# ATTACHMENT B: ANALYSIS OF BROWNFIELD’S CLEANUP ALTERNATIVES (ABCA) - PRELIMINARY EVALUATION ASBESTOS REMOVAL AND REMEDIATION

**PROJECT: Ludlow Mill Building Roofs, Interior Tiles and Window Glazing**

 **Ludlow Mills Complex, 100 State Street, Ludlow, Ma 01056**

This Analysis of Brownfield’s Cleanup Alternatives (ABCA) is intended to provide a cleanup project summary outline in support of a pending Grant Application to the FY 2021 US EPA Brownfield Cleanup program.

# Release Tracking Number

The Massachusetts Department of Environmental Protection (MADEP) does not assign specific tracking numbers to asbestos abatement projects such as the one proposed for Ludlow Mills. Release Tracking Numbers (RTNs) however were issued related to the AAI- ASTM Phase I and Phase II Environmental Site Assessment Reports and several other sites at Ludlow Mills where contamination has been cleaned up with State Site Remediation Grant funds. That remediation work was completed in June of 2014.

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1. **INTRODUCTION & BACKGROUND**
	1. **Site Location**

The project is located at 100 State Street in Ludlow, Massachusetts within the historic Ludlow Mills Complex and specifically involves mill building #44 located in the south-central portion of the mill complex along the Chicopee River, stockhouse annex #109A located in the central portion of the complex and stockhouse #s 158, 160, 162, and 164 just east of First Avenue at the eastern end of the complex.

# Previous Site Uses and any Previous Site Cleanup / Remediation

*Previous Site Use(s)*:

The project area on the Chicopee River has been utilized by industry since the late eighteenth century. Between 1812 and 1844 the site supported operation of textile and cotton mills. Gun barrels were manufactured at the site of the current Mill No. 8 building from 1840 to 1846. Between 1846 and 1848 the building was used for the manufacturing of textile machinery. Starting in 1850, Jute products were produced on the property and the Ludlow Manufacturing Company was established in 1856, later named the Ludlow Mills Company.

Jute manufacturing remained the primary activity on the site into the mid-20th century. A majority of the historic mill buildings, including the stockhouses and building #44, remain from the early 20th century having been built starting in 1901 with significant mill expansion. The historic mill complex is approximately 52 acres in size and contains approximately 35 structures with a total floor space of approximately 1,200,000 square feet. Since the 1960’s the complex has been a multi-tenant industrial park and contains a large number of commercial and industrial operations. Of the site’s extant mill buildings, five are large multi-story structures (Mill #s 8, 9, 10 and 11, and the 300 series storage building along State Street). The additional buildings consist of a series of small (approximately 6,000-12,000 SF), single story, brick block stockhouses located along the Chicopee River in the south and eastern portion part of the site; the former locomotive building and associated maintenance building (#58) and the former carpentry building (#44). The Ludlow Mills complex is included within the Ludlow Village National Historic District (LUD.F) and listed in the State and National Registers of Historic Places.

*Previous Site Clean-up and Remediation*:

Under the previous site ownership of Ludlow Industrial Realty Inc., a Phase 1 Environmental Site Assessment (ESA) was prepared in March 2009 by Advanced Environmental Solutions, Inc. (AES) for the US Environmental Protection Agency (EPA). That Phase 1 ESA was updated by AES in August 2011. In addition, AES prepared a Phase II ESA for the property between September 2010 and June 2011.

The Phase II Environmental Site Assessment (ESA), performed in 2010 and 2011, identified several Recognized Environmental Conditions (RECs). Subsequent environmental assessment activities including limited testing were conducted. The results were compiled in the Phase II ESA dated August 2011, in which 18 RECs existed. These RECs related to industrial use of the property and other subsequent tenants, the illegal disposal of materials, and the use of an up-gradient property as a gasoline station. The report indicated recommendations for additional assessment.

Known releases at the Ludlow Mills property identified in the Phase I and Phase II ESAs include releases of polychlorinated biphenyl (PCB) from transformers, #6 fuel oil from the use and storage of heating oil, and diesel fuel from a delivery truck. Releases of PCBs were concentrated around electrical substations to the north of Mill building 10 and on the Chicopee River bank. Contaminated soil that was accessible at the time was removed from these areas, however, residual contamination remained underneath the substations and an Activity and Use Limitation (AUL) is in place in order to limit exposure should the contaminated soil be disturbed. The AUL was terminated in 2014. Historically, several releases of fuel oil were reported near stockhouse #205, which served as the Boiler Building, as a result of filling operations of the two 15,000-gallon fuel oil underground storage tanks (USTs) used for fuel oil storage. Soil in the immediate area around the tanks was excavated and impacted water in storm drains was cleaned up. The two USTs were removed in April 2012.

Westmass and its consultant at that time, O’Reilly, Talbot and Okun Associates, Inc. (OTO), developed a Remediation Plan, (excluding asbestos) for implementation. The estimated cost of implementation of the Remediation Plan for the Recognized Environmental Concerns identified in the Phase I and II reports was estimated to be $1,500,000. Funding was secured from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) through a $1,500,000 grant awarded to Westmass for site remediation of the Ludlow Mills property. Westmass actively implemented the Remediation Plan and finalized this remediation work in June of 2014.

# Site Assessment Findings – Hazardous Materials

In August 2020, Westmass Area Development Corporation (Westmass) contracted with O’Reilly, Talbot and Okun Associates, Inc. (OTO) again to conduct asbestos assessment and testing on the floor tiles and window glazing of building #44 and stockhouses #158, 160, 162, and 164. Westmass Area Development Corporation paid for this contract from its own funds. In addition, Westmass analyzed the data from the June 2018 Draft Targeted Brownfields Assessment Report prepared by Nobis Engineering for EPA Region 1 in order to determine other sources of asbestos contamination. Results from the OTO and Nobis reports indicate numerous instances of asbestos on stockhouse roofs, floor tiles and window glazings as well as in the Ludlow mill building #44.

Building #44

The floors of this building are concrete or hardwood, finished in some areas with various color resilient flooring and associated mastics. Walls are either brick, or gypsum wallboard with seam tape and joint compound. Ceilings are primarily exposed wood ceiling with steel framing or finished with ceiling tiles. Windows (approximately 8’ x 9’) throughout the building are multi-pane, metal framed windows with glazing compounds. Bulk samples were collected of resilient flooring and mastics, gypsum wall components, ceiling tiles, and window glazing compounds. Laboratory analysis of these materials indicates that the resilient floor tiles and window glazing contain asbestos.

Other hazardous materials identified as having been dumped in building #44 include florescent light fixtures, ballasts and light tubes; tires; televisions; and universal waste- primarily paints, thinners, commercial size motor oils and cleaning products.

Stockhouses #158, 160, 162, and 164

The general construction of each of these structures is similar to building #44 but are one-story masonry, slab on grade structures. The exteriors are finished with brick. In some areas the brick contains adhesives that was likely present when former buildings were attached. Laboratory analysis for adhesive material samples indicate the adhesives contain asbestos in stockhouse 158.

Most of the Stockhouses have unfinished interiors, and are either vacant and/or used for storage of miscellaneous items. In general, finished areas of some stockhouses include various color and pattern resilient (tile or sheet) flooring with associated mastics, ceramic tile, or carpet over wood or concrete floors. Finished walls were constructed of gypsum wallboard, seam tape and joint compound. Ceilings were also gypsum wallboard, finished in some areas with a textured coat, or ceiling tiles. Bulk samples were collected of these various building materials.

Roofs

The 2018 Nobis report identified ACM during the roof inspections. Roofing materials containing asbestos were identified in several stockhouse roofs and include roof sealant, underlayment, roofing tar, roofing paper, rolled roofing/roll-on shingles, and modified bituminous patches. Specifically, the stockhouse 109A annex roof contains black tar paper and roof sealant as well as the roof on stockhouse # 162.

# Project Goal

The Ludlow Mills Preservation and Redevelopment Project continues to reverse years of neglect at the mill complex and will continue to spur local and regional economic activity and job creation. By remediating numerous environmental hazards & asbestos contamination, the project will protect sensitive environmental resources and provide the community with public access to the Chicopee River for passive recreation.

Redevelopment and revitalization of the Ludlow Mills complex is a regionally significant economic development project and has been cited within the 2019 Annual Comprehensive Economic Development Strategy (CEDS) report of the Pioneer Valley Plan for Progress, as a regional “High Priority Project”. The intent is to serve areas meeting US Economic Development Administration Economic Distress Criteria according to the Pioneer Valley Planning Commission.

Westmass plans to redevelop the complex with green technologies including solar and low impact development storm water (LID) systems. The overall project embraces sustainable development principles and seeks to meet USGBC LEED quality standards for new construction at the site. When redevelopment is complete, preliminary estimates indicate that the site could generate more than 2,000 jobs for residents of the region and potentially stimulate up to $300,000,000 of private investment. The project's primary focus will be on commercial and industrial development with a limited number of residential housing units.

Westmass has been successful in obtaining assistance and cooperation from several sources at the Federal, State and Local levels as well as private utilities for redevelopment efforts. The direct involvement and support from the start of this regionally significant project by federal and state officials, numerous elected officials and the community of Ludlow have been instrumental. Westmass is committed to seeing that the Ludlow Mills once again becomes a major contributor to the economic prosperity of the region.

To date the Ludlow Mills Preservation and Redevelopment project has achieved numerous milestones highlighted below:

* + - Between 2009 and 2011, the Project received $231,000 in funding from the U.S. Environmental Protection Agency for environmental site assessment.
		- Westmass Area Development Corporation purchased the property on August 24, 2011.
		- Westmass was awarded a $200,000 FY12 US EPA Brownfield Cleanup Grant for the Phase I portion of the Ludlow Mills Asbestos Abatement and Removal involving ACM Pipe Wrap on existing abandoned steam piping in mill buildings #s8 and 11 and the #300s buildings.
		- In 2012, Columbia Gas invested in excess of $600,000 to complete construction of a new intermediate pressure natural gas line along the length of State Street.
		- Westmass was awarded a total of $400,000 with two separate FY13 US EPA Brownfield Cleanup Grants for the Phase II portion of the Ludlow Mills Asbestos Abatement and Removal involving ACM abatement and demolition of Storehouse building 286-291 and Storehouse building 292-296.
		- Westmass received a $1.5 million grant from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) for environmental remediation work (excluding asbestos) at Ludlow Mills.
		- The $27 Million dollar HealthSouth Rehabilitation Hospital Project (Private) was completed in November 2013 and achieved LEED HC Gold certification.
		- In 2017 Winn Development, utilizing Historic Tax Credits as part of the financing package, completed a $24 million, adaptive reuse of Mill #10 to provide 55 units of Senior Independent Living.
		- The Town of Ludlow received $3.7 million in funding for the reconstruction of State Street and First Avenue, replacement of water lines, and installation of streetscape improvements and a sewer pump station.
		- With input from Westmass, the Town of Ludlow voted to change the zoning for the site from Industrial A to Mill Redevelopment District, to allow mixed use development. In addition the Town created a Smart Growth Overlay District, Ludlow Mills Sub-District.
		- Westmass secured State permitting from MEPA for the Final Environmental Impact Report in September 2017 with the issuance of a Certificate of the Secretary of Energy and Environmental Affairs.
		- Westmass has received approval of the delineation of wetlands and riverfront area under the Massachusetts Wetlands Protection Act from the Ludlow Conservation Commission.
		- Westmass has received $2 million of private financing for project development from a consortium of regional lenders.
		- In 2019, the Town of Ludlow, in partnership with Westmass, received $6.6 million in grant funds from the MassWorks Infrastructure Program and the US Department of Commerce Economic Development Administration to construct a 4,200 linear foot roadway and associated infrastructure within the mill complex to advance revitalization efforts.
		- With a $7 million investment, the Town of Ludlow is currently completing the construction of a new Ludlow Senior Center State Street on mill land formerly owned by Westmass on State Street.
		- Winn Development is currently proposing to adaptively reuse Mill #8 (theiconic clocktower building) as residential housing using historic tax credits. This represents an approximate $58 million investment.

# APPLICABLE REGULATIONS AND CLEANUP STANDARDS

**Cleanup Oversight Responsibility** – Westmass Area Development Corporation will be responsible for oversight of the Asbestos Removal and Remediation. In a public bid process following set procurement guidelines, Westmass will solicit and select an Environmental Engineer for project planning, oversight and assistance with the selection of a Licensed Abatement Contactor with a Licensed Inspection / Testing Firm. Selections will be based both on qualifications and costs.

# Cleanup Standards for Major Contaminants

Laws and regulations are applicable to the removal and disposal of Asbestos materials as Hazardous Waste. These standards are in place to prevent it from becoming airborne and harmful to workers or the public. Regulations include Federal laws and worker protection standards from exposures, address transportation of asbestos waste, and limit air pollutants under National Emissions Standards for Hazardous Air Pollutants.

Massachusetts Laws and Regulations require notification and work practices to avoid fiber release for asbestos handling, removal, storage, transport, and disposal. Regulation also requires inspection of demolition/renovation and manufacturing operations and special waste landfilling of asbestos and asbestos-containing material.

# Laws and Regulations Applicable to the Cleanup

Federal Regulations

* + - Brownfields Revitalization Act
		- Davis / Bacon Act
		- OSHA: Regulations: 29 CFR Parts 1910 & 1926.
		- DOT: Title 49, section 173.1090.
		- EPA: (NESHAP)**:** 40 CFR Part 61 Subpart M.
		- Emergency Response Act (AHERA) 40 CFR Part 763
		- Toxic Substances Control Act (TSCA).

Massachusetts Regulations

* + - 310 CMR 7.00: AIR POLLUTION CONTROL specifically section 7.09: Dust, Odor, Construction and Demolition,
		- Regulations: 310 CMR 4.00 (Air quality notification approval timelines and fees), 7.00, 7.09(5), 7.15 (Air quality asbestos regulation) and 310 CMR 19.061 (disposal requirements) and 310 CMR 16.00 (landfill siting; asphalt-brick-concrete recycling).
		- Massachusetts Department of Environmental Protection and its Bureau of Waste Site Cleanup (DEP-BWSC), regulates cleanup of hazardous materials. Material containing asbestos must be reported if released to the environment or if it poses a threat of release, Regulations: 310 CMR 40.0000.
		- The Massachusetts Department of Public Health’s (DPH) State Sanitary code requires that property owners must maintain asbestos in good repair. Any repair and removal of asbestos must be done in accordance with all DEP and DPH asbestos regulations, Regulations: 105 CMR 410.353 (Sanitary Code) 105 CMR 670 (Community Right-to-Know).
		- Mass Department of Occupational Safety (DOS) prescribes training, certification and/or licensing requirements for persons and firms engaged in asbestos work, inspections, monitoring, laboratories and training providers. DOS also prescribes project notification and work practice requirements for asbestos work.

Local Regulation and Project Coordination

Westmass, along with its Licensed Abatement Contactor and Licensed Inspection / Testing Firm, will coordinate with the Ludlow Building Commissioner and the Ludlow Board of Health as applicable for this cleanup. Westmass, and its contractors, will obtain required sign offs and will take all cautions practicable to prevent any condition that may affect the health or safety of the public or occupants of Ludlow Mills.

Other applicable regulations include Federal, state, and local laws regarding procurement of contractors conducting the cleanup will be followed. In addition, all appropriate permits will be acquired prior to the work commencing such as Dig Safe, Transport and other Asbestos MADEP Asbestos Abatement Notification filings.

# EVALUATION OF CLEANUP ALTERNATIVES

* 1. **Cleanup Alternatives Considered**

To address contamination at the Site, three different alternatives were considered as follows:

* + - Alternative #1: No Action,
		- Alternative #2: Repair, Encapsulation and Ongoing Maintenance, and
		- Alternative #3: Removal and Offsite Disposal.

#  Effectiveness, Implementability & Cost of Cleanup Alternatives

**Effectiveness**

Alternative #1: No Action: This Alternative is not an effective option in controlling or preventing the exposure of persons or the environment to contamination at the site. No Action is included in this evaluation in order to compare and contrast any significant reduction in site risk to other remedial actions to.

The No Action Alternative would severely restrict the ability of Westmass to move forward with the adaptive reuse of some mill buildings as well the demolition of buildings impeding other significant redevelopment projects. As outlined previously there has been significant investment to date from both public and private funding for the Ludlow Mills project which would be significantly impacted and stranded.

The No Action Alternative does not meet the goal of the redevelopment of the Ludlow Mills because adaptive reuse of the buildings or removal of unusable or unstable buildings cannot occur unless the asbestos is removed.

Alternative #2: Repair, Encapsulation, Operation and Maintenance (O&M): Repair and encapsulation could be an effective way to prevent persons from coming into direct contact with asbestos in the Mill Area if the encapsulation is maintained. However, encapsulation is not an effective means to control other exposures, such as direct contact risks for occupants of the site over time as well as workers performing the adaptive reuse work planned to revitalize Ludlow Mills. Repair and encapsulation limits the reuse options to those without occupied space such as storage and is not a viable option when demolition of the building is necessary.

Asbestos encapsulation is the process of using a product that either coats or creates a membrane to prevent the asbestos fibers from getting into the air or penetrates the asbestos containing material binding the components together. Asbestos encapsulation can also be done by sealing off any areas containing asbestos with an air proof barrier. In some cases asbestos encapsulation can be used in order to avoid the high cost of asbestos removal. Asbestos encapsulation is a cheaper option, and is safe as long as the area does not need to be disturbed.

During repair and encapsulation the Abatement contractor will isolate the portion of the building where repair and encapsulation is taking place most likely with sheets of plastic, and provide self-contained showers and throwaway protective suits to prevent contamination of the workers. All tools and materials used must be sufficiently cleaned and all waste containing asbestos generated by the project such the protective suits will be bagged in plastic, and properly disposed of.

The Environmental Protection Agency does not recommend asbestos encapsulation where the asbestos is more than one inch thick, water damaged, has poor cohesive strength or where the asbestos is accessible to the people who are using the building. In these instances it is better to remove the asbestos to minimize the risk to the occupants of the building.

Alternative #2 would severely restrict the ability of Westmass to move forward with the redevelopment of Ludlow Mills and specifically the demolition of stockhouses that are unsafe or unstable.

Alternative #3: Removal and Offsite Disposal: Removal and offsite disposal is the most effective way to eliminate risk to humans and the environment at the site, since ACM contamination will be removed and the exposure pathways will no longer exist. All asbestos-containing materials are totally removed from the roofs and interior spaces of the Mill buildings in question which will facilitate redevelopment activities. No further monitoring or maintenance of the asbestos-containing materials is needed.

The Abatement contractor will isolate and remove the portion of the buildings where the asbestos removal is taking place with sheets of plastic, and provide self-contained showers and throwaway protective suits to prevent contamination of the workers. All asbestos- containing materials will be bagged in plastic, and proper disposal arranged.

An important aspect of asbestos-removal is air quality monitoring by an inspector who will be at the site throughout the abatement work. The selected firm monitoring the project will be completely independent from the contractor performing the work to provide oversight. This independent firm will set up an air monitoring station to ensure that the concentrations of asbestos fibers both inside and outside the work area do not increase beyond standards required by MA DEP.

The Environmental Protection Agency recommends asbestos removal as the best method to minimize the risk to workers or the occupants of the building the public and visitors to the Ludlow Mills complex.

**Implementability**

Alternative #1: No Action: No Action is a simple alternative to implement since no actions need to be undertaken by the owner.

Alternative #2: Repair, Encapsulation, Operation and Maintenance (O&M): These actions require significant effort and expense to implement given the extent of asbestos contamination on many of the stockhouse roofs. Repair and encapsulation will require access to all outside and confined spaces that were identified to have asbestos contamination. Testing will be required when the work is being performed. In addition, this alternative may require the long term installation and monitoring of air quality monitoring stations. Because the site is active with diverse tenants and leasing space and adaptive reuse being planned for the structures’ throughout the mills, ongoing air sampling equipment, monitoring and maintenance of the encapsulation would require periodic testing and reporting. Because of these reasons this alternative is considered very difficult to implement over the long term.

Alternative #3: Removal and Offsite Disposal: Removal and offsite disposal is moderately difficult to implement. Coordination and testing will be required during cleanup activities (e.g., site control and air handling enclosures, dust suppression and monitoring). A minor increase in traffic will result from additional trucks transporting materials offsite. Testing will be required when the abatement work is being performed however long term monitoring and maintenance will not be required after offsite disposal. By taking advantage of the asbestos removal, alternative the hazardous materials can be removed intact, placed in bags, sealed, transported and disposed of offsite. An opportunity currently exists with many of the stockhouses as they are currently unoccupied so the remediation work can be performed efficiently.

One significant advantage of the Ludlow Mills Asbestos Removal and Offsite Disposal Alternative for the stockhouses is that they are separate structures which can be abated and demolished in a controlled operation. The result of the cleanup and potential demolition would be advantageous to the overall Ludlow Mills Preservation and Redevelopment project and consistent with the approved Ludlow Mills Master Plan, approved Local Comprehensive Plan and Massachusetts Environmental Policy Act (MEPA) permitting.

**Cost**

Alternative #1: No Action: No direct costs are associated with the “No Action” alternative.

Alternative #2: Repair, Encapsulation, Operation and Maintenance (O&M): Direct costs would be incurred from relocation of business or uses of the buildings being remediated. No new use is projected for these buildings if the asbestos was abated via encapsulation in Alternative #2. An extensive Operation and Maintenance Plan and associated costs will be required. Major private investment and public funding for adaptive reuse and redevelopment which are enabling other Mill buildings to be revitalized would not leveraged if the asbestos contamination remains in place. In addition, asbestos encapsulation typically just defers the time when the asbestos will need to be removed. All future renovations to an area which has asbestos encapsulation will require the removal of the asbestos, adding that cost to the planned renovation.

Alternative #3: Removal and Offsite Disposal: The estimated cost is approximately $365,000 for remediation and removal of the ACM in stockhouse roofs, interior floor tiles and window glazing. Some costs may be offset by salvaged materials and recycling.

#  Recommended Cleanup Alternative

The recommended cleanup alternative is **Alternative #3: Removal with Offsite Disposal.**

Alternative#1: No Action

The No Action alternative cannot be recommended since it does not effectively address public health risks posed by the Hazardous Materials when the site is redeveloped. In addition, this alternative does not allow the achievement of the project goal of reuse, redevelopment and job creation. Extensive redevelopment of the historic mill and the adaptive reuse of several historic buildings could not occur.

Alternative #2: Encapsulation, Repair and Maintenance

The encapsulation, repair and maintenance alternative cannot be recommended since it does not address site risks posed by the hazardous materials. Although Alternative #2 is less expensive than removal and offsite disposal, it would require ongoing costs potentially including air monitoring and maintenance. Using asbestos encapsulation also only defers the time when the asbestos will need to be removed. Any proposed renovations for adaptive reuse and redevelopment to buildings or areas containing asbestos after encapsulation will require the removal of the asbestos, adding to the cost of renovation for the adaptive reuse or demolition planned. This makes Alterative #2 more difficult to implement than Alternative #3. In addition, this alternative does not enable the achievement of the project goals.

Alternative #3: Removal and Remediation with Offsite Disposal

This Alternative would achieve a permanent solution of preventing exposure by removing contamination at the site. Removal of the asbestos from the roofs, window glazing and floor tiles will enable the demolition and/or adaptive reuse redevelopment program at the Mills to proceed. Costs of ACM removal will not be included piece meal as buildings are rehabilitated and there may be cost savings from bidding a larger project. Removal will also accelerate the overall project timeline by making other nearby buildings readily available. In addition, an opportunity currently exists with the abandonment and demolition to efficiently remove whole sections of asbestos roofing, quickly bag these items and remove them for proper disposal. Finally, the removal and remediation with offsite disposal of asbestos and demolition of the resulting unsafe structures is an eligible cleanup cost under the EPA grant. This is not the case with the funds received for the other environmental remediation work at Ludlow Mills from the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), so this grant funding is critical to the ongoing remediation and redevelopment of the site.

Alternative #3 protects public health to the greatest extent and has the benefit of achieving the desired results for the long term benefits of the project. For these reasons, Westmass has selected **Alternative #3: Removal and Remediation with Offsite Disposa**l and complete cleanup as the preferred Alternative and will be submitting this Alternative as a Grant Application to the FY 2021 US EPA Brownfield Cleanup program.

# Sources:

***Asbestos and Hazardous Materials Assessment Report: Building #44 and Select Stockhouses***, O’Reilly, Talbot & Okun, Inc. August 2020. Prepared for Westmass.

***Targeted Brownfields Assessment Report***, Nobis Engineering, Inc. June 2018. Prepared for EPA Region 1.

Compass