve the destruction of all or any part of such archaeological site? ___ Yes ___ No; if yes, please describe:

D. If you answered "No" to <u>all parts of both</u> questions A, B and C, proceed to the **Attachments and Certifications** Sections. If you answered "Yes" to <u>any part of either</u> question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

II. Impacts

Describe and assess the project's impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

The Project is not anticipated to result in direct or indirect impacts on listed or inventoried historical or archeological resources as coordinated with MHC.

III. Consistency

Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to preserving historical and archaeological resources:

As described, no effect on historic or archeological resources are anticipated or likely; however, should a resource be uncovered, work will be paused while the appropriate entities are consulted. If the SHPO or BUAR provides future comments or guidance on the project as part of the MEPA process, the City of Springfield will incorporate that guidance into the Project.

CLIMATE CHANGE ADAPTATION AND RESILIENCY SECTION

This section of the Environmental Notification Form (ENF) solicits information and disclosures related to climate change adaptation and resiliency, in accordance with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency (the "MEPA Interim Protocol"), effective October 1, 2021. The Interim Protocol builds on the analysis and recommendations of the 2018 Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan (SHMCAP), and incorporates the efforts of the Resilient Massachusetts Action Team (RMAT), the inter-agency steering committee responsible for implementation, monitoring, and maintenance of the SHMCAP, including the "Climate Resilience Design Standards and Guidelines" project. The RMAT team recently released the RMAT Climate Resilience Design Standards Tool, which is available here.

The MEPA Interim Protocol is intended to gather project-level data in a standardized manner that will both inform the MEPA review process and assist the RMAT team in evaluating the accuracy and effectiveness of the RMAT Climate Resilience Design Standards Tool. Once this testing process is completed, the MEPA Office anticipates developing a formal Climate Change Adaptation and Resiliency Policy through a public stakeholder process. Questions about the RMAT Climate Resilience Design Standards Tool can be directed to rmat@mass.gov.

All Proponents must complete the following section, referencing as appropriate the results of the output report generated by the RMAT Climate Resilience Design Standards Tool and attached to the ENF. In completing this section, Proponents are encouraged, but not required at this time, to utilize the recommended design standards and associated Tier 1/2/3 methodologies outlined in the RMAT Climate Resilience Design Standards Tool to analyze the project design. However, Proponents are requested to respond to a respond to a user feedback survey on the RMAT website or to provide feedback to rmat@mass.gov, which will be used by the RMAT team to further refine the tool. Proponents are also encouraged to consult general guidance and best practices as described in the RMAT Climate Resilience Design Guidelines.

Climate Change Adaptation and Resiliency Strategies

I. Has the project taken measures to adapt to climate change for all of the climate parameters analyzed in the RMAT Climate Resilience Design Standards Tool (sea level rise/storm surge, extreme precipitation (urban or riverine flooding), extreme heat)? _**X**_ Yes __ No

Note: Climate adaptation and resiliency strategies include actions that seek to reduce vulnerability to anticipated climate risks and improve resiliency for future climate conditions. Examples of climate adaptation and resiliency strategies include flood barriers, increased stormwater infiltration, living shorelines, elevated infrastructure, increased tree canopy, etc. Projects should address any planning priorities identified by the affected municipality through the Municipal Vulnerability Preparedness (MVP) program or other planning efforts, and should consider a flexible adaptive pathways approach, an adaptation best practice that encourages design strategies that adapt over time to respond to changing climate conditions. General guidance and best practices for designing for climate risk are described in the RMAT Climate Resilience Design Guidelines.

A. If no, explain why.

B. If yes, describe the measures the project will take, including identifying the planning horizon and climate data used in designing project components. If applicable, specify the return period and design storm used (e.g., 100-year, 24-hour storm).

Please see Attachment 1 – EENF Narrative and Attachment 6 for discussion of the climate change parameters and design implications.

C. Is the project contributing to regional adaptation strategies? __ Yes _**X**_ No; If yes, describe.

II. Has the Proponent considered alternative locations for the project in light of climate change risks? ___ Yes _**X**_ No

A. If no, explain why.

The Project is the rehabilitation of an existing dam and therefore it cannot be executed or completed elsewhere. An alternative location is not feasible.

B. If yes, describe alternatives considered.

III. Is the project located in Land Subject to Coastal Storm Flowage (LSCSF) or Bordering Land Subject to Flooding (BLSF) as defined in the Wetlands Protection Act? ____Yes _**X**__No

If yes, describe how/whether proposed changes to the site's topography (including the addition of fill) will result in changes to floodwater flow paths and/or velocities that could impact adjacent properties or the functioning of the floodplain. General guidance on providing this analysis can be found in the CZM/MassDEP Coastal Wetlands Manual, available here.

ENVIRONMENTAL JUSTICE SECTION

As this Project is requesting an expedited review procedure, an assessment of the existing unfair or inequitable environmental burden is included as Attachment 8. This attachment augments the information found on the EJ Mapper (Attachment 8-1), in the EJ Screening Form (Attachment 8-2), and the discussion included below regarding the community notification and outreach. The Fact Sheet that was distributed within the community is included in Attachment 8-3.

I. Identifying Characteristics of EJ Populations

A. If an Environmental Justice (EJ) population has been identified as located in whole or in part within 5 miles of the project site, describe the characteristics of each EJ populations as identified in the EJ Maps Viewer (i.e., the census block group identification number and EJ characteristics of "Minority," "Minority and Income," etc.). Provide a breakdown of those EJ populations within 1 mile of the project site, and those within 5 miles of the site.

A complete listing and description of EJ populations located in whole or in part within 5 miles of the Project limit of work is included in Attachment 8-2, the EJ Screening Form. The characteristics of the EJ populations within the Designated Geographic Area (DGA) are summarized in Attachment 1.

As this Project only exceeds wetland and waterway thresholds, the DGA is a 1-mile radius from the limit of work.

B. Identify all languages identified in the "Languages Spoken in Massachusetts" tab of the EJ Maps Viewer as spoken by 5 percent or more of the EJ population who also identify as not speaking English "very well." The languages should be identified for each census tract located in whole or in part within 1 mile and 5 miles of the project site, regardless of whether such census tract contains any designated EJ populations.

Within 1 mile of the Project, none of the EJ populations in Chicopee were identified as having a language other than English spoken by at least 5% of the population who also identify as not speaking English "very well." Conversely, each identified EJ population within the City of Springfield within 1 mile of the Project site (25 populations) are identified as having greater than 5% of the population who speaks Spanish or Spanish Creole and do not speak English "very well."

Within 5 miles of the Project, languages spoken by at least 5% of the population who do not speak English "very well" include Portuguese or Portuguese Creole, Russian, and Spanish or Spanish Creole. These languages are not identified for each census tract as they are outside the Designated Geographic Area and as such, no outreach is required to these populations.

C. If the list of languages identified under Section I.B. has been modified with approval of the EEA EJ Director, provide a list of approved languages that the project will use to provide public involvement opportunities during the course of MEPA review. If the list has been expanded by the Proponent (without input from the EEA EJ Director), provide a list of the additional languages that will be used to provide public involvement opportunities during the course of MEPA review as required by Part II of the MEPA Public Involvement Protocol for Environmental Justice Populations ("MEPA EJ Public Involvement Protocol"). If the project is exempt from Part II of the protocol, please specify.

Not applicable – The list of languages was not modified and the EJ Screening Form and Fact Sheet were distributed in both English and Spanish.

II. Potential Effects on EJ Populations

A. If an EJ population has been identified using the EJ Maps Viewer within 1 mile of the project site, describe the likely effects of the project (both adverse and beneficial) on the identified EJ population(s).

Please see Attachment 1 – EENF Narrative for a description of the anticipated adverse and beneficial effects of the Project on the identified EJ populations.

B. If an EJ population has been identified using the EJ Maps Viewer within 5 miles of the project site, will the project: (i) meet or exceed MEPA review thresholds under 301 CMR 11.03(8)(a)-(b) __ Yes _**X**_ No; or (ii) generate150 or more new average daily trips (adt) of diesel vehicle traffic, excluding public transit trips, over a duration of 1 year or more. ___ Yes _**X**_ No

C. If you answered "Yes" to either question in Section II.B., describe the likely effects of the project (both adverse and beneficial) on the identified EJ population(s).

Not Applicable.

III. Public Involvement Activities

A. Provide a description of activities conducted prior to filing to promote public involvement by EJ populations, in accordance with Part II of the MEPA EJ Public Involvement Protocol. In particular:

1. If advance notification was provided under Part II.A., attach a copy of the Environmental Justice Screening Form and provide list of CBOs/tribes contacted (with dates). Copies of email correspondence can be attached in lieu of a separate list.

The Environmental Justice outreach process was initiated on May 13, 2022, with the electronic submittal of the Project EJSCREEN form and attachments in English and Spanish to Community-based Organizations (CBOs) and tribal organizations identified by the MEPA Office. The EJSCREEN form, attachments, and proof of emailing are included in Attachment 8-2.

2. State how CBOs and tribes were informed of ways to request a community meeting, and if any meeting was requested. If public meetings were held, describe any issues of concern that were raised at such meetings, and any steps taken (including modifications to the project design) to address such concerns.

The EJSCREEN form provided direct contact information for two parties from GZA that could be contacted regarding the Project as well as a link to a website where Project Information was available and requests or questions could be submitted.

As part of the initial outreach, Project websites were established in English and Spanish which provide basic project information and have the ability for readers to submit comments or questions about the Project or to request a meeting or more information. The website also provides a Project Locus Map and Project Fact Sheet. The Project Fact Sheet is also available in English and Spanish. The Project websites are available at the locations listed below:

https://www.gza.com/upper-van-horn-reservoir-dam-improvements-project
https://www.gza.com/proyecto-de-mejoras-de-la-presa-del-embalse-upper-van-horn

Also, as part of initial outreach, the Fact Sheets (English and Spanish) were provided to the neighborhood councils for posting at key neighborhood locations and were also provided to the City Libraries to post. In July 2022, a news story and the fact sheets were also posted in English and Spanish on the City's website at the following URL:
https://www.springfield-ma.gov/cos/news-story?tx_news_pi1%5Baction%5D=detail&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Bnews%5D=15753&cHash=3dde0d3ec14062ef2c5720b618669313

The Project was also presented at the July 21, 2022 Parks Commission Meeting, which is open to the public. No concerns or issues were raised at that meeting and the Commission was in favor of the Project.

At the end of the original 45-90 day outreach period, the City needed additional time to prepare the Expanded Environmental Notification Form filing; as such, a new EJ outreach period was established through a second EJSCREEN filing and notification email on August 4, 2022, to the same parties as in the original submittal. The second EJSCREEN form, attachments, and proof of emailing are also included in Attachment 8-2. After the second notification was submitted, the Fact Sheets were updated to include a QR code. This would allow anyone viewing the fact sheet that had a smart phone to click the QR code and automatically be directed to either the English or Spanish versions of the Project website. This modification was made to try to make Project information easier to access.

The City and GZA attended two in-person meetings to discuss the Project at public neighborhood council meetings during the second outreach period, with each meeting posted on the Project website. The neighborhood meetings had citizens onsite if translation was needed, but none was needed/provided.

- **New North Citizens Council Meeting at the Kenefick Park Meeting Room on Plainfield Street in Springfield – Tuesday October 11, 2022, 5PM**
- **Lower Liberty Heights Neighborhood Council at the Field House at Emily Bill Park, 233 Franklin Street in Springfield – Thursday October 20, 2022, 1PM**

A third meeting was scheduled with the Atwater Park Civic Association for October, but this meeting was cancelled by the Civic Association. The City hopes to reschedule this meeting for November.

At each of the two meetings held, GZA and the City provided an overview of the Project with graphics and photos, as well as hard copies of fact sheets. Both groups indicated that they would distribute the new fact sheets. The New North Citizens Council indicated that they would conduct outreach and share information with residents and businesses in the streets around the park.

Both groups were generally supportive of the Project and its effect on public safety through dam rehabilitation and the City indicated that as the design/permitting process continues, updates will be provided to the groups at their meetings.

The following questions/comments were raised:

- **Will the Project hinder park views? GZA indicated that there will be temporary visual impacts during construction associated with the temporary drawdown and construction activities.**
- **What is the proposed timing? GZA and the City indicated that it is funding dependent but that the goal would be for construction in 2024 at the earliest or when funding is procured. The City will keep the councils informed as more information becomes available.**
- **Will the Project result in traffic issues? GZA and the City indicated that the Project construction will result in some limited lane closures and potentially short-term road closures and detours due to the need for work on Armory Street, which is the top of the dam. The City will work with the councils and the hospital, schools, and ambulance companies for notifications and coordination and closures will be limited to the extent possible.**
- **Will there be fencing? GZA indicated that there will be safety fencing along the roadway in areas with the spillway chute and areas with steep slopes immediately adjacent to pedestrian walkways.**
- **What about park safety/homeless? There will be improved streetscape lighting along Armory Street, which has been raised as an issue in the past. Also, the tree removal and creation of cleared dam embankments will help with visibility. The City is also working to increase patrols with park rangers and the Sheriff's Department.**

3. If the project is exempt from Part II of the protocol, please specify.

B. Provide below (or attach) a distribution list (if different from the list in Section III.A. above) of CBOs and tribes, or other individuals or entities the Proponent intends to maintain for the notice of the MEPA Site Visit and circulation of other materials and notices during the course of MEPA review.

The EJSCREEN form was also sent to the following City of Springfield Neighborhood Councils:

- **Armoury Quadrangle Civic Association**
- **Atwater Park Civic Association**
- **Bay Area Neighborhood Council**
- **Hungry Hill Neighborhood Council**
- **Lower Liberty Heights Neighborhood Council**
- **McKnight Neighborhood Council**
- **New North Citizens Council**

The contact information for these organizations are included in Attachment 3 – Distribution List.

The City of Springfield regularly works with the local neighborhood councils to help disseminate information about projects and to solicit input and feedback from the council and citizens regarding upcoming projects. These neighborhood councils are an important resource and actively engage residents on a regular basis.

C. Describe (or submit as a separate document) the Proponent's plan to maintain the same level of community engagement throughout the MEPA review process, as conducted prior to filing.

The City intends to continue outreach throughout the MEPA process and throughout the entire design/permitting/construction process, including continued contact with the neighborhood councils, with a goal of keeping residents and local businesses engaged

and informed about the Project.

As part of the ongoing process, the City will:

- **Include the CBOs, tribal organizations, and neighborhood councils on the Distribution List for the EENF and EIR;**
- **Notify the councils and all the applicable CBOs and tribal organizations about the MEPA site walk and any Zoom/Teams meeting;**
- **Provide continued updates to the Parks Commission and Neighborhood Councils throughout the Project; and**
- **Maintain the Project website and update it with new information, including MEPA site walk.**

CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

   (Name) The Republican (Date) November 1, 2022

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

Signatures:

10/28/22	10/28/22
Date Signature of Responsible Officer or Proponent	Date Signature of person preparing ENF (if different from above)
Patrick J. Sullivan	Stephen L. Lecco, AICP, CEP
Name (print or type)	Name (print or type)
City of Springfield Dept. of Parks, Buildings, and Recreation Management	GZA GeoEnvironmental, Inc.
Firm/Agency	Firm/Agency
200 Trafton Road	1350 Main St., Suite 1400
Street	Street
Springfield, MA 01108	Springfield, MA 01103
Municipality/State/Zip	Municipality/State/Zip
413-787-6440	413-726-2100
Phone	Phone

PUBLIC NOTICE OF ENVIRONMENTAL REVIEW

PROJECT: Upper Van Horn Reservoir Dam Improvements Project

LOCATION: 625 Armory Street, Springfield, MA 01104

PROPONENT: City of Springfield Dept. of Parks, Buildings, and Recreation Management

The undersigned is submitting an Expanded Environmental Notification Form ("EENF") to the Secretary of Energy and Environmental Affairs on or before October 28, 2022.

This will initiate the review of the above project pursuant to the Massachusetts Environmental Policy Act ("MEPA," M.G.L. c.30, ss. 61-62L). Electronic or paper copies of the EENF may be obtained from:

GZA GeoEnvironmental, Inc.
1350 Main Street, Suite 1400
Springfield, MA 01103
Attn: Jennifer Burke – jennifer.burke@gza.com
413-726-2117

Copies of the EENF are also being sent to the Conservation Commission and Planning Board of the City of Springfield.

The Secretary of Energy & Environmental Affairs will publish notice of the EENF in the Environmental Monitor, receive public comments on the project, and then decide if an Environmental Impact Report is required. A site visit and/or remote consultation session on the project may also be scheduled. All persons wishing to comment on the project, or to be notified of a site visit and/or remote consultation session, should email MEPA@mass.gov or the MEPA analyst listed in the Environmental Monitor. Requests for language translation or other accommodations should be directed to the same email address. Mail correspondence should be directed to the Secretary of Energy & Environmental Affairs, 100 Cambridge St., Suite 900, Boston, Massachusetts 02114, Attention: MEPA Office, referencing the above project.

By: City of Springfield

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EENF NARRATIVE

1.0 INTRODUCTION

1.1 BACKGROUND

Upper Van Horn Reservoir Dam (National Dam Inventory (NID) No. MA00574) is a Significant Hazard potential, Intermediate-sized embankment dam owned and operated by the City of Springfield through their Department of Parks, Buildings, & Recreation Management (referred to herein as "the City"). The hazard classification and size classification for the dam are based on the State's Dam Safety Regulations (302 CMR 10.00). Intermediate-sized dams are defined as dams with a storage volume equal to or greater than 50 acre-feet and less than 1,000 acre-feet, with a height equal to or greater than 15 feet and less than 40 feet. Significant hazard potential dams are defined as dams "located where failure may cause loss of life and damage to home(s), industrial or commercial facilities, secondary highway(s) or railroad(s) or cause interruption of use or service of relatively important facilities".

The Upper Van Horn Reservoir Dam was reportedly constructed as a water supply dam circa 1848 and was owned by the Springfield Aqueduct Company. The Springfield Water Department purchased the reservoir and dam in 1873 and transferred ownership to the Springfield Parks Department in 1909, after the reservoir was no longer utilized for water supply. The primary purpose of the reservoir is now recreation. The current spillway culverts and spillway chute configuration date to ca. 1957, and were constructed in response to damages during the flood of August 1955. Circa 2000, the upstream headwall of the spillway culverts was modified so that a plaza area and overlook could be constructed by the Springfield Department of Public Parks (now the Springfield Department of Parks, Buildings, and Recreation Management).

Upper Van Horn Reservoir Dam is located along Armory Street and within Van Horn Park in the Liberty Heights neighborhood in the northwest portion of the City of Springfield, in Hampden County, MA. The dam separates the Upper and Lower Van Horn Reservoirs and is also the roadway embankment for Armory Street, a significant local connector road, which runs along the crest of the dam. The drainage area to the Dam is 0.4 square miles and is primarily urban in character, with a high percentage of impervious surfaces and extensive stormwater collection and conveyance systems which feed the Reservoir. The Reservoir discharges to Lower Van Horn Reservoir which discharges flow through the Lower Van Horn Reservoir dam's outlet structure into a culvert to its confluence with the Connecticut River approximately 1.5 miles downstream of Upper Van Horn Dam. The two dams are located in series and the Lower Van Horn Reservoir Dam was subject to a complete rehabilitation project in recent years. Modeling completed as part of that work indicated that if the Upper Van Horn Reservoir Dam were to be breached, the Lower Van Horn Reservoir Dam would be able to accept discharges from the Upper Van Horn Reservoir Dam without overtopping, as it provides flood storage.

The Upper Van Horn Reservoir Dam is an earthen embankment structure approximately 905 feet long with a structural height of just over 30 feet. The top of the dam is situated along Armory Street and is approximately 50-feet wide with steep embankment slopes on both sides. The primary spillway is composed of twin 8-foot wide by 5-foot high box culverts, with upstream inverts at El. 167.4±, which control the normal pool elevation of the reservoir. These culverts discharge to a steeply-sloped concrete spillway chute which flows into the downstream Lower Van Horn Reservoir, which in turn outlets through the Lower Van Horn Reservoir Dam, a High hazard dam, to a 48-inch diameter concrete pipe that is part of the City of Springfield's stormwater drainage system and ultimately discharges to the Connecticut River.

Upper Van Horn Reservoir is approximately 9.7 acres and is the keystone feature of Van Horn Park. The park is approximately 114 acres with developed park amenities to the east of the reservoir including tennis courts, parking, ball fields, and a playground. The remainder of the park (on both sides of Armory Street) is largely wooded with a paved access road which circumnavigates the Upper Reservoir. The Lower Van Horn Reservoir Dam impounds the Lower Van

Horn Reservoir downstream of the Upper Van Horn Reservoir Dam, south of Armory Street. The remainder of the area south of Armory Street is primarily undeveloped, with the exception of the Upper and Lower Van Horn Reservoir Dams and their appurtenant structures.

1.2 PROJECT SITE AND MEPA THRESHOLDS/REQUEST FOR SEIR

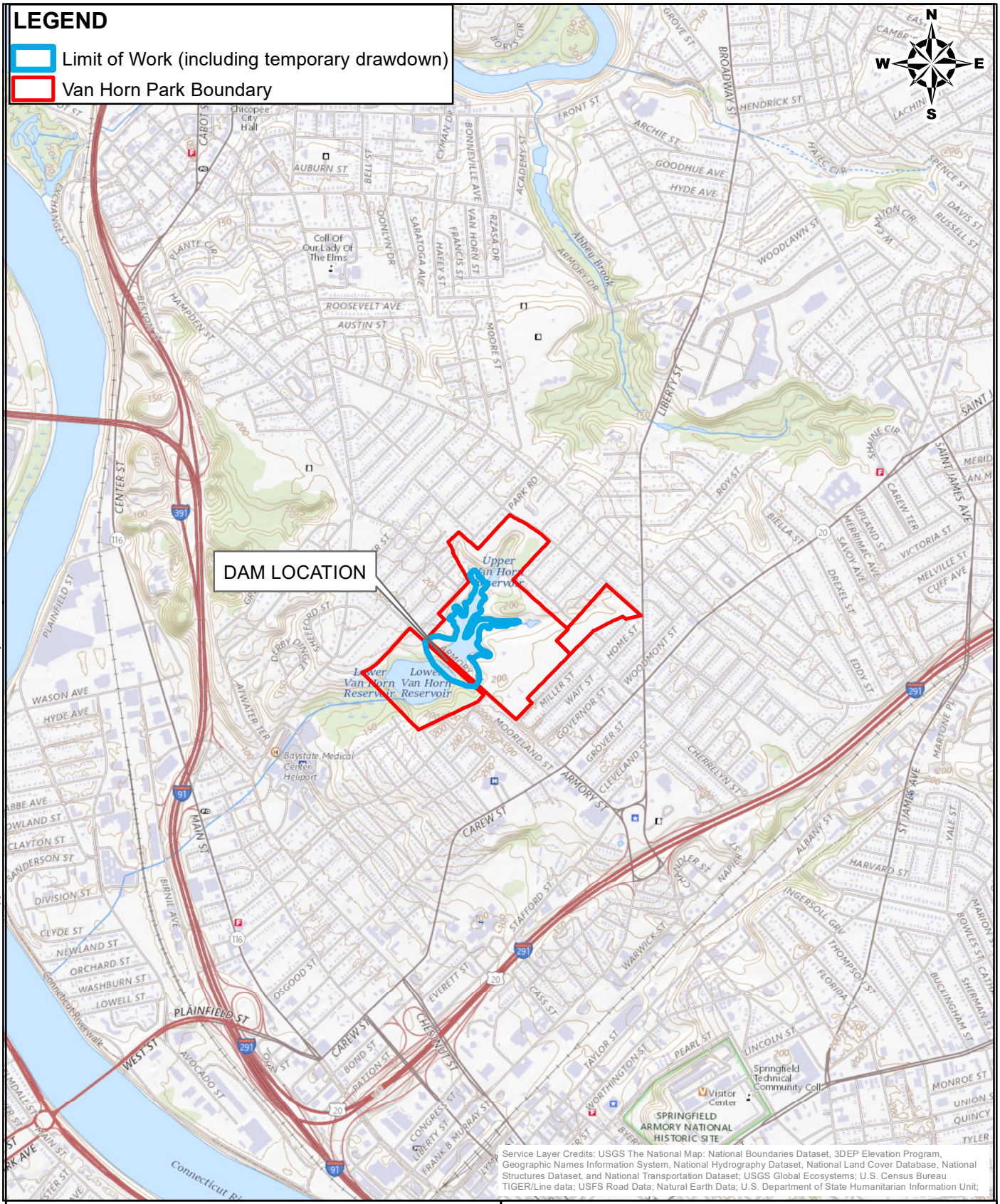
For the purposes of this submittal to the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Massachusetts Environmental Policy Act (MEPA) Office, the Upper Van Horn Reservoir Dam Improvements Project (the "Project") site (the Site) has been identified as the entirety of Upper Van Horn Reservoir as well as the existing dam footprint, and additional downstream areas which encompass proposed temporary and permanent impacts (**Figure 1**). Thus defined, the Project site consists of 15.2 acres. Of the total, the temporary reservoir drawdown constitutes 9.7 acres of impact. Of that 9.7 acres, approximately 1.1 acres of the Upper Van Horn Reservoir will also be permanently altered. The remaining 5.5 acres includes the dam and Armory Street, as well as construction access and equipment storage areas, and a small area of Lower Van Horn Reservoir which will be impacted to facilitate downstream embankment work and spillway outlet improvements. In total, 10.0 acres of wetlands will be altered. This total includes 8.6 acres of wetlands other than BVW that will be temporarily altered, and 1.4 acres of wetlands other than BVW will be permanently altered. The permanent alteration will occur in Land Under Water Bodies and Waterways and Riverfront Area.

The Project, as currently designed, exceeds the following review thresholds:

- 301 CMR 11.03(3)(a)(1)(a) – Alteration of ten or more acres of any other wetland;
- 301 CMR 11.03(3)(b)(1)(b) – Alteration of 500 or more linear feet of bank along a fish run or inland bank; and
- 301 CMR 11.03(3)(b)(1)(f) – Alteration of ½ or more acres of any other wetland.

Although the Project will alter over 10 acres of wetland resources other than Bordering Vegetated Wetlands (BVW), most of the impact is temporary, associated with the temporary construction-phase drawdown of the Upper Van Horn Reservoir. The reservoir will be returned to its pre-construction water surface elevation following the completion of construction. Impact and mitigation associated with the drawdown are discussed further in this document. Similarly, much of the bank impacts are associated with the temporary drawdown or with the re-culverting of the formerly culverted segment of stream near the toe of the dam.

Given the temporary nature of the work that exceeds the mandatory Environmental Impact Report and the overall purpose of the Project for public safety dam improvements, we respectfully request that the Secretary allow the City to submit a Single Environmental Impact Report (SEIR) in accordance with 301 CMR 11.06(8). The Project is designed to address an existing Certificate of Non-Compliance and Dam Safety Order and will serve to increase public safety around and downstream of the dam through repairs and improvements to the dam. Through the strong history of environmental documentation of site conditions, as presented herein, as well as broad analysis of the Project and alternatives, a detailed baseline of potential environmental impacts is included in this document. Additionally, as there are mapped Environmental Justice populations within one mile of the Project, this EENF includes documentation of public involvement opportunities and an assessment of the baseline existing unfair or inequitable Environmental Burden on Environmental Justice Populations in accordance with 301 CMR 11.07(6)(n)1.



0 1,000 2,000 4,000

SCALE IN FEET

UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
CITY OF SPRINGFIELD DPBRM
200 TRAFTON ROAD
SPRINGFIELD, MA 01108

LOCUS MAP

PROJ MGR: JRB	REVIEWED BY: CWC	CHECKED BY: SLL	FIGURE 1
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 2,000 ft	
DATE: OCTOBER 2022	PROJECT NO: 15.0167018.00	REVISION NO:	

1.3 PURPOSE AND NEED

A 2017 Phase I dam inspection found the dam to be in "POOR" condition and in need of significant repair to address identified dam safety deficiencies. Subsequent to the 2017 inspection, on September 18, 2017, the City received a Certificate of Non-Compliance and Dam Safety Order dated August 31, 2017 (**Attachment 4**). The Dam Safety Order requires the City to conduct follow-up inspections at six-month intervals until the dam is repaired, to conduct a Phase II Inspection/Investigation, and to bring the dam into compliance by either completing the needed repairs or breaching/removing the dam. The City has been completing follow-up inspections since 2018 and conducted a Phase II Investigation in 2020.

The dam's Poor condition rating is based on the following primary deficiencies:

- Significant erosion on the upstream and downstream slopes, including failing drainage system outlets;
- Uncontrolled seepage along the toe of the dam;
- Large trees and dense brush on the upstream and downstream slopes;
- Spalling and minor surface cracking of the concrete structures, with separation of joints in the spillway chute and associated training walls;
- No low-level outlet or provisions for lowering the water level;
- Uncontrolled discharge from a ponded/wetland area near the left downstream abutment, contributing to erosion near/at the toe of slope (due to a failed piped system);
- Failure to meet modern design standards relative to seepage and stability;
- Animal burrows along the downstream slope; and
- Lack of an Operations and Maintenance (O&M) Plan and Emergency Action Plan (EAP).

The Project is being undertaken by the City seeking to restore the dam to Good condition and bring it into compliance with accepted dam safety engineering practices and Massachusetts Dam Safety Regulations (302 CMR 10.00). The Project is necessary to reduce risks to downstream life and property, improve public safety, preserve the reservoir for recreation, and improve access for future inspection, operation, and maintenance of the dam.

1.4 PREVIOUS DAM SAFETY INSPECTIONS, ENGINEERING ANALYSIS, AND REPORTS

Upper Van Horn Reservoir Dam is inspected regularly as part of the requirements of the Massachusetts Dam Safety Regulations (302 CMR 10) and in accordance with the requirements of the Certificate of Non-Compliance and Dam Safety Order dated August 31, 2017 (**Attachment 4**). GZA has also collected other data and provided engineering and ecological assessments of the dam from the City and other sources. There are a significant number of existing reports, studies, and inspections that have documented the existing conditions at the Site, with much of this work summarized in this EENF.

Relevant drawings, studies and reports include the following:

- Upper Van Horn Reservoir Bathymetry (1939);
- Van Horn Reservoir Outlet, Armory St. Westerly – Prepared by the City of Springfield, Massachusetts, Department of Streets and Engineering (1950);
- Construction Plans for Upper and Lower Van Horn Reservoir Dams – Prepared by Green Engineering Affiliates, Inc. (1957);
- Springfield Park Redevelopment Project, Site Plan – Prepared by Hartford Design Group and Koton Engineering (1977);
- Van Horn Park Boundary Plan – Prepared by City of Springfield, DPW Engineering Division (1984);

- Diagnostic/Feasibility Study, Van Horn Reservoir, Springfield MA – Prepared by Lycott Environmental Research, Inc. (1990);
- Rehabilitation of Van Horn Park, Armory Street, Springfield, MA, Record Plans – Prepared by Baystate Environmental Consultants (2002);
- Management Plan for City of Springfield Ponds and Lakes – Prepared by Baystate Environmental Consultants, Inc. (2007);
- Phase I Inspection/Evaluation - Upper Van Horn Reservoir Dam – Prepared by Baystate Environmental Consultants (2009);
- Rehabilitation of Lower Van Horn Reservoir Dam, Springfield, Massachusetts, Contract Drawings, Project No. 17-016 – Prepared by GZA (2016);
- Phase I Inspection/Evaluation - Upper Van Horn Reservoir Dam – Prepared by GZA GeoEnvironmental, Inc. (2017)
- Follow-Up visual inspections conducted by GZA on:
    - September 24, 2017
    - April 24, 2018
    - January 4, 2019
    - July 26, 2019
    - July 21, 2020
    - March 30, 2021
    - December 7, 2021
    - September 21, 2022
- Phase II Engineering Evaluation and Alternatives Analysis, Upper Van Horn Reservoir Dam (NID# MA00574), Springfield, Massachusetts – Prepared by GZA GeoEnvironmental, Inc. (2020).

2.0 PROJECT DESCRIPTION

2.1 PROJECT SUMMARY/ELEMENTS

To address the current dam safety deficiencies and improve safety for the community, the Project proposes to:

- Remove all trees and woody vegetation along the embankment and develop a grass surface per the Office of Dam Safety (ODS) Policy on Trees on Dams (**Attachment 4**);
- Modify the embankment slopes to improve stability and control seepage through:
    - Regrading the upstream and downstream slopes to a more stable slope;
    - Adding a stability berm and toe drain/blanket;
    - Addressing existing erosion/scour issues from failed drainage system segments and repairing animal burrows;
    - Adding riprap/rockfill along portions of the upstream and downstream slopes for stability and erosion/scour protection; and
    - Adding rockfill along the upstream slope.
- Repair concrete within the spillway box culverts and replace the degraded spillway chute;
- Re-culvert a portion of an intermittent stream (Bank resource) within a previously-failed culvert to minimize slope erosion immediately downstream of the dam and establish a new engineered outlet;
- Replace and improve a section of the drainage system associated with Armory Street along the dam with catch basins with offline higher capacity inlets, sumps and hoods, with controlled outfall locations within the spillway chute to prevent further erosion along the embankment portions of the dam;
- Install a new siphon to facilitate future drawdowns for maintenance or emergencies;
- Remove and grout a former non-functional outlet along the right side of the dam;
- Construct new gated maintenance access drives to facilitate future operation and maintenance; and
- Construct improvements along Armory Street (roadway repaving, guardrail replacement, sidewalk repairs, safety fencing, access controls, and lighting).

Project Drawings for the Preferred Alternative are included as **Attachment 2**.

The Massachusetts Office of Dam Safety's *Policy on Trees on Dams* (**Attachment 4**) requires that "earth embankment dams be maintained free of the existence of trees and woody growth" and "be maintained with a healthy uniform cover of desirable vegetation such as an appropriate variety of grasses." ODS also recommends "that the area at least 20 feet downstream from the entire downstream toe of earth embankment dams be maintained free of trees and woody growth. This is necessary to prevent root systems from growing into the dam embankment causing damage to this area of the dam." This policy represents the current accepted practices relative to vegetation on embankment dams. The rehabilitation of the Upper Van Horn Reservoir Dam proposes to adhere to the ODS policy and will clear and grub all woody vegetation on and within 20 feet downstream of the dam and will establish grass cover.

To safely conduct the construction of the proposed Project, Upper Van Horn Reservoir will be temporarily drawn down during construction to provide a safe and dry work environment. A low cofferdam will be constructed near the dam in the reservoir with a pumped water diversion around the work area. Limited areas of Van Horn Park way also be temporarily closed for public safety during construction; however, the park and reservoir will be fully reopened after construction. During construction, there will be times when lane closures or short-term road closures may be needed along Armory Street to conduct the work. A maintenance and protection of traffic plan will be developed as part of the Project, including signage and notification/coordination for potential delays or detours.

The Project is a water resources improvement project and will not change overall traffic or infrastructure demands. There is ample and unconstrained infrastructure available, as discussed further in this submittal. The Site is readily accessed from existing roadways in an urbanized area and all utilities are available at the Site.

As part of the proposed Project design, multiple design and engineering alternatives and decisions have been made to minimize undue land or wetland alteration. These decisions include reducing fill within the Land Under Water Bodies and Waterways to the extent practicable by the use of rockfill in some areas to allow for steeper slopes that will both provide adequate protection and meet dam safety requirements without compromising flood storage or expanding the footprint of the dam beyond what it must be. Additionally, roadway improvements are being coordinated with the City Department of Public Works and utility providers to improve the stormwater system, coordinate utility modifications, and improve pedestrian safety during dam rehabilitation efforts and to conduct the work in a manner to minimize total lane or road closure time. Finally, based upon engineering inspections, existing concrete infrastructure within the spillway will be repaired or improved when feasible instead of replaced to decrease the total Project disruption and disturbance and the creation of waste from the Project.

2.2 CONSTRUCTION APPROACH/SEQUENCING

It is anticipated that the Project will include the following generalized sequence, although the selected Contractor may propose to conduct certain activities concurrently or in a slightly different order, depending on the season, weather, staffing, and other site-specific considerations.

The anticipated generalized sequence is as follows, with all work to be conducted in accordance with the applicable Project permits:

- Mobilization to the Site;
- Installation of erosion and sedimentation controls;
- Installation of bypass pumping equipment and commencement of drawdown and bypass pumping for control of water;
- Tree and vegetation clearing, which may occur on a sequenced basis along the upstream and downstream embankment;
- Selective site preparation and demolition and establishment of temporary facilities;
- Installation of upstream construction access and upstream cofferdam along the proposed stability berm;
- Dredging and preparation of upstream embankment for rockfill;
- Removal of failed drainage facilities and fill/grouting and siphon construction;
- Upstream embankment grading and fill;
- Upstream embankment restoration;
- Installation of downstream cofferdam and demolition of existing spillway chute;
- Downstream embankment regrading/filling and maintenance access construction with new spillway installation and drainage connections and spillway box culvert repairs;
- Roadway improvements;
- Installation of new culverted sections and outlet protection;
- Installation of fencing, railings, lighting;
- Restoration of disturbed areas with loam and seed and turf establishment;
- Final cleaning;
- Removal of erosion and sedimentation controls; and
- Demobilization.

3.0 ALTERNATIVES ANALYSIS

As part of the *Phase II Engineering Evaluation and Alternatives Analysis* prepared in 2020 for the dam, an alternatives analysis was developed to assess options to address existing deficiencies at the Upper Van Horn Reservoir Dam. The alternatives were evaluated based on consistency with Project goals, public safety, feasibility and cost, and potential impacts to the environment. Three alternatives were identified, as summarized herein:

- Alternative No. 1 – No Action;
- Alternative No. 2 – Breach or remove the dam; or
- Alternative No 3 – Repair or rehabilitate the dam.

These Project alternatives are discussed in detail below. As part of the alternatives analysis, various options were evaluated for control of water throughout construction and for the limited quantity of dredging required for the work. Those alternatives are also included in this section.

3.1 ALTERNATIVE NO. 1 – NO ACTION

Under the No Action alternative, the dam would remain in its current condition and continue to degrade, with no significant maintenance or repair activities.

The No Action alternative was not considered as a viable option due to the dam's current status as a Significant hazard class structure in "POOR" condition. Failure to address the identified deficiencies as described above would violate Massachusetts law (M.G.L. c. 253, § 44-49), as amended by Chapter 330 of the Acts of 2002) and the associated Massachusetts Dam Safety regulations at 302 CMR 10.00, which obligate dam owners to property maintain their dam to meet minimum design and safety standards. Failure to correct the deficiencies identified at the Upper Van Horn Reservoir Dam could endanger downstream property and public safety. The No Action alternative would be a violation of the August 31, 2017, Dam Safety Order contained within the Certificate of Non-Compliance issued by the Commonwealth of Massachusetts Department of Conservation and Recreation Office of Dam Safety and as such, was removed from further consideration.

3.2 ALTERNATIVE NO. 2 – BREACH OR REMOVE DAM

The option to breach and/or remove the dam was evaluated. The dam crest supports Armory Street, an important roadway within the City. Removal or breach of the dam would result in a loss of the waterbody and would require construction of a bridge and support and relocation of all utilities within the roadway. This would result in both significant expense to the City as well as prolonged road closures and impacts to the surrounding neighborhood.

This option is not preferred because the dam currently maintains an open water passive recreational resource (Upper Van Horn Reservoir) within Van Horn Park, a resource which the City has dedicated significant resources to maintain for open water and parkland resources for the surrounding neighborhood. There are no other similarly-sized open water bodies in the City of Springfield within approximately 2-miles of Van Horn Park, and loss of this resource would increase an existing and unfair environmental burden in the surrounding Environmental Justice populations. In addition, the cost and impacts related to removal or breach of the dam and construction of a bridge would be significant.

3.3 ALTERNATIVE NO. 3 – REPAIR OR REHABILITATE DAM

As the City is committed to maintaining the Upper Van Horn Reservoir, repair of the dam is the Preferred Alternative. As such, the dam and its appurtenant structures must be modernized and rehabilitated so that they meet or exceed current dam safety regulatory requirements and accepted dam safety engineering practices. This alternative will preserve the Upper Van Horn Reservoir as an open water recreational resource for the local community for multiple purposes (aesthetic, ecological, recreational), will reduce risks to public health and safety associated with the current dam deficiencies, and will improve access allowing for improved ongoing inspection, operation, and maintenance of the dam.

In support of the Preferred Alternative, multiple proposed means and methods were assessed before developing the proposed Project, as discussed in Sections 3.4 and 3.5.

3.4 WATER HANDLING ALTERNATIVES ANALYSIS

As part of the preferred alternative to repair/rehabilitate the dam, multiple water handling options were considered, as discussed in this section.

3.4.1 Option No. 3.1 – No Drawdown

The option to rehabilitate the dam without drawing down the reservoir was evaluated. Under this option, the work would be completed from barges and other large equipment located onshore. This option was not preferred due to logistics and spatial constraints, as well as cost. The barges or land-based equipment needed to perform the work would require significant tree clearing and alteration to the park for access. Additionally, the cost of this equipment and staging would be prohibitive. This option would not support required stabilization work on the upstream slope of the embankment.

3.4.2 Option No. 3.2 – Partial Drawdown

The option to partially drawdown the reservoir only within the proposed limits of work was evaluated. Under this option, a full height coffer dam would be installed in the same or similar location to that shown on the plans. The reservoir would be drawn down via bypass pumping that would divert water from the work area and discharge it to the spillway culverts. The remainder of the reservoir outside the limit of work would remain at its usual water surface elevation. This would create a dry work area; however, given the reservoir depth near the limit of work, this alternative is not preferred as it does not adequately provide for worker safety. Near the limit of work, the reservoir is nearly 20-feet deep and the risk to worker safety of failure of a cofferdam resulting in flooding of the work area is unacceptable. Additionally, cofferdam failure during work could risk the stability of the dam increasing safety risks to Armory Street and to downstream communities and infrastructure.

3.4.3 Option No. 3.3 – Full Drawdown

The option to fully drawdown the reservoir for the period of construction with bypass pumping and a low cofferdam is the preferred option, as it is the only option that adequately protects worker safety and stability of downstream infrastructure. Under this option, the reservoir will be drawn down via bypass pumping to the spillway culverts and a partial height cofferdam will be installed to segregate the work area. This option will create a safe and dry work environment and is protective of the dam stability.

3.5 DREDGING ALTERNATIVES OPTIONS

In accordance with 314 CMR 9.07(1)(b), an alternatives analysis is required for any proposed dredging other than maintenance dredging. As such, a formal alternatives analysis relative to the limited dredging portion of the Project was conducted, as summarized in this section.

3.5.1 No Dredge Option

A no dredge option was evaluated for the Project. This option is only feasible if the No Action alternative had been selected. Under the proposed alternative – repair or rehabilitation of the dam – dredging will be required to create a stable surface over which to regrade the upstream embankment and under a dam removal or breach alternative, dredging would be required to minimize sediment infilling of Lower Van Horn Reservoir.

As previously discussed, a No Action alternative is not preferred as it would violate the existing dam safety order and would pose ongoing and increasing safety risks to downstream and surrounding communities and infrastructure.

3.5.2 Dredging Option

As designed, the upstream dam embankment slope will be regraded to lessen the steepness. To create a stable subgrade for the placement of additional embankment materials, soft sediments in the proposed embankment footprint must be removed. Dredged sediments will be repositioned within the deepest areas of the reservoir located immediately upstream of the proposed embankment footprint. If repositioning of some or all of the sediment is not feasible, it will be disposed of at a landfill in accordance with the Section 401 Water Quality Certification and other applicable regulations, permits, and authorizations.

The proposed dredging has been designed to minimize the impact through limiting the dredging to only that necessary to support a stable slope. No additional dredging to deepen or alter the reservoir is proposed. Multiple dredge methodologies were evaluated for feasibility given the Project needs and logistics and compliance with the Dredging Performance Standards at 314 CMR 9.07(3).

3.5.2.1 Conventional Excavation in the Dry

Conventional excavation (often referred to as mechanical excavation) in the dry is generally recognized as the least expensive alternative for small waterbodies or excavation areas. The waterbody is drained to the maximum extent feasible, and the bottom sediments are removed with an excavator and are either loaded directly into trucks or temporarily stockpiled and subsequently loaded for removal after a period of dewatering by gravity. In the case of in-reservoir repositioning, dewatering may not be necessary, and sediment may be directly placed into the repositioning location. Under the best of scenarios, the water level in the pond is drawn down below the depth to be excavated and the work area is kept dry while the construction equipment operates on the hard bottom substrate.

Because the reservoir will be drawn down to create a safe working environment and the relatively small volume of sediment and area to be excavated, conventional excavation in the dry is the preferred methodology. This alternative will result in the least additional disturbance and will be protective of the waterbody by limiting shoreline alteration.

3.5.2.2 Bucket Dredging in the Wet

Bucket dredging in the wet involves the use of a clamshell, excavator, or dragline working from the shore or from a floating barge. Dredging takes place through the water column, and historically has been the methodology of choice in shallow

salt-water settings, for the removal of sand and gravel, or in settings where the creation of turbidity and excessive sedimentation is not an issue.

This option is not preferred because it is better suited for more granular material than the sediments and organics present within the proposed dredging footprint of the reservoir. Additionally, this method of dredging would require additional shoreline alteration to stage equipment which would increase the total proposed work area and likely result in the removal of additional mature vegetation (i.e., trees). To protect the Lower Van Horn Reservoir, a turbidity curtain would need to be installed upstream of the spillway to avoid and minimize sediment migration. Give that the next phase of the work, regrading the upstream embankment slope, requires a dry work area, installing the turbidity curtain represents unnecessary effort and expense to the Project. Overall, bucket dredging in the wet would be less protective of the resources and require additional effort during construction to execute; therefore, it is not preferred.

3.5.2.3 Hydraulic Dredging in the Wet

Hydraulic dredging in the wet involves sediment withdrawal and pumping equipment which are mounted on a floating barge and operate within the reservoir under normal water surface conditions. Sediment is removed by a suction pipe and cutterhead controlled from the dredge and lowered into the sediment. Typically, a containment basin is constructed on a nearby site into which the dredge slurry is pumped, and solids are settled out. Another method employs the use of onsite belt filter presses or large geotextile filter tubes, which remove solids in smaller batches. These systems act as water treatment processes that provide a return of “clean” effluent to the waterbody. The waterbody must have a continuous inflow of water that is equal or greater than the excavation pumping rate; otherwise, the waterbody may be gradually drained during the dredging process.

This option is not preferred as it would increase the work area required through the creation of sediment containment basins. Land area within Van Horn Park is not conducive to the creation of such basins given the steep and wooded slopes. Significant tree clearing and/or slope stabilization would be required to create and then permanently stabilize the containment basins; therefore, hydraulic dredging is not preferred.

3.6 COMPARISON OF ALTERATIVES AND SELECTION OF THE PREFERRED ALTERNATIVE

The determination of the Preferred Alterative was based on a review of the Project goals and objectives, feasibility, legality, cost benefits and drawbacks, and potential impacts to the environment, facilitated by the development of the matrix presented in **Table 3.1** on the following page. Based on the alternatives considered, the City of Springfield selected the Repair and Rehabilitation of the dam as the Preferred Alternative.

Table 3.1. Comparison of Alternatives

Topic	No Action	Dam Removal	Dam Repair
Topography, Geology, Soils, Sediment	Slopes will continue to erode due to uncontrolled stormwater discharges, negatively affecting dam stability	Significant impacts for removal of earthen embankment dam	Significant impacts for regrading and stability berm additions needed for dam safety
Wetland Resources	No impacts	Significant wetland conversion impacts	Significant temporary impacts. No wetland conversion
Water Resources, Hydrology, Water Quality	No impacts	Significant permanent impacts	Significant temporary impacts
Vegetation	No impacts	Significant permanent impacts	Significant impacts required for dam safety
Fisheries and Wildlife	No impacts	Significant permanent impacts	Significant temporary impacts
Endangered, Threatened, and Special Concern Species	No impacts, no listed species or habitat identified	No impacts, no listed species or habitat identified.	No impacts, no listed species or habitat identified.
Historic, Archaeological Resources	No impacts	Would result in loss of reservoir, which is part of a state inventoried property – Van Horn Park	No impacts
Air Quality	No impacts	Minor temporary impacts	Minor temporary impacts
Greenhouse Gas Emissions	No impacts	Minor temporary impacts	Minor temporary impacts
Noise	No impacts	Minor temporary impacts	Minor temporary impacts
Hazardous Materials	No impacts	No impacts	No impact
Land Use, Open Space, Aesthetics, Recreation	Failure to improve the dam's condition could threaten its long-term viability, which would threaten loss of the Upper Van Horn Reservoir, a key open water resource for the community	Significant Impacts – Loss of Upper Van Horn Reservoir as open water resource	Temporary impacts during construction for temporary drawdown and limited park area closures
Utilities, Infrastructure	Failure to improve the dam's condition could threaten its long-term viability, resulting in potential dam failure, which would result in a loss of	Significant impacts – alternative will remove a dam and require new support for Armory Street roadway and utilities	Moderate temporary impacts during construction

	Armory Street and its embedded utilities until repairs could be made		
Socioeconomic Resources	No impacts, except in event of dam failure – see Land Use above	Significant Impacts – Loss of Upper Van Horn Reservoir as open water resource	Moderate temporary impacts during construction due to traffic detours/delays and partial park area closures
Traffic, Transit, Bicycle & Pedestrian Access	No impacts, except in event of dam failure – see Utilities above	Moderate impact during construction	Moderate temporary impacts for temporary lane or road closures/detours during construction
Addresses Dam Safety Order?	No	Yes	Yes
Addresses Project Purpose and Need?	No	No	Yes

4.0 EXISTING ENVIRONMENT

4.1 TOPOGRAPHY, SOILS, GEOLOGY, SEDIMENTS

Topography surrounding the Upper Van Horn Reservoir is generally steep along the pond shoreline and then flattens out in the surrounding park and residential areas. Topography is shown on the Locus Map included as **Figure 1**. A site-specific topographic survey was completed for the Project in the area of the dam, which has been used in the development of design drawings to date. The Existing Conditions drawing prepared for the Project (**Attachment 2**) shows topography in the Project area.

As part of investigative studies at the dam, a limited bathymetric survey was completed utilizing sonar. Bathymetric contours for top of sediment collected by Vespos Hydrographic Surveys & Software in 2022 are included on the Existing Conditions drawing.

Upper Van Horn Reservoir is located within sand and gravel glacial deposits with some fine-grained glacial deposits. According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (2022), which includes data from the Hampden County, Massachusetts, Central Part Survey, undisturbed soils in areas near the Project area for the dam are classified as Windsor loamy sand, Unadilla very fine sandy loam, Eldridge loamy sand, and the dam area is classified as Dam. Bedrock geology is classified as Mesozoic Basin Sedimentary, per MassGIS bedrock datalayers.

4.1.1 Sediment Analysis

In preparation for Project permitting and to understand the character and quality of soft accumulated sediments within Upper Van Horn Reservoir Dam in the vicinity of the dam, in-pond sediment sampling was conducted on April 5, 2022, through the use of vibracores. The sediment sampling program included a due diligence analysis and was designed in coordination with the Section 401 permitting group of the Massachusetts Department of Environmental Protection (MassDEP). Six (6) full-depth cores were collected over the full depth of soft sediment. Sediments along the dam ranged in depth from approximately 2 ft to 6 ft in depth and were field identified primarily as muck.

Six sediment samples were collected and Volatile Organic Compounds (VOC) samples were collected directly from each core sample for analysis. Six VOC samples were submitted to the state-certified laboratory for VOC analysis.

After the VOC samples were collected, series of two cores each were composited into a single sample for laboratory analysis. A total of three (3) composited samples were sent to a state-certified laboratory for analysis, in accordance with the requirements of 314 CMR 9.00, within allowable hold times and using appropriate sediment handling and sample preservation and storage procedures.

Samples were analyzed for the following:

- Metals – Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Polychlorinated Biphenyls (PCBs) – by NOAA Summation of Congeners
- Extractable Petroleum Hydrocarbons (EPH) – by MassDEP method
- Percent Water
- Total Organic Carbon
- Grain Size Distribution

The complete laboratory results, as well as a plan depicting sampling locations are included in **Attachment 5**. Laboratory results are summarized and tabulated in this section for the purposes of discussion herein. Based on measured Lead levels, a Toxicity Characteristic Leaching Procedure (TCLP) was also performed on the three composite samples.

4.1.1.1 Physical Parameter Testing

The results of the physical analysis of the sediment samples are presented in **Table 4.1**. The sediment samples had a high moisture content, which was expected based on visual observations onsite, as shown in the table.

Table 4.1. Sediment Testing Results – Physical Parameters.

	SAMPLE ID:		
	S- 1/2	**S-3/4**	**S-5/6**
Sample Date:	4/5/2022	4/5/2022	4/5/2022
Testing Parameter:			
Percent Moisture (%) (2540G)	71.2	72.9	70.2
Total Organic Carbon (%) (1,9060A)	7.51	8.52	6.43
Particle Size -- By Sieve (Percent Finer) (ASTM D6913/D7928)			
Sieve, 3"	100.0	100.0	100.0
Sieve, 1.5"			
Sieve, 1"			
Sieve, 0.75"			
Sieve, 0.5"			
Sieve, 0.375"			
Sieve, #4	98.0	82.5	71.2
Sieve, #10	92.2	55.4	50.0
Sieve, #20			
Sieve, #40	64.8	34.4	33.6
Sieve, #60	50.9	29.2	29.1
Sieve, #100			
Sieve, #200	19.1	18.1	18.3
Sediment Description based on visual field classification:	Dark brown high organic content muck	Dark brown high organic content muck	Dark brown high organic content muck

4.1.1.2 Total Metals and Toxicity Characteristic Leaching Procedure

Table 4.2 presents the total metals analysis for the Upper Van Horn Reservoir sediment samples. The term "total" refers to the total amount of the tested substance within the sample and is commonly expressed in milligrams per kilogram (mg/kg – also expressed as parts per million (ppm)) or micrograms per kilogram (ug/kg – also expressed as parts per billion (ppb)). This test reveals only the total amount of a substance, regardless of what molecular compounds it may be bound

within. As an example, any test results which indicate elevated Total Lead levels may be reason for concern; however, certain lead compounds are very stable in nature and may remain bound to the sediment, presenting little to no toxicity within the natural environment.

Of the metals analyzed, only Lead was detected in concentrations exceeding the Massachusetts Contingency Plan (MCP) S-1/GW-1 standards. The MCP does not have specific standards related to sediment; therefore, soil standards are used as a general comparison.

Table 4.2. Sediment Testing Results - Total Metals.

Total Metals	MCP Method 1 Standards	MADEP Identified Background Levels in "Natural" Soil	COMM 97 Reuse at Unlined Landfills Standard	SAMPLE ID:		
	S-1 & GW-1, S-1 & GW-2	--	--	S-1/2	S-3/4	S-5/6
			Sample Date:	4/5/2022	4/5/2022	4/5/2022
Arsenic, Total	20	20	40	11.3	12.5	16.1
Cadmium, Total	70	2	30	1.990	1.544	1.339
Chromium, Total	100	30	1,000	22.9	20.2	25.6
Copper, Total	N/A	40	N/A	63.9	41.8	46.0
Lead, Total	200	100	1,000	539	457	358
Mercury, Total	20	0.3	10	0.232	0.312	0.295
Nickel, Total	600	20	N/A	25.7	17.6	22.3
Zinc, Total	1,000	100	N/A	299	234	234

All units in mg/kg

As a follow-up, a TCLP was completed for each composite sample for Lead, as shown below in **Table 4.3**.

Table 4.3. Sediment Testing Results - TCLP for Lead.

TCLP (1311/6010C)	SAMPLE ID:		
	S-1/2	S-3/4	S-5/6
Sample Date:	4/5/2022	4/5/2022	4/5/2022
Lead	0.509	0.806	ND (0.500)

All units in mg/kg

4.1.1.3 Polycyclic Aromatic Hydrocarbons

Polycyclic Aromatic Hydrocarbons are chemicals that occur naturally in coal, crude oil, and gasoline. They result from the combustion of products such as coal, gasoline, wood, waste materials, and tobacco. PAH testing results are shown in **Table 4.4**. Of the PAHs analyzed, several parameters were detected in concentrations exceeding the Massachusetts Contingency Plan (MCP) S-1/GW-1 standards, with some also exceeding the MCP Method 1 S-1/GW-2 standards.

Table 4.4. Sediment Testing Results – Polycyclic Aromatic Hydrocarbons.

PAH by GC/MS SIM 8270	MCP Method 1 Standards	MCP Method 1 Standards	MADEP Identified Background Levels in "Natural" Soil	SAMPLE ID:		
	S-1 & GW-1	S-1 & GW-2	--	S-1/2	S-3/4	S-5/6
			Sample Date:	4/5/2022	4/5/2022	4/5/2022
2-Methylnaphthalene	0.7	80	0.5	0.385	0.871	1.240
Acenaphthene	4	1,000	0.5	0.651	1.410	2.530
Acenaphthylene	1	600	0.5	1.630	2.550	2.190
Anthracene	1,000	1,000	1	3.210	6.470	7.810
Benzo(a)anthracene	7	7	2	11.10	18.700	18.200
Benzo(a)pyrene	2	2	2	11.10	18.900	17.500
Benzo(b)fluoranthene	7	7	2	9.73	18.60	17.800
Benzo(g,h,i)perylene	1,000	1,000	1	6.990	11.400	10.500
Benzo(k)fluoranthene	70	70	1	8.280	12.000	11.000
Chrysene	70	70	2	10.60	19.80	18.400
Dibenzo(a,h)anthracene	0.7	0.7	0.5	1.560	2.600	2.480
Fluoranthene	1,000	1,000	4	20.20	39.60	40.00
Fluorene	1,000	1,000	1	1.380	3.170	4.310
Indeno(1,2,3-cd)pyrene	7	7	1	7.270	12.100	11.400
Naphthalene	4	20	0.5	0.733	1.550	1.810
Phenanthrene	10	500	3	9.38	27.20	33.500
Pyrene	1,000	1,000	4	22.60	42.30	41.800
Total PAHs	--		--	126.80	239.22	242.47

All units in mg/kg

4.1.1.4 Volatile Organic Compounds

Table 4.5 presents the chemical analysis results for VOCs. VOCs are compounds that are primarily manmade, with a high vapor pressure and low water solubility. They are used in the manufacture of paints, pharmaceuticals, and refrigerants in the form of industrial solvents and are common ingredients of petroleum-based fuels, hydraulic fluids, paint thinners, and dry cleaning agents. Most of the VOCs tested for were not detected; however, two compounds – acetone and methyl ethyl ketone were detected. MCP Method 1 values were not exceeded for either VOC constituent detected.

Table 4.5. Sediment Testing Results – Volatile Organic Compounds.

Volatile Organics - 8260B (mg/kg)	MCP Method 1 Standards	MCP Method 1 Standards	COMM 97 Reuse at Unlined Landfills Standard	SAMPLE ID:		
	S-1 & GW-1	S-1 & GW-2	--	S-1	S-3	S-6
				4/5/2022	4/5/2022	4/5/2022
Acetone	6	50	N/A	0.100	0.150	0.100
Methyl ethyl ketone	4	50	N/A	ND (0.028)	0.037	ND (0.027)
Total VOCs			4			

All units in mg/kg

4.1.1.5 Extractable Petroleum Hydrocarbons

Table 4.6 presents the EPH results for the Upper Van Horn Reservoir Dam sediment samples. Petroleum products such as gasoline, motor oil, and fuel oil consist of hundreds of different hydrocarbons and can be found in the environment due to spills and leakages. Identifying and quantifying all possible hydrocarbons in an analysis can be difficult and expensive. In the interest of identifying hydrocarbons with regard to toxicological implications, the EPH method allows for analysis of range of the aliphatic and aromatic fractions, the two main hydrocarbon groups. The MassDEP has developed a method for analysis of three ranges of EPHs that is used when evaluating sediments to be dredged. The EPH method indicated the presence of several constituents in all three samples tested. None of the detectable levels of EPHs exceed the MCP Method 1 standards.

Table 4.6. Sediment Testing Results – Extractable Petroleum Hydrocarbons.

MA EPH (MA EPH Method)	MCP Method 1 Standards	SAMPLE ID:		
	S-1 & GW-1 S-1 & GW-2	S-1/2	S-3/4	S-5/6
		4/5/2022	4/5/2022	4/5/2022
C9-C18 Aliphatics	1,000	ND (44.6)	46.7	ND (22.3)
C19-C36 Aliphatics	3,000	489	649	181
C11-C22 Aromatics	1,000	398	558	169

All units in mg/kg

4.1.1.6 Polychlorinated Biphenyls

PCBs are manmade chemicals that are resistant to extreme heat and pressure and were used widely for electrical components, hydraulic fluids, and lubricants, among other uses. Use of these materials ended in the 1970s after a ban by EPA. **Table 4.7** provides the results of testing for PCBs. A few congeners were detected in sample S-3/4. There are no MCP Method 1 Standards for individual congeners, just total PCBs. MCP values below were not exceeded for the samples.

Table 4.7. Sediment Testing Results – PCBs by Summation of Congeners.

PCBs (NOAA Summation of Congeners)	MCP Method 1 Standards	COMM 97 Reuse at Unlined Landfills Standard	SAMPLE ID		
PCB Congeners	S-1 & GW-1 S-1 & GW-2	--	S-1/2	S-3/4	S-5/6
		Sample Date:	5/4/2022	5/4/2022	5/4/2022
BZ#8	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#18	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#28	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#44	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#49			ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#52	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#66	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#87			ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#101	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#105	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#118	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#128	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#138	--	--	ND (0.0276)	0.0331	ND (0.0257)
BZ#153	--	--	ND (0.0276)	0.0280	ND (0.0257)
BZ#170	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#180	--	--	ND (0.0276)	0.0320	ND (0.0257)
BZ#183			ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#184			ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#187	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#195	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#206	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
BZ#209	--	--	ND (0.0276)	ND (0.0277)	ND (0.0257)
Total PCBs	1	<2	_	**0.0931**	_

4.1.1.7 Summary of Sediment Sampling Results

The sediment within Upper Van Horn Reservoir is typical of that in an urban environment and may also be indicative of the capture potential of the deep waterbody. Based on the sediment testing data, it is anticipated that sediment which must be dredged and removed from the reservoir (if any) will need to be disposed of at landfill in conjunction with a 401 Water Quality Certification which will be pursued for the Project.

4.2 WETLAND RESOURCES

The principal wetland resource areas associated with Upper Van Horn Reservoir are:

- Land Under Waterbodies and Waterways (LUWW);
- Bank;
- Bordering Vegetated Wetland (BVW); and
- Riverfront Area (RA).

The MassGIS MassDEP Wetlands data layer which shows vegetated wetlands and open water resources is depicted on **Figure 2**. Wetland scientists from GZA performed field wetland delineations and assessments within the vicinity of the proposed work in July and September 2019 and updated the delineation in February 2022. The surveyed flag locations are included on the Existing Conditions drawings included as **Attachment 2.**

4.2.1 Land Under Waterbodies and Waterways

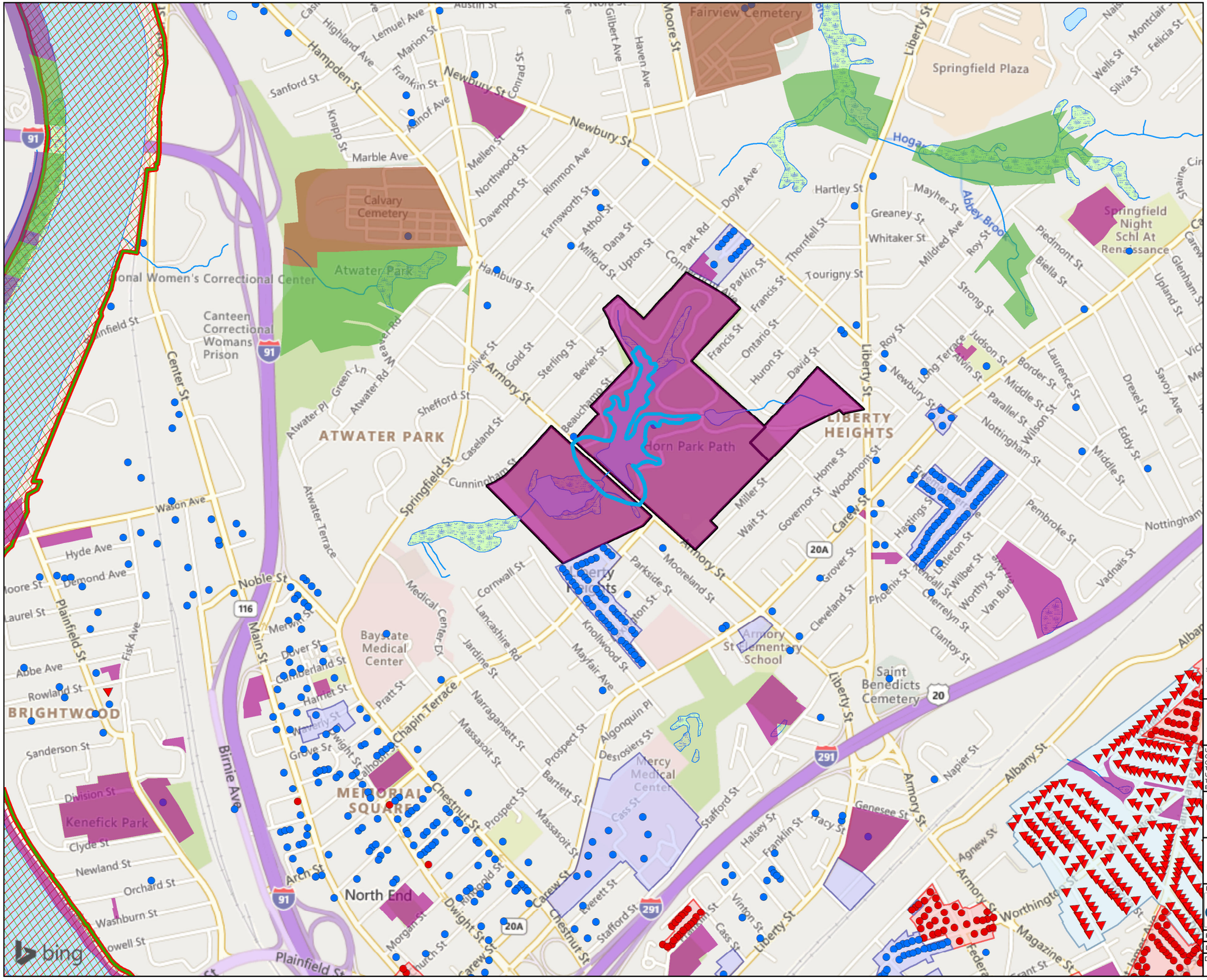
Upper Van Horn Reservoir is an approximately 9.7-acre pond with the main body located northeast of Armory Street and two elongated lobes extending to the northeast. The reservoir has a mean depth of 8 feet and a maximum depth of approximately 20 feet within the main body. In total, the reservoir contains approximately 75.2 acre-feet of water at its normal water surface elevation. At its furthest point, the reservoir extends approximately 1,400 linear feet upstream from the dam and has a maximum width near the dam of approximately 720 feet. The pond is not included in the Massachusetts Great Ponds List subject to Chapter 91.

Downstream of the dam, Lower Van Horn Reservoir is an approximately 2.8-acre pond that is roughly oval in shape and is located between Upper Van Horn Reservoir Dam to the northeast and Lower Van Horn Reservoir Dam to the southwest. This reservoir has a mean depth of 4 feet and a maximum depth of approximately 8 feet deep. In total, the reservoir contains approximately 27.2 acre-feet of water and extends approximately 910 feet long by 460 feet wide. The pond is not included in the Massachusetts Great Ponds List subject to Chapter 91.

4.2.2 Bank

Upper and Lower Van Horn Reservoirs have shorelines of approximately 6,000 and 2,000 linear feet respectively which represent the linear extent of the Bank resource area. Within the reservoirs, the vertical and horizontal separation between mean high water and mean low water is extremely limited due to the controlled water levels associated with the dams. Given their locations in Van Horn Park, neither reservoir is significantly developed along its shoreline, and most of the Bank resource area has overhanging woody vegetation, with the exception of the Bank along the Lower Van Horn Reservoir Dam. Upgradient of the Banks, the land is generally steeply sloping. The Banks associated with the two reservoirs are connected to one another along a short length of what is designated on United States Geological Survey (USGS) as a perennial river but is in reality the twin box culverts and concrete spillway which convey water under Armory Street and along the downstream dam embankment to the upstream Bank of the Lower Van Horn Reservoir.

An additional Bank resource located within a failed culvert was delineated near the downstream dam embankment. This Bank extends along a previously-culverted intermittent stream which flows westerly along the southern side of Armory Street to Lower Van Horn Reservoir.



LEGEND

- Limit of Work (including temporary drawdown)
- Property Boundary
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

OpenSpace: Article 97 Lands

- Conservation
- Historical/Cultural
- Recreation
- Recreation and Conservation

DEP Wetlands (2005)

- Hydrologic Connection
- Marsh/Bog
- Wooded marsh
- Open Water

MassHistoric Commission Inventory

- National Register of Historic Places
- NRHP and LHD
- Inventoried Property
- National Register of Historic Places
- NRHP and LHD
- Inventoried Property

N

500 250 0 500 1,000 1,500 2,000 Feet

UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
SPRINGFIELD, MA

CONSTRAINTS MAP

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: CITY OF SPRINGFIELD DPBRM 200 TRAFTON ROAD SPRINGFIELD, MA 01108	
PROJ MGR: JRB	REVIEWED BY: CC	CHECKED BY: SLL	FIGURE 2
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 1,000 ft	
DATE: OCTOBER 2022	PROJECT NO: 15.0167018.00	REVISION NO:	

4.2.3 Bordering Vegetated Wetland

Most of the margins of the Upper Van Horn Reservoir do not include fringing BVW, with the exception of the far northern extent; however, most of the Lower Van Horn Reservoir does include fringing BVW. GZA conducted a wetland delineation and assessment which field-delineated the resources within the vicinity of the Limit of Work. This delineation did not identify BVW along the upstream side of the dam given the steep slopes. The delineation did identify BVW downstream of the Upper Van Horn Reservoir Dam spillway that were associated with the Lower Van Horn Reservoir.

4.2.4 Riverfront Area

Riverfront Area in the City of Springfield is 25 feet from the Mean Annual High Water line (MAHWL) of perennial rivers. Within the limit of work, the Riverfront Area is limited to the short section of perennial stream connecting the Upper and Lower Van Horn Reservoirs as previously identified.

4.3 WATER RESOURCES

Upper Van Horn Reservoir is an impoundment which is stormwater-fed. According to the MassGIS watershed classification, the reservoir is located within the Connecticut River Basin. The reservoir has a drainage area (watershed) to Upper Van Horn Reservoir Dam of approximately 0.4 square miles, which is entirely contained within the City of Springfield. Most of the watershed is urban in character, with a high percentage of impervious surfaces and extensive stormwater collection and conveyance systems which feed the reservoir. Water flows from Upper Van Horn Reservoir into Lower Van Horn Reservoir (**Figure 3**). From there, water discharges through the Lower Dam into a stilling basin, which discharges to a culvert which directs flows to the Connecticut River approximately one mile downstream.

Both reservoirs are identified as impaired with Upper Van Horn Pond (MA34128) being identified as Category 5: waters requiring a TMDL (impairments identified as Nutrient/Eutrophication Biological Indicators and Total Phosphorus) and Lower Van Horn Pond (MA34129) being identified as Category 4C: impairment not caused by a pollutant (Water Chestnut) on the *Massachusetts Year 2018/2020 Integrated List of Waters.* A 2007 assessment and report by Baystate Environmental Consultants, Inc. (BEC) concluded that both reservoirs were eutrophic

There are no surface or groundwater public water supply resources (Zone I, Zone II, Interim Wellhead Protection Areas, etc.) on the Project site or vicinity.

4.4 CLIMATE CHANGE/RESILIENCY

The MEPA Interim Protocol on Climate Change Adaptation and Resiliency (also known as Interim Protocol), which became effective on October 1, 2021, was developed to comply with Executive Order 569 which directed EEA to coordinate efforts state-wide to strengthen the resilience of communities, prepare for climate changes impacts, and plan for extreme weather events to mitigate future damages. The Interim Policy is also meant to complement the 2010 MEPA Greenhouse Gas Emissions Policy and Protocol.

Per the Interim Policy, all new projects filing with MEPA are required to prepare a project-specific analysis relative to climate change using the Resilient Massachusetts Action Team (RMAT) Climate Resilience Design Standards Tool and to attach the output report from the tool and submit it as an attachment to Environmental Notification Form (ENF) or EENF filings. The RMAT output report for this Project is included with this submittal as **Attachment 6**, as discussed in the Impacts section of this document. Completion of a supplemental ENF section on Climate Change Adaptation and Resiliency is also required as part of the Interim Protocol to provide project-specific information relative to any adaptation strategies the project will include to address climate risks.

The Interim Policy encourages, but at this time does not mandate, that a project utilize the recommended design standards from a Tier 1/2/3 methodology analysis as part of the project.

4.4.1 Existing Conditions Hydrologic and Hydraulic Analysis

As part of the *Phase II Engineering Evaluation and Alternatives Analysis* (GZA, 2020), GZA conducted an existing conditions hydrologic and hydraulic analysis for the Upper Van Horn Reservoir Dam to review the reservoir's storage storage/discharge capabilities and overtopping potential for the Spillway Design Flood (SDF). Based upon the dam's size and hazard potential classification, the 100-year flood was used as the SDF, in accordance with the Massachusetts Dam Safety Regulations (302 CMR 10.14).

The Upper Van Horn Reservoir is located along an unnamed tributary stream to the Connecticut River, fed primarily by urban stormwater runoff, which enters the reservoir either through stormwater drainage pipe outfalls or via overland surface flow. Reservoir inflows are ungauged; thus, data regarding actual flows into the reservoir are not unavailable. The rainfall/runoff process was simulated using HydroCAD® 10.0, an integrated computer program developed by HydroCAD Software Solutions LLC for the analysis, design, and documentation of comprehensive drainage systems using standard hydrograph techniques. An inflow hydrograph was generated for the 100-year flood/storm using a 24-hour NRCC Storm Curve C rainfall distribution and the Soil Conservation Service (SCS) Dimensionless Unit Hydrograph methodology. The Northeast Regional Climate Center (NRCC) Storm Curve C rainfall distribution is available within the HydroCAD software and was derived from the WinTR-55 1.00.10 NRCC rainfall tables[1]. The analysis was conducted using the mean 100-year storm precipitation depth as predicted by the National Weather Service (NWS) web-based Precipitation Frequency Data Server (PFDS) tool for location-specific precipitation frequency data published in the National Oceanographic and Atmospheric Administration (NOAA) Atlas 14. For the coordinates of the approximate centroid of the watershed associated with Upper Van Horn Reservoir Dam, the PFDS tool returned partial duration series (PDS) -based point precipitation frequency curves and tables with 90% confidence intervals (in inches) for 5-minute through 60-day events of 1- through 1000-year recurrence intervals, which the PFDS tool interpolates from spatial proximity to points within a "high-resolution" grid of point-precipitation-frequency estimates documented in the Precipitation Frequency Atlas of the United States, Northeastern States (NOAA Atlas 14, Vol. 10, published in 2015). The NRCC rainfall distributions available in HydroCAD® were developed for use with Atlas 14 rainfall data for the Northeast states, in reference to data from the Northeast Regional Climate Center (NRCC).

The total watershed area contributing runoff to Upper Van Horn Reservoir Dam is approximately 0.4 square miles in area and was delineated by GZA based on the City of Springfield's municipal storm drain mapping (Springfield Sewer Book, 1979).

The spillway and dam geometry of the Upper Van Horn Reservoir Dam (i.e., length, spillway invert elevation, etc.) were taken from the topographic survey for this project, from a plan entitled "Plan of Land in Springfield, Massachusetts Surveyed for GZA GeoEnvironmental", dated October 14, 2019 by Heritage Surveys, Inc (i.e., 2019 survey), which is referenced to the NAVD88 datum.

The dam's outlet structure was simulated in HydroCAD® using the "Outlets" function on a "Pond" element. The storage capacity in the reservoir was defined at roughly 5-foot stage increments in HydroCAD® by input of the surface area of the reservoir's water depth contours derived from the *Springfield Lakes and Ponds Inventory and Restoration Plan* (BEC, May 1980). The water depths were referenced to the reservoir's normal pool elevation to derive stage elevations.

[1] User Guide (UG) 210-16-4 ENG – WinTR-55 Version 1.00.10 Database Update (WinTR-55 DB) Updated "NRCS_Storm_Data" File, and Updates to the "Rainfall Distributions", "Dimensionless Unit Hydrographs", and "Sample Files" Folders for WinTR-55; March 10, 2016.

0 300 600 1,200

SCALE IN FEET

UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
CITY OF SPRINGFIELD DPBRM
200 TRAFTON ROAD
SPRINGFIELD, MA 01108

AERIAL PHOTO

PROJ MGR: JRB	REVIEWED BY: CWC	CHECKED BY: SLL	FIGURE
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 600 ft	3
DATE: OCTOBER 2022	PROJECT NO: 15.0167018.00	REVISION NO:	

The following key input parameters used for the HydroCAD® simulation are shown in **Tables 4.8 thru 4.10**, below:

Table 4.8. Upper Van Horn Reservoir Dam and Spillway Elevations.

Location	Elevation (NAVD88, Feet)
Top of Dam	175.6±
Primary Spillway – two (2) side-by-side, 8' wide x 5' high reinforced concrete box culverts (invert elevations)	167.40 (Right) 167.44 (Left)
Initial Water Surface Elevation	167.4

Source: "Plan of Land in Springfield, Massachusetts, surveyed for GZA GeoEnvironmental, Inc." by Heritage Surveys, Inc., dated October 14, 2019.

Table 4.9. Upper Van Horn Reservoir Dam Hydrocad® Watershed Input

Drainage Area (acre)	Runoff Potential (SCS Curve Number)	Time of Concentration (min)
257.9	73	87

Table 4.10. Hydrocad® Precipitation Input.

Flood Rainfall Event	Storm Duration	Rainfall Depth	Antecedent Moisture Condition
100-year, NRCC 24-hour storm, Type C Distribution	24 hours	8.12 inches	2 / II (Normal)

Refer to **Table 4.11** for a summary of the HydroCAD® results. Under 100-year storm event conditions based on NOAA Atlas 14, Volume 10, rainfall, the peak inflow to the Upper Van Horn Reservoir is 441 cfs and the peak outflow from the dam (after routing through the reservoir) is 253 cfs. The peak stage of Upper Van Horn Reservoir is 170.6± feet, which allows 5± feet of freeboard at the Upper Van Horn Reservoir Dam. These results assume initial operating pool levels coincident with the primary spillway invert elevations at the onset of the test flood. This assumption is consistent with normally accepted engineering practice for spillway design.

Table 4.11. Hydrologic and Hydraulic Model Results

Dam	Inflow Area (Acres)	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Stage (ft, NAVD 88)	Min. Dam Freeboard (feet)	Top of Dam Min. Elevation (feet)
Upper Van Horn Reservoir	257.9	441	253	170.6	5.0[3]	175.6

Under the 100-year storm simulation in HydroCAD®, the peak reservoir stage elevation at the Upper Van Horn Reservoir Dam occurred approximately 14 hours into the 24-hour storm. The HydroCAD® simulation shows Upper Van Horn Reservoir remaining at the peak stage for approximately 10 minutes, then returning to approximate normal pool by the end of the 48-hour simulated timespan.

The results of the HydroCAD® flood analysis indicate that the existing Upper Van Horn Reservoir Dam can safely pass the Spillway Design Flood (100-Year Storm) without overtopping. The peak stage of the reservoir under Spillway Design Flood conditions is 5.0± feet below the lowest point along the crest of the dam, which is adequate freeboard to accommodate wave runup. The peak outflow from the dam during the SDF is approximately half of the peak inflow. Therefore, the Upper Van Horn Reservoir provides moderate attenuation of large flood flows.

The 500-year Storm event was also reviewed to determine if the 500-Year event can be safely passed without overtopping. The peak stage of the reservoir under the 500-Year event is 172.0, which is 3.6± ft below the lowest point also the crest of the dam.

4.4.2 Heat

Because the Project site is in passive use as a dam, past and present analyses relative to heat have not been a requirement. Data used for analyses relative to heat are as indicated in the Impacts section. For a baseline condition, data from the resilientma.mass.gov website mapping tool were used, as tabulated in **Attachment 6-2**.

4.4.3 Resiliency Discussion

In its current condition, the dam has several elements that are not resilient relative to climate change. The drainage outlets are failing in multiple locations and increased intensity and depth of precipitation events would continue the degradation and erosion of these areas of the dam. The spillway chute is deteriorated, and the lack of maintenance access has prevented past improvements and removal of fallen vegetation along the dam, as well as overall vegetation maintenance. The existing spillway culverts are in fair to good condition and are able to meet current dam safety standards for passage of the Spillway Design Flood (SDF).

The dam currently does not have a low-level outlet or siphon or other engineered or planned means of drawing down the reservoir in the event of an emergency or maintenance need for situations such as a hurricane/expected flood, an urgent dam safety concern that requires reducing the pressure on the dam, or maintenance of dam surfacing. This can be seen as a lack of resilience, as the City cannot respond to extreme precipitation events or other events that require an immediate drawdown.

Relative to heat, Van Horn Park provides a large expanse of greenspace and wooded areas and the only paved area along the dam is Armory Street. Within the park, there is a small parking areas and access and loop roads, as well as paved access roads along the Lower Van Horn Reservoir Dam, but the majority of the park adjacent to both the Upper and Lower Reservoirs is green space.

4.5 FISH/WILDLIFE RESOURCES/VEGETATION

As part of the *Diagnostic/Feasibility Study – Van Horn Reservoir, Springfield, MA*, prepared by Lycott Environmental Research, Inc. (Lycott), dated July 1990, gill netting was performed, which netted pickerel, largemouth bass, bullhead, and bluegill. This study also appended older correspondence relative to fish species and stocking, which identified the presence of black bass, pickerel, horned pout, white perch, and yellow perch in the 1930s. In the 1950s, documents indicate that brown bullheads and goldfish and notations that largemouth bass, yellow perch, and bullheads were stocked.

A Wildlife Habitat Evaluation was prepared for the Project in 2022 by GZA and the observations are documented below.

Natural communities within the Project Area are limited and typical of those located within urban settings. Natural communities within the Project Area consist of previously disturbed upland forest and BVW which is present between the downstream upland forest and Bank.

Due to its previously disturbed nature, the Project area has become vegetated with a mixture of invasive, non-native and native upland and wetland tree, shrub, vine and forb species, including jewelweed, Virginia creeper, mugwort, various sedge species, ash species, red maple, sugar maple, Norway maple, common reed, and goldenrods. These plants provide some shelter and cover for birds; however, many of the species present are invasive, including Norway maple, Asiatic bittersweet, Morrow's honeysuckle, multiflora rose, and common reed.

The area provides some cover and shelter for small mammals and songbirds while also providing minimal forage and perching locations for songbirds. Because of the somewhat fragmented nature of this Project site, most of the wildlife usage of these areas is expected to be by common urban-adapted species moving through the site. Mammal species such as Virginia opossum, grey squirrel and eastern chipmunk are expected to be the most common inhabitants of this area with occasional raccoons, striped skunk, or white-tailed deer. Use by herpetiles is expected to be limited due to the lack of abundant habitat features along the Bank that would support such species, including exposed rocks for basking. Common herpetiles that may be present include garter snakes, brown snakes, green frogs, and bull frogs that would be moving through the area, as more suitable habitat for these species is present both up and downstream. Passerine birds expected to travel through the area would be common songbirds including sparrows, grackles, mourning doves, robins, blue jays, cardinals, etc. Various amphibians, reptiles, and invertebrates may use the aquatic habitat for forage and cover.

Aquatic vegetation within the reservoirs has been evaluated over the years and was most recently documented in 2006. This evaluation documented mats of algae and duckweed in the northern and northeastern arms of the upper reservoir, high concentrations of coontail and watershield in both ponds, and an abundance of the invasive curly pondweed in the upper reservoir. Macrophytic growth in the upper reservoir was documented within approximately 10 to 30 feet of the littoral zone around the pond's margin with deeper water sections being macrophyte free. The lower pond was covered with a dense stand of coontail.

4.6 ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

The Massachusetts Natural Heritage and Endangered Species Program (MA NHESP) MassGIS layers were reviewed to determine if the Project falls within or is in the immediate vicinity of the following designated areas:

- Priority Habitats of Rare Species (as of August 2021);
- Estimated Habitats of Rare Wildlife (as of August 2021); and
- Certified Vernal Pools (updated June 2022).

As shown on the Constraints Map (**Figure 2**), there are no NHESP polygons or points within or immediately adjacent to the Project site.

4.7 HISTORICAL/ARCHAEOLOGICAL RESOURCES

The Project is located within the boundary of Van Horn Park, an inventoried property. The Massachusetts Cultural Resources Information System (MACRIS) also identifies many of the surrounding residential properties as inventoried.

As part of this Project, the City consulted with the Massachusetts Historical Commission (MHC) regarding the proposed project as discussed in the impacts section. Agency correspondence that indicates the Project "is unlikely to affect significant historic or archaeological resources" is included in **Attachment 7**.

4.8 AIR QUALITY/GREENHOUSE GAS EMISSIONS

Under the Federal Clean Air Act (CAA) and its associated amendments (42 USC 7401 et seq.), the federal government regulates and sets the National Ambient Air Quality Standards (NAAQS) for six "criteria" air pollutants through the United States Environmental Protection Agency (EPA) by developing human health-based and/or environmentally based criteria which are used to set primary standards (human health based) and secondary standards (prevention of environmental damage and property damage based). The six criteria pollutants are: Nitrogen oxides (NO_x), Sulfur dioxide (SO_2), Lead (Pb), Carbon monoxide (CO), Particulate matter with a diameter of 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$), and Ozone (O_3).

In accordance with the CAA requirements, the Commonwealth of Massachusetts has adopted its own air quality standards which are administered by MassDEP. 310 CMR 6 and 310 CMR 7 of the Commonwealth of Massachusetts Regulations are the state's regulations. The CAA requires states to develop a plan to attain and maintain NAAQS and specific plans for areas which are designated as nonattainment areas. According to MassDEP's website, MassDEP's Air Assessment Branch (AAB) operates a network of 22 ambient air quality monitoring stations across the state to meet the federal requirement for each state to monitor the ambient air to determine whether it meets the NAAQS. The nearest monitoring site is on Liberty Street in Springfield, southeast of the Project site. This site monitors for SO_2, NO_x, $PM_{2.5}$, and Black Carbon.

According to MassDEP's *Massachusetts 2020 Air Quality Report*, monitored levels of the six criteria air pollutants in Massachusetts meet the NAAQS.

The Massachusetts Secretary of Energy and Environmental Affairs issued the *Greenhouse Gas (GHG) Emissions Policy and Protocol* (the GHG Policy) in 2007. The GHG Policy became mandatory for certain projects that filed an Environmental Notification Form (ENF) with the MEPA Office after November 1, 2007. The GHG Policy was revised in November 2008 to apply to all projects filing an ENF after February 3, 2009, which required the preparation of an Environmental Impact Report. The GHG Policy was again revised in 2010 to clarify requirements for review and analysis of GHG emissions. The overall policy requires that projects quantify their GHG emissions and identify measures to avoid, minimize, and mitigate such emissions, as well as to evaluate project alternatives which may result in lower GHG emissions and to quantify the impact of proposed mitigation (emissions, energy savings). The GHG Policy includes a *de minimus* exemption for projects that are expected to produce minimal GHG emissions, such as dam rehabilitation projects.

Sources of air pollution or emissions generation associated with a Project site (post-construction) can be derived from either stationary or mobile sources. The only existing mobile source of potential air pollution to the Project site is from the occasional visits to the site by City staff and/or contractors for maintenance or inspection and are expected to be minimal. There are currently no stationary sources. Other mobile sources of potential pollution would be from vehicle traffic along Armory Street, unrelated to dam operation.

4.9 NOISE

Noise levels are measured in the decibel (dB), the unit of sound pressure. The human ear has an extremely wide range of response to sound amplitude. A method for weighting the frequency spectrum to more closely represent how humans hear and perceive noise is called A-weighting. This method gives less weight (or emphasis) to both the high and low frequency ends of the spectra where human response is poor. A-weighting is widely accepted as an appropriate measure to describe the effects of environmental noise. When a noise level is so weighted, its level would be written as dBA.

Federal noise regulations include the Noise Pollution Act of 1972, which placed the primary responsibility for noise control with state and local governments. At the state level, noise is regulated as an air pollutant under 310 CMR 7.10 and Policy 90-001, which indicates that a source of sound will be considered to violate the noise regulation if the source:

1. Increases the broadband sound level by more than 10dB(A) above ambient, where dBA is an A-weighted decibel, as described below; or

2. Produces a "pure tone" condition (as defined in the policy).

Both conditions are as measured at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours.

In the City of Springfield, noise is regulated under Chapter 259, the Noise Control City ordinance. The Chapter protects residential areas against "unreasonable noise", and limits the creation of noise at night. This Chapter applies to the control of all sound originating within City limits including:

> *power lawn mowers, engine-powered equipment, air conditioners, animals, birds, loud amplification devices, firecrackers, firearms, pile drivers, shovels, graters, scrapers, tractors, jackhammers, and other construction equipment. This chapter is intended to prohibit preventable and unnecessary noise and is not intended nor shall it be construed to regulate the usual and customary noise incidental to urban life.*

Chapter 259-6 pertains to limitations on Construction Hours and states that:

> *No erection, demolition, alteration, or repair of any building and excavation in regard thereto shall take place except between the hours of 7:00 a.m. and 7:00 p.m. on weekdays or except in the interest of public safety or welfare, upon the issuance of and pursuant to a permit from the Code Enforcement Commissioner, which permit may be renewed for one or more periods not exceeding one week each and so as not to be plainly audible at a distance of 100 feet from the lot line of the lot on which said construction activity is located, except for emergency work of public special exceptions may be only authorized by the Code Enforcement Commissioner in a written format.*

Chapter 259-12 prohibits excessive noise that is plainly audible at a distance of 100 feet or, in the case of loud amplification devices or other similar equipment, noise plainly audible at a distance of fifty feet from its source by a person of normal hearing. No specific dB or dBA limits are set as part of this Chapter.

Noise levels at the site are typical of the surrounding environment. Surrounding land uses include primarily residential and institutional uses. Baystate Medical Center is located to the southwest of the site. The only noise source at the Project site is the flow of water through the dam or voices related to park amenities (ballfields, splash pad, etc.). Armory Street is the primary source of noise at the site, related to roadway traffic and ambulances and school buses that traverse the roadway.

4.10 SOLID WASTE/HAZARDOUS MATERIALS

The Project site and its current use does not result in the generation of solid or hazardous wastes. Occasionally leaves or woody material are cleared from the spillway entrance as part of regular maintenance of the dam which may generate yard waste type materials. There are no known hazardous materials associated with the dam components. Separate from the dam, users to the park may generate limited solid waste, which may be in trash receptacles at the park that are emptied by City staff.

4.11 LAND USE/AESTHETIC RESOURCES/OPEN SPACE/RECREATIONAL RESOURCES

Upper Van Horn Reservoir Dam, a 9.7-acre open water resource, is set within the northern portion of Van Horn Park, a 114- acre City park, which is identified as Article 97 land. Van Horn Park is one of the largest parks in the City and is the largest in Liberty Heights and surrounding areas. The park is bisected by the Upper Van Horn Dam and Armory Street. The park also includes the 4-acre Lower Van Horn Reservoir, located south of Armory Street. Both the Upper and Lower Reservoirs are aesthetic resources and offer passive recreation opportunities. Fishing is a popular activity within the waterbodies. The park has many amenities, including a loop trail around the Upper Reservoir and a walking trail along the west side of the Lower Reservoir. The northern portion of the park has a playground, exercise stations, picnic area, ballfields/courts (baseball, soccer, football, basketball, tennis), a spray structure, a pavilion, among other resources. The park is well-used on a daily basis for its walkability and also is home to events through the year. Surrounding the amenities, there are significant wooded areas within the park.

4.12 UTILITIES/INFRASTRUCTURE

Upper Van Horn Reservoir Dam is an important part of the City's infrastructure for preservation/maintenance of Upper Van Horn Reservoir behind the dam and for preservation of the Armory Street corridor with associated sidewalks. The dam is owned and maintained by the City, specifically the Department of Parks, Buildings, and Recreation Management, which is responsible for its operation and maintenance.

Armory Street is a two-lane collector roadway within the City of Springfield which runs northwest-southeast from Weaver Road in the northwest to Federal Street at its southeast end. In the vicinity of the dam, Armory Street had sidewalks on both the northern and southern sides of the road. The northern sidewalk is separated from the roadway by timber guardrail along the dam, with a second timber guardrail to protect the public from the steep dam slopes on the upstream side of the embankment. On top of the spillway culverts, there is a plaza area that extends out, with benches, trash receptacles, lighting and decorative metal fencing. On the southern side, there is a metal guardrail on the far side of the sidewalk to protect the public from the steep downstream slope of the dam. There are areas of cracking along the southern sidewalk which currently can pose trip hazards for pedestrians. Decorative lamp posts are located along the north (upstream side) of the roadway and utility structures and lines along the southern side of the roadway. There is curbing along both sides of the roadway. During larger precipitation events, there is evidence that stormwater runoff overtops the curb line and crosses the sidewalk, discharging to the downstream slope, particularly in an area near the spillway culverts, where there is a retrofitted 24-inch diameter horizontal high density polyethylene (HDPE) pipe laid horizontally with an open top retrofitted with a cage to accept overflows.

The Project site area is urbanized, with all typical utility services provided in the general area of the site (electric, natural gas, cable, telecommunications, water, sewer). The area surrounding the Project site has well developed roadway infrastructure to support access to the site.

The following utility providers serve the area:

- Electric – Eversource
- Water – Springfield Water and Sewer Commission (SWSC)
- Wastewater/Sewer – Springfield Water and Sewer Commission
- Natural Gas – Columbia Gas of Massachusetts
- Telecommunications/Cable – Comcast/Xfinity
- Stormwater – City of Springfield Department of Public Works

Armory Street currently supports multiple utilities, including both underground and aboveground utilities. Below ground utilities within the street line include stormwater, water, and natural gas. Aboveground utilities include overhead electrical and telecommunications/cable, which are located on structures along the south side of the street line.

The existing stormwater system along the dam consists of a series of catch basins and outfall piping, which according to the most recent topographic survey is primarily comprised of 12-inch diameter reinforced concrete pipe (RCP), confirmed by recent dam inspections where the outlets are visible. The pipes discharge stormwater runoff along the steep slopes of the dam, which has resulted in erosion of the dam embankment downgradient of the outfalls at multiple locations along the dam. This has resulted in a loss of section of the dam and had led to the end sections of the pipes disconnecting and falling down the slopes, which in turn has led to increased erosion. On the upstream embankment of the dam, erosion or scour holes have resulted from failures within the drainage system.

Along the right side of the reservoir (facing downstream), there is a former outlet for the impoundment which traverses through the dam downstream, eventually discharging near the Lower Van Horn Reservoir Dam. This outlet system is a series of vitrified clay pipes and connecting manholes which has been the subject of multiple past investigations in 2008 and 2020. The pipe appears to be intact through the dam and the inlet at the reservoir appears to have either been plugged or filled in the past. This pipe is unneeded infrastructure and is a penetration through the dam, which is undesirable.

Along the downstream toe of the dam on the left downstream slope, there is a failed piped outlet, which discharges flows from an upgradient wetland and stormwater system. A vitrified clay pipe historically collected flows from the wetland and piped them along the toe of the dam to a discharge point near the Lower Van Horn Reservoir. The joints of this piped system pulled apart over time and resulted in an open water channel and erosion gully along the downstream toe, which is eroding at the toe of the dam, a concern from a dam safety standpoint.

4.13 SOCIOECONOMIC RESOURCES/ENVIRONMENTAL JUSTICE

Upper Van Horn Reservoir Dam is within the City's Liberty Heights neighborhood, near the northern boundary between the cities of Chicopee and Springfield. Given the proposed work and associated MEPA review thresholds, the Designated Geographic Area (DGA) extends one mile from the Limit of Work, which includes the entire reservoir due to temporary impacts associated with drawdown. This DGA includes 28 mapped Environmental Justice (EJ) populations, three of which are located in Chicopee (upstream of the Project), and 25 of which are located in Springfield. The mapped EJ populations are designated as follows:

- Income (1 in Chicopee)
- Minority (1 in Chicopee; 7 in Springfield)
- Minority and English Isolation (1 in Springfield)
- Minority and Income (1 in Chicopee; 8 in Springfield)
- Minority, Income, and English Isolation (9 in Springfield)

Within the DGA, all 25 identified EJ populations in Springfield are identified as having greater than 5% of the population who speak Spanish or Spanish Creole and do not speak English "very well." The DGA within Chicopee did not contain English isolation populations.

Based on the Department of Public Health (DPH) Environmental Justice Tool review of Vulnerable Health EJ Criteria, it appears that there is an existing unfair or inequitable environmental burden on the populations surrounding the Upper Van Horn Reservoir. The required baseline assessment of existing unfair or environmental burden, as required by the

MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations, Effective January 1, 2022 is included in **Attachment 8**.

4.14 TRAFFIC/TRANSIT/BICYCLE AND PEDESTRIAN ACCESS

As discussed in the Utilities/Infrastructure section, Armory Street is an important two-lane collector road within the City. The street has sidewalks on either side of the roadway which provide pedestrian access. There is no bike lane on the roadway, bicyclers either use the sidewalk or roadway edge for passage. There is also a pedestrian plaza along the upstream side of the roadway, overlooking the Upper Van Horn Reservoir.

The Project Site is centered on Armory Street, which also serves as the crest of the dam. The upper portion of the park is served by three separate entrances. Two entrances to the park access road which circle the reservoir are located on either side of the reservoir along Armory Street. These entrances have stone masonry pillar along either side of the roadway and are gated and typically in the closed and locked position. The main park entrance is further to the east along Armory Street and leads to a parking lot and the main park amenity areas.

City streets within 5-10 blocks of the Project Site feature transit (bus) stops, but there are no transit stops associated with the Project site.

The current use and operation of the dam does not have a traffic demand.

5.0 IMPACTS ASSESSMENT

5.1 TOPOGRAPHY, SOILS, GEOLOGY, SEDIMENTS

The Project will result in localized changes in topography and soils along the dam associated with the regrading to lessen the steepness of the existing dam embankment sections and with minor changes in roadway regrading to improve drainage. These changes will have a positive effect in terms of dam safety and public safety, improving the dam's condition and bringing it into compliance with current dam safety design principles. If unsuitable soils are discovered during the regrading process and need to be removed from the site, disposal/reuse will be offsite, in accordance with all applicable local, state, and federal regulations and project permits. No changes to bedrock geology are anticipated as encountering bedrock is not anticipated.

On the upstream side of the dam, sediments will need to be dredged within the footprint of the dam to create a stable subgrade for placement of additional embankment materials in the regrading of the dam. Because of the significant depth of water in areas immediately adjacent to the dam (15-20 feet in some areas), the intent is to reposition sediments that must be removed from the dam footprint within the reservoir to the area immediately upstream of the dam to the maximum extent possible. Work relative to sediments will be permitted through the MassDEP 401 Water Quality Certification process for sediments being dredged and removed from the reservoir or repositioned within the reservoir. All sediment that must be removed from the reservoir will be disposed of at a landfill, in accordance with all applicable regulations and with permits and authorizations obtained for the Project.

5.2 WETLAND RESOURCES

While the permanent impacts to wetland resources have been limited to the maximum extent practical, larger temporary impacts will also occur, tied primarily to the temporary drawdown needed to safely construct the Project. Potential impacts are discussed and quantified in the following subsections. The proposed work is depicted on **Attachment 2** Project Drawings. The proposed alteration areas are summarized in **Table 5.1.** Impacts to wetlands and water resources have been limited to the extent practical through a careful design. To limit the footprint of the dam, rockfill has been pursued for stability along the upstream embankment, which allows for a steeper slope than earthen fill, reducing the potential loss of Land Under Water.

5.2.1 Land Under Waterbodies and Waterways (LUWW)

5.2.1.1 Upper Van Horn Reservoir

The preferred option of a "full drawdown" with the installation of a cofferdam to segregate the work from the larger reservoir area will result in temporary impacts to the full 9.7-acres of Upper Van Horn Reservoir. The full drawdown will not eliminate all open water from the reservoir basin, based upon its bathymetry and the cofferdam configuration. A minimal pool may still exist in the deepest section of the reservoir and be used for diversion pumping around the work area. The full drawdown will provide the safest conditions for workers and provide a dry construction environment to facilitate dam improvements and repairs. Following construction completion, the reservoir will be returned to its pre-construction water surface elevation.

There will be permanent alteration of LUWW associated with the dam improvements. Materials will be added to the upstream embankment slope to lessen the steepness and provide stability, in accordance with accepted dam safety design standards. To accomplish this, earthen fill, rockfill, and slope protection will be added which will enlarge the dam's total footprint as necessary for stability. To support this additional material and create a stable and secure slope, soft sediments at the toe of

the existing embankment slope will be repositioned away from the toe within adjacent deep areas of the impoundment or removed from the Site and taken to landfill for disposal.

The alteration is not anticipated to impact the carrying capacity or the water surface elevation of the LUWW as the H&H analysis indicates that the dam provides excess freeboard during the 100-year Spillway Design Flood and the majority of the loss of volume is below the normal pool elevation and therefore does not contribute to flood storage capacity.

5.2.1.2 Spillway

The twin box culvert spillway connecting the Upper and Lower Van Horn Reservoirs will have concrete repairs and the existing spillway chute on the downstream slope will be replaced. The proposed work includes repairing the concrete within the spillway box culverts and replacing the degraded spillway chute in its current location. At the toe of the downstream embankment, the spillway chute will be integrated with other dam improvements, with a stilling area and velocity dissipation prior to discharge to the Lower Van Horn Reservoir. Additionally, as part of the stormwater system improvements, the new storm drain system will outlet into the concrete spillway, thus avoiding and minimizing the potential for the significant outfall erosion that has occurred on the existing dam.

The impacts to the spillway are permanent; however, they have been designed to repair or replace the existing constructed channel in the same location and will not result in a change in available habitat or carrying capacity.

5.2.1.3 Lower Van Horn Reservoir

Along the downstream embankment, the dam footprint will also expand to address seepage and to create a more stable slope with access for maintenance, in accordance with standard dam safety design practices. This expansion will result in the permanent conversion of LUWW to upland forming the embankment stability berm with toe drain and rip rap slope. During construction, a small, low, temporary cofferdam will be installed along the downstream extent of the work to provide a dry work environment and protect Lower Van Horn Reservoir. The lower reservoir will not be drawn down beyond this cofferdam.

5.2.2 Bank

5.2.2.1 Upper Van Horn Reservoir

The preferred option of a “full drawdown” will result in temporary impacts to the estimated 6,000 linear feet of Bank (i.e., the entire perimeter of the reservoir), due to the temporary drop of the water level associated with the drawdown. Once the reservoir is allowed to refill, the Bank is expected to return to its current location. There will be a permanent impact to Bank associated with the placement of rockfill/riprap along the upstream embankment slope Bank.

5.2.2.2 Spillway

The spillway culvert and chute Banks, which are concrete walls, will be altered as described in the LUWW section.

5.2.2.3 Lower Van Horn Reservoir

There will be a permanent impact to Bank associated with the Lower Van Horn Reservoir along the proposed embankment slope toe. Additionally, the intermittent stream (Bank resource) flowing along the downstream embankment into Lower Van Horn Reservoir will be returned to a culvert. This Bank was previously contained in a culvert; however, the pipes have deteriorated and broken apart over time, resulting in surface flow that is eroding toward the dam embankment. The culverted Bank will have an engineered outlet to minimize future erosion or undermining.

5.2.3 Bordering Vegetated Wetland (BVW)

The Project drawdown is not anticipated to result in significant temporary or permanent impacts to BVW. The areas of BVW located in the northern branch of the reservoir will continue to receive stormwater, surface water, and groundwater inputs as they are located far upgradient of the proposed siphon for the drawdown. While impacts are not anticipated, the City will work with MassDEP and the City's Conservation Commission on any requirements for monitoring during or post-drawdown, with provisions for mitigation of potential adverse effects, if required. No work is proposed within BVW areas in either the Upper or Lower Van Horn Reservoirs. In the Lower Van Horn Reservoir, work areas have been limited to avoid BVW areas downstream of the dam.

5.2.4 25-Foot Riverfront Area (RA)

Dam rehabilitation and roadway and utility repair work will occur within the Riverfront Area along the embankment slope associated with the spillway culverts and chutes. This area is previously altered through the historical construction and 1950s modification of the dam itself and roadway and utility development. No expansion of impervious surface is anticipated within the RA; however, woody vegetation will be removed from the RA along the dam embankments to comply with the ODS *Policy on Trees on Dams* (**Attachment 4**). The dam surface with either be stone (i.e., the stability berm) or returned to turf grass.

5.2.5 Summary of Wetland Resource Impacts

The following **Table 5.1** summarizes the wetland resource impacts associated with the Project.

Table 5.1. Summary of Wetland Resource Impacts.

Resource Area	Permanent Impact	Temporary Impact	Total Impact	Work Area/Type
LUWW (SF)	0 SF	373,670 SF	53,560 SF Permanent / 373,670 Temporary	Upper Van Horn Reservoir drawdown
	48,863* SF	0 SF		Upper Van Horn Reservoir sediment repositioning and embankment expansion
	4,697 SF	0 SF		Spillway repair and replacement & Lower Van Horn Reservoir embankment expansion
Bank (LF)	0 LF	6,000 LF	1,400 LF Permanent / 6,000 LF Temporary	Upper Van Horn Reservoir drawdown
	430 LF	0 LF		Spillway repair and replacement; primarily associated with existing concrete channel walls
	970 LF	0 LF		Restoring failed culvert along downstream side of dam
BVW (SF)	0 SF	0 SF	0 SF Permanent / 0 SF Temporary	Upper Van Horn Reservoir drawdown
	0 SF	0 SF		Lower Van Horn Reservoir embankment expansion
RA (SF)	6,600 SF	0 SF	6,600 SF Permanent / 0 SF Temporary	Embankment area

*This permanent impact area is located within the 9.7-acre Upper Van Horn Reservoir. It is only accounted for as permanent impact to avoid duplicate impacts from the temporary drawdown and permanent work.

5.3 WATER RESOURCES

The proposed Project will not change the watershed characteristics nor will it affect land uses within the watershed. The drawdown will temporarily reduce the surface area of Upper Van Horn Reservoir and may affect local hydrology along the reservoir, but no long-term effects are anticipated post-drawdown. The resulting configurations of the upper and lower reservoirs will be substantially similar to those that existed prior to the start of work with only minor modifications.

5.4 CLIMATE CHANGE/RESILIENCY

As required under the MEPA Interim Protocol on Climate Change Adaptation and Resiliency, Project-specific information was entered into the RMAT Tool and an output report generated (which is included in **Attachment 6** as required). The output indicates that the Project (dam rehabilitation/improvements) provides a Low Risk relative to Sea Level Rise/Storm Surge, which is logical, given the Project's inland location. The RMAT Tool also indicates that the Project provides a High Risk relative to Extreme Precipitation – Urban Flooding, Extreme Precipitation – Riverine Flooding, and Extreme Heat. The Target Planning Horizon is identified as 2070 for the Project. For Extreme Precipitation the RMAT Tool identifies a 100-year 1% annual chance) design storm and a Tier 3 analysis. For Extreme Heat, the RMAT Tool identifies a 90th percentile review with a Tier 3 analysis.

GZA performed Tier 3 analyses for both Extreme Precipitation and Extreme Heat, as indicated by the RMAT Tool. Technical memoranda summarizing the work are included in **Attachments 6-1 and 6-2**, respectively.

5.4.1 Extreme Precipitation Analysis Summary

Based on the results of the RMAT Tool analysis which indicated a 2070 planning horizon for the 100-Year (1%) storm, GZA performed a RMAT Tier 3 projected total precipitation depth analysis and peak intensity review for the Upper Van Horn Reservoir Dam Improvements Project (summarized in **Attachment 6-1**).

GZA calculated the projected 2070 planning horizon 24-hour, 100-year storm depth to be 11.48 inches. The calculated increase in 100-yr storm precipitation depth by 2070 calculated by GZA was similar to the projected 11.4 inches of depth estimated by the RMAT Climate Resilience Design Standards Tool Project Report. The projected 2070 planning horizon 24-hour, 100-year storm depth is 3.36 inches greater than the existing value used from NOAA Atlas 14 calculations (which was 8.12 inches).

The 2070 planning horizon value was then used to update the model for the dam and reservoir. The model indicates that the projected increase in 100-yr storm depth by 2070 will increase the peak inflow by 270 cubic feet per second (cfs), the peak outflow by 190 cfs, and the peak pool elevation by 1.4 ft. Even under this extreme precipitation scenario, the Upper Van Horn Reservoir Dam would still safely pass the 100-year storm in 2070 with 3.6 feet of freeboard, as shown in **Table 5.2** below. Peak intensities were also reviewed for changes in the 2070 horizon using the RMAT 3 methods (results are shown in **Attachment 1**).

Table 5.2: Present Day and Projected Future 100-Year Storm HydroCAD Model Results

Scenario	Precipitation Depth (in)	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Pool Elevation (ft)	Top of Dam Elevation (ft)	Freeboard (ft)
Present Day	8.12	441	253	170.6	175.6	5.0
Projected Future (2070)	11.48	711	442	172.0		3.6

The existing spillway configuration at the dam is sufficient to pass the required flows during the present-day 100-year storm (which is the regulatory Spillway Design Flood (SDF) per the Massachusetts Dam Safety Regulations as discussed earlier in this document and also can safely pass the RMAT Tier 3 2070 planning horizon event. While the peak intensities increase in the 2070 horizon, the reservoir has the ability to store and pass the increased flow. As such, no changes to the existing spillway configuration or conceptual design are warranted relative to extreme precipitation, since the existing configuration already has sufficient capacity to account for climate change relative to precipitation levels per the RMAT Tier 3.

5.4.2 Extreme Heat Analysis Summary

Based on the results of the RMAT Tool analysis which indicated a 2070 planning horizon for the 90th percentile for Extreme Heat, GZA performed a RMAT Tier 3 analysis for the Upper Van Horn Reservoir Dam Improvements Project for projected annual/summer/winter average temperatures; projected heat index; projected days above 95 degrees Fahrenheit, above 90 degrees Fahrenheit, and below 32 degrees Fahrenheit; and projected number of heat waves and duration of heat waves. A summary memorandum is included in **Attachment 6-2**.

Table 5.3 summarizes the results for the main parameters. Baseline values tabulated below were taken from the Resilientma.mass.gov website mapping tool.

Table 5.3. 90th Percentile Data Summary – Extreme Heat Analysis for the 2070s

Design Criteria	Baseline	90th Percentile, 2070s
Annual average temperature (F)	46.98	70.16
Annual summer temperature (F)	67.93	92.30
Annual winter temperature (F)	25.01	48.17
Estimated High Heat Index (F)	--	-see discussion in **Attachment 6-2**-
Days per year with max temperature > 95 F	<1	38
Days per year with max temperature > 90 F	6	74
Days per year with minimum temperature < 32 F	159	91
Number of heat waves per year	--	9
Average heat wave duration (days)	--	10

In general, the calculated results are consistent with other recent studies and reports, including the document entitled "Massachusetts Climate Change Projections", by Resilient MA Climate Change Clearinghouse for the Commonwealth, 2018. This document projected increased average, minimum, and maximum temperatures; increases in days over 90°F and 95°F, and decreases in days below 32°F in the Connecticut Basin.

The function and maintenance of the dam will not be affected by the increased heat. The proposed Project will not involve any long-term emissions (only short-term emissions related to construction vehicles) and will preserve the open water resource of Upper Van Horn Reservoir, as well as the surrounding parkland as open space with wooded areas. The Project will require tree/vegetation removal along the dam and immediately upstream and downstream for compliance with the Dam Safety Order for the dam, as well as the Office of Dam Safety's *Policy on Trees on Dams,* an impact which cannot be avoided.

5.4.3 Discussion

The overall Project will result in improvements to the dam that will increase its resiliency to climate change. The Project will result in improvements to deteriorated concrete within the spillway culverts, as well as replacement of the spillway chute which is degraded. The new spillway chute will include velocity dissipation devices to reduce the potential for erosion downstream of the dam and will also provide a stable, concrete area for discharge of reconstructed stormwater systems along the dam on Armory Street. The current outlets are failing and discharge to the erodible dam slope. To prevent similar damage in the future, the outlets are being proposed within the spillway chute to a stable concrete surface, with velocity dissipation.

The spillway culverts are already sized appropriately to meet dam safety standards and to also meet the demand associated with future climate change, as evidenced by the Tier 3 analysis. As such, no changes to the design were warranted relative to extreme precipitation, beyond the improvements discussed above relative to improved stormwater outlets.

The Project includes provisions for installation of a siphon to allow for future drawdown of the reservoir for emergency or maintenance needs, which is another improvement that will make the dam more resilient in terms of meeting operational needs.

Although tree removal has the potential to impact heat through the heat island effect in areas of pavement, removal of the trees and brush from the dam is a matter of dam safety and regulatory compliance and is over areas that will not be paved, but generally maintained as turf, with some areas of rockfill or stone, as needed for dam stability or future dam maintenance. Tree removal will make the dam more resilient in terms of maintenance and upkeep, as well as safety. The dam has had notable tree falls in response to severe storms in recent years, which has resulted in erosion and loss of section of the dam embankment, all safety issues. Maintaining a turf and rock surfacing will remove this source of potential damage and allow for frequent maintenance and inspection, allowing the City to see signs of potential safety issues such as animal burrows or slope instability much more easily. Further, the Project will help to maintain the Upper Van Horn Reservoir, and the park areas surrounding the dam which include heavily forested areas have been preserved and will not change as a result of the Project.

5.5 FISH/WILDLIFE RESOURCES/VEGETATION

Permanent impacts to fish and wildlife in and around the reservoirs (Upper and Lower) are not anticipated, although temporary impacts are unavoidable within the Upper Van Horn Reservoir during the temporary drawdown of the pond. A drawdown would temporarily affect the flora and fauna in and potentially along the margins of the reservoirs, as well as the dam embankment areas. Certain types of lake-bottom invertebrates (e.g. various stages of insects) would likely experience temporary reductions in numbers that would be expected to rebound post-drawdown.

Fish habitat within the Upper Van Horn Reservoir will be temporarily, significantly impacted during the drawdown. However, because the drawdown is temporary, no species populations are expected to be lost from the system permanently.

Measures to minimize impacts to fish and wildlife will be developed and permitted in coordination with the Springfield Conservation Commission and MassWildlife (the Massachusetts Division of Fisheries and Wildlife).

The proposed drawdown would utilize a low cofferdam in an area near the dam selected to minimize the extent of the cofferdam. Though a small shallow residual pool may remain upstream, it would not be expected to support significant fish habitat; however, it is expected that many of the fish will congregate in the Lower Van Horn Pond.

Post-construction, the reservoir will be refilled in accordance with the *Final Generic Environmental Impact Report (GEIR) for Eutrophication and Aquatic Plant Management in Massachusetts* (EEA, 2004) guidelines for maintaining minimum outflow during the refilling process. The City of Springfield will coordinate with MassWildlife to develop a restocking plan and will restock appropriate species post-construction.

GZA conducted initial outreach with MassWildlife regarding potential impacts, contacting Caleb Slater via email on February 15, 2022, to share information that the City had regarding the Project and seek input from the Division, because the Project is proposing a temporary drawdown of the impoundment during construction for safety reasons. Jason Stolarski responded to GZA's inquiry, indicating that MassWIldlife had not surveyed the reservoir recently but that largemouth bass, carp, brown bullhead, yellow perch, golden shiner, banded killfish, bluegill, pumpkinseed, goldfish, and chain pickerel have been observed in the past. This information is consistent with past available documentation located by GZA and the City. He also indicated that detailed comments or coordination from the agency would not be provided until during the MEPA process.

Impacts to Bank of the Upper and Lower Van Horn Reservoirs are minimal and will not have adverse effects on the overall aquatic habitat or connectivity of the lower and upper reservoirs, as project activities will not permanently alter the current wildlife functions. Most of these Bank impacts are temporary and are associated with the drawdown of Upper Van Horn Reservoir. Portions of the Bank will be restored with rocks and boulders for stabilization which may increase cover and forage for small mammals and herpetiles, and basking habitat features for herpetiles. Vegetation removal of trees and shrubs within the previously disturbed Project Area is limited to those needed for the dam rehabilitation activities for dam safety compliance. Following work, portions of these areas will likely have topsoil replaced and will be seeded with a native seed mix and left to revegetate. The Bank located within and along the failed culvert will be returned to culvert. This represents a permanent alteration to the Bank; however, the area currently provides minimal habitat. Permanent habitat impacts for this area are negligible as these habitats are:

a) Previously disturbed and of limited value,
b) of a small area within the surrounding forested parcel, and
c) primarily used by common urban-adapted species.

Temporary disturbance during construction may displace many birds during work; however, the area will re-populate with avian species immediately following construction.

There will also be temporary impacts to the aquatic vegetation associated with the drawdown. The water level drawdown over the winter months can kill aquatic plants that grow in shallow water by exposing the root systems to drying and freezing. As discussed in the Existing Environment section, Upper Van Horn Reservoir has a robust aquatic vegetation population in the shallower areas. As such, it is anticipated that the drawdown may have the effect of reducing some aquatic plants in the pond basin. Because of the observed species, a reduction in aquatic plant density is unlikely to result in a long-term change in vegetation upon the refill of the basin after the temporary drawdown. The reservoir's aquatic vegetation population would be expected to re-establish once the pond is refilled.

Due to the temporary change in hydrology, vegetation in the upstream BVWs surrounding the reservoir may see temporary effects during the drawdown period; however, experience with other drawdowns suggests that the vegetation is likely to rebound following the refilling of the pond and that the BVWs will not be altered.

5.6 ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

As shown on **Figure 2**, there are no NHESP polygons or points within or immediately adjacent to the Project site. As such, no impacts to Endangered, Threatened, or Special Concern species are anticipated to be associated with the Project.

5.7 HISTORICAL/ARCHAEOLOGICAL RESOURCES

The proposed Project is for resiliency and safety improvements to the dam which is located along Amory Street and straddles the upper and lower sections of Van Horn Park, a State-Inventoried site. No recreation or park amenities or structures exist on the dam itself and therefore, no amenities or structures will be altered or removed as part of the Project.

The City of Springfield has corresponded with the Massachusetts Historical Commission regarding the proposed Project. MHC provided a letter dated June 30, 2022 indicating that the proposed Project "is unlikely to affect significant historic or archaeological resources." This correspondence is included as **Attachment 7**.

5.8 AIR QUALITY/GREENHOUSE GAS EMISSIONS

Temporary air quality impacts may result from construction-generated vehicle and equipment emissions. Construction related to the Preferred Alternative would result in a short-term increase in construction-generated particulates, which would be minimized through the use of erosion and sediment controls and dust controls throughout construction. Temporary increased emissions related to construction vehicles and equipment will also occur during construction, but will be minimized by compliance with 310 CMR 7.11(1) for the Project which includes limiting idling to no more than 5 minutes except under certain circumstances (per 310 CMR 7.11(1)(b), as well as a requirement for contractors to use ultra-low sulfur diesel fuel (ULSD). The Project will have a Stormwater Pollution Prevention Plan which will include requirements for addressing the potential for fugitive dust (surface wetting, sweeping, etc.) and erosion/sedimentation. Any waste containers on site and dump trucks will be required to be covered to further minimize the potential for airborne particulates.

The Preferred Alternative will not change the operation of the site, nor will it result in any permanent change or increase in traffic demand. City personnel will continue to visit the site periodically for maintenance, operation, and inspections, causing only minimal emissions. GZA understands that no Greenhouse Gas (GHG) Emissions analysis is likely to be required by this EENF or the subsequent EIR as described in the "Revised MEPA Greenhouse Gas Emissions Policy and Protocol" effective May 5, 2010, as dam repair is identified as a project type that may qualify for the *de minimis* exemption. Emissions will be limited to the temporary operation of equipment during construction and will not result in long-term effect.

As such, we believe that the project should qualify for a *de minimis* exemption, similar to EEA's determination on other similar projects.

There is the potential for odor generation during the initial drawdown. Based on experience with numerous other lake and pond drawdowns, sediments do not tend to produce much long-term odor. However, if fish/shellfish, etc. are on the exposed impoundment bottom post-drawdown, there is the potential for brief odors. These tend to be short duration in the week or two following drawdown. The City will have staff on hand or a subcontractor to provide for removal or burial of trapped species to minimize odor. Other forms of odor control can also be ready as a contingency, such as portable foam generating systems. The foam forms a barrier between the odor producing substance and the atmosphere and can be applied to provide immediate minimization of odors. The foams are biodegradable and pose no threat to workers, residents, or surface waters and groundwater.

5.9 NOISE

Temporary increases in noise levels are anticipated related to construction of the Preferred Alternative, associated with construction vehicles and equipment. Construction would be performed within the standard work hours defined by the

City noise ordinance and would follow the conditions of that ordinance. Anti-idling provisions to mitigate potential air quality impacts will also reduce noise impacts associated with construction.

Post-construction noise at the Project site would be expected to be the same as the existing condition, as no changes in the maintenance or operation of the site are proposed. Noise would be associated with the dam's overflow of water and roadway traffic along Armory Street. No permanent impacts are anticipated related to noise.

5.10 SOLID WASTE/HAZARDOUS MATERIALS

There are no known hazardous materials or asbestos associated with the dam or its components. As such, no impacts related to hazardous waste are anticipated.

The Project will not result in long-term impacts relative to either solid waste or hazardous materials. Expected short-term construction impacts include the generation of construction waste associated with implementation of the Project, which will include the demolition of the existing spillway chute (concrete), as well as repairs to the spillway culverts which may require removal of small amounts of concrete to prepare the surface. Drainage piping (primarily concrete or clay) and concrete drainage structures will be replaced and work along Armory Street will result in the removal/replacement of areas of pavements, guardrails, etc. Vegetation removal is also needed for trees and woody materials. All solid waste materials will be removed from the site via dumpster or dump truck by the Contractor to an approved reuse/disposal site in accordance with all local, state, and federal regulations. All vegetation (trees, brush) from the dam will be removed from the site by the Contractor in accordance with all applicable regulations.

5.11 LAND USE/AESTHETIC RESOURCES/OPEN SPACE/RECREATIONAL RESOURCES

The proposed Project will not change land use or recreational resources, or permanently alter aesthetics of the reservoir area, although tree removal along the dam is required for dam safety purposes. The embankment areas will be grass or for stability berm areas and areas with concerns regarding erosion, rockfill/riprap. There will be a temporary impact for aesthetics and viewsheds during the temporary drawdown period and construction period for the Project. Park users will have views of exposed pond bottom and construction areas during the drawdown and construction period, a necessary impact for the work. Following project completion, the view of the Upper Van Horn Reservoir will be improved from the roadway and sidewalks. The overall park will continue to be open during the Project construction, although the dam area will be closed to the public and portions of the park within the work area will also be temporarily closed. At the conclusion of the Project all areas of the park will be reopened to the public.

The City is fortunate to have many more than 15 other open public access waterbodies and parks and will publicize other local parks and open water resources for fishing and recreation during the construction period.

5.12 UTILITIES/INFRASTRUCTURE

At its core, the Project is an infrastructure and water resources improvement project, aimed at restoring the dam to Good condition to meet the conditions of the Dam Safety Order and Dam Safety Regulations. Restoring the dam to Good condition will provide future resiliency for the City, maintain a key open water resource, and maintain a key roadway.

The Project will involve work along the Armory Street corridor, which comprises the crest, or top, of the dam. Minor regrading, repaving, and work within the roadway will be required to address drainage concerns and pedestrian safety concerns. Minor utility work may also be required in the event that there are any conflicts with work needed for dam improvements, such as installation of the siphon. The siphon will be installed through the dam to allow for future drawdown of the impoundment for maintenance or in the case of severe weather or another emergency.

To address current issues with failing elements of the drainage system and elements which are resulting in erosion to the dam embankment, a new drainage system is proposed as part of the Project. The new drainage system will include high capacity inlets and deep sump catch basins with hooded outlets with minor regrading to allow for better capture of stormwater runoff. The existing drainage system elements (catch basins, piping) will be removed and properly disposed of offsite by the Contractor and erosion scars along the embankments from the failing system will be addressed by filling and regrading. The new system will be designed to discharge to the reconstructed spillway chute, a concrete structure with velocity dissipation. Discharging to a hard surface rather than the erodible slopes of the dam will provide resiliency, preventing future erosion due to stormwater discharges. The Project will include filing a Notice of Intent for Limited Project status under the Wetland Protection Act, which includes the Massachusetts Stormwater Standards. The Project will seek to meet the redevelopment standards to the extent possible relative to stormwater, given the unique setting on a dam, which make treatment options such as infiltration infeasible.

Existing deteriorated sidewalk segments will be repaired/replaced as part of the Project and new guardrail will be placed to improve safety for pedestrians. In addition, safety fencing will be added downstream of the sidewalk to limit access to the slopes for safety and to preserve their condition.

As part of the Project, the City is considering at this time whether the current overhead utilities could be located below ground along the dam, which could also improve resiliency. Lighting improvements will also be included along the south side of the roadway, in an area where no lighting currently exists. The City has received feedback about safety in this area due to a lack of sufficient lighting.

Along the right side of the dam (facing downstream), the former outlet will need to be addressed by grouting and excavating and removing the inlet during the regrading process. This will eliminate an unneeded penetration through the dam and reduce risks associated with a pathway that can allow water movement through the dam in an uncontrolled way.

Along the left downstream toe of the dam, the Project includes re-culverting the flow from the wetland and stormwater system along the toe of the dam, with an engineered outlet with velocity dissipation. This would address the uncontrolled discharge and erosion gully along the toe, a dam safety concern.

Finally, the proposed Project includes construction of new gated maintenance access, which will provide for future inspection, operation, and maintenance of the dam. This lack of a maintenance access is currently an issue at the dam.

5.13 SOCIOECONOMIC RESOURCES/ENVIRONMENTAL JUSTICE

The Project is a dam rehabilitation project that will increase public safety and resiliency while maintaining an important outdoor recreational facility used by several EJ populations. The Project is not an economic development project and will have little or no impact on the long-term economic outcome of the surrounding populations, though it will protect existing roadway and utility infrastructure and represents investment in the communities by the City. The Project has been assessed and potential adverse and beneficial impacts on EJ populations are described in the following subsections.

Additional assessment of the EJ populations and baseline conditions in compliance with the *MEPA Public Involvement Protocol for Environmental Justice Populations, Effective January 1, 2022* and the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations, Effective January 1, 2022* are included in **Attachment 8**. Based on the reviewed information available for the surrounding EJ communities, there appears to be an unfair and inequitable environmental burden on the communities within the one-mile radius to the Project Site. As described in these protocols, assessment of the Project impacts will be included in the Environmental Impact Report.

5.13.1 Potential Adverse Impacts on EJ Populations

During construction, potentially adverse impacts will be temporary and may include air quality, noise, and traffic impacts related to construction equipment. These impacts will be managed and mitigated as described in the associated sections of this document.

Work will be limited to normal workday hours to the extent possible. Additional construction related concerns include the potential for lane closures along Armory Street. If closures are required to perform the repair work, they will be advertised and minimized and a maintenance and protection of traffic plan will be required, including detour routes, if necessary.

During construction, because the reservoir is more than 20 feet deep, the Upper Van Horn Reservoir will also need to be temporarily drawn down to provide a safe, dry, working environment needed to support the work. A low cofferdam will be constructed in the reservoir and a pumped diversion of water will be needed. Limited areas of Van Horn Park may also need to be closed for public safety during construction for vehicle and construction access, but the park will be fully re-opened and the reservoir water elevation returned to pre-construction condition following completion of the work.

To control ongoing seepage concerns and comply with dam safety standards and Massachusetts Office of Dam Safety's *Policy on Trees on Dams,* the dam must be maintained free of trees and woody growth and must be maintained with grass/turf or other materials (rock) for safety. As such, all trees and woody growth will be removed to meet that policy.

5.13.2 Potential Beneficial Impacts on EJ Populations

The Project has been designed and will be implemented to improve the condition of the Upper Van Horn Reservoir Dam to preserve the safety of the public downstream of the dam who would be at risk in the event of a potential dam failure. Important existing utility and roadway infrastructure, namely Armory Street, are located along the embankment. Armory Street is a major thoroughfare for the neighborhood, Mercy Medical Center and Baystate Medical Center. During the embankment and roadway repairs, the failed stormwater drainage system will be modernized to improve stormwater capture, treatment, and discharge which may result in water quality improvements and prevent erosion at the discharge points. The roadway work will also include pedestrian access improvements including sidewalk repairs/replacement, guardrail repair/replacement and additional lighting, which has been identified by the community as a concern.

The Project has been designed to maintain the upper reservoir and park in their current configuration to provide continued recreational water access including fishing, hiking, birding, and other park activities. If the dam were to fail, in addition to the infrastructure and public safety concerns, the reservoir would also be lost as a community resource. The proposed Project includes the installation of a reservoir drawdown mechanism so that the water volume in the reservoir can be proactively managed in the future in the event of an emergency, dam safety concern, or for maintenance.

5.14 TRAFFIC/TRANSIT/BICYCLE AND PEDESTRIAN ACCESS

The proposed Project will not change the use of the Project site. There is no traffic demand associated with the existing dam, nor with the Project, other than temporary construction vehicle access to the Project site during the construction period. The Project site and surrounding area has ample and unconstrained access for completion and future operation of the Project.

Because of the nature of the Project and its location along an active roadway, there will be times that one lane may need to be closed, and on a very limited basis, times where the roadway needs to be closed for short periods of time. Diversions, warning signs, and postings/alerts will be used to alert roadway users and outreach will be undertaken with the local hospitals, as discussed in the Mitigation section.

6.0 CUMULATIVE IMPACTS

Cumulative and secondary impacts that may result from the proposed Project were also considered as part of this analysis. The Project requires that a temporary drawdown of the impoundment be completed to allow for safely conducting the dam rehabilitation and improvement work. As discussed herein, this will result in the temporary loss of recreational uses of the open water resource and other potential temporary impacts. The water level will be restored to the existing condition post-construction.

As discussed earlier, temporary lane or roadway closures/detours may be needed at limited times during the construction period for work on Armory Street, which may result in temporary increases in traffic on other local roads or temporary traffic delays. The road will be restored to the existing capacity condition post-construction.

Completion of the Project will result in the Upper Van Horn Reservoir Dam being maintained as an important open water resource in the City of Springfield and the dam being restored, improved, and more resilient, meeting current dam safety standards and accepted engineering practices. The City does not envision other projects originating from this dam improvement project. As such, no other cumulative or secondary impacts are expected to be associated with the Project.

7.0 REQUIRED PERMITS AND APPROVALS

The following permits or approvals are anticipated to be necessary for the proposed Project:

- City of Springfield Conservation Commission – Order of Conditions (MassDEP if superseding Order of Conditions required);
- Massachusetts Environmental Policy Act Office – Secretary's Certificate on Expanded Environmental Notification Form and Environmental Impact Report;
- Massachusetts Department of Environmental Protection – Section 401 Water Quality Certificate;
- Massachusetts Department of Conservation and Recreation, Office of Dam Safety – Chapter 253 Dam Safety Permit
- Massachusetts Historical Commission – Project Notification Form
- US Army Corps of Engineers (USACE) General Permit – Section 404 General Permit Authorization
- US Environmental Protection Agency (US EPA) – Stormwater Pollution Prevention Plan (SWPPP) and National Pollutant Discharge Elimination System (NPDES) Notice of Intent for coverage under the Construction General Permit.

8.0 PROPOSED MITIGATION MEASURES

Temporary and permanent impacts have been identified based on the current level of design and have been avoided or minimized to the extent possible. However, there will be certain impacts that are unavoidable as part of the Project, due to the water dependent nature of the Project and its location.

This section has been prepared to summarize mitigation measures identified to date for the Project. As design and outreach are ongoing, it is anticipated that additional mitigation measures may be identified in the EIR process based on design refinement and on comments from agencies and the public on the EENF. The EIR in the next phase of MEPA review will also include Draft Section 61 findings.

Table 8.1 summarizes mitigation measures identified to date for impacts that have been identified for the Project.

Table 8.1. Summary of Mitigation Measures.

Category	Impact	Mitigation	Schedule
Topography, Geology, Soils, Sediment	Sediment dredging/fill Earthwork, fill and regrading of dam embankment	The City will apply for and follow conditions of the Section 401, 404 and NPDES Construction Permit authorizations for the Project, as well as all other permits and approvals relative to dredging, fill, and reuse/disposal. The City will apply for required wetland permitting related to needed earthwork/regrading in buffer zones and wetlands (see Wetland Resources below). This work is needed to comply with the issued Dam Safety Order.	Throughout the permitting and construction period
Wetland Resources Land Under Water Bodies and Waterways; Bank	Expansion of dam footprint within Land Under Water Bodies and Waterways Restoration of Bank to culvert	The Project will file a Notice of Intent with the Springfield Conservation Commission and appropriate Sections 401 and 404 permitting related to work in the Land Under Water. Mitigation requirements will be determined by the applicable agencies and addressed in their authorizations.	Design/Permitting/ Construction
Fish/Wildlife/Vegetation	Temporary impacts to warm water fisheries due to temporary drawdown Permanent removal of trees along the dam surface	The City will coordinate with MassWildlife regarding the necessary temporary drawdown to determine if an aquatic salvage plan or other mitigation is warranted and to set any time of year recommendations/restrictions for the work. The City will coordinate a warm water fish restocking program with MassWildlife. For dam safety reasons, the dam will be maintained with a grass and rock surface and trees will not be allowed to regrow, so mitigation within the dam is not possible for this impact.	Design/permitting Following refill of the reservoir, post-construction Throughout the construction and operation period

Cultural Resources (Historic/Archaeological)	None identified to date	The Massachusetts Historical Commission already provided a response on a PNF filed for the Project and received a response that the Project is "unlikely to affect significant historic or archaeological resources". Should there be any further input from MHC or the Board of Underwater Archaeological Resources, the City will work with that agency to address their concerns. Should a resource be uncovered, work will be paused while the appropriate entities are consulted.	As needed
Air Quality/Greenhouse Gas Emissions	Temporary impacts to air quality related to construction vehicles	The City will specify and follow an anti-idling policy and will require the use of ULSD fuel for the Project. The Project SWPPP will include provisions to prevent fugitive dust and limit particulates through proper erosion and sedimentation controls. All waste containers and dump trucks will be covered to reduce the potential for airborne particulates.	During construction
Noise	Temporary noise impacts during construction	State noise regulation and local noise ordinance will be followed and work hours will be limited per City of Springfield requirements. Anti-idling policy will be established and followed for the Project.	During construction
Hazardous Materials/Solid Waste	Temporary impact - Solid waste produced during construction	Proper handling, covered storage, and offsite recycling/reuse/disposal of construction debris by the Contractor in accordance with all applicable local, state, and federal regulations.	During construction
Land Use, Open Space, Recreational Resources	Temporary loss of recreational use of reservoir and portions of the park during drawdown and	Signage and public notifications regarding any potential closures of portions of the roadway or park during construction, as well as educational information regarding the project. City will share information on other open water resources and parks in the local area where patrons can go while improvements are underway.	During construction

	construction period for abutters and residents Improved seating area	Following construction, the existing seating area facing the Upper Van Horn Reservoir will be improved through the replacement of the existing fencing and installation of additional street lighting.	Post-construction
Utilities/Infrastructure	Minor utility modifications	City will hold utility and Public Works/DPBRM meetings to discuss the Project and coordinate potential impacts/improvements. Contractor will be required to contact DigSafe prior to work. If outages or modifications are required, utility coordination meetings will be held onsite prior to work.	Design/Permitting During construction
Socioeconomic Resources/Environmental Justice	Temporary drawdown of the reservoir and potential limited access to certain park areas during construction. Temporary road or lane closures impact walking/driving/biking routes	EJSCREEN notification, Fact sheet distribution to neighborhood councils in the area and within the local community, noticing on the City's website in English and Spanish, fact sheet posting at the local libraries, public meetings to educate the public and provide opportunities to comment. Project website with information in English and Spanish and publicizing of other local park resources to use during the improvements phase. Detours and closures will be advertised and limited to extent possible.	Design/Permitting/ Construction
Traffic/Transit/Pedestrian and Bicycle Access	Temporary additional access trips during construction. Temporary lane or roadway closures,	The City will coordinate with the nearby hospitals and emergency services regarding potential lane or roadway closures and with the school department and local schools regarding any road or sidewalk closures or detours.	During construction

	detours, and sidewalk closures during construction Positive long-term impacts through drainage system replacement and sidewalk repairs/replacement, as well as new guardrails and improved lighting for pedestrian safety	A construction phase maintenance and protection of traffic plan will be required as part of the Project to identify potential closures, detours, signage, and police details and to minimize potential impacts. This information will be communicated by the City to the public and neighborhood councils. Positive Impact, no mitigation needed.	During construction Long-term post-construction

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ATTACHMENT 2

PROJECT DRAWINGS

NOTES:

THIS EXISTING CONDITIONS PLAN WAS DEVELOPED AS FOLLOWS:

1. TOPOGRAPHIC AND SITE INFORMATION WERE TAKEN FROM A PLAN BY HERITAGE SURVEYS, INC., ENTITLED "PLAN OF LAND IN SPRINGFIELD MASSACHUSETTS, SURVEYED FOR GZA GEOENVIRONMENTAL, INC", DATED OCTOBER 14, 2019, REVISED JUNE 1, 2022.
2. HORIZONTAL DATUM IS MASSACHUSETTS STATE PLANE COORDINATES, MASS. MAINLAND (1983) IN UNITS OF FEET.
3. ELEVATIONS DEPICTED ON THIS DRAWING ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) IN UNITS OF FEET.
4. WETLAND BOUNDARIES IMMEDIATELY UPSTREAM AND DOWNSTREAM OF THE DAM WERE FIELD-DELINEATED BY A GZA WETLAND SCIENTIST IN JULY AND SEPTEMBER 2019 AND FEBRUARY 2022. WETLAND FLAG LOCATIONS WERE SURVEY LOCATED BY HERITAGE SURVEYS, INC.
5. EXISTING BATHYMETRY (TOP AND BOTTOM OF SEDIMENT) IN THE VICINITY OF THE DAM WAS OBTAINED BY VESPOS HYDROGRAPHIC SURVEYS & SOFTWARE IN APRIL 2022
6. EXISTING BOAT RAMP AND LOOP ROAD ALIGNMENT INFORMATION TAKEN FROM RECORD PLANS DATED MAY 28, 2002 FOR REHABILITATION OF VAN HORN PARK, ARMORY ST., SPRINGFIELD, MA, PREPARED BY JOHN C. WALKER, LANDSCAPE ARCHITECTURE, INC., BAYSTATE ENVIRONMENTAL CONSULTANTS, INC., AND THE BSC GROUP.
7. FORMER POND OUTLET SYSTEM LOCATIONS ESTIMATED BASED ON PLAN ENTITLED "SPRINGFIELD, MASS. DEPARTMENT OF STREETS AND ENGINEERING–VAN HORN RESERVOIR OUTLET, ARMORY ST. WESTERLY". DATED DECEMBER 7, 1950.

LEGEND

- WF B2 — WETLAND BOUNDARY
- 100 FT WETLAND BUFFER
- 25 FT RIVERFRONT BOUNDARY
- OBSERVED EDGE OF WATER (7/12/19)
- 188 — EXISTING 1' CONTOUR
- 190 — EXISTING 5' CONTOUR
- 140 — TOP OF SEDIMENT CONTOUR (APRIL 2022)
- 197x21 — EXISTING SPOT GRADE
- EXISTING PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
- EXISTING CURB
- EXISTING CHAIN LINK FENCE
- EXISTING PICKET FENCE
- EXISTING GUARD RAIL (TIMBER OR STEEL BEAM)
- EXISTING TREE LINE
- D — EXISTING STORM DRAIN LINE
- SS — EXISTING SANITARY SEWER
- G — EXISTING GAS LINE
- W — EXISTING WATER LINE
- EXISTING CATCH BASIN
- EXISTING UTILITY POLE
- EXISTING LIGHT POLE
- EXISTING WATER VALVE
- EXISTING GAS VALVE

0 20 40 80
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

EXISTING CONDITIONS PLAN

PREPARED BY:
GZA GeoEnvironmental, Inc.
www.gza.com

PREPARED FOR:
CITY OF SPRINGFIELD
DEPARTMENT OF PARKS, BUILDINGS, AND RECREATION MANAGEMENT

PROJ MGR: JRB	REVIEWED BY: CWC	CHECKED BY: NLR	DRAWING
DESIGNED BY: NRS	DRAWN BY: EDM	SCALE: AS NOTED	1
DATE: OCTOBER, 2022	PROJECT NO. 15.0167018.00	REVISION NO. -	

CONDUCT TEMPORARY DRAWDOWN OF UPPER VAN HORN RESERVOIR AND PROVIDE FOR CONTROL OF WATER THROUGH CONSTRUCTION TO FACILITATE DRY, SAFE WORK ENVIRONMENT

REMOVE DEBRIS FROM BOX CULVERTS, CLEAN AND REPAIR CONCRETE INTERIOR OF CULVERTS

PARTIALLY DREDGE SEDIMENTS ALONG DAM EMBANKMENT AND REPOSITION WITHIN DEEP AREAS OF POND ADJACENT TO DAM OR DISPOSE OF AT LANDFILL

CITY OF SPRINGFIELD
UPPER VAN HORN RESERVOIR
WATER ELEVATION
167.4±
7/12/19

APPROXIMATE LIMIT OF WORK (TYP.)

EXCAVATE AND REMOVE FORMER POND OUTLET AND GROUT PIPE THROUGH DAM, BACKFILL INLET TO NEW GRADE

EXCAVATE AND FILL SCOUR HOLE

DRAINAGE IMPROVEMENTS- REMOVE EXISTING CATCH BASINS AND PIPING AND REPLACE WITH NEW DEEP SUMP CATCH BASINS WITH HOODS AND HIGH CAPACITY INLETS AND MINOR GRADING

16-INCH DUCTILE IRON PIPE SIPHON FOR DRAWDOWN

INLET TO NEW SIPHON FOR DRAWDOWN INV.=147.5±

COFFERDAM

UPSTREAM 20-FT WIDE ROCK STABILITY BERM

ROCK FILL SLOPE (TYP.)

EXCAVATE AND FILL SCOUR HOLE

20-FT WIDE OPEN GRADED CRUSHED STONE TEMPORARY CONSTRUCTION ACCESS ROAD

20-FT WIDE OPEN GRADED CRUSHED STONE PERMANENT ACCESS ROAD

20-FT WIDE OPEN GRADED CRUSHED STONE TEMPORARY CONSTRUCTION ACCESS ROAD

N/F QUILES BOOK 21566 PAGE 82

N/F BALDYGA BOOK 16398 PAGE 578

N/F HARRIS & WARD 309 PAGE 6, K 2 PAGE 3

N43°21'35"E 394.69'

S47°59'25"E 1466.59'

S47°59'25"E 1455.31'

FILL PORT FOR SIPHON

ROADWAY IMPOVEMENTS- REPAIR/REPLACE GUARDRAILS AND SIDEWALKS AND ADD NEW SAFETY FENCING ON EMBANKMENTS, ADD NEW STREETSCAPE LIGHTING ALONG ROADWAY

16-FT BAR GATE

EXCAVATE MANHOLE AND GROUT PIPE FROM MH-6 TO FORMER POND OUTLET

15 -FT WIDE OPEN GRADED CRUSHED STONE PERMANENT ACCESS ROAD

VALVE FOR SIPHON

DOWNSTREAM 25-FT WIDE ROCK STABILITY BERM WITH SEEPAGE BLANKET AND TOE DRAIN

ROCK FILL SLOPE (TYP.)

FLARED END SECTION INV.=146±

RECONSTRUCTED SPILLWAY WITH NEW SAFETY FENCING

APPROXIMATE LIMIT OF WORK (TYP.)

FILL EROSION CHANNEL TO RESTORE GRADE AND STABILIZE VEGETATION

PRECAST INLET STRUCTURE

COFFERDAM

RIPRAP OUTLET PROTECTION

CITY OF SPRINGFIELD
LOWER VAN HORN RESERVOIR
NORMAL POOL EL. 145±

LEGEND

- WETLAND BOUNDARY
- 100 FT WETLAND BUFFER
- 25 FT RIVERFRONT BOUNDARY
- OBSERVED EDGE OF WATER (7/12/19)
- 188 EXISTING 1' CONTOUR
- 190 EXISTING 5' CONTOUR
- 140 TOP OF SEDIMENT CONTOUR (APRIL 2022)
- 197x21 EXISTING SPOT GRADE
- EXISTING PROPERTY LINE
- EXISTING EDGE OF PAVEMENT
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- EXISTING CHAIN LINK FENCE
- EXISTING PICKET FENCE
- EXISTING GUARD RAIL (TIMBER OR STEEL BEAM)
- EXISTING TREE LINE
- D EXISTING STORM DRAIN LINE
- SS EXISTING SANITARY SEWER
- G EXISTING GAS LINE
- W EXISTING WATER LINE
- EXISTING CATCH BASIN
- EXISTING UTILITY POLE
- EXISTING LIGHT POLE
- EXISTING WATER VALVE
- EXISTING GAS VALVE
- PROPOSED CATCH BASIN
- PROPOSED DRAIN MANHOLE
- PROPOSED STORM DRAIN
- NEW TREELINE
- 170 PROPOSED GRADE
- 158.0 PROPOSED SPOT GRADE
- PROPOSED ROCK FILL SLOPE
- PROPOSED RIPRAP OUTLET PROTECTION
- PROPOSED STABILITY BERM
- PROPOSED OPEN GRADED CRUSHED STONE TEMPORARY ACCESS ROAD
- PROPOSED OPEN GRADED CRUSHED STONE PERMANENT ACCESS ROAD
- PROPOSED EROSION CHANNEL TO BE FILLED

DAM EMBANKMENT:

- CLEAR AND GRUB ALL VEGETATION FROM DAM TO PROPOSED TREELINE.
- STRIP AND STOCKPILE EXISTING LOAM FROM DAM EMBANKMENT.
- REGRADE DAM SLOPES AND CREST AS NOTED.
- FILL ANIMAL BURROWS AND EROSION/SCOUR AREAS ENCOUNTERED.
- INSTALL RIPRAP ALONG UPSTREAM SLOPE FROM TOE TO 2 FT ABOVE NORMAL POOL.
- CONSTRUCT STABILITY BERM AND TOE DRAIN ON DOWNSTREAM EMBANKMENT AND STABILITY BERM ALONG UPSTREAM SLOPE.
- INSTALL RIPRAP OUTLET PROTECTION DOWNGRADIENT OF SPILLWAY OUTLET.
- SCREEN AND RESPREAD ONSITE LOAM.
- PROVIDE AND SPREAD LOAM BORROW TO PROVIDE MIN. 6" LOAM ON DISTURBED AREAS.
- ESTABLISH TURF GRASSES OVER ALL DISTURBED AREAS NOT OTHERWISE SURFACED.
- RECONSTRUCT ARMORY STREET, INCLUDING DRAINAGE, UTILITIES AND PAVEMENTS.

SCALE IN FEET
0 20 40 80

NO.	ISSUE/DESCRIPTION	BY	DATE

UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

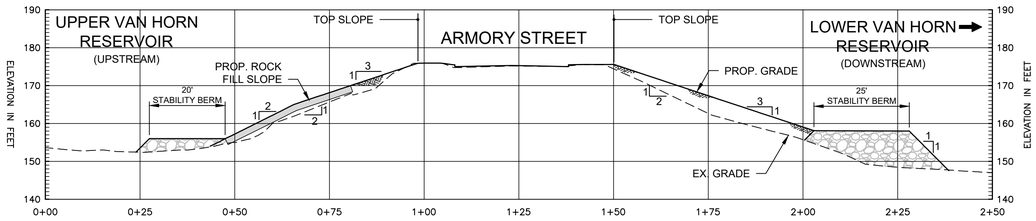
PROPOSED IMPROVEMENTS PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. www.gza.com

PREPARED FOR: CITY OF SPRINGFIELD
DEPARTMENT OF PARKS, BUILDINGS, AND RECREATION MANAGEMENT

PROJ MGR: JRB	REVIEWED BY: CWC	CHECKED BY: NLR	DRAWING	
DESIGNED BY: EDM	DRAWN BY: EDM	SCALE: AS NOTED		
DATE: OCTOBER, 2022	PROJECT NO. 15.0167018.00	REVISION NO. -		2

Z:\0 167000 – 0 167099\15.0167018.00 REHABILITATION OF UPPER VAN HORN RESERVOIR DAM\15.0167018.00 CAD\DWG\167018.00–UPPER VAN HORN RESERVOIR DAM.DWG
LAST SAVED: October 27, 2022 EDWARD MULLIN



SECTION A-A
1"=20'

0 10 20 40
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

TYPICAL EMBANKMENT SECTION

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. www.gza.com		CITY OF SPRINGFIELD DEPARTMENT OF PARKS, BUILDINGS, AND RECREATION MANAGEMENT	
PROJ MGR: JRB	REVIEWED BY: CWC	CHECKED BY: NLR	DRAWING
DESIGNED BY: EDM	DRAWN BY: EDM	SCALE: AS NOTED	3
DATE: OCTOBER, 2022	PROJECT NO. 15.0167018.00	REVISION NO. -	

G:\0 167000 – 0 167099\15.0167018.00 REHABILITATION OF UPPER VAN HORN RESERVOIR DAM\15.0167018.00 CAD\DWG\167018.00–UPPER VAN HORN RESERVOIR DAM.DWG MEPA–DRAWING 3 October 27, 2022 EDWARD MULLIN

ATTACHMENT 3

EENF DISTRIBUTION LIST

Expanded Environmental Notification Form (EENF)
Submitted to the Massachusetts Environmental Policy Act Unit
for the
Upper Van Horn Reservoir Dam Improvements Project
Springfield, Massachusetts

Distribution List

(note that due to COVID-19, the MEPA office and State Agencies will receive electronic submittals only, per MEPA's guidance entitled "Important Operations Concerning MEPA Operations". The email address for the contact person for each agency is provided below. Where paper copies are being submitted, a note is indicated as such under the email address column). Paper copies will be provided upon agency request.

Agency	Physical Address	Email Address
MEPA Office	Executive Office of Energy and Environmental Affairs (EEA) Attn: MEPA Office 100 Cambridge Street, Suite 900 Boston, MA 02114	MEPA@mass.gov
Massachusetts Department of Environmental Protection (MassDEP) Boston Office	Department of Environmental Protection Commissioner's Office One Winter Street Boston, MA 02108	Helena.boccadoro@mass.gov
MassDEP Regional Office	MassDEP Western Regional Office Attn: MEPA Coordinator State House West – 4th Floor 436 Dwight Street Springfield, MA 01103	Kathleen.fournier@mass.gov
Massachusetts Department of Transportation Boston Office	MassDOT Public/Private Development Unit 10 Park Plaza, Suite 4150 Boston, MA 02116	MassDOTPPDU@dot.state.ma.us
Massachusetts Department of Transportation District Office	MassDOT District #2 Attn: MEPA Coordinator 811 North King Street Northampton, MA 01060	Bao.lang@dot.state.ma.us
Massachusetts Historical Commission	Massachusetts Historical Commission The MA Archives Building 220 Morrissey Blvd. Boston, MA 02125	Paper copy required and submitted

Bureau of Underwater Archaeological Resources (BUAR)	Bureau of Underwater Archaeological Resources Attn: David Robinson, Director 251 Causeway Street, Suite 800 Boston, MA 02114-2136	Paper copy submitted
Applicable Regional Planning Agency	Pioneer Valley Planning Commission (PVPC) Gary M. Roux, Principal Planner 60 Congress Street, 1st Floor Springfield, MA 01104-3419	gmroux@pvpc.org (plus one Hard Copy)
Municipal Offices	Springfield City Council 36 Court Street, Room 200 Springfield, MA 01103	Paper copy submitted
	Office of Planning and Economic Development 70 Tapley Street Springfield, MA 01104	Paper copy submitted
	Conservation Commission 70 Tapley Street Springfield, MA 01104	Paper copy submitted
	Department of Health & Human Services 311 State Street Springfield, MA 01105	Paper copy submitted
	Department of Public Works Christopher Cignoli, Director 70 Tapley Street Springfield, MA 01104	Paper copy submittal
EEA Environmental Justice	MEPA Office Attn: EEA EJ Director 100 Cambridge Street, Suite 900 Boston, MA 02144	MEPA-EJ@mass.gov
Department of Public Health	Department of Public Health Director of Environmental Health 250 Washington Street Boston, MA 02115	dphtoxicology@massmail.state.ma.us
Department of Energy Resources	Department of Energy Resources Attn: MEPA Coordinator 100 Cambridge Street, 10th floor Boston, MA 02114	Paul.ormond@mass.gov Brendan.place@mass.gov

Department of Conservation and Recreation	MA Department of Conservation and Recreation Office of Dam Safety 251 Causeway Street, Suite 600 Boston, MA 02114	David.ouellette@state.ma.us
MEPA Environmental Justice Listing of Required Notifications for Community Based Organizations and Tribal Organizations		danielledolan@massriversalliance.org juliablatt@massriversalliance.org Andrea@n2nma.org elvis@n2nma.org ben@environmentmassachusetts.org claire@uumassaction.org cluppi@cleanwater.org deb.pasternak@sierraclub.org hclish@outdoors.org hricci@massaudubon.org kelly.boling@tpl.org kerry@msaadapartners.com lorel@thetrustees.org ngoodman@environmentalleague.org pstanton@e4thefuture.org rob@oceanriver.org robb@massland.org sarah@massclimateaction.net srubin@clf.org sylvia@communityactionworks.org wvaughan@hcwh.org tribalcouncil@chappaquiddickwampanoag.org crwritings@aol.com john.peters@mass.gov acw1213@verizon.net melissa@herringpondtribe.org rockerpatriciad@verizon.net rhalsey@naicob.org Coradot@yahoo.com Solomon.Elizabeth.e@gmail.com thpo@wampanoagtribe-nsn.gov bonney.hartley@mohican-nsn.gov Brian.Weeden@mwtribe-nsn.gov tanisha@arisespringfield.org ibrahim@gardeningthecommunity.orgzulma@n2nma.org mbejjani8@gmail.com shudson@publichealthwm.org rodonnell@ctriver.org mark@kestreltrust.org
City of Springfield Neighborhood Groups	Atwater Park Civic Association PO Box 70572 Springfield, MA 01107	info@atwaterpark.org
	Armoury Quadrangle Civic Association 140 Chestnut St Springfield, MA 01103	aqca@aqca.org

	Bay Area Neighborhood Council PO Box 91066 Springfield, MA 01109	bayareaneighborhoodcouncil@yahoo.com
	McKnight Neighborhood Council PO Box 90336 Springfield, MA 01109	mcknightcouncil@yahoo.com
	New North Citizens Council 2455 Main Street Springfield, MA 01107	mligus@newnorthcc.org
	Hungary Hill Neighborhood Council PO Box 352 Springfield, MA 01101	hungryhillcouncil@yahoo.com
	Lower Liberty Heights Neighborhood Council 233 Franklin Street Springfield, MA 01104	Rvbigred72@aol.com lowerlibertyheightscouncil@gmail.com

ATTACHMENT 4

CERTIFICATE OF NON-COMPLIANCE AND DAM SAFETY ORDER, DATED AUGUST 31, 2017 AND OFFICE OF DAM SAFETY'S POLICY ON TREES ON DAMS

12:10 9/18/17

please again to RAT's to reclassify

Thanks

RECEIVED
SEP 18 2017
BY: CJackson

dcr
Massachusetts

August 31, 2017
Certified Mail No. 7013 1090 0000 4863 6028
Return Receipt Requested

City of Springfield
Department of Parks and Recreation
c/o Patrick Sullivan
200 Trafton Road
Springfield, MA 01108

Subject: **CERTIFICATE OF NON-COMPLIANCE and DAM SAFETY ORDER**

Dam Name:	**Upper Van Horn Reservoir Dam**
Location:	Springfield
National ID No:	MA00574
Known Condition:	Poor
Hazard Potential:	Significant

Dear Mr. Sullivan:

In accordance with 302 CMR 10.08, the Department of Conservation and Recreation (DCR), Office of Dam Safety (ODS) has determined that Upper Van Horn Reservoir Dam does not meet accepted dam safety standards and is a potential threat to public safety. Therefore, DCR hereby issues a **CERTIFICATE OF NON-COMPLIANCE and DAM SAFETY ORDER.**

ODS records indicate that the City of Springfield is the Owner of the Upper Van Horn Reservoir Dam, National Inventory of Dams No. MA00574. ODS classifies the dam as an **Intermediate Size, Significant Hazard Potential** Structure. Significant Hazard Potential Dams are dams that may cause the loss of life and property damage in the event of dam failure.

On April 17, 2009, an inspection of the Upper Van Horn Reservoir Dam was performed by your engineering consultants Baystate Environmental Consultants, Inc, a GZA Company. As a result of this inspection, the dam was determined to be **STRUCTURALLY DEFICIENT** and in **POOR** condition. The dam has been found to be in need of repair, breaching or removal to bring the dam into compliance with dam safety regulations.

The CERTIFICATE OF NON-COMPLIANCE is based on the above-referenced inspection report results which listed the observance of many deficiencies, including but not limited to:

- No design or post-design analyses concerning stability of embankment and seepage.
- No evidence of regular maintenance
- No Operations & Maintenance (O&M) manual
- Uncontrolled seepage along the downstream toe of dam
- Significant erosion on both the upstream and downstream slopes
- Large trees on both the upstream and downstream slopes
- Spalling and minor surface cracking of concrete structures, especially the spillway chute; open joints in concrete structures
- No low level outlet or other provisions for emptying the reservoir.

ODS staff visited the site the dam site on April 11, 2017 and observed that the conditions of the dam were substantially similar to the conditions reported at the time of the April 17, 2009 Phase I Inspection Report, and that accordingly, the dam remains in Poor condition. These foregoing deficiencies compromise the structural integrity of the dam and present a potential threat to public safety. ODS has determined that the dam needs to be repaired, breached or removed in order to bring the dam into compliance with dam safety regulations.

As stated in the April 17, 2009 report, Upper Van Horn Reservoir Dam is located upstream of numerous residential homes and commercial buildings, a railroad corridor, Interstate 91, and Baystate Medical Center. The embankment of the dam forms the highly-travelled Armory Street, a local collector road. Lower Van Horn Reservoir Dam is located immediately downstream of Upper Van Horn Reservoir Dam. It appears that failure of the Upper Van Horn Reservoir Dam at maximum pool may cause loss of life and cause interruption of use or service of relatively important facilities, including Armory Street and the flood-attenuation capabilities of the Lower Van Horn Reservoir.

G.L. c. 253, Sections 44-48 and 302 CMR 10.00 set forth the jurisdiction for ODS and its authority to take action and order actions to be taken. For your information a copy of the Dam Safety Regulations, 302 CMR 10.00 Dam Safety, can be found on the ODS website.

DAM SAFETY ORDER:

In accordance with the authority of G.L. c. 253, Section 47, 302 CMR 10.07 and 10.08 you are hereby **ORDERED** to comply with the following:

1) **Conduct Follow-up Inspections:** You shall complete follow-up visual inspections at six (6)-month intervals, conducted by a registered professional civil engineer qualified to conduct dam inspections, at your cost, until adequate repairs are made or the dam is adequately breached. You shall submit the first Follow-up inspection to ODS no later than **October 6, 2017.**

   Follow-up inspections are to be summary in format and shall provide a written description, including photographs, of any changes in condition. Your engineer is to use the attached ODS Poor Condition Dam Follow-up Inspection Form to report follow-up inspection findings. The form is also available electronically on the ODS web site. Your engineer shall include a cover letter on engineering firm letterhead that briefly summarizes the current follow-up inspection and findings.

   You shall submit one (1) hard copy printed double-sided and one (1) electronic pdf copy of all completed follow-up visual inspection reports to ODS within thirty (30) days of the date of follow-up inspection field work.

   For your information, Phase I inspections, which are due on a five-year frequency for Significant Hazard Potential structures and are more comprehensive than a Follow-Up inspection, satisfy the Follow-Up inspection requirement for one cycle, with the next Follow-Up inspection being due six (6) months from the date of the Phase I inspection. ODS notes that the last Phase I inspection of this dam is dated April 17, 2009. Therefore, this dam is overdue for a Phase I inspection at this time.

2) **Conduct Phase II Inspection and Investigations**. You shall hire at your cost, a qualified registered professional engineer with dam engineering experience (engineer) to conduct a Phase II Inspection and Investigation of the dam to evaluate the structural integrity and spillway hydraulic adequacy of your dam and to develop/implement a plan to bring the dam into compliance with dam safety regulations by adequately repairing, breaching or removing the dam (see attached Phase II Investigation Outline).

   a. You shall commence the Phase II Inspection and Investigation no later than **December1, 2017.** The Phase II Inspection and Investigation is to conform to the attached Phase II Investigation Outline. You are to, in a letter to ODS, no later than **November 16, 2017,** identify your selected engineer and inform ODS of the start date of the Phase II work.

   b. The Phase II Inspection and Investigation is to be completed, signed and stamped by your engineer and copies of the Phase II final report are to be delivered to ODS no later than **March 1, 2018.**

You shall include a cover letter with the submitted Phase II report which describes your selected alternative to bring the dam into compliance with dam safety regulations. The owner shall submit a statement of your intent to implement inspection report recommendations to address structural and operational deficiencies to ODS upon submission of the required Phase II Inspection and Investigation completed by your engineer.

3) **Bring the dam into compliance and complete all repair, breach or removal work no later than March 1, 2019.** With your Phase II submittal, you must also provide a proposed timeline to design, permit and construct the selected alternative to repair, breach or remove the dam. The selected alternative must be completed, and the dam brought into compliance with Dam Safety regulations, by March 1, 2019.

4) **Additional Requirements:**
   a. You shall furnish copies of all required submittals listed above via certified mail.

   b. In order to maintain compliance with the Commonwealth's Wetlands Protection Laws you may have to seek requisite approval from your local Conservation Commission in accordance with G.L. c. 131, §40. You are obligated to contact and maintain communication with the Springfield Conservation Commission and any other local, state or federal permitting agency the ensure compliance with the Wetlands Protection Act and any other regulatory requirements.

   c. You must inform the following parties about the condition of the dam and your developing plans to bring the dam into compliance with dam safety regulations: all abutters of the impoundment upstream; property owners within one-half mile downstream of the Upper Van Horn Reservoir Dam; Ralph Taylor, District Manager, Connecticut Valley District, Division of Fisheries & Wildlife, 341 East St, Belchertown, MA 01007; Michael Gorski, Department of Environmental Protection, Western Region, 436 Dwight Street, Springfield, MA 01103; Mayor Domenic J. Sarno, City Hall, 36 Court St, Springfield, MA 01103; Christopher Collins, Chair, Conservation Commission, 70 Tapley St, Springfield, MA 01104; Robert Hassett, Emergency Management Director, 1212 Carew St, Springfield, MA 01104.

Please be advised that in accordance with G.L. c. 253, § 47, "any person who fails to comply with the provisions of this chapter or of any order, regulation or requirement of the department relative to dam safety, shall be fined an amount not to exceed $5,000 for each offense, to be fixed by the court." Furthermore, each violation shall be regarded as a separate and distinct offense and, in case of a continuing violation, each day's continuance thereof shall be deemed to be a separate and distinct offense.

Nothing in this order releases the owner from the requirements of any prior Dam Safety Order issued for this dam.

In accordance with 302 CMR 10.08, this CERTIFICATE OF NON-COMPLIANCE and DAM SAFETY ORDER will be recorded by the DCR at the Registry of Deeds in the county where the dam lies. Issuance of a Certificate of Compliance following adequate repair or breaching of the dam will be required to discharge the CERTIFICATE OF NON-COMPLIANCE and DAM SAFETY ORDER.

Please direct any technical questions, correspondence, or submittals to Emily Caruso, Department of Conservation and Recreation, Office of Dam Safety, 180 Beaman Street, West Boylston, MA 01583. Legal questions should be directed to the DCR Assistant General Counsel, Ariana Johnson, 251 Causeway Street, Suite 600, Boston, MA 02114. Additional dam safety information can be found at the DCR-ODS website: http://www.mass.gov/eea/agencies/dcr/conservation/dam-safety/.

Thank you for your cooperation.

Sincerely,

Leo Roy
Commissioner

CC: Senator James T. Welch
Representative Jose F. Tosado
Mayor Domenic J. Sarno, City of Springfield
Robert Hassett, Springfield Emergency Management Director
Christopher Collins, Chair, Springfield Conservation Commission
Barbara Newman, U.S. Army Corps
Michael Gorski, DEP
Deirdre Buckley, MEPA
Ralph Taylor, DFW
Rob Lowell, DCR
William Salomaa, DCR
Ariana Johnson, Esq., DCR
Tim Purinton, DER

Department of Conservation and Recreation
Office of Dam Safety
Phase II Inspection and Investigation Outline

I.	Review of existing information.....
II.	Updated Detailed Phase I surface inspection in compliance with Office of Dam Safety Phase I Inspection format.....
III.	Subsurface Investigations – borings, sampling, analysis.....
IV.	Topographic Survey, wetlands flagging/delineation, of sufficient detail to support not only the Phase II effort, but sufficient for the future implementation of design phase.....
V.	Stability and seepage analyses – Seismic and static stability evaluation of dam (upstream and downstream slopes, internal materials), seepage potential, internal erosion potential, piping potential.....
VI.	Hydrologic/Hydraulic Analysis and spillway inadequacy resolution.....
VII.	Alternatives analysis and presentation of conceptual designs and associated estimated design, permitting and construction costs to bring the dam structure into compliance with Chapter 253 Section 44-48 and 302 CMR 10.00 Dam Safety Regulations by either executing selected repair plan or breach plan.....
VIII.	Final Report Presented to the Office of Dam Safety.....

Commonwealth of Massachusetts
Department of Conservation and Recreation
Office of Dam Safety Poor Condition Dam Follow-up Inspection Form

(Complete this inspection form and provide a cover letter on consulting firm letterhead that briefly summarizes the current follow-up inspection and findings. The cover letter shall be signed and stamped by the Registered Professional Engineer in charge of the inspection)

Dam Name:
Dam Owner:
Nat. ID Number:
Hazard Potential:
Location of Dam (town):
Coordinate location (lat, long):
Date of Inspection:
Weather:

Consultant Inspector(s): **firm name and name of Registered Professional Engineer in charge of inspection.**

Others in Attendance at Field Inspection: **include list of names, affiliation and phone numbers.**

Attachments: **Updated site sketch with photo locations, Updated photos, and copy of locus map from Phase I report and other applicable attachments.**

I. **Previous Inspection date/Overall Condition:**
- Date of most recent formal Phase I Inspection Report:
- List the overall condition reported in most recent Phase I Inspection Report:

II. **Previous Inspection Deficiencies:**
- List identified deficiencies in the most recent Phase I Inspection Report:

III. **Overall Condition of Dam at the Time of the Current Follow-up Inspection:**
   a. **State the current condition**
   b. **Have conditions changed since the previous inspection? Yes or no.**

IV. **Comparison of Current Conditions to Condition Listed in Previous Phase I Inspection Report:**
   a. **Have any of the deficiencies listed in the previous Phase I Inspection Report worsened?**
   b. **If yes, list the changes.**
   c. **Are there any additional deficiencies that have been identified in the current inspection?**

d. **If yes, list the deficiencies and describe.**

V. **Dam Safety Orders:**
- **List dam safety orders that have been issued to the dam owner pertaining to this dam.**

VI. **Maintenance:**
1. Indicate if there exists an operation and maintenance plan for the dam.
2. Indicate if it appears the dam is being maintained.

VII. **Recommendations:**

VIII. **Other Comments or Observations:**

IX. **Updated Site Sketch with Photo Locations:**

X. **Updated Photos:**

XI. **Copy of Locus Map from Phase I Report:**

XII. **Other applicable attachment:**

Policy on Trees on Dams

The Massachusetts Office of Dam Safety requires that earth embankment dams be maintained free of the existence of trees and woody growth

Tree and woody vegetation growth on earthen dams and in close proximity to other dams such as concrete dams is undesirable and at a minimum has some level of detrimental impact upon operation, inspection, performance, and safety of dams. Tree roots cause serious structural damage to earth embankment and appurtenant dam features such as gate wells, spillway walls and other components.

It is recommended that earth embankment dams be maintained with a healthy uniform cover of desirable vegetation such as an appropriate variety of grasses. Dam embankment grass should be mowed periodically to promote healthy cover and prevent infestation of undesirable woody growth and weeds.

Trees and woody growth can make it difficult to conduct inspections of dams. Tree roots can cause leaks, damage concrete joints and overturn during high wind events causing large voids due to pull out of root balls and cause many other problems that will be very costly to repair. Trees and woody growth located in spillways will dramatically reduce spillway flow capacity. Trees are known to accelerate deterioration of dams and can lead to dam failure.

It is recommended that the area at least 20 feet downstream from the entire downstream toe of earth embankment dams be maintained free of trees and woody growth. This is necessary to prevent root systems from growing into the dam embankment causing damage to this area of the dam.

For concrete dams and appurtenant features of all dams it is recommended that tree growth not be allowed to occur within 20 feet of such features. In some cases it may be necessary to maintain a greater distance to ensure roots do not adversely impact dam components. Do not allow tree growth in areas located above buried conduits/pipes.

Prior to removal of existing trees and woody growth from dams, part A of a Chapter 253 Dam Safety Permit Application must be submitted to the Office of Dam Safety. Permit applications should be prepared by a qualified dam engineer for larger projects involving removal of trees in excess of 4 inches and where there is planned excavation of roots. The Office of Dam Safety will review applications and determine if the planned work requires a permit. If the project involves removal of brush and trees 4 inches and less in diameter the Office of Dam Safety may find a permit is not necessary to conduct the work. In general routine maintenance activity does not require a Dam Safety permit.

Please note the dam owner is responsible for ensuring that all other local, state and federal agency permits that may apply to planned work are obtained prior to conducting work.

Sources of information about trees and vegetation on dams

Dam Owner's Guide to Plant Impact on Earthen Dams, FEMA Publication L-263, September 2005
(/files/documents/2016/08/wn/fema-publication-l-263.pdf)
This brochure is intended to help dam owners nationwide identify and mitigate problem vegetation before adverse effects occur.

Technical Manual for Dam Owners, Impacts of Plants on Earthen Dams, FEMA Publication 534, September 2005
(/files/documents/2016/08/pl/fema-publication-534.pdf)
Damage to earthen dams and dam safety issues associated with tree and woody vegetation penetrations of earthen dams is all too often believed to be routine maintenance situations by many dam owners and engineers.

Contrary to this belief, tree and woody vegetation penetrations of earthen dams and their appurtenances have been demonstrated to be causes of serious structural deterioration and distress that can result in failure of earthen dams.

CONTACT

Office of Dam Safety

Address
180 Beaman Street, West Boylston, MA 01583
Directions
(https://maps.google.com/?q=180+Beaman+Street%2C+West+Boylston%2C+MA+01583)

Phone
(508) 792-7716 ext 41828 (tel:508792771641828)

ATTACHMENT 5

SEDIMENT SAMPLING LABORATORY RESULTS

ANALYTICAL REPORT

Lab Number:	L2217633
Client:	GZA Springfield 1350 Main Street Suite 1400 Springfield, MA 01103
ATTN:	Jennifer Burke
Phone:	(413) 726-2117
Project Name:	UPPER VAN HORN RESERVOIR DAM
Project Number:	15.0167018.00
Report Date:	05/12/22

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2217633
Report Date: 05/12/22

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2217633-01	S-1	SEDIMENT	SPRINGFIELD, MA	04/05/22 11:20	04/06/22
L2217633-02	S-1/2	SEDIMENT	SPRINGFIELD, MA	04/05/22 11:40	04/06/22
L2217633-03	S-3	SEDIMENT	SPRINGFIELD, MA	04/05/22 13:05	04/06/22
L2217633-04	S-3/4	SEDIMENT	SPRINGFIELD, MA	04/05/22 13:35	04/06/22
L2217633-05	S-6	SEDIMENT	SPRINGFIELD, MA	04/05/22 14:30	04/06/22
L2217633-06	S-5/6	SEDIMENT	SPRINGFIELD, MA	04/05/22 14:45	04/06/22
L2217633-07	S-1/2 (AIR DRIED)	SEDIMENT	SPRINGFIELD, MA	04/05/22 14:45	04/06/22
L2217633-08	S-3/4 (AIR DRIED)	SEDIMENT	SPRINGFIELD, MA	04/05/22 14:45	04/06/22
L2217633-09	S-5/6 (AIR DRIED)	SEDIMENT	SPRINGFIELD, MA	04/05/22 14:45	04/06/22

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	YES
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	NO
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	NO
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	NO

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2217633
Project Number:	15.0167018.00	**Report Date:**	05/12/22

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2217633
Project Number:	15.0167018.00	**Report Date:**	05/12/22

Case Narrative (continued)

Report Revision

May 12, 2022: The Client IDs were amended on L2217633-07, -08 and -09.

Report Submission

May 12, 2022: This final report includes the results of all requested analyses.

May 04, 2022: This is a preliminary report.

April 28, 2022: This is a preliminary report.

April 20, 2022: This is a preliminary report.

MCP Related Narratives

Sample Receipt

The grab samples submitted for Volatile Organics were received without raw soil for the Total Solids analysis. At the client's request, the Total Solids results from the corresponding composite samples were utilized in the dry weight calculation of the Volatile Organics data.

In reference to question H:

A Matrix Spike was not submitted for the analysis of Total Metals.

Volatile Organics

In reference to question H:

L2217633-01, -03, and -05: Initial Calibration did not meet:

Lowest Calibration Standard Minimum Response Factor: 1,4-dioxane (0.0019), 1,1,2-trichloroethane (0.1752)

Average Response Factor: 1,4-dioxane

L2217633-01, -03, and -05: The associated continuing calibration standard is outside the acceptance criteria for several compounds; however, it is within overall method allowances. Associated results are considered to be biased high if the %D is negative and biased low if the %D is positive. A copy of the continuing calibration standard is included as an addendum to this report.

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2217633
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Case Narrative (continued)

EPH

In reference to question G:

L2217633-02: One or more of the target analytes did not achieve the requested CAM reporting limits.

In reference to question I:

All samples were analyzed for a subset of MCP analytes per client request.

Non-MCP Related Narratives

PAHs/PCB Congeners

L2217633-02D, -04D, and -06D: The sample has elevated detection limits due to the dilution required by the sample matrix.

Total Organic Carbon

L2217633-02, -04, and -06: The sample was frozen upon receipt in order to arrest the holding time.

Grain Size Analysis

The WG1634408-1 Laboratory Duplicate RPDs for % total gravel (49%), % coarse sand (24%), and % medium sand (25%), performed on L2217633-04, are outside the acceptance criteria. The elevated RPDs have been attributed to the non-homogeneous nature of the native sample.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Caitlin Walukevich

Caitlin Walukevich

Title: Technical Director/Representative

Date: 05/12/22

QC OUTLIER SUMMARY REPORT

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2217633
Report Date: 05/12/22

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
Grain Size Analysis - Mansfield Lab								
D6913/D7928	Batch QC (L2217633-04)	WG1634408-1	% Total Gravel	Duplicate	49	20	02,04,06	non-directional bias
D6913/D7928	Batch QC (L2217633-04)	WG1634408-1	% Coarse Sand	Duplicate	24	20	02,04,06	non-directional bias
D6913/D7928	Batch QC (L2217633-04)	WG1634408-1	% Medium Sand	Duplicate	25	20	02,04,06	non-directional bias

ORGANICS

VOLATILES

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-01 Date Collected: 04/05/22 11:20
Client ID: S-1 Date Received: 04/06/22
Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 141,8260D
Analytical Date: 04/13/22 16:32
Analyst: AJK
Percent Solids: 29%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
Methylene chloride	ND		ug/kg	14	--	1
1,1-Dichloroethane	ND		ug/kg	2.8	--	1
Chloroform	ND		ug/kg	4.2	--	1
Carbon tetrachloride	ND		ug/kg	2.8	--	1
1,2-Dichloropropane	ND		ug/kg	2.8	--	1
Dibromochloromethane	ND		ug/kg	2.8	--	1
1,1,2-Trichloroethane	ND		ug/kg	2.8	--	1
Tetrachloroethene	ND		ug/kg	1.4	--	1
Chlorobenzene	ND		ug/kg	1.4	--	1
Trichlorofluoromethane	ND		ug/kg	11	--	1
1,2-Dichloroethane	ND		ug/kg	2.8	--	1
1,1,1-Trichloroethane	ND		ug/kg	1.4	--	1
Bromodichloromethane	ND		ug/kg	1.4	--	1
trans-1,3-Dichloropropene	ND		ug/kg	2.8	--	1
cis-1,3-Dichloropropene	ND		ug/kg	1.4	--	1
1,3-Dichloropropene, Total	ND		ug/kg	1.4	--	1
1,1-Dichloropropene	ND		ug/kg	1.4	--	1
Bromoform	ND		ug/kg	11	--	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	1.4	--	1
Benzene	ND		ug/kg	1.4	--	1
Toluene	ND		ug/kg	2.8	--	1
Ethylbenzene	ND		ug/kg	2.8	--	1
Chloromethane	ND		ug/kg	11	--	1
Bromomethane	ND		ug/kg	5.5	--	1
Vinyl chloride	ND		ug/kg	2.8	--	1
Chloroethane	ND		ug/kg	5.5	--	1
1,1-Dichloroethene	ND		ug/kg	2.8	--	1
trans-1,2-Dichloroethene	ND		ug/kg	4.2	--	1

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-01 Date Collected: 04/05/22 11:20

Client ID: S-1 Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
Trichloroethene	ND		ug/kg	1.4	--	1
1,2-Dichlorobenzene	ND		ug/kg	5.5	--	1
1,3-Dichlorobenzene	ND		ug/kg	5.5	--	1
1,4-Dichlorobenzene	ND		ug/kg	5.5	--	1
Methyl tert butyl ether	ND		ug/kg	5.5	--	1
p/m-Xylene	ND		ug/kg	5.5	--	1
o-Xylene	ND		ug/kg	2.8	--	1
Xylenes, Total	ND		ug/kg	2.8	--	1
cis-1,2-Dichloroethene	ND		ug/kg	2.8	--	1
1,2-Dichloroethene, Total	ND		ug/kg	2.8	--	1
Dibromomethane	ND		ug/kg	5.5	--	1
1,2,3-Trichloropropane	ND		ug/kg	5.5	--	1
Styrene	ND		ug/kg	2.8	--	1
Dichlorodifluoromethane	ND		ug/kg	28	--	1
Acetone	100		ug/kg	69	--	1
Carbon disulfide	ND		ug/kg	28	--	1
Methyl ethyl ketone	ND		ug/kg	28	--	1
Methyl isobutyl ketone	ND		ug/kg	28	--	1
2-Hexanone	ND		ug/kg	28	--	1
Bromochloromethane	ND		ug/kg	5.5	--	1
Tetrahydrofuran	ND		ug/kg	11	--	1
2,2-Dichloropropane	ND		ug/kg	5.5	--	1
1,2-Dibromoethane	ND		ug/kg	2.8	--	1
1,3-Dichloropropane	ND		ug/kg	5.5	--	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	1.4	--	1
Bromobenzene	ND		ug/kg	5.5	--	1
n-Butylbenzene	ND		ug/kg	2.8	--	1
sec-Butylbenzene	ND		ug/kg	2.8	--	1
tert-Butylbenzene	ND		ug/kg	5.5	--	1
o-Chlorotoluene	ND		ug/kg	5.5	--	1
p-Chlorotoluene	ND		ug/kg	5.5	--	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	8.3	--	1
Hexachlorobutadiene	ND		ug/kg	11	--	1
Isopropylbenzene	ND		ug/kg	2.8	--	1
p-Isopropyltoluene	ND		ug/kg	2.8	--	1
Naphthalene	ND		ug/kg	11	--	1
n-Propylbenzene	ND		ug/kg	2.8	--	1

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-01 Date Collected: 04/05/22 11:20

Client ID: S-1 Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/kg	5.5	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	5.5	--	1
1,3,5-Trimethylbenzene	ND		ug/kg	5.5	--	1
1,2,4-Trimethylbenzene	ND		ug/kg	5.5	--	1
Diethyl ether	ND		ug/kg	5.5	--	1
Diisopropyl Ether	ND		ug/kg	5.5	--	1
Ethyl-Tert-Butyl-Ether	ND		ug/kg	5.5	--	1
Tertiary-Amyl Methyl Ether	ND		ug/kg	5.5	--	1
1,4-Dioxane	ND		ug/kg	220	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	99		70-130
Toluene-d8	112		70-130
4-Bromofluorobenzene	106		70-130
Dibromofluoromethane	95		70-130

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-03
Client ID: S-3
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 13:05
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 141,8260D
Analytical Date: 04/13/22 16:58
Analyst: AJK
Percent Solids: 27%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
Methylene chloride	ND		ug/kg	15	--	1
1,1-Dichloroethane	ND		ug/kg	3.0	--	1
Chloroform	ND		ug/kg	4.4	--	1
Carbon tetrachloride	ND		ug/kg	3.0	--	1
1,2-Dichloropropane	ND		ug/kg	3.0	--	1
Dibromochloromethane	ND		ug/kg	3.0	--	1
1,1,2-Trichloroethane	ND		ug/kg	3.0	--	1
Tetrachloroethene	ND		ug/kg	1.5	--	1
Chlorobenzene	ND		ug/kg	1.5	--	1
Trichlorofluoromethane	ND		ug/kg	12	--	1
1,2-Dichloroethane	ND		ug/kg	3.0	--	1
1,1,1-Trichloroethane	ND		ug/kg	1.5	--	1
Bromodichloromethane	ND		ug/kg	1.5	--	1
trans-1,3-Dichloropropene	ND		ug/kg	3.0	--	1
cis-1,3-Dichloropropene	ND		ug/kg	1.5	--	1
1,3-Dichloropropene, Total	ND		ug/kg	1.5	--	1
1,1-Dichloropropene	ND		ug/kg	1.5	--	1
Bromoform	ND		ug/kg	12	--	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	1.5	--	1
Benzene	ND		ug/kg	1.5	--	1
Toluene	ND		ug/kg	3.0	--	1
Ethylbenzene	ND		ug/kg	3.0	--	1
Chloromethane	ND		ug/kg	12	--	1
Bromomethane	ND		ug/kg	5.9	--	1
Vinyl chloride	ND		ug/kg	3.0	--	1
Chloroethane	ND		ug/kg	5.9	--	1
1,1-Dichloroethene	ND		ug/kg	3.0	--	1
trans-1,2-Dichloroethene	ND		ug/kg	4.4	--	1

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-03 Date Collected: 04/05/22 13:05

Client ID: S-3 Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
Trichloroethene	ND		ug/kg	1.5	--	1
1,2-Dichlorobenzene	ND		ug/kg	5.9	--	1
1,3-Dichlorobenzene	ND		ug/kg	5.9	--	1
1,4-Dichlorobenzene	ND		ug/kg	5.9	--	1
Methyl tert butyl ether	ND		ug/kg	5.9	--	1
p/m-Xylene	ND		ug/kg	5.9	--	1
o-Xylene	ND		ug/kg	3.0	--	1
Xylenes, Total	ND		ug/kg	3.0	--	1
cis-1,2-Dichloroethene	ND		ug/kg	3.0	--	1
1,2-Dichloroethene, Total	ND		ug/kg	3.0	--	1
Dibromomethane	ND		ug/kg	5.9	--	1
1,2,3-Trichloropropane	ND		ug/kg	5.9	--	1
Styrene	ND		ug/kg	3.0	--	1
Dichlorodifluoromethane	ND		ug/kg	30	--	1
Acetone	150		ug/kg	74	--	1
Carbon disulfide	ND		ug/kg	30	--	1
Methyl ethyl ketone	37		ug/kg	30	--	1
Methyl isobutyl ketone	ND		ug/kg	30	--	1
2-Hexanone	ND		ug/kg	30	--	1
Bromochloromethane	ND		ug/kg	5.9	--	1
Tetrahydrofuran	ND		ug/kg	12	--	1
2,2-Dichloropropane	ND		ug/kg	5.9	--	1
1,2-Dibromoethane	ND		ug/kg	3.0	--	1
1,3-Dichloropropane	ND		ug/kg	5.9	--	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	1.5	--	1
Bromobenzene	ND		ug/kg	5.9	--	1
n-Butylbenzene	ND		ug/kg	3.0	--	1
sec-Butylbenzene	ND		ug/kg	3.0	--	1
tert-Butylbenzene	ND		ug/kg	5.9	--	1
o-Chlorotoluene	ND		ug/kg	5.9	--	1
p-Chlorotoluene	ND		ug/kg	5.9	--	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	8.9	--	1
Hexachlorobutadiene	ND		ug/kg	12	--	1
Isopropylbenzene	ND		ug/kg	3.0	--	1
p-Isopropyltoluene	ND		ug/kg	3.0	--	1
Naphthalene	ND		ug/kg	12	--	1
n-Propylbenzene	ND		ug/kg	3.0	--	1

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-03 Date Collected: 04/05/22 13:05

Client ID: S-3 Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/kg	5.9	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	5.9	--	1
1,3,5-Trimethylbenzene	ND		ug/kg	5.9	--	1
1,2,4-Trimethylbenzene	ND		ug/kg	5.9	--	1
Diethyl ether	ND		ug/kg	5.9	--	1
Diisopropyl Ether	ND		ug/kg	5.9	--	1
Ethyl-Tert-Butyl-Ether	ND		ug/kg	5.9	--	1
Tertiary-Amyl Methyl Ether	ND		ug/kg	5.9	--	1
1,4-Dioxane	ND		ug/kg	240	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	101		70-130
Toluene-d8	107		70-130
4-Bromofluorobenzene	105		70-130
Dibromofluoromethane	95		70-130

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-05
Client ID: S-6
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 14:30
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 141,8260D
Analytical Date: 04/13/22 17:25
Analyst: AJK
Percent Solids: 30%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
Methylene chloride	ND		ug/kg	14	--	1
1,1-Dichloroethane	ND		ug/kg	2.7	--	1
Chloroform	ND		ug/kg	4.1	--	1
Carbon tetrachloride	ND		ug/kg	2.7	--	1
1,2-Dichloropropane	ND		ug/kg	2.7	--	1
Dibromochloromethane	ND		ug/kg	2.7	--	1
1,1,2-Trichloroethane	ND		ug/kg	2.7	--	1
Tetrachloroethene	ND		ug/kg	1.4	--	1
Chlorobenzene	ND		ug/kg	1.4	--	1
Trichlorofluoromethane	ND		ug/kg	11	--	1
1,2-Dichloroethane	ND		ug/kg	2.7	--	1
1,1,1-Trichloroethane	ND		ug/kg	1.4	--	1
Bromodichloromethane	ND		ug/kg	1.4	--	1
trans-1,3-Dichloropropene	ND		ug/kg	2.7	--	1
cis-1,3-Dichloropropene	ND		ug/kg	1.4	--	1
1,3-Dichloropropene, Total	ND		ug/kg	1.4	--	1
1,1-Dichloropropene	ND		ug/kg	1.4	--	1
Bromoform	ND		ug/kg	11	--	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	1.4	--	1
Benzene	ND		ug/kg	1.4	--	1
Toluene	ND		ug/kg	2.7	--	1
Ethylbenzene	ND		ug/kg	2.7	--	1
Chloromethane	ND		ug/kg	11	--	1
Bromomethane	ND		ug/kg	5.4	--	1
Vinyl chloride	ND		ug/kg	2.7	--	1
Chloroethane	ND		ug/kg	5.4	--	1
1,1-Dichloroethene	ND		ug/kg	2.7	--	1
trans-1,2-Dichloroethene	ND		ug/kg	4.1	--	1

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-05 Date Collected: 04/05/22 14:30

Client ID: S-6 Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
Trichloroethene	ND		ug/kg	1.4	--	1
1,2-Dichlorobenzene	ND		ug/kg	5.4	--	1
1,3-Dichlorobenzene	ND		ug/kg	5.4	--	1
1,4-Dichlorobenzene	ND		ug/kg	5.4	--	1
Methyl tert butyl ether	ND		ug/kg	5.4	--	1
p/m-Xylene	ND		ug/kg	5.4	--	1
o-Xylene	ND		ug/kg	2.7	--	1
Xylenes, Total	ND		ug/kg	2.7	--	1
cis-1,2-Dichloroethene	ND		ug/kg	2.7	--	1
1,2-Dichloroethene, Total	ND		ug/kg	2.7	--	1
Dibromomethane	ND		ug/kg	5.4	--	1
1,2,3-Trichloropropane	ND		ug/kg	5.4	--	1
Styrene	ND		ug/kg	2.7	--	1
Dichlorodifluoromethane	ND		ug/kg	27	--	1
Acetone	100		ug/kg	68	--	1
Carbon disulfide	ND		ug/kg	27	--	1
Methyl ethyl ketone	ND		ug/kg	27	--	1
Methyl isobutyl ketone	ND		ug/kg	27	--	1
2-Hexanone	ND		ug/kg	27	--	1
Bromochloromethane	ND		ug/kg	5.4	--	1
Tetrahydrofuran	ND		ug/kg	11	--	1
2,2-Dichloropropane	ND		ug/kg	5.4	--	1
1,2-Dibromoethane	ND		ug/kg	2.7	--	1
1,3-Dichloropropane	ND		ug/kg	5.4	--	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	1.4	--	1
Bromobenzene	ND		ug/kg	5.4	--	1
n-Butylbenzene	ND		ug/kg	2.7	--	1
sec-Butylbenzene	ND		ug/kg	2.7	--	1
tert-Butylbenzene	ND		ug/kg	5.4	--	1
o-Chlorotoluene	ND		ug/kg	5.4	--	1
p-Chlorotoluene	ND		ug/kg	5.4	--	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	8.2	--	1
Hexachlorobutadiene	ND		ug/kg	11	--	1
Isopropylbenzene	ND		ug/kg	2.7	--	1
p-Isopropyltoluene	ND		ug/kg	2.7	--	1
Naphthalene	ND		ug/kg	11	--	1
n-Propylbenzene	ND		ug/kg	2.7	--	1

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-05 Date Collected: 04/05/22 14:30

Client ID: S-6 Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by EPA 5035 Low - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/kg	5.4	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	5.4	--	1
1,3,5-Trimethylbenzene	ND		ug/kg	5.4	--	1
1,2,4-Trimethylbenzene	ND		ug/kg	5.4	--	1
Diethyl ether	ND		ug/kg	5.4	--	1
Diisopropyl Ether	ND		ug/kg	5.4	--	1
Ethyl-Tert-Butyl-Ether	ND		ug/kg	5.4	--	1
Tertiary-Amyl Methyl Ether	ND		ug/kg	5.4	--	1
1,4-Dioxane	ND		ug/kg	220	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	98		70-130
Toluene-d8	107		70-130
4-Bromofluorobenzene	99		70-130
Dibromofluoromethane	94		70-130

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 141,8260D
Analytical Date: 04/13/22 16:05
Analyst: LAC

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01,03,05 Batch: WG1627117-5					
Methylene chloride	ND		ug/kg	5.0	--
1,1-Dichloroethane	ND		ug/kg	1.0	--
Chloroform	ND		ug/kg	1.5	--
Carbon tetrachloride	ND		ug/kg	1.0	--
1,2-Dichloropropane	ND		ug/kg	1.0	--
Dibromochloromethane	ND		ug/kg	1.0	--
1,1,2-Trichloroethane	ND		ug/kg	1.0	--
Tetrachloroethene	ND		ug/kg	0.50	--
Chlorobenzene	ND		ug/kg	0.50	--
Trichlorofluoromethane	ND		ug/kg	4.0	--
1,2-Dichloroethane	ND		ug/kg	1.0	--
1,1,1-Trichloroethane	ND		ug/kg	0.50	--
Bromodichloromethane	ND		ug/kg	0.50	--
trans-1,3-Dichloropropene	ND		ug/kg	1.0	--
cis-1,3-Dichloropropene	ND		ug/kg	0.50	--
1,3-Dichloropropene, Total	ND		ug/kg	0.50	--
1,1-Dichloropropene	ND		ug/kg	0.50	--
Bromoform	ND		ug/kg	4.0	--
1,1,2,2-Tetrachloroethane	ND		ug/kg	0.50	--
Benzene	ND		ug/kg	0.50	--
Toluene	ND		ug/kg	1.0	--
Ethylbenzene	ND		ug/kg	1.0	--
Chloromethane	ND		ug/kg	4.0	--
Bromomethane	ND		ug/kg	2.0	--
Vinyl chloride	ND		ug/kg	1.0	--
Chloroethane	ND		ug/kg	2.0	--
1,1-Dichloroethene	ND		ug/kg	1.0	--
trans-1,2-Dichloroethene	ND		ug/kg	1.5	--
Trichloroethene	ND		ug/kg	0.50	--

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 141,8260D
Analytical Date: 04/13/22 16:05
Analyst: LAC

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01,03,05 Batch: WG1627117-5					
1,2-Dichlorobenzene	ND		ug/kg	2.0	--
1,3-Dichlorobenzene	ND		ug/kg	2.0	--
1,4-Dichlorobenzene	ND		ug/kg	2.0	--
Methyl tert butyl ether	ND		ug/kg	2.0	--
p/m-Xylene	ND		ug/kg	2.0	--
o-Xylene	ND		ug/kg	1.0	--
Xylenes, Total	ND		ug/kg	1.0	--
cis-1,2-Dichloroethene	ND		ug/kg	1.0	--
1,2-Dichloroethene, Total	ND		ug/kg	1.0	--
Dibromomethane	ND		ug/kg	2.0	--
1,2,3-Trichloropropane	ND		ug/kg	2.0	--
Styrene	ND		ug/kg	1.0	--
Dichlorodifluoromethane	ND		ug/kg	10	--
Acetone	ND		ug/kg	25	--
Carbon disulfide	ND		ug/kg	10	--
Methyl ethyl ketone	ND		ug/kg	10	--
Methyl isobutyl ketone	ND		ug/kg	10	--
2-Hexanone	ND		ug/kg	10	--
Bromochloromethane	ND		ug/kg	2.0	--
Tetrahydrofuran	ND		ug/kg	4.0	--
2,2-Dichloropropane	ND		ug/kg	2.0	--
1,2-Dibromoethane	ND		ug/kg	1.0	--
1,3-Dichloropropane	ND		ug/kg	2.0	--
1,1,1,2-Tetrachloroethane	ND		ug/kg	0.50	--
Bromobenzene	ND		ug/kg	2.0	--
n-Butylbenzene	ND		ug/kg	1.0	--
sec-Butylbenzene	ND		ug/kg	1.0	--
tert-Butylbenzene	ND		ug/kg	2.0	--
o-Chlorotoluene	ND		ug/kg	2.0	--

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 141,8260D
Analytical Date: 04/13/22 16:05
Analyst: LAC

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01,03,05 Batch: WG1627117-5					
p-Chlorotoluene	ND		ug/kg	2.0	--
1,2-Dibromo-3-chloropropane	ND		ug/kg	3.0	--
Hexachlorobutadiene	ND		ug/kg	4.0	--
Isopropylbenzene	ND		ug/kg	1.0	--
p-Isopropyltoluene	ND		ug/kg	1.0	--
Naphthalene	ND		ug/kg	4.0	--
n-Propylbenzene	ND		ug/kg	1.0	--
1,2,3-Trichlorobenzene	ND		ug/kg	2.0	--
1,2,4-Trichlorobenzene	ND		ug/kg	2.0	--
1,3,5-Trimethylbenzene	ND		ug/kg	2.0	--
1,2,4-Trimethylbenzene	ND		ug/kg	2.0	--
Diethyl ether	ND		ug/kg	2.0	--
Diisopropyl Ether	ND		ug/kg	2.0	--
Ethyl-Tert-Butyl-Ether	ND		ug/kg	2.0	--
Tertiary-Amyl Methyl Ether	ND		ug/kg	2.0	--
1,4-Dioxane	ND		ug/kg	80	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	101		70-130
Toluene-d8	106		70-130
4-Bromofluorobenzene	97		70-130
Dibromofluoromethane	92		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,03,05 Batch: WG1627117-3 WG1627117-4								
Methylene chloride	82		81		70-130	1		20
1,1-Dichloroethane	84		85		70-130	1		20
Chloroform	84		83		70-130	1		20
Carbon tetrachloride	90		89		70-130	1		20
1,2-Dichloropropane	83		84		70-130	1		20
Dibromochloromethane	109		110		70-130	1		20
1,1,2-Trichloroethane	103		107		70-130	4		20
Tetrachloroethene	114		115		70-130	1		20
Chlorobenzene	106		106		70-130	0		20
Trichlorofluoromethane	97		95		70-130	2		20
1,2-Dichloroethane	87		86		70-130	1		20
1,1,1-Trichloroethane	93		91		70-130	2		20
Bromodichloromethane	88		87		70-130	1		20
trans-1,3-Dichloropropene	110		113		70-130	3		20
cis-1,3-Dichloropropene	90		90		70-130	0		20
1,1-Dichloropropene	92		93		70-130	1		20
Bromoform	112		113		70-130	1		20
1,1,2,2-Tetrachloroethane	109		110		70-130	1		20
Benzene	86		87		70-130	1		20
Toluene	105		107		70-130	2		20
Ethylbenzene	108		109		70-130	1		20
Chloromethane	90		89		70-130	1		20
Bromomethane	76		82		70-130	8		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,03,05 Batch: WG1627117-3 WG1627117-4								
Vinyl chloride	90		91		70-130	1		20
Chloroethane	92		92		70-130	0		20
1,1-Dichloroethene	90		89		70-130	1		20
trans-1,2-Dichloroethene	81		80		70-130	1		20
Trichloroethene	88		86		70-130	2		20
1,2-Dichlorobenzene	111		111		70-130	0		20
1,3-Dichlorobenzene	113		113		70-130	0		20
1,4-Dichlorobenzene	111		111		70-130	0		20
Methyl tert butyl ether	89		90		70-130	1		20
p/m-Xylene	112		112		70-130	0		20
o-Xylene	112		112		70-130	0		20
cis-1,2-Dichloroethene	84		84		70-130	0		20
Dibromomethane	85		84		70-130	1		20
1,2,3-Trichloropropane	107		110		70-130	3		20
Styrene	114		114		70-130	0		20
Dichlorodifluoromethane	88		88		70-130	0		20
Acetone	108		96		70-130	12		20
Carbon disulfide	88		87		70-130	1		20
Methyl ethyl ketone	87		84		70-130	4		20
Methyl isobutyl ketone	112		112		70-130	0		20
2-Hexanone	116		117		70-130	1		20
Bromochloromethane	85		84		70-130	1		20
Tetrahydrofuran	84		86		70-130	2		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,03,05 Batch: WG1627117-3 WG1627117-4								
2,2-Dichloropropane	91		89		70-130	2		20
1,2-Dibromoethane	108		110		70-130	2		20
1,3-Dichloropropane	105		107		70-130	2		20
1,1,1,2-Tetrachloroethane	108		109		70-130	1		20
Bromobenzene	108		109		70-130	1		20
n-Butylbenzene	119		119		70-130	0		20
sec-Butylbenzene	117		117		70-130	0		20
tert-Butylbenzene	116		116		70-130	0		20
o-Chlorotoluene	98		109		70-130	11		20
p-Chlorotoluene	112		113		70-130	1		20
1,2-Dibromo-3-chloropropane	112		110		70-130	2		20
Hexachlorobutadiene	122		120		70-130	2		20
Isopropylbenzene	114		114		70-130	0		20
p-Isopropyltoluene	120		120		70-130	0		20
Naphthalene	117		114		70-130	3		20
n-Propylbenzene	113		114		70-130	1		20
1,2,3-Trichlorobenzene	116		115		70-130	1		20
1,2,4-Trichlorobenzene	121		119		70-130	2		20
1,3,5-Trimethylbenzene	114		114		70-130	0		20
1,2,4-Trimethylbenzene	114		115		70-130	1		20
Diethyl ether	88		90		70-130	2		20
Diisopropyl Ether	88		89		70-130	1		20
Ethyl-Tert-Butyl-Ether	89		89		70-130	0		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,03,05 Batch: WG1627117-3 WG1627117-4								
Tertiary-Amyl Methyl Ether	88		89		70-130	1		20
1,4-Dioxane	85		86		70-130	1		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	97		95		70-130
Toluene-d8	106		108		70-130
4-Bromofluorobenzene	97		96		70-130
Dibromofluoromethane	89		89		70-130

SEMIVOLATILES

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-02 D
Client ID: S-1/2
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 11:40
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 04/19/22 20:25
Analyst: GP
Percent Solids: 29%

Extraction Method: EPA 3570
Extraction Date: 04/07/22 17:20
Cleanup Method: EPA 3630
Cleanup Date: 04/14/22

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Naphthalene	733		ug/kg	276	--	20
2-Methylnaphthalene	385		ug/kg	276	--	20
Acenaphthylene	1630		ug/kg	276	--	20
Acenaphthene	651		ug/kg	276	--	20
Fluorene	1380		ug/kg	276	--	20
Phenanthrene	9380		ug/kg	276	--	20
Anthracene	3210		ug/kg	276	--	20
Fluoranthene	20200		ug/kg	276	--	20
Pyrene	22600		ug/kg	276	--	20
Benz(a)anthracene	11100		ug/kg	276	--	20
Chrysene	10600		ug/kg	276	--	20
Benzo(b)fluoranthene	9730		ug/kg	276	--	20
Benzo(k)fluoranthene	8280		ug/kg	276	--	20
Benzo(a)pyrene	11100		ug/kg	276	--	20
Indeno(1,2,3-cd)Pyrene	7270		ug/kg	276	--	20
Dibenz(a,h)anthracene	1560		ug/kg	276	--	20
Benzo(ghi)perylene	6990		ug/kg	276	--	20
Cl2-BZ#8	ND		ug/kg	27.6	--	20
Cl3-BZ#18	ND		ug/kg	27.6	--	20
Cl3-BZ#28	ND		ug/kg	27.6	--	20
Cl4-BZ#44	ND		ug/kg	27.6	--	20
Cl4-BZ#49	ND		ug/kg	27.6	--	20
Cl4-BZ#52	ND		ug/kg	27.6	--	20
Cl4-BZ#66	ND		ug/kg	27.6	--	20
Cl5-BZ#87	ND		ug/kg	27.6	--	20
Cl5-BZ#101	ND		ug/kg	27.6	--	20
Cl5-BZ#105	ND		ug/kg	27.6	--	20
Cl5-BZ#118	ND		ug/kg	27.6	--	20

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-02 D
Client ID: S-1/2
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 11:40
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Cl6-BZ#128	ND		ug/kg	27.6	--	20
Cl6-BZ#138	ND		ug/kg	27.6	--	20
Cl6-BZ#153	ND		ug/kg	27.6	--	20
Cl7-BZ#170	ND		ug/kg	27.6	--	20
Cl7-BZ#180	ND		ug/kg	27.6	--	20
Cl7-BZ#183	ND		ug/kg	27.6	--	20
Cl7-BZ#184	ND		ug/kg	27.6	--	20
Cl7-BZ#187	ND		ug/kg	27.6	--	20
Cl8-BZ#195	ND		ug/kg	27.6	--	20
Cl9-BZ#206	ND		ug/kg	27.6	--	20
Cl10-BZ#209	ND		ug/kg	27.6	--	20

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	62		30-150
Pyrene-d10	74		30-150
Benzo(b)fluoranthene-d12	61		30-150
DBOB	87		50-125
BZ 198	85		50-125

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-04 D
Client ID: S-3/4
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 13:35
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 04/19/22 20:56
Analyst: GP
Percent Solids: 27%

Extraction Method: EPA 3570
Extraction Date: 04/07/22 17:20
Cleanup Method: EPA 3630
Cleanup Date: 04/14/22

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Naphthalene	1550		ug/kg	277	--	20
2-Methylnaphthalene	871		ug/kg	277	--	20
Acenaphthylene	2550		ug/kg	277	--	20
Acenaphthene	1410		ug/kg	277	--	20
Fluorene	3170		ug/kg	277	--	20
Phenanthrene	27200		ug/kg	277	--	20
Anthracene	6470		ug/kg	277	--	20
Fluoranthene	39600		ug/kg	277	--	20
Pyrene	42300		ug/kg	277	--	20
Benz(a)anthracene	18700		ug/kg	277	--	20
Chrysene	19800		ug/kg	277	--	20
Benzo(b)fluoranthene	18600		ug/kg	277	--	20
Benzo(k)fluoranthene	12000		ug/kg	277	--	20
Benzo(a)pyrene	18900		ug/kg	277	--	20
Indeno(1,2,3-cd)Pyrene	12100		ug/kg	277	--	20
Dibenz(a,h)anthracene	2600		ug/kg	277	--	20
Benzo(ghi)perylene	11400		ug/kg	277	--	20
Cl2-BZ#8	ND		ug/kg	27.7	--	20
Cl3-BZ#18	ND		ug/kg	27.7	--	20
Cl3-BZ#28	ND		ug/kg	27.7	--	20
Cl4-BZ#44	ND		ug/kg	27.7	--	20
Cl4-BZ#49	ND		ug/kg	27.7	--	20
Cl4-BZ#52	ND		ug/kg	27.7	--	20
Cl4-BZ#66	ND		ug/kg	27.7	--	20
Cl5-BZ#87	ND		ug/kg	27.7	--	20
Cl5-BZ#101	ND		ug/kg	27.7	--	20
Cl5-BZ#105	ND		ug/kg	27.7	--	20
Cl5-BZ#118	ND		ug/kg	27.7	--	20

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-04 D
Client ID: S-3/4
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 13:35
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Cl6-BZ#128	ND		ug/kg	27.7	--	20
Cl6-BZ#138	33.1		ug/kg	27.7	--	20
Cl6-BZ#153	28.0		ug/kg	27.7	--	20
Cl7-BZ#170	ND		ug/kg	27.7	--	20
Cl7-BZ#180	32.0		ug/kg	27.7	--	20
Cl7-BZ#183	ND		ug/kg	27.7	--	20
Cl7-BZ#184	ND		ug/kg	27.7	--	20
Cl7-BZ#187	ND		ug/kg	27.7	--	20
Cl8-BZ#195	ND		ug/kg	27.7	--	20
Cl9-BZ#206	ND		ug/kg	27.7	--	20
Cl10-BZ#209	ND		ug/kg	27.7	--	20

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	59		30-150
Pyrene-d10	69		30-150
Benzo(b)fluoranthene-d12	57		30-150
DBOB	97		50-125
BZ 198	62		50-125

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-06 D
Client ID: S-5/6
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 04/19/22 21:28
Analyst: GP
Percent Solids: 30%

Extraction Method: EPA 3570
Extraction Date: 04/07/22 17:20
Cleanup Method: EPA 3630
Cleanup Date: 04/14/22

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Naphthalene	1810		ug/kg	257	--	20
2-Methylnaphthalene	1240		ug/kg	257	--	20
Acenaphthylene	2190		ug/kg	257	--	20
Acenaphthene	2530		ug/kg	257	--	20
Fluorene	4310		ug/kg	257	--	20
Phenanthrene	33500		ug/kg	257	--	20
Anthracene	7810		ug/kg	257	--	20
Fluoranthene	40000		ug/kg	257	--	20
Pyrene	41800		ug/kg	257	--	20
Benz(a)anthracene	18200		ug/kg	257	--	20
Chrysene	18400		ug/kg	257	--	20
Benzo(b)fluoranthene	17800		ug/kg	257	--	20
Benzo(k)fluoranthene	11000		ug/kg	257	--	20
Benzo(a)pyrene	17500		ug/kg	257	--	20
Indeno(1,2,3-cd)Pyrene	11400		ug/kg	257	--	20
Dibenz(a,h)anthracene	2480		ug/kg	257	--	20
Benzo(ghi)perylene	10500		ug/kg	257	--	20
Cl2-BZ#8	ND		ug/kg	25.7	--	20
Cl3-BZ#18	ND		ug/kg	25.7	--	20
Cl3-BZ#28	ND		ug/kg	25.7	--	20
Cl4-BZ#44	ND		ug/kg	25.7	--	20
Cl4-BZ#49	ND		ug/kg	25.7	--	20
Cl4-BZ#52	ND		ug/kg	25.7	--	20
Cl4-BZ#66	ND		ug/kg	25.7	--	20
Cl5-BZ#87	ND		ug/kg	25.7	--	20
Cl5-BZ#101	ND		ug/kg	25.7	--	20
Cl5-BZ#105	ND		ug/kg	25.7	--	20
Cl5-BZ#118	ND		ug/kg	25.7	--	20

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-06 D
Client ID: S-5/6
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Cl6-BZ#128	ND		ug/kg	25.7	--	20
Cl6-BZ#138	ND		ug/kg	25.7	--	20
Cl6-BZ#153	ND		ug/kg	25.7	--	20
Cl7-BZ#170	ND		ug/kg	25.7	--	20
Cl7-BZ#180	ND		ug/kg	25.7	--	20
Cl7-BZ#183	ND		ug/kg	25.7	--	20
Cl7-BZ#184	ND		ug/kg	25.7	--	20
Cl7-BZ#187	ND		ug/kg	25.7	--	20
Cl8-BZ#195	ND		ug/kg	25.7	--	20
Cl9-BZ#206	ND		ug/kg	25.7	--	20
Cl10-BZ#209	ND		ug/kg	25.7	--	20

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	73		30-150
Pyrene-d10	81		30-150
Benzo(b)fluoranthene-d12	70		30-150
DBOB	101		50-125
BZ 198	99		50-125

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 04/19/22 09:20
Analyst: GP

Extraction Method: EPA 3570
Extraction Date: 04/07/22 17:20
Cleanup Method: EPA 3630
Cleanup Date: 04/14/22

Parameter	Result	Qualifier	Units	RL	MDL
PAHs/PCB Congeners by GC/MS - Mansfield Lab for sample(s): 02,04,06 Batch: WG1624848-1					
Naphthalene	ND		ug/kg	4.00	--
2-Methylnaphthalene	ND		ug/kg	4.00	--
Acenaphthylene	ND		ug/kg	4.00	--
Acenaphthene	ND		ug/kg	4.00	--
Fluorene	ND		ug/kg	4.00	--
Phenanthrene	ND		ug/kg	4.00	--
Anthracene	ND		ug/kg	4.00	--
Fluoranthene	ND		ug/kg	4.00	--
Pyrene	ND		ug/kg	4.00	--
Benz(a)anthracene	ND		ug/kg	4.00	--
Chrysene	ND		ug/kg	4.00	--
Benzo(b)fluoranthene	ND		ug/kg	4.00	--
Benzo(k)fluoranthene	ND		ug/kg	4.00	--
Benzo(a)pyrene	ND		ug/kg	4.00	--
Indeno(1,2,3-cd)Pyrene	ND		ug/kg	4.00	--
Dibenz(a,h)anthracene	ND		ug/kg	4.00	--
Benzo(ghi)perylene	ND		ug/kg	4.00	--
Cl2-BZ#8	ND		ug/kg	0.400	--
Cl3-BZ#18	ND		ug/kg	0.400	--
Cl3-BZ#28	ND		ug/kg	0.400	--
Cl4-BZ#44	ND		ug/kg	0.400	--
Cl4-BZ#49	ND		ug/kg	0.400	--
Cl4-BZ#52	ND		ug/kg	0.400	--
Cl4-BZ#66	ND		ug/kg	0.400	--
Cl5-BZ#87	ND		ug/kg	0.400	--
Cl5-BZ#101	ND		ug/kg	0.400	--
Cl5-BZ#105	ND		ug/kg	0.400	--
Cl5-BZ#118	ND		ug/kg	0.400	--
Cl6-BZ#128	ND		ug/kg	0.400	--

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 04/19/22 09:20
Analyst: GP

Extraction Method: EPA 3570
Extraction Date: 04/07/22 17:20
Cleanup Method: EPA 3630
Cleanup Date: 04/14/22

Parameter	Result	Qualifier	Units	RL	MDL
PAHs/PCB Congeners by GC/MS - Mansfield Lab for sample(s): 02,04,06 Batch: WG1624848-1					
Cl6-BZ#138	ND		ug/kg	0.400	--
Cl6-BZ#153	ND		ug/kg	0.400	--
Cl7-BZ#170	ND		ug/kg	0.400	--
Cl7-BZ#180	ND		ug/kg	0.400	--
Cl7-BZ#183	ND		ug/kg	0.400	--
Cl7-BZ#184	ND		ug/kg	0.400	--
Cl7-BZ#187	ND		ug/kg	0.400	--
Cl8-BZ#195	ND		ug/kg	0.400	--
Cl9-BZ#206	ND		ug/kg	0.400	--
Cl10-BZ#209	ND		ug/kg	0.400	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	77		30-150
Pyrene-d10	84		30-150
Benzo(b)fluoranthene-d12	88		30-150
DBOB	104		50-125
BZ 198	84		50-125

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PAHs/PCB Congeners by GC/MS - Mansfield Lab Associated sample(s): 02,04,06 Batch: WG1624848-2 WG1624848-3								
Naphthalene	77		82		40-140	6		30
Acenaphthylene	78		81		40-140	4		30
Acenaphthene	80		82		40-140	2		30
Fluorene	82		84		40-140	2		30
Phenanthrene	86		87		40-140	1		30
Anthracene	78		79		40-140	1		30
Fluoranthene	86		86		40-140	0		30
Pyrene	86		86		40-140	0		30
Benz(a)anthracene	91		93		40-140	2		30
Chrysene	79		78		40-140	1		30
Benzo(b)fluoranthene	92		96		40-140	4		30
Benzo(k)fluoranthene	81		81		40-140	0		30
Benzo(a)pyrene	79		80		40-140	1		30
Indeno(1,2,3-cd)Pyrene	90		92		40-140	2		30
Dibenz(a,h)anthracene	88		89		40-140	1		30
Benzo(ghi)perylene	96		98		40-140	2		30
Cl2-BZ#8	89		91		40-140	2		50
Cl3-BZ#18	82		83		40-140	1		50
Cl3-BZ#28	87		88		40-140	1		50
Cl4-BZ#44	91		92		40-140	1		50
Cl4-BZ#49	76		81		40-140	6		50
Cl4-BZ#52	92		87		40-140	6		50
Cl4-BZ#66	82		81		40-140	1		50

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PAHs/PCB Congeners by GC/MS - Mansfield Lab Associated sample(s): 02,04,06 Batch: WG1624848-2 WG1624848-3								
Cl5-BZ#87	84		84		40-140	0		50
Cl5-BZ#101	87		84		40-140	4		50
Cl5-BZ#105	86		85		40-140	1		50
Cl5-BZ#118	86		86		40-140	0		50
Cl6-BZ#128	86		86		40-140	0		50
Cl6-BZ#138	88		88		40-140	0		50
Cl6-BZ#153	92		91		40-140	1		50
Cl7-BZ#170	88		87		40-140	1		50
Cl7-BZ#180	89		88		40-140	1		50
Cl7-BZ#183	83		83		40-140	0		50
Cl7-BZ#184	91		87		40-140	4		50
Cl7-BZ#187	85		84		40-140	1		50
Cl8-BZ#195	95		95		40-140	0		50
Cl9-BZ#206	94		94		40-140	0		50
Cl10-BZ#209	95		94		40-140	1		50

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Methylnaphthalene-d10	74		77		30-150
Pyrene-d10	92		91		30-150
Benzo(b)fluoranthene-d12	87		87		30-150
DBOB	101		99		50-125
BZ 198	96		94		50-125

PETROLEUM HYDROCARBONS

Project Name: UPPER VAN HORN RESERVOIR DAM
Lab Number: L2217633
Project Number: 15.0167018.00
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-02
Client ID: S-1/2
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 11:40
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8015D(M)
Analytical Date: 04/12/22 10:44
Analyst: MEO
Percent Solids: 29%

Extraction Method: EPA 3546
Extraction Date: 04/11/22 06:47

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Petroleum Hydrocarbon Quantitation - Westborough Lab						
TPH (C10-C36)	938000		ug/kg	109000	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	61		40-140

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-04
Client ID: S-3/4
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 13:35
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8015D(M)
Analytical Date: 04/12/22 11:09
Analyst: MEO
Percent Solids: 27%

Extraction Method: EPA 3546
Extraction Date: 04/11/22 06:47

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Petroleum Hydrocarbon Quantitation - Westborough Lab						
TPH (C10-C36)	1100000		ug/kg	116000	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	68		40-140

Project Name: UPPER VAN HORN RESERVOIR DAM
Lab Number: L2217633
Project Number: 15.0167018.00
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-06
Client ID: S-5/6
Sample Location: SPRINGFIELD, MA

Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8015D(M)
Analytical Date: 04/12/22 11:34
Analyst: MEO
Percent Solids: 30%

Extraction Method: EPA 3546
Extraction Date: 04/11/22 06:47

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Petroleum Hydrocarbon Quantitation - Westborough Lab						
TPH (C10-C36)	368000		ug/kg	108000	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	46		40-140

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8015D(M)
Analytical Date: 04/12/22 08:40
Analyst: MEO

Extraction Method: EPA 3546
Extraction Date: 04/11/22 06:47

Parameter	Result	Qualifier	Units	RL	MDL
Petroleum Hydrocarbon Quantitation - Westborough Lab for sample(s): 02,04,06 Batch: WG1625684-1					
TPH (C10-C36)	ND		ug/kg	32800	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	63		40-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Petroleum Hydrocarbon Quantitation - Westborough Lab Associated sample(s): 02,04,06 Batch: WG1625684-2								
TPH (C10-C36)	82		-		40-140	-		40

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
o-Terphenyl	82				40-140

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID:	L2217633-02	Date Collected:	04/05/22 11:40
Client ID:	S-1/2	Date Received:	04/06/22
Sample Location:	SPRINGFIELD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Sediment	Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1	Extraction Date:	04/11/22 06:30
Analytical Date:	04/12/22 12:58	Cleanup Method1:	EPH-19-2.1
Analyst:	JB	Cleanup Date1:	04/12/22
Percent Solids:	29%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	44.6	--	2
C19-C36 Aliphatics	489		mg/kg	44.6	--	2
C11-C22 Aromatics	474		mg/kg	44.6	--	2
C11-C22 Aromatics, Adjusted	398		mg/kg	44.6	--	2

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	62		40-140
o-Terphenyl	75		40-140
2-Fluorobiphenyl	73		40-140
2-Bromonaphthalene	75		40-140

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID:	L2217633-04	Date Collected:	04/05/22 13:35
Client ID:	S-3/4	Date Received:	04/06/22
Sample Location:	SPRINGFIELD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Sediment	Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1	Extraction Date:	04/11/22 06:30
Analytical Date:	04/12/22 13:33	Cleanup Method1:	EPH-19-2.1
Analyst:	JB	Cleanup Date1:	04/12/22
Percent Solids:	27%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	46.7		mg/kg	23.3	--	1
C19-C36 Aliphatics	649		mg/kg	23.3	--	1
C11-C22 Aromatics	701		mg/kg	23.3	--	1
C11-C22 Aromatics, Adjusted	558		mg/kg	23.3	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	59		40-140
o-Terphenyl	73		40-140
2-Fluorobiphenyl	76		40-140
2-Bromonaphthalene	81		40-140

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID:	L2217633-06	Date Collected:	04/05/22 14:45
Client ID:	S-5/6	Date Received:	04/06/22
Sample Location:	SPRINGFIELD, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Sediment	Extraction Method:	EPA 3546
Analytical Method:	135,EPH-19-2.1	Extraction Date:	04/11/22 06:30
Analytical Date:	04/12/22 14:08	Cleanup Method1:	EPH-19-2.1
Analyst:	JB	Cleanup Date1:	04/12/22
Percent Solids:	30%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	22.3	--	1
C19-C36 Aliphatics	181		mg/kg	22.3	--	1
C11-C22 Aromatics	220		mg/kg	22.3	--	1
C11-C22 Aromatics, Adjusted	169		mg/kg	22.3	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	62		40-140
o-Terphenyl	71		40-140
2-Fluorobiphenyl	74		40-140
2-Bromonaphthalene	74		40-140

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Analytical Method: 135,EPH-19-2.1
Analytical Date: 04/12/22 09:29
Analyst: JB

Extraction Method: EPA 3546
Extraction Date: 04/11/22 06:30
Cleanup Method: EPH-19-2.1
Cleanup Date: 04/12/22

Parameter	Result	Qualifier	Units	RL	MDL
Extractable Petroleum Hydrocarbons - Westborough Lab for sample(s): 02,04,06 Batch: WG1625683-1					
C9-C18 Aliphatics	ND		mg/kg	6.44	--
C19-C36 Aliphatics	ND		mg/kg	6.44	--
C11-C22 Aromatics	ND		mg/kg	6.44	--
C11-C22 Aromatics, Adjusted	ND		mg/kg	6.44	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	69		40-140
o-Terphenyl	72		40-140
2-Fluorobiphenyl	74		40-140
2-Bromonaphthalene	74		40-140

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 02,04,06 Batch: WG1625683-2 WG1625683-3								
C9-C18 Aliphatics	68		67		40-140	1		25
C19-C36 Aliphatics	84		78		40-140	7		25
C11-C22 Aromatics	77		77		40-140	0		25
Naphthalene	63		66		40-140	5		25
2-Methylnaphthalene	65		69		40-140	6		25
Acenaphthylene	71		66		40-140	7		25
Acenaphthene	67		70		40-140	4		25
Fluorene	69		72		40-140	4		25
Phenanthrene	70		73		40-140	4		25
Anthracene	70		74		40-140	6		25
Fluoranthene	70		74		40-140	6		25
Pyrene	72		76		40-140	5		25
Benzo(a)anthracene	73		76		40-140	4		25
Chrysene	72		74		40-140	3		25
Benzo(b)fluoranthene	70		73		40-140	4		25
Benzo(k)fluoranthene	68		71		40-140	4		25
Benzo(a)pyrene	72		74		40-140	3		25
Indeno(1,2,3-cd)Pyrene	70		72		40-140	3		25
Dibenzo(a,h)anthracene	70		73		40-140	4		25
Benzo(ghi)perylene	66		68		40-140	3		25

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 02,04,06 Batch: WG1625683-2 WG1625683-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Chloro-Octadecane	71		70		40-140
o-Terphenyl	71		72		40-140
2-Fluorobiphenyl	74		76		40-140
2-Bromonaphthalene	77		76		40-140
% Naphthalene Breakthrough	0		0		
% 2-Methylnaphthalene Breakthrough	0		0		

METALS

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-07 Date Collected: 04/05/22 14:45

Client ID: S-1/2 (AIR DRIED) Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Matrix: Sediment

Percent Solids: 98%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Arsenic, Total	11.3		mg/kg	0.503	--	10	05/11/22 14:19	05/11/22 15:42	EPA 3050B	97,6020B	SV
Cadmium, Total	1.990		mg/kg	0.2014	--	10	05/11/22 14:19	05/11/22 15:42	EPA 3050B	97,6020B	SV
Chromium, Total	22.9		mg/kg	2.01	--	10	05/11/22 14:19	05/11/22 15:42	EPA 3050B	97,6020B	SV
Copper, Total	63.9		mg/kg	2.01	--	10	05/11/22 14:19	05/11/22 15:42	EPA 3050B	97,6020B	SV
Lead, Total	539		mg/kg	0.604	--	10	05/11/22 14:19	05/11/22 15:42	EPA 3050B	97,6020B	SV
Mercury, Total	0.232		mg/kg	0.082	--	1	04/27/22 16:45	04/28/22 07:37	EPA 7471B	97,7471B	DMB
Nickel, Total	25.7		mg/kg	1.01	--	10	05/11/22 14:19	05/11/22 15:42	EPA 3050B	97,6020B	SV
Zinc, Total	299		mg/kg	10.1	--	10	05/11/22 14:19	05/11/22 15:42	EPA 3050B	97,6020B	SV

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-08 Date Collected: 04/05/22 14:45

Client ID: S-3/4 (AIR DRIED) Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Matrix: Sediment

Percent Solids: 97%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Arsenic, Total	12.5		mg/kg	0.500	--	10	05/11/22 14:19	05/11/22 15:48	EPA 3050B	97,6020B	SV
Cadmium, Total	1.544		mg/kg	0.2001	--	10	05/11/22 14:19	05/11/22 15:48	EPA 3050B	97,6020B	SV
Chromium, Total	20.2		mg/kg	2.00	--	10	05/11/22 14:19	05/11/22 15:48	EPA 3050B	97,6020B	SV
Copper, Total	41.8		mg/kg	2.00	--	10	05/11/22 14:19	05/11/22 15:48	EPA 3050B	97,6020B	SV
Lead, Total	457		mg/kg	0.600	--	10	05/11/22 14:19	05/11/22 15:48	EPA 3050B	97,6020B	SV
Mercury, Total	0.312		mg/kg	0.082	--	1	04/27/22 16:45	04/28/22 07:41	EPA 7471B	97,7471B	DMB
Nickel, Total	17.6		mg/kg	1.00	--	10	05/11/22 14:19	05/11/22 15:48	EPA 3050B	97,6020B	SV
Zinc, Total	234		mg/kg	10.0	--	10	05/11/22 14:19	05/11/22 15:48	EPA 3050B	97,6020B	SV

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-09 Date Collected: 04/05/22 14:45

Client ID: S-5/6 (AIR DRIED) Date Received: 04/06/22

Sample Location: SPRINGFIELD, MA Field Prep: Not Specified

Sample Depth:

Matrix: Sediment

Percent Solids: 97%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Arsenic, Total	16.1		mg/kg	0.499	--	10	05/11/22 14:19	05/11/22 15:53	EPA 3050B	97,6020B	SV
Cadmium, Total	1.339		mg/kg	0.1998	--	10	05/11/22 14:19	05/11/22 15:53	EPA 3050B	97,6020B	SV
Chromium, Total	25.6		mg/kg	2.00	--	10	05/11/22 14:19	05/11/22 15:53	EPA 3050B	97,6020B	SV
Copper, Total	46.0		mg/kg	2.00	--	10	05/11/22 14:19	05/11/22 15:53	EPA 3050B	97,6020B	SV
Lead, Total	358		mg/kg	0.599	--	10	05/11/22 14:19	05/11/22 15:53	EPA 3050B	97,6020B	SV
Mercury, Total	0.295		mg/kg	0.074	--	1	04/27/22 16:45	04/28/22 07:44	EPA 7471B	97,7471B	DMB
Nickel, Total	22.3		mg/kg	0.999	--	10	05/11/22 14:19	05/11/22 15:53	EPA 3050B	97,6020B	SV
Zinc, Total	234		mg/kg	9.99	--	10	05/11/22 14:19	05/11/22 15:53	EPA 3050B	97,6020B	SV

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab for sample(s): 07-09 Batch: WG1631585-1										
Mercury, Total	ND		mg/kg	0.083	--	1	04/27/22 16:45	04/28/22 07:27	97,7471B	DMB

Prep Information

Digestion Method: EPA 7471B

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab for sample(s): 07-09 Batch: WG1637217-1										
Arsenic, Total	ND		mg/kg	0.500	--	10	05/11/22 14:19	05/11/22 15:37	97,6020B	SV
Cadmium, Total	ND		mg/kg	0.2000	--	10	05/11/22 14:19	05/11/22 15:37	97,6020B	SV
Chromium, Total	ND		mg/kg	2.00	--	10	05/11/22 14:19	05/11/22 15:37	97,6020B	SV
Copper, Total	ND		mg/kg	2.00	--	10	05/11/22 14:19	05/11/22 15:37	97,6020B	SV
Lead, Total	ND		mg/kg	0.600	--	10	05/11/22 14:19	05/11/22 15:37	97,6020B	SV
Nickel, Total	ND		mg/kg	1.00	--	10	05/11/22 14:19	05/11/22 15:37	97,6020B	SV
Zinc, Total	ND		mg/kg	10.0	--	10	05/11/22 14:19	05/11/22 15:37	97,6020B	SV

Prep Information

Digestion Method: EPA 3050B

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Total Metals - Mansfield Lab Associated sample(s): 07-09 Batch: WG1631585-2 WG1631585-3 SRM Lot Number: D113-540								
Mercury, Total	94		85		60-140	10		30
MCP Total Metals - Mansfield Lab Associated sample(s): 07-09 Batch: WG1637217-2 WG1637217-3 SRM Lot Number: D113-540								
Arsenic, Total	96		104		70-130	8		30
Cadmium, Total	95		102		75-125	7		30
Chromium, Total	90		99		70-130	10		30
Copper, Total	88		93		75-125	6		30
Lead, Total	98		106		72-128	8		30
Nickel, Total	94		101		70-130	7		30
Zinc, Total	88		95		70-130	8		30

INORGANICS
&
MISCELLANEOUS

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-01
Client ID: S-1
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment

Date Collected: 04/05/22 11:20
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	28.8		%	0.100	--	1	-	04/08/22 15:31	121,2540G	AL

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-02
Client ID: S-1/2
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment

Date Collected: 04/05/22 11:40
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	8.33		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Rep2)	6.70		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Average)	7.51		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Grain Size Analysis - Mansfield Lab										
% Total Gravel	2.00		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Coarse Sand	5.80		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Medium Sand	27.4		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Fine Sand	45.7		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Total Fines	19.1		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
General Chemistry - Westborough Lab										
Solids, Total Volatile	18		%	0.10	--	1	-	04/12/22 05:20	121,2540G	DW
General Chemistry - Mansfield Lab										
Solids, Total	28.8		%	0.100	--	1	-	04/08/22 15:31	121,2540G	AL

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-03
Client ID: S-3
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment

Date Collected: 04/05/22 13:05
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	27.1		%	0.100	--	1	-	04/08/22 15:31	121,2540G	AL

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-04
Client ID: S-3/4
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment

Date Collected: 04/05/22 13:35
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	8.94		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Rep2)	8.10		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Average)	8.52		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Grain Size Analysis - Mansfield Lab										
% Total Gravel	17.5		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Coarse Sand	27.1		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Medium Sand	21.0		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Fine Sand	16.3		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Total Fines	18.1		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
General Chemistry - Westborough Lab										
Solids, Total Volatile	17		%	0.10	--	1	-	04/12/22 05:20	121,2540G	DW
General Chemistry - Mansfield Lab										
Solids, Total	27.1		%	0.100	--	1	-	04/08/22 15:31	121,2540G	AL

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-05
Client ID: S-6
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment

Date Collected: 04/05/22 14:30
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	29.8		%	0.100	--	1	-	04/08/22 15:31	121,2540G	AL

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-06
Client ID: S-5/6
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment

Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	6.88		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Rep2)	5.98		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Average)	6.43		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Grain Size Analysis - Mansfield Lab										
% Total Gravel	11.8		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Coarse Sand	27.4		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Medium Sand	20.2		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Fine Sand	18.5		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
% Total Fines	22.1		%	0.100	NA	1	-	05/04/22 14:45	12,D6913/D7928	SK
General Chemistry - Westborough Lab										
Solids, Total Volatile	12		%	0.10	--	1	-	04/12/22 05:20	121,2540G	DW
General Chemistry - Mansfield Lab										
Solids, Total	29.8		%	0.100	--	1	-	04/08/22 15:31	121,2540G	AL

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-07
Client ID: S-1/2 (AIR DRIED)
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment
Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.6		%	0.100	--	1	-	04/27/22 11:15	121,2540G	JM

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-08
Client ID: S-3/4 (AIR DRIED)
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment
Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.0		%	0.100	--	1	-	04/27/22 11:15	121,2540G	JM

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00
Lab Number: L2217633
Report Date: 05/12/22

SAMPLE RESULTS

Lab ID: L2217633-09
Client ID: S-5/6 (AIR DRIED)
Sample Location: SPRINGFIELD, MA
Sample Depth:
Matrix: Sediment
Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.3		%	0.100	--	1	-	04/27/22 11:15	121,2540G	JM

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2217633

Project Number: 15.0167018.00 **Report Date:** 05/12/22

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02,04,06 Batch: WG1626040-1										
Solids, Total Volatile	ND		%	0.10	--	1	-	04/12/22 05:20	121,2540G	DW
Total Organic Carbon - Mansfield Lab for sample(s): 02,04,06 Batch: WG1635095-1										
Total Organic Carbon (Rep1)	ND		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Rep2)	ND		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP
Total Organic Carbon (Average)	ND		%	0.010	--	1	-	05/04/22 18:35	1,9060A	SP

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Organic Carbon - Mansfield Lab	Associated sample(s): 02,04,06		Batch: WG1635095-2					
Total Organic Carbon (Rep1)	94		-		75-125	-		25
Total Organic Carbon (Rep2)	95		-		75-125	-		25
Total Organic Carbon (Average)	95		-		75-125	-		25

Lab Duplicate Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2217633

Report Date: 05/12/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02,04,06 QC Batch ID: WG1626040-2 QC Sample: L2217633-02 Client ID: S-1/2						
Solids, Total Volatile	18	18	%	0		11
General Chemistry - Mansfield Lab Associated sample(s): 07-09 QC Batch ID: WG1631615-1 QC Sample: L2217633-07 Client ID: S-1/2 (AIR DRIED)						
Solids, Total	97.6	97.7	%	0		10
Grain Size Analysis - Mansfield Lab Associated sample(s): 02,04,06 QC Batch ID: WG1634408-1 QC Sample: L2217633-04 Client ID: S-3/4						
% Total Gravel	17.5	28.8	%	**49**	Q	20
% Coarse Sand	27.1	21.2	%	**24**	Q	20
% Medium Sand	21.0	16.4	%	**25**	Q	20
% Fine Sand	16.3	15.3	%	6		20
% Total Fines	18.1	18.3	%	1		20

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2217633
Report Date: 05/12/22

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2217633-01A	Vial MeOH preserved	A	NA		4.3	Y	Absent		MCP-8260HLW-21(14)
L2217633-01B	Vial water preserved	A	NA		4.3	Y	Absent	05-APR-22 16:05	MCP-8260HLW-21(14)
L2217633-01C	Vial water preserved	A	NA		4.3	Y	Absent	05-APR-22 16:05	MCP-8260HLW-21(14)
L2217633-02A	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		-
L2217633-02B	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		A2-TS(7)
L2217633-02C	Glass 250ml/8oz unpreserved	A	NA		4.3	Y	Absent		A2-PAH/PCBCONG(14)
L2217633-02D	Glass 250ml/8oz unpreserved	A	NA		4.3	Y	Absent		A2-TOC-9060-2REPS(28)
L2217633-02E	Plastic 8oz unpreserved for Grain Size	A	NA		4.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-TGRAVEL(),A2-HYDRO-CSAND()
L2217633-02F	Glass 500ml/16oz unpreserved	A	NA		4.3	Y	Absent		EPH-20(14),TVS-2540(7),TPH-DRO-D(14)
L2217633-03A	Vial MeOH preserved	A	NA		4.3	Y	Absent		MCP-8260HLW-21(14)
L2217633-03B	Vial water preserved	A	NA		4.3	Y	Absent	05-APR-22 16:05	MCP-8260HLW-21(14)
L2217633-03C	Vial water preserved	A	NA		4.3	Y	Absent	05-APR-22 16:05	MCP-8260HLW-21(14)
L2217633-04A	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		-
L2217633-04B	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		A2-TS(7)
L2217633-04C	Glass 250ml/8oz unpreserved	A	NA		4.3	Y	Absent		A2-PAH/PCBCONG(14)
L2217633-04D	Glass 250ml/8oz unpreserved	A	NA		4.3	Y	Absent		A2-TOC-9060-2REPS(28)
L2217633-04E	Plastic 8oz unpreserved for Grain Size	A	NA		4.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-TGRAVEL(),A2-HYDRO-CSAND()
L2217633-04F	Glass 500ml/16oz unpreserved	A	NA		4.3	Y	Absent		EPH-20(14),TVS-2540(7),TPH-DRO-D(14)
L2217633-05A	Vial MeOH preserved	A	NA		4.3	Y	Absent		MCP-8260HLW-21(14)
L2217633-05B	Vial water preserved	A	NA		4.3	Y	Absent	05-APR-22 16:05	MCP-8260HLW-21(14)
L2217633-05C	Vial water preserved	A	NA		4.3	Y	Absent	05-APR-22 16:05	MCP-8260HLW-21(14)

*Values in parentheses indicate holding time in days

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2217633
Report Date: 05/12/22

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2217633-06A	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		-
L2217633-06B	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		A2-TS(7)
L2217633-06C	Glass 250ml/8oz unpreserved	A	NA		4.3	Y	Absent		A2-PAH/PCBCONG(14)
L2217633-06D	Glass 250ml/8oz unpreserved	A	NA		4.3	Y	Absent		A2-TOC-9060-2REPS(28)
L2217633-06E	Plastic 8oz unpreserved for Grain Size	A	NA		4.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-TGRAVEL(),A2-HYDRO-CSAND()
L2217633-06F	Glass 500ml/16oz unpreserved	A	NA		4.3	Y	Absent		EPH-20(14),TVS-2540(7),TPH-DRO-D(14)
L2217633-07A	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2217633-07X	Glass 60ml unpreserved split	A	NA		4.3	Y	Absent		A2-CR-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-TS(7),A2-HG-MCP7471T-10(28),A2-CU-MCP6020T-10(180),A2-HGPREP-AF(28),A2-NI-MCP6020T-10(180),A2-PB-MCP6020T-10(180),A2-PREP-3050:2T(180)
L2217633-08A	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2217633-08X	Glass 60ml unpreserved split	A	NA		4.3	Y	Absent		A2-CR-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-TS(7),A2-CD-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-CU-MCP6020T-10(180),A2-HG-MCP7471T-10(28),A2-HGPREP-AF(28),A2-PREP-3050:2T(180),A2-PB-MCP6020T-10(180)
L2217633-09A	Plastic 2oz unpreserved for TS	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2217633-09X	Glass 60ml unpreserved split	A	NA		4.3	Y	Absent		A2-CR-MCP6020T-10(180),A2-AS-MCP6020T-10(180),A2-ZN-MCP6020T-10(180),A2-CD-MCP6020T-10(180),A2-TS(7),A2-CU-MCP6020T-10(180),A2-NI-MCP6020T-10(180),A2-HG-MCP7471T-10(28),A2-HGPREP-AF(28),A2-PREP-3050:2T(180),A2-PB-MCP6020T-10(180)

*Values in parentheses indicate holding time in days

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2217633
Project Number:	15.0167018.00	**Report Date:**	05/12/22

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2217633
Project Number:	15.0167018.00	**Report Date:**	05/12/22

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2217633
Project Number:	15.0167018.00	**Report Date:**	05/12/22

Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2217633
Project Number:	15.0167018.00	**Report Date:**	05/12/22

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.

97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IIID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.

105 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IIIA, 1997 in conjunction with NOAA Technical Memorandum NMFS-NWFSC-59: Extraction, Cleanup and GC/MS Analysis of Sediments and Tissues for Organic Contaminants, March 2004 and the Determination of Pesticides and PCBs in Water and Oil/Sediment by GC/MS: Method 680, EPA 01A0005295, November 1985.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

135 Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), MassDEP, December 2019, Revision 2.1 with QC Requirements & Performance Standards for the Analysis of EPH under the Massachusetts Contingency Plan, WSC-CAM-IVB, March 1, 2020.

141 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA and IIB, November 2021.

LIMITATION OF LIABILITIES

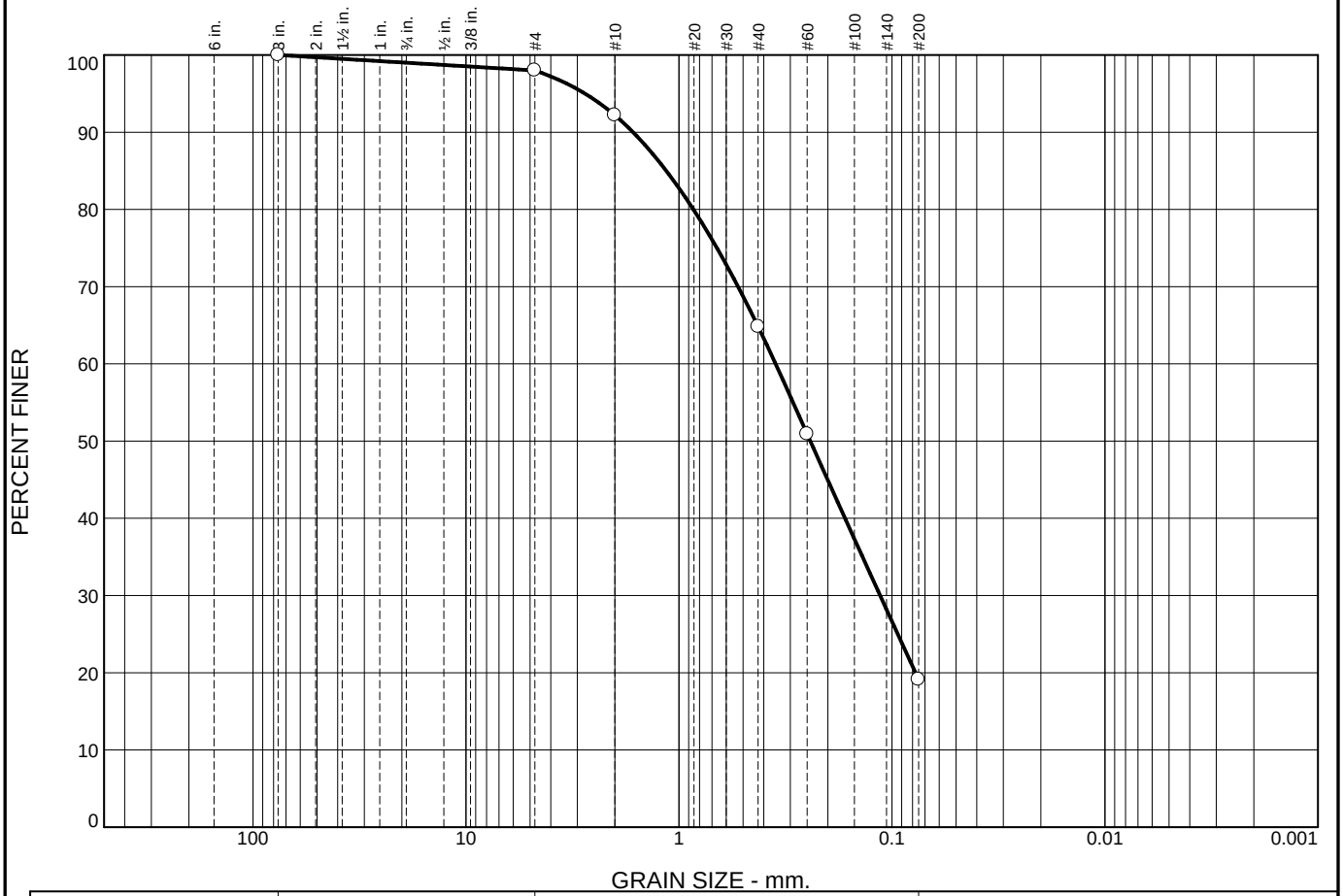
Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

ASTM D6913/D7928

GRAIN SIZE ANALYSIS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	1.0	1.0	5.8	27.4	45.7	19.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.1466	0.3518	0.2418	0.1136				

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** S-1/2 **Sample Number:** L2217633-02

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

5/11/2022

Location: S-1/2
Sample Number: L2217633-02

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 43.50
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
43.50	0.00	3"	0.00	0.00	100.0
		#4	0.87	0.00	98.0
		#10	2.52	0.00	92.2
		#40	11.91	0.00	64.8
		#60	6.06	0.00	50.9
		#200	13.82	0.00	19.1

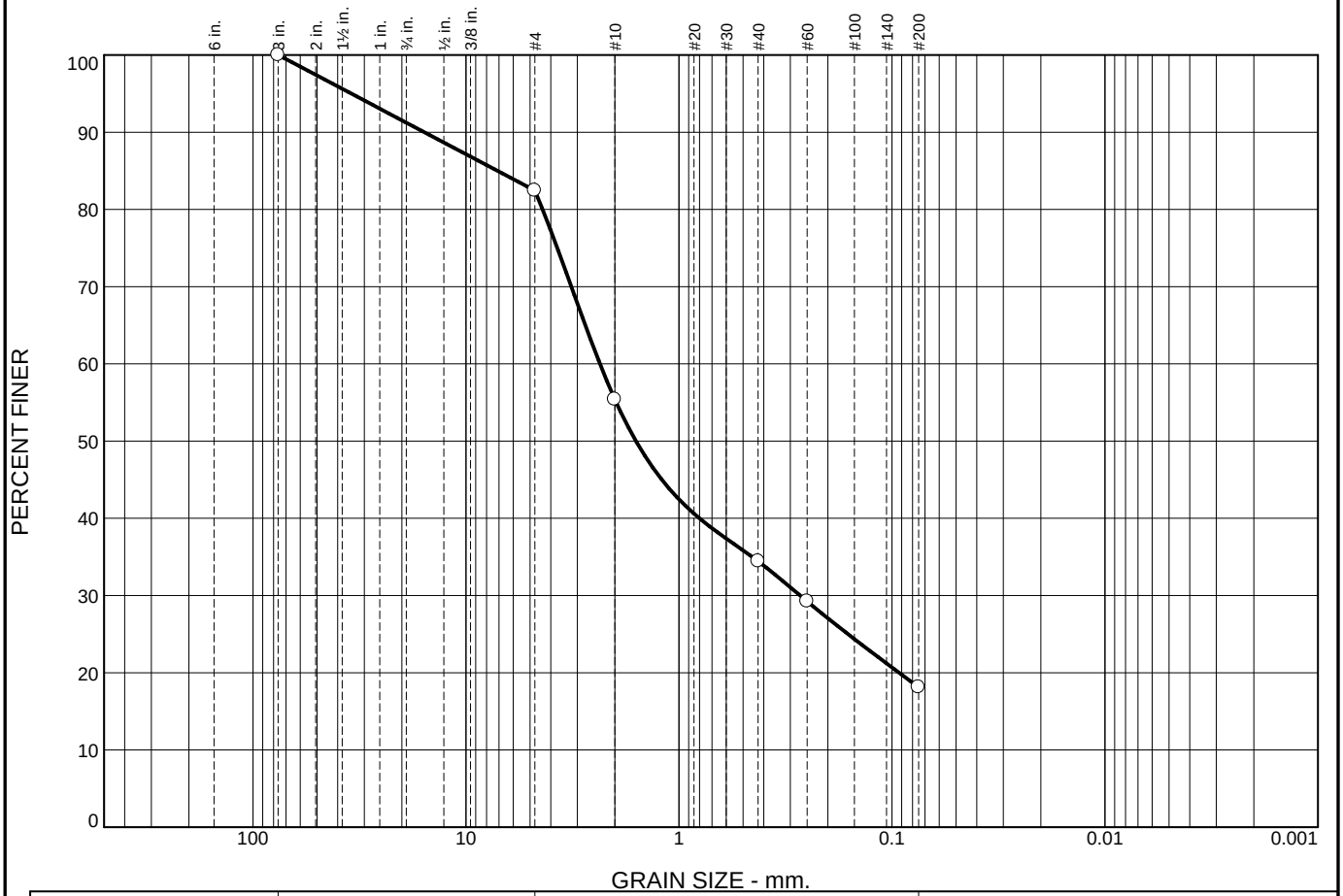
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	1.0	1.0	2.0	5.8	27.4	45.7	78.9			19.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.0775	0.1136	0.1660	0.2418	0.3518	0.8557	1.1466	1.6414	2.7617

Fineness Modulus
1.60

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	8.8	8.7	27.1	21.0	16.3	18.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			7.1022	2.3487	1.5917	0.2698				

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** S-3/4 **Sample Number:** L2217633-04

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

5/11/2022

Location: S-3/4
Sample Number: L2217633-04

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 32.15
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
32.15	0.00	3"	0.00	0.00	100.0
		#4	5.64	0.00	82.5
		#10	8.70	0.00	55.4
		#40	6.74	0.00	34.4
		#60	1.67	0.00	29.2
		#200	3.57	0.00	18.1

Fractional Components

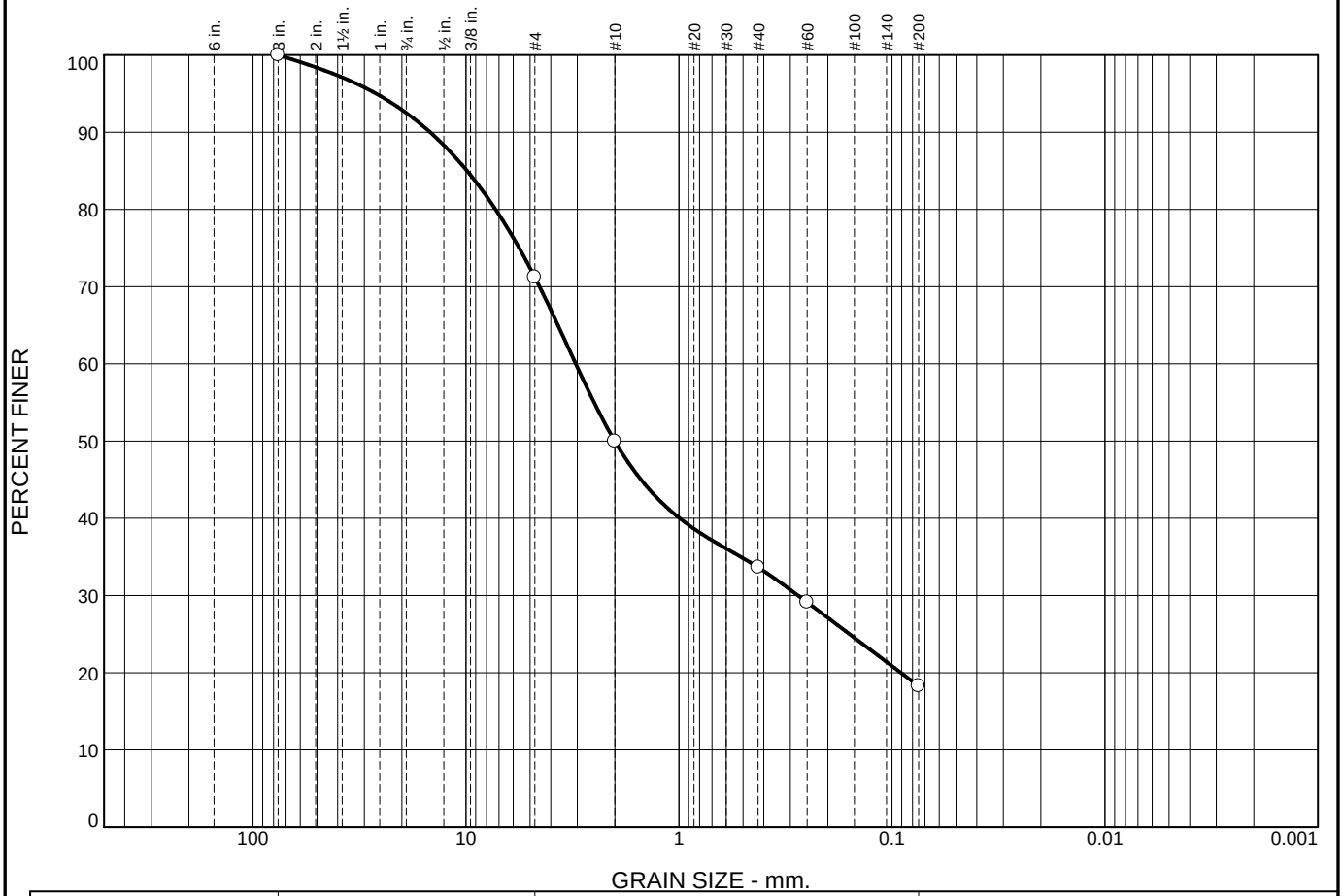
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	8.8	8.7	17.5	27.1	21.0	16.3	64.4			18.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.0925	0.2698	0.8008	1.5917	2.3487	4.3687	7.1022	15.6644	34.5489

Fineness Modulus
3.46

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	7.5	21.3	21.2	16.4	15.3	18.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			9.8818	3.0523	2.0030	0.2760				

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** S-3/4 **Sample Number:** WG1634408-1

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

5/11/2022

Location: S-3/4
Sample Number: WG1634408-1

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 32.70
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
32.70	0.00	3"	0.00	0.00	100.0
		#4	9.41	0.00	71.2
		#10	6.95	0.00	50.0
		#40	5.34	0.00	33.6
		#60	1.48	0.00	29.1
		#200	3.54	0.00	18.3

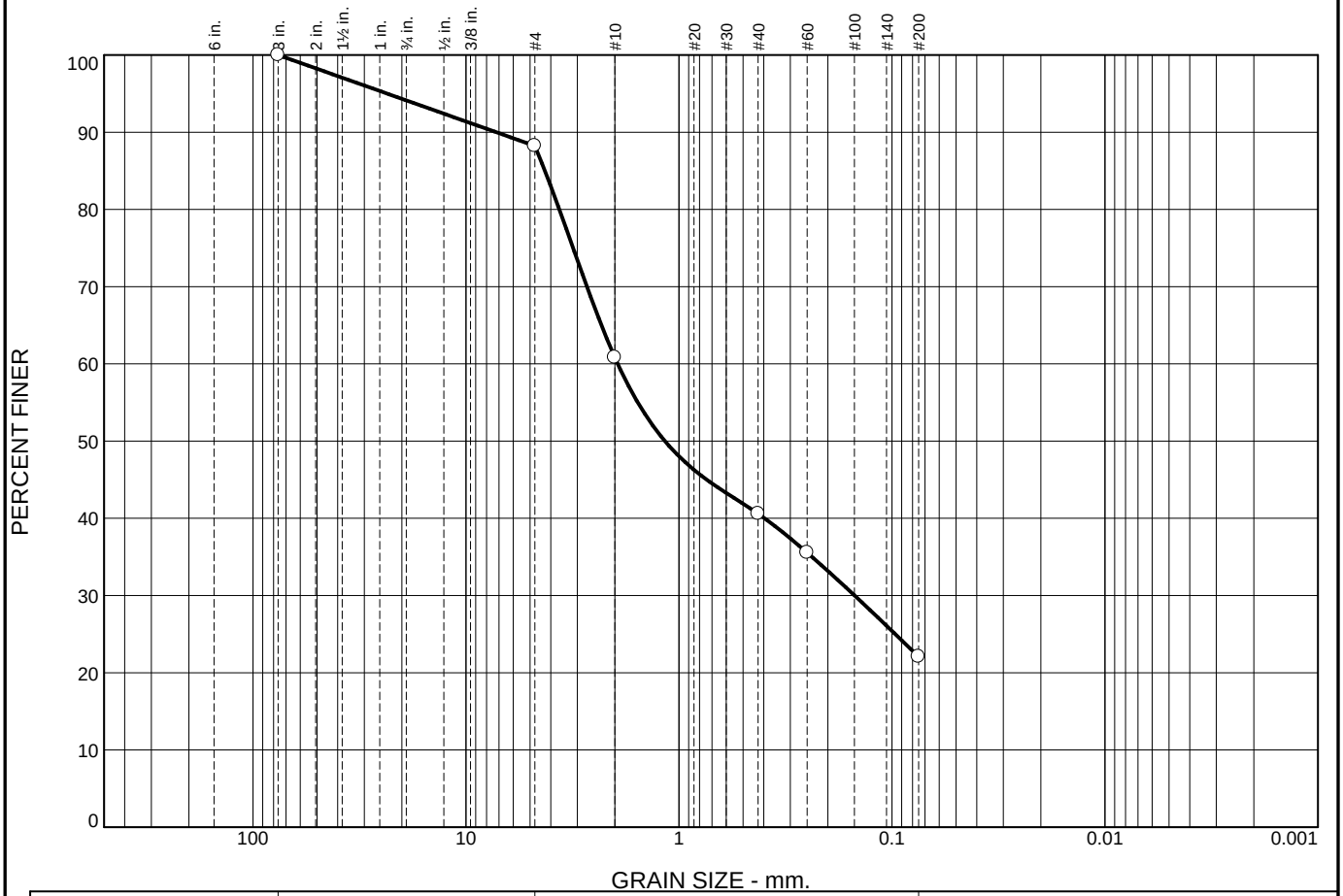
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	7.5	21.3	28.8	21.2	16.4	15.3	52.9			18.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.0907	0.2760	0.9920	2.0030	3.0523	7.2578	9.8818	14.7236	26.4524

Fineness Modulus
3.68

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	5.9	5.9	27.4	20.2	18.5	22.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			4.2604	1.9384	1.1636	0.1497				

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** S-5/6 **Sample Number:** L2217633-06

Remarks:

Alpha Analytical

Mansfield, MA

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

5/11/2022

Location: S-5/6
Sample Number: L2217633-06

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 45.72
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
45.72	0.00	3"	0.00	0.00	100.0
		#4	5.38	0.00	88.2
		#10	12.53	0.00	60.8
		#40	9.25	0.00	40.6
		#60	2.31	0.00	35.5
		#200	6.15	0.00	22.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	5.9	5.9	11.8	27.4	20.2	18.5	66.1			22.1

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1497	0.3964	1.1636	1.9384	3.6461	4.2604	7.2062	23.4332

Fineness Modulus
3.03

Alpha Analytical

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF

Date Rec'd in Lab: 4/6/22

ALPHA Job #: L2217633

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: ~~GZA~~ ~~City of Springfield DPRM~~

Address: ~~300 Front St~~ 1350 Main St. Suite 1400 Springfield MA 01103

Phone: 413-374 9614

Email: jennifer.burke@gza.com

Project Information

Project Name: Upper Van Horn Reservoir Dam

Project Location: Springfield, MA

Project #: 15.0167018.00

Project Manager: Jennifer Burke

ALPHA Quote #: 7614

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☐ Yes ☐ No MA MCP Arialytical Methods ☐ Yes ☐ No CT RCP Analytical Methods

☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)

☐ Yes ☒ No GW1 Standards (Info Required for Metals & EPH with Targets)

☐ Yes ☒ No NPDES RGP

☐ Other State /Fed Program 401 DEPWPC reporting limits required Criteria

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

TCLP for 20X rule, call client, do extractions now air dry if needed for 401 Reporting limits

LL VOA FROZEN ON 4/5/22 @ 1605

ANALYSIS: VOC: ☒ 8260 ☐ 624 ☐ 524.2 HI/LO; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☒ Quant Only ☐ Fingerprint; 401 WQC (Metals, PAH, VOC, EPH, TPH); Total Vol Solids 2540 (<2MM Size); TCLP extraction (hold for 20X rule)

SAMPLE INFO: Filtration ☐ Field ☒ Lab to do; Preservation ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC	TPH: Quant Only	401 WQC (Metals, PAH, VOC, EPH, TPH)	Total Vol Solids 2540 (<2MM Size)	TCLP extraction (hold for 20X rule)	Sample Comments	TOTAL # BOTTLES
17633-01	S-1	4/5/22	1120	SE	AJC	X						
-02	S-1/2	4/5/22	1140	SE	AJC		X	X	X	X	2-8oz unpres. 1-16oz unpres 2 plastic 2oz (1) plastic 8oz	
-03	S-3	4/5/22	1305	SE	AJC	X						
-04	S-3/4	4/5/22	1335	SE	AJC		X	X	X	X		
-05	S-6	4/5/22	1430	SE	AJC	X						
-06	S-5/6	4/5/22	1445	SE	AJC		X	X	X	X		

Container Type	V							Sec Above				
Preservative	C, F							Sec Above				

Container Type: P= Plastic, A= Amber glass, V= Vial, G= Glass, B= Bacteria cup, C= Cube, O= Other, E= Encore, D= BOD Bottle

Preservative: A= None, B= HCl, C= HNO_3, D= H_2SO_4, E= NaOH, F= MeOH, G= $NaHSO_4$, H = $Na_2S_2O_3$, I= Ascorbic Acid, J = NH_4Cl, K= Zn Acetate, O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[illegible]	4/5/22 1605	Gza Sample Fridge	
[illegible]	4/6/22 1040	[illegible]	4/6/22 1040
[illegible]	4/6/22 1630	[illegible]	4/6/22 1630

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

Method Blank Summary
Form 4
Volatiles

Client	: GZA Springfield	**Lab Number**	: L2217633
Project Name	: UPPER VAN HORN RESERVOIR DAM	**Project Number**	: 15.0167018.00
Lab Sample ID	: WG1627117-5	**Lab File ID**	: V00220412N04
Instrument ID	: VOA100		
Matrix	: SOIL	**Analysis Date**	: 04/13/22 16:05

Client Sample No.	Lab Sample ID	Analysis Date
WG1627117-3LCS	WG1627117-3	04/13/22 14:45
WG1627117-4LCSD	WG1627117-4	04/13/22 15:12
S-1	L2217633-01	04/13/22 16:32
S-3	L2217633-03	04/13/22 16:58
S-6	L2217633-05	04/13/22 17:25

Calibration Verification Summary
Form 7
Volatiles

Client	: GZA Springfield	**Lab Number**	: L2217633		
Project Name	: UPPER VAN HORN RESERVOIR DAM	**Project Number**	: 15.0167018.00		
Instrument ID	: VOA100	**Calibration Date**	: 04/13/22 14:45		
Lab File ID	: V00220412N01	**Init. Calib. Date(s)**	: 04/06/22	04/06/22	
Sample No	: WG1627117-2	**Init. Calib. Times**	: 20:15	23:45	
Channel	:				

Compound	Ave. RRF	RRF	Min RRF	%D	Max %D	Area%	Dev(min)
Fluorobenzene	1	1	-	0	20	112	0
Dichlorodifluoromethane	0.339	0.298	-	12.1	20	96	0
Chloromethane	0.498	0.449	-	9.8	20	103	.02
Vinyl chloride	0.394	0.354	-	10.2	20	98	0
Bromomethane	0.203	0.153	-	24.6*	20	92	0
Chloroethane	0.208	0.191	-	8.2	20	101	0
Trichlorofluoromethane	0.508	0.492	-	3.1	20	108	0
Ethyl ether	0.127	0.111	-	12.6	20	97	0
1,1-Dichloroethene	0.246	0.222	-	9.8	20	103	0
Carbon disulfide	0.747	0.655	-	12.3	20	102	0
Freon-113	0.264	0.247	-	6.4	20	104	0
Acrolein	0.049	0.038	-	22.4*	20	92	0
Methylene chloride	0.29	0.237	-	18.3	20	94	0
Acetone	40	43	-	-7.5	20	108	0
trans-1,2-Dichloroethene	0.298	0.242	-	18.8	20	93	0
Methyl acetate	0.234	0.202	-	13.7	20	96	0
Methyl tert-butyl ether	0.682	0.608	-	10.9	20	98	0
tert-Butyl alcohol	0.029	0.029	-	0	20	108	0
Diisopropyl ether	1.27	1.12	-	11.8	20	97	0
1,1-Dichloroethane	0.6	0.506	-	15.7	20	97	0
Halothane	0.224	0.197	-	12.1	20	99	0
Acrylonitrile	0.096	0.081	-	15.6	20	94	0
Ethyl tert-butyl ether	0.991	0.879	-	11.3	20	95	0
Vinyl acetate	0.716	0.685	-	4.3	20	103	0
cis-1,2-Dichloroethene	0.329	0.275	-	16.4	20	96	0
2,2-Dichloropropane	0.471	0.43	-	8.7	20	103	0
Bromochloromethane	0.147	0.125	-	15	20	94	0
Cyclohexane	0.595	0.549	-	7.7	20	101	0
Chloroform	0.598	0.503	-	15.9	20	98	0
Ethyl acetate	0.293	0.254	-	13.3	20	97	0
Carbon tetrachloride	0.475	0.43	-	9.5	20	103	0
Tetrahydrofuran	0.093	0.078	-	16.1	20	93	0
Dibromofluoromethane	0.293	0.261	-	10.9	20	101	0
1,1,1-Trichloroethane	0.473	0.439	-	7.2	20	103	0
2-Butanone	0.148	0.128	-	13.5	20	97	0
1,1-Dichloropropene	0.379	0.349	-	7.9	20	100	0
Benzene	1.177	1.017	-	13.6	20	97	0
tert-Amyl methyl ether	0.745	0.655	-	12.1	20	94	0
1,2-Dichloroethane-d4	0.3	0.291	-	3	20	109	0
1,2-Dichloroethane	0.438	0.381	-	13	20	98	0
Methyl cyclohexane	0.509	0.456	-	10.4	20	101	0
Trichloroethene	0.308	0.27	-	12.3	20	98	0
Dibromomethane	0.173	0.147	-	15	20	95	0

* Value outside of QC limits.

Calibration Verification Summary
Form 7
Volatiles

Client	: GZA Springfield	**Lab Number**	: L2217633		
Project Name	: UPPER VAN HORN RESERVOIR DAM	**Project Number**	: 15.0167018.00		
Instrument ID	: VOA100	**Calibration Date**	: 04/13/22 14:45		
Lab File ID	: V00220412N01	**Init. Calib. Date(s)**	: 04/06/22	04/06/22	
Sample No	: WG1627117-2	**Init. Calib. Times**	: 20:15	23:45	
Channel	:				

Compound	Ave. RRF	RRF	Min RRF	%D	Max %D	Area%	Dev(min)
1,2-Dichloropropane	0.338	0.281	-	16.9	20	94	0
2-Chloroethyl vinyl ether	0.08	0.076	-	5	20	99	0
Bromodichloromethane	0.432	0.38	-	12	20	99	0
1,4-Dioxane	0.00237	0.00202*	-	14.8	20	86	0
cis-1,3-Dichloropropene	0.467	0.418	-	10.5	20	96	.01
Chlorobenzene-d5	1	1	-	0	20	92	0
Toluene-d8	1.151	1.221	-	-6.1	20	98	0
Toluene	0.762	0.8	-	-5	20	98	0
4-Methyl-2-pentanone	0.099	0.111	-	-12.1	20	97	0
Tetrachloroethene	0.34	0.389	-	-14.4	20	101	0
trans-1,3-Dichloropropene	0.437	0.483	-	-10.5	20	98	0
Ethyl methacrylate	0.31	0.341	-	-10	20	96	0
1,1,2-Trichloroethane	0.205	0.211	-	-2.9	20	94	0
Chlorodibromomethane	0.32	0.349	-	-9.1	20	97	0
1,3-Dichloropropane	0.427	0.448	-	-4.9	20	95	0
1,2-Dibromoethane	0.241	0.262	-	-8.7	20	96	0
2-Hexanone	0.206	0.24	-	-16.5	20	103	0
Chlorobenzene	0.866	0.915	-	-5.7	20	98	0
Ethylbenzene	1.471	1.593	-	-8.3	20	100	0
1,1,1,2-Tetrachloroethane	0.333	0.362	-	-8.7	20	98	0
p/m Xylene	0.553	0.621	-	-12.3	20	99	0
o Xylene	0.539	0.604	-	-12.1	20	99	0
Styrene	0.855	0.972	-	-13.7	20	98	0
1,4-Dichlorobenzene-d4	1	1	-	0	20	88	0
Bromoform	0.346	0.388	-	-12.1	20	97	0
Isopropylbenzene	2.44	2.789	-	-14.3	20	101	0
4-Bromofluorobenzene	0.821	0.799	-	2.7	20	88	0
Bromobenzene	0.653	0.709	-	-8.6	20	98	0
n-Propylbenzene	2.938	3.311	-	-12.7	20	100	0
1,4-Dichlorobutane	0.861	0.924	-	-7.3	20	96	0
1,1,2,2-Tetrachloroethane	0.501	0.545	-	-8.8	20	94	0
4-Ethyltoluene	2.502	2.836	-	-13.3	20	100	0
2-Chlorotoluene	1.777	1.737	-	2.3	20	87	0
1,3,5-Trimethylbenzene	2.17	2.479	-	-14.2	20	100	0
1,2,3-Trichloropropane	0.425	0.453	-	-6.6	20	96	0
trans-1,4-Dichloro-2-buten	0.191	0.222	-	-16.2	20	96	0
4-Chlorotoluene	1.837	2.068	-	-12.6	20	100	0
tert-Butylbenzene	1.82	2.118	-	-16.4	20	101	0
1,2,4-Trimethylbenzene	2.172	2.489	-	-14.6	20	100	0
sec-Butylbenzene	2.754	3.22	-	-16.9	20	101	0
p-Isopropyltoluene	2.359	2.827	-	-19.8	20	103	0
1,3-Dichlorobenzene	1.274	1.441	-	-13.1	20	100	0
1,4-Dichlorobenzene	1.306	1.452	-	-11.2	20	100	0

* Value outside of QC limits.

Calibration Verification Summary
Form 7
Volatiles

Client	: GZA Springfield	**Lab Number**	: L2217633		
Project Name	: UPPER VAN HORN RESERVOIR DAM	**Project Number**	: 15.0167018.00		
Instrument ID	: VOA100	**Calibration Date**	: 04/13/22 14:45		
Lab File ID	: V00220412N01	**Init. Calib. Date(s)**	: 04/06/22	04/06/22	
Sample No	: WG1627117-2	**Init. Calib. Times**	: 20:15	23:45	
Channel	:				

Compound	Ave. RRF	RRF	Min RRF	%D	Max %D	Area%	Dev(min)
p-Diethylbenzene	1.429	1.713	-	-19.9	20	103	0
n-Butylbenzene	2.157	2.572	-	-19.2	20	103	0
1,2-Dichlorobenzene	1.208	1.342	-	-11.1	20	99	0
1,2,4,5-Tetramethylbenzene	2.269	2.751	-	-21.2*	20	103	0
1,2-Dibromo-3-chloropropan	0.096	0.108	-	-12.5	20	95	0
1,3,5-Trichlorobenzene	1.037	1.238	-	-19.4	20	105	0
Hexachlorobutadiene	0.581	0.707	-	-21.7*	20	107	0
1,2,4-Trichlorobenzene	0.929	1.124	-	-21*	20	105	0
Naphthalene	1.823	2.127	-	-16.7	20	99	0
1,2,3-Trichlorobenzene	0.868	1.01	-	-16.4	20	102	0

*** Value outside of QC limits.**

ANALYTICAL REPORT

Lab Number:	L2220637
Client:	GZA Springfield 1350 Main Street Suite 1400 Springfield, MA 01103
ATTN:	Jennifer Burke
Phone:	(413) 726-2117
Project Name:	UPPER VAN HORN RESERVOIR DAM
Project Number:	15.0167018.00
Report Date:	06/07/22

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2220637
Report Date: 06/07/22

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2220637-01	S-1/2 (AIRDRY)	SOIL	SPRINGFIELD, MA	04/05/22 11:40	04/06/22
L2220637-02	S-3/4 (AIRDRY)	SOIL	SPRINGFIELD, MA	04/05/22 13:35	04/06/22
L2220637-03	S-5/6 (AIRDRY)	SOIL	SPRINGFIELD, MA	04/05/22 14:45	04/06/22

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2220637
Project Number:	15.0167018.00	**Report Date:**	06/07/22

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2220637
Project Number:	15.0167018.00	**Report Date:**	06/07/22

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2220637
Project Number:	15.0167018.00	**Report Date:**	06/07/22

Case Narrative (continued)

MCP Related Narratives

Report Submission

All MCP required questions were answered with affirmative responses; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Caitlin Walukevich

Title: Technical Director/Representative Date: 06/07/22

QC OUTLIER SUMMARY REPORT

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2220637
Report Date: 06/07/22

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment

There are no QC Outliers associated with this report.

METALS

Project Name: UPPER VAN HORN RESERVOIR DAM
Lab Number: L2220637
Project Number: 15.0167018.00
Report Date: 06/07/22

SAMPLE RESULTS

Lab ID: L2220637-01
Client ID: S-1/2 (AIRDRY)
Sample Location: SPRINGFIELD, MA
Date Collected: 04/05/22 11:40
Date Received: 04/06/22
Field Prep: Not Specified
Sample Depth:
Matrix: Soil
TCLP/SPLP Ext. Date: 05/22/22 17:20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Mansfield Lab											
Lead, TCLP	0.509		mg/l	0.500	--	1	05/29/22 06:48	06/06/22 22:22	EPA 3015	1,6010D	SB

Project Name: UPPER VAN HORN RESERVOIR DAM
Lab Number: L2220637
Project Number: 15.0167018.00
Report Date: 06/07/22

SAMPLE RESULTS

Lab ID: L2220637-02
Client ID: S-3/4 (AIRDRY)
Sample Location: SPRINGFIELD, MA
Date Collected: 04/05/22 13:35
Date Received: 04/06/22
Field Prep: Not Specified
Sample Depth:
Matrix: Soil
TCLP/SPLP Ext. Date: 05/22/22 17:20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Mansfield Lab											
Lead, TCLP	0.806		mg/l	0.500	--	1	05/29/22 06:48	06/06/22 23:08	EPA 3015	1,6010D	SB

Project Name: UPPER VAN HORN RESERVOIR DAM
Lab Number: L2220637
Project Number: 15.0167018.00
Report Date: 06/07/22

SAMPLE RESULTS

Lab ID: L2220637-03
Client ID: S-5/6 (AIRDRY)
Sample Location: SPRINGFIELD, MA
Date Collected: 04/05/22 14:45
Date Received: 04/06/22
Field Prep: Not Specified
Sample Depth:
Matrix: Soil
TCLP/SPLP Ext. Date: 05/22/22 17:20

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Mansfield Lab											
Lead, TCLP	ND		mg/l	0.500	--	1	05/29/22 06:48	06/06/22 23:13	EPA 3015	1,6010D	SB

Project Name: UPPER VAN HORN RESERVOIR DAM **Lab Number:** L2220637

Project Number: 15.0167018.00 **Report Date:** 06/07/22

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Mansfield Lab for sample(s): 01-03 Batch: WG1644142-1										
Lead, TCLP	ND		mg/l	0.500	--	1	05/29/22 06:48	06/06/22 21:59	1,6010D	SB

Prep Information

Digestion Method: EPA 3015

TCLP/SPLP Extraction Date: 05/22/22 06:09

Lab Control Sample Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2220637

Report Date: 06/07/22

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
TCLP Metals by EPA 1311 - Mansfield Lab Associated sample(s): 01-03 Batch: WG1644142-2								
Lead, TCLP	93		-		75-125	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2220637
Report Date: 06/07/22

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
TCLP Metals by EPA 1311 - Mansfield Lab Associated sample(s): 01-03 (AIRDRY) QC Batch ID: WG1644142-3 QC Sample: L2220637-01 Client ID: S-1/2												
Lead, TCLP	0.509	5.3	5.44	93		-	-		75-125	-		20

Lab Duplicate Analysis

Batch Quality Control

Project Name: UPPER VAN HORN RESERVOIR DAM

Project Number: 15.0167018.00

Lab Number: L2220637

Report Date: 06/07/22

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
TCLP Metals by EPA 1311 - Mansfield Lab (AIRDRY) Associated sample(s): 01-03 QC Batch ID: WG1644142-4 QC Sample: L2220637-01 Client ID: S-1/2						
Lead, TCLP	0.509	0.513	mg/l	1		20

Project Name: UPPER VAN HORN RESERVOIR DAM
Project Number: 15.0167018.00

Lab Number: L2220637
Report Date: 06/07/22

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2220637-01A	Glass 120ml unpreserved split	A	NA		4.3	Y	Absent		-
L2220637-01B	Amber 500ml unpreserved	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2220637-01W	Glass 250ml unpreserved split	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2220637-01X	Plastic 120ml HNO3 preserved Extracts	NA	NA			Y	Absent		PB-CI(180)
L2220637-01X9	Tumble Vessel	A	NA		4.3	Y	Absent		-
L2220637-02A	Glass 120ml unpreserved split	A	NA		4.3	Y	Absent		-
L2220637-02B	Glass 500ml/16oz unpreserved	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2220637-02W	Glass 250ml unpreserved split	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2220637-02X	Plastic 120ml HNO3 preserved Extracts	A	NA		4.3	Y	Absent		PB-CI(180)
L2220637-02X9	Tumble Vessel	A	NA		4.3	Y	Absent		-
L2220637-03A	Glass 120ml unpreserved split	A	NA		4.3	Y	Absent		-
L2220637-03B	Glass 500ml/16oz unpreserved	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2220637-03W	Glass 250ml unpreserved split	A	NA		4.3	Y	Absent		A2-AIRDRY()
L2220637-03X	Plastic 120ml HNO3 preserved Extracts	A	NA		4.3	Y	Absent		PB-CI(180)
L2220637-03X9	Tumble Vessel	A	NA		4.3	Y	Absent		-

*Values in parentheses indicate holding time in days

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2220637
Project Number:	15.0167018.00	**Report Date:**	06/07/22

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: Data Usability Report

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2220637
Project Number:	15.0167018.00	**Report Date:**	06/07/22

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Report Format: Data Usability Report

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2220637
Project Number:	15.0167018.00	**Report Date:**	06/07/22

Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: Data Usability Report

Project Name:	UPPER VAN HORN RESERVOIR DAM	**Lab Number:**	L2220637
Project Number:	15.0167018.00	**Report Date:**	06/07/22

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Serial_No:06072211:21

L2220637 kb 5/12/22

CHAIN OF CUSTODY

PAGE 1 OF ____

Date Rec'd in Lab: 4/6/22

ALPHA Job #: ~~L2217637~~

ALPHA Analytical
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: ~~GZA~~ ~~City of Springfield DPW&M~~

Address: ~~200 Broadway~~ 1350 Main St. Suite 1400 Springfield MA 01103

Phone: 413-374 9614

Email: jennifer.burke@gza.com

Project Information

Project Name: Upper Van Horn Reservoir Dam

Project Location: Springfield, MA

Project #: 15.0167018.00

Project Manager: Jennifer Burke

ALPHA Quote #: 7614

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☒ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☒ No CT RCP Analytical Methods

☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)

☐ Yes ☒ No GW1 Standards (Info Required for Metals & EPH with Targets)

☐ Yes ☒ No NPDES RGP

☐ Other State /Fed Program 401 DEPWPC Criteria reporting limits required

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due:

Additional Project Information:

TCLP for 20x rule, call Client, do extractions now air dry if needed for 401 Reporting limits

LL VOA FROZEN ON 4/5/22 @ 1603

Air Dried portion

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC: ☒ 8260 ☐ 624	SVOC: ☐ ABN ☐ PAH	METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15	METALS: ☐ RCRA5 ☐ RCRA8	EPH: ☐ Ranges & Targets ☐ PP13	VPH: ☐ Ranges & Targets ☐ Ranges Only	☐ PCB ☐ PEST	TPH: ☒ Quant Only ☐ Fingerprint	401 WQC (Metals, PAH, EPH, Vec TIC, 624 MW Size)	Total Vol Solids 2540	TCLP extraction (hold for 20x rule)	SAMPLE INFO: Filtration ☐ Field ☒ Lab to do; Preservation ☐ Lab to do	Sample Comments	TOTAL # BOTTLES
~~L2220637-01~~	S-1	4/5/22	~~1120~~ 1120	SE	AJC	X													
20637.01 -02	S-1/2	4/5/22	1140	SE	AJC								X	X	X	X		2: 8oz unpres 1: 16oz unpres 2: 4oz plastic 8oz	11
-03	S-3	4/5/22	1305	SE	AJC	X													
.02 -04	S-3/4	4/5/22	1335	SE	AJC								X	X	X	X			
-05	S-6	4/5/22	1430	SE	AJC	X													
.03 -06	S-5/6	4/5/22	1445	SE	AJC								X	X	X	X			

Container Type	V																Sec Above		
Preservative	C, F																Sec Above		

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
[illegible]	4/5/22 1605	Cus Sample Fridge	
Jackson	4/6/22 1040	[illegible]	
[illegible]	4/6/22 1630	[illegible]	4/6/22 1630

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

ATTACHMENT 6

RMAT OUTPUT REPORT

RMAT Climate Resilience Design Standards Tool Project Report

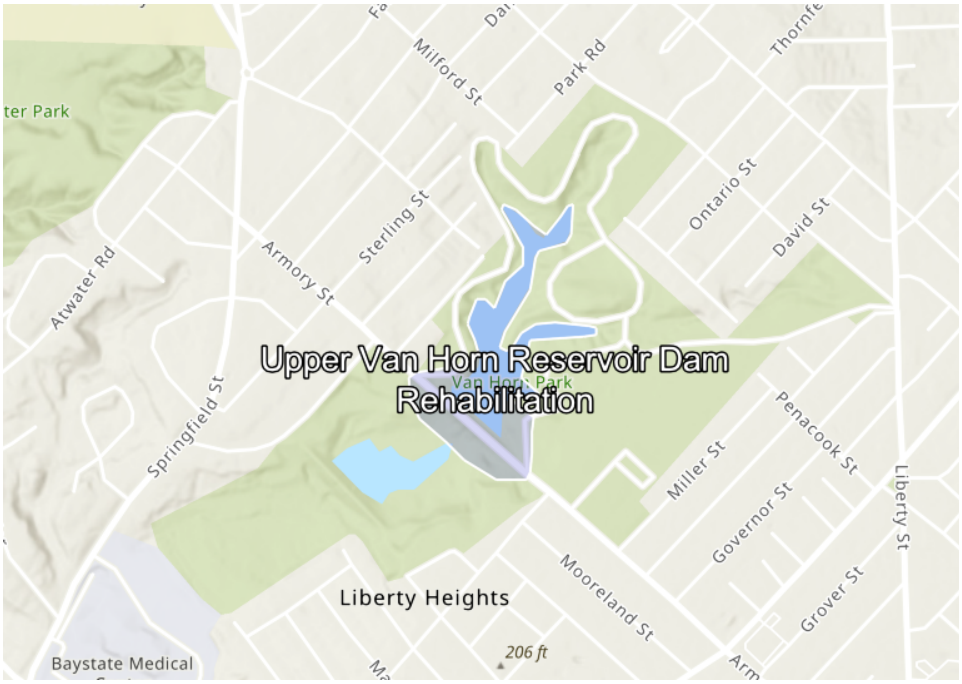
Upper Van Horn Reservoir Dam Improvements Project
Date Created: 3/23/2022 1:10:31 PM Created By: adunk Download

Project Summary

Link to Project

Estimated Construction Cost: $3300000.00
End of Life Year: 2073
Project within mapped Environmental Justice neighborhood: Yes

Ecosystem Benefits	Scores
Project Score	Moderate
Exposure	**Scores**
Sea Level Rise/Storm Surge	Not Exposed
Extreme Precipitation - Urban Flooding	High Exposure
Extreme Precipitation - Riverine Flooding	High Exposure
Extreme Heat	High Exposure



Asset Summary

Number of Assets: 2

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Upper Van Horn Reservoir Dam	Low Risk	High Risk	High Risk	High Risk
Upper Van Horn Reservoir	—— Natural Resource project assets do not receive a preliminary climate risk rating. ——			

Project Outputs

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Upper Van Horn Reservoir Dam					
Upper Van Horn Reservoir					
Extreme Precipitation					
Upper Van Horn Reservoir Dam	2070			100-yr (1%)	Tier 3
Upper Van Horn Reservoir	2030				Tier 1
Extreme Heat					
Upper Van Horn Reservoir Dam	2070		90th		Tier 3
Upper Van Horn Reservoir	2030		50th		Tier 1

Scoring Rationale - Exposure

Sea Level Rise/Storm Surge

This project received a "Not Exposed" because of the following:

- Not located within the predicted mean high water shoreline by 2030
- No historic coastal flooding at project site
- Not located within the Massachusetts Coast Flood Risk Model (MC-FRM)

Extreme Precipitation - Urban Flooding

This project received a "High Exposure" because of the following:

- Increased impervious area
- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- No historic flooding at project site
- Existing impervious area of the project site is less than 10%

Extreme Precipitation - Riverine Flooding

This project received a "High Exposure" because of the following:

- Part of the project is within 100ft of a waterbody
- Project is potentially susceptible to riverine erosion
- No historic riverine flooding at project site
- The project is not within a mapped FEMA floodplain [outside of the Massachusetts Coast Flood Risk Model (MC-FRM)]

Extreme Heat

This project received a "High Exposure" because of the following:

- 30+ days increase in days over 90 deg. F within project's useful life
- Increased impervious area
- Existing trees are being removed as part of the proposed project
- Between 10% and 40% of the existing project site has canopy cover
- Located within 100 ft of existing water body

Scoring Rationale - Asset Risk Scoring

Asset - Upper Van Horn Reservoir Dam
Primary asset criticality factors influencing risk ratings for this asset:

- Asset must be operable at all times, even during natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to result in possible loss of life
- Inoperability is likely to significantly impact other facilities, assets, or buildings and will likely affect their ability to operate
- Impact on natural resources can be mitigated naturally with the inoperability of the asset

Asset - Upper Van Horn Reservoir
Primary asset criticality factors influencing risk ratings for this asset:

No score available

Project Design Standards Output

Asset: Upper Van Horn Reservoir Dam — Infrastructure

Sea Level Rise/Storm Surge — Low Risk

Applicable Design Criteria

Projected Tidal Datums: No
Projected Water Surface Elevation: No
Projected Wave Action Water Elevation: No
Projected Wave Heights: No
Projected Duration of Flooding: No
Projected Design Flood Velocity: No
Projected Scour & Erosion: No

Extreme Precipitation — High Risk

Target Planning Horizon: 2070
Return Period: 100-yr (1%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Upper Van Horn Reservoir Dam	2070	100-Year (1%)	11.4	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat High Risk

Target Planning Horizon: 2070
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Annual/Summer/Winter Average Temperatures: Yes
Projected Heat Index: Yes
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes
Projected Cooling Degree Days & Heating Degree Days (base = 65°F): No

Asset: Upper Van Horn Reservoir Natural Resources

Sea Level Rise/Storm Surge

Applicable Design Criteria

Projected Tidal Datums: No
Projected Water Surface Elevation: No
Projected Wave Action Water Elevation: No
Projected Wave Heights: No
Projected Duration of Flooding: No
Projected Design Flood Velocity: No
Projected Scour & Erosion: No

Extreme Precipitation

Target Planning Horizon: 2030

Applicable Design Criteria

Tiered Methodology: Tier 1

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Upper Van Horn Reservoir	2030	25-Year (4%)	7.2	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is

general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat

Target Planning Horizon: 2030
Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 1

Projected Annual/Summer/Winter Average Temperatures: Yes
Projected Heat Index: No
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: No
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: No
Projected Cooling Degree Days & Heating Degree Days (base = 65°F): No

Project Inputs

Core Project Information

Name:	Upper Van Horn Reservoir Dam Improvements Project
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2073
Location of Project:	Springfield
Estimated Capital Cost:	$3,300,000
Who is the Submitting Entity?	City/Town Springfield Patrick Sullivan (psullivan@springfieldcityhall.com)
Is this project identified as a priority project in the Municipal Vulnerability Preparedness (MVP) plan or the local or regional Hazard Mitigation Plan (HMP)?	Yes
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Design
Is climate resiliency a core objective of this project?	Yes
Is this project being submitted as part of the state capital planning process?	No
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	Rehabilitate existing dam to meet current Office of Dam Safety standards.
Project Submission Comments:	

Project Ecosystem Benefits

Factors Influencing Output

✓ Project reduces storm damage
✓ Project recharges groundwater
✓ Project improves water quality
✓ Project protects fisheries, wildlife, and plant habitat
✓ Project provides recreation

Factors to Improve Output

✓ Incorporate nature-based solutions that may provide flood protection
✓ Protect public water supply by reducing the risk of contamination, pollution, and/or runoff of surface and groundwater sources used for human consumption
✓ Incorporate strategies that reduce carbon emissions
✓ Incorporate green infrastructure to filter stormwater
✓ Incorporate nature-based solutions that sequester carbon carbon
✓ Preserve, enhance, and/or restore coastal shellfish habitats
✓ Incorporate vegetation that provides pollinator habitat
✓ Identify opportunities to remediate existing sources of pollution
✓ Increase plants, trees, and/or other vegetation to provide oxygen production
✓ Mitigate atmospheric greenhouse gas concentrations and other toxic air pollutants through nature-based solutions
✓ Identify opportunities to prevent pollutants from impacting ecosystems
✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	Yes
Recharges groundwater	Yes

Protects public water supply	No
Filters stormwater using green infrastructure	No
Improves water quality	Yes
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	No
Remediates existing sources of pollution	No
Protects fisheries, wildlife, and plant habitat	Yes
Protects land containing shellfish	No
Provides pollinator habitat	No
Provides recreation	Yes
Provides cultural resources/education	No

Project Climate Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	No
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	Yes
Are existing trees being removed as part of the proposed project?	Yes

Project Assets

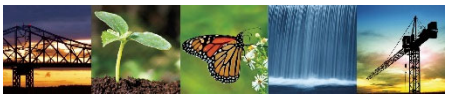
Asset: Upper Van Horn Reservoir Dam
Asset Type: Dams and Flood Control Structures
Asset Sub-Type: Dams
Construction Type: Major Repair/Retrofit
Construction Year: 2023
Useful Life: 50
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure must be accessible/operable at all times, even during natural hazard event.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be limited to local area and/or municipality
Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 10,000 people
Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
Yes
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would be expected to result in possible loss of life
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Significant – Inoperability is likely to impact other facilities, assets, or buildings and result in cascading impacts that will likely affect their ability to operate
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources can be mitigated naturally
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure may reduce the ability to maintain some government services, while a majority of services will still exist
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Loss of confidence in government agency
Asset: Upper Van Horn Reservoir
Asset Type: Aquatic Ecosystems
Asset Sub-Type: Lakes and Ponds - Non water supply
Construction Type: Maintenance (environmental)
Construction Year: 2023
Useful Life: 1

Report Comments

N/A

ATTACHMENT 6-1

TECHNICAL MEMORANDUM – RMAT TIER 3 PRECIPITATION ANALYSIS SUMMARY



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TECHNICAL MEMORANDUM

RMAT TIER 3 PRECIPITATION ANALYSIS SUMMARY
UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
SPRINGFIELD, MA

JULY 2022

In accordance with the *Massachusetts Environmental Policy Act (MEPA) Interim Protocol on Climate Change Adaptation and Resiliency* (Interim Protocol) (effective date October 1, 2021), GZA GeoEnvironmental, Inc. (GZA) prepared an analysis relative to climate change using the Resilient Massachusetts Action Team (RMAT) Climate Resilience Design Standards Tool, which is provided as an attachment to the Expanded Environmental Notification Form (EENF) being field for the Upper Van Horn Reservoir Dam Improvements Project (Project) in Springfield, MA.

Based on the results of the RMAT Tool analysis which indicated a 2070 planning horizon for the 100-Year (1%) storm, GZA performed a RMAT Tier 3 projected total precipitation depth analysis and peak intensity review for the Upper Van Horn Reservoir Dam Improvements Project. This memorandum outlines the methodology and results of the projected precipitation analysis, as well as the updated hydrologic and hydraulic (H&H) analysis of Upper Van Horn Reservoir Dam with the calculated 24-hour, 100-year projected precipitation depth. All elevations in this report are NAVD88 feet unless otherwise specified. This report and work are subject to the Limitations in **Appendix A** of this memo.

TIER 3 ANALYSIS

The most updated RMAT Tier 3 methodology to assess projected total precipitation depth for 24-hour design storms is presented in a document entitled *Climate Resilience Design Standards – Projected Total Precipitation Depth Design Criteria – Tiered Methodology* dated April 2022. The methodology consists of downloading projected daily precipitations from 14 climate change models and then computing a ratio between modeled baseline and future precipitations for the given planning horizon that can then be applied to the present-day design precipitation depth to estimate projected future design precipitation. For the Upper Van Horn Reservoir Dam, GZA calculated the projected future 24-hour, 100-yr storm depth.

GZA downloaded projected daily precipitations from 14 Global Climate Models (GCMs) for the RCP 8.5 climate scenario (i.e. high emission scenario where average temperatures rise by 4.9 degrees Celsius, or nearly 9 degrees Fahrenheit) from Localized Constructed Analogs (LOCA). Temporally, the RMAT methodology instructs the user to download LOCA data between January 1950 and December 2099. Spatially, LOCA data is downloaded in grids; the RMAT methodology instructs the user to download three grids per project site with one grid containing the project and two grids surrounding the project grid. The procedure for downloading LOCA grids is attached as **Appendix B** to this memo. Once the three grids were downloaded, data was imported into RStudio. The remainder of the computation in the Tier 3 analysis were performed using the R programming language.

For each grid, GZA further divided the 1950 to 2099 data temporally into the modeled baseline and modeled future projection datasets based on the planning horizon recommended by the RMAT Climate Resilience Design Standards Tool Project Report (e.g. 2070 for this project). Thirty years of data was included in each dataset; the future data ranged from 2060 to 2089, and the baseline data ranged from 1991 to 2022. Note that the RMAT Tier III methodology did not specify the years to include in the baseline dataset, so GZA inferred the date range based on the 30-year planning horizon around 2070. The annual maxima precipitation for each GCMs was calculated for each time period per grid. At this point in the methodology there were 84 sets of data; the modeled present day and modeled future annual maxima for each of the 14 GCMs for each of the three grids.

GZA fit the Generalized Extreme Value (GEV) distribution to the annual maxima of each set of data using the *fevd* function of the *extRemes* package. The outputs of this calculation step were 84 recurrence interval curves that can be used to estimate 1-day precipitation depth for any given recurrence interval. To convert 1-day depths to 24-hour depths, GZA multiplied the precipitation of each curve by 1.11. The 24-hour, 100-year storm depths were calculated per curve.

GZA calculated the ratio between the modeled baseline and modeled future projection datasets per GCMs per grid, resulting in 42 24-hour, 100-year storm depth ratios. The mean, 5% confidence level (CL) and 95% CL were calculated for all GCMs per grid and multiplied by the present-day design 24-hour, 100-year storm depth. The result of this analysis was three 24-hour, 100-year storm depths: means, 5% confidence levels (CLs), and 95% CLs, one per grid. GZA then calculated the final projected future 24-hour, 100-year storm depth by averaging the three mean 24-hour, 100-year storm depths. The resulting projected future 24-hour, 100-year storm depth was 11.48 inches. The calculated increase in 100-yr storm precipitation depth by 2070 calculated by GZA was similar to the projected 11.4 inches of depth estimated by the RMAT Climate Resilience Design Standards Tool Project Report. The projected 100-year depth represents an increase of 3.36 inches over the existing 100-year storm depth (over a 40% increase).

HYDROLOGIC AND HYDRAULIC ANALYSIS

The hydrologic and hydraulic analysis for Upper Van Horn Reservoir Dam was performed in HydroCAD version 10.10-5a. GZA applied the same model created for the *Phase II Engineering Evaluation and Alternatives Analysis* prepared by GZA in 2020, as shown in **Appendix C1** of this memo. Because the watershed is small and simple, with no significant channel/streamflow, HydroCAD was used rather than a more detailed HEC-RAS model. To update the model for RMAT purposes, GZA applied the calculated 2070 projected 24-hour, 100-year storm depth of 11.48 inches.

The model consists of two nodes representing the Upper Van Horn watershed and the Upper Van Horn reservoir. The model uses the SCS curve number methodology to calculate loss and the SCS Dimensionless Unit Hydrograph methodology to transform precipitation excess to runoff. The area-weighted average curve applied was 73, and the time of concentration was 86.8 minutes.

Storage in the Upper Van Horn reservoir was represented using an elevation-area curve, shown in **Table 1**. Outflow from the reservoir was calculated with two, 60 ft in length box culverts at elevation 167.4 ft, and a rectangular weir 100 ft in length representing the top of dam at elevation 175.6 ft.

GZA applied the 24-hour NRCC Storm Curve C rainfall distribution to the watershed with a cumulative depth of 8.12 inches of water for the 100-year storm as retrieved from NOAA Atlas 14. Per the Massachusetts Dam Safety Regulations (302 CMR 10.14), the Spillway Design Flood (SDF) Design Storm for a Significant Hazard, Intermediate Size dam is the 100-year storm event.

Table 1: Upper Van Horn Reservoir Elevation-Area Input Data

Elevation (ft)	Area (acres)
152.5	0.38
157.5	2.65
162.5	5.94
167.5	9.82
177.0	15.86

To update the model, GZA increased the precipitation depth to 11.48 inches as calculated from the RMAT Tier 3 analysis while keeping the rainfall distribution the same. The updated rainfall peak intensities compared to present day intensities are in **Table 2**. The HydroCAD results for both the present-day precipitation and projected future precipitation 100-year runs are in **Table 3**, and the HydroCAD reports can be found in **Appendix C1** and **Appendix C2** of this memo, respectively.

Table 2: 24-hour NRCC Storm Curve C Rainfall Distribution with Present and Projected 2070 100-year Peak Intensities

Duration (hr)	Depth Ratio	Present Day (8.12 in)		Projected 2070 (11.48 in)	
		Cumulative Depth (in)	Hourly Peak Intensity (in/hr)	Cumulative Depth (in)	Hourly Peak Intensity (in/hr)
0	0.00	0.00	0.00	0.00	0.00
1	0.01	0.09	0.09	0.12	0.12
2	0.02	0.18	0.09	0.25	0.13
3	0.03	0.28	0.10	0.39	0.14
4	0.05	0.38	0.10	0.54	0.15
5	0.06	0.49	0.11	0.69	0.15
6	0.07	0.61	0.12	0.86	0.16
7	0.10	0.77	0.17	1.09	0.24
8	0.12	0.96	0.19	1.36	0.26
9	0.14	1.17	0.21	1.65	0.30
10	0.18	1.49	0.32	2.10	0.45
11	0.25	2.01	0.52	2.84	0.73
12	0.48	3.89	1.88	5.50	2.66
13	0.75	6.11	**2.23**	8.64	**3.15**
14	0.82	6.63	0.52	9.38	0.73
15	0.86	6.95	0.32	9.83	0.45
16	0.88	7.16	0.21	10.12	0.30
17	0.90	7.35	0.19	10.39	0.26
18	0.93	7.51	0.17	10.62	0.24
19	0.94	7.63	0.12	10.79	0.16
20	0.95	7.74	0.11	10.94	0.15
21	0.97	7.84	0.10	11.09	0.15
22	0.98	7.94	0.10	11.23	0.14
23	0.99	8.03	0.09	11.36	0.13
24	1.00	8.12	0.09	11.48	0.12

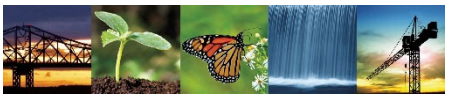
Table 3: Present Day and Projected Future 100-yr Storm HydroCAD Model Results

Scenario	Precipitation Depth (in)	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Pool Elevation (ft)	Top of Dam Elevation (ft)	Freeboard (ft)
Present Day	8.12	441	253	170.6	175.6	5.0
Projected Future (2070)	11.48	711	442	172.0		3.6

The model indicates that the projected increase in 100-yr storm depth by 2070 will increase the peak inflow by 270 cubic feet per second (cfs), the peak outflow by 190 cfs, and the peak pool elevation by 1.4 ft. Even under this extreme precipitation scenario, the Upper Van Horn Reservoir Dam would still safely pass the 100-year storm in 2070 with 3.6 feet of freeboard.

CONCLUSION

The objective of the study was to develop a 2070 projected 100-year storm depth and peak intensities using the RMAT Tier 3 methodology to apply to an existing hydrological and hydraulic HydroCAD model. GZA performed the RMAT Tier 3 methodology for the site using the R programming language, which indicated that 100-year precipitation depth would increase by 3.36 inches from 8.12 inches to 11.48 inches between the present day and 2070 and that peak intensities would increase as well. Applying the projected 2070 100-year storm depth to the existing HydroCAD indicated that, while inflows and outflows to and from Upper Van Horn Reservoir Dam would increase by 270 cfs and 190 cfs, respectively, the dam would still safely pass the future 100-year flows with approximately 3.4 feet of freeboard. The existing spillway configuration at the dam is sufficient to pass the required flows during the present-day 100-year storm (which is the regulatory Spillway Design Flood (SDF) per the Massachusetts Dam Safety Regulations and also can safely pass the RMAT Tier 3 2070 planning horizon event. While the peak intensities increase in the 2070 horizon, the reservoir has the ability to store and pass the increased flow. As such, no changes to the existing spillway configuration or conceptual design are warranted since the existing configuration already has sufficient capacity to account for climate change relative to precipitation levels per the RMAT Tier 3.



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APPENDIX A
Limitations

USE OF REPORT

1. GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of the Client for the stated purpose(s) and location(s) identified in the Report. Use of this Report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

STANDARD OF CARE

2. Our findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. Conditions other than described in this report may be found at the subject location(s).

3. The interpretations and conclusions presented in the Report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of the described services. The work described in this report was carried out in accordance with the agreed upon Terms and Conditions of Engagement.

4. GZA's hydrologic and hydraulic evaluation was performed in accordance with generally accepted practices of qualified professionals performing the same type of services at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made. The findings are dependent on numerous assumptions and uncertainties inherent in the assessment process. The findings of the evaluation are not an absolute characterization of actual risks, but rather serve to highlight potential sources of risk at the site(s).

5. Unless specifically stated otherwise, the evaluations performed by GZA and associated results and conclusions are based upon evaluation of historic data, trends, references, and guidance with respect to the current climate and sea level conditions. Future climate change may result in alterations to inputs which influence flooding at the site (*e.g.*, rainfall totals, storm intensities, mean sea level, *etc.*). Such changes may have implications on the estimated flood elevations, flood frequencies and/or other parameters contained in this report.

RELIANCE ON INFORMATION FROM OTHERS

6. In conducting our work, GZA has relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Any inconsistencies in this information which we have noted are discussed in the Report.

COMPLIANCE WITH CODES AND REGULATIONS

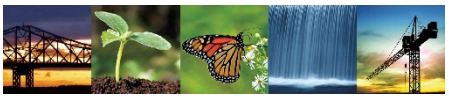
7. We used reasonable care in identifying and interpreting applicable codes and regulations necessary to execute our scope of work. These codes and regulations are subject to various, and possibly contradictory, interpretations. Interpretations with codes and regulations by other parties are beyond our control.

ADDITIONAL INFORMATION

8. In the event that the Client or others authorized to use this report obtain information on conditions at the site(s) not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this evaluation, may modify the opinions stated in this report.

ADDITIONAL SERVICES

9. GZA recommends that we be retained to provide services during any future investigations, design, implementation activities, construction, and/or property development/ redevelopment at the Site. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.



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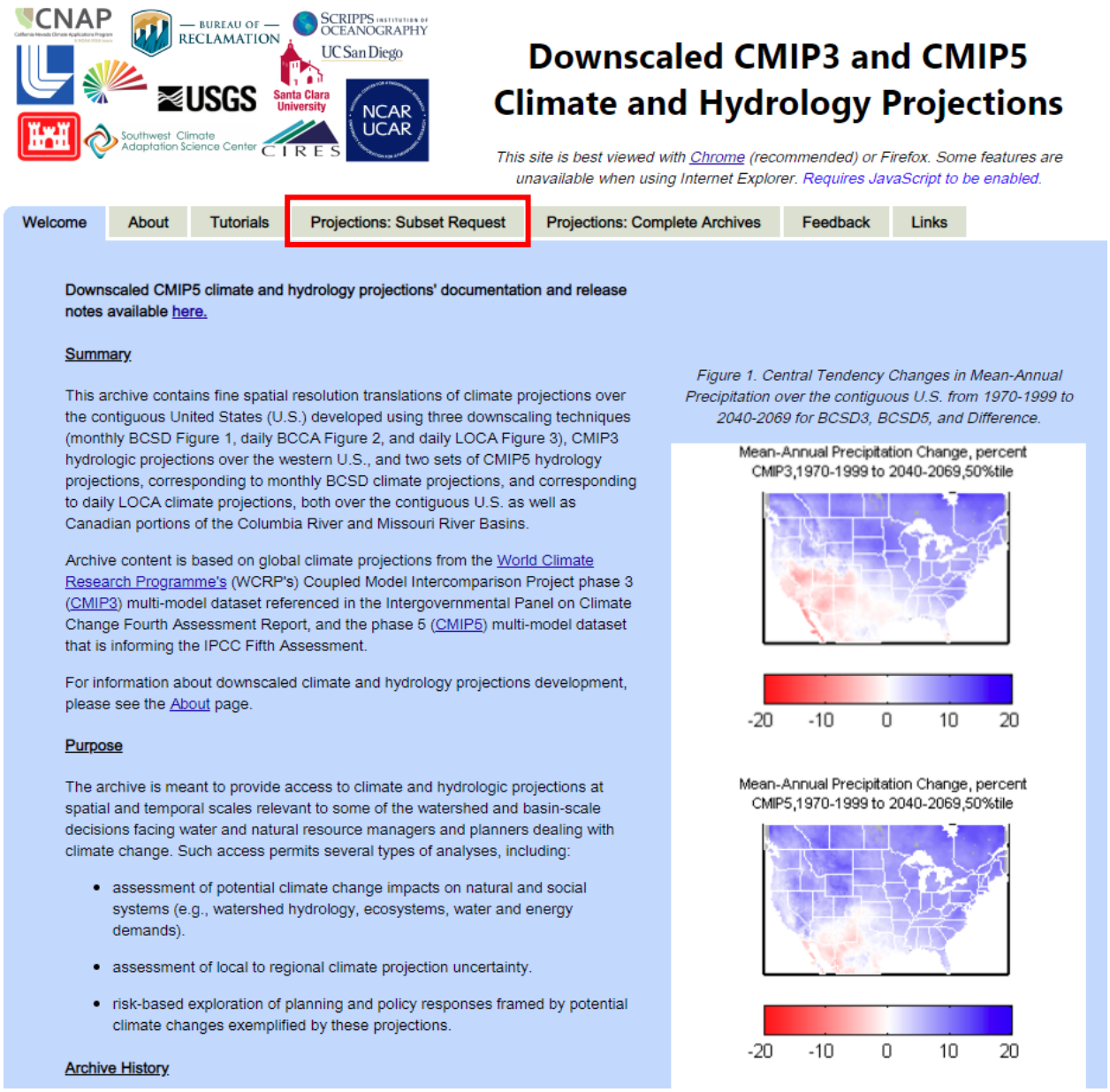
APPENDIX B
LOCA Grid Download Procedure

1. Go to https://gdo-dcp.ucllnl.org/ and select the "Projection: Subset Request" tab

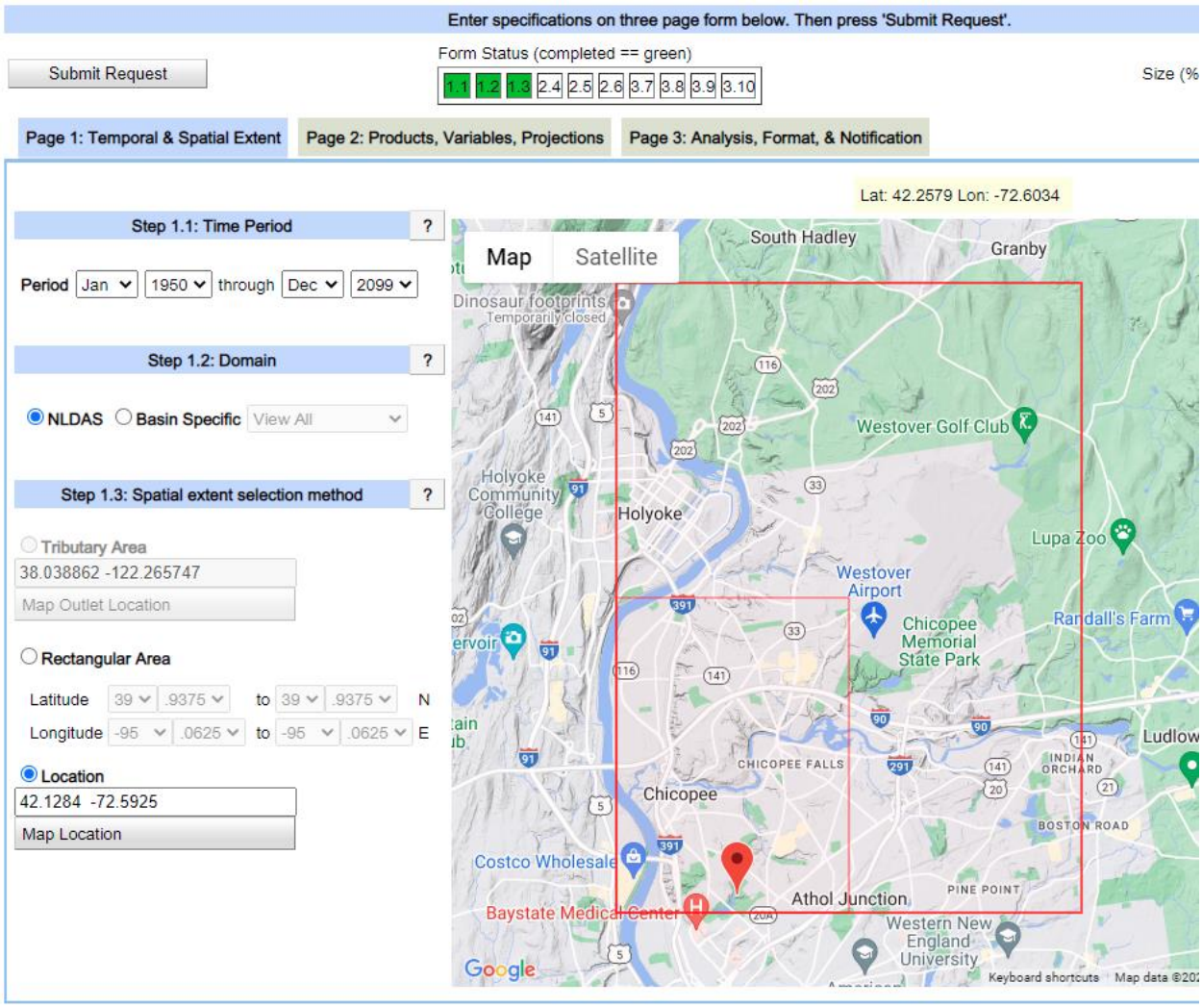


2. On “Page 1: Temporal & Spatial Extent”:

   a. In “Step 1.1: Time Period”, select the time period between January 1950 and December 2099.

   b. In “Step 1.2: Domain”, select ‘NLDAS’

   c. In “Step 1.3: Spatial extent selection method”, choose ‘Location’ and enter coordinates, or interact with the map to the right to select location.



3. On "Page 2: Products, Variables, Projections":

   a. In "Step 2.4: Select Projection Set", select 'LOCA-CMIP5-Climate-daily'.

   b. In "Step 2.5: Products & Variables -- daily projections", select:
      - '1/16 degree LOCA projections'
      - '1/16 degree Observed data (1950-2005)'
      - 'Precipitation Rate (mm/day)'

   c. In "Step 2.6: Emissions Scenarios, Climate Models and Runs", select under 'Emissions Path: RCP8.5':
      - 'bcc-csm-1'
      - 'bcc-csm-1-m'
      - 'ccsm4'
      - 'cnrm-cm5'
      - 'csiro-mk3-6-0'
      - 'gfdl-cm3'
      - 'giss-e2-h'
      - 'giss-e2-r'
      - 'hadgem2-ao'
      - 'hadgem2-cc'
      - 'inmcm4'
      - 'ipsl-cm5a-lr'
      - 'miroc5'
      - 'mri-cgcm3'

Enter specifications on three page form below. Then press 'Submit Request'. ?

Submit Request

Form Status (completed == green)

1.1 1.2 1.3 2.4 2.5 2.6 3.7 3.8 3.9 3.10

Size (%, 100 max): 94

Page 1: Temporal & Spatial Extent | Page 2: Products, Variables, Projections | Page 3: Analysis, Format, & Notification

Step 2.4: Select Projection Set (Green text indicates projection set form completed) ?

- ○ BCSD-CMIP3-Climate-monthly
- ○ BCCAv2-CMIP3-Climate-daily
- ○ BCSD-CMIP3-Hydrology-monthly
- ○ BCSD-CMIP5-Climate-monthly
- ○ BCCAv2-CMIP5-Climate-daily
- ○ BCSD-CMIP5-Hydrology-monthly
- ◉ LOCA-CMIP5-Climate-daily
- ○ LOCA-CMIP5-Hydrology-daily

BCSD-CMIP3-Climate-monthly | BCCAv2-CMIP3-Climate-daily | BCSD-CMIP3-Hydrology-monthly | BCSD-CMIP5-Climate-monthly | BCCAv2-CMIP5-Climate-daily | BCSD-CMIP5-Hydrology-monthly | **LOCA-CMIP5-Climate-daily** | LOCA-CMIP5-Hydrology-daily

Step 2.5: Products & Variables -- daily projections ?

Products
- ☑ 1/16 degree LOCA projections
- ☑ 1/16 degree Observed data (1950-2005)
- ☐ 1 degree LOCA projections

Variables
- ☑ Precipitation Rate (mm/day)
- ☐ Min Surface Air Temperature (deg C)
- ☐ Max Surface Air Temperature (deg C)

Step 2.6: Emissions Scenarios, Climate Models and Runs ?

De-select all runs	None	None	None	None
Select all runs	All	All	All	All
Climate Models:	Emissions Path: RCP2.6	Emissions Path: RCP4.5	Emissions Path: RCP6.0	Emissions Path: RCP8.5
access1-0	☐	☐	☐	☐
access1-3	☐	☐	☐	☐
bcc-csm1-1	☐	☐	☐	☑
bcc-csm1-1-m	☐	☐	☐	☑
canesm2	☐	☐	☐	☐
ccsm4	☐	☐	☐	☑
cesm1-bgc	☐	☐	☐	☐
cesm1-cam5	☐	☐	☐	☐
cmcc-cm	☐	☐	☐	☐
cmcc-cms	☐	☐	☐	☐
cnrm-cm5	☐	☐	☐	☑
csiro-mk3-6-0	☐	☐	☐	☑
ec-earth	☐	☐	☐	☐
fgoals-g2	☐	☐	☐	☐
gfdl-cm3	☐	☐	☐	☑
gfdl-esm2g	☐	☐	☐	☐
gfdl-esm2m	☐	☐	☐	☐
giss-e2-h	☐	☐	☐	☑
giss-e2-r	☐	☐	☐	☑
hadgem2-ao	☐	☐	☐	☑
hadgem2-cc	☐	☐	☐	☑
hadgem2-es	☐	☐	☐	☐
inmcm4	☐	☐	☐	☑
ipsl-cm5a-lr	☐	☐	☐	☑
ipsl-cm5a-mr	☐	☐	☐	☐
miroc-esm	☐	☐	☐	☐
miroc-esm-chem	☐	☐	☐	☐
miroc5	☐	☐	☐	☑
mpi-esm-lr	☐	☐	☐	☐
mpi-esm-mr	☐	☐	☐	☐
mri-cgcm3	☐	☐	☐	☑
noresm1-m	☐	☐	☐	☐

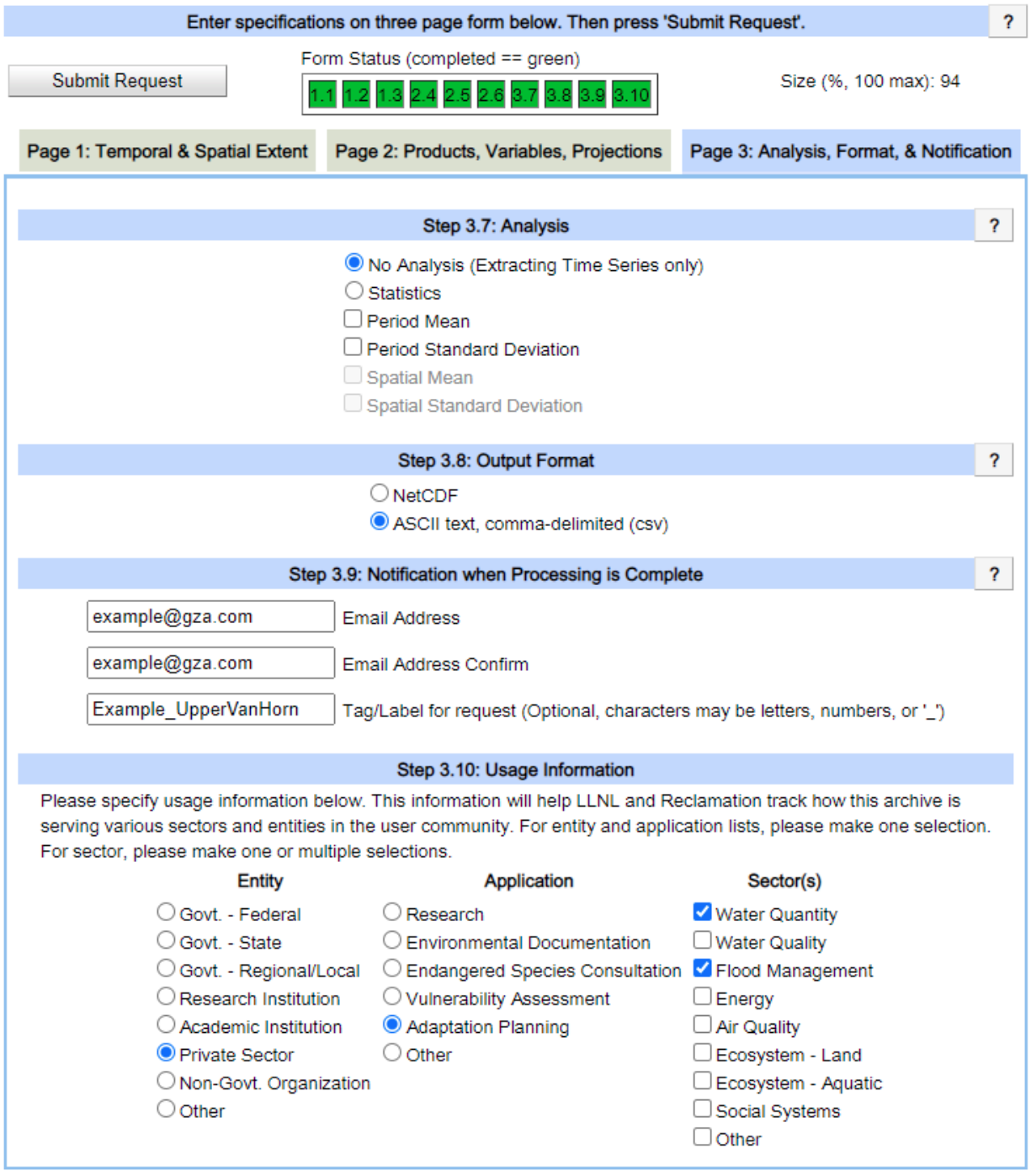
4. On “Page 3: Analysis, Format, & Notification”:

   a. In “Step 3.7: Analysis”, select ‘No Analysis’.

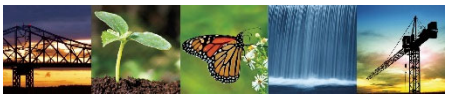
b. In “Step 3.8: Output Format”, select ‘ASCII text, comma-delimited (csv)’

c. In “Step 3.9: Notification when Processing is Complete”, enter ‘Email Address’ and ‘Tag/Label for request’.

d. In “Step 3.10: Usage Information”, select information as needed.



5. Repeat steps 1 to 4 for the other two grids needed in the Tier III analysis. Ensure to select grids adjacent to site grid.



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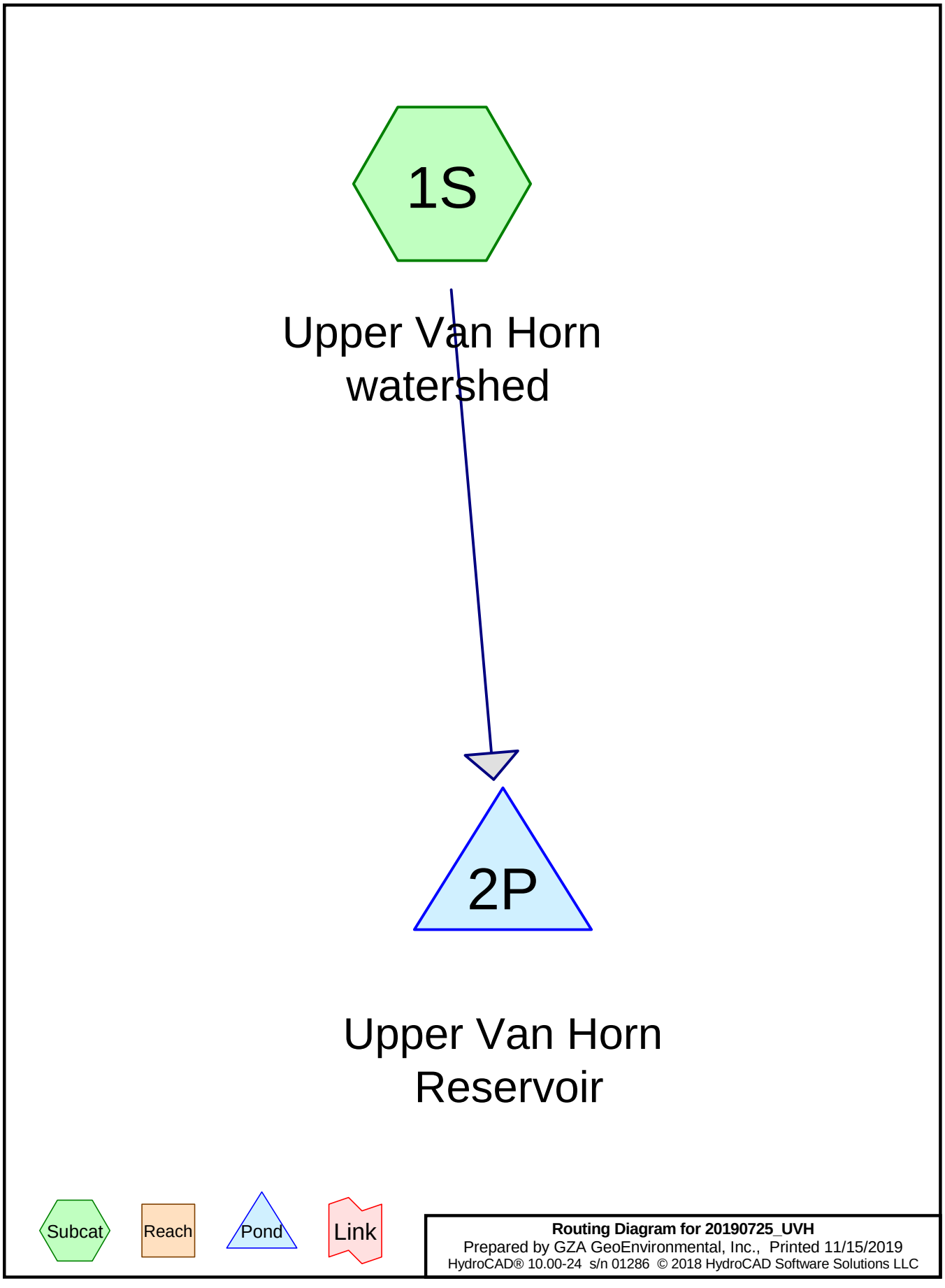
APPENDIX C
HydroCAD Reports



Routing Diagram for 20190725_UVH
Prepared by GZA GeoEnvironmental, Inc., Printed 11/15/2019

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
171.800	87	1/4 acre lots, 38% imp, HSG D (1S)
19.600	49	50-75% Grass cover, Fair, HSG A (1S)
0.200	69	50-75% Grass cover, Fair, HSG B (1S)
7.800	98	Water Surface, HSG A (1S)
29.300	36	Woods, Fair, HSG A (1S)
3.700	73	Woods, Fair, HSG C (1S)
0.400	79	Woods, Fair, HSG D (1S)
25.100	30	Woods, Good, HSG A (1S)
257.900	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
81.800	HSG A	1S
0.200	HSG B	1S
3.700	HSG C	1S
172.200	HSG D	1S
0.000	Other	
257.900		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	171.800	0.000	171.800	1/4 acre lots, 38% imp	1S
19.600	0.200	0.000	0.000	0.000	19.800	50-75% Grass cover, Fair	1S
7.800	0.000	0.000	0.000	0.000	7.800	Water Surface	1S
29.300	0.000	3.700	0.400	0.000	33.400	Woods, Fair	1S
25.100	0.000	0.000	0.000	0.000	25.100	Woods, Good	1S
81.800	**0.200**	**3.700**	**172.200**	**0.000**	**257.900**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	4,100.0	0.0034	0.017	12.0	0.0	0.0
2	2P	167.40	166.42	60.0	0.0163	0.013	96.0	60.0	0.0
3	2P	167.44	166.42	60.0	0.0170	0.013	96.0	60.0	0.0

Notes Listing (all nodes)

Line#	Node Number	Notes
1	1S	7/25/19:
2		Area calc derived from USDA Soil survey. Each area represents one soil type; soil types boundaries were generally coincident with different land uses - see Hydrologic Soil Group pdf saved in job folder.
3	2P	7/26/19: outlet structures elevations from Survey Plan by Heritage dated 8/16/19
4		bathymetry - source of data is Springfield Lakes and Ponds Inventory and Restoration Plan (BEC, May 1980).
5		Assumed weir length of 100 feet for portion that is at elevation 175.6, based on profile developed in CAD

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Upper Van Horn Runoff Area=257.900 ac 28.34% Impervious Runoff Depth=4.92"
Flow Length=5,650' Tc=86.8 min CN=73 Runoff=440.75 cfs 105.662 af

Pond 2P: Upper Van Horn Reservoir Peak Elev=170.56' Storage=101.528 af Inflow=440.75 cfs 105.662 af
Outflow=252.68 cfs 105.201 af

Total Runoff Area = 257.900 ac Runoff Volume = 105.662 af Average Runoff Depth = 4.92"
71.66% Pervious = 184.816 ac 28.34% Impervious = 73.084 ac

Summary for Subcatchment 1S: Upper Van Horn watershed

7/25/19:
Area calc derived from USDA Soil survey. Each area represents one soil type; soil types boundaries were generally coincident with different land uses - see Hydrologic Soil Group pdf saved in job folder.

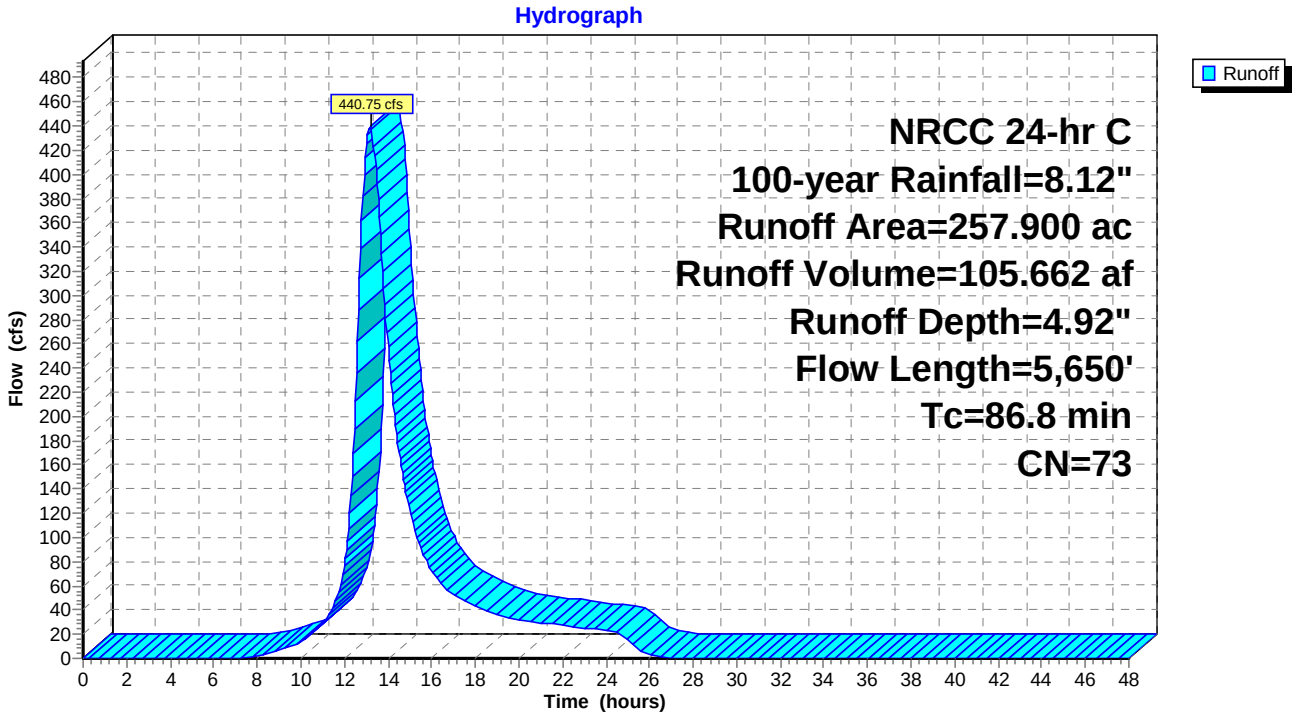
Runoff = 440.75 cfs @ 13.18 hrs, Volume= 105.662 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-year Rainfall=8.12"

Area (ac)	CN	Description
7.800	98	Water Surface, HSG A
0.400	79	Woods, Fair, HSG D
3.700	73	Woods, Fair, HSG C
1.400	36	Woods, Fair, HSG A
23.000	30	Woods, Good, HSG A
21.600	36	Woods, Fair, HSG A
2.100	30	Woods, Good, HSG A
6.300	36	Woods, Fair, HSG A
0.200	69	50-75% Grass cover, Fair, HSG B
19.600	49	50-75% Grass cover, Fair, HSG A
171.800	87	1/4 acre lots, 38% imp, HSG D
257.900	73	Weighted Average
184.816		71.66% Pervious Area
73.084		28.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.0	100	0.0034	0.04		**Sheet Flow, Overland** Woods: Light underbrush n= 0.400 P2= 3.14"
4.4	250	0.0034	0.94		**Shallow Concentrated Flow, over lawns** Unpaved Kv= 16.1 fps
33.8	4,100	0.0034	2.02	1.59	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.017 Concrete sewer w/manholes & inlets
4.6	1,200	0.0200	4.37	2,622.80	**Channel Flow,** Area= 600.0 sf Perim= 200.0' r= 3.00' n= 0.100 Earth, dense brush, high stage
86.8	5,650	Total			

Subcatchment 1S: Upper Van Horn watershed



Summary for Pond 2P: Upper Van Horn Reservoir

7/26/19: outlet structures elevations from Survey Plan by Heritage dated 8/16/19
bathymetry - source of data is Springfield Lakes and Ponds Inventory and Restoration Plan (BEC, May 1980).
Assumed weir length of 100 feet for portion that is at elevation 175.6, based on profile developed in CAD

Inflow Area = 257.900 ac, 28.34% Impervious, Inflow Depth = 4.92" for 100-year event
Inflow = 440.75 cfs @ 13.18 hrs, Volume= 105.662 af
Outflow = 252.68 cfs @ 14.02 hrs, Volume= 105.201 af, Atten= 43%, Lag= 50.3 min
Primary = 252.68 cfs @ 14.02 hrs, Volume= 105.201 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 167.40' Surf.Area= 9.746 ac Storage= 67.476 af
Peak Elev= 170.56' @ 14.02 hrs Surf.Area= 11.769 ac Storage= 101.528 af (34.052 af above start)
Flood Elev= 176.00' Surf.Area= 15.220 ac Storage= 174.893 af (107.416 af above start)

Plug-Flow detention time= 565.2 min calculated for 37.686 af (36% of inflow)
Center-of-Mass det. time= 133.1 min (1,034.5 - 901.4)

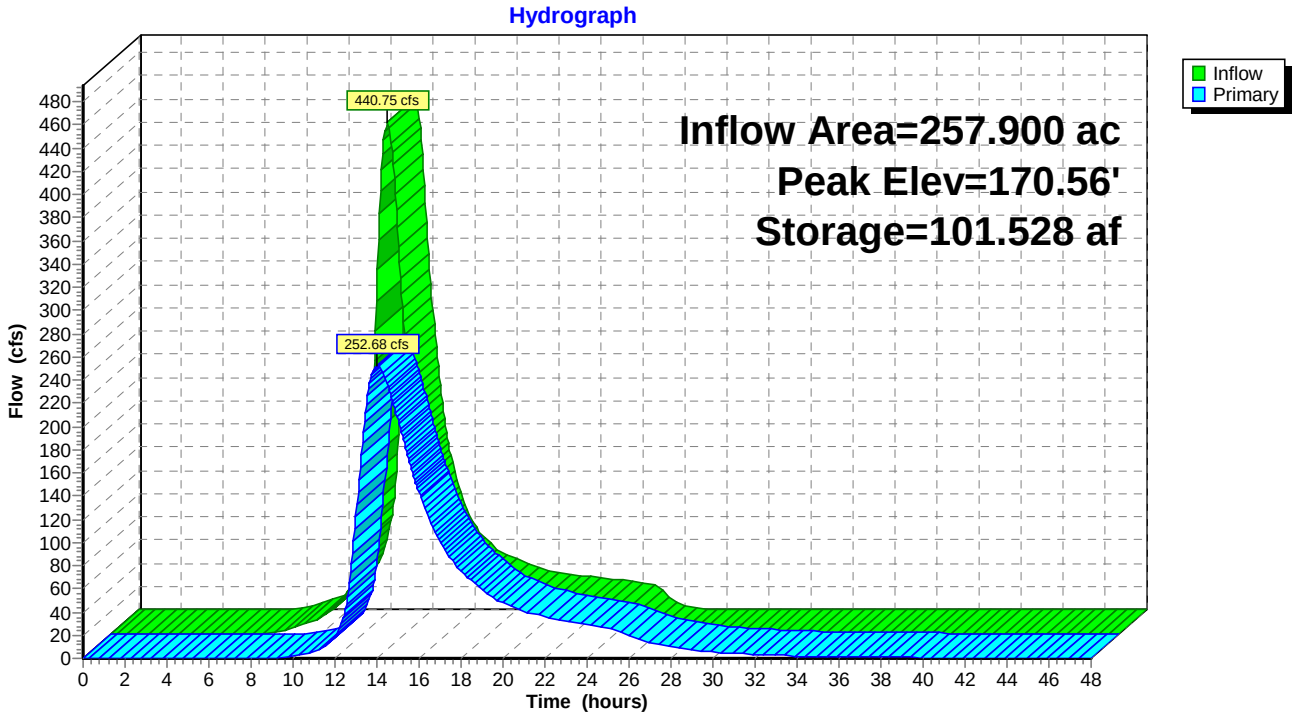
Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	190.430 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
152.50	0.382	0.000	0.000
157.50	2.653	7.587	7.587
162.50	5.935	21.470	29.057
167.50	9.824	39.398	68.455
177.00	15.855	121.975	190.430

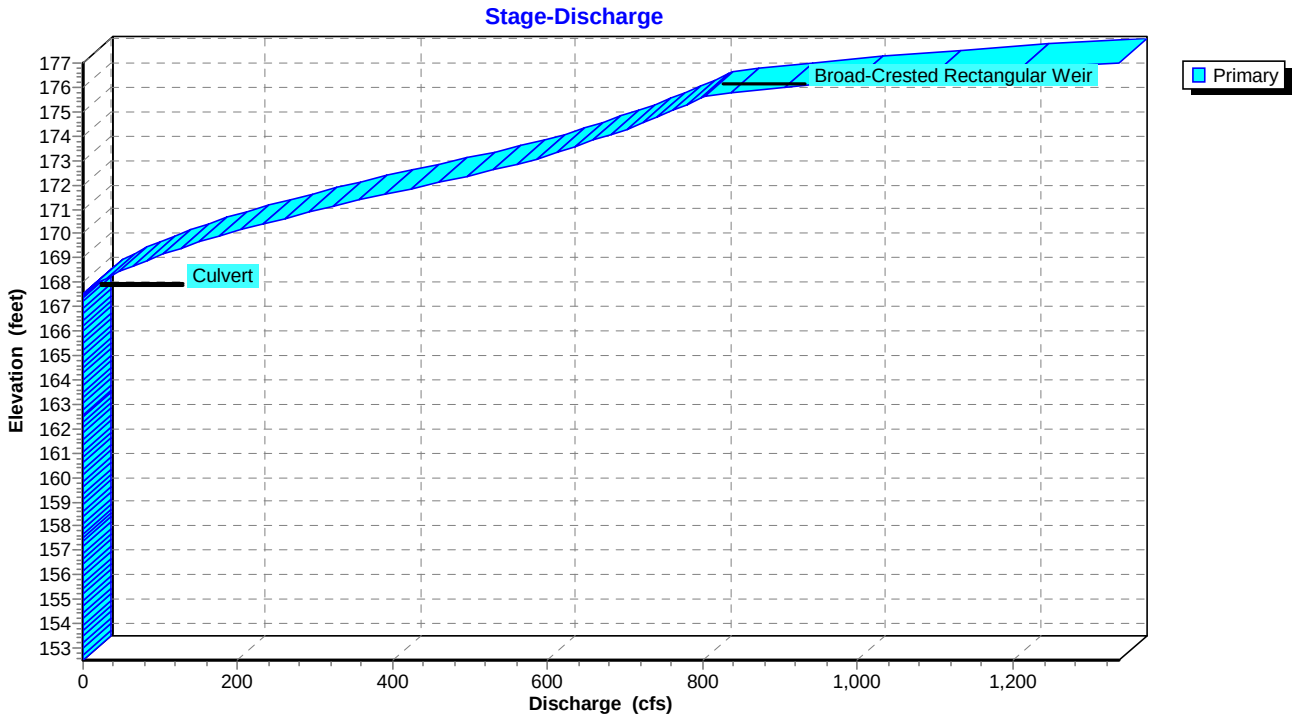
Device	Routing	Invert	Outlet Devices
#1	Primary	167.40'	**96.0" W x 60.0" H Box Culvert** L= 60.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 167.40' / 166.42' S= 0.0163 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 40.00 sf
#2	Primary	175.60'	**100.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Primary	167.44'	**96.0" W x 60.0" H Box Culvert** L= 60.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 167.44' / 166.42' S= 0.0170 '/' Cc= 0.900 n= 0.013, Flow Area= 40.00 sf

Primary OutFlow Max=252.50 cfs @ 14.02 hrs HW=170.56' TW=144.50' (Fixed TW Elev= 144.50')
- **1=Culvert** (Inlet Controls 127.46 cfs @ 5.04 fps)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Culvert** (Inlet Controls 125.05 cfs @ 5.01 fps)

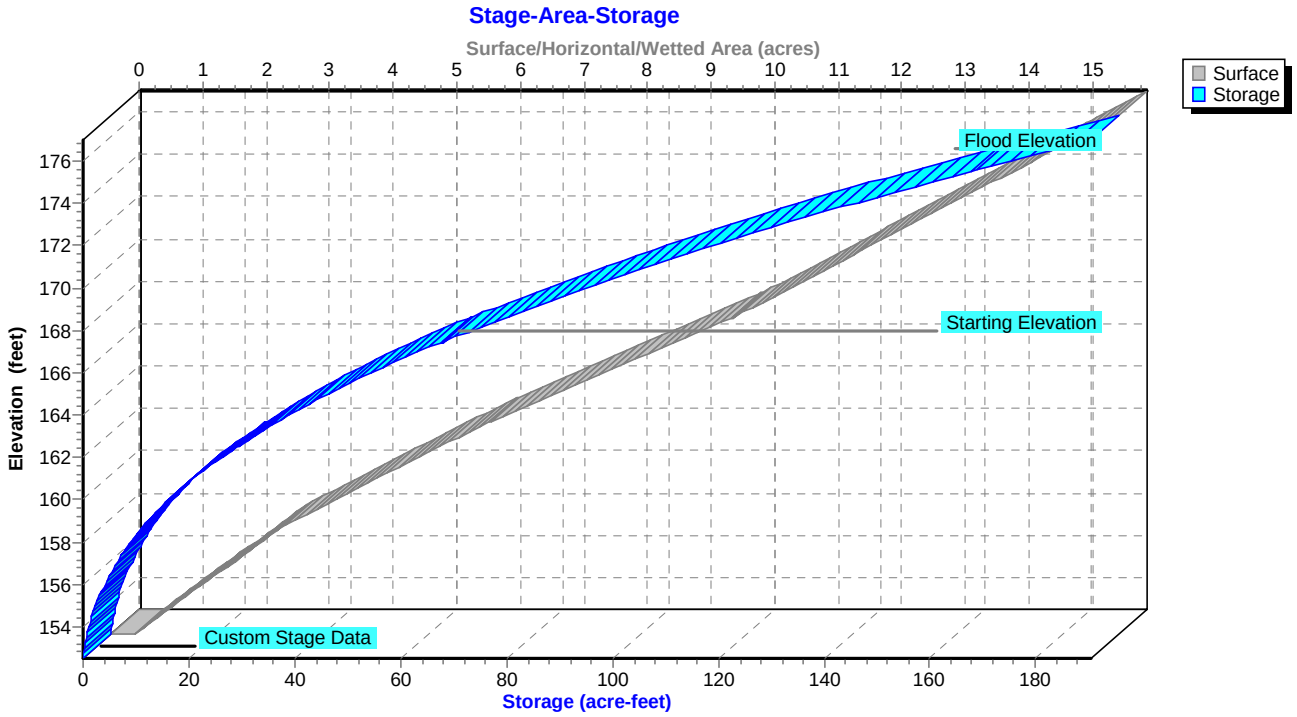
Pond 2P: Upper Van Horn Reservoir

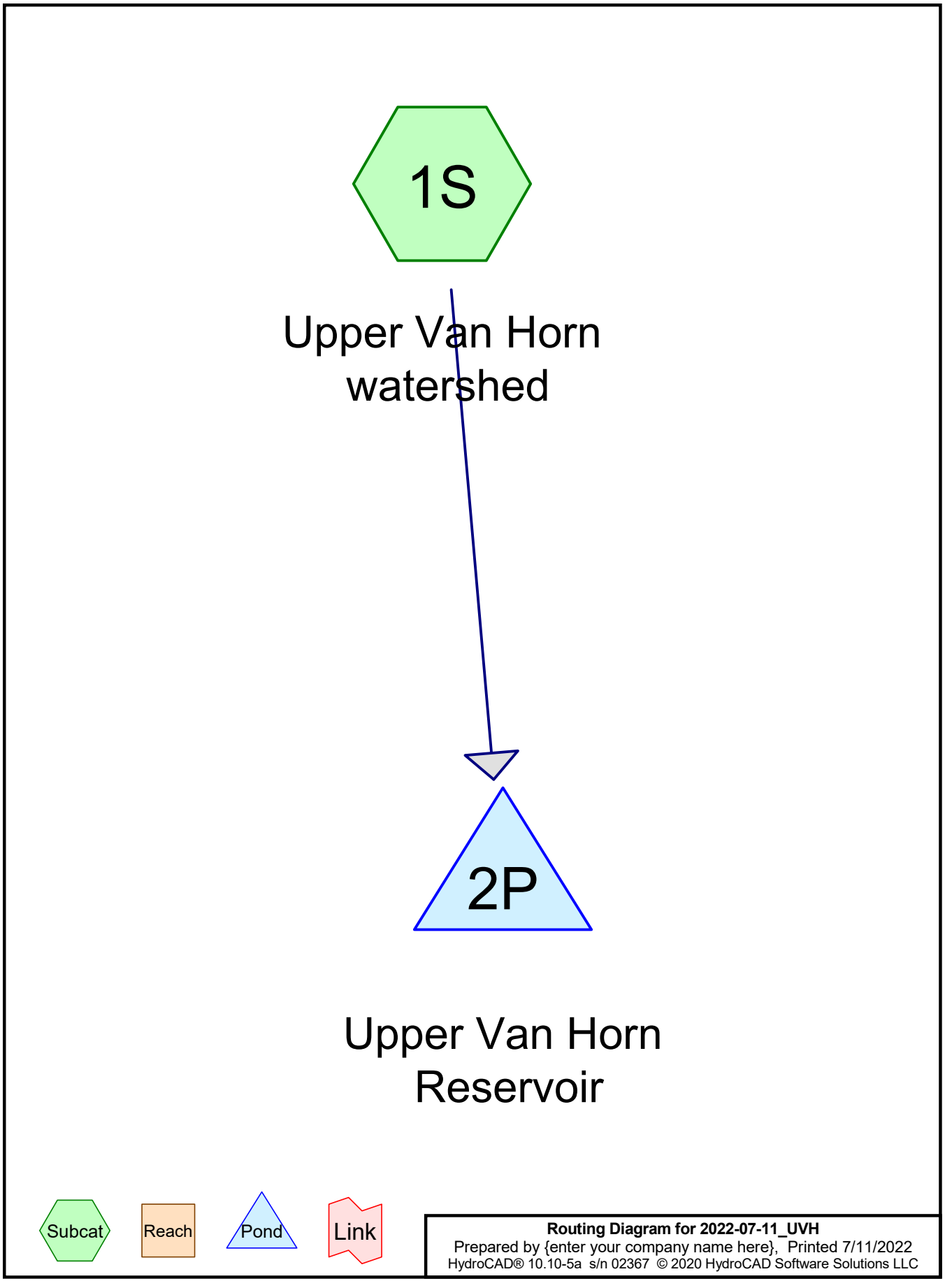


Pond 2P: Upper Van Horn Reservoir



Pond 2P: Upper Van Horn Reservoir




1S
Upper Van Horn watershed
2P
Upper Van Horn Reservoir
Subcat
Reach
Pond
Link
Routing Diagram for 2022-07-11_UVH
Prepared by {enter your company name here}, Printed 7/11/2022
HydroCAD® 10.10-5a s/n 02367 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
171.800	87	1/4 acre lots, 38% imp, HSG D (1S)
19.600	49	50-75% Grass cover, Fair, HSG A (1S)
0.200	69	50-75% Grass cover, Fair, HSG B (1S)
7.800	98	Water Surface, HSG A (1S)
29.300	36	Woods, Fair, HSG A (1S)
3.700	73	Woods, Fair, HSG C (1S)
0.400	79	Woods, Fair, HSG D (1S)
25.100	30	Woods, Good, HSG A (1S)
257.900	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
81.800	HSG A	1S
0.200	HSG B	1S
3.700	HSG C	1S
172.200	HSG D	1S
0.000	Other	
257.900		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	171.800	0.000	171.800	1/4 acre lots, 38% imp	1S
19.600	0.200	0.000	0.000	0.000	19.800	50-75% Grass cover, Fair	1S
7.800	0.000	0.000	0.000	0.000	7.800	Water Surface	1S
29.300	0.000	3.700	0.400	0.000	33.400	Woods, Fair	1S
25.100	0.000	0.000	0.000	0.000	25.100	Woods, Good	1S
81.800	**0.200**	**3.700**	**172.200**	**0.000**	**257.900**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1S	0.00	0.00	4,100.0	0.0034	0.017	0.0	12.0	0.0
2	2P	167.40	166.42	60.0	0.0163	0.013	96.0	60.0	0.0
3	2P	167.44	166.42	60.0	0.0170	0.013	96.0	60.0	0.0

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Upper Van Horn Runoff Area=257.900 ac 28.34% Impervious Runoff Depth=7.99"
Flow Length=5,650' Tc=86.8 min CN=73 Runoff=710.67 cfs 171.699 af

Pond 2P: Upper Van Horn Reservoir Peak Elev=171.99' Storage=118.907 af Inflow=710.67 cfs 171.699 af
Outflow=442.19 cfs 171.221 af

Total Runoff Area = 257.900 ac Runoff Volume = 171.699 af Average Runoff Depth = 7.99"
71.66% Pervious = 184.816 ac 28.34% Impervious = 73.084 ac

Summary for Subcatchment 1S: Upper Van Horn watershed

7/25/19:
Area calc derived from USDA Soil survey. Each area represents one soil type; soil types boundaries were generally coincident with different land uses - see Hydrologic Soil Group pdf saved in job folder.

[47] Hint: Peak is 44734% of capacity of segment #3

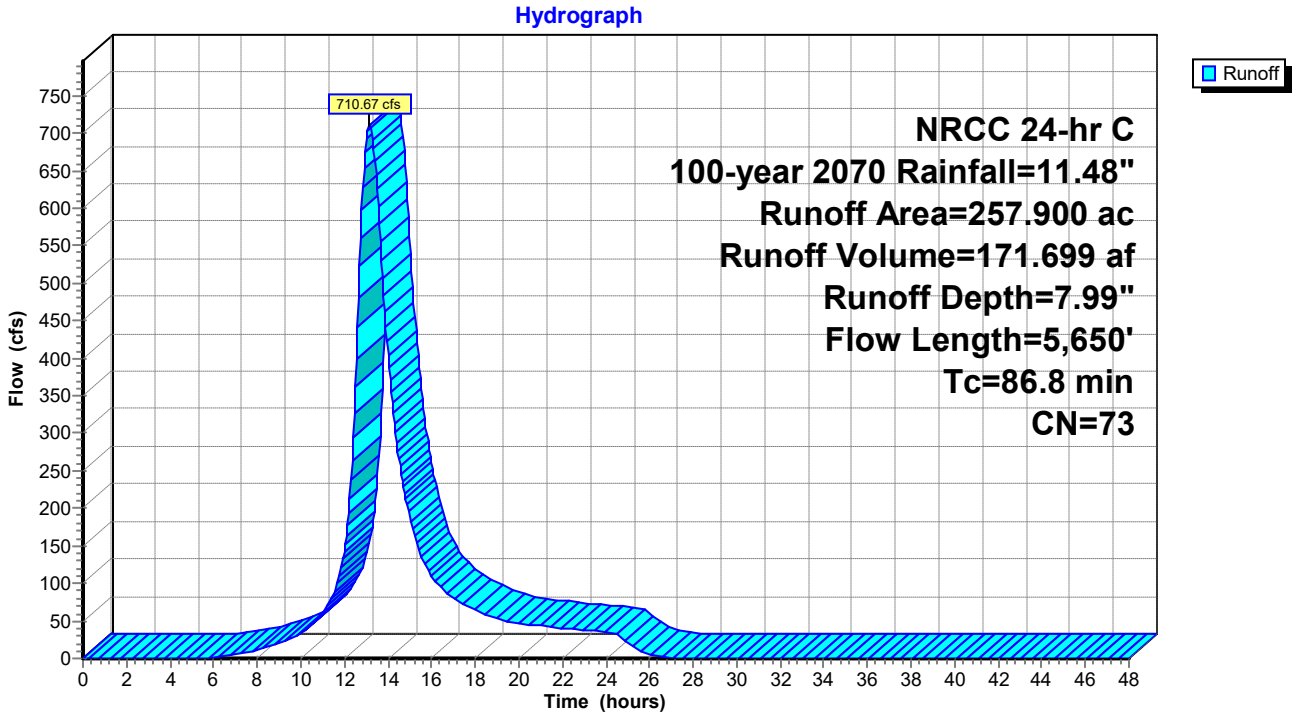
Runoff = 710.67 cfs @ 13.17 hrs, Volume= 171.699 af, Depth= 7.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-year 2070 Rainfall=11.48"

Area (ac)	CN	Description
7.800	98	Water Surface, HSG A
0.400	79	Woods, Fair, HSG D
3.700	73	Woods, Fair, HSG C
1.400	36	Woods, Fair, HSG A
23.000	30	Woods, Good, HSG A
21.600	36	Woods, Fair, HSG A
2.100	30	Woods, Good, HSG A
6.300	36	Woods, Fair, HSG A
0.200	69	50-75% Grass cover, Fair, HSG B
19.600	49	50-75% Grass cover, Fair, HSG A
171.800	87	1/4 acre lots, 38% imp, HSG D
257.900	73	Weighted Average
184.816		71.66% Pervious Area
73.084		28.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.0	100	0.0034	0.04		**Sheet Flow, Overland** Woods: Light underbrush n= 0.400 P2= 3.14"
4.4	250	0.0034	0.94		**Shallow Concentrated Flow, over lawns** Unpaved Kv= 16.1 fps
33.8	4,100	0.0034	2.02	1.59	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.017 Concrete sewer w/manholes & inlets
4.6	1,200	0.0200	4.37	2,622.80	**Channel Flow,** Area= 600.0 sf Perim= 200.0' r= 3.00' n= 0.100 Earth, dense brush, high stage
86.8	5,650	Total			

Subcatchment 1S: Upper Van Horn watershed



Hydrograph for Subcatchment 1S: Upper Van Horn watershed

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
0.50	0.06	0.00	0.00
1.00	0.13	0.00	0.00
1.50	0.20	0.00	0.00
2.00	0.28	0.00	0.00
2.50	0.36	0.00	0.00
3.00	0.44	0.00	0.00
3.50	0.52	0.00	0.00
4.00	0.61	0.00	0.00
4.50	0.70	0.00	0.00
5.00	0.79	0.00	0.00
5.50	0.89	0.01	0.14
6.00	0.98	0.02	0.99
6.50	1.09	0.03	2.68
7.00	1.21	0.05	5.02
7.50	1.35	0.09	8.03
8.00	1.49	0.13	11.75
8.50	1.65	0.18	16.11
9.00	1.82	0.24	21.13
9.50	2.02	0.33	26.80
10.00	2.27	0.45	34.32
10.50	2.56	0.60	45.44
11.00	2.96	0.83	60.55
11.50	3.59	1.24	85.88
12.00	5.47	2.65	141.88
12.50	7.89	4.71	362.48
13.00	8.52	5.27	**692.92**
13.50	8.92	5.64	**624.73**
14.00	9.21	5.90	404.31
14.50	9.46	6.12	265.86
15.00	9.66	6.31	186.05
15.50	9.83	6.46	139.88
16.00	9.99	6.61	110.05
16.50	10.13	6.74	91.74
17.00	10.27	6.86	79.55
17.50	10.39	6.97	71.74
18.00	10.50	7.07	65.14
18.50	10.59	7.17	58.98
19.00	10.69	7.25	53.65
19.50	10.78	7.34	49.77
20.00	10.87	7.42	47.32
20.50	10.96	7.50	45.41
21.00	11.04	7.58	43.74
21.50	11.12	7.66	42.24
22.00	11.20	7.73	40.69
22.50	11.28	7.80	39.24
23.00	11.35	7.86	37.75
23.50	11.42	7.93	36.26
24.00	**11.48**	**7.99**	34.81
24.50	11.48	7.99	31.97
25.00	11.48	7.99	22.01
25.50	11.48	7.99	10.48
26.00	11.48	7.99	4.44
26.50	11.48	7.99	1.88
27.00	11.48	7.99	0.78
27.50	11.48	7.99	0.31
28.00	11.48	7.99	0.11
28.50	11.48	7.99	0.02
29.00	11.48	7.99	0.00
29.50	11.48	7.99	0.00
30.00	11.48	7.99	0.00
30.50	11.48	7.99	0.00
31.00	11.48	7.99	0.00
31.50	11.48	7.99	0.00
32.00	11.48	7.99	0.00
32.50	11.48	7.99	0.00
33.00	11.48	7.99	0.00
33.50	11.48	7.99	0.00
34.00	11.48	7.99	0.00
34.50	11.48	7.99	0.00
35.00	11.48	7.99	0.00
35.50	11.48	7.99	0.00
36.00	11.48	7.99	0.00
36.50	11.48	7.99	0.00
37.00	11.48	7.99	0.00
37.50	11.48	7.99	0.00
38.00	11.48	7.99	0.00
38.50	11.48	7.99	0.00
39.00	11.48	7.99	0.00
39.50	11.48	7.99	0.00
40.00	11.48	7.99	0.00
40.50	11.48	7.99	0.00
41.00	11.48	7.99	0.00
41.50	11.48	7.99	0.00
42.00	11.48	7.99	0.00
42.50	11.48	7.99	0.00
43.00	11.48	7.99	0.00
43.50	11.48	7.99	0.00
44.00	11.48	7.99	0.00
44.50	11.48	7.99	0.00
45.00	11.48	7.99	0.00
45.50	11.48	7.99	0.00
46.00	11.48	7.99	0.00
46.50	11.48	7.99	0.00
47.00	11.48	7.99	0.00
47.50	11.48	7.99	0.00
48.00	11.48	7.99	0.00

Summary for Pond 2P: Upper Van Horn Reservoir

7/26/19: outlet structures elevations from Survey Plan by Heritage dated 8/16/19
bathymetry - source of data is Springfield Lakes and Ponds Inventory and Restoration Plan (BEC, May 1980).
Assumed weir length of 100 feet for portion that is at elevation 175.6, based on profile developed in CAD

Inflow Area = 257.900 ac, 28.34% Impervious, Inflow Depth = 7.99" for 100-year 2070 event
Inflow = 710.67 cfs @ 13.17 hrs, Volume= 171.699 af
Outflow = 442.19 cfs @ 13.90 hrs, Volume= 171.221 af, Atten= 38%, Lag= 43.8 min
Primary = 442.19 cfs @ 13.90 hrs, Volume= 171.221 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 167.40' Surf.Area= 9.746 ac Storage= 67.476 af
Peak Elev= 171.99' @ 13.90 hrs Surf.Area= 12.672 ac Storage= 118.907 af (51.430 af above start)
Flood Elev= 176.00' Surf.Area= 15.220 ac Storage= 174.893 af (107.416 af above start)

Plug-Flow detention time= 360.8 min calculated for 103.744 af (60% of inflow)
Center-of-Mass det. time= 116.0 min (1,002.1 - 886.1)

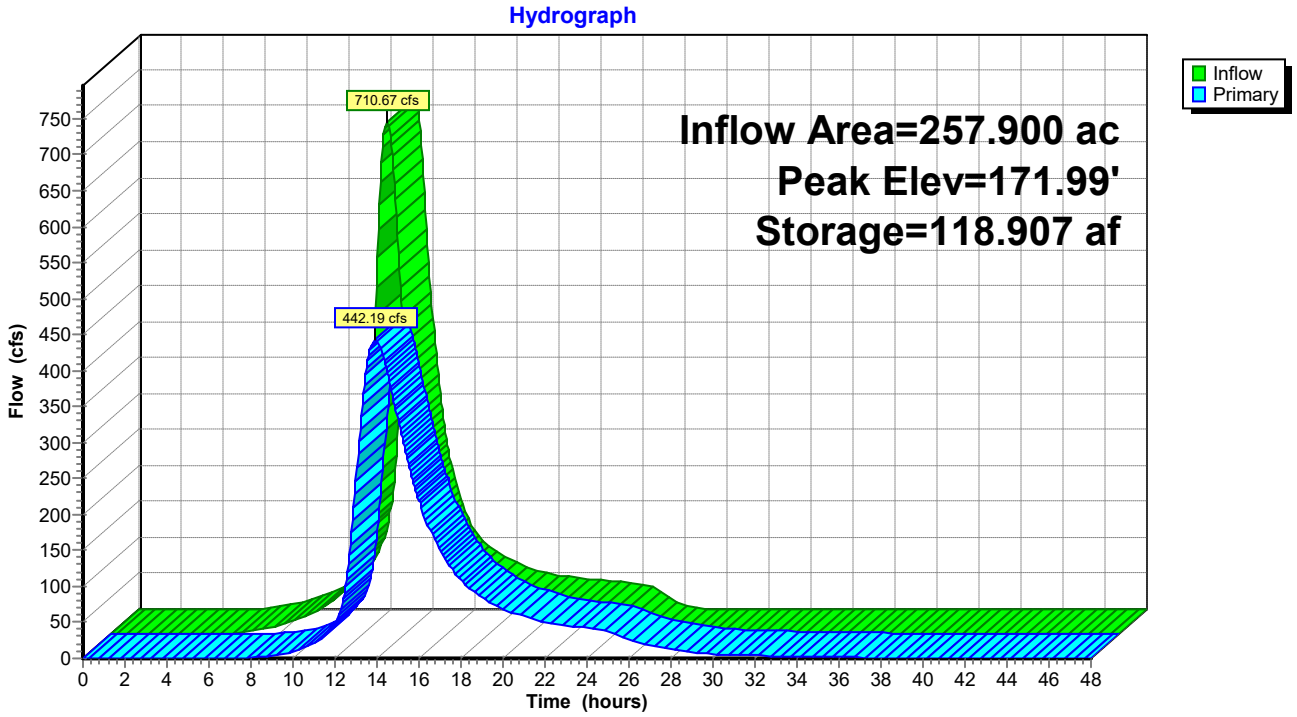
Volume	Invert	Avail.Storage	Storage Description
#1	152.50'	190.430 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
152.50	0.382	0.000	0.000
157.50	2.653	7.587	7.587
162.50	5.935	21.470	29.057
167.50	9.824	39.398	68.455
177.00	15.855	121.975	190.430

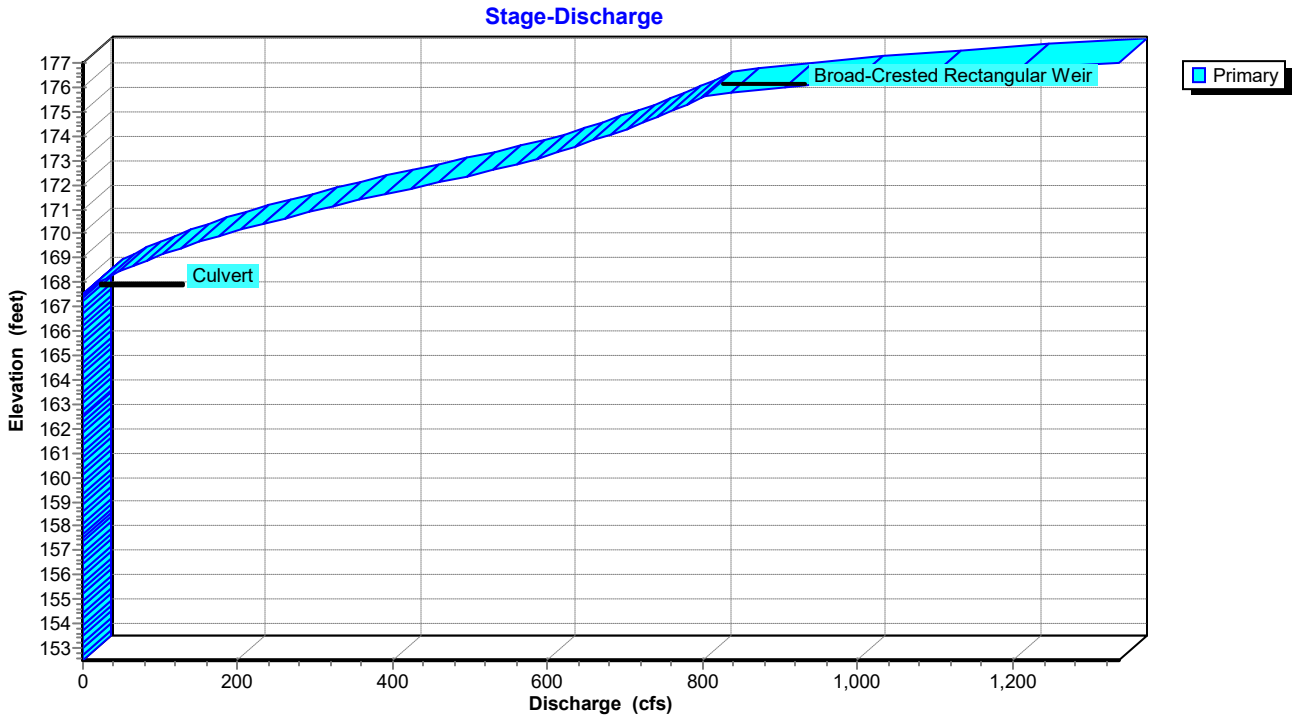
Device	Routing	Invert	Outlet Devices
#1	Primary	167.40'	**96.0" W x 60.0" H Box Culvert** L= 60.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 167.40' / 166.42' S= 0.0163 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 40.00 sf
#2	Primary	175.60'	**100.0' long x 50.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#3	Primary	167.44'	**96.0" W x 60.0" H Box Culvert** L= 60.0' Box, 0° wingwalls, square crown edge, Ke= 0.700 Inlet / Outlet Invert= 167.44' / 166.42' S= 0.0170 '/' Cc= 0.900 n= 0.013, Flow Area= 40.00 sf

Primary OutFlow Max=442.07 cfs @ 13.90 hrs HW=171.99' TW=144.50' (Fixed TW Elev= 144.50')
- **1=Culvert** (Inlet Controls 222.49 cfs @ 6.07 fps)
- **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **3=Culvert** (Inlet Controls 219.58 cfs @ 6.04 fps)

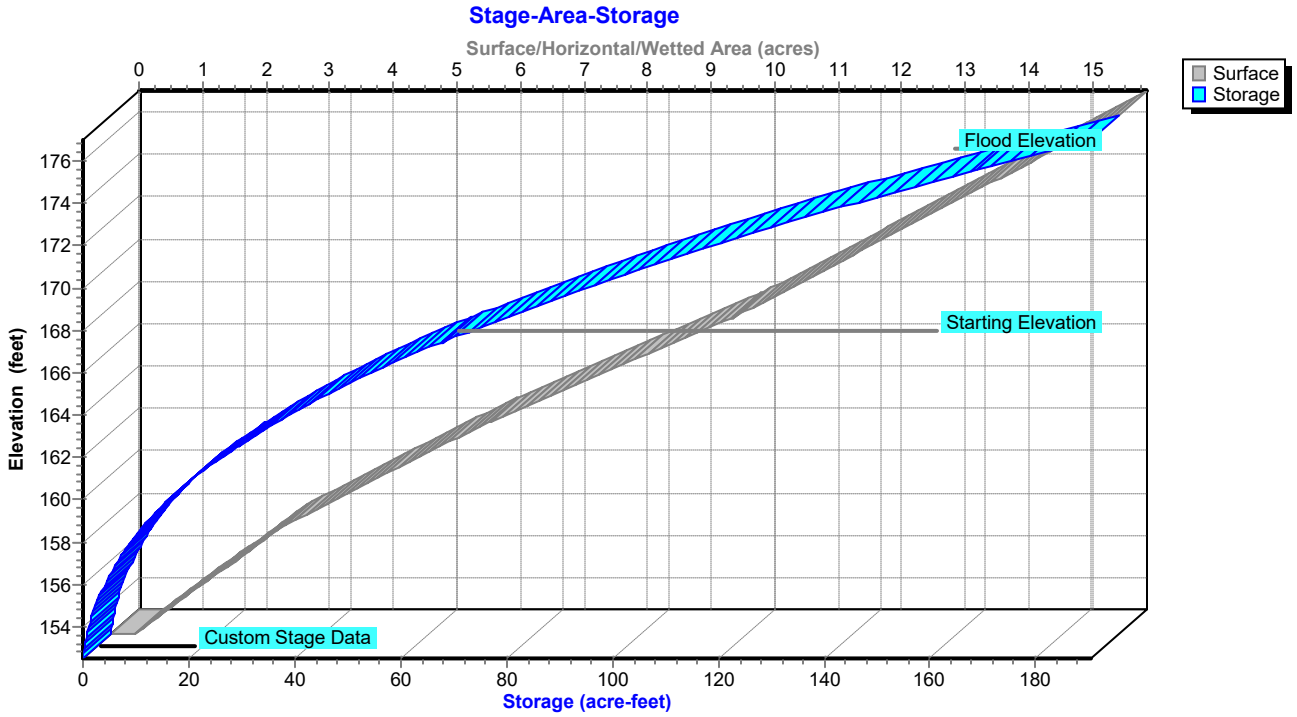
Pond 2P: Upper Van Horn Reservoir



Pond 2P: Upper Van Horn Reservoir



Pond 2P: Upper Van Horn Reservoir



Hydrograph for Pond 2P: Upper Van Horn Reservoir

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	67.476	167.40	0.00
1.00	0.00	67.476	167.40	0.00
2.00	0.00	67.476	167.40	0.00
3.00	0.00	67.476	167.40	0.00
4.00	0.00	67.476	167.40	0.00
5.00	0.00	67.476	167.40	0.00
6.00	0.99	67.498	167.40	0.01
7.00	5.02	67.725	167.43	0.12
8.00	11.75	68.365	167.49	0.91
9.00	21.13	69.515	167.61	4.05
10.00	34.32	71.210	167.78	10.08
11.00	60.55	73.760	168.03	21.93
12.00	141.88	78.488	168.49	50.30
13.00	**692.92**	**100.915**	**170.51**	**246.40**
14.00	**404.31**	**118.756**	**171.97**	**440.41**
15.00	186.05	109.033	171.19	331.86
16.00	110.05	98.293	170.29	220.02
17.00	79.55	90.926	169.64	149.87
18.00	65.14	86.296	169.22	109.59
19.00	53.65	83.223	168.94	84.70
20.00	47.32	81.074	168.73	68.50
21.00	43.74	79.632	168.60	58.17
22.00	40.69	78.617	168.50	51.19
23.00	37.75	77.854	168.43	45.94
24.00	34.81	77.222	168.37	42.01
25.00	22.01	76.453	168.29	37.26
26.00	4.44	74.730	168.13	27.09
27.00	0.78	73.051	167.96	18.16
28.00	0.11	71.827	167.84	12.69
29.00	0.00	70.944	167.75	8.96
30.00	0.00	70.319	167.69	6.33
31.00	0.00	69.853	167.64	5.01
32.00	0.00	69.484	167.60	3.96
33.00	0.00	69.192	167.57	3.14
34.00	0.00	68.960	167.55	2.48
35.00	0.00	68.778	167.53	1.96
36.00	0.00	68.633	167.52	1.55
37.00	0.00	68.518	167.51	1.23
38.00	0.00	68.427	167.50	1.01
39.00	0.00	68.349	167.49	0.89
40.00	0.00	68.280	167.48	0.78
41.00	0.00	68.220	167.48	0.69
42.00	0.00	68.166	167.47	0.61
43.00	0.00	68.119	167.47	0.54
44.00	0.00	68.077	167.46	0.47
45.00	0.00	68.041	167.46	0.42
46.00	0.00	68.009	167.45	0.37
47.00	0.00	67.980	167.45	0.32
48.00	0.00	67.955	167.45	0.28

Stage-Discharge for Pond 2P: Upper Van Horn Reservoir

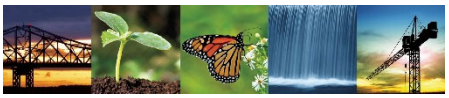
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
152.50	0.00	162.90	0.00	173.30	608.73
152.70	0.00	163.10	0.00	173.50	628.53
152.90	0.00	163.30	0.00	173.70	647.56
153.10	0.00	163.50	0.00	173.90	665.93
153.30	0.00	163.70	0.00	174.10	683.72
153.50	0.00	163.90	0.00	174.30	700.98
153.70	0.00	164.10	0.00	174.50	717.77
153.90	0.00	164.30	0.00	174.70	734.13
154.10	0.00	164.50	0.00	174.90	750.09
154.30	0.00	164.70	0.00	175.10	765.69
154.50	0.00	164.90	0.00	175.30	780.94
154.70	0.00	165.10	0.00	175.50	795.88
154.90	0.00	165.30	0.00	175.70	818.99
155.10	0.00	165.50	0.00	175.90	869.08
155.30	0.00	165.70	0.00	176.10	934.44
155.50	0.00	165.90	0.00	176.30	1,009.20
155.70	0.00	166.10	0.00	176.50	1,091.43
155.90	0.00	166.30	0.00	176.70	1,183.84
156.10	0.00	166.50	0.00	176.90	**1,284.34**
156.30	0.00	166.70	0.00		
156.50	0.00	166.90	0.00		
156.70	0.00	167.10	0.00		
156.90	0.00	167.30	0.00		
157.10	0.00	167.50	1.05		
157.30	0.00	167.70	6.73		
157.50	0.00	167.90	15.08		
157.70	0.00	168.10	25.42		
157.90	0.00	168.30	37.42		
158.10	0.00	168.50	50.87		
158.30	0.00	168.70	65.63		
158.50	0.00	168.90	81.60		
158.70	0.00	169.10	98.69		
158.90	0.00	169.30	116.82		
159.10	0.00	169.50	135.95		
159.30	0.00	169.70	156.02		
159.50	0.00	169.90	176.99		
159.70	0.00	170.10	198.83		
159.90	0.00	170.30	221.49		
160.10	0.00	170.50	244.96		
160.30	0.00	170.70	269.20		
160.50	0.00	170.90	294.20		
160.70	0.00	171.10	319.92		
160.90	0.00	171.30	346.35		
161.10	0.00	171.50	373.47		
161.30	0.00	171.70	401.27		
161.50	0.00	171.90	429.72		
161.70	0.00	172.10	458.81		
161.90	0.00	172.30	488.54		
162.10	0.00	172.50	517.83		
162.30	0.00	172.70	543.09		
162.50	0.00	172.90	566.27		
162.70	0.00	173.10	588.05		

Stage-Area-Storage for Pond 2P: Upper Van Horn Reservoir

Elevation (feet)	Surface (acres)	Storage (acre-feet)
152.50	0.382	0.000
153.00	0.609	0.248
153.50	0.836	0.609
154.00	1.063	1.084
154.50	1.290	1.672
155.00	1.517	2.374
155.50	1.745	3.190
156.00	1.972	4.119
156.50	2.199	5.162
157.00	2.426	6.318
157.50	2.653	7.587
158.00	2.981	8.996
158.50	3.309	10.569
159.00	3.638	12.305
159.50	3.966	14.206
160.00	4.294	16.271
160.50	4.622	18.500
161.00	4.950	20.893
161.50	5.279	23.451
162.00	5.607	26.172
162.50	5.935	29.057
163.00	6.324	32.122
163.50	6.713	35.381
164.00	7.102	38.835
164.50	7.491	42.483
165.00	7.880	46.326
165.50	8.268	50.363
166.00	8.657	54.594
166.50	9.046	59.020
167.00	9.435	63.640
167.50	9.824	68.455
168.00	10.141	73.446
168.50	10.459	78.596
169.00	10.776	83.905
169.50	11.094	89.373
170.00	11.411	94.999
170.50	11.729	100.784
171.00	12.046	106.727
171.50	12.363	112.830
172.00	12.681	119.091
172.50	12.998	125.511
173.00	13.316	132.089
173.50	13.633	138.826
174.00	13.950	145.722
174.50	14.268	152.777
175.00	14.585	159.990
175.50	14.903	167.362
176.00	15.220	174.893
176.50	15.538	182.582
177.00	**15.855**	**190.430**

ATTACHMENT 6-2

TECHNICAL MEMORANDUM – RMAT TIER 3 HEAT ANALYSIS SUMMARY



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TECHNICAL MEMORANDUM

RMAT TIER 3 HEAT ANALYSIS SUMMARY
UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
SPRINGFIELD, MA

JULY 2022

In accordance with the *Massachusetts Environmental Policy Act (MEPA) Interim Protocol on Climate Change Adaptation and Resiliency* (Interim Protocol) (effective date October 1, 2021), GZA GeoEnvironmental, Inc. (GZA) prepared an analysis relative to climate change using the Resilient Massachusetts Action Team (RMAT) Climate Resilience Design Standards Tool, which is provided as an attachment to the Expanded Environmental Notification Form (EENF) being field for the Upper Van Horn Reservoir Dam Improvements Project (Project) in Springfield, MA.

Based on the results of the RMAT Tool analysis which indicated a 2070 planning horizon for the 90th percentile for Extreme Heat, GZA performed a RMAT Tier 3 analysis for the Upper Van Horn Reservoir Dam Improvements Project for projected annual/summer/winter average temperatures; projected heat index; projected days above 95 degrees Fahrenheit, above 90 degrees Fahrenheit, and below 32 degrees Fahrenheit; and projected number of heat waves and duration of heat waves. This memorandum outlines the methodology and results of the analyses and is subject to the Limitations in **Appendix A**.

TIER 3 ANALYSIS

Climate data were obtained from the Multivariate Adaptive Constructed Analogs (MACA) data portal. When drawn in the MACA as a rectangular subset, the area of interest contained four (4) latitude-longitude points. Data from these four points were averaged with an arithmetic mean for each daily temperature or relative humidity value. Further calculations were made from these spatially averaged time series in the R statistical computing environment.

The Climate Resilience Design Standards Tool instructs the permit applicant for this project to calculate nine (9) parameters for a 30-year window around the relevant planning horizon:

- **Annual Average Temperature:** The daily high, averaged over the calendar year, calculated using the daily maximum 2-meter surface temperature dataset.

- **Average Summer Temperature:** The daily high, averaged over June, July, and August of each year, calculated using the daily maximum 2-meter surface temperature dataset.

- **Average Winter Temperature:** The daily high, averaged over December of the previous year, and January and February of the nominal year, calculated using the daily maximum 2-meter surface temperature dataset.

- **Days Above 90 degrees Fahrenheit (F):** The number of days the daily high is above 90 F in the calendar year, calculated using the daily maximum 2-meter surface temperature dataset.

- **Days Above 95 F:** The number of days the daily high is above 95 F in the calendar year, calculated using the daily maximum 2-meter surface temperature dataset.

- **Days Below 32 F:** The number of days the daily low is below 32 F in the calendar year, calculated using the daily minimum 2-meter surface temperature dataset.

- **Heat Index:** The estimated high heat index, calculated using the Rothfusz regression[1] on the annual high temperature and annual average relative humidity, from the daily maximum 2-meter surface temperature dataset and the daily maximum 2-meter relative humidity dataset.

- **Number of Heat Waves:** The number of times in each year the daily high remains above 90 F for 3 or more consecutive days, using the daily maximum 2-meter surface temperature dataset.

- **Average Length of Heat Waves:** The average length of heat waves in each year, calculated using the previously defined Heat Waves.

For the 2070 planning horizon, the 30-year window covers January 2060 to December 2089 (December 2059 is additionally included in "Winter 2060").

Parameters were calculated for each year for each of 12 climate models, with the exception of a Heat Index parameter for the CCSM4 model, since a relative humidity dataset was unavailable for that model. The 90th percentile values were calculated for each parameter for each model for the 2070 planning horizon, and then those percentiles were averaged across models to provide the results summarized in **Table 1** on the following page. Baseline values tabulated below were taken from the Resilientma.mass.gov website mapping tool.

It must be noted that the calculated estimate for high heat index is not an expected value. Given the long planning outlook of this infrastructure project, the statistics of the 90th percentile for the 2070s result in temperatures outside of the range of existing formulas and tables for calculating heat index. **Table 2** on the following page, taken from the National Weather Service, illustrates the range over which heat indexes have been historically calculated.

SUMMARY

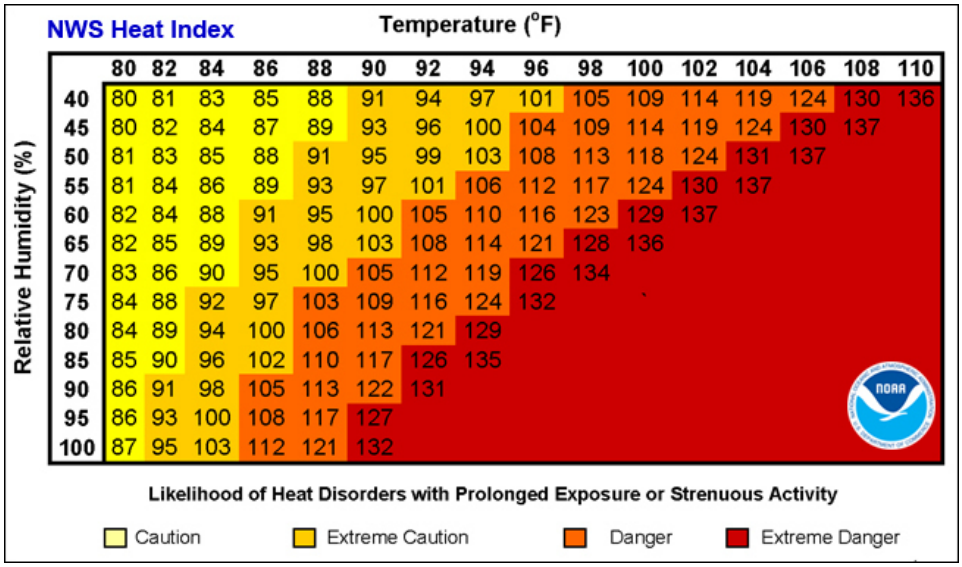
In accordance with MEPA requirements, a Tier 3 analysis relative to Extreme Heat has been completed for the Project. These results are consistent with other recent studies and reports, including the document entitled "Massachusetts Climate Change Projections", by Resilient MA Climate Change Clearinghouse for the Commonwealth, 2018. This analysis projected increased average, minimum, and maximum temperatures; increases in days over 90 F and 95 F, and decreases in days below 32F in the Connecticut Basin. The proposed Project will not include stationary or mobile sources for Greenhouse gases and will not result in increased emissions, except for minor construction phase increases related to construction vehicles and equipment. The Project will preserve a large vegetated open space park within the City.

[1] https://www.wpc.ncep.noaa.gov/html/heatindex_equation.shtml

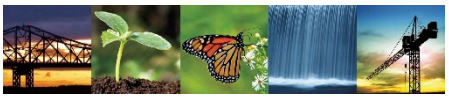
Table 1. 90th Percentile Data Summary – Extreme Heat Analysis for the 2070s

Design Criteria	Baseline	90th Percentile, 2070s
Annual average temperature (F)	46.98	70.16
Annual summer temperature (F)	67.93	92.30
Annual winter temperature (F)	25.01	48.17
Estimated High Heat Index (F)	--	204.19[2]
Days per year with max temperature > 95 F	<1	38
Days per year with max temperature > 90 F	6	74
Days per year with minimum temperature < 32 F	159	91
Number of heat waves per year	--	9
Average heat wave duration (days)	--	10

Table 2. Current NWS Heat Index Table



[2] While temperatures and heat indexes can be expected to rise, an estimate of 204.19 degrees F as a 2070 heat index high should not be taken without context. The Rothfusz regression (NWS Technical Attachment SR 90-23, 1990) used in the RMAT design standards was derived via a 2nd order polynomial multiple regression on the original heat index table developed and published by R. G. Steadman in the Journal of Applied Meteorology in 1979 and is not valid outside of the range of the original table. The highest heat indexes defined in the table are 127.4 F at 118 F with 20% rh, 123.8 F at 116.6 F with 20% rh, 125.6 F at 111.2 F with 30% rh, and, noted as approximations, 123.8 F at both 95 F with 70% rh and 89.6 F with 90% rh. (Temperatures are converted from Celsius for this footnote.) Modeled temperature and humidity values for the 2070 planning horizon fall well outside of this range. For example, the CNRM-CM5 model produced a 90th percentile value nearest to the average across all models, with a relative humidity of 84.41% and temperature of 106.18 F giving a heat index of 204 F.



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APPENDIX A
Limitations

USE OF REPORT

1. GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of the Client for the stated purpose(s) and location(s) identified in the Report. Use of this Report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

STANDARD OF CARE

2. Our findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. Conditions other than described in this report may be found at the subject location(s).

3. The interpretations and conclusions presented in the Report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of the described services. The work described in this report was carried out in accordance with the agreed upon Terms and Conditions of Engagement.

4. GZA's evaluation was performed in accordance with generally accepted practices of qualified professionals performing the same type of services at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made. The findings are dependent on numerous assumptions and uncertainties inherent in the assessment process. The findings of the evaluation are not an absolute characterization of actual risks, but rather serve to highlight potential sources of risk at the site(s).

5. Unless specifically stated otherwise, the evaluations performed by GZA and associated results and conclusions are based upon evaluation of historic data, trends, references, and guidance with respect to the current climate and sea level conditions. Future climate change may result in alterations to inputs which influence flooding at the site (*e.g.*, rainfall totals, storm intensities, mean sea level, heat, *etc.*). Such changes may have implications on the estimated flood elevations, flood frequencies and/or other parameters contained in this report.

RELIANCE ON INFORMATION FROM OTHERS

6. In conducting our work, GZA has relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Any inconsistencies in this information which we have noted are discussed in the Report.

COMPLIANCE WITH CODES AND REGULATIONS

7. We used reasonable care in identifying and interpreting applicable codes and regulations necessary to execute our scope of work. These codes and regulations are subject to various, and possibly contradictory, interpretations. Interpretations with codes and regulations by other parties are beyond our control.

ADDITIONAL INFORMATION

8. In the event that the Client or others authorized to use this report obtain information on conditions at the site(s) not contained in this report, such information shall be brought to GZA's attention forthwith. GZA will evaluate such information and, on the basis of this evaluation, may modify the opinions stated in this report.

ADDITIONAL SERVICES

9. GZA recommends that we be retained to provide services during any future investigations, design, implementation activities, construction, and/or property development/ redevelopment at the Site. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

ATTACHMENT 7

MASSACHUSETTS HISTORICAL COMMISSION CORRESPONDENCE

EB

RECEIVED

JUN 3 0 2022

MASS. HIST. COMM

RC.71769

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A

MASSACHUSETTS HISTORICAL COMMISSION

220 MORRISSEY BOULEVARD

BOSTON, MASS. 02125

617-727-8470, FAX: 617-727-5128

After review of MHC files and the materials you submitted, it has been determined that this project is unlikely to affect significant historic or archaeological resources.

MHC#RC.71769

Edward L. Bell 01 July 2022 Date

Deputy State Historic Preservation Officer

Massachusetts Historical Commission

PROJECT NOTIFICATION FORM

Project Name: Upper Van Horn Reservoir Dam Improvements Project

Location / Address: 625 Armory Street

City / Town: Springfield

Project Proponent

Name: City of Springfield Department of Parks, Buildings, and Recreation Management

Address: 200 Trafton Road

City/Town/Zip/Telephone: Springfield, 01108, 413-787-6444

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	Type of License or funding (specify)
MassDEP	Section 401 Water Quality Certification
USACE	Section 404 Permit
EPA	NPDES Construction General Permit
Conservation Commission/MassDEP	NOI/Order of Conditions for Wetland Protection Act
MA EEA	Secretary's Certificate on MEPA filing-EENF and EIR
MA DCR ODS	Chapter 253 Dam Safety Permit
MA DCR ODS	Dam and Seawall Repair or Removal Program related funding

Project Description (narrative):
The Upper Van Horn Reservoir Dam (UVHRD) Improvements Project is being undertaken to improve the condition of the UVHRD to bring it into compliance with with MA Dam Safety Regulations and modern day safety practices. The dam is currently rated in POOR condition by the MA Office of Dam Safety. The dam is a Significant Hazard potential, Intermediate-sized embankment dam that was constructed in the mid-1800s for water supply. The current purpose of the dam is recreation and it supports the roadway embankment for Armory Street. The Project will address multiple deficiencies including: large trees and brush on the slopes, erosion on the slopes, seepage at the downstream toe of the dam, animal burrows, debris in the spillway and chute, drainage system failures leading to erosion, and no low-level outlet to drawdown the reservoir when needed.

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition.
No structure demolition is proposed (there are no buildings present on the dam).

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation.
The Project will rehabilitate the dam. No other buildings or structures are part of this Project.

Does the project include new construction? If so, describe (attach plans and elevations if necessary).
No, this is a rehabilitation project.

APPENDIX A (continued)

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify.
No. The MACRIS database was reviewed and the dam and reservoir are not listed. Van Horn Park is a state-listed resource; however, no permanent alterations to the park are proposed. Additionally, an adjacent property is identified that is outside the limit of work. A screen capture of MACRIS is included as Figure 3.

What is the total acreage of the project area?

Woodland	3.4 acres	Productive Resources:	
Wetland	11.4* acres	Agriculture	acres
Floodplain	acres	Forestry	acres
Open space	acres	Mining/Extraction	acres
Developed	1.1 acres	Total Project Acreage	15.9 acres

*Most of the wetland impact (approximately 10 acres) is the temporary drawdown of Upper Van Horn Reservoir during construction.

What is the acreage of the proposed new construction? 0 acres

What is the present land use of the project area?
The Project area includes Upper Van Horn Reservoir located within the Van Horn Park and the dam which is the roadway embankment for for Armory Street. Following construction, these resources will continue to function in [illegible] current capacity.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.
See Figure 1 - attached for a USGS Map with the Project site marked and Figure 2 - Aerial photo showing the Project site and Project limits in more detail. Project site photos are also included to characterize the area.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of Person submitting this form: Jennifer R M Burke Date: [illegible]

Name: Jennifer Burke, P.E.

Address: GZA GeoEnvironmental, Inc., 1350 Main Street, Suite 1400

City/Town/Zip: Springfield, MA 01103

Telephone: 413-726-2117

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

ATTACHMENT 8

ASSESSMENT OF EXISTING UNFAIR OR INEQUITABLE ENVIRONMENTAL BURDEN

Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

ASSESSMENT OF EXISITNG UNFAIR OR INEQUITABLE ENVIORNMENTAL BURDEN

UPPER VAN HORN RESERVOIR DAM IMPROVEMENTS PROJECT
SPRINGFIELD, MA

In accordance with Part II of the Final MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice (EJ) Populations, effective January 1, 2022 (the "Protocol"), GZA prepared this assessment of the existing unfair or inequitable environmental burden for the EJ populations identified within the "Designated Project Area" (DGA) (1-mile radius) of the Upper Van Horn Reservoir Dam Improvements Project (the "Project"). The printout from the EEA EJ Maps Viewer is included as **Attachment 8-1** and the EJ Screener Form is included as **Attachment 8-2,** along with proof of advance notification. A fact sheet was developed for the Project that was posted on the city's website in English and Spanish, at local libraries, and provided to the local neighborhood councils for posting at neighborhood and community gathering places within the DGA and to provide to residents or businesses when discussing the Project. An initial fact sheet was developed in June 2022 in English and Spanish and a newer version circulated in October 2022 as part of continued outreach. The newer fact sheets (both English and Spanish versions) have a QR code that allows a viewer to use their phone to link directly to the Project website for more info and to see when info is updated or meetings are being held. This link to the website also provides a viewer with the opportunity to provide comments on the Project or request a meeting or additional information. These fact sheets are included in **Attachment 8-3**.

Based on a review of neighborhood mapping by the Pioneer Valley Planning Commission (PVPC) provided in their Data Atlas by Neighborhood, Van Horn Park is located within the Liberty Heights neighborhood of Springfield, and the DGA encompasses most of the neighborhoods of Liberty Heights and the adjacent Memorial Square neighborhood which includes the Mercy and Baystate Hospital complexes. The DGA also includes smaller portions of the Brightwood, Metro Center, McKnight, and East Springfield neighborhoods as well as a small portion of the southwest corner of the City of Chicopee. [1]

The following subsections are organized to parallel the assessment steps as defined in the Protocol.

CONSULT DPH VULNERABLE EJ CRITERIA

GZA consulted the Massachusetts Department of Public Health (DPH) Environmental Justice Tool to evaluate the four Vulnerable Health EJ Criteria within Springfield, Chicopee, and applicable EJ tracts. The data is summarized in **Table 1** below. As shown, Springfield exceeds 110% of the State average rates for all four Vulnerable Health EJ Criteria, while Chicopee exceeds three of the four. Nine of the 11 census tracts within the DGA exceed at least one Vulnerable Health EJ Criteria measured at the tract level, and five exceed both criteria. Where the DPH tool indicated that no data was shown, this indicates that there is too little data available to develop statistics that can be considered reliable. When there is too little data to

[1] Data Atlas by Neighborhood: City of Springfield, MA. 2014. Pioneer Valley Planning Commission Regional Information & Policy Center.

generate reliable statistics, it is assumed that the number of cases within the subject area are below the DPH's threshold rates.

Table 1. Summary of Vulnerable Health EJ Criteria Data for the Designated Geographic Area (110% of State Rates included in parentheses)

Geographic Area	Criteria (110% State Rate)			
	Elevated Blood Lead Prevalence (17.7 per 1000)	Low Birth Weight (238.5 per 1000)	Heart Attack Rate (29.065 per 10,000)	Pediatric Asthma ED Visit (91.4 per 10,000)
BY COMMUNITY				
Springfield	**35.0**	**254.8**	**35.9**	**220.5**
Chicopee	15.8	**279.1**	**33.7**	**133.9**
BY TRACT				
Tract 8003	11.0	NS	NA	NA
Tract 8004	**37.4**	205.0	NA	NA
Tract 8005	**50.5**	**286.9**	NA	NA
Tract 8006	**21.6**	**287.1**	NA	NA
Tract 8007	**24.3**	**295.1**	NA	NA
Tract 8008	**19.2**	NS	NA	NA
Tract 8009	**25.6**	**373.8**	NA	NA
Tract 8011.01	NS	NS	NA	NA
Tract 8012	15.5	**416.7**	NA	NA
Tract 8013	**95.2**	**369.3**	NA	NA
Tract 8109.02	11.4	**431.0**	NA	NA

NA - Not Applicable; Data not produced for this geographic area

NS - Not Shown; too few occurrences available to calculate rate for tract; Assumed non-exceedance

Bold and Shaded Cells Indicate exceedance of 110% of state rate

CONSULT ADDITIONAL DPH DATA

GZA reviewed the data available on the DPH Environmental Justice Tool, which includes data regarding infrastructure, Massachusetts Department of Environmental Protection (MassDEP) permits and violations, and other industrial facilities which may be potential sources of pollution. Based on a visual assessment of the density of facility occurrences, it appears that the DGA has a lower density of reviewed facilities compared to other areas of Springfield located along the Connecticut River and US Route 20 / I-291. The reviewed data within the DGA is summarized below.

Transportation Routes

Van Horn Park is located within a primarily residential area and the DGA encompasses both residential and commercial developments. The DGA includes major transportation routes for the region including a portions of:

- Interstate I-91/State Route 116;
- Interstate Beltway I-291/ US Route 20; and
- State Route 20A.

Additionally, the DGA includes portions of Main Street and Albany Streets which are identified by the PVPC[2] as evacuation routes for areas potentially affected by hazard areas including flooding, severe snow/ice storms, tornado/microburst, and earthquake. The area is served by the Pioneer Valley Transit Authority (PVTA) which operates 11 routes on local, state, and federal roadways within the DGA that serve Springfield and surrounding municipalities. Several bus stops are located within a quarter mile of the Van Horn Park.

Active rail lines traverse the DGA in a general north-south and northeast-southwest orientation. These rail lines provide both passenger and freight service. No passenger train stations or freight rail yards are located within the DGA.

No airports are identified within the DGA; however, the Local Hazards Mitigation Plan identifies four emergency services helicopter landing sites in the DGA, including one at Van Horn Park.

Facilities or Permits Documented within DGA

The additional data layers available in the DPH EJ Tool and the recommended for review in the Protocol were reviewed in July 2022. **Table 2** summarizes the number and general locations of the facilities or active permits within the DGA. Because the Project involves temporary and permanent impacts to wetlands and waterways, the number and location of facilities and permits has been accounted for within this subset of the DGA separately.

Table 2. Summary of Facilities and Active Permits within the DGA

Facility or Permit / DPH Data Findings	Underground Storage Tanks	"Tier II" Toxics Use Reporting Facilities	MassDEP major air and waste facilities	MassDEP Sites with AULs	M.G.L. c. 21E Sites
Number in Springfield	9	10	6	12	7
Number in Chicopee	3	2	0	0	1
Number in Upper Van Horn Reservoir Watershed*	1	0	0	0	0
Total Number within DGA	12	12	6	12	8

* The number of facilities or permits within the Upper Van Horn Reservoir Watershed is not cumulative within the table as the entire watershed is contained within the Springfield portion of the DGA.

[2] The City of Springfield Local Natural Hazards Mitigation Plan. 2016. The Springfield Natural Hazards Mitigation Planning Committee and The Pioneer Valley Planning Commission.

The instances of underground storage tanks, "Tier II" Toxics Use Reporting Facilities and MassDEP Major Air and Waste Facilities do not indicate that there have been or are ongoing releases. These data only identify the approximate location and number of facilities. The nearest underground storage tank is associated with a gas station located approximately 0.4 miles southeast of the upstream extent of the Limit of Work, and over 0.5 miles from the proposed construction area. The nearest "Tier II" Toxics Use Reporting Facility is located over 0.8-miles from the Limit of Work and is located south of I-291. Of the six MassDEP Major Air and Waste Facilities one is an air operating permit, one is a hazardous waste recycler, and four are Massachusetts and/or EPA-regulated hazardous waste only. The nearest mapped facility is approximately 0.48-miles downgradient of the Limit of Work at Baystate Medical Complex which is identified as a Massachusetts and/or EPA-regulated hazardous waste only site.

The MassDEP Sites with Activity and Use Limitations (AULs) indicate that a release previously occurred; however, an engineering or administrative control is in place prior to site closure. Provided use of these sites complies with the AUL, there is not an ongoing threat to public health or the environment. The nearest mapped AUL, Site Number 1-0010342, is mapped approximately 0.4-miles west of the Limit of Work. Based on a review of information regarding this site in the Energy & Environmental Affairs Data Portal, the site is a residence where #2 fuel oil was released in 1994. The site reached regulatory compliance on May 9, 1995.

M.G.L. c. 21E Sites are those where a reportable release has occurred; however, the site has not yet reached regulatory closure. Of the total sites mapped within the DGA, four sites are identified as Tier 1D and four are Tier II sites. The Tier Classification determines the level MassDEP oversite. The Tier 1D designation indicates that a deadline has not been met or another instance of noncompliance has occurred with the site. The Tier II designation indicates that the site does not meet the Tier I designation. These are generally located further from groundwater resources and/or do not pose an imminent hazard that would require an immediate response. The nearest mapped 21E site is a Tier II site, Site Number 1-0019016, located approximately 0.3 miles southeast of the Limit of Work. Based on a review of information regarding this site in the Energy & Environmental Affairs Data Portal, the site is a dry cleaner which reached Tier II compliance in 2015 and has continued to provide required reporting to the Department.

Although the Limit of Work is large to encompass the temporary drawdown of the Upper Van Horn Reservoir, the area of construction is more limited. Based on the work proposed and the location of these mapped facilities, it is not anticipated that the Project would disturb or alter these facilities. No new facilities or MassDEP Major Air or Waste Facilities are proposed as part of this Project, which is a dam rehabilitation.

Facilities or Permits Not Documented within DGA

There were no mapped instances of the following facilities or active permits within the DGA:

- Energy Generation and Supply facilities;
- EPA Facilities – Toxic Release Inventory or Superfund Sites;
- Wastewater Treatment Plants;
- Massachusetts Public Water Suppliers; and
- MassDEP Groundwater Discharge Permits.

REVIEW RMAT REPORT

GZA prepared an RMAT Climate Resilience Design Standards Tool Project Report (RMAT Report) as part of this EENF. The RMAT Report as well as associated analysis are included as **Attachment 6**. The RMAT Report identified the Project has "High" exposure to Extreme Precipitation resulting in urban and riverine flooding and "High" exposure to extreme heat.

The Project is rated as High exposure for urban and riverine flooding because of the impervious area, projected increases in maximum daily rainfall, and the potential for riverine erosion. However, as discussed and modeled in the Climate Change section, the proposed Project will not increase flooding as the dam is of adequate size and capacity to safely pass the design storm now and in the future condition, even with considerations for climate change, as discussed in the RMAT Attachment (**Attachment 6**). The area is currently not mapped as a FEMA Floodplain and the RMAT report indicates that there is no historic flooding at the project site.

As the useful life of the Upper Van Horn Reservoir Dam is over 50 years, the planning horizon includes a significant increase in maximum daily temperatures due to climate change. As the dam will have limited greenhouse gas emissions associated with the rehabilitation, it is unlikely to significantly contribute to ongoing climate change concerns. The Project is obligated to remove trees located along the dam and restore the earthen dam surface to turf grass to comply with modern dam safety standards, which will decrease shading along Armory Street and the Upper and Lower Van Horn Reservoirs, although the area will still remain largely vegetated and the Project will help preserve the larger Van Horn Park in its natural state.

ENVIRONMENTAL JUSTICE COMMUNITY CONCERNS

The Environmental Justice outreach efforts described in the EENF Form did not receive comments regarding concerns about the Project to date. As the Project is to comply with dam safety regulations and is meant to improve public safety by reducing the potential for dam failure, there is a limited scope of changes feasible, but the City will aim to address concerns raised by the public during the MEPA process.

In the past, residents that frequent the area have raised concerns with the City regarding insufficient lighting along the walkways on Armory Street. As part of the overall improvements, the Project will include lighting improvements to address this concern.

EXISTING UNFAIR OR INEQUITABLE ENVIRONMENTAL BURDEN CONCLUSIONS

Based on the information reviewed in this assessment and the guidance on this review process from EEA, it appears that an unfair or inequitable burden currently exists within at least nine of the 11 census tracts located partially or entirely within the DGA. During the Environmental Impact Report evaluation, additional analysis of Project impacts on this existing unfair or inequitable burden will be evaluated and mitigated appropriately.

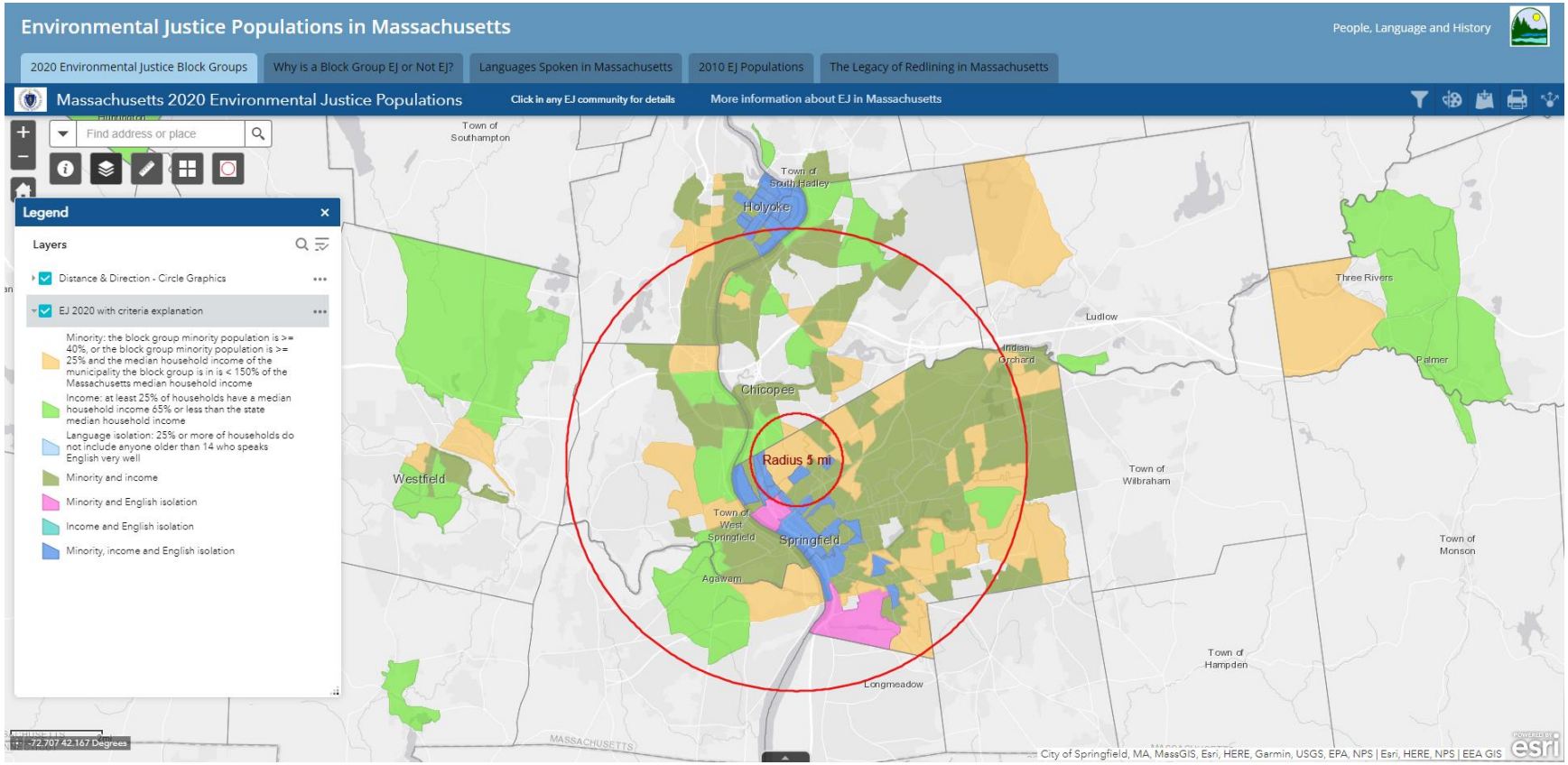
This assessment is based primarily on the DPH Vulnerable Health EJ Criteria which indicate that the communities within the DGA experience worse health outcomes than the State average.

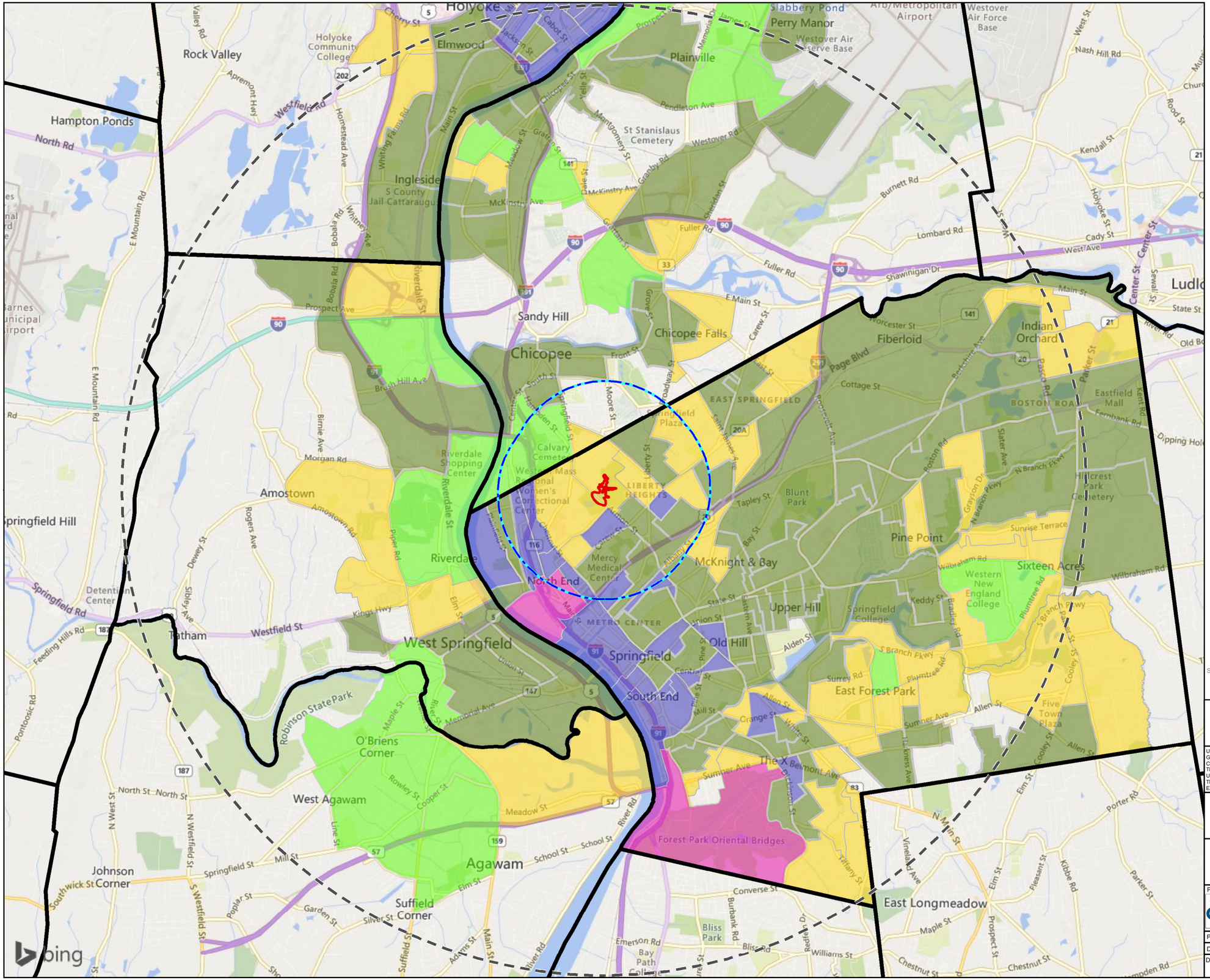
Although there did not appear to be a comparatively high concentration of facilities and MassDEP permits within the DGA based on the reviewed data layers, there are several large transportation routes which are generally associated with increased pollution levels in the DGA or immediately adjacent.

As with any waterbody, there is the risk of flooding from increased rainfall rates and total volume. At this time, the Upper Van Horn Reservoir Dam is modeled and designed to adequate pass the regulatory design storm under current and future conditions, even with considerations for climate change as discussed herein.

ATTACHMENT 8-1

PRINTOUT FROM EJ MAPS VIEWER


Environmental Justice Populations in Massachusetts
People, Language and History
2020 Environmental Justice Block Groups
Why is a Block Group EJ or Not EJ?
Languages Spoken in Massachusetts
2010 EJ Populations
The Legacy of Redlining in Massachusetts
Massachusetts 2020 Environmental Justice Populations
Click in any EJ community for details
More information about EJ in Massachusetts
Find address or place
Legend
Layers
Distance & Direction - Circle Graphics
EJ 2020 with criteria explanation
Minority: the block group minority population is >= 40%, or the block group minority population is >= 25% and the median household income of the municipality the block group is in is < 150% of the Massachusetts median household income
Income: at least 25% of households have a median household income 65% or less than the state median household income
Language isolation: 25% or more of households do not include anyone older than 14 who speaks English very well
Minority and income
Minority and English isolation
Income and English isolation
Minority, income and English isolation
Town of Southampton
Town of South Hadley
Holyoke
Ludlow
Indian Orchard
Three Rivers
Palmer
Chicopee
Radius 5 mi
Westfield
Town of Wilbraham
Town of West Springfield
Springfield
Agawam
Town of Monson
Town of Hampden
Longmeadow
MASSACHUSETTS
-72.707 42.167 Degrees
City of Springfield, MA, MassGIS, Esri, HERE, Garmin, USGS, EPA, NPS | Esri, HERE, NPS | EEA GIS
esri



LEGEND

- Minority
- Income
- Language isolation
- Minority and income
- Minority and English isolation
- Income and English isolation
- Minority, income and English isolation
- Limit of Work (LOW)
- 1-mile buffer
- 5-mile buffer
- MATOWNS

N

Service Layer Credits: © 2022 Microsoft Corporation © 2022 TomTom

1 0.5 0 1 Miles

UPPER VAN HORN RESERVOIR
DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

ENVIRONMENTAL JUSTICE POPULATIONS

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: CITY OF SPRINGFIELD DEPARTMENT OF PARKS, BULIDINGS, AND RECREATION MANAGEMENT	
PROJ MGR: JRB	REVIEWED BY: CC	CHECKED BY: SLL	FIGURE 1
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 5,200 ft	
DATE: 05/05/2022	PROJECT NO: 15.0167018.00	REVISION NO:	

ATTACHMENT 8-2

ENVIRONMENTAL JUSTICE SCREENING FORMS AND PROOF OF NOTIFICATION

Environmental Justice Screening Form

Project Name	Upper Van Horn Reservoir Dam Improvements Project
Anticipated Date of MEPA Filing	September 15, 2022
Proponent Name	City of Springfield – Department of Parks, Buildings, & Recreation Management
Contact Information (e.g., consultant)	Adrienne Dunk Adrienne.dunk@gza.com 413-726-2144 Jennifer R.M. Burke Jennifer.burke@gza.com 413-726-2117
Public website for project or other physical location where project materials can be obtained (if available)	https://www.gza.com/upper-van-horn-reservoir-dam-improvements-project The above-referenced website will be updated as Project information becomes available. Requests for additional information or to hold a meeting can be submitted on this website.
Municipality and Zip Code for Project (if known)	Springfield, MA 01104 & 01107
Project Type* (list all that apply)	Dam Repair/Rehabilitation
Is the project site within a mapped 100-year FEMA flood plain? Y/N/yet unknown	No
Estimated GHG emissions of conditioned spaces if known	Not applicable – no conditioned spaces are proposed, and the Project qualifies for the de minimis exemption as it will not result in significant GHG emissions.

Project Description

1. Provide a brief project description, including overall size of the project site and square footage of proposed buildings and structures if known.

The Upper Van Horn Reservoir Dam Improvements Project is being undertaken by the City to improve the condition of the Upper Van Horn Reservoir to bring it into compliance with the Massachusetts Dam Safety Regulations and modern dam safety practices. This project is necessary to reduce the risk to downstream life and property and improve public safety by addressing deficiencies at the dam, to preserve the reservoir for recreation, and to improve access for future maintenance and operation of the dam. Based on the Massachusetts Department of Conservation and Recreation Office of Dam Safety rating guidelines, the dam is currently rated in Poor condition and is need of repairs and improvements.

The Upper Van Horn Reservoir Dam is a Significant Hazard potential, Intermediate-sized embankment dam that was constructed in the mid-1800s for water supply. The Springfield Water Department bought the dam in 1873 and transferred it to the City's Parks Department in 1909, when it was no longer needed for

water supply. The current purpose of the dam is recreation, forming Upper Van Horn Reservoir which is 9.7 acres. The dam and reservoir are located along an unnamed tributary to the Connecticut River. The dam separates the Upper and Lower Van Horn Reservoirs and provides the roadway embankment for Armory Street.

The dam is approximately 905 feet long and 30.6 feet high. The crest or top of dam along Armory Street is approximately 50 feet wide and the side slopes are steep. The spillway is twin 8-foot wide by 5-feet high box culverts, which discharge water to a spillway chute on the downstream slope of the dam to the Lower Van Horn Reservoir.

The dam currently has multiple deficiencies, including large trees and brush on the slopes, erosion on the slopes, seepage at the downstream toe of the dam, animal burrows, debris in the spillway and chute, drainage system failures leading to erosion, and no low-level outlet to drawdown the reservoir when needed.

The proposed project will provide repairs and improvements to the dam, including:

- Removal of all trees and woody vegetation and developing a grass surface;
- Modifications to the dam's slopes to improve stability and control seepage:
    - Regrading the upstream and downstream slopes to be less steep;
    - Addition of a stability berm and toe drain/blanket;
    - Addition of riprap along portions of the upstream and downstream slope;
- Concrete repairs and replacement of the spillway chute, which is degraded;
- Re-culverting of a portion of intermittent stream that was previously in a culvert which has failed;
- Drainage system replacement and improvements along Armory Street with new controlled outlet points;
- Removal and repair of animal burrows and erosion scars;
- A new siphon for drawdown;
- Removal and grouting of a former outlet;
- A new maintenance access drive to provide access for future maintenance and operation; and
- Roadway, guardrail, sidewalk, safety fencing, access controls, and lighting improvements along Armory Street.

2. List anticipated MEPA review thresholds (301 CMR 11.03) (if known)

- 301 CMR 11.03(3)(a)(1)(A) – Alteration of ten or more acres of any other wetland (Land Under Water Bodies and Waterways) – *Note that this is a temporary impact related to the temporary drawdown of the reservoir needed during the dam repair process to conduct the work in a safe manner;*
- 301 CMR 11.03(3)(b)(1)(b) – Alteration of 500 or more linear feet of bank along a fish run or inland bank;
- 301 CMR 11.03(3)(b)(1)(f) – Alteration of ½ or more acres of any other wetland (Land Under Water Bodies and Waterways)

3. List all anticipated state, local and federal permits needed for the project (if known)

Local –

- City of Springfield Conservation Commission – Order of Conditions (OOC) under the Wetland Protection Act (WPA)

State –

- Massachusetts Department of Environmental Protection (MassDEP) – Section 401 of the Clean Water Act, Water Quality Certification
- Massachusetts Department of Conservation and Recreation, Office of Dam Safety – Chapter 253 Dam

Safety Permit
- Project Notification Form, Massachusetts Historical Commission

Federal –
- United States Army Corps. Of Engineers (USACE) – Section 404 Authorization
- United States Environmental Protection Agency (EPA) – Notice of Intent for Coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activities

4. Identify EJ populations and characteristics (Minority, Income, English Isolation) within 5 miles of project site (can attach map from EJ Maps Viewer in lieu of narrative)

See attached table and figure for details.

There are 28 EJ census block populations within 1 mile of the project site. Three of these communities are located in the adjacent City of Chicopee, with one identified as Income, one identified as Minority, and one identified as Income and Minority. None of the populations within the City of Chicopee have greater than 5% of individuals who speak a language other than English that do not speak English very well.

The 25 Springfield EJ census block populations are all identified as having >5% of individuals who speak Spanish or Spanish Creole and do not speak English well. The Springfield EJ populations are designated as:
- Minority (7)
- Minority and English Isolation (1)
- Minority and Income (8)
- Minority, Income, and English Isolation (9)

There are 144 additional EJ census block populations mapped within 5 miles of the project site. These populations are located in the communities of Springfield, Holyoke, West Springfield, Chicopee, and Agawam.

These EJ populations are designated as:
- Income (15)
- Minority (35)
- Minority and English Isolation (1)
- Minority and Income (78)
- Minority, Income, and English Isolation (15)

Languages spoken by greater than 5% of individuals who do not speak English well within EJ populations in this area include Portuguese or Portuguese Creole, Russian, and Spanish or Spanish Creole.

5. Identify any municipality or census tract meeting the definition of "vulnerable health EJ criteria" in the DPH EJ Tool located in whole or in part within a 1 mile radius of the project site

The definition of "vulnerable health EJ criteria" are municipalities or tracts where the rate of specific health indices is greater than or equal to 110% of the state rate. For municipalities, there are four (4) health indices: elevated blood lead level, low birth weight, heart attack, and pediatric asthma emergency department (ED) visit rates. For census tracts, only elevated blood lead and low birth weight rates are applicable due to data collection methods and sensitivity.

Springfield exceeds all four (4) vulnerable health criteria, while Chicopee exceeds three (3) criteria – low

birth weight, heart attack, and pediatric asthma ED visits.

Of the 11 census tracts within one mile of the project, six (6) tracts (8005, 8006, 8007, 8008, 8009, 8013) exceed both vulnerable health criteria (elevated blood lead and low birth weight). Two tracts (8012, 8109.02) exceed only low birth weight rates, and one tract (8004) only exceeds elevated blood lead level. One tract (8003) does not exceed elevated blood lead level and data is not available for low birth weight rates. No data is available for either vulnerable health criteria for tract 8011.01.

See the attached table for rates of each vulnerable health EJ criteria within each geographic area.

6. Identify potential short-term and long-term environmental and public health impacts that may affect EJ Populations and any anticipated mitigation

Short-Term Impacts

Temporary impacts will occur during construction, including air quality and noise impacts from the use of construction equipment, which will be mitigated by requirements to minimize vehicle idling, emission control devices, and control of dust. Work will be limited to normal workday hours to the extent possible. Because the dam is along Armory Street, there will be times where lane or road closures will be required to perform the repair work. These will be advertised and minimized and a traffic control plan will be required, including detour routes.

Because the reservoir is more than 20 feet deep and because of the nature of the work, the reservoir will need to be drawn down during the construction period to provide a safe, dry working environment needed to support the work. A low cofferdam will be constructed at a narrow point in the reservoir and a pumped diversion of water will be needed. Limited areas of Van Horn Park may also need to be closed for public safety during construction, but the park and reservoir will be fully reopened after construction.

Long-Term Impacts

To meet current dam safety standards, the embankment portions of the dam need to be less steep and modified to improve stability and address seepage. This will expand the footprint of the dam, which will require permanent impacts to open water and wetland areas. An intermittent stream, which was previously in a culvert that failed, is located downstream of the dam, but is eroding toward the dam. For safety reasons to protect the dam, the stream needs to be re-culverted, which will result in a modification to existing conditions.

To comply with dam safety standards and Massachusetts Office of Dam Safety's *Policy on Trees on Dams,* the dam must be maintained free of trees and woody growth and maintained with grass/turf or other materials (rock) for safety. All trees and woody growth will be removed as part of this project to meet that policy.

7. Identify project benefits, including "Environmental Benefits" as defined in 301 CMR 11.02, that may improve environmental conditions or public health of the EJ population

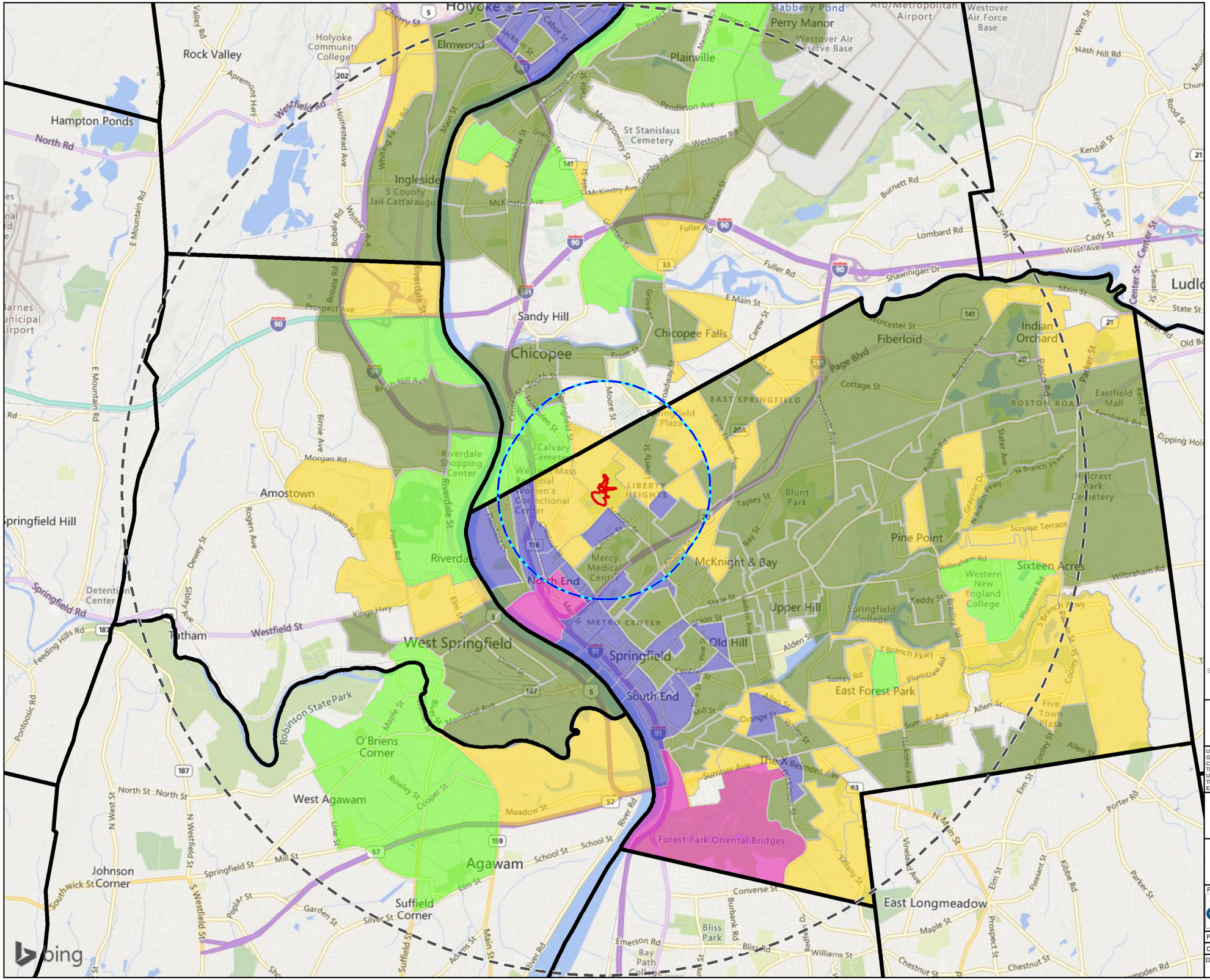
The project has been designed and is being implemented to improve the condition of the Upper Van Horn Reservoir Dam to preserve the safety of the public downstream of the dam who would be at risk in the event of a potential dam failure and to protect the existing utility and roadway infrastructure along Armory Street. These improvements will also install a means of drawing down the reservoir in the event of an emergency or a dam safety issue for maintenance in the future.

Further, improving the dam condition will maintain the upper reservoir and park in their current condition to provide ongoing recreational water access for including fishing, hiking, birding, and other park amenities. The improvements are designed to increase safety and maintain Upper Van Horn Reservoir as an open water resource for the community for the future. If left unaddressed, the dam could potentially fail, resulting in the loss of this open water resource and impacts to life and property.

Finally, Armory Street, located on top of the dam embankment, is a major thoroughfare in the Liberty Heights neighborhood and provides emergency vehicle access (ambulances) to both Mercy Medical Center and Baystate Medical Center. The dam embankment and roadway include buried utilities servicing the surrounding neighborhoods. The project includes replacing the failed stormwater drainage system with modern stormwater capture, treatment, and discharge methods which may result in water quality improvements and prevent erosion at the discharge points.

8. Describe how the community can request a meeting to discuss the project, and how the community can request oral language interpretation services at the meeting. Specify how to request other accommodations, including meetings after business hours and at locations near public transportation.

The City of Springfield is planning on holding a community meeting to discuss the project and solicit input. Community members can submit information, meeting, or interpretation requests through the website identified above or by emailing or calling one of the two contacts identified above. Please include details regarding preferred times or locations in any requests for meetings. GZA and the City of Springfield will honor these requests and provide accommodations to the extent practicable to aid in community attendance.



LEGEND

- Minority
- Income
- Language isolation
- Minority and income
- Minority and English isolation
- Income and English isolation
- Minority, income and English isolation
- Limit of Work (LOW)
- 1-mile buffer
- 5-mile buffer
- MATOWNS

N

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1 0.5 0 1 Miles

UPPER VAN HORN RESERVOIR
DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

ENVIRONMENTAL JUSTICE POPULATIONS

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: CITY OF SPRINGFIELD DEPARTMENT OF PARKS, BULIDINGS, AND RECREATION MANAGEMENT	
PROJ MGR: JRB	REVIEWED BY: CC	CHECKED BY: SLL	FIGURE 1
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 5,200 ft	
DATE: 05/05/2022	PROJECT NO: 15.0167018.00	REVISION NO:	

Table 1: EJ Populations and Characteristics within 5 Miles of the Project Area				
Block Group	**Census Tract Number**	**EJ Criteria Designation**	**Distance from Project**	**Municipality**
Block Group 3	Census Tract 8109.02	Income	<1 Mile	CHICOPEE
Block Group 2	Census Tract 8109.02	Minority	<1 Mile	CHICOPEE
Block Group 4	Census Tract 8109.02	Minority and income	<1 Mile	CHICOPEE
Block Group 1	Census Tract 8003	Minority	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8003	Minority	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8004	Minority	<1 Mile	SPRINGFIELD
Block Group 4	Census Tract 8004	Minority	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8005	Minority	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8005	Minority	<1 Mile	SPRINGFIELD
Block Group 4	Census Tract 8013	Minority	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8008	Minority and English isolation	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8003	Minority and income	<1 Mile	SPRINGFIELD
Block Group 4	Census Tract 8003	Minority and income	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8004	Minority and income	<1 Mile	SPRINGFIELD
Block Group 5	Census Tract 8004	Minority and income	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8007	Minority and income	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8009	Minority and income	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8009	Minority and income	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8013	Minority and income	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8004	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8005	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8006	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8006	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8006	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8008	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8009	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8011.01	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8012	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8132.07	Income	1-5 Miles	AGAWAM
Block Group 2	Census Tract 8132.07	Income	1-5 Miles	AGAWAM
Block Group 3	Census Tract 8132.07	Income	1-5 Miles	AGAWAM
Block Group 3	Census Tract 8132.09	Income	1-5 Miles	AGAWAM
Block Group 1	Census Tract 8132.09	Minority	1-5 Miles	AGAWAM
Block Group 1	Census Tract 8110	Income	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8110	Income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8111.01	Income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8113.01	Income	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8113.02	Income	1-5 Miles	CHICOPEE
Block Group 5	Census Tract 8113.02	Income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8106.01	Minority	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8107	Minority	1-5 Miles	CHICOPEE
Block Group 5	Census Tract 8107	Minority	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8111.02	Minority	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8112	Minority	1-5 Miles	CHICOPEE
Block Group 2	Census Tract 8106.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8107	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8108	Minority and income	1-5 Miles	CHICOPEE
Block Group 2	Census Tract 8108	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8109.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8111.01	Minority and income	1-5 Miles	CHICOPEE

Block Group	Census Tract Number	EJ Criteria Designation	Distance from Project	Municipality
Block Group 4	Census Tract 8111.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8111.02	Minority and income	1-5 Miles	CHICOPEE
Block Group 2	Census Tract 8111.02	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8113.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8113.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8113.02	Minority and income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8121.01	Minority	1-5 Miles	HOLYOKE
Block Group 3	Census Tract 8121.04	Minority	1-5 Miles	HOLYOKE
Block Group 4	Census Tract 8121.04	Minority	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8115	Minority and income	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8121.03	Minority and income	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8121.03	Minority and income	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8121.04	Minority and income	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8121.04	Minority and income	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8114	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8114	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8115	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8116	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8116	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 4	Census Tract 8116	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8016.01	Income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8024	Income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8001.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8001.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8002.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8002.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8015.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8015.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8016.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.04	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.05	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8021	Minority	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8021	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8022	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8023	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8024	Minority	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8024	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8025	Minority	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8025	Minority	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8025	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8026.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8026.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8026.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8021	Minority and English isolation	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8001.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8001.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8001.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8002.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8002.01	Minority and income	1-5 Miles	SPRINGFIELD

Block Group	Census Tract Number	EJ Criteria Designation	Distance from Project	Municipality
Block Group 5	Census Tract 8002.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8002.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8011.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8012	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8012	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8013	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8013	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8014.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8014.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8014.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8014.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8015.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8015.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8015.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8015.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8015.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8015.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8015.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8015.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8016.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8016.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.05	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8019.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8019.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8019.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8021	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8021	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8022	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8022	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8023	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8023	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8023	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8024	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8025	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8025	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8026.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8026.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8007	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8011.02	Minority, income and English isolation	1-5 Miles	SPRINGFIELD

Block Group	Census Tract Number	EJ Criteria Designation	Distance from Project	Municipality
Block Group 4	Census Tract 8018	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8019.02	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8019.02	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8020	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8020	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8023	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8026.01	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8122.01	Income	1-5 Miles	WEST SPRINGFIELD
Block Group 3	Census Tract 8122.02	Income	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8123	Income	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8122.01	Minority	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8122.02	Minority	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8124.04	Minority	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8122.01	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8122.02	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8123	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 3	Census Tract 8123	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 4	Census Tract 8123	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8124.03	Minority and income	1-5 Miles	WEST SPRINGFIELD

Table 2: Vulnerable Health EJ Criteria for Geographic Areas within 1 Mile of Project Area				
Geographic Area	Criteria (110% State Rate)			
	Elevated Blood Lead Prevalence (17.7 per 1000)	Low Birth Weight (238.5 per 1000)	Heart Attack Rate (29.065 per 10,000)	Pediatric Asthma ED Visit (91.4 per 10,000)
BY COMMUNITY				
Springfield	**35.0**	**254.8**	**35.9**	**220.5**
Chicopee	15.8	**279.1**	**33.7**	**133.9**
BY TRACT				
Tract 8003	11.0	NS	NA	NA
Tract 8004	**37.4**	205.0	NA	NA
Tract 8005	**50.5**	**286.9**	NA	NA
Tract 8006	**21.6**	**287.1**	NA	NA
Tract 8007	**24.3**	**295.1**	NA	NA
Tract 8008	**19.2**	NS	NA	NA
Tract 8009	**25.6**	**373.8**	NA	NA
Tract 8011.01	NS	NS	NA	NA
Tract 8012	15.5	**416.7**	NA	NA
Tract 8013	**95.2**	**369.3**	NA	NA
Tract 8109.02	11.4	**431.0**	NA	NA

NA - Not Applicable; Data not produced for this geographic area

NS - Not Shown; too few occurrences available to calculate rate for tract; Assumed non-exceedance

Indicates exceedance of 110% of state rate

Environmental Justice Screening Form

Project Name	Upper Van Horn Reservoir Dam Improvements Project
Anticipated Date of MEPA Filing	June 30, 2022
Proponent Name	City of Springfield – Department of Parks, Buildings, & Recreation Management
Contact Information (e.g., consultant)	Adrienne Dunk Adrienne.dunk@gza.com 413-726-2144 Jennifer R.M. Burke Jennifer.burke@gza.com 413-726-2117
Public website for project or other physical location where project materials can be obtained (if available)	https://www.gza.com/upper-van-horn-reservoir-dam-improvements-project The above-referenced website will be updated as Project information becomes available. Requests for additional information or to hold a meeting can be submitted on this website.
Municipality and Zip Code for Project (if known)	Springfield, MA 01104 & 01107
Project Type* (list all that apply)	Dam Repair/Rehabilitation
Is the project site within a mapped 100-year FEMA flood plain? Y/N/yet unknown	No
Estimated GHG emissions of conditioned spaces if known	Not applicable – no conditioned spaces are proposed, and the Project qualifies for the de minimis exemption as it will not result in significant GHG emissions.

Project Description

1. Provide a brief project description, including overall size of the project site and square footage of proposed buildings and structures if known.

The Upper Van Horn Reservoir Dam Improvements Project is being undertaken by the City to improve the condition of the Upper Van Horn Reservoir to bring it into compliance with the Massachusetts Dam Safety Regulations and modern dam safety practices. This project is necessary to reduce the risk to downstream life and property and improve public safety by addressing deficiencies at the dam, to preserve the reservoir for recreation, and to improve access for future maintenance and operation of the dam. Based on the Massachusetts Department of Conservation and Recreation Office of Dam Safety rating guidelines, the dam is currently rated in Poor condition and is need of repairs and improvements.

The Upper Van Horn Reservoir Dam is a Significant Hazard potential, Intermediate-sized embankment dam that was constructed in the mid-1800s for water supply. The Springfield Water Department bought the dam in 1873 and transferred it to the City's Parks Department in 1909, when it was no longer needed for

water supply. The current purpose of the dam is recreation, forming Upper Van Horn Reservoir which is 9.7 acres. The dam and reservoir are located along an unnamed tributary to the Connecticut River. The dam separates the Upper and Lower Van Horn Reservoirs and provides the roadway embankment for Armory Street.

The dam is approximately 905 feet long and 30.6 feet high. The crest or top of dam along Armory Street is approximately 50 feet wide and the side slopes are steep. The spillway is twin 8-foot wide by 5-feet high box culverts, which discharge water to a spillway chute on the downstream slope of the dam to the Lower Van Horn Reservoir.

The dam currently has multiple deficiencies, including large trees and brush on the slopes, erosion on the slopes, seepage at the downstream toe of the dam, animal burrows, debris in the spillway and chute, drainage system failures leading to erosion, and no low-level outlet to drawdown the reservoir when needed.

The proposed project will provide repairs and improvements to the dam, including:

- Removal of all trees and woody vegetation and developing a grass surface;
- Modifications to the dam's slopes to improve stability and control seepage:
    - Regrading the upstream and downstream slopes to be less steep;
    - Addition of a stability berm and toe drain/blanket;
    - Addition of riprap along portions of the upstream and downstream slope;
- Concrete repairs and replacement of the spillway chute, which is degraded;
- Re-culverting of a portion of intermittent stream that was previously in a culvert which has failed;
- Drainage system replacement and improvements along Armory Street with new controlled outlet points;
- Removal and repair of animal burrows and erosion scars;
- A new siphon for drawdown;
- Removal and grouting of a former outlet;
- A new maintenance access drive to provide access for future maintenance and operation; and
- Roadway, guardrail, sidewalk, safety fencing, access controls, and lighting improvements along Armory Street.

2. List anticipated MEPA review thresholds (301 CMR 11.03) (if known)

- 301 CMR 11.03(3)(a)(1)(A) – Alteration of ten or more acres of any other wetland (Land Under Water Bodies and Waterways) – *Note that this is a temporary impact related to the temporary drawdown of the reservoir needed during the dam repair process to conduct the work in a safe manner;*
- 301 CMR 11.03(3)(b)(1)(b) – Alteration of 500 or more linear feet of bank along a fish run or inland bank;
- 301 CMR 11.03(3)(b)(1)(f) – Alteration of ½ or more acres of any other wetland (Land Under Water Bodies and Waterways)

3. List all anticipated state, local and federal permits needed for the project (if known)

Local –

- City of Springfield Conservation Commission – Order of Conditions (OOC) under the Wetland Protection Act (WPA)

State –

- Massachusetts Department of Environmental Protection (MassDEP) – Section 401 of the Clean Water Act, Water Quality Certification
- Massachusetts Department of Conservation and Recreation, Office of Dam Safety – Chapter 253 Dam

Safety Permit
- Project Notification Form, Massachusetts Historical Commission

Federal –
- United States Army Corps. Of Engineers (USACE) – Section 404 Authorization
- United States Environmental Protection Agency (EPA) – Notice of Intent for Coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activities

4. Identify EJ populations and characteristics (Minority, Income, English Isolation) within 5 miles of project site (can attach map from EJ Maps Viewer in lieu of narrative)

See attached table and figure for details.

There are 28 EJ census block populations within 1 mile of the project site. Three of these communities are located in the adjacent City of Chicopee, with one identified as Income, one identified as Minority, and one identified as Income and Minority. None of the populations within the City of Chicopee have greater than 5% of individuals who speak a language other than English that do not speak English very well.

The 25 Springfield EJ census block populations are all identified as having >5% of individuals who speak Spanish or Spanish Creole and do not speak English well. The Springfield EJ populations are designated as:
- Minority (7)
- Minority and English Isolation (1)
- Minority and Income (8)
- Minority, Income, and English Isolation (9)

There are 144 additional EJ census block populations mapped within 5 miles of the project site. These populations are located in the communities of Springfield, Holyoke, West Springfield, Chicopee, and Agawam.

These EJ populations are designated as:
- Income (15)
- Minority (35)
- Minority and English Isolation (1)
- Minority and Income (78)
- Minority, Income, and English Isolation (15)

Languages spoken by greater than 5% of individuals who do not speak English well within EJ populations in this area include Portuguese or Portuguese Creole, Russian, and Spanish or Spanish Creole.

5. Identify any municipality or census tract meeting the definition of "vulnerable health EJ criteria" in the DPH EJ Tool located in whole or in part within a 1 mile radius of the project site

The definition of "vulnerable health EJ criteria" are municipalities or tracts where the rate of specific health indices is greater than or equal to 110% of the state rate. For municipalities, there are four (4) health indices: elevated blood lead level, low birth weight, heart attack, and pediatric asthma emergency department (ED) visit rates. For census tracts, only elevated blood lead and low birth weight rates are applicable due to data collection methods and sensitivity.

Springfield exceeds all four (4) vulnerable health criteria, while Chicopee exceeds three (3) criteria – low

birth weight, heart attack, and pediatric asthma ED visits.

Of the 11 census tracts within one mile of the project, six (6) tracts (8005, 8006, 8007, 8008, 8009, 8013) exceed both vulnerable health criteria (elevated blood lead and low birth weight). Two tracts (8012, 8109.02) exceed only low birth weight rates, and one tract (8004) only exceeds elevated blood lead level. One tract (8003) does not exceed elevated blood lead level and data is not available for low birth weight rates. No data is available for either vulnerable health criteria for tract 8011.01.

See the attached table for rates of each vulnerable health EJ criteria within each geographic area.

6. Identify potential short-term and long-term environmental and public health impacts that may affect EJ Populations and any anticipated mitigation

Short-Term Impacts

Temporary impacts will occur during construction, including air quality and noise impacts from the use of construction equipment, which will be mitigated by requirements to minimize vehicle idling, emission control devices, and control of dust. Work will be limited to normal workday hours to the extent possible. Because the dam is along Armory Street, there will be times where lane or road closures will be required to perform the repair work. These will be advertised and minimized and a traffic control plan will be required, including detour routes.

Because the reservoir is more than 20 feet deep and because of the nature of the work, the reservoir will need to be drawn down during the construction period to provide a safe, dry working environment needed to support the work. A low cofferdam will be constructed at a narrow point in the reservoir and a pumped diversion of water will be needed. Limited areas of Van Horn Park may also need to be closed for public safety during construction, but the park and reservoir will be fully reopened after construction.

Long-Term Impacts

To meet current dam safety standards, the embankment portions of the dam need to be less steep and modified to improve stability and address seepage. This will expand the footprint of the dam, which will require permanent impacts to open water and wetland areas. An intermittent stream, which was previously in a culvert that failed, is located downstream of the dam, but is eroding toward the dam. For safety reasons to protect the dam, the stream needs to be re-culverted, which will result in a modification to existing conditions.

To comply with dam safety standards and Massachusetts Office of Dam Safety's *Policy on Trees on Dams,* the dam must be maintained free of trees and woody growth and maintained with grass/turf or other materials (rock) for safety. All trees and woody growth will be removed as part of this project to meet that policy.

7. Identify project benefits, including "Environmental Benefits" as defined in 301 CMR 11.02, that may improve environmental conditions or public health of the EJ population

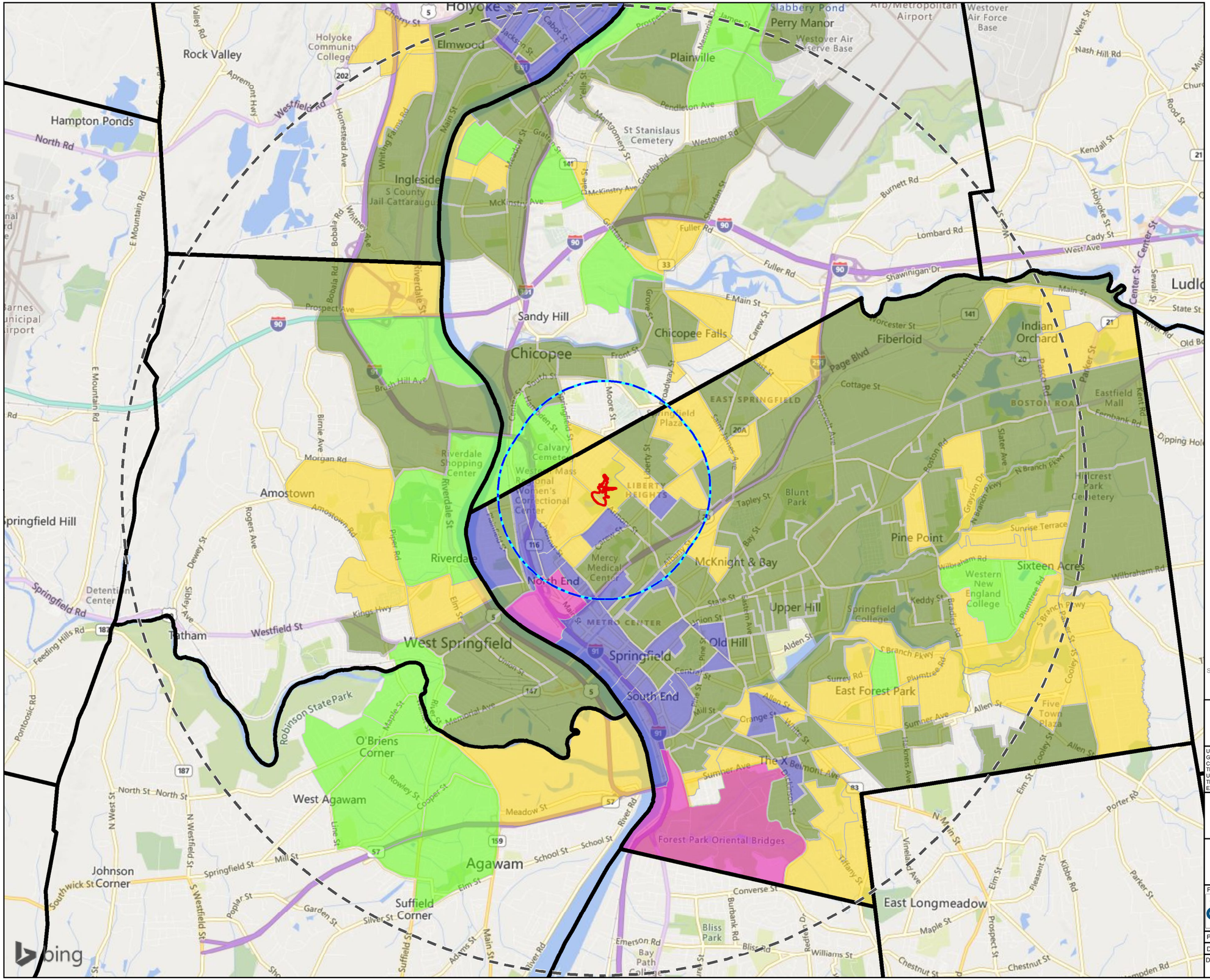
The project has been designed and is being implemented to improve the condition of the Upper Van Horn Reservoir Dam to preserve the safety of the public downstream of the dam who would be at risk in the event of a potential dam failure and to protect the existing utility and roadway infrastructure along Armory Street. These improvements will also install a means of drawing down the reservoir in the event of an emergency or a dam safety issue for maintenance in the future.

Further, improving the dam condition will maintain the upper reservoir and park in their current condition to provide ongoing recreational water access for including fishing, hiking, birding, and other park amenities. The improvements are designed to increase safety and maintain Upper Van Horn Reservoir as an open water resource for the community for the future. If left unaddressed, the dam could potentially fail, resulting in the loss of this open water resource and impacts to life and property.

Finally, Armory Street, located on top of the dam embankment, is a major thoroughfare in the Liberty Heights neighborhood and provides emergency vehicle access (ambulances) to both Mercy Medical Center and Baystate Medical Center. The dam embankment and roadway include buried utilities servicing the surrounding neighborhoods. The project includes replacing the failed stormwater drainage system with modern stormwater capture, treatment, and discharge methods which may result in water quality improvements and prevent erosion at the discharge points.

8. Describe how the community can request a meeting to discuss the project, and how the community can request oral language interpretation services at the meeting. Specify how to request other accommodations, including meetings after business hours and at locations near public transportation.

The City of Springfield is planning on holding a community meeting to discuss the project and solicit input. Community members can submit information, meeting, or interpretation requests through the website identified above or by emailing or calling one of the two contacts identified above. Please include details regarding preferred times or locations in any requests for meetings. GZA and the City of Springfield will honor these requests and provide accommodations to the extent practicable to aid in community attendance.



LEGEND

- Minority
- Income
- Language isolation
- Minority and income
- Minority and English isolation
- Income and English isolation
- Minority, income and English isolation
- Limit of Work (LOW)
- 1-mile buffer
- 5-mile buffer
- MATOWNS

N

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1 0.5 0 1 Miles

UPPER VAN HORN RESERVOIR
DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

ENVIRONMENTAL JUSTICE POPULATIONS

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: CITY OF SPRINGFIELD DEPARTMENT OF PARKS, BULIDINGS, AND RECREATION MANAGEMENT	
PROJ MGR: JRB	REVIEWED BY: CC	CHECKED BY: SLL	FIGURE 1
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 5,200 ft	
DATE: 05/05/2022	PROJECT NO: 15.0167018.00	REVISION NO:	

Table 1: EJ Populations and Characteristics within 5 Miles of the Project Area				
Block Group	**Census Tract Number**	**EJ Criteria Designation**	**Distance from Project**	**Municipality**
Block Group 3	Census Tract 8109.02	Income	<1 Mile	CHICOPEE
Block Group 2	Census Tract 8109.02	Minority	<1 Mile	CHICOPEE
Block Group 4	Census Tract 8109.02	Minority and income	<1 Mile	CHICOPEE
Block Group 1	Census Tract 8003	Minority	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8003	Minority	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8004	Minority	<1 Mile	SPRINGFIELD
Block Group 4	Census Tract 8004	Minority	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8005	Minority	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8005	Minority	<1 Mile	SPRINGFIELD
Block Group 4	Census Tract 8013	Minority	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8008	Minority and English isolation	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8003	Minority and income	<1 Mile	SPRINGFIELD
Block Group 4	Census Tract 8003	Minority and income	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8004	Minority and income	<1 Mile	SPRINGFIELD
Block Group 5	Census Tract 8004	Minority and income	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8007	Minority and income	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8009	Minority and income	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8009	Minority and income	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8013	Minority and income	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8004	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8005	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8006	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8006	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 3	Census Tract 8006	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8008	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 2	Census Tract 8009	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8011.01	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8012	Minority, income and English isolation	<1 Mile	SPRINGFIELD
Block Group 1	Census Tract 8132.07	Income	1-5 Miles	AGAWAM
Block Group 2	Census Tract 8132.07	Income	1-5 Miles	AGAWAM
Block Group 3	Census Tract 8132.07	Income	1-5 Miles	AGAWAM
Block Group 3	Census Tract 8132.09	Income	1-5 Miles	AGAWAM
Block Group 1	Census Tract 8132.09	Minority	1-5 Miles	AGAWAM
Block Group 1	Census Tract 8110	Income	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8110	Income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8111.01	Income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8113.01	Income	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8113.02	Income	1-5 Miles	CHICOPEE
Block Group 5	Census Tract 8113.02	Income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8106.01	Minority	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8107	Minority	1-5 Miles	CHICOPEE
Block Group 5	Census Tract 8107	Minority	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8111.02	Minority	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8112	Minority	1-5 Miles	CHICOPEE
Block Group 2	Census Tract 8106.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8107	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8108	Minority and income	1-5 Miles	CHICOPEE
Block Group 2	Census Tract 8108	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8109.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8111.01	Minority and income	1-5 Miles	CHICOPEE

Block Group	Census Tract Number	EJ Criteria Designation	Distance from Project	Municipality
Block Group 4	Census Tract 8111.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8111.02	Minority and income	1-5 Miles	CHICOPEE
Block Group 2	Census Tract 8111.02	Minority and income	1-5 Miles	CHICOPEE
Block Group 1	Census Tract 8113.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 4	Census Tract 8113.01	Minority and income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8113.02	Minority and income	1-5 Miles	CHICOPEE
Block Group 3	Census Tract 8121.01	Minority	1-5 Miles	HOLYOKE
Block Group 3	Census Tract 8121.04	Minority	1-5 Miles	HOLYOKE
Block Group 4	Census Tract 8121.04	Minority	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8115	Minority and income	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8121.03	Minority and income	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8121.03	Minority and income	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8121.04	Minority and income	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8121.04	Minority and income	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8114	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8114	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8115	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8116	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 2	Census Tract 8116	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 4	Census Tract 8116	Minority, income and English isolation	1-5 Miles	HOLYOKE
Block Group 1	Census Tract 8016.01	Income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8024	Income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8001.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8001.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8002.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8002.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8015.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8015.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8016.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.04	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.05	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8021	Minority	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8021	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8022	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8023	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8024	Minority	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8024	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8025	Minority	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8025	Minority	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8025	Minority	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8026.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8026.01	Minority	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8026.02	Minority	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8021	Minority and English isolation	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8001.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8001.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8001.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8002.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8002.01	Minority and income	1-5 Miles	SPRINGFIELD

Block Group	Census Tract Number	EJ Criteria Designation	Distance from Project	Municipality
Block Group 5	Census Tract 8002.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8002.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8011.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8012	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8012	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8013	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8013	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8014.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8014.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8014.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8014.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8015.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8015.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8015.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8015.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8015.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8015.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8015.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8015.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8016.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8016.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8016.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.03	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8016.05	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8017	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8018	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8019.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8019.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8019.02	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8021	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 6	Census Tract 8021	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8022	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8022	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8023	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8023	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8023	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8024	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8025	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8025	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8026.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 5	Census Tract 8026.01	Minority and income	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8007	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8011.02	Minority, income and English isolation	1-5 Miles	SPRINGFIELD

Block Group	Census Tract Number	EJ Criteria Designation	Distance from Project	Municipality
Block Group 4	Census Tract 8018	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8019.02	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8019.02	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 1	Census Tract 8020	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 2	Census Tract 8020	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8023	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 4	Census Tract 8026.01	Minority, income and English isolation	1-5 Miles	SPRINGFIELD
Block Group 3	Census Tract 8122.01	Income	1-5 Miles	WEST SPRINGFIELD
Block Group 3	Census Tract 8122.02	Income	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8123	Income	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8122.01	Minority	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8122.02	Minority	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8124.04	Minority	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8122.01	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8122.02	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 1	Census Tract 8123	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 3	Census Tract 8123	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 4	Census Tract 8123	Minority and income	1-5 Miles	WEST SPRINGFIELD
Block Group 2	Census Tract 8124.03	Minority and income	1-5 Miles	WEST SPRINGFIELD

Table 2: Vulnerable Health EJ Criteria for Geographic Areas within 1 Mile of Project Area				
Geographic Area	Criteria (110% State Rate)			
	Elevated Blood Lead Prevalence (17.7 per 1000)	Low Birth Weight (238.5 per 1000)	Heart Attack Rate (29.065 per 10,000)	Pediatric Asthma ED Visit (91.4 per 10,000)
BY COMMUNITY				
Springfield	**35.0**	**254.8**	**35.9**	**220.5**
Chicopee	15.8	**279.1**	**33.7**	**133.9**
BY TRACT				
Tract 8003	11.0	**NS**	NA	NA
Tract 8004	**37.4**	205.0	NA	NA
Tract 8005	**50.5**	**286.9**	NA	NA
Tract 8006	**21.6**	**287.1**	NA	NA
Tract 8007	**24.3**	**295.1**	NA	NA
Tract 8008	**19.2**	**NS**	NA	NA
Tract 8009	**25.6**	**373.8**	NA	NA
Tract 8011.01	**NS**	**NS**	NA	NA
Tract 8012	15.5	**416.7**	NA	NA
Tract 8013	**95.2**	**369.3**	NA	NA
Tract 8109.02	11.4	**431.0**	NA	NA

NA - Not Applicable; Data not produced for this geographic area

NS - Not Shown; too few occurrences available to calculate rate for tract; Assumed non-exceedance

Indicates exceedance of 110% of state rate

Formulario de Evaluación de Justicia Ambiental

Nombre del proyecto	Proyecto de Mejoras de la Presa del Embalse Upper Van Horn
Fecha prevista de presentación de MEPA	junio 30, 2022
Nombre del proponente	Ciudad de Springfield - Departamento de Parques, Edificios y Gestión de Recreación
Información de contacto (por ejemplo, consultor)	Adrienne Dunk Adrienne.dunk@gza.com 413-726-2144 Jennifer R.M. Burke Jennifer.burke@gza.com 413-726-2117
Sitio web público para el proyecto u otra ubicación física donde se pueden obtener materiales del proyecto (si están disponibles)	https://www.gza.com/proyecto-de-mejoras-de-la-presa-del-embalse-upper-van-horn El sitio web mencionado anteriormente se actualizará a medida que se disponga de información del Proyecto. Las solicitudes de información adicional o para celebrar una reunión se pueden enviar a este sitio web.
Municipio y código postal para el proyecto (si se conoce)	Springfield, MA 01104 y 01107
Tipo de proyecto* (enumere todos los que correspondan)	Reparación/Rehabilitación de Presas
¿Está el sitio del proyecto dentro de un terreno de inundación proyectado a 100 años mapeado por FEMA? Y/N/aún desconocido	No
Emisiones estimadas de GEI de espacios acondicionados si se conocen	No aplicable: no se proponen espacios acondicionados, y el Proyecto califica para la exención *de minimis*, ya que no dará lugar a emisiones significativas de GEI.

Descripción del proyecto

1. Proporcione una breve descripción del proyecto, incluido el tamaño total del sitio del proyecto y los pies cuadrados de los edificios y estructuras propuestos, si se conocen.

El Proyecto de Mejoras de la Presa del Embalse de Upper Van Horn está siendo emprendido por la Ciudad para mejorar la condición del Embalse de Upper Van Horn para que cumpla con las Regulaciones de Seguridad y prácticas modernas de seguridad de Presas de Massachusetts. Este proyecto es necesario para reducir el riesgo para la vida y la propiedad aguas abajo y mejorar la seguridad pública al abordar las deficiencias en la presa, preservar el embalse para la recreación y mejorar el acceso para el mantenimiento y la operación futuros de la Presa. Según las pautas de calificación de la Oficina de Seguridad de Presas del Departamento de Conservación y Recreación de Massachusetts, la Presa actualmente está clasificada en malas condiciones y necesita reparaciones y mejoras.

La Presa del embalse Upper Van Horn es una Presa de terraplén de tamaño intermedio con potencial de peligro significativo que se construyó a mediados de la década de 1800 para el suministro de agua. El

Departamento de Agua de Springfield compró la Presa en 1873 y la transfirió al Departamento de Parques de la Ciudad en 1909, cuando ya no era necesaria para el suministro de agua. El propósito actual de la Presa es la recreación, formando el embalse Upper Van Horn, que tiene 9.7 acres. La presa y el embalse se encuentran a lo largo de un afluente sin nombre del río Connecticut. La Presa separa los embalses superior e inferior de Van Horn y proporciona el terraplén de la carretera para Armory Street.

La Presa tiene aproximadamente 905 pies de largo y 30.6 pies de alto. La cresta o parte superior de la Presa a lo largo de Armory Street tiene aproximadamente 50 pies de ancho y las laderas laterales son empinadas. El aliviadero es gemelo de 8 pies de ancho por alcantarillas de caja de 5 pies de alto, que descargan agua a un conducto de aliviadero en la pendiente aguas abajo de la Presa hasta el embalse Lower Van Horn.

La Presa actualmente tiene múltiples deficiencias, incluyendo grandes árboles y arbustos en las laderas, erosión en las laderas, filtraciones en la punta aguas abajo de la Presa, madrigueras de animales, escombros en el aliviadero y el conducto o tobogán, fallas en el sistema de drenaje que conducen a la erosión y ninguna salida de bajo nivel para reducir el embalse cuando sea necesario.
El proyecto propuesto proporcionará reparaciones y mejoras a la Presa, incluyendo:

- Eliminación de todos los árboles y vegetación leñosa y desarrollo de una superficie de césped;
- Modificaciones en los taludes de la Presa para mejorar la estabilidad y controlar las filtraciones:
    - Re-nivelación las pendientes aguas arriba y aguas abajo para que sean menos pronunciadas ;
    - Adición de una berma de estabilidad y drenaje / manta;
    - Adición de enrocado a lo largo de partes de la pendiente aguas arriba y aguas abajo ;
- Reparaciones de concreto y reemplazo del conducto del aliviadero, que está degradado;
- Re-alcantarillado de una porción de corriente intermitente que anteriormente estaba en una alcantarilla que ha fallado;
- Reemplazo del sistema de drenaje y mejoras a lo largo de Armory Street con nuevos puntos de salida controlados;
- Remoción y reparación de madrigueras de animales y cicatrices de erosión;
- Un nuevo sifón para la reducción;
- Extracción y lechada de una salida antigua;
- Una nueva unidad de acceso de mantenimiento para proporcionar acceso para el mantenimiento y la operación futuros; y
- Carretera, defensa (barandilla), acera, vallas de seguridad, controles de acceso y mejoras de iluminación a lo largo de Armory Street.

2. Enumerar los umbrales de revisión de MEPA anticipados (301 CMR 11.03) (si se conocen)

- 301 CMR 11.03(3)(a)(1)(A) – Alteración de diez o más acres de cualquier otro humedal (Tierra bajo cuerpos de agua y vías fluviales) – *Tenga en cuenta que este es un impacto temporal relacionado con la reducción temporal del embalse necesaria durante el proceso de reparación de la Presa para llevar a cabo el trabajo de manera segura;*
- 301 CMR 11.03(3)(b)(1)(b) – Alteración de 500 o más pies lineales de banco a lo largo de una carrera de peces o banco interior;
- 301 CMR 11.03(3)(b)(1)(f) – Alteración de 1/2 o más acres de cualquier otro humedal (Tierra bajo cuerpos de agua y vías fluviales)

3. Enumere todos los permisos estatales, locales y federales anticipados necesarios para el proyecto (si se conocen)

Local –

- Comisión de Conservación de la Ciudad de Springfield – Orden de Condiciones (OOC) bajo la Ley de Protección de Humedales (WPA)

Estado –

- Departamento de Protección Ambiental de Massachusetts (MassDEP) – Sección 401 de la Ley de Agua Limpia, Certificación de Calidad del Agua
- Departamento de Conservación y Recreación de Massachusetts, Oficina de Seguridad de Presas – Capítulo 253 Permiso de Seguridad de Presas
- Formulario de notificación de proyecto, Comisión Histórica de Massachusetts

Federal –

- Cuerpo de Ingenieros de Ejército de los Estados Unidos. (USACE) – Autorización de la Sección 404
- Agencia de Protección Ambiental de los Estados Unidos (EPA) – Aviso de intención de cobertura bajo el Permiso General de Construcción (CGP) del Sistema Nacional de Eliminación de Descargas de Contaminantes (NPDES) para Descargas de Aguas Pluviales de Actividades de Construcción

4. Identifique las poblaciones y características de EJ (minoría, ingresos, aislamiento inglés) dentro de las 5 millas del sitio del proyecto (puede adjuntar un mapa de EJ Maps Viewer en lugar de narrativa o texto)

Consulte la tabla y la figura adjuntas para obtener más detalles.

Hay 28 poblaciones **de bloques censales** de E**J dentro de 1 milla del sitio del proyecto.** Tres de estas comunidades están ubicadas en la ciudad adyacente de Chicopee, con una identificada como Ingreso, una identificada como Minoría y una identificada como Ingreso y Minoría. Ninguna de las poblaciones dentro de la ciudad de Chicopee tiene más del 5% de individuos que hablan un idioma distinto al inglés que no hablan inglés muy bien.

Las 25 poblaciones del bloque censal de Springfield EJ se identifican con >5% de las personas que hablan español o español criollo y no hablan bien inglés. Las poblaciones de Springfield EJ se designan como:

- Minoría (7)
- Minoría y aislamiento inglés (1)
- Minoría e Ingresos (8)
- Aislamiento de minorías, ingresos e inglés (9)

Hay 144 poblaciones **adicionales del bloque censal de EJ mapeadas dentro de las 5 millas del sitio del proyecto**. Estas poblaciones se encuentran en las comunidades de Springfield, Holyoke, West Springfield, Chicopee y Agawam.

Estas poblaciones de EJ se designan como:

- Ingresos (15)
- Minoría (35)
- Minoría y aislamiento inglés (1)
- Minoría e ingresos (78)
- Aislamiento de minorías, ingresos e inglés (15)

Los idiomas hablados por más del 5% de las personas que no hablan bien inglés dentro de las poblaciones de

EJ en esta área incluyen portugués o portugués criollo, ruso y español o español criollo.

5. Identifique cualquier municipio o sección censal que cumpla con la definición de "criterios de EJ de salud vulnerable" en la Herramienta DPH EJ ubicada en su totalidad o en parte dentro de un radio de 1 milla del sitio del proyecto

La definición de "criterios de salud vulnerable EJ" son municipios o tramos donde la tasa de índices de salud específicos es mayor o igual al 110% de la tasa estatal. Para los municipios, hay cuatro (4) índices de salud: nivel elevado de plomo en la sangre, bajo peso al nacer, ataque cardíaco y tasas de visitas al departamento de emergencias (DE) de asma pediátrica. Para las secciones censales, solo se aplican las tasas elevadas de plomo en la sangre y bajo peso al nacer debido a los métodos de recopilación de datos y la sensibilidad.

Springfield excede los cuatro (4) criterios de salud vulnerables, mientras que Chicopee excede tres (3) criterios: bajo peso al nacer, ataque cardíaco y visitas de urgencias por asma pediátrica.

De las 11 secciones censales dentro de una milla del proyecto, seis (6) secciones (8005, 8006, 8007, 8008, 8009, 8013) superan ambos criterios de salud vulnerables (plomo en sangre elevado y bajo peso al nacer). Dos tractos (8012, 8109.02) exceden solo las tasas de bajo peso al nacer, y un tracto (8004) solo excede el nivel elevado de plomo en la sangre. Un tracto (8003) no excede el nivel elevado de plomo en la sangre y no hay datos disponibles para las tasas de bajo peso al nacer. No hay datos disponibles para ninguno de los criterios de salud vulnerables para el tracto 8011.01.

Consulte la tabla adjunta para conocer las tasas de cada criterio de EJ de salud vulnerable dentro de cada área geográfica.

6. Identifique los posibles impactos ambientales y de salud pública a corto y largo plazo que puedan afectar a las poblaciones de EJ y cualquier mitigación anticipada

Impactos a corto plazo

Los impactos temporales ocurrirán durante la construcción, incluidos los impactos en la calidad del aire y el ruido del uso de equipos de construcción, que se mitigarán mediante requisitos para minimizar el ralentí de los vehículos, los dispositivos de control de emisiones y el control del polvo. El trabajo se limitará a las horas normales de la jornada laboral en la medida de lo posible. Debido a que la Presa está a lo largo de Armory Street, habrá momentos en los que se requerirán cierres de carriles o carreteras para realizar el trabajo de reparación. Estos se anunciarán y minimizarán y se requerirá un plan de control de tráfico, incluidas las rutas de desvío.

Debido a que el reservorio tiene más de 20 pies de profundidad y debido a la naturaleza del trabajo, será necesario extraer el reservorio durante el período de construcción para proporcionar un entorno de trabajo seco y seguro necesario para apoyar el trabajo. Se construirá una ataguía baja en un punto estrecho del embalse y se necesitará un desvío de agua bombeado. Es posible que las áreas limitadas de Van Horn Park también deban cerrarse por seguridad pública durante la construcción, pero el parque y el embalse se reabrirán por completo después de la construcción.

Impactos a largo plazo

Para cumplir con los estándares actuales de seguridad de la Presa, las partes del terraplén de la Presa deben ser menos empinadas y modificadas para mejorar la estabilidad y abordar la filtración. Esto ampliará la huella de la Presa, lo que requerirá impactos permanentes en aguas abiertas y áreas de humedales. Un arroyo intermitente, que anteriormente estaba en una alcantarilla que falló, se encuentra aguas abajo de la presa, pero se está erosionando hacia la presa. Por razones de seguridad para proteger la presa, el arroyo debe ser re-alcantarillado, lo que resultará en una modificación de las condiciones existentes.

Para cumplir con los estándares de seguridad de la presa y la Política de la Oficina de Seguridad de *Presas de Massachusetts sobre árboles en presas,* la presa debe mantenerse libre de árboles y crecimiento leñoso y mantenida con césped / césped u otros materiales (roca) para mayor seguridad. Todos los árboles y el crecimiento leñoso se eliminarán como parte de este proyecto para cumplir con esa política.

7. Identificar los beneficios del proyecto, incluidos los "Beneficios ambientales" según se definen en 301 CMR 11.02, que pueden mejorar las condiciones ambientales o la salud pública de la población de EJ

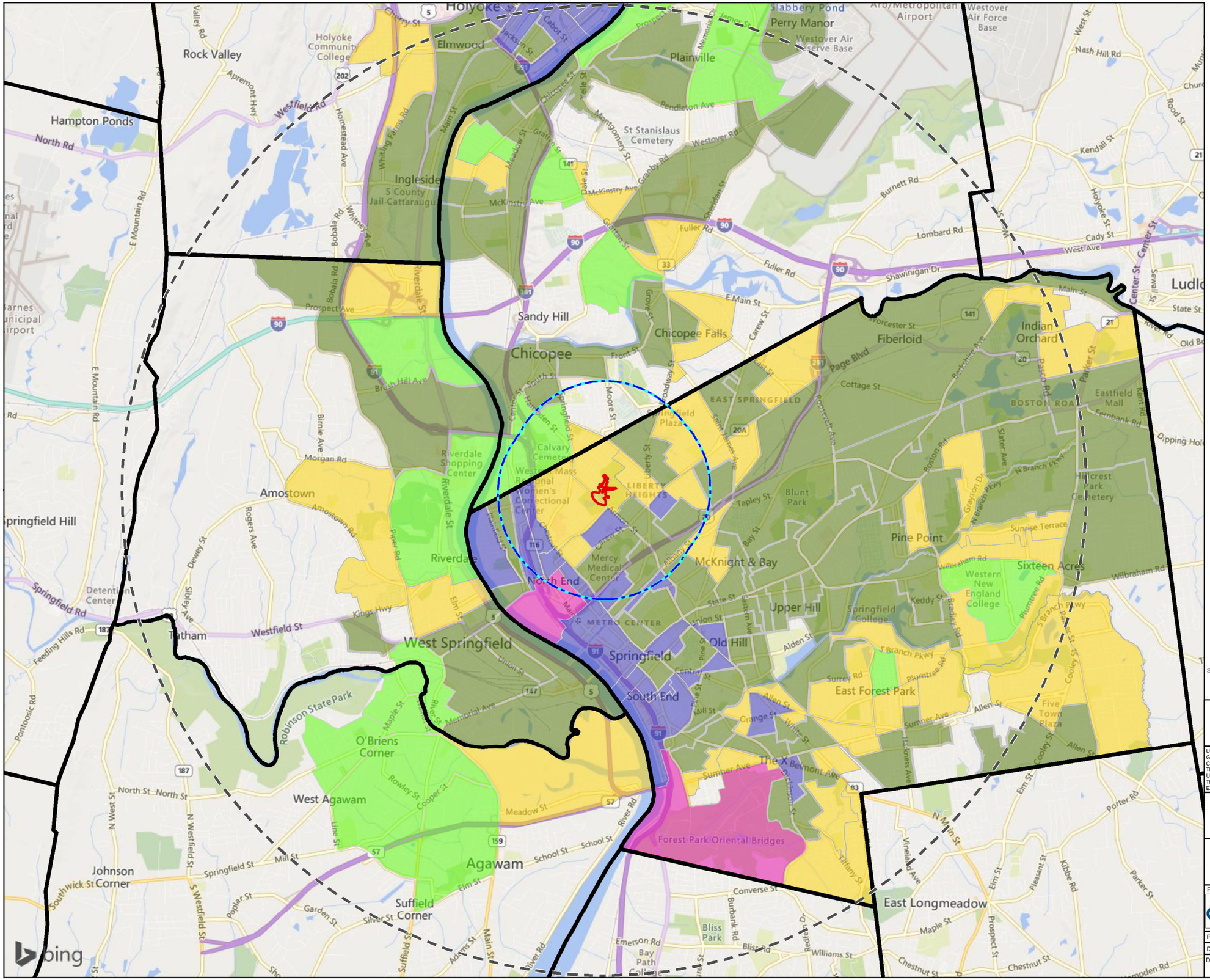
El proyecto ha sido diseñado y se está implementando para mejorar la condición de la presa del embalse de Upper Van Horn para preservar la seguridad del público aguas abajo de la presa que estaría en riesgo en caso de una posible falla de la presa y para proteger la infraestructura existente de servicios públicos y carreteras a lo largo de Armory Street. Estas mejoras también instalarán un medio para extraer el embalse en caso de una emergencia o un problema de seguridad de la presa para su mantenimiento en el futuro.

Además, mejorar la condición de la presa mantendrá el embalse superior y el parque en su condición actual para proporcionar acceso continuo al agua recreativa para incluir pesca, senderismo (caminar), observación de aves y otras comodidades del parque. Las mejoras están diseñadas para aumentar la seguridad y mantener el embalse de Upper Van Horn como un recurso de agua abierta para la comunidad en el futuro. Si no se aborda, la Presa podría fallar, lo que resultaría en la pérdida de este recurso de agua abierta y los impactos en la vida y la propiedad.

Finalmente, Armory Street, ubicada en la parte superior del terraplén de la presa, es una vía importante en el vecindario de Liberty Heights y proporciona acceso de vehículos de emergencia (ambulancias) tanto al Mercy Medical Center como al Baystate Medical Center. El terraplén de la presa y la carretera incluyen servicios públicos enterrados que dan servicio a los vecindarios circundantes. El proyecto incluye el reemplazo del fallido sistema de drenaje de aguas pluviales con métodos modernos de captura, tratamiento y descarga de aguas pluviales que pueden resultar en mejoras en la calidad del agua y evitar la erosión en los puntos de descarga.

8. Describa cómo la comunidad puede solicitar una reunión para discutir el proyecto y cómo la comunidad puede solicitar servicios de interpretación de lenguaje oral en la reunión. Especifique cómo solicitar otras adaptaciones, incluidas las reuniones después del horario comercial y en lugares cercanos al transporte público.

La ciudad de Springfield está planeando celebrar una reunión comunitaria para discutir el proyecto y solicitar aportes. Los miembros de la comunidad pueden enviar información, reuniones o solicitudes de interpretación a través del sitio web identificado anteriormente o enviando un correo electrónico o llamando a uno de los dos contactos identificados anteriormente. Incluya detalles sobre los horarios o lugares preferidos en cualquier solicitud de reuniones. GZA y la Ciudad de Springfield cumplirán con estas solicitudes y proporcionarán adaptaciones en la medida de lo posible para ayudar en la asistencia de la comunidad.



LEGEND

- Minority
- Income
- Language isolation
- Minority and income
- Minority and English isolation
- Income and English isolation
- Minority, income and English isolation
- Limit of Work (LOW)
- 1-mile buffer
- 5-mile buffer
- MATOWNS

N

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1 0.5 0 1 Miles

UPPER VAN HORN RESERVOIR
DAM IMPROVEMENTS PROJECT
ARMORY STREET
SPRINGFIELD, MA

ENVIRONMENTAL JUSTICE POPULATIONS

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: CITY OF SPRINGFIELD DEPARTMENT OF PARKS, BULIDINGS, AND RECREATION MANAGEMENT	
PROJ MGR: JRB	REVIEWED BY: CC	CHECKED BY: SLL	FIGURE 1
DESIGNED BY: ARD	DRAWN BY: ARD	SCALE: 1 in = 5,200 ft	
DATE: 05/05/2022	PROJECT NO: 15.0167018.00	REVISION NO:	

Table 1: Las poblaciones y características de EJ dentro de las 5 millas del sitio del proyecto				
Bloque censal	**Tracto censal**	**Designación de criterios de EJ**	**Distancia desde el proyecto**	**Municipio**
Bloque Censal 3	Tracto censal 8109.02	Ingresos	<1 milla	CHICOPEE
Bloque Censal 2	Tracto censal 8109.02	Minoría	<1 milla	CHICOPEE
Bloque Censal 4	Tracto censal 8109.02	Minoría e Ingresos	<1 milla	CHICOPEE
Bloque Censal 1	Tracto censal 8003	Minoría	<1 milla	SPRINGFIELD
Bloque Censal 3	Tracto censal 8003	Minoría	<1 milla	SPRINGFIELD
Bloque Censal 2	Tracto censal 8004	Minoría	<1 milla	SPRINGFIELD
Bloque Censal 4	Tracto censal 8004	Minoría	<1 milla	SPRINGFIELD
Bloque Censal 2	Tracto censal 8005	Minoría	<1 milla	SPRINGFIELD
Bloque Censal 3	Tracto censal 8005	Minoría	<1 milla	SPRINGFIELD
Bloque Censal 4	Tracto censal 8013	Minoría	<1 milla	SPRINGFIELD
Bloque Censal 2	Tracto censal 8008	Minoría y aislamiento inglés	<1 milla	SPRINGFIELD
Bloque Censal 2	Tracto censal 8003	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 4	Tracto censal 8003	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8004	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 5	Tracto censal 8004	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8007	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8009	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 3	Tracto censal 8009	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 3	Tracto censal 8013	Minoría e Ingresos	<1 milla	SPRINGFIELD
Bloque Censal 3	Tracto censal 8004	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8005	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8006	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 2	Tracto censal 8006	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 3	Tracto censal 8006	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8008	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 2	Tracto censal 8009	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8011.01	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8012	Aislamiento de minorías, ingresos e inglés	<1 milla	SPRINGFIELD
Bloque Censal 1	Tracto censal 8132.07	Ingresos	1-5 millas	AGAWAM
Bloque Censal 2	Tracto censal 8132.07	Ingresos	1-5 millas	AGAWAM
Bloque Censal 3	Tracto censal 8132.07	Ingresos	1-5 millas	AGAWAM
Bloque Censal 3	Tracto censal 8132.09	Ingresos	1-5 millas	AGAWAM
Bloque Censal 1	Tracto censal 8132.09	Minoría	1-5 millas	AGAWAM
Bloque Censal 1	Tracto censal 8110	Ingresos	1-5 millas	CHICOPEE
Bloque Censal 4	Tracto censal 8110	Ingresos	1-5 millas	CHICOPEE
Bloque Censal 3	Tracto censal 8111.01	Ingresos	1-5 millas	CHICOPEE
Bloque Censal 3	Tracto censal 8113.01	Ingresos	1-5 millas	CHICOPEE
Bloque Censal 4	Tracto censal 8113.02	Ingresos	1-5 millas	CHICOPEE
Bloque Censal 5	Tracto censal 8113.02	Ingresos	1-5 millas	CHICOPEE
Bloque Censal 3	Tracto censal 8106.01	Minoría	1-5 millas	CHICOPEE
Bloque Censal 4	Tracto censal 8107	Minoría	1-5 millas	CHICOPEE
Bloque Censal 5	Tracto censal 8107	Minoría	1-5 millas	CHICOPEE
Bloque Censal 4	Tracto censal 8111.02	Minoría	1-5 millas	CHICOPEE
Bloque Censal 3	Tracto censal 8112	Minoría	1-5 millas	CHICOPEE
Bloque Censal 2	Tracto censal 8106.01	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 3	Tracto censal 8107	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 1	Tracto censal 8108	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 2	Tracto censal 8108	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 1	Tracto censal 8109.01	Minoría e Ingresos	1-5 millas	CHICOPEE

Bloque censal	Tracto censal	Designación de criterios de EJ	Distancia desde el proyecto	Municipio
Bloque Censal 1	Tracto censal 8111.01	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 4	Tracto censal 8111.01	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 1	Tracto censal 8111.02	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 2	Tracto censal 8111.02	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 1	Tracto censal 8113.01	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 4	Tracto censal 8113.01	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 3	Tracto censal 8113.02	Minoría e Ingresos	1-5 millas	CHICOPEE
Bloque Censal 3	Tracto censal 8121.01	Minoría	1-5 millas	HOLYOKE
Bloque Censal 3	Tracto censal 8121.04	Minoría	1-5 millas	HOLYOKE
Bloque Censal 4	Tracto censal 8121.04	Minoría	1-5 millas	HOLYOKE
Bloque Censal 1	Tracto censal 8115	Minoría e Ingresos	1-5 millas	HOLYOKE
Bloque Censal 1	Tracto censal 8121.03	Minoría e Ingresos	1-5 millas	HOLYOKE
Bloque Censal 2	Tracto censal 8121.03	Minoría e Ingresos	1-5 millas	HOLYOKE
Bloque Censal 1	Tracto censal 8121.04	Minoría e Ingresos	1-5 millas	HOLYOKE
Bloque Censal 2	Tracto censal 8121.04	Minoría e Ingresos	1-5 millas	HOLYOKE
Bloque Censal 1	Tracto censal 8114	Aislamiento de minorías, ingresos e inglés	1-5 millas	HOLYOKE
Bloque Censal 2	Tracto censal 8114	Aislamiento de minorías, ingresos e inglés	1-5 millas	HOLYOKE
Bloque Censal 2	Tracto censal 8115	Aislamiento de minorías, ingresos e inglés	1-5 millas	HOLYOKE
Bloque Censal 1	Tracto censal 8116	Aislamiento de minorías, ingresos e inglés	1-5 millas	HOLYOKE
Bloque Censal 2	Tracto censal 8116	Aislamiento de minorías, ingresos e inglés	1-5 millas	HOLYOKE
Bloque Censal 4	Tracto censal 8116	Aislamiento de minorías, ingresos e inglés	1-5 millas	HOLYOKE
Bloque Censal 1	Tracto censal 8016.01	Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8024	Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8001.01	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8001.02	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8002.01	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8002.01	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8015.01	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8015.02	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8016.01	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8016.02	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8016.02	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8016.04	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8016.05	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8021	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8021	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8022	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8023	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8024	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8024	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8025	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8025	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 6	Tracto censal 8025	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8026.01	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 6	Tracto censal 8026.01	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8026.02	Minoría	1-5 millas	SPRINGFIELD
Bloque Censal 5	Tracto censal 8021	Minoría y aislamiento inglés	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8001.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8001.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8001.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD

Bloque censal	Tracto censal	Designación de criterios de EJ	Distancia desde el proyecto	Municipio
Bloque Censal 1	Tracto censal 8002.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8002.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 5	Tracto censal 8002.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8002.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8011.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8012	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8012	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8013	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8013	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8014.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8014.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8014.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8014.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8015.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8015.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8015.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8015.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8015.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8015.03	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8015.03	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8015.03	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8016.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8016.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8016.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8016.03	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8016.03	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8016.05	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8017	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8017	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8017	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 5	Tracto censal 8017	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 6	Tracto censal 8017	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8018	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8018	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8018	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 5	Tracto censal 8018	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8019.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8019.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8019.02	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8021	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 6	Tracto censal 8021	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8022	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8022	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8023	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8023	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 5	Tracto censal 8023	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8024	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8025	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 5	Tracto censal 8025	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8026.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD

Bloque censal	Tracto censal	Designación de criterios de EJ	Distancia desde el proyecto	Municipio
Bloque Censal 5	Tracto censal 8026.01	Minoría e Ingresos	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8007	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8011.02	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8018	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8019.02	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8019.02	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 1	Tracto censal 8020	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 2	Tracto censal 8020	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8023	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 4	Tracto censal 8026.01	Aislamiento de minorías, ingresos e inglés	1-5 millas	SPRINGFIELD
Bloque Censal 3	Tracto censal 8122.01	Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 3	Tracto censal 8122.02	Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 2	Tracto censal 8123	Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 1	Tracto censal 8122.01	Minoría	1-5 millas	WEST SPRINGFIELD
Bloque Censal 2	Tracto censal 8122.02	Minoría	1-5 millas	WEST SPRINGFIELD
Bloque Censal 1	Tracto censal 8124.04	Minoría	1-5 millas	WEST SPRINGFIELD
Bloque Censal 2	Tracto censal 8122.01	Minoría e Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 1	Tracto censal 8122.02	Minoría e Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 1	Tracto censal 8123	Minoría e Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 3	Tracto censal 8123	Minoría e Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 4	Tracto censal 8123	Minoría e Ingresos	1-5 millas	WEST SPRINGFIELD
Bloque Censal 2	Tracto censal 8124.03	Minoría e Ingresos	1-5 millas	WEST SPRINGFIELD

Tabla 2: Criterio de EJ de salud vulnerable dentro de cada área geográfica				
área geográfica	Criterios (110% State Rate)			
	nivel elevado de plomo en la sangre (17.7 per 1000)	bajo peso al nacer (238.5 per 1000)	ataque cardíaco (29.065 per 10,000)	tasas de visitas al departamento de emergencias (DE) de asma pediátrica (91.4 per 10,000)
LA COMUNIDAD				
Springfield	**35.0**	**254.8**	**35.9**	**220.5**
Chicopee	15.8	**279.1**	**33.7**	**133.9**
TRACTO				
Tracto 8003	11.0	**NS**	NA	NA
Tracto 8004	**37.4**	205.0	NA	NA
Tracto 8005	**50.5**	**286.9**	NA	NA
Tracto 8006	**21.6**	**287.1**	NA	NA
Tracto 8007	**24.3**	**295.1**	NA	NA
Tracto 8008	**19.2**	**NS**	NA	NA
Tracto 8009	**25.6**	**373.8**	NA	NA
Tracto 8011.01	**NS**	**NS**	NA	NA
Tracto 8012	15.5	**416.7**	NA	NA
Tracto 8013	**95.2**	**369.3**	NA	NA
Tracto 8109.02	11.4	**431.0**	NA	NA

NA - No Aplica; Datos no producidos para esta área geográfica

NS - No Mostrado; muy pocas ocurrencias disponibles para calcular la tasa para el tracto; Presunta no excedencia

Indica una superación del 110 % de la tasa estatal

Adrienne Dunk

From: Adrienne Dunk
Sent: Friday, May 13, 2022 9:50 AM
To: danielledolan@massriversalliance.org; juliablatt@massriversalliance.org; Andrea@n2nma.org; elvis@n2nma.org; ben@environmentmassachusetts.org; claire@uumassaction.org; cluppi@cleanwater.org; deb.pasternak@sierraclub.org; hclish@outdoors.org; hricci@massaudubon.org; kelly.boling@tpl.org; kerry@msaadapartners.com; lorel@thetrustees.org; ngoodman@environmentalleague.org; pstanton@e4thefuture.org; rob@oceanriver.org; robb@massland.org; sarah@massclimateaction.net; srubin@clf.org; sylvia@communityactionworks.org; wvaughan@hcwh.org; tribalcouncil@chappaquiddick-wampanoag.org; crwritings@aol.com; john.peters@mass.gov; acw1213@verizon.net; melissa@herringpondtribe.org; rockerpatriciad@verizon.net; rhalsey@naicob.org; Coradot@yahooe.com; mligus@newnorthcc.org; mcknightcouncil@yahoo.com; Solomon.Elizabeth.e@gmail.om; thpo@wampanoagtribe-nsn.gov; bonney.hartley@mohican-nsn.gov; Brian.Weeden@mwtribe-nsn.gov; tanisha@arisespringfield.org; ibrahim@gardeningthecommunity.org; zulma@n2nma.org; mbejjani8@gmail.com; shudson@publichealthwm.org; rodonnell@ctriver.org; mark@kestreltrust.org; info@atwaterpark.org; aqca@aqca.org; bayareaneighborhoodcouncil@yahoo.com; Gwendolynsmith5074@gmail.com; hungryhillcouncil@yahoo.com; rvbigred72@aol.com
Cc: Jennifer Burke; Walsh, Laura Anne.; psullivan@springfieldcityhall.com; Adrienne Dunk
Subject: Environmental Justice Notification - Upper Van Horn Reservoir Dam Improvements Project
Attachments: EJ screening form 5-13-2022.pdf; Formulario de Evaluación de Justicia Ambiental 5-13-2022.pdf

Community-based organizations and tribal organizations are receiving this notification in accordance with the MEPA Public Involvement Protocol for Environmental Justice Populations, which took effect on January 1, 2022. More information is available on MEPA website.

Las organizaciones comunitarias y tribales están recibiendo esta notificación de acuerdo con el Protocolo de Participación Pública para Poblaciones de Justicia Ambiental de MEPA, que entró en vigencia el 1 de enero de 2022. Hay más información disponible en el sitio web de MEPA.

Hello,

Please find attached information regarding the proposed Upper Van Horn Reservoir Dam Improvements Project located on Armory Street in Springfield, Massachusetts. Additional project information can be obtained at the websites identified below or by contacting the GZA representatives identified on the attached form.

Encuentre información adjunta sobre el proyecto propuesto de mejoras a la represa del embalse Upper Van Horn ubicado en Armory Street en Springfield, Massachusetts. Se puede obtener información adicional del proyecto en los sitios web identificados a continuación o comunicándose con los representantes de GZA identificados en el formulario adjunto.

English / Inglés: https://www.gza.com/upper-van-horn-reservoir-dam-improvements-project
Español / Spanish: https://www.gza.com/proyecto-de-mejoras-de-la-presa-del-embalse-upper-van-horn

Thank you,
Adrienne

Adrienne Dunk
Assistant Project Manager
GZA | 1350 Main Street, Suite 1400 | Springfield, MA 01103
o: 413-726-2144 | c: 201-247-8950 | adrienne.dunk@gza.com | www.gza.com | LinkedIn

Adrienne Dunk

From: Adrienne Dunk
Sent: Friday, May 13, 2022 12:33 PM
To: leigh-anne@communityactionworks.org; coradot@yahoo.com; solomon.elizabeth.e@gmail.com; tribalcouncil@chappaquiddick-wampanoag.org
Subject: Environmental Justice Notification - Upper Van Horn Reservoir Dam Improvements Project
Attachments: EJ screening form 5-13-2022.pdf; Formulario de Evaluación de Justicia Ambiental 5-13-2022.pdf

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Adrienne Dunk

From: Adrienne Dunk
Sent: Thursday, August 4, 2022 3:30 PM
To: danielledolan@massriversalliance.org; juliablatt@massriversalliance.org; Andrea@n2nma.org; elvis@n2nma.org; ben@environmentmassachusetts.org; claire@uumassaction.org; cluppi@cleanwater.org; deb.pasternak@sierraclub.org; hclish@outdoors.org; hricci@massaudubon.org; kelly.boling@tpl.org; kerry@msaadapartners.com; lorel@thetrustees.org; ngoodman@environmentalleague.org; pstanton@e4thefuture.org; rob@oceanriver.org; robb@massland.org; sarah@massclimateaction.net; srubin@clf.org; sylvia@communityactionworks.org; wvaughan@hcwh.org; tribalcouncil@chappaquiddickwampanoag.org; crwritings@aol.com; john.peters@mass.gov; acw1213@verizon.net; melissa@herringpondtribe.org; rockerpatriciad@verizon.net; rhalsey@naicob.org; Coradot@yahooe.com; Solomon.Elizabeth.e@gmail.com; thpo@wampanoagtribe-nsn.gov; bonney.hartley@mohican-nsn.gov; Brian.Weeden@mwtribe-nsn.gov; tanisha@arisespringfield.org; ibrahim@gardeningthecommunity.org; zulma@n2nma.org; mbejjani8@gmail.com; shudson@publichealthwm.org; rodonnell@ctriver.org; mark@kestreltrust.org; info@atwaterpark.org; aqca@aqca.org; bayareaneighborhoodcouncil@yahoo.com; Gwendolynsmith5074@gmail.com; mcknightcouncil@yahoo.com; mligus@newnorthcc.org; hungryhillcouncil@yahoo.com; rvbigred72@aol.com
Cc: Jennifer Burke; Walsh, Laura Anne.; Sullivan, Pat
Subject: Environmental Justice Notification - Upper Van Horn Reservoir Dam Improvements Project
Attachments: EJ screening form 8-4-2022.pdf; Formulario de Evaluación de Justicia Ambiental 8-4-2022.pdf

Community-based organizations and tribal organizations are receiving this notification in accordance with the MEPA Public Involvement Protocol for Environmental Justice Populations, which took effect on January 1, 2022. More information is available on MEPA website.

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Hello,

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Encuentre información adjunta sobre el proyecto propuesto de mejoras a la represa del embalse Upper Van Horn ubicado en Armory Street en Springfield, Massachusetts. Se puede obtener información adicional del proyecto en los sitios web identificados a continuación o comunicándose con los representantes de GZA identificados en el formulario adjunto. Esta es una nueva notificación del proyecto ya que cambió la fecha límite de presentación. Se le notificó previamente sobre este proyecto propuesto en mayo de 2022.

English / Inglés: https://www.gza.com/upper-van-horn-reservoir-dam-improvements-project

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Adrienne Dunk

From: Adrienne Dunk
Sent: Monday, August 15, 2022 9:42 AM
To: elvis@n2nma.org; maria@n2nma.org; coradot@yahoo.com
Subject: Environmental Justice Notification - Upper Van Horn Dam Improvements Project
Attachments: EJ screening form 8-4-2022.pdf; Formulario de Evaluación de Justicia Ambiental 8-4-2022.pdf

Community-based organizations and tribal organizations are receiving this notification in accordance with the MEPA Public Involvement Protocol for Environmental Justice Populations, which took effect on January 1, 2022. More information is available on MEPA website.

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ATTACHMENT 8-3

ENVIRONMENTAL JUSTICE OUTREACH AND ENGAGEMENT MATERIALS

Project Notice

Upper Van Horn Reservoir Dam Improvements Project

Armory Street, Springfield MA

June 2022

Spillway chute with fallen trees that needs replacement

View of top of dam on Armory Street with trees requiring removal along dam slopes

Project Overview:

The City of Springfield is proposing to rehabilitate the Upper Van Horn Reservoir Dam to comply with the Massachusetts Dam Safety Regulations and modern-day safety practices and to improve resiliency. The dam supports Armory Street and separates the Upper and Lower Van Horn Reservoirs.

The project will include flattening and reinforcing slopes to improve stability, spillway improvements, vegetation removal, improvements to address erosion and seepage, and access improvements. The project will require temporary traffic disruptions along Armory Street, a temporary drawdown of the Upper Van Horn Reservoir, removal of the trees located along the dam, and necessary impacts to wetland resources to provide for the improvements. The project will improve dam safety and facilitate ease of future maintenance.

The City is designing and permitting this project through a consultant and seeks input from those who live and work in the area. The City will host at least one public meeting this summer to gather input. Please visit the website below to find information about upcoming meetings.

View of Upper Van Horn Reservoir facing downstream with dam and concrete spillway in background

For more information, to submit a comment, or request a meeting, please visit:

https://www.gza.com/upper-van-horn-reservoir-dam-improvements-project

Aviso de Proyecto

Proyecto de Mejoras de la Presa del Embalse Upper Van Horn

Armory Street, Springfield MA
Junio 2022

Conducto de aliviadero con árboles caídos que necesita reemplazo

Vista de la parte superior de la presa en Armory Street con árboles que requieren eliminación a lo largo de las laderas de la presa

Descripción general del proyecto:

La ciudad de Springfield se propone rehabilitar la Presa del Embalse Upper Van Horn para cumplir con las Regulaciones de Seguridad de Presas de Massachusetts y las prácticas de seguridad modernas y para mejorar la resiliencia. La Presa soporta la calle Armory y separa la parte superior y baja del embalse Van Horn.

El proyecto incluirá aplanamiento y refuerzo de taludes para mejorar la estabilidad, mejoras en los aliviaderos, remoción de vegetación, mejoras para abordar la erosión y las filtraciones, y mejoras en el acceso. El proyecto requerirá interrupciones temporales del tráfico a lo largo de Armory Street, una reducción temporal del embalse Upper Van Horn, la eliminación de los árboles ubicados a lo largo de la presa y los impactos necesarios en los recursos de los humedales para proporcionar las mejoras. El proyecto mejorará la seguridad de la presa y facilitará el mantenimiento futuro.

La Ciudad está diseñando y permitiendo este proyecto a través de un consultor y busca el aporte y opinión de quienes viven y trabajan en el área. La Ciudad organizará al menos una reunión pública este verano para recopilar información. Por favor, visite el sitio web a continuación para encontrar información sobre las próximas reuniones.

Vista del embalse Upper Van Horn mirando río abajo con presa y aliviadero de hormigón al fondo

Para obtener más información, enviar sus comentarios o solicitar una reunión, visite:
https://www.gza.com/proyecto-de-mejoras-de-la-presa-del-embalse-upper-van-horn

Project Notice

Upper Van Horn Reservoir Dam Improvements Project

Armory Street, Springfield MA
October 2022

Spillway chute with fallen trees that needs replacement

View of top of dam on Armory Street with trees requiring removal along dam slopes

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View of Upper Van Horn Reservoir facing downstream with dam and concrete spillway in background

Scan this QR code to go directly to the project website for more info and meeting details.

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https://www.gza.com/upper-van-horn-reservoir-dam-improvements-project

Aviso de Proyecto

Proyecto de Mejoras de la Presa del Embalse Upper Van Horn

Armory Street, Springfield MA
Octubre 2022

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Vista de la parte superior de la presa en Armory Street con árboles que requieren eliminación a lo largo de las laderas de la presa

Descripción general del proyecto:

La ciudad de Springfield se propone rehabilitar la Presa del Embalse Upper Van Horn para cumplir con las Regulaciones de Seguridad de Presas de Massachusetts y las prácticas de seguridad modernas y para mejorar la resiliencia. La Presa soporta la calle Armory y separa la parte superior y baja del embalse Van Horn.

El proyecto incluirá aplanamiento y refuerzo de taludes para mejorar la estabilidad, mejoras en los aliviaderos, remoción de vegetación, mejoras para abordar la erosión y las filtraciones, y mejoras en el acceso. El proyecto requerirá interrupciones temporales del tráfico a lo largo de Armory Street, una reducción temporal del embalse Upper Van Horn, la eliminación de los árboles ubicados a lo largo de la presa y los impactos necesarios en los recursos de los humedales para proporcionar las mejoras. El proyecto mejorará la seguridad de la presa y facilitará el mantenimiento futuro.

La Ciudad está diseñando y permitiendo este proyecto a través de un consultor y busca el aporte y opinión de quienes viven y trabajan en el área. La Ciudad organizará al menos una reunión pública este verano para recopilar información. Por favor, visite el sitio web a continuación para encontrar información sobre las próximas reuniones.

Vista del embalse Upper Van Horn mirando río abajo con presa y aliviadero de hormigón al fondo

Escanee este código QR para ir directamente al sitio web del proyecto para obtener más información y detalles de la reunión.

Para obtener más información, enviar sus comentarios o solicitar una reunión, visite:
https://www.gza.com/proyecto-de-mejoras-de-la-presa-del-embalse-upper-van-horn

ATTACHMENT 9
PHOTOGRAPHIC LOG

Photographic Log

Client Name: City of Springfield DPBRM	**Site Location:** Upper Van Horn Reservoir Improvements Project – Springfield, MA	**Project No.** 15.0167018.00

Photo No.	**Date:**
1	10-20-22

Direction Photo Taken:
Southeast

Description:
View of dam (in red circle) which supports Armory Street and mature woody vegetation.

Photo No.	**Date:**
2	04-5-22

Direction Photo Taken:
Southeast

Description:
View of dam (in red circle) during leaf-off with concrete spillway visible. This photo was taken from similar location as Photo 1.

Photographic Log

Client Name: City of Springfield DPBRM	**Site Location:** Upper Van Horn Reservoir Improvements Project – Springfield, MA	**Project No.** 15.0167018.00

Photo No.	**Date:**
3	02-18-22

Direction Photo Taken:
Northeast

Description:
View of fallen trees along downstream spillway chute. Presence of trees and lack of a maintenance access have hindered maintenance and repairs.

Photo No.	**Date:**
4	02-11-22

Direction Photo Taken:
East

Description:
View of failed culvert near toe of dam which has resulted in erosion downstream of the dam and threatens to erode the toe of the dam.

Photographic Log

Client Name: City of Springfield DPBRM	**Site Location:** Upper Van Horn Reservoir Improvements Project – Springfield, MA	**Project No.** 15.0167018.00

Photo No.	**Date:**
5	10-20-22

Direction Photo Taken:
Northeast

Description:
Gates to loop road around Upper Van Horn Reservoir. New access roads will be installed for construction and future dam maintenance to avoid damaging the stonework.

Photo No.	**Date:**
6	10-20-22

Direction Photo Taken:
Northeast

Description:
Red arrow points to scour hole related to failed drainage system outlet approximately 3-feet in diameter along upstream side of dam.

GZA GeoEnvironmental, Inc.