Brownfield Program Response Action Plans

Redevelopment or reuse of a brownfield site may require cleanup or risk management to avoid exposing the public and/or the environment to contamination. Site redevelopment may also require special handling of impacted soil or groundwater that may be encountered or disturbed during excavation activities. Improper management of contaminated media can expose a developer or landowner to environmental liability and administrative penalties or fines. To safely redevelop or reuse a brownfield site, and to avoid incurring liability for contamination, a developer or landowner can request Minnesota Pollution Control Agency (MPCA) Brownfield Program review and approval of a Response Action Plan (RAP) and/or Construction Contingency Plan (CCP).

The intended audience of this guidance document is environmental professionals who are preparing a RAP or CCP for Brownfield Program review. It provides an overview of the expected contents of a RAP/CCP and offers information to facilitate MPCA review.

1. Overview

A RAP/CCP covers the range of planned or potential response actions that may be necessary at a brownfield site. A RAP includes detailed planned actions to remediate and/or manage contaminated media known to be present based on sampling data and field observations, while a CCP is prepared to manage unanticipated environmental issues that may be discovered during site redevelopment. A CCP may be a stand-alone document, or it may be a component of a RAP.

Successful implementation of an MPCA-approved RAP or CCP, and subsequent submittal of an implementation report, may lead to an implementation report approval letter, which provides confirmation that the reported cleanup and/or management of contaminated media was conducted in accordance with the approved RAP or CCP. The Brownfield Program also offers various assurance letters that provide environmental closure for the identified contamination. Refer to the Brownfield Program Services guidance document for a description of available letters.

Response actions and/or other site improvements related to redevelopment of a property are not eligible for Petrofund reimbursement. For Brownfield Program sites with comingled contaminants regulated by the Minnesota Department of Agriculture (MDA), response actions should also comply with applicable MDA guidance documents.

2. Site investigation

Before MPCA Brownfield Program staff will review a RAP, the extent and magnitude of contamination must be defined and described in the supporting Phase II Environmental Site Assessment report(s) or equivalent site investigation report(s). See related guidance on the MPCA's Brownfield Redevelopment and Remediation guidance and resources webpages. Guidance specific to investigating petroleum-impacted sites can be found on the MPCA's Petroleum Cleanup Guidance webpage. The MPCA's review of the site investigation report(s) may lead to comments or identify gaps in information that must be addressed before the MPCA can approve the RAP.

If the Petroleum Brownfield Program has been asked to provide closure for an active leak site to facilitate brownfield redevelopment, the petroleum investigation results must be presented using the Petroleum Remediation Program's Excavation and/or Investigation Report Forms.

To determine if response actions are necessary, a risk evaluation must be completed to define any risks to human health and the environment posed by the contamination. The risk evaluation must consider both current receptors as well as risk exposure pathways that will be created by the planned property use. For a site enrolled in the MPCA's Brownfield Program, the risk evaluation is included in the site investigation report(s) through an evaluation of all data collected at the site with respect to relevant risk-based criteria. The risk evaluation should also be

included in the RAP, to provide context for the proposed response actions. See Section 4 for guidance on performing a risk evaluation.

3. Review and approval of response action plans

The Brownfield Program encourages submittal of a RAP and/or CCP for staff review and approval, as this provides a voluntary party with a clear path forward and a record that the MPCA agrees that the proposed response actions are appropriate. Not obtaining MPCA approval of the RAP/CCP prior to implementation runs the risk of jeopardizing eligibility for a final closure letter if a response action deemed necessary by the MPCA was omitted or failed to achieve acceptable cleanup goals. Note that when sub-slab soil vapor concentrations below an occupied building exceed the MPCA's expedited vapor mitigation action level, the Brownfield Program encourages prompt installation of the vapor mitigation system in accordance with the MPCA's vapor mitigation best management practices, in lieu of waiting for Brownfield Program staff to review and approve a vapor mitigation RAP.

Brownfield Program staff will generally review a RAP/CCP and provide a response (approval, request for additional information, or rejection of the document) within 45 business days; however, if implementation of the RAP will not occur for many months (e.g., the next field season), staff triage may result in a delayed RAP review in favor of meeting shorter-term deadlines. It is important to clearly communicate the redevelopment schedule and any pressing deadlines for RAP review and approval to the assigned staff. A voluntary party seeking RAP approval in support of a contamination cleanup grant application must submit a complete RAP to the MPCA at least 60 business days before the grant application due date. Late RAPs will not be treated as a priority and are not guaranteed a review before the grant application deadline or other site-specific deadlines.

Brownfield Program staff will not review a RAP or CCP when implementation of the response actions has already begun. However, lack of an MPCA-approved RAP or CCP does not preclude issuance of a No Further Action letter or Vapor Mitigation Completion Letter, as appropriate for the site, upon completion of a project. The decision to issue one of these closure letters is based on clear documentation that environmental risk at the site has been managed and that appropriate cleanup/performance goals have been met.

Per Minn. Stat. § 115B.175, subd. 4, non-responsible parties conducting response actions for a release of hazardous substances in accordance with an MPCA-approved RAP do not associate themselves with the release as a result of performance of those response actions. Minn. Stat. § 115B.03, subd. 10 provides similar liability protection to contractors for conducting response actions or site development activities, provided that the contractor performs those actions in accordance with an MPCA-approved plan. If liability protection under these statutes is desired, the RAP/CCP must be approved by the MPCA before implementing response actions or beginning construction/redevelopment work at the property.

4. Risk evaluation

The need for response actions at a brownfield site will depend on the concentration of contaminants relative to risk-based screening values, the depth and extent of contamination, the planned property use, the specific redevelopment plan, and current/potential exposure pathways. Because every brownfield site reflects a unique combination of hydrogeologic conditions, environmental contamination, and potential exposure pathways, the information presented below should be considered general guidance. It is through risk evaluation that the site-specific circumstances are weighed, and a reasoned course of action chosen. Note that exceedance of a risk-based screening value does not necessarily mean that a risk-based response action is necessary. An exceedance may indicate the need for additional data to define the magnitude and extent of contamination or additional information about the site-specific exposure pathways. The need for a risk-based response action depends on the collective body of information, the representativeness of the data, and a reasonable evaluation of risk exposure pathways. A voluntary party may choose to conduct response actions over and above those required by a risk-based approach, to avoid an institutional control requirement or based on other business decisions.

Each category of risk-based values described below has a specific application and is intended to be used as an integrated piece of the overall risk evaluation.

A. Soil-human health pathway

Soil reference values (SRVs) are a screening tool used to evaluate potential human health risk from exposure to hazardous substances in contaminated soil. They are derived using exposure assumptions based on specific land-use scenarios. The generic SRVs for *recreational/residential* use and *commercial/industrial* use, included in the SRV spreadsheet, are intended to be used as risk-based screening values. Exceedance of a generic SRV may indicate additional site investigation or information about site-specific exposure pathways is needed to determine if there is actual risk present.

A RAP/CCP submitted to the Brownfield Program often references the generic SRVs as a cleanup goal, for convenience, predictability, and in consideration of the site's redevelopment schedule. In some cases, it may be beneficial to derive site-specific cleanup values to use instead of the generic SRVs. See the SRV Technical Support Document for additional information.

Risk-based screening values for the soil-human health pathway:

- 100 mg/kg for DRO or GRO
- 10 ppm organic vapors (PID)
- SRVs for hazardous substances

For additional information about evaluating risk for the soil-human health pathway, see the following references on the MPCA's cleanup guidance webpage:

- SRV spreadsheet
- SRV Technical Support Document
- Risk Evaluation and site management decision at petroleum release sites

To determine the need for a response action to address the soil-human health pathway, the first step is to compare soil data to the MPCA's contaminant-specific risk-based screening criteria. For hazardous substances, SRVs for the appropriate land use are used to evaluate the soil-human health pathway. For petroleum impacted soil, a threshold value of 100 milligrams per kilogram (mg/kg) is used for diesel range organics (DRO) or gasoline range organics (GRO). A value of 10 parts per million (ppm), as measured by a photoionization detector (PID), is used to evaluate risk from the more volatile fraction of petroleum compounds. Note that SRVs and petroleum thresholds are not intended as required cleanup standards.

Common response actions to prevent exposure to contaminated soil at a brownfield site include excavation of contaminated soil to achieve appropriate cleanup goals and construction of caps or vertical buffers over residual contamination.

Debris material in the subsurface may present a physical hazard to site occupants, even in the absence of chemical contamination. Response actions should include creation of a debris-free vertical buffer in greenspace areas and below buildings/pavement. The thickness of the debris-free buffer will depend on the specific development plan but is typically four feet in greenspace areas and two feet below new pavement/buildings for multi-family residential, commercial, and industrial buildings.

The soil human health pathway also includes exposure to contaminated soil airborne particulates and vapors. A RAP should address dust control and air monitoring, as appropriate for the site, and propose control measures to mitigate impacts to construction workers and the community during excavation or other activities that could potentially generate airborne exposure health risks.

B. Soil leaching pathway

Volatile organic compounds (VOCs) and per- and polyfluoroalkyl substances (PFAS) pose the greatest risk to groundwater due to their mobility in the environment. Soil leaching values (SLVs) are a risk-based screening tool that can be used to evaluate *potential* risk to groundwater due to leaching of soil contaminants. They are used for certain leachable contaminants of concern at a site when groundwater data is not available. In many cases, determining whether the soil leaching pathway is a concern is best done through evaluation of groundwater data; this is always the case when a drinking water receptor is at potential risk.

Risk-based screening values for the soil leaching pathway:

- SLVs for certain hazardous substances

For additional information about SLVs and their proper application, see the following references on the MPCA's cleanup guidance webpage:

- SLV spreadsheet
- SLV guidance document

Screening SLVs are based on a set of default hydrogeologic parameters and provide a conservative estimate of the potential for groundwater contamination. Site-adjusted SLVs may be calculated for a more realistic estimation of risk associated with the soil leaching pathway. Proposed response actions based on site-adjusted SLVs must include a site-adjusted SLV calculation spreadsheet and supporting documentation for the chosen input parameters.

While SLVs to assess the soil-to-groundwater leaching pathway have been developed for various contaminants, SLVs are not being developed for PFAS. Given the low risk-based drinking water criteria established by the Minnesota Department of Health and the high mobility of PFAS in the environment, any detection of PFAS in soil is considered to pose a potential risk to groundwater. If a groundwater receptor is present at a brownfield site, the potential risk should be resolved by groundwater sampling for PFAS.

If soil impacted by VOCs is present at a brownfield site, the soil leaching pathway for VOCs is often more pertinent than the soil-human health pathway, due to the magnitude of difference between the SRV and the SLV for any given VOC. For example, the MPCA's current residential SRV for tetrachloroethylene (PCE) is 32 mg/kg, while the current SLV is 0.042 mg/kg. If a soil response action was designed solely to address an SRV exceedance, a significant source area may remain at the site, posing a risk to groundwater quality. If a brownfield site has soil impacted by VOCs, the risk evaluation should include the soil leaching pathway. If a No Further Action letter for VOCs in soil is desired, the RAP may need to propose a strategy to address potential source areas for groundwater contamination. In lieu of proposing a soil response action based on SLVs, a groundwater investigation can be conducted at the site to determine if groundwater contamination is present above drinking water criteria. Groundwater data from an appropriately designed investigation trumps SLVs when making risk-based decisions about the soil leaching pathway.

Under typical site conditions, the soil leaching pathway is less pertinent for polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals. While screening SLVs have been developed for PAHs, PCBs, and certain metals, they are less useful for evaluating the soil leaching pathway, as these types of contaminants don't readily leach from the soil. When these contaminants are found in groundwater, it is usually due to site-specific circumstances, such as, for example, direct discharge of coal tar waste to the land surface (PAHs), facilitated transport by a carrier fluid (PCBs), or mobilization due to acidic conditions or geochemical changes in the aquifer (metals). In contrast, these same contaminants, when present at typical concentrations in historical urban fill, do not generally pose a concern for the soil leaching pathway, even when the concentrations exceed the screening SLV. These general observations should be considered when evaluating the soil leaching pathway for these types of contaminants. For a typical brownfield site, a response action for soil impacted by PAHs, PCBs, and metals is generally driven by the soil-human health pathway (i.e., SRVs, not SLVs).

Common strategies to address the soil leaching pathway at brownfield sites include excavation of soil impacted by VOCs to the extent practical (considering how low the SLVs are) and strategies to reduce infiltration in affected areas, such as construction of a low permeability cap, paved surface, or building slab. Special attention must be paid to locations on a redevelopment site intended to manage stormwater through infiltration. Remediation of soil impacts to below applicable SLVs in the footprint of proposed stormwater management features may be necessary to mitigate the leaching risk to groundwater. For higher concentrations of VOCs in the vadose zone, in-situ remedial technologies can be evaluated, provided the soil conditions are appropriate.

C. Vapor intrusion pathway

If the site investigation identified VOCs in soil, groundwater, or soil vapor, the vapor intrusion pathway must be evaluated for current or planned structures at the site. The concentrations of VOCs in soil vapor should be compared to contaminant-specific intrusion screening values (ISVs) for the current or planned land use. If on-site concentrations are greater than the appropriate vapor mitigation action level, the RAP should propose a vapor mitigation strategy for the current or planned building. In some cases, remediation of the VOC source(s) may also be necessary.

Risk-based screening values for the vapor intrusion (VI) pathway:

- ISVs for VOCs
- 10% of LEL for methane

For additional information about evaluating the vapor intrusion pathway, see the following references:

- ISV spreadsheet
- ISV Technical Support Document
- Remediation Division Methane Guidance

If the site history identifies the potential for an anthropogenic source of methane, soil vapor samples should also be analyzed for methane. The Brownfield Program uses 10% of the lower explosive limit (LEL) as a vapor intrusion mitigation action level for methane. If soil vapor includes flammable or explosive compounds at concentrations of concern, the active vapor mitigation system must be designed to be intrinsically safe. See the *Remediation Division Methane Guidance* and the Brownfield Program's *Best Management Practices for Development on or Near Former Dumps* for additional information.

A typical risk evaluation of the vapor intrusion pathway presumes that two seasonal soil vapor sampling events were completed during the site investigation, in accordance with the MPCA's Vapor investigation and mitigation decision best management practices, and a vapor mitigation decision is based on that data. Occasionally, the site redevelopment schedule or other project considerations result in a different approach. A few examples are provided below, with cautionary notes when applicable. See the Brownfield Program Services guidance document for details regarding soil vapor sampling requirements for various assurance letters.

i. The MPCA may determine that no vapor mitigation system is required, based on the two seasonal soil vapor sampling events, but a developer may nevertheless choose to install an active vapor mitigation system in a site building. The MPCA considers this vapor mitigation system to be a proactive measure, not a required response action. No institutional control for the vapor mitigation system is required in this situation.

ii. In lieu of a second seasonal soil vapor sampling event to document that a vapor mitigation system is not needed, a RAP may propose installation of an *active* vapor mitigation system in the site building. An Environmental Covenant and Easement (ECE) is required in this situation to document the affirmative obligation to operate and maintain the vapor mitigation system.

iii. In lieu of a second seasonal soil vapor sampling event to document that a vapor mitigation system is not needed, a RAP may propose installation of a *passive* vapor mitigation system, with the option to convert to active, based on post-construction soil vapor sampling. The passive vapor mitigation system must be capped or plugged for a minimum of one month prior to conducting the post-construction soil vapor sampling. The RAP should include a detailed scope of work and schedule for post-construction soil vapor sampling. Please be aware that this approach may not be acceptable at a given site, for example, if the source of the soil vapor impacts is unknown, or if the source will still be present after site redevelopment. Given that post-construction soil vapor data may not be representative of long-term conditions, this approach is best suited to circumstances where the known source of vapor impacts will be removed during site redevelopment or response actions. If the post-construction soil vapor sampling indicates a change to active vapor mitigation is necessary, an ECE is required to document the affirmative obligation to operate and maintain the vapor mitigation system.

iv. When extensive knowledge of the site and/or site vicinity indicates an active vapor mitigation system is prudent, based on known VOC impacts to soil and/or groundwater, a RAP may propose installation of an active vapor mitigation system in the absence of soil vapor data. An ECE is required in this situation to document the affirmative obligation to operate and maintain the vapor mitigation system.

v. As per the MPCA's vapor intrusion guidance, when soil vapor data collected at a site may not necessarily be representative of long-term conditions, an active vapor mitigation system may be warranted even if two seasonal rounds of soil vapor sampling show VOC concentrations less than the typical vapor mitigation action level. Example scenarios include potentially unstable conditions associated with known groundwater and/or soil vapor plumes, the demonstrated need for vapor mitigation in surrounding buildings in an area with known regional soil vapor impacts, and planned transition from greenspace to a land surface "capped" by new building(s) and/or pavement. In site-specific circumstances, and in response to a voluntary party's request for liability protection and/or environmental closure for soil vapor impacts on a brownfield site, the Brownfield Program may require an active vapor mitigation system for a site building as a long-term protective measure, despite short-term seasonal soil vapor data not exceeding the typical vapor mitigation action level. An ECE is required in this situation to document the affirmative obligation to operate and maintain the vapor mitigation system.

The MPCA does not approve the proposed engineering design for a vapor mitigation system. The MPCA relies on post-installation measurement of pressure field extension (PFE) and confirmation sample results to document that the vapor mitigation system has achieved the performance criteria outlined in the MPCA's Vapor mitigation best management practices.

D. Groundwater pathway

Most brownfield redevelopment projects do not create pathways of exposure to contaminated groundwater, so groundwater response actions are not typically required for site redevelopment. However, it may be necessary to address contaminated groundwater if a voluntary party desires regulatory closure or certain liability assurances for the groundwater contamination. Actions in these cases could range from monitored natural attenuation to more active remedies designed to contain and treat a contaminant plume. If groundwater contamination poses a potential risk to a receptor, unrelated to the voluntary party's actions at the site, and the voluntary party does not wish to pursue regulatory closure for the groundwater contamination, Brownfield Program staff will refer the groundwater contamination to the appropriate MPCA regulatory program for further evaluation.

Risk-based screening values from the Minnesota Department of Health (MDH) for the groundwater pathway:

- Health risk limits (HRLs)
- Health-based values (HBVs)
- Risk assessment advice (RAA)

The above criteria can be found on the MDH's website:

- MDH Health-Based Water Guidance Table

If contaminated groundwater will or may be encountered during construction activities, such as dewatering, the RAP or CCP should reference the need to obtain a permit from the appropriate authority for the management and disposal of impacted groundwater. Similarly, precipitation or snowmelt may result in ponded water coming into contact with soil contamination. Appropriate discharge approvals and/or permits should also be obtained for excavation dewatering required as a result of precipitation or snowmelt. The Brownfield Program does not review or approve dewatering actions, including the testing, discharge and/or treatment of stormwater or groundwater generated during dewatering.

The Minnesota Department of Health (MDH) develops state guidance values for evaluating potential risk posed by consumption of contaminated groundwater. Refer to the MDH's Guidance Values and Standards for Contaminants in Drinking Water webpage for an overview of the different types of state guidance values and federal water quality standards used to evaluate risk to drinking water receptors.

5. Field screening

Field screening is typically completed during soil excavation to assess the level of contamination for stockpiling and/or disposal purposes. It can also help define the extent of a release during a remedial excavation and guide the efficient collection of soil confirmation samples. Field screening is a valuable tool but is not intended to replace sampling for laboratory analysis. It should not be the sole source of data to drive a mitigation decision or to document completion of a soil response action.

A photoionization detector (PID) is commonly used to detect organic vapors in soil samples collected from borings, test pits, remedial excavations, and stockpiles. During soil excavation, field screening measurements using a PID should be collected every 10 cubic yards. In some instances, an x-ray fluorescence (XRF) meter may be used to screen in-situ soil for lead or other metals, to assist with field decisions.

Field screening methods have limitations concerning the types of contaminants and range of concentrations they can detect. Refer to the MERLA Soil Investigation Guidance or the Petroleum Soil sample collection and analysis procedures guidance for descriptions of common field screening methods and their limitations. The RAP should describe the type of field screening methods to be used during RAP implementation and the related quality control procedures to ensure accurate, reliable field screening data.

6. Confirmation soil sampling

If a remedial excavation is conducted, confirmation soil samples from the excavation floor and sidewalls are collected to show that the cleanup goals have been met or to document contamination remaining in place beneath an appropriate vertical buffer. The RAP must describe the confirmation sampling strategy, including the number, location, and depth of samples and the proposed analytes. Tables 1 and 2 show the recommended number of base and sidewall confirmation samples, respectively, based on the area of the excavation floor and sidewalls.

Table 1. Excavation base confirmation sampling rates

Area of excavation base	Number of base confirmation samples
Less than 500 square feet	2
500 to 1,000 square feet	3
1,001 to 1,500 square feet	4
1,501 to 2,500 square feet	5
2,501 to 4,000 square feet	6
4,001 to 6,000 square feet	7
6,000 to 8,500 square feet	8
8,501 to 10,890 square feet (0.25 acre)	9
0.25 to 3.0 acres	1 sample every 15 to 30 feet
Greater than 3.0 acres	1 sample every 30 feet

Table 2. Excavation sidewall confirmation sampling rates

Area of sidewall	Number of sidewall confirmation samples
Less than 500 square feet	4
500 to 1,000 square feet	5
1,001 to 1,500 square feet	6
1,501 to 2,000 square feet	7
2,001 to 3,000 square feet	8
3,001 to 4,000 square feet	9
Greater than 4,000	1 sample every 45 lineal feet

7. Waste management and disposal

Environmental oversight by a qualified environmental professional is necessary during implementation of the RAP, to ensure that response actions are carried out as planned and to identify the need for contingency action if unexpected conditions are encountered. In some circumstances, contaminated or debris-impacted soil excavated during RAP implementation can be hauled directly to a permitted landfill for disposal. Other times, the excavated material may need to be stockpiled on site for characterization and/or treatment prior to landfill disposal. The chosen approach may depend on the availability of storage space at the site, the degree to which the material has already been characterized, or the need for soil treatment prior to landfill disposal.

When excavated material is temporarily stockpiled on site, the stockpiles should be placed on and securely covered by plastic sheeting or equivalent, to control dust and prevent contact with stormwater runoff. Excavated material with different contaminant characteristics should be stockpiled separately. For debris-impacted fill, the MPCA encourages removal of recyclable materials for recycling rather than landfill disposal. In addition, some inert solid wastes may be used as a substitution for an engineered product. Examples of reuse include uncontaminated recognizable concrete and brick when used as a substitute for conventional aggregate. Refer to the MPCA's Beneficial use of solid waste webpage for information and requirements.

Every permitted solid waste landfill in Minnesota has an Industrial Solid Waste Management Plan that has been approved by the MPCA's Solid Waste staff. A landfill's permit and its Industrial Solid Waste Management Plan establish its waste acceptance criteria. It is the responsibility of the property owner/remediation contractor to characterize excavated material and determine a suitable landfill for wastes generated during RAP implementation, and it is the responsibility of the chosen landfill to require and review sufficient information so it can make a waste acceptance decision that complies with its Solid Waste permit and Industrial Solid Waste Management Plan. Brownfield Program approval of a RAP does not provide approval for contaminated material to go to any particular landfill.

Hazardous waste generated during site cleanup or redevelopment:

When excavating contaminated soil, special management procedures are necessary if the contaminated soil is classified as hazardous. Contaminated soil is a hazardous waste if it is either **characteristically hazardous**, as defined in Minn. R. 7045.0131 or if it contains a **listed waste**, as defined by Minn. R. 7045.0135.

- Excavated material that is characteristically hazardous must be treated prior to disposal in an appropriate Subtitle D landfill, to render the material non-hazardous.
- If excavated material contains a listed hazardous waste, reach out to your VIC project manager to discuss a *Hazardous Waste Determination* for disposal purposes.

8. Buried asbestos containing materials

Asbestos is a fibrous, naturally occurring material commonly found in building materials and demolition debris. Asbestos is most commonly a risk to human health through airborne exposure of asbestos fibers and very rarely through asbestos fibers within drinking water. The best way to reduce exposure to asbestos fibers is to prevent them from becoming airborne by keeping asbestos-containing materials (ACM) intact and contained.

Buried demolition debris and many historical, unpermitted dumps include debris containing ACM. Samples of suspected ACM must be collected by an MDH-certified Asbestos Inspector and analyzed for the presence of asbestos fibers by polarized light microscopy (PLM). If asbestos is detected in debris samples, then proper management is required if those materials will be disturbed during construction or cleanup activities. The presence of buried ACM, whether friable (ACM that crumbles with hand pressure) or non-friable (asbestos fibers bound in a matrix), are treated the same because degradation and the crushing/abrading of non-friable ACM during demolition and excavation may make the ACM friable. When ACM is present at a site, the RAP must include information on removal or management of the material. Removal and excavation of ACM must meet the federal emission control requirements of Title 40 Code of Federal Regulations (C.F.R.) § 61.145 and the federal waste handling provisions of 40 C.F.R. § 61.150.

In general, if ACM needs to be excavated for site redevelopment, the MPCA Brownfield Program requires it to be removed and disposed of properly and not reburied. The Brownfield Program recommends complete removal and landfill disposal of all ACM at sites; however, if left in place, an engineering control and/or institutional control will be required. If ACM in soil will remain in place, an orange non-degrading or inert geotextile fabric (i.e., marker layer) is often placed at the upper limit of the ACM. A minimum vertical separation distance of four feet is required beneath greenspace and two feet beneath paved surfaces and building slabs.

Consolidation of buried debris may be appropriate; however, consolidation must take place within the existing footprint of the waste. The remedial work must be completed under the oversight of an MDH-licensed Asbestos Contractor. No placement of ACM is allowed within five feet of groundwater or near surface water.

9. Hazardous building materials

Brownfield redevelopment projects often include the demolition or renovation of existing buildings that may contain building materials contaminated with hazardous substances, such as PCBs, mercury, asbestos, and lead. Prior to demolition or renovation, a hazardous building materials survey is required. If ACM or other hazardous materials are identified, those materials must be removed by a licensed abatement company, in compliance with MDH and MPCA requirements, in order to prevent a release to the environment. Brownfield Program staff do not review or approve demolition plans or abatement plans. However, the RAP must state that any hazardous building materials will be abated prior to the start of renovation or demolition work and will comply with all state, federal, and local government requirements. For information about asbestos abatement, refer to the MPCA webpage Asbestos in demolition or renovations.

10. Soil reuse

Whether soil excavated during site redevelopment activities may be reused on- or off-site depends on the type and concentrations of contaminants, and the planned property use. Planned reuse of excavated soil must be described in the RAP/CCP. Table 3 summarizes options for soil reuse for sites enrolled in the MPCA's Brownfield Program. For details, refer to the MPCA's guidance documents linked below. In some circumstances, soil may need to be stockpiled and sampled prior to on-site or off-site reuse. See Table 4 for typical stockpile sampling rates.

Table 3. Potential reuse options for excavated soil

Contamination level	Potential reuse option	Criteria/additional information
Unregulated fill	Reuse on-site or off-site at discretion of source property owner and receiving property owner.	See BMP for the Off-Site Reuse of Unregulated Fill
Regulated fill	Reuse on-site in accordance with MPCA-approved RAP or off-site in accordance with regulated fill policy	See Off-site Use of Regulated Fill. If soil is impacted by VOCs and/or PID > 10 ppm, avoid reuse near building foundations or as backfill in utility trench.
Exceeds regulated fill criteria	On-site management in accordance with an MPCA-approved RAP	Excavated soil that contains a listed hazardous waste cannot be reused; it must be disposed of at an appropriate permitted landfill. Depending on site-specific circumstances, excavated soil that is characteristically hazardous may be managed on site with prior soil treatment.
Petroleum- impacted < 100 ppm (PID)	On-site landscape berm	Mix 50/50 with clean fill, with two-foot cover of unregulated fill and vegetative cover.
Petroleum- impacted < 200 ppm (PID)	Thin spread on-site under road or pavement.	Maximum thickness of four inches
Petroleum- impacted > 200 ppm (PID)	None	Needs landfill disposal or treatment at MPCA-approved facility.

Table 4. Soil stockpile sampling rates

Volume of stockpile	Stockpile sampling rate
0 to 500 cubic yards	1 sample per 100 cubic yards
501 to 1,000 cubic yards	1 sample per 250 cubic yards
1,001 or more cubic yards	1 sample per 500 cubic yards

11. Stormwater management

Stormwater management at a brownfield site is regulated by the local permitting authority (municipality, watershed district or organizations, as applicable to where the site is located) and/or the MPCA (if over one-acre of disturbed land). If applicable, a Stormwater permit is issued by the MPCA's Municipal Division/Stormwater Section. Brownfield Program staff do not approve stormwater management plans. It is the responsibility of the permittee to ensure that the chosen stormwater management approach will comply with the terms of the applicable stormwater permit. See the Minnesota Stormwater Manual for helpful information.

Infiltration of stormwater can affect the soil leaching pathway and, in some cases, mobilize existing groundwater contamination. If stormwater infiltration is planned at a brownfield site, the location and design of the stormwater system should take into consideration the type and distribution of contaminants at the site.

The RAP should include stormwater design information, such as the type of stormwater management system planned for the site and its location relative to contaminated soil or groundwater. Although the Brownfield Program does not approve stormwater design plans, through RAP review, staff can provide guidance on best practices to avoid mobilizing contaminants and incurring liability. If infiltration is planned in an area of contaminated soil or groundwater, the following options are recommended:

- Remove impacted soil throughout the infiltration footprint.
- Move the stormwater feature to a different site location where mobilization of contaminants is not expected.
- Model the hydrologic system to demonstrate that infiltration of stormwater will not mobilize groundwater contamination.
- Consider a non-infiltration stormwater management system.

12. Institutional controls

Institutional controls are administrative or legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of a remedy. Institutional controls are implemented when contaminants remain at a property at levels that may pose a future risk to human health or the environment. An institutional control provides notice to future property owners regarding the environmental conditions that exist at the site. The institutional control may also restrict certain activities at the site, such as disturbing contaminated soil at depth or extracting groundwater, or it may require certain actions, such as maintaining clean soil buffers or ongoing operation of a vapor mitigation system. The types of institutional controls most commonly used by the Brownfield Program include an *Affidavit Concerning Real Property Contaminated with Hazardous Substances* and an *Environmental Covenant and Easement*.

For additional information about the use of institutional controls at brownfield sites, refer to the Institutional controls section of the MPCA's Remediation guidance and resources web page and the Remediation Division Institutional Control Guidance

Sometimes the need for an institutional control is not known until after response actions have been completed, when the post-cleanup condition of the site is fully known. In this situation, the need for an institutional control will be determined during MPCA review of the RAP implementation report. Other times, the need for an institutional control is known at the time of RAP development and should be specifically addressed in the RAP.

If an institutional control is required for a site, a draft must be submitted for MPCA review and approval, preferably at the same time as the RAP Implementation Report. A copy of the *recorded* institutional control must be submitted to the MPCA before the Brownfield Program will approve the RAP Implementation Report or issue final assurances for the site.

13. Components of a Response Action Plan

A RAP describes the actions a party intends to take to remediate and/or manage contamination at a brownfield site. A summary of the site history, environmental conditions, and the planned property use is required to present the context and rationale for the proposed response actions. **Appendix A** provides a menu of items that are common to many RAPs. When all items are relevant for a particular site are included in the RAP, it allows Brownfield Program staff to review the document in a more efficient and timely manner.

The general outline in Appendix A is not meant to be an inclusive checklist or required format. Other RAP elements not listed may be appropriate on a site-specific basis. Similarly, some listed items may not be pertinent for a particular brownfield site. The outline in Appendix A should be used as a reference when preparing a RAP. Contact Brownfield Program staff if in doubt about the applicability of any particular item. If pertinent items are missing from the RAP, staff will not be able to complete review of the document until such information is received. If pertinent information regarding planned response actions is not yet available, the response action is considered conceptual, and submittal of a RAP is premature. The Brownfield Program does not review or approve conceptual RAPs.

When preparing a RAP, the MPCA encourages incorporating features that support climate resiliency in the brownfield redevelopment plan and RAP. The United States Environmental Protection Agency (US EPA) has created the following resource to help create development plans that encompass climate resiliency and minimize climate impacts:

- Climate Smart Brownfields Manual (epa.gov)

Appendix A
Components of a Response Action Plan

Bookmark each section in the table of contents.
Bookmark the cover page for the figures, tables, and each appendix.
Confirm that the bookmarks work.

Introduction

- Site location and description
- MPCA site name and project number(s)
- Brief description of the proposed development
- Letters/assurances desired from the Brownfield Program
- Identification, project responsibilities, and contact information for contractors and MPCA staff

RAP scope and objectives

- Overview of RAP objectives
- Proposed cleanup goals

Summary of past investigations

Phase I Environmental Site Assessment

- Historical and current use of the site
- Recognized environmental conditions at the site
- Summary of historical investigations/response actions for the site
- Surrounding land use and off-site environmental issues that may affect the site

Phase II Investigation/Site Investigation

- Scope and results of all the investigation(s) that have been completed at the site

Site conceptual model

- Geology and hydrogeology
- Nature and extent of contamination (e.g., debris fill, impacted soil, other media as appropriate)

Risk evaluation

- Comparison of contaminants of concern to risk-based screening values
- Potential receptors and exposure pathways
- Identification of unacceptable risks for which response actions are proposed

Proposed response actions

Soil response actions

- Estimated total volume of soil to be excavated during site activities (remedial or otherwise)
- Proposed remedial soil excavations (contaminants of concern, location, size, depth, estimated volume)
- Environmental oversight and field screening procedures
- On-site soil management, including temporary contaminated stockpiling procedures
- Waste characterization procedures (sampling frequency, analytes, and methods, etc.)
- Soil stabilization or other on-site waste treatment procedures
- Disposition of excavated soil, including estimated volumes and criteria for on-site and off-site reuse, treatment and/or landfill disposal
- Identification of off-site treatment/disposal facilities (if known) for contaminated media
- Need for hazardous waste determination to support landfill disposal of soil
- Confirmation samples (number/frequency, parameters, analytical methods, sampling procedures, etc.)

- Minnesota Department of Health (MDH)-certified laboratory to be used for sample analysis

Engineering controls

- Proposed soil buffers in greenspace areas and below pavement/building (thickness, criteria)
- Use of pavement or building as a cap/cover
- Use of vapor barrier in utility trenches

Engineered remedial systems

- Description and proposed design of engineered remedial systems (e.g., soil vapor extraction, building vapor mitigation, groundwater containment/treatment, engineered soil cap, etc.). Brownfield program staff does not review/approve the full engineering design for a remedial system; however, enough information about the system must be provided in the RAP to allow an evaluation of the scope and effectiveness of the proposed system.
- Need for bench- or field-scale pilot testing of remedial system, air emissions testing, etc.
- Need for future submittal of Operation and Maintenance Plan

Short-term monitoring/temporary engineering controls

- Perimeter monitoring and nuisance management (e.g., dust, noise, odor)
- Need for stormwater controls, including Construction Site Stormwater Pollution Prevention Plan
- Site security
- Reference to Health and Safety Plan

Long-term monitoring/institutional controls

- Affidavit Concerning Real Property Contaminated with Hazardous Substances/Petroleum
- Environmental Covenant and Easement

Necessary permits, variances, access agreements

- Need for discharge permit for dewatering

Climate resiliency features

Anticipated project schedule

- Applicable cleanup grant application deadline(s)
- Implementation of response actions and construction activities
- Submittal of Response Action Implementation Report and draft institutional control

Construction contingency plan

- Types of unexpected environmental conditions that might be encountered (e.g., buried debris, suspected asbestos containing waste materials, contaminated media, stained soil, odors, underground storage tanks, barrels, unsealed wells, etc.)
- Actions to follow if unexpected conditions, wastes, or contaminated media are encountered
- Specialized personnel that may be required, such as a licensed asbestos inspector, licensed well contractor, etc.

Figures

Site figures may be combined, as appropriate, provided that the requested information is clearly conveyed.

- Site location map (USGS topographic map, 7.5-minute, 1:24,000-scale) showing the site boundary
- Map showing site/parcel boundaries and adjacent properties, with streets and land uses labeled
- Detailed site map showing site/parcel boundaries, existing structures and features, and current/historical potential sources of contamination
- Detailed site map, as above, showing location of all borings, test pits, wells, other sampling points
- Detailed site map(s), as above, showing sample results for contaminants of concern (by media)
- Geologic cross section(s) of property showing locations of borings, test pits/trenches, monitoring wells, and key site features, such as buildings, basements, utilities, etc.

- Potentiometric map(s) showing groundwater flow direction
- Site redevelopment plan showing proposed structures, utilities, stormwater management system, pavement, and greenspace areas
- Site redevelopment plan, as above, including sample results for contaminants of concern
- Site map(s) showing the proposed *location* and *depths* of remedial soil excavations and construction-related excavations relative to sample results for the contaminants of concern
- Supporting design for any engineered remedial system(s)
- Grading plan and/or cut-and-fill map. If contaminated soil is to be reused on site, indicate the proposed location and depth for soil placement, relative to planned structures, utilities, pavement, and greenspace

Tables

- Comprehensive summary of field observations and screening results (e.g., photoionization detector (PID), x-ray fluorescence (XRF) meter, soil staining, odor, debris, etc.)
- Comprehensive summary of analytical data, by media, compared to appropriate risk-based screening values. In top row(s), include sample identification number, date of sample collection, and sample depth. Highlight exceedances of risk-based values.
  - Soil data (typically milligrams per kilogram (mg/kg)). In top row, include other helpful context, such as whether the sample was collected from an interval that had staining/odor/debris, or whether it was fill versus native soil.
    - Compare diesel range organics (DRO)/gasoline range organics (GRO) results to a threshold value of 100 mg/kg.
    - Compare hazardous substances results to MPCA residential/recreational or commercial/industrial soil reference values (SRVs), as appropriate for current or planned site use.
    - For volatile organic compounds (VOCs), also compare data to MPCA soil leaching values (SLVs).
  - Groundwater data (micrograms per liter (µg/l)). Compare to MDH Health Risk Limits (HRLs) and other relevant drinking water criteria established by the MDH
  - Surface water data. Compare to applicable surface water standards
  - Soil vapor data (micrograms per cubic meter (µg/m3)), compared to MPCA intrusion screening values (ISVs), 33-times (33X) ISVs, and (if applicable) 33X expedited ISVs for the current and/or planned property use. If an adjacent property is occupied by a different type of receptor (e.g., residential or commercial/industrial), also include ISVs, 33X ISVs, and (if applicable) 33X expedited ISVs for that adjacent property use in the table.
  - Indoor air data (µg/m3). Compare to MPCA ISVs for the current or planned property use
- Comprehensive summary of static water level elevations from monitoring wells/piezometers
- Monitoring well construction information, with the well name, unique well numbers, date installed, total depth, casing/screen material, and elevation of ground surface, top of casing and screened interval

Appendices

- Applicable redevelopment plan sheets
- Soil boring/test pit/well construction logs from site investigations
- If RAP contains *new* investigation results, include laboratory analytical reports, including quality assurance/quality control (QA/QC) data and chromatograms
- Staff biographies/resumes