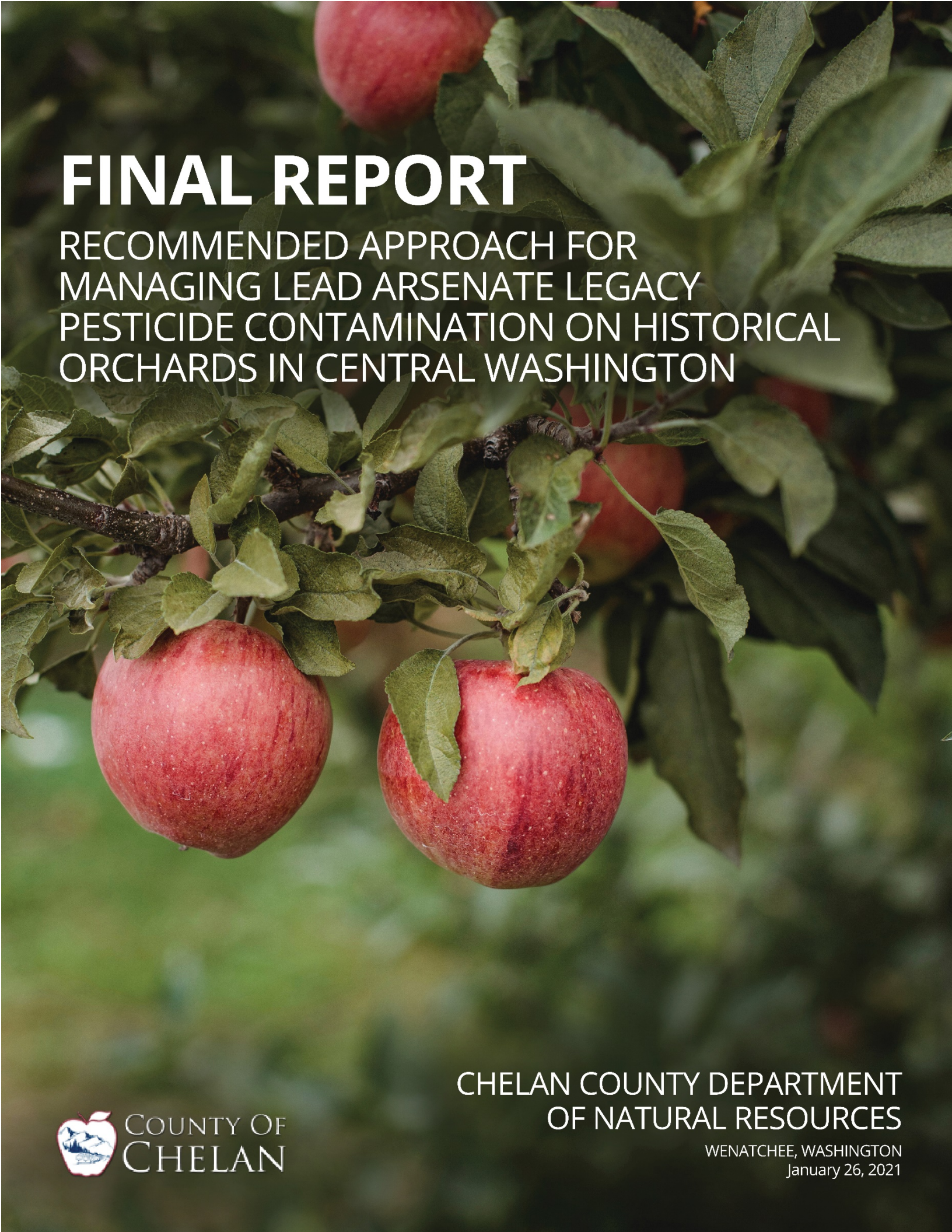

FINAL REPORT

RECOMMENDED APPROACH FOR MANAGING LEAD ARSENATE LEGACY PESTICIDE CONTAMINATION ON HISTORICAL ORCHARDS IN CENTRAL WASHINGTON

CHELAN COUNTY DEPARTMENT
OF NATURAL RESOURCES

WENATCHEE, WASHINGTON

January 26, 2021

COUNTY OF CHELAN

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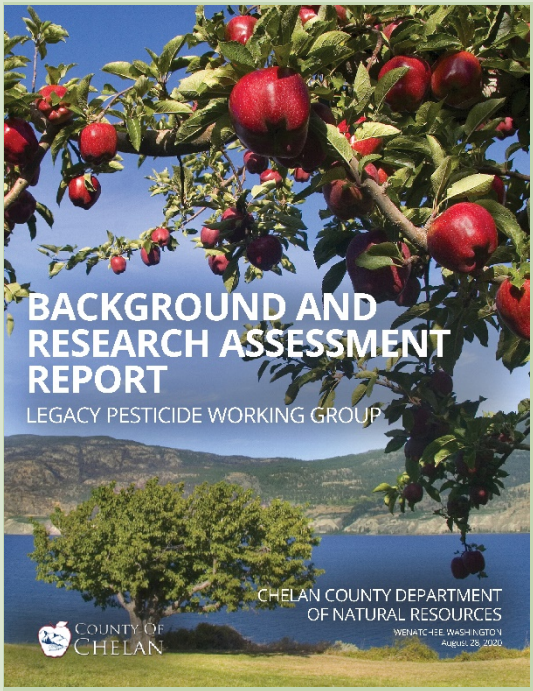
1 INTRODUCTION

Tree fruit orchards have been an important economic and cultural resource in Central Washington communities since the late 1800s. Population growth and increasing demand for housing have resulted in conversion of historical orchard sites to other, nonagricultural uses, including residential development. Historical application of lead arsenate (LA) pesticides on tree fruit orchards has resulted in the accumulation of lead and arsenic in shallow soil at concentrations above Washington State cleanup levels. These are levels that may be harmful to human health when properties are used for activities other than agricultural or industrial land uses. This report outlines a recommended approach for managing and mitigating LA pesticide soil contamination, as well as educating impacted people and communities about the issue. The recommendations are intended to be consistent with the Washington State Model Toxics Control Act (MTCA).

Background

Tree fruit orchards have been an important economic and cultural resource in Central Washington communities since the late 1800s. Until approximately 1950, agricultural activities at tree fruit orchards often included the use of LA pesticides to mitigate insect damage. In some cases, historical application of LA pesticides has resulted in shallow-soil concentrations of lead and arsenic that exceed Washington State cleanup levels. According to the Washington State Agricultural Census from 1947, compiled by the Washington State Department of Ecology (Ecology), nearly 188,000 acres of land in Washington have been historical orchard areas subject to application of LA pesticides, and are therefore considered potentially contaminated by lead and arsenic. Of those areas, approximately 115,000 acres of potentially impacted tree fruit orchard lands are located in Yakima, Chelan, Douglas, Okanogan, and Benton counties.



Over time growth in these counties has resulted in the transition of tree fruit orchards to nonagricultural uses (e.g., residential or commercial), increasing the potential for more frequent, direct exposure to soil that may have elevated concentrations of lead and arsenic that could adversely impact human health. In many cases, the concentration of lead and arsenic in the historical orchard soil exceeds the MTCA cleanup levels for these compounds. MTCA requires appropriate assessment, notification, and cleanup methods to ensure sufficient protection of potential, current, and future residents living in historical orchard areas where lead and arsenic may be present at levels of concern.

MTCA, the environmental cleanup law for Washington State, was created in 1989 by a vote of the people through a citizens' initiative process. MTCA is triggered when one or more hazardous substances are suspected or confirmed. Ecology is charged with implementing MTCA with rules establishing the process of investigation and cleanup. MTCA authorizes Ecology to require property owners to investigate and clean up toxic contamination.

As growth in historical orchards occurs, compliance with MTCA where LA pesticide contamination may be present is brought to the forefront. For commercial and industrial development, and as public schools and parks are constructed and/or redeveloped, MTCA compliance is routinely addressed through current rules and practices implemented by Ecology. Recently, significant questions, confusion and challenges associated with ensuring MTCA compliance during residential development has occurred, especially while projects make their way through the city/county permitting process. Understanding how and when MTCA compliance is triggered for residential development, and identifying who is responsible for meeting the investigation and cleanup requirements, has created several community concerns:

Health: Many are concerned with the increased health risks to people living in areas with LA pesticide contamination from historical orchard practices, particularly if they are unaware of the contamination.

Costs: There are increased costs associated with addressing LA pesticide contamination that could deter new residential development in areas already experiencing a shortage of housing supply. Where an inadequate supply and mix of housing types exists, the affordability of what does exist in the market is negatively affected, often across a variety of income sectors.

Notification, Education and Outreach: The current confusion about the LA pesticide contamination issue has created a demand for significant education and outreach efforts geared toward reaching a wide variety of stakeholders. Areas of concern include ensuring all who may be affected (e.g., residents, local governments, developers) are aware of the issue; understanding who may be liable for historic LA pesticide contamination and required cleanup activities; creating consistent messaging and guidance related to compliance with MTCA; and making sure updated, accurate data is used to create easy to find mapping resources identifying areas that may be affected by historic LA pesticide applications.

Process

To address the issue of LA pesticide contamination on historical orchard areas, Ecology established the Legacy Pesticide Working Group (LPWG) in December 2019, which included a diverse group of stakeholders representing private and public interests throughout Central Washington. As described on Ecology's website for this effort, the purpose of the LPWG was "*to address the complex issues surrounding lead and arsenic contamination on former orchard lands.*"

The primary objectives for the working group were:

- Creating a process for evaluation of all properties.
- Notifying buyers and current homeowners concerning the specifics of LA pesticide contamination on their properties.
- Identifying actions that meet Ecology's cleanup regulations.
- Creating a broad-based strategy for educating the public about managing the risk from LA pesticide contamination.

This final report has been prepared in support of the LPWG's efforts and outlines a final recommended process to achieve these primary objectives. Ecology plans to continue to work with members of the LPWG and others to implement the activities discussed in this plan.

QUICK REFERENCE GUIDE

I want to...	Relevant Report Sections
Understand the issue of LA pesticide contamination	Find information in the introduction of this report and online at https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-sites/Former-orchard-lands
Find out if a property has LA pesticide contamination	Check your property address using the interactive webpage at (TBD)
Understand options to manage LA pesticide contamination	Review Figure 3-3 Cleanup Technology Comparison and page 11 for Best Management Practices
Understand my responsibilities for cleanup	Review Figure 3-2 Property Sampling Decision Tree
Understand my role in the permitting, land development and transaction process	Review Chapters 2 and 3
Understand what Ecology has planned for community outreach	Review Chapter 5 of this report
Understand the health risk associated with LA pesticide contamination	Review Chapter 2 of the Background Report developed in August 2020
Understand the relevant federal and state regulations regarding LA pesticide contamination	Review Chapter 3 of the Background Report developed in August 2020
Understand how soil sampling works and what I can do about it	Review Chapter 4 of the Background Report developed in August 2020
Review what other agencies have done about similar contamination issues	Review Chapter 5 of the Background Report developed in August 2020

2 AFFECTED DEVELOPMENT PROJECTS

This chapter provides typical scenarios for development projects that can take place in historical orchard areas in Central Washington. Scenarios show similarities across jurisdictions and decision points in permit review processes that will allow for consistent cleanup of LA pesticide. Local planners and developers were interviewed to provide background for costs, permitting, and cleanup strategies that comply with MTCA.

Introduction

Generally, there are two situations - 1) existing developed properties and 2) proposed new development projects - where addressing the issue of lead and arsenic contamination from historical orchard practices will be required.

Existing single-family homes, apartment buildings, and school and park areas built in historical orchard areas are examples of developed properties that may have lead and arsenic contamination in shallow soils. Many existing schools and parks in Central Washington have already completed, or will implement, soil cleanup projects, often through available funding programs sponsored by Ecology.

Current residents living in historical orchard areas are a primary target of the public education and outreach strategy being developed through this effort (see Chapter 5). This strategy will provide detailed information to existing residents on ways to lower the risk of impacts from any lead and arsenic contamination that may exist. It will also identify Ecology resources residents can use to help them test the soil to know for sure whether or not contamination exists on their property, and how to clean it up, if they choose to do so.

New commercial, industrial and school and park development on historical orchard areas will continue to follow the current cleanup processes available in MTCA. New residential development on historical orchards, including single family home construction, multifamily development projects and residential subdivisions, are the primary subject of the alternative MTCA compliance approach described in Chapter 3 of this report.

To better understand how to reduce uncertainty and confusion related to MTCA compliance on new residential development, this chapter first seeks to summarize typical residential development projects and permitting processes, focusing on residential subdivisions, single family home construction, and multifamily development projects. As a starting point, a series of interviews with both developers and local government planning staff were conducted, and insights from these interviews are integrated throughout this chapter. A comparison table of the interviewed local jurisdictions' development permit review processes is available in Appendix A. In addition to conducting the interviews, several recently completed and proposed development projects were reviewed to determine the typical scale and type of residential development occurring in the region.

Commonly Affected Development Projects

Four scenarios were examined based on residential development types that are common in Central Washington and that may be impacted by LA pesticide contamination: large subdivisions, small subdivisions, new multifamily developments, and new single-family home construction. Table 2-1 below outlines the identified typical development scenarios.

Table 2-1. Typical Development Projects and SEPA Requirements

Project type	Lot Size (acres)	Individual Lot Size after Subdivision	Number of Lots/Units	Typical Housing Unit Size	Subject to SEPA Review?
Large subdivisions	30	0.3	100	2,200 square feet 3 bedrooms	Yes
Small subdivisions	2.4	0.3	8	2,200 square feet 3 bedrooms	No
New multifamily development	2		100	800 square feet Studio 2 bedrooms	Dependent on jurisdiction and number of units
New single-family home construction	0.3		1	2,200 square feet 3 bedrooms	No

Development Process

An overview of a typical development project planning and permitting process, from initial due diligence to issuance of occupancy permits, is described below, based on conversations with both developers and local planning staff. In addition to the due diligence conducted by the developer prior to beginning a project, there are two basic permitting processes addressed: the subdivision of a larger parcel into smaller lots for individual sale or lease, and construction of a residential structure.

For simplicity, this report describes projects where a single developer is responsible for not only creating the subdivision, but also constructing all of the housing units within it. However, it is common for one developer to acquire and subdivide property, and then to sell individual lots to different contractors/builders that continue with the individual construction process, eventually selling homes to a new homeowner or leasing apartments to residents. Regardless of who is involved in the different processes, the basic permit and review requirements remain the same.

Due Diligence

Each type of residential development begins with a developer identifying a suitable property for their project idea. In this early phase of the project, the developer conducts due diligence to determine if it is feasible, given any constraints on the site including zoning or site features such as size, slopes, or the potential presence of LA pesticide contamination. The developer also creates an estimate of the number of housing units that can fit on the site, the cost for site preparation and construction, and the potential return on investment once the units are sold or leased. If the developer believes the project is feasible, or that it "pencils," they typically work to control the site by either purchasing it or negotiating a purchase agreement that is dependent on completing further design and/or successful permitting processes.

PERMITTING PROCESSES

Most jurisdictions in Central Washington, except Okanogan County and its cities, implement their development permit review processes consistent with the requirements of Washington State's Local Project Review (Revised Code of Washington 36.70B). These processes typically include the following review steps.

Preapplication: Usually involves a meeting that is conducted before submittal of application materials. It often includes the project proponent and various departments from the jurisdiction responsible for authorizing permits, as well as other, outside agencies that may have permits or regulations applicable to a project proposal. This meeting allows the proponent to discuss their project and gather information about what may be required for their proposal, including whether additional studies may be required.

Application review: Once a project proponent decides to submit their application materials, the formal review process begins. Depending on the complexity of the proposal, and after the application is determined to be complete and ready for processing, there may be a comment period that the jurisdiction uses to collect information from internal departments, other agencies, and the public. For projects that require a State Environmental Policy Act (SEPA) review process, this comment period is also typically when comments are gathered following a Determination of Nonsignificance (DNS). The jurisdiction gathers all information and comments received, evaluates the proposal for compliance with applicable regulations, and prepares either a decision document for those projects that do not require a public hearing, or a staff report that is intended to support the decisionmaker conducting the public hearing.

Public hearing, if required: The purpose of a public hearing is to allow another opportunity for review of the proposal, and for interested parties, including the general public, to provide comments about the development project before a final decision is made. The decisionmaker considers the staff report, as well as the testimony provided by interested parties at the public hearing and develops a final decision.

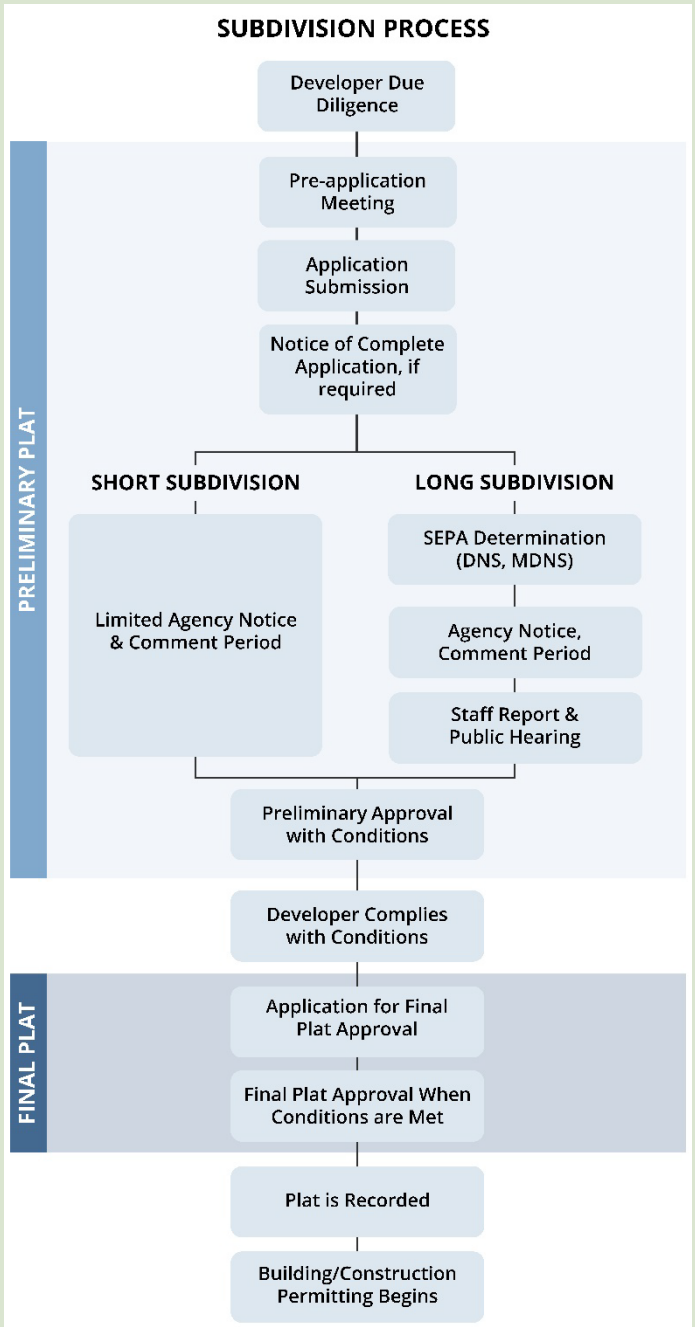
Decision: For a significant number of development permit proposals, the final approval decision will include conditions with which the project proponent must comply. For example, subdivision proposals will typically require development of on-site infrastructure and utilities (roads, stormwater facilities, water, sewer, power, and telecommunications), and in some cases additional, off-site improvements may be required. For other types of land use permits, conditions of approval may obligate the project proponent to change different aspects of their project or require them to conduct their activities in a certain manner to reduce potentially negative impacts to surrounding properties.

Residential Subdivisions

If a developer wants to divide a large parcel into additional, smaller lots to lease or sell, they are required to go through a subdivision process. There are two types of processes: short subdivisions and long subdivisions. Depending on the specific jurisdiction, subdivisions of up to four, or up to nine lots can go through a short subdivision process, which is typically exempt from SEPA review. Subdivisions creating five or ten lots or more go through a long subdivision process, including a required SEPA review. Both types of subdivision processes typically include the preapplication and application review steps described above, and successful applications result in a preliminary approval. The preliminary approval often includes a series of required conditions, including necessary site infrastructure improvements such as access roads and extension of utilities to serve the proposed new lots.

Following preliminary approval, the developer completes the required conditions including necessary survey work and construction of site improvements that define and create the new lots. Once the preliminary approval conditions have been completed, the developer can apply for final approval of the subdivision. The local government reviews the final plat application to ensure the conditions required in the preliminary approval have been satisfied and issues a final approval decision, which allows the new lots to be recorded as legal lots that can then be sold or leased individually. The timeline for this process varies greatly, depending on the size of the project, the completeness of application materials submitted by the developer, and how quickly the preliminary conditions of approval are satisfied. One local planning staff member estimated that a short subdivision can take between six and eight months, while long subdivisions take one and one-half to three years to complete. This process is displayed in Figure 2-1.

Figure 2-1. Subdivision Process

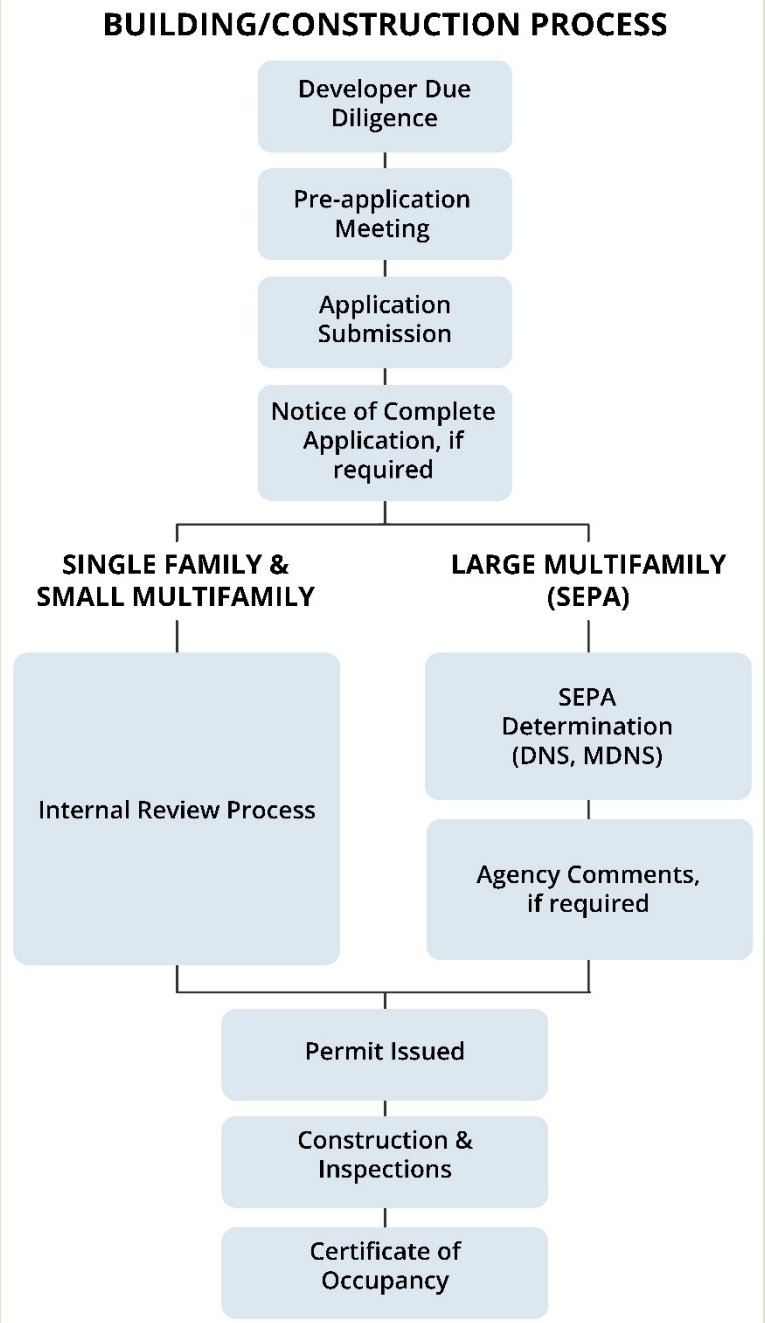


Building Construction

Once a subdivision of land is complete, permits for individual structures are required. For all residential structures, a building permit is required, and in some circumstances, some jurisdictions will require multifamily developments to apply for additional land use permits, such as a conditional use permit, prior to the building permit being issued. Multifamily projects may also be subject to a SEPA review, based on the number of units being proposed. Each city and county establishes how many units (based on a range established in the state law) will determine whether or not a SEPA review is required. These SEPA thresholds for multifamily projects range from four or more units in the City of East Wenatchee to 61 or more units in the City of Yakima. In other words, a 50-unit multifamily development project in East Wenatchee would be required to undergo SEPA review, but a similar project in Yakima would not.

Once the review of a completed application has been conducted, the jurisdiction issues a building permit. A building permit requires multiple inspections throughout the construction process to ensure compliance with building codes and development regulations. Once construction and the required inspections are complete, the jurisdiction issues a certificate of occupancy. The building permit process is displayed in Figure 2-2. This marks the end of the permit process and allows the lease or sale of the unit to the new residents.

Figure 2-2. Building/ Construction Process



Typical Costs

Developers interviewed for this report provided ballpark estimates of typical costs associated with residential development scenarios, including property acquisition, site preparation, and building construction in Yakima County and in the Chelan/Douglas Counties region. For purposes of this report, site preparation costs encompass all activities required to prepare the site for construction, including development of infrastructure, such as access roads and utilities, grading, off-site mitigation if needed, permitting, and holding costs while work is under way. The costs provided in Table 2-2 are average figures for both the Yakima and Chelan/Douglas regions developed from the estimates provided by developers.

Table 2-2. Typical Development Costs

Land Acquisition	
Land cost/acre	$80,000
Site Preparation	
Cost/10,000 Square Foot (SF) lot	$45,000
Single Family Home Construction	
Cost/SF	$150
Average SF/Unit	2,200
Construction Cost/Unit	$330,000
Multifamily Construction	
Cost per SF	$160
Average Unit SF	600
Construction Cost/unit	$500,000

3 RECOMMENDED APPROACH

Based on the findings outlined in Chapter 2, this Chapter outlines a recommended approach for a uniformly applied and streamlined process for cleanup and/or management of lead and arsenic contamination. The goal of this process is to integrate the assessment and cleanup requirements of MTCA with the residential development permit process to reduce confusion, increase predictability and awareness of the issue, and create a lower cost alternative for achieving documented compliance with MTCA.

Introduction

Based on research, review of applicable land use and environmental regulations, and on input from the LPWG and Ecology, this report outlines a recommended approach for managing potential LA pesticide contamination on historical orchard areas in Central Washington. The recommended approach seeks to integrate required components of MTCA related to investigating, cleaning up, and managing LA pesticide contamination with the process of permitting and constructing development projects. It is also intended to help control costs associated with LA pesticide cleanup actions thereby minimizing potential negative impacts on the housing supply and affordability within the Central Washington communities affected by this area-wide issue.

The recommended approach for managing potential LA pesticide contamination on historical orchard areas in Central Washington presented below includes four primary components:

Public education and outreach to people throughout Central Washington, including those who may be living in existing homes and apartments that may be located on historical orchard properties.

Development of a Model Remedy pursuant to MTCA, specifically for historical orchard areas in Central Washington, outlining pre-approved soil sampling and soil cleanup remedies that, if utilized in a development project, will result in Ecology certification that cleanup under MTCA has been satisfied.

Implementation of an integrated development permit review process that clearly outlines how and when the recommended Model Remedy components are considered during the local government land use and building permit processes for residential development projects, including single-family home construction, residential subdivisions, and multifamily developments[1].

Development of soil banks in different urban areas throughout Central Washington to either facilitate the availability of clean soil for cleanup technologies, provide approved locations for disposal of contaminated soil, establish facilities to treat and clean contaminated soil, or create facilities that provide a combination of these services based on the needs of the different communities.

Public Outreach and Education

Addressing the issue of potential LA pesticide contamination on properties that have already been developed will rely on a robust public education and outreach strategy. The use of lead arsenate as a pesticide was widespread in Central Washington, however, the risks associated with exposure to these contaminants can be significantly reduced if homeowners/residents implement appropriate best management practices (BMPs). It is important to ensure that residents have access to and knowledge of these practices, some of which are listed below. Chapter 5 of this report discusses in detail the public education and outreach strategy that has been developed to support this component of the recommended approach.

[1] Evaluation of commercial, industrial, public school and public park projects is anticipated to continue through the currently available administrative pathways identified in MTCA.

The following activities are ways residents can reduce or prevent exposure to LA pesticide residues in soil.

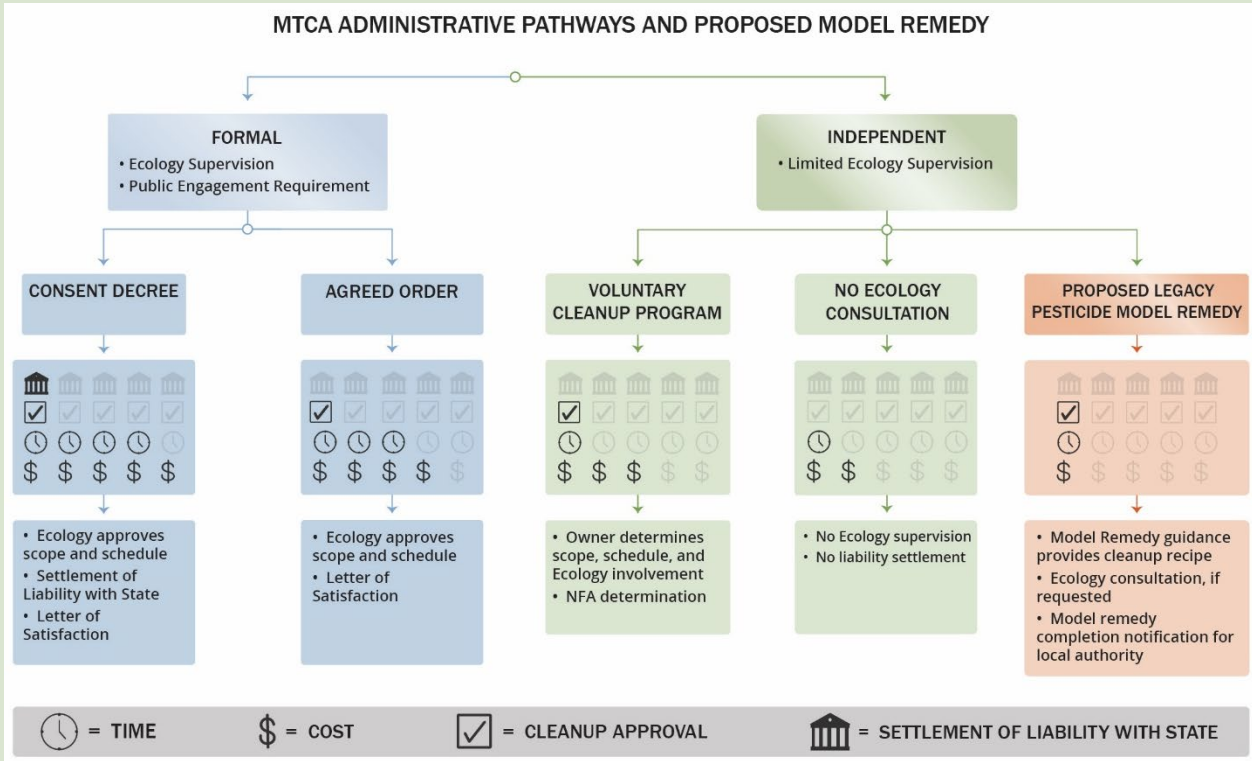
- Use raised beds with clean, imported soil for fruit and vegetable gardens.
- Ensure grass layer is kept up so no bare patches of soil are present
- Wash all fruits and vegetables before eating.
- Wash hands with soap after working or playing in the dirt.
- Remove shoes before entering your home.
- Wash children's toys and pacifiers frequently.
- Wear shoes and gloves when gardening and working outdoors.
- Wash dirt off pets frequently.
- Create children's play areas (for example, raised sandboxes or rubber mats below play areas).
- Vacuum and dust your home at least weekly.

Development of a Model Remedy

Ecology has several existing administrative pathways by which a contaminated site is evaluated and cleaned up under MTCA, as shown in Figure 3-1, below. Formal pathways typically years to complete and result in significant costs because they require extensive Ecology involvement, as well as consulting and attorney fees. Informal pathways are designed to be completed quickly and at a lower cost, but they do not all result in an Ecology certification that cleanup is complete.

For purposes of this study, it is anticipated the existing regulatory cleanup pathways will continue to address commercial and industrial projects, as well as public school and park facilities. As summarized below and described in Appendix B, a new model remedy to address LA pesticide contamination on historical orchards in Central Washington is being recommended for new residential development. The intent of the recommended model remedy is to provide specific guidance for soil sampling and quick, lower-cost clean up methods that can be incorporated into the process of developing new residential projects, resulting in an Ecology certification documenting compliance with MTCA has been achieved.

Figure 3-1. MTCA Administrative Pathways and Proposed Model Remedy



Where there are routine types of cleanup projects, with common features and lower risk to human health and the environment, MTCA allows for development of specific model remedies. MTCA defines model remedies as: "*a set of technologies, procedures, and monitoring protocols identified by Ecology for use in routine types of cleanup projects at facilities that have common features and lower risk to human health and the environment.*" Because potential contamination of shallow soils from LA pesticides on historical orchard properties is widespread and consistent, the recommended approach outlined in this study is based on Ecology developing and implementing a specific LA pesticide Model Remedy for historical orchard areas in Central Washington.

The recommended Model Remedy (detailed information is provided in Appendix B) is intended to accomplish the following:

- Creation of defined, Ecology-approved soil sampling and cleanup approaches that can be efficiently applied during development projects.
- Provision of a framework requiring minimal Ecology oversight, unless it is requested.
- Reducing delays associated with soil sampling, cleanup selection, and permitting for new residential development projects.
- Minimizing costs associated with MTCA compliance, especially those related to Ecology oversight, consultant fees and cleanup methods.

- Allowing for ongoing resident notification and awareness of not only the potential existence of LA pesticide contamination, but also of cleanup remedies and ways to help manage potential contamination.

Proposed Model Remedy Guidance

The following information summarizes the detailed recommendations in Appendix B regarding the technical content that should be included in the new Model Remedy. It is recommended that Ecology prepare a comprehensive document that summarizes the recommended approach and includes guidance on the following primary components:

- Investigation (soil sampling) process
- Cleanup process
- Potential permits
- Construction BMPs
- BMPs for existing developments
- Cleanup notification

The figures provided below are visual representations of several of these recommended Model Remedy components, and are intended to be used in summary, nontechnical guidance documents provided to applicants and project proponents. Ideally, the summary guidance documents will not only be provided on Ecology-sponsored media platforms but will also be extensively used by local governments as they interact with applicants, particularly early in the due diligence stage of a proposed project.

Figure 3-2 outlines the proposed framework for investigating whether LA pesticide contamination exists on a particular property and identifying the chemicals and their concentrations.

Figure 3-2. Property Sampling Decision Tree

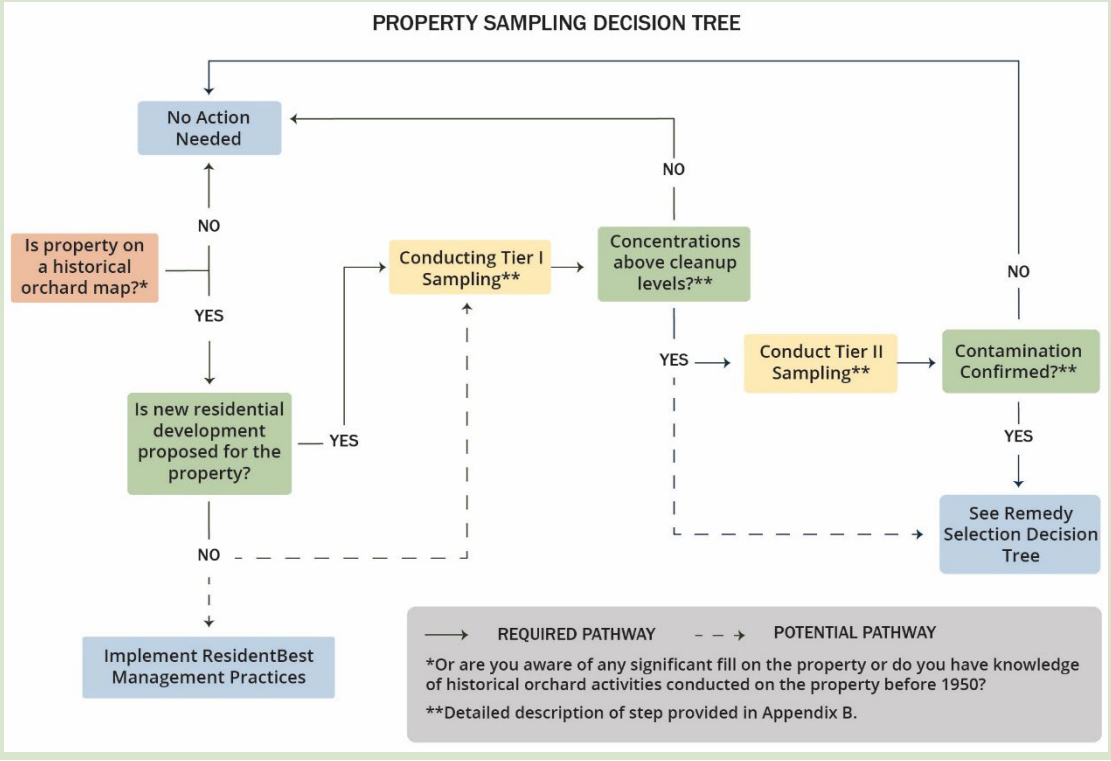


Figure 3-3 identifies and compares the various preapproved cleanup methods/technologies that can be selected for use on property with LA pesticide contamination

Figure 3-3. Cleanup Technology Comparison

CLEANUP TECHNOLOGY COMPARISON

CLEANUP TECHNOLOGY	REQUIREMENTS	TIER II SAMPLING?	CONFIRMATION SAMPLING?	REQUIRES DISPOSAL OF SOIL?	TCLP TESTING REQUIRED?	IMPORT SOIL FILL TESTING REQUIRED?	CC&Rs OR PLAT NOTES?	TIMING IMPLEMENTATION CONSIDERATIONS	POTENTIAL DEVELOPMENT IMPLEMENTATION SCENARIO	ADVANTAGES	DISADVANTAGES
SOFT CAPPING	At least 6 inches of soil or sod with demarcation fabric	✗	✗	✗	✗	✓	✓	Requires availability of clean fill	• Can support lawns, landscaping, open space	• Relatively consistent with typical development	• Requires availability of clean fill • Requires notification to future residents via CC&Rs or plat notes • Potential to erode over time
HARD CAPPING	At least 3 inches of impervious or semipervious material[1]	✗	✗	✗	✗	✗	✓	Can occur as part of routine development (sidewalks, roads, foundations)	• Sidewalks, roads, driveways, foundations	• Consistent with typical development	• Limited to specific areas (e.g., roads, foundations) • Requires notification to future residents via CC&Rs or plat notes
EXCAVATION	Typically requires removal of 2 to 3 feet of soil	✓	✓	✓	✓	✗	✗	If combined with soft or hard capping, confirmation sampling not required	• Grading for a development	• Relatively consistent with typical development when grading is needed • Would not require notification to future residents via CC&Rs or plat notes • Highly permanent remedy	• May require off-site disposal • Requires testing for off-site disposal to determine if soil is potentially hazardous
MIXING	Concentrations of lead and arsenic minimally exceed cleanup levels	✓	✓	✗	✗	✓	✗	Requires availability of clean fill	• Grading for a development	• Relatively consistent with typical development when grading is needed • Would not require notification to future residents via CC&Rs or plat notes	• Concentrations of lead and arsenic typically need to be below 483 and 33 mg/kg, respectively[2] • Requires availability of clean fill
CONSOLIDATION	Combined with excavating and capping (soft or hard)	✓	✓	✗	✗	✓	✓	Most likely will occur during development	• Reconfiguring topograhpy for a development (raising the grade) • Grading for a development	• Reduces the amount of material disposed of off site	• Implementation dependent on availability of area for containment • Requires notification to future residents via CC&Rs or plat notes

Notes:
[1]Compacted gravel of at least 6 inches with demarcation fabric would be considered a hard cap.
[2]Assumes that statewide background concentrations of lead and arsenic (17 and 7 mg/kg, respectively) will be present in imported fill, and mixing will occur at a 1:1 ratio.

✓ = Yes ✓ = Yes, under conditions ✗ = No

Figure 3-4 helps project proponents evaluate the available, preapproved cleanup methods, and to select the method that works best for their situation. This is one of the tools intended to reduce the need for direct Ecology evaluation and oversight on any specific project.

Figure 3-4. Remedy Selection Decision Tree

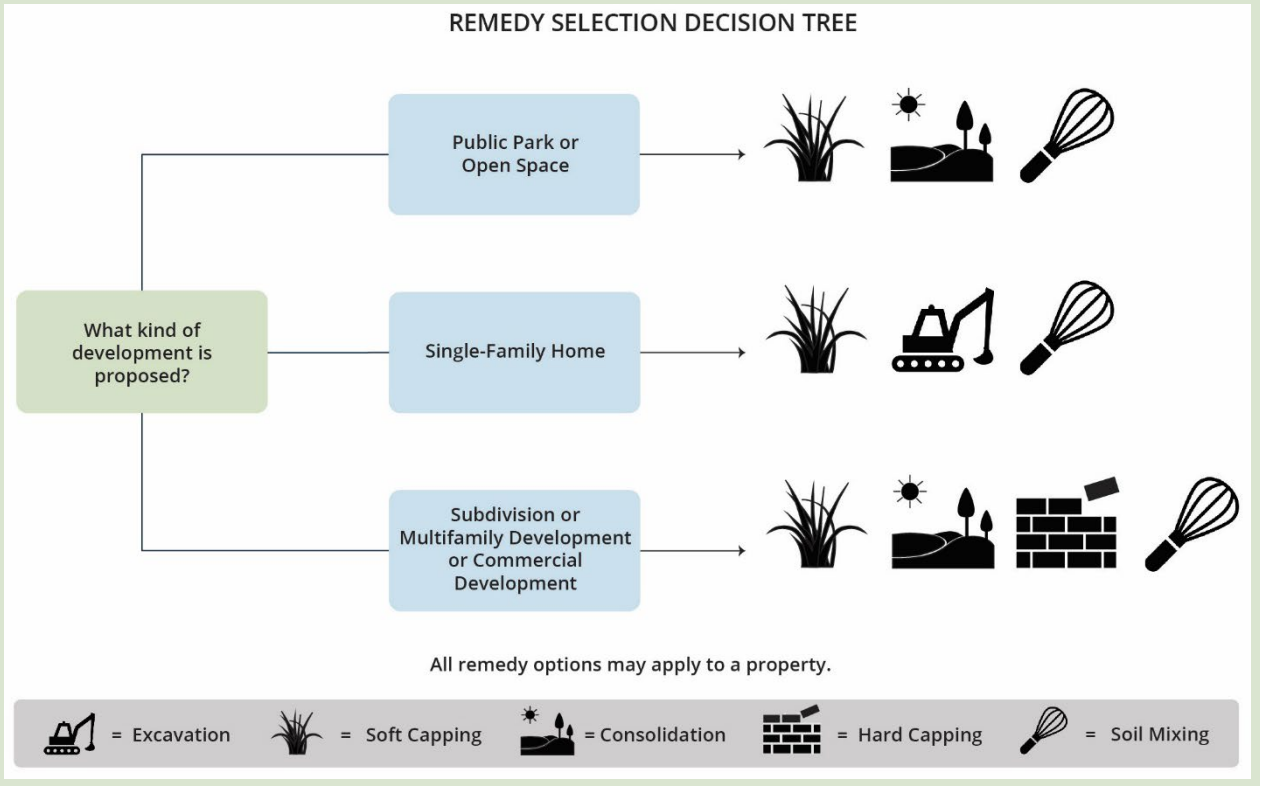
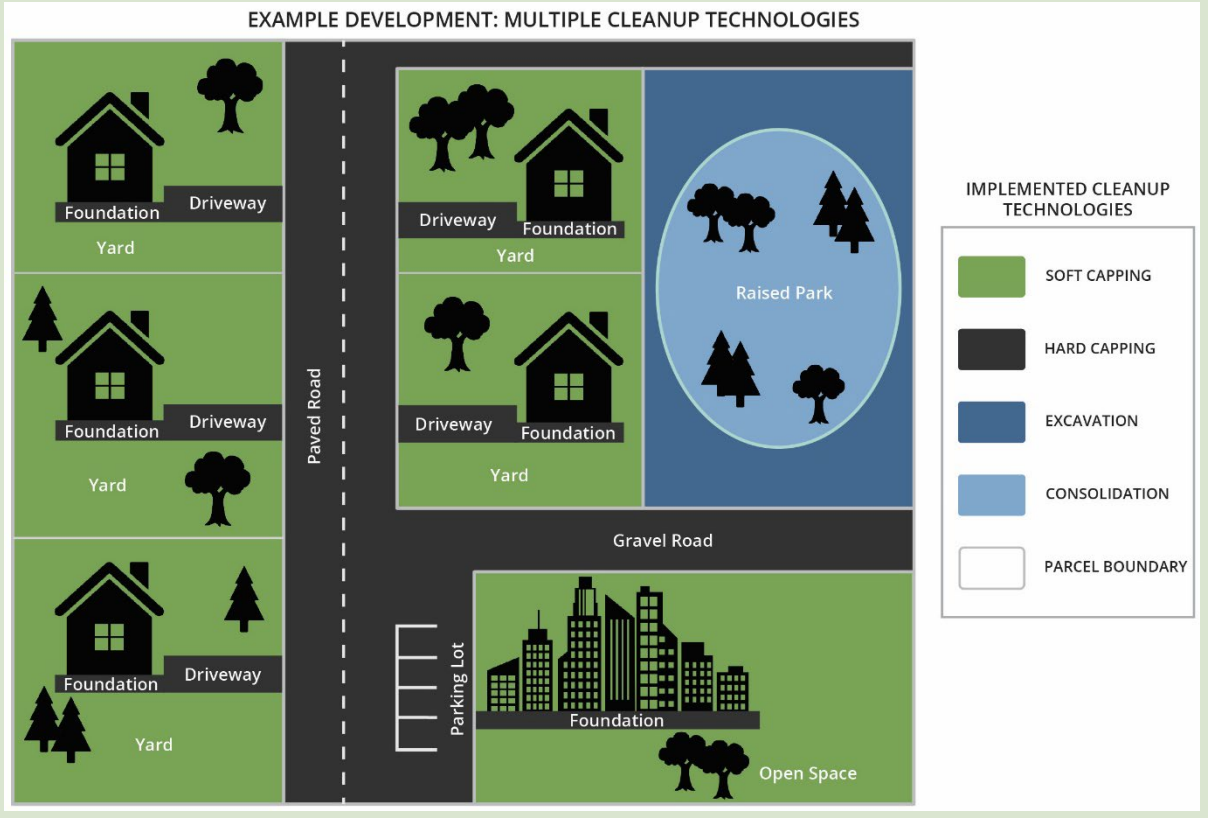


Figure 3-5 shows how the different cleanup methods might be used in different areas of a single project. For example, hard-capping technologies will typically be applied to roadways and individual building foundations, soft capping will often be used for yards and landscaped areas, and excavation or consolidation methods might be used in on-site stormwater and/or common open space areas.

Figure 3-5. Example Development: Multiple Cleanup Scenario



Covenants, Conditions, and Restrictions and Plat Notes

In addition to the preapproved soil sampling and cleanup remedies identified in the Model Remedy, it will be important to ensure that notification about the presence of LA pesticide contamination, and any cleanup actions that may have been taken, is conveyed to future property owners. It is recommended the Model Remedy provide language that can be consistently used by Ecology, and by local governments issuing development approvals and building permits.

In approving residential subdivisions applications and multifamily building permit applications, local governments can require notes be placed on the face of new plats, alerting future buyers of the LA pesticide contamination, conveying any potential cleanup maintenance that may be required, and providing important BMPs to reduce and manage the level of risk for exposure to contaminated soil. Additionally, some jurisdictions may require Covenants, Conditions and Restrictions (CCRs) that could also be used to convey this same information. It is acknowledged local governments don't enforce CCRs and they can be amended by agreement of the homeowners subject to them. However, requiring plat notes and CCRs to be recorded with the County Auditor's office helps provide a reasonable mechanism allowing future buyers ample opportunity for notification and information as part of their real estate transaction process.

Appendix B includes example language for conditions of approval requiring plat notes and CCR's that should be incorporated into the Model Remedy. The integrated development permit review process described below lays out how and when these conditions can be applied.

Potential Permits

Often there are permits specifically related to site construction activities on a residential development project, in addition to those discussed in the integrated development permit review process, below. To help educate and inform people, it is recommended the Model Remedy developed by Ecology outline the potential permits that may apply to specific cleanup technologies planned for a property, with an acknowledgment that these permits will vary by jurisdiction. This will help ensure a project proponent is aware of all the potential permits that may be required concurrent with the site development and cleanup process. Additionally, the development of the Model Remedy should consider incorporating additional preapproved standards and practices for other Ecology-issued permits, such as the Construction Stormwater General Permit, to enhance the time and cost savings associated with reduced Ecology oversight that the Model Remedy seeks to achieve.

Construction Best Management Practices

Construction BMPs are focused on reducing the potential exposure of workers and the larger community to contaminated soils during construction. Standard construction BMPs for arsenic- and lead-impacted sites can be clearly identified in the Model Remedy, allowing contractors to easily understand and incorporate them into their operations. Recommended BMPs applicable to construction projects where LA pesticide contamination exists focus on reducing soil migration and dust generation (see Appendix B).

Best Management Practices for Residents

It is not recommended that sampling at existing developments and residences be required. However, recommendations for reducing risk at existing residential properties within the historical orchard footprint should be provided in the Model Remedy guidance. Examples include:

- Wash hands with soap after working or playing in the dirt.
- Remove shoes prior to entering the home.
- Wash children's toys and pacifiers frequently.
- Wear shoes and gloves when gardening and working outdoors.
- Wash all fruits and vegetables before eating.
- Wash dirt off pets frequently.
- Create children's play areas (for example, raised sandboxes or rubber mats below play areas).
- Vacuum and dust the home at least weekly.

Cleanup Notification

Once a cleanup has been completed on a property, it is important there is a record of the completed cleanup. This will ensure not only future residents' knowledge and awareness, but also future mortgage lenders' awareness that, even though LA pesticide contamination may have existed on the property in the past, Ecology-approved MTCA compliant cleanup actions have been completed on the property.

For someone selling a piece of property identified as having potential LA pesticide contamination from historical orchard practices, it is important to have easily accessible, official documentation verifying Ecology-approved, MTCA compliant cleanup actions have occurred. The recommended approach relies on a partnership between Ecology and local government permitting agencies to help developers and property owners obtain that documentation.

The cleanup notifications being presented in the recommended approach include the following:

- For residential subdivisions, require plat notes and CCR's to ensure future owners, and their mortgage lenders, if applicable, are given the opportunity to be aware MTCA-compliant cleanup has occurred.
- For residential subdivisions and multifamily developments that are subject to SEPA review require a Remedy Completion Report form (developed by Ecology) documenting which of the pre-approved sampling and cleanup methods have been implemented on the site be filled out by the developer and submitted before final plat approval is given, or before a certificate of occupancy is issued.
- For residential construction projects that do not require SEPA review, a notarized self-certification form signed by the property owner and building contractor prior to a final certificate of occupancy being issued could be required. Further information describing these elements is provided in the Appendix B.

Integrated Development Permit Review Process

Ecology has broad authority to enforce MTCA requirements, including investigation and cleanup, when there are, *"…any releases or threatened releases of hazardous substances…"*, and *"…If there is a reasonable basis to believe that a release or threatened release…may exist…"*. (RCW 70A.305.030). Land use development proposals are approved through an inherently public process, often generating interest, potential concern, and scrutiny that can trigger MTCA enforcement where there is a "reasonable basis to believe" hazardous substances exist. For this reason, the recommended approach relies heavily on not only the development of Model Remedy guidance, but also integration of that guidance into existing local government land use permitting processes.

To reduce confusion and delays to new residential development projects, it is important to ensure compliance with MTCA can be accomplished within the local government land use and building permit processes a developer is already required to complete. One overarching goal of this project is to provide reasonable, low-cost, MTCA compliant cleanup actions that are feasible and efficient for developers and homebuilders to implement. The recommended approach described below outlines how the Model Remedy components can be integrated into these existing local government processes to help achieve this goal.

In the context of the governing state statutes, the local government actions recommended below are consistent with the "police powers" granted to cities and counties to protect public health, safety and general welfare. And, to the degree they are consistent with state laws, local regulations are unique to each jurisdiction. The recommended integrated development permit review process described in this

chapter is not intended to be a directive. Ecology is still ultimately responsible to ensure compliance with MTCA regulations. However, a partnership between Ecology, cities and counties will help developers, residents and communities more efficiently and effectively manage the area-wide contamination associated with historical orchard practices.

Where local government permit approvals require a SEPA review, the integrated development permit review process establishes clear procedural authority for the recommended actions to be implemented. As a commenting agency during a SEPA review, and because of the authority to enforce MTCA, Ecology can adopt the proposed Model Remedy and provide standardized comments (see Appendix C). These comments will indicate one of two things:

- The applicant is proposing appropriate, pre-approved sampling and cleanup methods as part of their project, consistent with the Model Remedy, and MTCA compliance will be achieved, provided the conditions of approval (as outlined in the Model Remedy) are included; or,
- There is insufficient information provided by the applicant, and they need to work with Ecology to conduct sampling and implement cleanup methods prior to moving forward with their project.

Development projects that are not subject to SEPA are smaller and generally require a more abbreviated permit review process that doesn't automatically require review and comment by Ecology. However, that does not mean the property on which those projects are being proposed isn't subject to MTCA requirements. While Ecology has made clear through this process their priority for MTCA enforcement is geared toward new, larger residential projects (typically those subject to SEPA), it is not their intent to target individual property owners and smaller developments. The integrated development permit review process for SEPA-exempt actions described below proposes a collaborative effort to help these smaller projects proactively comply with MTCA to avoid delays and more difficult cleanup actions.

Residential Subdivision Process

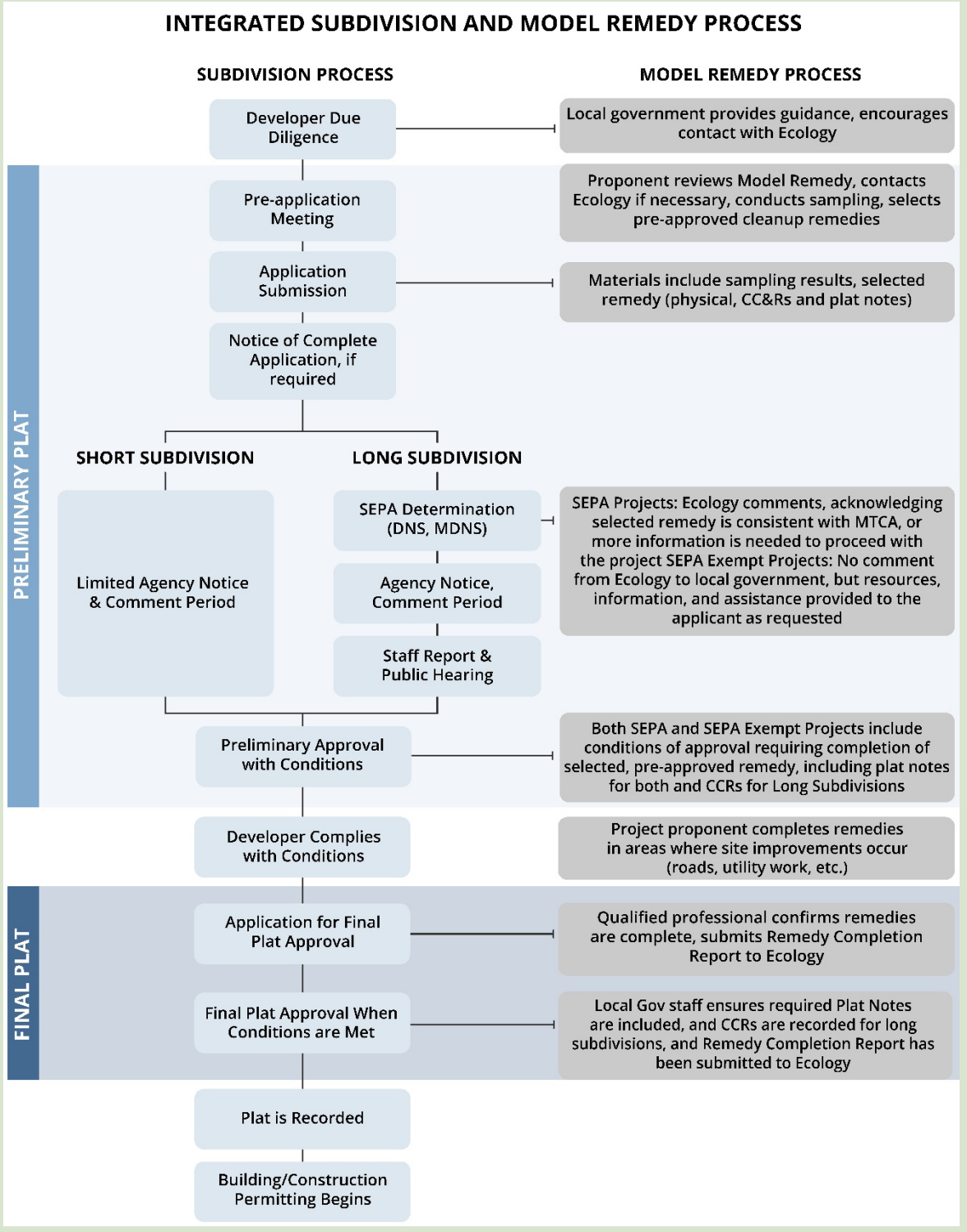
For residential subdivisions, the recommended approach relies on early, upfront education to project proponents that LA pesticides may be present on properties that fall within the online mapping tool provided by Ecology. This education will be accomplished generally, through the broader public education and outreach strategy, and, more specifically, through simple, straightforward guidance, developed by Ecology and based on the model remedy, that is geared toward a nontechnical audience. The guidance, including Ecology resources and staff contact information, will be provided to city and county permitting agencies to give to potential applicants when they first contact the agency about their project.

Figure 3-6 outlines the recommended approach for integration of the Model Remedy components into new subdivision projects. The integrated development permit approach suggests local government permitting staff do the following:

- Direct applicants to Ecology resources and staff as early as possible.

- Strongly encourage applicants include sampling information and selected, pre-approved model remedies in their application materials to avoid delays associated with Ecology's review of their proposal. This does **not** include an expectation that soil samples or selected cleanup remedies be evaluated, reviewed or approved by local governments, only that the sampling information is included, and the selected cleanup remedies are from pre-approved Model Remedy.
- Include the standard conditions (see Appendix F) in the preliminary approval, requiring compliance with selected remedy in application materials, including requiring plat notes for both short and long subdivisions and CCRs for long subdivisions.
- During review and approval of the final plat, ensure the required plat notes and CCRs, as applicable, are included in the final plat materials, and that a Remedy Completion Report, as required by the Model Remedy, has been filled out, signed and submitted to Ecology prior to approving the final plat. This does **not** include an expectation the on-site clean up remedies be inspected, evaluated and approved, nor the accuracy of the Remedy Completion Report be confirmed; only that the report has been submitted to Ecology.

Figure 3-6. Integrated Subdivision and Model Remedy Process



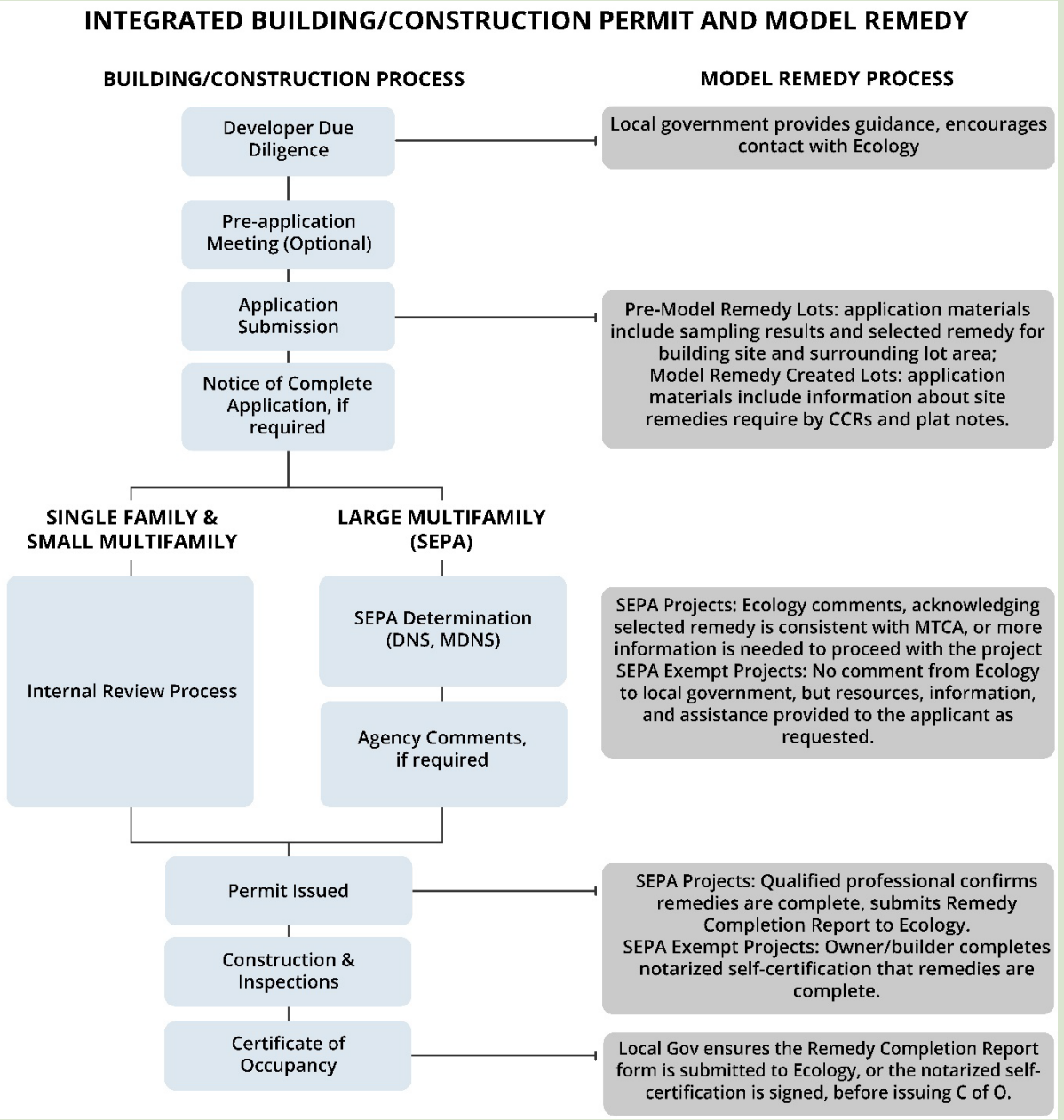
Residential Building/Construction Process

The construction of single family residences and multifamily developments may happen subsequent to the above process that includes plat notes and CC&Rs, or they may happen on existing vacant lots created prior to the recommended process, in which case information about potential LA pesticide contamination may not be available to residential building contractors and future residents. To address these situations, Figure 3-7 demonstrates how the recommended approach integrates the Model Remedy components into new residential building construction projects.

Figure 3-7 outlines the recommended approach for integration of the Model Remedy components into new residential construction projects. The integrated development permit approach suggests local government permitting staff do the following:

- Direct applicants to Ecology resources and staff as early as possible.
- Strongly encourage applicants to include sampling information and selected, pre-approved model remedies in their application materials for projects located on lots approved prior to the Model Remedy to avoid delays associated with a potential MTCA action. Alternatively, if the application is for construction on a lot that is subject to plat notes and CCRs required by Model Remedy, ensure any necessary information consistent with those requirements be submitted. This does **not** include an expectation that soil samples or selected cleanup remedies be evaluated, reviewed or approved by the local government, only that the sampling information is included, the selected cleanup remedies are from the pre-approved Model Remedy, and/or applicable plat notes and CCRs related to the Model Remedy are included.
- Prior to issuing a Certificate of Occupancy, ensure a Remedy Completion Report, as required by the Model Remedy, is filled out, signed and submitted to Ecology for projects subject to SEPA, or that a notarized self-certification statement is signed and submitted for projects exempt from SEPA. This does **not** include an expectation the on-site clean up remedies be inspected, evaluated and approved by local government, nor that the accuracy of the Remedy Completion Report be confirmed; only that the report is signed and submitted to Ecology if required, and/or the notarized self-certification form is signed and part of the public file.

Figure 3-7. Integrated Building/Construction Permit and Model Remedy



To support consistency and transparency among the jurisdictions participating in implementing this process, the recommended approach includes sample letters Ecology will use in communicating with project proponents and agencies about the requirements for complying with MTCA through the Model Remedy process (please see Appendix C). For projects subject to SEPA review, there are two letters: one indicates the applicant has been in contact with Ecology and use of the pre-approved Model Remedy components will meet the standards of MTCA; and a second indicating contact with

Ecology has not occurred and is required prior to approval of the project application. Additional sample letters have been included to facilitate early notification to a property owner/developer and to help verify, for a buyer's mortgage purposes, when the Model Remedy has been used to address the issue of potential LA pesticide contamination and meets the standards of MTCA.

Soil Management

To understand the scale of the LA pesticide impact, it is important to understand how many acres of developable land may be contaminated with lead and arsenic. Ecology has developed an online mapping tool to help identify former orchard properties with suspected LA pesticide contamination. However, the online tool does not currently identify land that is already developed, nor does it provide zoning information for the various jurisdictions, particularly residential classifications that are inside Urban Growth Areas (UGAs) that are most likely to transition to new residential development. To more definitely determine how many acres of land may be subject to the Model Remedy approach in the future, an initial, high-level representative geographic information system (GIS) analysis of the Chelan and Yakima areas was performed. Using the Ecology online mapping tool showing historical orchard areas, as well as local residential zoning data and a Microsoft tool that identifies the presence of buildings using aerial imagery, it was estimated there are roughly 17,000 acres in Chelan County and 10,000 acres in Yakima County that are potentially contaminated and most likely to develop into residential uses.

GIS was also used to perform a very high level analysis of potential areas where clean fill material could be obtained for purposes of implementing the Model Remedy cleanup methods and how much clean soil may be available. For this analysis the same data described above was used along with the Natural Resources Conservation Service soil survey data identifying soil characteristics, including basic slope data. To be considered suitable, the soil type had to have a slope less than 30 percent, and it couldn't be classified as stony or have cobbles. It was estimated there are roughly 226,000 acres of potentially suitable sources of clean soil in Chelan County and 515,000 acres of suitable sources of clean soil in Yakima County.

The results of this analysis are provided in Figures 3-8 and 3-9. The GIS analysis does not include several factors impacting the cost and availability of clean soil, such as transportation, local rates of economic development and growth, and it is a rough approximation of potential need and supply of local clean fill material. While this analysis focused on Chelan and Yakima counties, Ecology is creating similar maps of historic orchard areas for other counties in Central Washington.

Figure 3-8. Yakima County Likely Residential Areas on Historical Orchards and Clean Soil for Fill Analysis

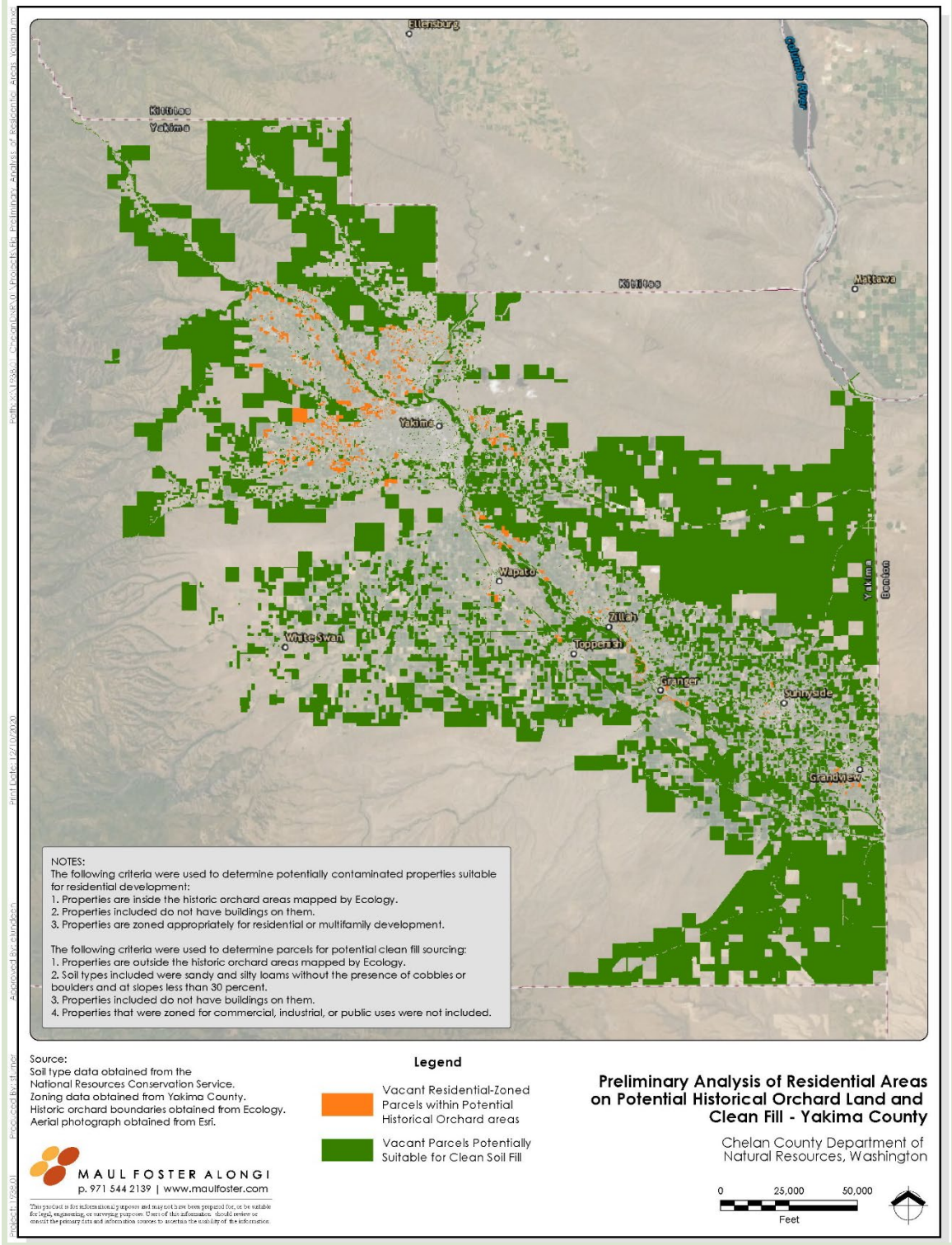
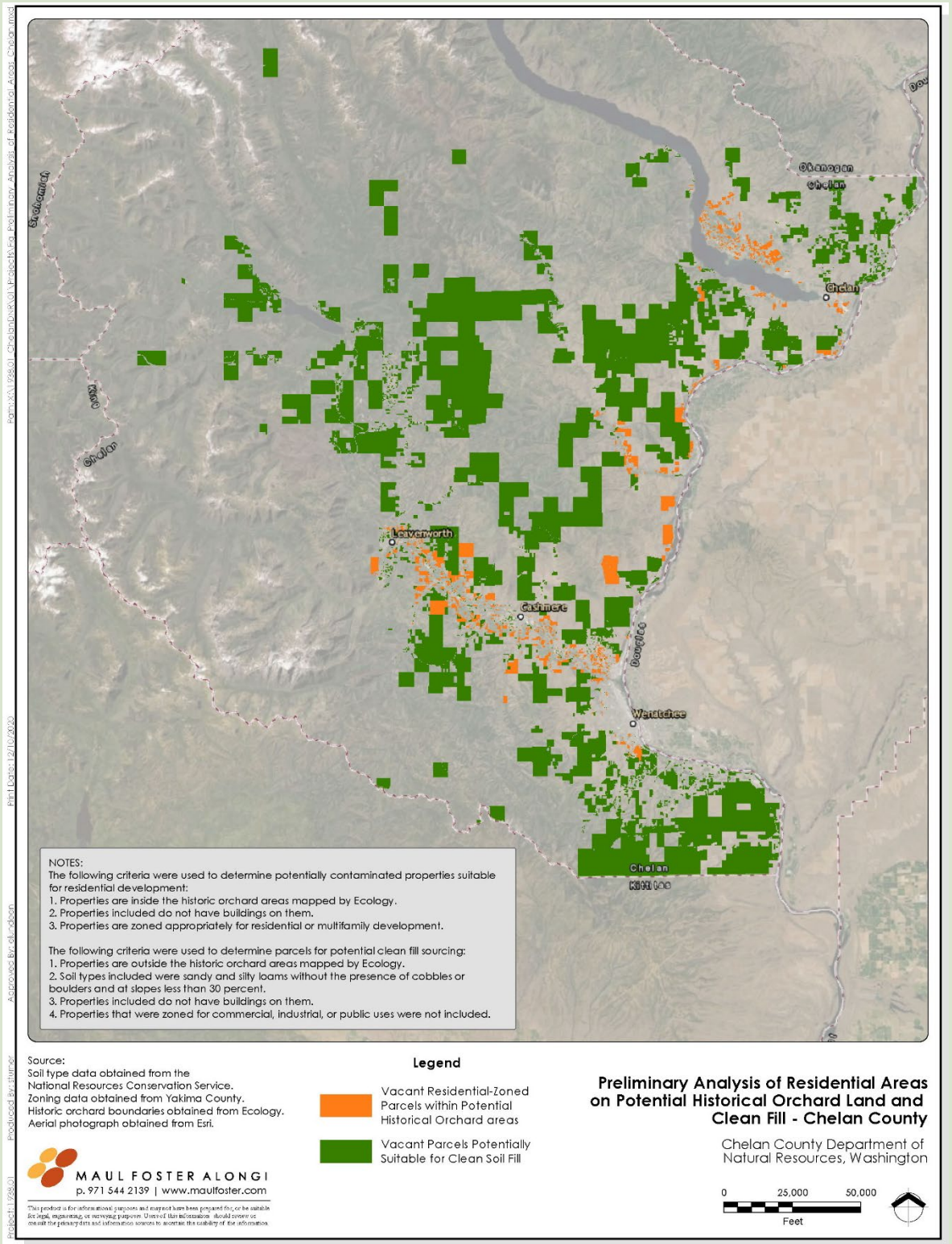


Figure 3-9. Chelan County: Likely Residential Areas on Historical Orchards and Clean Soil for Fill Analysis



Access to clean soil and an ability to dispose of contaminated soil are key elements of implementing the proposed Model Remedy. Although the specific issues related to availability of clean soil are different in various areas of Central Washington, it is nonetheless a critical component to the success of the proposed Model Remedy approach described in this report. Additional support facilities could help offset likely increases to the cost of residential development in areas subject to potential LA pesticide contamination by providing a readily available source of clean soil and areas for low/no cost disposal of contaminated material. For example, a centrally located clean soil bank could provide an affordable source of material to reduce financial strain on developers, homebuilders, and homeowners looking to build on contaminated former orchard land. Such a facility would provide a dependable and easily identified source of clean soil for development projects, minimizing the need for sourcing and sampling soil (to verify that the material is clean) from off-site sources.

There are several different approaches, including a clean soil bank, a soil repository, and a soil treatment facility, described below, that could aid in reducing cleanup costs and ensuring that it can be implemented concurrent with the property development process. These potential facilities could be developed in different areas of Central Washington as public facilities, depending on available funding, or as a private venture or public/private partnership, depending on the specific needs, including supply and demand, in each area.

Because availability of clean soil to implement Model Remedy cleanup methods is a significant component of the recommended approach, this report recommends Ecology consider a further, more detailed feasibility analysis of specific soil bank facilities, based on the specific needs of the different areas of Central Washington. Where a site-specific facility is deemed viable/feasible, it is also recommended that potential Federal or State grant funding be identified to assist with development/implementation of the facilities.

Clean Soil Bank

A clean soil bank would provide a local source of clean material to be used in the application of pre-approved Model Remedy cleanup methods as properties are developed. There are two potential ways in which a clean soil bank could be implemented, either independently or as part of a more comprehensive facility: a site-specific physical facility and a virtual clean soil exchange program.

Physical Facility

A site specific physical clean soil bank is a location where clean soil can be stored and distributed for use on development project sites facing the issue of LA pesticide contamination. The facility would operate like most landscape-supply businesses where clean soil is sold and distributed on a cubic-yard or ton basis. With a clean soil bank, developers would have a certified source of clean fill and would not need to perform soil sampling prior to bringing material on site.

Sourcing clean topsoil to supply the clean soil bank could be a challenge for a variety of reasons, including proximity of available soil to where it is located (transportation costs increase as distance from demand increases), potential surface mining regulations and permitting, and potentially nutrient-deficient soil that won't support sod or seeded grass. The proximity and mining regulation issues will be directly dependent upon where a specific clean soil bank is located, and will need to be evaluated based on those site specific factors.

An example of a commercial topsoil supply operation.

Source: https://kusmackexcavatingandseptic.com/files/2016/09/Landscape-Supply-1-e1496178358758.jpg?c&a=t

To address the nutrient deficiency issue, soil could be composted with a variety of organic material to increase valuable nutrients, with an added benefit or providing options for reusing the organic material, as opposed to disposing of it or burning it. These sources of soil and soil amendments would have to be periodically tested for lead and arsenic to ensure they can serve as clean fill. Potential sources of clean soil and compost to supply a facility may include the following:

- Soil from nonhistorical orchards
- Excess material from regular fruit tree pruning and maintenance practices or where trees are being removed either for replanting or for changes in land use from orchards that haven't been contaminated by hazardous substances
- Cow manure and straw from dairy farms
- Dredged sediment from irrigation ponds
- Clean soil from other construction projects

The list below is a preliminary identification of components that are expected to make up a physical clean soil bank facility. A feasibility study and pro forma analysis is recommended for a more in-depth evaluation of the effort, expenses, and revenues of constructing and operating a clean soil bank, given a specific location/jurisdiction, including consideration of the following elements:

- Land—to house the facility and potentially source clean soil
- Permitting (land use, potential mineral/mining) processes to authorize the clean soil bank

- Office facility—could be a full trailer or a small shed
- Scales to implement a system of weights and measures
- Basic soil testing equipment
- Heavy equipment (loader)—to move and load soil
- Concrete eco blocks—barriers to help contain stockpiles
- Dust control
- Stormwater infrastructure
- Perimeter fence and gates
- On-site gravel roads
- Stabilization (winterizing)

The initial capital expense of setting up a basic soil bank is estimated at between $200,000 and $475,000, depending on the size of the site and the type of office structure and equipment that are provided. A breakdown of the items included in this estimate are provided in Appendix D. This estimate does not include costs associated with purchasing land; design, permitting, or operational labor expenses; and the costs of facility maintenance.

Virtual Program

Under a clean soil exchange virtual program, no physical facility to stockpile and distribute clean soil would be necessary. Individual citizens, contractors, farmers, and others who have sources of clean soil that they wish to remove from their sites would be matched with developers and homeowners who need clean soil to complete the model remedies. Soil transactions would be coordinated on an individual basis. A virtual program would require a person or entity to be assigned to manage the program and tasked with reviewing applications/requests and coordinating exchanges between parties.

Coordinating a virtual clean soil exchange program does present challenges. For the transaction to run smoothly, the construction schedules of both parties would have to align. Additionally, ensuring the exchanged soil meets the clean soil standards for use as a Model Remedy cleanup method would be difficult and cumbersome. Parties involved may become frustrated or avoid using the service if soil is not collected or provided on time, if it isn't of the quality they expected, or if it isn't available when needed.

Key components of the virtual program include:

- Designated agency/staff member to manage the exchange, including office space and equipment
- Online platform or application (optional)

While it is the most cost-effective option, a stand-alone, virtual clean soil exchange program relies on voluntary participation from individuals with clean soil and an adequate supply to feed the regional demand. Clean material would have to be sampled before the program could accept it. If a sampling methodology could be developed to ensure the quality of the soil, it is possible a virtual clean soil exchange program could be implemented in conjunction with a site-specific physical clean soil bank,

particularly as a way to mitigate transportation costs and impacts of hauling clean soil to the bank and back out to a site to be used.

Soil Repository

A soil repository would offer a centralized location for developers, contractors and residents take contaminated soil, potentially helping to reduce transportation and disposal costs. Under this model, LA pesticide contaminated soil from historical orchard properties is transported to the repository where the soil is consolidated and then compacted using heavy equipment. After the repository is filled, it is closed with a liner placed over the top.

EPA-operated soil repository in Idaho.

Source: Leadville Harold, Rachel Woolworth, May 16, 2018 https://www.leadvilleherald.com/news/article_142e7500-5941-11e8-a7a7-83aed3396621.html

A contaminated soil repository facility likely has more significant regulatory requirements than the clean soil bank, because it is essentially functioning as a landfill. Material being sent to the repository will have to be tested for lead and arsenic using the toxicity characteristic leaching procedure to ensure the material is not classified hazardous waste. There are also various long-term maintenance requirements for this type of facility, even after it has been covered and closed.

An additional feasibility study is needed to create complete a facility design and cost estimates, but the basic required components of a repository are:

- Land
- Office—could be a full trailer or a small shed
- Heavy equipment (loader, excavator, compactor)—to move, consolidate, and compact material
- Concrete eco blocks—barriers to help contain stockpiles
- Perimeter fence and gates
- Truck scale (optional)
- Concrete pad (optional)—to drop off contaminated material
- Dust control
- Top High Density Poly Ethylene or polyvinyl chloride liner—to close facility
- Bottom liner (may or may not be required)
- Leachate management (may or may not be required, based on above)
- Stormwater infrastructure
- Stabilization (winterizing)
- Wheel wash and wash water treatment or collection facility

- On-site gravel roads
- Engineering and regulatory support (operating plans, closure plans, permitting support)

The initial capital expense of setting up a soil repository is estimated at between $525,000-$1,600,000, depending on the size of the repository and whether a bottom liner is required. A breakdown of the items included in this estimate are provided in Appendix D. This estimate doesn't include costs associated with purchasing the land nor for the optional facilities listed above (a truck scale and a concrete pad), nor does it consider costs associated with design, permitting, operational labor, maintenance, and closure of the facility. The lower estimated cost also assumes that a bottom liner and a leachate management system are not required.

If the creation of a new repository is determined to be too expensive or not practical, another option for providing the service offered by this type of facility is to work with an existing licensed landfill to develop an agreement and/or protocol for accepting contaminated soil at a reduced rate. Municipal landfills require soil to properly cover waste and some may be willing to reduce the cost of disposal in exchange for this useful material. The landfill will likely require that material be sampled for lead and arsenic prior to acceptance.

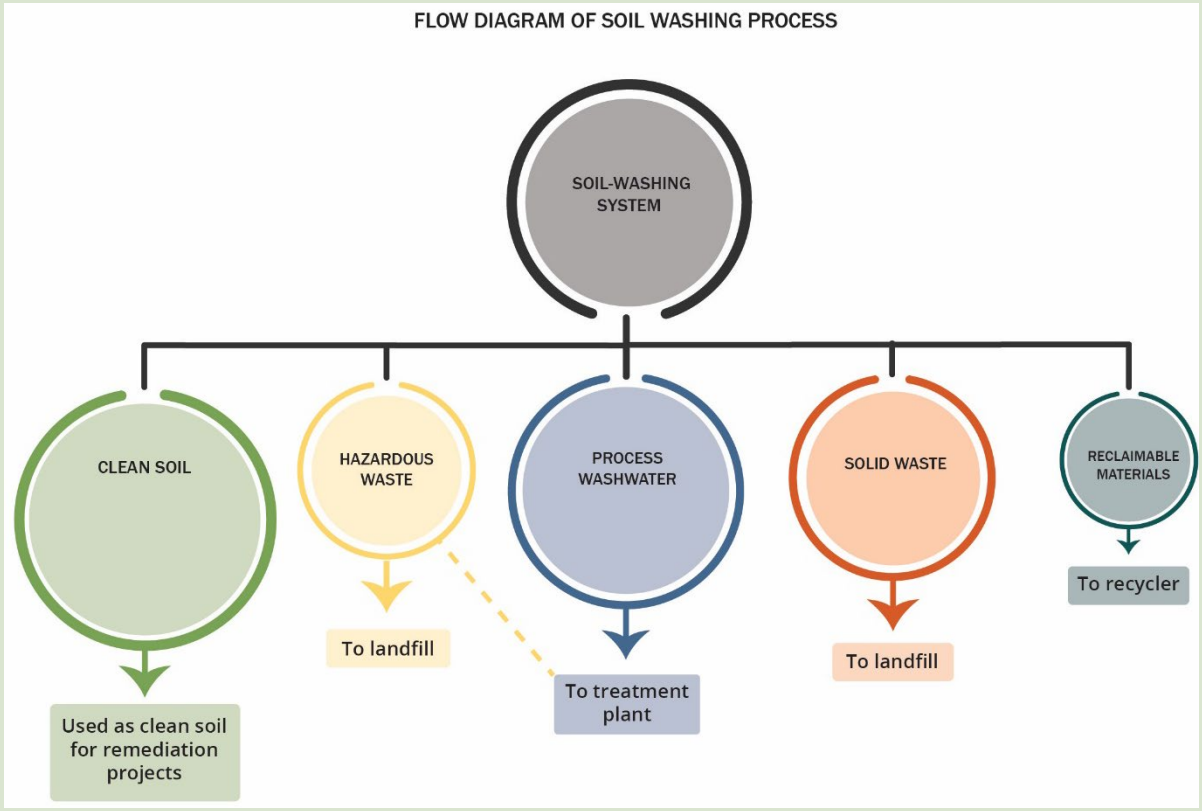
Treatment Facility

A soil treatment facility would take in soil contaminated with lead and arsenic from historical orchard sites, treat it to remove the metals using soil-washing technology, and then distribute the clean soil for use on development projects implementing the Model Remedy cleanup methods. Contaminated soil would be delivered to the facility and run through on-site process equipment, and, once treated, the soil would be tested and then distributed in the same manner as in the clean soil bank concept.

The soil treatment process uses physical and chemical separation methods to remove lead and arsenic. For the treatment to be effective, the soil must have a specific set of physical characteristics. A pilot study using local orchard soils would have to be conducted to assess the effectiveness of the treatment, and to then design a full-scale process facility. Compared to the other soil bank models, the treatment facility requires more equipment, testing, and operational labor to implement. Additionally, the treatment process generates several waste streams, which would have to be managed and disposed of in appropriately regulated landfills.

While this process is more complicated and expensive than the other two options, it offers two services instead of one, creating two potential revenue streams to fund operations and maintenance. Fees could be charged for disposal of contaminated soil as well as for purchase of the clean soil after it goes through the treatment process. Figure 3-10 provides a visual diagram of a soil washing process.

Figure 3-10. Flow Diagram of Soil Washing Process



Example of a soil-washing plant.

Source: Baioni https://www.baioni.it/en/News/PORTABLE-SOIL-WASHING-PLANT/

An additional feasibility study is needed to create a facility design and associated cost estimates, but the basic required components of the soil treatment facility are:

- Pilot/treatability planning and study
- Land
- Office—could be a full trailer or a small shed
- Heavy equipment (loader, excavator)
- Concrete eco blocks—barriers to help contain stockpiles
- Small on-site laboratory
- Stormwater infrastructure
- Dust control
- Waste disposal (hazardous and/or dangerous)
- Washwater handling
- On-site gravel roads
- Stabilization (winterizing)
- Cover structure
- Truck scales
- Process equipment
  - Soil hopper and conveyor
  - Leaching tank
  - Precipitation tanks
  - Acid tanks
  - Washwater tanks
  - Sand screws
  - Log washers
  - Jigs
  - Filter press

Unlike the clean soil bank and the soil repository, the cost of the process equipment required for a soil treatment facility is heavily dependent on the results of the pilot study. Sizing of different equipment and estimates of process waste may change, based on the process efficiency and project life span. The initial capital expense of setting up a soil treatment facility is estimated at between $800,000 and $1,600,000, depending on the size of the facility and equipment needed. While this analysis did not yield an exact cost for all necessary treatment processing equipment, short-term remediation projects (not permanent installations) had treatment costs ranging from $97 to $430 per ton (numbers adjusted for inflation) of soil, making this a very expensive treatment. With the soil treatment facility operational labor costs will be higher than the other two models, and there are also costs associated with waste disposal of the byproducts from the treatment system.

It is important to note that while the cost between a treatment facility and a repository may appear similar, there are more significant costs associated with the treatment facility that are not represented in the cost estimate. A breakdown of the items included in this estimate are provided in Appendix D. This estimate does not include costs associated with purchasing land, design, permitting, operation and maintenance, and waste management. Due to the significant costs, operational labor, and waste stream generation, a soil treatment facility is not a likely candidate for the region.

Additional Considerations

Based on input from the LPWG and Ecology, several additional concepts and ideas were identified for both Ecology and local governments to consider that could enhance the efficiency of the recommended approach. These ideas are presented as considerations and are not intended to be interpreted as being required of either Ecology or local governments. These are important, innovative concepts and ideas meant to provide a wide variety of options for specific communities to address the impacts caused by this unique, area-wide LA pesticide contamination issue.

Ecology

- Request the Legislature to consider changes to RCW Chapter 64.06 Real Property Transfers – Sellers' Disclosures to address concerns related to disclosure of potential LA pesticide contamination in shallow soil during the sale of existing properties. For example, amendments to specifically require disclosure of known soil conditions, and prior pesticide use could be added and/or enhanced, and they could be made part of the environmental disclosures that cannot be waived in the transaction.
- Update SEPA Guidance on the Ecology's website and in the SEPA Handbook to direct examination of Ecology's online mapping tool to specifically identify/address LA pesticide contamination associated with historical orchard practices.
- Provide guidance on how to research and access Ecology records and databases.
- Fund the recommended detailed, site-specific soil bank feasibility analyses in/near each of the larger urban areas within Central Washington to assist the community with an identifiable source of clean soil that is necessary to ensure success of the recommended approach described in this report. Where a viable soil bank facility is identified out of the analyses, help identify/secure grant funding to assist with implementation/construction of the facility.

Local Governments

- Consider amending local land use and/or building codes, if necessary, to clearly indicate the requirement to provide a "self-certification" (as described in Appendix B Model Remedy Recommendations) for those smaller projects not requiring a "notice of complete application" (such as single family building permits) and/or for those projects exempt from SEPA. This will ensure property owners are amply aware of the potential presence of LA pesticide contamination and how to successfully manage the associated potential risk, and it provides a clear, reasonable path to obtain documented assurance their property is compliant with the requirements of MTCA.
- Consider adding a requirement for pre-application meetings/conferences for larger projects (such as those requiring a full administrative and/or public hearing review process) to ensure project proponents have ample opportunity to be made aware of the potential presence of LA pesticide contamination as early as possible in their due diligence process.
- Consider amending local ordinances to mitigate the cost impacts associated with complying with MTCA and cleaning up LA pesticide contamination on their property. Potential options for accomplishing this could include:
  - Allow for additional density for those projects implementing the recommended Model Remedy approach.
  - Increase allowable density within existing residential zoning districts.
  - Develop a Transfer of Development Rights program.
  - Create an overlay district applicable to residential areas within the footprint of historical orchard practices, creating special/unique development standards and procedures to off-

set the requirements of the Model Remedy and to create a level playing field for these properties when compared to land not subject to potential LA pesticide contamination. Potential standards to consider in an overlay zone could include:

- Smaller permitted lot sizes
- Increased allowance for impervious surface coverage
- Incentives for multifamily developments
- Reduced building setback requirements
- Creative stormwater requirements
- Allowing for additional non-residential uses of the property

Responsibilities Table

The issue of potential LA pesticide contamination on historical orchards in Central Washington is a complex issue requiring effort on the part of all stakeholders. The table below is intended to provide a summary of the important roles different stakeholders play in helping the proposed recommended strategy outlined in this report succeed.

Who	What	When
Existing Homeowner/Renter	Incorporate BMPs, reach out to Ecology re: testing/added physical remedies	Following being made aware of the situation via Public Outreach and Education Strategy tactics
Realtors	Help inform buyers and sellers in real estate transactions of the potential for LA pesticide contamination and direct them to the Ecology resources (online mapping, model remedies, staff contacts) that can assist with managing the potential impacts if the contamination is present on a particular property.	As properties are listed for sale by owners. As buyers are identifying properties of interest for purchase
Developers/ Contractors	Use available Ecology resources (online mapping, model remedies) when made aware of the potential presence of LA pesticides during the due diligence process	Early in the due diligence process
	Implement the Ecology Model Remedy as applicable to each development, including investigation, soil clean up, notification remedies (CCRs, plat notes), and certification	Once the Model Remedy is implemented by Ecology

Who	What	When
Local Governments	Direct people to Ecology's Model Remedy (guidance, mapping) early and often	At the permit counter, during pre-app meetings, website links, development brochures. Primarily for subdivisions and for building and construction permits happening on existing lots (NOT those created thru the "new", Model Remedy process)
	Ensure proponents/applicants understand if there are CCR's and plat notes related to the Model Remedy if applicable to a project	Primarily for building construction projects, applicable for those subdivisions going through this recommended process
	Ensure Model Remedy components (physical, CC&R's, plat notes) are included in the application materials submitted	As applications are turned in, and prior to issuing "notice of complete application" for those projects that require it
	Require Model Remedy components as part of the approval process (Notice of Decision/SEPA determination), including use of the example conditions of approval language, and the required plat notes and CCRs	Preliminary plat approval (short and long/SEPA and non-SEPA). Permit issuance/Notice of decision for construction projects
	Ensure either a Remedy Completion Report or a notarized Self-Certification is provided for physical model remedy components (not a qualitative review, only that they are included in the public record of the permit process) Ensure CCR's are recorded, and Plat notes are included	Final plat approval for subdivisions (short and long/SEPA and non-SEPA) Certificate of Occupancy for building permits
Department of Ecology	Implement the Public Education and Outreach Strategy	As soon as possible
	Officially adopt Model Remedy that includes our recommendations (see Model Remedy Components)	As soon as possible
	Develop and implement technical Model Remedy guidance consistent with our recommendations	As soon as possible
	Develop simple guidance based on technical guidance to be handed out by the Local Governments	As soon as possible
	Respond to individuals (existing homeowners—BMPs, sampling) and project proponents (new projects) with help re: the Model Remedies	As contacted
	Work within Ecology divisions to simplify other, related permit approvals (e.g., construction stormwater permits) for these projects, if possible	As soon as possible

4 COMPARATIVE COST ANALYSIS

To assess the cost savings of the proposed Model Remedy approach described in Chapter 3, a comparative cost analysis was conducted, the results of which are outlined in this chapter and the related appendices. The analysis evaluated estimated cost impacts of a typical MTCA sampling and cleanup process compared to estimated cost impacts anticipated for a sampling and cleanup process using the proposed Model Remedy, using the typical development projects and conceptual costs discussed in Chapter 2.

Introduction

To assess the impact the recommended approach could have on the cost of developing a historical orchard property with LA pesticide contamination, a cost analysis for several common development scenarios was performed. For each scenario, two estimates were prepared: one using a traditional MTCA cleanup process, and one using the recommended model remedy. These costs were then compared with the standard costs of development outlined in Chapter 2.

Development Scenarios

For the analysis the costs associated with construction of a single-family home, a small subdivision, a large subdivision, and a multifamily development were evaluated. Assumptions regarding lot sizes, housing footprints, housing density, and other development details were made based on interviews with developers from Chelan, Douglas and Yakima counties. A description of each development scenario and the MTCA baseline and recommended model remedy cleanup actions is provided in the table below.

Table 4-1. Overview: Development Assumptions and Existing and Proposed Cleanup Scenarios

Development Scenario Assumptions	MTCA Baseline Process	Recommended Approach
New Single-Family Home		
• 10,000-square-foot lot • 2,200-square-foot home • 1,150-square-foot garage and driveway	• Excavate contaminated soil to a depth of 2 feet across the entire property. • Dispose of excavated material off site at a licensed landfill.	• Hard cap areas underneath house and driveway. • Soft cap open spaces with a demarcation layer, 4 inches of topsoil, and 2 inches of sod.
New Small Subdivision		
• 8 lots • 400 feet of 30-foot-wide road with sidewalks • 10,000-square-foot lots • 2,200-square-foot homes • 1,150-square-foot garage and driveway per lot	• Excavate contaminated soil to a depth of 2 feet across the entire property. • Dispose of excavated material off site at a licensed landfill.	• Hard cap areas underneath house, driveway, roads, and sidewalks. • Soft cap open spaces with a demarcation layer, 4 inches of topsoil, and 2 inches of sod.
New Large Subdivision		
• 100 lots • 6,600 feet of 30-foot-wide road with sidewalks • 10,000-square-foot lots • 2,200-square-foot homes	• Excavate contaminated soil to a depth of 2 feet across the entire property. • Dispose of excavated material off site at a licensed landfill.	• Hard cap areas underneath house, driveway, roads, and sidewalks. • Consolidate 2 feet of soil in the park area and cap.

Development Scenario Assumptions	MTCA Baseline Process	Recommended Approach
• 1,150-square-foot garage and driveway per lot • ½-acre park in development		• Soft cap open spaces with an orange demarcation layer, 4 inches of topsoil, and 2 inches of sod.
New Multifamily Development		
• 2-acre lot • 35,000-square-foot building footprint • 100 units • 9,000-square-foot parking lot	• Excavate contaminated soil to a depth of 2 feet across the entire property. • Dispose of excavated material off site at a licensed landfill.	• Hard cap areas underneath building and parking lot. • Soft cap open spaces with an orange demarcation layer, 4 inches of topsoil, and 2 inches of sod.

Comparative Cost Analysis

Table 4-2, below, summarizes the results of detailed cost estimates (see Appendix E) when the above development scenarios completed the MTCA baseline cleanup scenario and the described recommended Model Remedy cleanup action. The baseline cost estimates for both the standard MTCA approach and the recommended Model Remedy approach were created using standard estimating techniques typically applied for feasibility studies. Actual costs of development projects and the selected cleanup method will vary from site to site. However, this comparative cost analysis demonstrated that the recommended approach could significantly reduce the added cost of cleaning up contaminated soil when compared to the MTCA baseline scenario.

The base development cost considered is inclusive of all costs associated with going through the standard development process. This includes land purchase, permitting, infrastructure development, land preparation, building construction, and project design and management. Base development costs were gathered anecdotally through interviews with local developers and homebuilders in Chelan, Kittitas and Yakima counties and may not be representative of development costs in all affected areas.

The MTCA baseline costs assume that the conservative MTCA compliant cleanup approach outlined in Table 4-1 is implemented prior to the start of site development. Since cleanup occurs prior to any development actions on the property, the estimates include additional administrative, planning, design, and mobilization costs.

Unlike the MTCA baseline costs, the recommended approach is assumed to occur throughout the development process. The cost estimates for the recommended approach include all costs associated with implementing the Model Remedies detailed in Table 4-1.

For a new single-family home, it was estimated to cost $8,000 to implement the proposed Model Remedy approach. This cost is primarily dependent on the size of the home footprint relative to the size of a lot. If the footprint of a home takes up most of the lot, the cost of the Model Remedy will be lower compared to a property with a large lawn and lots of open space.

The cost estimates developed for both the MTCA baseline and model remedy scenarios are intended to be conservative and may not represent the cost at a specific site. For instance, under a model remedy scenario, a new single-family home construction project may not have any additional costs related to design or project management or items such as sod may already be in a project's landscaping budget regardless of the selected remedy. These items are included in the estimates to provide a comprehensive picture of the elements needed to implement a remedy. Some additional factors which could raise or lower the cost of remedy implementation include cost of materials and labor, size of the proposed home relative to the size of the property, whether a contractor chooses to implement and certify the remedy themselves or hire a consultant, and when the remedy is built into the project timeline. The estimates provide are intended to show relative costs between remedies and traditional constructions and are not meant to be used as budgetary estimates.

Table 4-2. Comparative Cost Analysis

Scenario	Base Development Cost (Estimated)[1]	Additional Remediation Expense[2]	
		MTCA Baseline Cost (Estimated)	Recommended Approach Cost (Estimated)
New Single-Family Home	$390,000–$400,000	$185,000 (+46-47%)	$8,000 (+2%)
New Small Subdivision	$3,000,000–$3,500,000	$1,440,000 (+41-48%)	$61,000 (+2%)
New Large Subdivision	$38,000,000–40,000,000	$17,612,000 (+44-46%)	$1,031,000 (+3%)
New Multifamily Development	$5,000,000-$6,000,000	$1,190,000 (+19-21%)	$40,000 (+1%)

NOTES:

[1]Base development cost includes all costs associated with taking an empty lot and getting a property containing a home ready for sale, including: permit, grading, utilities, infrastructure, and home construction. Values were obtained through interviews with developers and homebuilders.

[2]These costs are estimated based on the Typical Development Projects and Cost Estimates identified in Chapter 2.

5 PUBLIC EDUCATION & OUTREACH STRATEGY

In addition to the recommended approach described in Chapter 3, Ecology will start an education and outreach strategy about LA pesticide contamination, cleanup strategies, and BMPs.

Introduction

The public education and outreach strategy includes an analysis of the communications environment related to LA pesticide contamination, as well as recommendations for how best to achieve proactive and targeted public education and outreach to a wide and varied audience of community stakeholders. The primary audiences for the public education and outreach strategy are people who currently live on potentially impacted properties and the broader community in the counties with known LA pesticide contamination. Chapters 1 through 4 of this final report outline a process in which our other key audiences, including developers, builders, and planners, will address LA pesticide contamination and remediation through existing property development processes.

This chapter is a summary of the full public education and outreach strategy that Ecology is implementing.

Goals

Ecology's overarching goal for the Legacy Pesticide Working Group process is to provide reasonable, low-cost, and protective mitigation options that are feasible and efficient for developers and homebuilders. For the education and outreach strategy the primary goal is to educate the public about how to manage their risk regarding LA pesticide soil contamination. More specifically, Ecology will use the education and outreach strategy to:

- Demonstrate that Ecology has a plan and is addressing LA pesticide contamination on historical orchard properties.
- Increase public awareness and understanding about LA pesticide contamination, how to test for contamination, and how to manage risk on impacted properties.
- Partner with community leaders, including local governments, landowners, developers, builders, and real estate companies, to help communicate about LA pesticide contamination and what people can do about it.

The education and outreach strategy also identifies how best to share information about LA pesticide contamination. Outreach will target key stakeholders and landowners, emphasizing messages for those who live, work, and play where LA pesticide contamination is commonly found in historical orchard areas. Attention will be given to the steps people can take, from testing their property for contamination, to cleaning up soils, and other best management practices and actions that can be taken to manage and mitigate risk if LA pesticide contamination exists.

Project Timeline

The public education and outreach strategy outlines all elements of the effort that will begin in early 2021 and continue as long as LA pesticide contamination remains an issue of concern. The strategy outlines tactics to establish within the first year of implementation, as well as activities to ensure an ongoing rhythm of education and outreach. Because things change over time, this plan requires updates to address new issues, audiences, and opportunities.

Education and Outreach Sequence

2020	2021				2022	
Q4	Q1	Q2	Q3	Q4	Q1	**Onward**
Draft strategy and materials	*Partner onboarding and test messages*	*Finalize materials and distribute "partner toolkit"*	*Conduct Outreach and Education*			

Tools

Project materials	• Display or presentation materials (e.g., PowerPoint). • Updated informational fact sheets and handouts, including translating the material into, Spanish. • Post project materials on Ecology's web page. • Partner toolkit to share information, materials, and resources with partners and request they share the information with their networks.
Direct outreach	• Stakeholder lists • Mailers, door hangers, and county annual assessment or utility bill inserts to be sent to all potentially impacted properties. • Project email inbox to collect incoming questions from target audiences. • Information and referrals to health, human, and social service organizations. • PreventionPays. Text message service that links texters with resources.
Web-based tools	• Project-specific public-facing web page that includes all project materials, engagement opportunity information, project contact information (email and distribution list sign-up) and is regularly updated. • Project listserv email sign-up and email updates using existing distribution lists for project updates and engagement opportunities. • Ecology blog posts. • Social media posts. • Online public information sessions. • Short videos.

Media	• Public service announcement. • Proactive media outreach: – News releases for local and regional newspapers and media at key milestones, when blogs are posted, and other news-worthy events. – Deskside briefings and deep dives on important topics, or topics otherwise difficult for the general public to grasp, to help pull back the curtain and make topics more accessible to all.
Events	• Online and in-person informational sessions with the general public. • Briefing circuit. Attend existing meetings and provide briefings to partner agencies, local elected officials and city councils, business, and other interest groups.

Audiences (Broad Groups)

- Ecology staff
- LPWG members
- State/federal agencies and groups
- Local government elected and appointed officials and staff
- Impacted residents, homeowners, and landowners
- Real estate parties
- Local health care providers
- Schools, including nurses and teachers
- Daycare providers
- Impacted workers
- Interest groups (e.g., housing, building, environmental, gardening, WSU Master Gardeners program, WSU Extension)
- General public
- Local and regional media

Ways to Get Engaged

This public education and outreach strategy is just the tip of the iceberg. Ecology is embarking on a multiyear, multifaceted education and outreach effort to reach communities across Central Washington. If you have ties to these communities and want to make sure you are on the partner contact list, please send your preferred email and contact information to Ecology at FormerOrchards@ecy.wa.gov.

APPENDIX A

LOCAL GOVERNMENT LAND USE PERMITTING PROCESSES

Permitting Stakeholder Interview Findings

Project Type	Size (Lots, Units)	SEPA Review	Decision maker	Pre-app meeting	Notice of Complete Application	Application referred to agencies	Public comment & hearing	Appeal
Jurisdiction: City of East Wenatchee								
Short Plat	4 lots or less	No	Admin	Optional	Yes	Yes	No	Hearing Examiner
Major Subdivision	5 lots or more	Yes	Planning Commission	Yes	Yes	Yes	Yes	LUPA process
Small MF Development	3 units or less	No	Admin	Yes	Yes	Yes	No	LUPA process
Large MF Development	4 units or more	Yes	Admin	Yes	Yes	Yes	Yes	LUPA process
Jurisdiction: City of Wenatchee								
Short Plat	9 lots or less	No	Admin	Optional	Yes	Yes	No	Hearing Examiner
Major Subdivision (5 or more lots)	10 lots or more	Yes	Hearing Examiner	Optional	Yes	Yes	Yes	District Court
Small MF Development	20 units or less	No	Admin	Optional	Yes	No	No	Hearing Examiner
Large MF Development	21 units or more	Yes	Admin	Optional	Yes	Yes	Yes	Hearing Examiner
Jurisdiction: City of Yakima								
Short Plat	9 lots or less	No	Admin	Optional	Yes	No	Yes	Hearing Examiner
Major Subdivision (5 or more lots)	10 lots or more	Yes	City Council	Optional	Yes	Yes	Yes	Superior Court
Small MF Development	60 units or less	No	Admin	Optional	Yes	No	No	Hearing Examiner

Permitting Stakeholder Interview Findings								
Project Type	**Size (Lots, Units)**	**SEPA Review**	**Decision maker**	**Pre-app meeting**	**Notice of Complete Application**	**Application referred to agencies**	**Public comment & hearing**	**Appeal**
Large MF Development	61 units or more	Yes	Admin	Optional	Yes	Yes	Yes	Hearing Examiner
Jurisdiction: Chelan County								
Short Plat	4 lots or less outside UGA, 9 lots or less within UGA	No	Admin	Optional	Yes	Yes	Yes	Hearing Examiner
Major Subdivision (5 or more lots)	5 lots or more outside UGA, 10 lots or more within UGA	Yes	Hearing Examiner	Yes	Yes	Yes	Yes	LUPA process
Small MF Development	60 units or less within UGA, 25 units or less outside UGA	No	Admin	Optional	Yes	No	No	Hearing Examiner
Large MF Development	61 units or more within UGA, 26 units or more outside UGA	Yes	Admin	Optional	Yes	Yes	Yes	Hearing Examiner
Jurisdiction: Douglas County								
Short Plat	4 lots or less outside UGA, 9 lots or less within UGA	No	Admin	Yes	Yes	Yes	Yes	Hearing Examiner
Major Subdivision (5 or more lots)	5 lots or more outside UGA, 10 lots or more within UGA	Yes	Hearing Examiner	Yes	Yes	Yes	Yes	LUPA process
Small MF Development	20 units or less	No	Admin	Yes	Yes	Yes	Yes	Hearing Examiner
Large MF Development	21 units or more	Yes	Admin	Yes	Yes	Yes	Yes	Hearing Examiner

APPENDIX B

MODEL REMEDY RECOMMENDATIONS

Introduction

The recommended approach is predicated on the Department of Ecology developing and implementing a specific Model Remedy, as defined in MTCA, for mitigating proposed new residential development projects on properties in Central Washington that were developed as tree fruit orchards prior to 1950. Below are the proposed detailed components of the *Model Remedy for Central Washington LA Pesticide Contamination on Historical Orchards* that are the basis of the recommended approach in Chapter 3 of the Final Report.

Investigation Process

The proposed framework for identifying and investigating a property for LA pesticide contamination is provided below in Figure 3-2 of the Final Report. The primary elements include:

- Identifying if the property is located on a historical orchard. The online mapping tool will be made accessible to the public on the Ecology website.
- Sampling will be needed for a property if it is located within the historical orchard footprint and development is proposed. For existing developments within the historical orchard footprint, BMPs will be implemented to mitigate risk. Owners of existing developments may also request soil sampling conducted by Ecology at no cost.
- If sampling shows lead or arsenic concentrations exceed cleanup levels at a property with proposed development, then cleanup will be required. Initial Tier 1 sampling can be conducted by Ecology at no cost. Tier 2 sampling is optional and may be conducted by the developer to confirm Tier 1 sampling results and refine the contamination extent.

Mapping

The first step for assessing a property for LA pesticide contamination is identifying if the property is located on property that was used for a historical orchard using Ecology's online mapping tool. The online mapping tool will be provided by Ecology and will be made easily accessible to the public. The historical orchard online mapping tool is being developed through the review of historical aerial photographs, land use, and elevation data.

If a property **is not** located on a historical orchard and there is no evidence of soil imported to the property from another location, **no additional evaluation is required.**

If a property **is** located on a historical orchard, additional evaluation (i.e., soil sampling) may be required.[1]

Soil Sampling

Once a property is identified as being located on a historical orchard, the development status of the property should be considered prior to soil sampling.

[1] Additional evaluation (i.e., Tier 1 sampling) is recommended if there is knowledge of significant fill placement or historical orchard activities on a property prior to 1950.

Existing developed properties:[2]

- If a developed property is located on a historical orchard property, soil sampling is strongly encouraged, but is not required**.**
- If a property is sampled, results above State cleanup levels must be reported to the Washington Department of Ecology and disclosed to future property owners, as is the case for sample results from all property types.
- If sampling is not conducted, or if sampling confirms lead or arsenic above State cleanup levels, best management practices (BMPs) should be implemented to reduce potential exposure to contaminated soil (further described in the *Best Management Practices for Existing Developments* section below).

Properties with proposed residential development (all types of subdivisions and multifamily development projects subject to SEPA review):[3]

- Required to perform sampling of soil, as described in the *Tier 1 Soil Sampling* subsection.

Two types of soil sampling, Tier 1 and Tier 2, may be performed. Tier 1 sampling will provide an initial evaluation of the presence or absence of contamination. Tier 2 sampling is optional and can be conducted to refine the extent of contamination associated with LA pesticide use. Tier 2 sampling may also be conducted to inform the types of cleanup technologies that can be applied to different areas of a property.

Tier 1 Soil Sampling

Tier 1 sampling evaluates the presence or absence of lead and arsenic concentrations in soil above cleanup levels.[4] The completion of Tier 1 sampling informs the need for Tier 2 sampling. If feasible, it is recommended that a representative from Ecology conduct the Tier 1 sampling for a property. However, it is suggested that Ecology provide Tier 1 sampling guidance on how an individual citizen can perform the Tier 1 sampling with Ecology oversight. *Tier 1 sampling is highly recommended for all properties with proposed development on a historical orchard, regardless of whether a remedy (for example, capping) has been preemptively selected, allowing Ecology to provide more detail for specific concerns.*

If lead or arsenic concentrations **are not** identified above cleanup levels during the Tier 1 sampling, **no additional evaluation is required.**

If lead and/or arsenic concentrations **are** identified above cleanup levels during the Tier 1 sampling, additional soil sampling may be needed to refine the area and depth of contamination. If capping is selected as the preferred remedy for a property, then Tier 2 sampling will not be necessary, and the project proponent will move to the cleanup process. See the *Cleanup Process* section.

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[2] Existing residential homes, private property where development is not planned, and existing parks/open spaces are examples of properties where development may not be proposed.

[3] New commercial, industrial, public school, and public park development projects remain subject to the existing administrative pathways outlined in MTCA.

[4] Lead concentrations above 250 milligrams per kilogram (mg/kg) or parts per million (ppm) and arsenic concentrations above 20 mg/kg or ppm are above Model Toxics Control Act Method A cleanup levels.

Tier 2 Soil Sampling

Tier 2 sampling evaluates the nature and extent of lead and arsenic concentrations above cleanup levels. This type of sampling will require collection of more soil samples to determine the vertical and horizontal extent of contamination on a property. It is recommended that Ecology provide guidance in the Model Remedy document on how to conduct Tier 2 sampling.

Given the likelihood that representatives from Ecology will not be able to conduct the Tier 2 sampling, the following considerations are proposed for the Tier 2 sampling guidance for ease of understanding and completion:

- If Tier 2 sampling is conducted in accordance with the Ecology-provided guidance, it is not necessary that a work plan be prepared or submitted to Ecology.
- Allow for averaging of concentrations in areas with isolated concentrations of lead or arsenic above the cleanup level consistent with MTCA. This would limit isolated exceedances requiring large-scale cleanups.
- Limit the maximum required number of samples collected to 50 to reduce the effort of handling and processing a significant number of samples.
- If desired, a work plan can be submitted for review and approval by Ecology to conduct Tier 2 sampling using a modified approach.
- Composite sampling should be considered to characterize areas of similar history or to reduce the number of collected samples analyzed at a laboratory.
- If soft or hard capping is the preferred remedy for a property, Tier 2 sampling is not needed, as described in the *Cleanup Process* section.

If lead or arsenic concentrations **are not** identified above cleanup levels during the Tier 2 sampling, **no cleanup is required.**

If lead and/or arsenic concentrations **are** identified above cleanup levels during the Tier 2 sampling, a remedy must be selected for implementation during development. See the *Cleanup Process* section.

Cleanup Process

Once soil sampling has been completed, a cleanup technology or combination of technologies must be selected. Any combination of the cleanup technologies described in the following could be considered for completing a cleanup. It is recommended that Ecology outline the requirements for appropriate implementation of each cleanup technology and include visuals of how multiple cleanup technologies could be implemented in a development. The following cleanup technologies that are recommended for incorporation into the model remedy guidance:

- Soft Capping
- Hard Capping
- Excavation
- Mixing
- Consolidation

CLEANUP TECHNOLOGIES

Soft Capping

Contaminated soil can be covered with a brightly colored demarcation fabric (marker material) and at least 6 inches of clean soil and/or sod. Areas of a development that will be covered by building foundations, sidewalks, driveways, roadways or other permanent hard surfaces do not require any additional action (see Hard Capping below). This remedy would only be required in development areas with proposed landscaping, lawns, or vegetation. This remedy leaves contamination in place but prevents exposure to the contaminated soils. A brightly colored demarcation fabric provides an easy visual for current and future property owners to ensure that impacted soils are not exposed during future construction, maintenance or landscaping activities. In some cases, placement of more than 6 inches of soil may be appropriate—for example, to mitigate soil thinning (e.g., on slopes), to account for placement of irrigation systems that have a burial depth of more than 6 inches, and to account for landscaping areas where deeper-rooting plants may be installed. Homeowners with demarcation fabric on their property will be notified of the presence and use of the marker material in the Covenants, Conditions, and Restrictions (CCRs) and plat notes for the property (see the *CCRs and Plat Notes* section).

If soft capping is selected as a cleanup technology, Tier 2 sampling and confirmation sampling (see the *Considerations for Cleanup Selection* section below) are not required for that area of the property. Because contamination will be capped, the lateral and vertical extent of contamination does not require characterization, and exposure to impacted soil will be prevented.

Soft capping likely will require importing of clean soil fill to create a portion, if not all, of the soft cap. Imported clean soil fill will have to be sampled to ensure that contamination is not present. See the *Considerations for Cleanup Selection* section below.

If a soft capping cleanup is completed for a property, a record of the soft capping cleanup must be recorded on CCRs and on plat notes to ensure that future homebuilders and owners are notified of the cleanup. Cap monitoring reports will not be required for submittal to Ecology (see the *Cleanup Notification* section below for additional details).

Hard Capping

A cleanup that includes hard capping can be implemented as part of routine site-development activities (construction of sidewalks, roadways, building foundations). This remedy leaves contamination in place but prevents exposure to contaminated soils, given typical maintenance of impervious or semipervious material. Contaminated soil should be covered with at least 3 inches of impervious or semipervious material (asphalt, pavement, concrete). A layer of at least 6 inches of compacted crushed gravel (e.g., for driveways) and a demarcation fabric are also considered to constitute a hard cap.

If hard capping is selected as a cleanup technology, Tier 2 sampling and confirmation sampling (see the *Considerations for Cleanup Selection* section below) are not required for that area of the property. Because contamination will be capped, the lateral and vertical extent of contamination does not require characterization, and exposure to impacted soil will be prevented regardless of depth or concentration.

As with soft capping, should a hard capping cleanup be completed for a property, it is recommended that a record of the hard capping cleanup be recorded on CCRs and on plat notes to ensure that future

homebuilders and owners are notified of the cleanup. Cap monitoring reports will not be required for submittal to Ecology (see the *Cleanup Notification* section below for additional details).

Excavation

Contaminated soil can be removed through excavation to a depth at which concentrations of lead and arsenic are no longer above cleanup levels (often 3 feet below ground surface or greater).

If all contaminated soil is removed from a property, as demonstrated by confirmation sampling, that property is considered clean and no additional remedial actions are required. Confirmation sampling must be rigorous in this case. Future property use will be based on the assumption that the property is clean, and no BMPs or other precautions are likely to be taken by the homeowner or occupant. If confirmation sampling indicates that contamination remains in place, additional excavation and confirmation sampling is required, otherwise an alternative remedy must be applied (see the *Soft Capping* and *Hard Capping* subsections above).

Excavation will require off-site disposal of contaminated soil.[5] If the contaminated soil is removed off site and has concentrations of lead above 1000 mg/kg or arsenic above 100 mg/kg, the soil will require testing by the toxicity characteristic leaching procedure (TCLP) to ensure that lead and arsenic concentrations can be disposed of in an appropriate landfill (see the *Considerations for Cleanup Selection* section below).

If post-excavation confirmation sampling is performed and concentrations of lead or arsenic do not remain above State cleanup levels, CCRs/plat notes will not be required; however, a remedy completion report (RCR) will still be required (see the *Cleanup Notification* section below).

Mixing

Mixing contaminated soil with clean soil (soil that does not have concentrations of lead or arsenic above cleanup levels) can reduce the concentrations of the soil to below cleanup levels. Implementation of this cleanup is limited by the magnitude of lead and arsenic concentrations present in the contaminated soil. For example, if clean soil is assumed to have concentrations of lead and arsenic at statewide background levels (i.e., 17 and 7 mg/kg, respectively), lead and arsenic concentrations in the top 6 inches of the contaminated soil should generally not exceed 483 and 33 mg/kg, respectively, in order to effectively reduce the contaminated soil concentrations, assuming a placement of 6 inches of clean soil fill and a 1:1 mixing scenario. Careful Tier 2 sampling is required if the mixing remedy is implemented. Rarely is contamination limited to the top 6 inches of soil. It is critical to have a detailed understanding of lead and arsenic concentrations and depth. The remedy can easily fail if areas of elevated concentrations are missed, and mixing does not bring concentrations below cleanup levels.

Mixing requires availability of enough clean soil, on site or imported, to cover the contaminated soil. Any soil used must be sampled to ensure that it is not contaminated. See the *Considerations for Cleanup Selection* section below. Sampling of the top 1 foot of the mixed soil (containing contaminated and clean soil) after the cleanup has been completed will be required to ensure that lead and arsenic

[5] Excavated soil may be combined with a consolidation cleanup action and gathered in a specific area to be capped (see the *Consolidation* section below). If excavated soil is consolidated on site, it will not require off site disposal sampling.

concentrations are sufficiently reduced to below cleanup levels. See the *Considerations for Cleanup Selection* section below.

As with *Excavation,* a mixing cleanup would not require CCRs or plat notes if concentrations in soil were sufficiently reduced to below cleanup levels. However, a RCR would still be required (see the *Cleanup Notification* section below).

Consolidation

Consolidation may be used in combination with excavation. Consolidation involves moving excavated contaminated soil to a specific area(s) on site to reduce the need for off-site soil disposal and to reduce the area requiring capping. Consolidation would require covering contaminated soil with a soft or hard capping cleanup technology, including the previously described requirements.

In addition to the capping requirements, the confirmation sampling requirements for excavation would be applicable in areas where soil was graded or excavated and ground surface was left exposed. Once an area has been graded or excavated, it should be treated consistent with the *Excavation* subsection. See the *Considerations for Cleanup Selection* section below.

As with soft and hard capping cleanup technologies, if a consolidation cleanup is implemented, a record of the consolidation cleanup will be recorded in the CCRs and on plat notes to ensure that future homebuilders and owners are notified of the completed remedy (see the *Cleanup Notification* section below for additional details).

CONSIDERATIONS FOR CLEANUP SELECTION

Confirmation Sampling

Confirmation soil sampling will be required for cleanup technologies that leave potentially contaminated soil exposed at the surface. This sampling confirms that the contamination has been removed (excavation) or reduced to below cleanup levels (mixing). It is recommended that Ecology provide guidance on the frequency of samples required per area and the sample depths (e.g., top 6 inches for excavation and top 1 foot for mixing) for confirmation sampling.

Imported Soil Fill Sampling

If fill soil is brought to a site to be used as a cap (soft capping) or mixed into the existing soil (mixing), sampling of the imported soil will be required. This ensures that soil brought into a site as a cleanup is not contaminated. It is recommended that Ecology provide guidance on the frequency of samples required per volume of imported fill (e.g., one composite sample per 500 cubic yards).

Contaminated Soil Disposal Sampling

Contaminated soil that is removed from a site (excavation) and has concentrations of lead above 1000 mg/kg or arsenic above 100 mg/kg will require TCLP sampling to ensure proper disposal at an appropriate landfill or other facility. It is recommended that Ecology provide guidance on the frequency of samples required per volume of imported fill.

All remedy options listed in the model remedy selection may apply to a property. However, it is likely that some remedies will be more applicable or more easily applied, depending on the type of property.

Figure 3-4 of the Final Report provides a comparison of the cleanup technologies included in the Model Remedy. Figure 3-5 of the Final Report provides the most likely remedies to apply to various developments or properties.

Potential Permits

The following permits are often required as part of a proposed new residential subdivision and/or multifamily development project. Ecology's Model Remedy should list these permits and identify standard, preapproved components of the permits issued by Ecology that can be included as part of the Model Remedy.

- Grading Permit: This permit is typically required for ground-disturbing activities and is often required if the area disturbed encompasses than 1 acre. Grading permits are typically obtained through a local jurisdiction and require general information on the project. They are relatively easy to prepare and are a component of standard development projects.
- SEPA Requirement: The requirement for a SEPA review process is jurisdiction-specific. See the *Permitting Process* section in Chapter 2 of the Final Report.

Construction Stormwater General Permit: The construction stormwater general permit (CSGP), applied for through Ecology, is prepared for development projects to reduce the potential for stormwater runoff from construction sites. The CSGP authorizes stormwater discharges associated with construction activities. Construction activity refers to clearing, grading, excavating, and other land-disturbing activities that result in the disturbance of at least 1 acre. There are additional requirements for the CSGP if there is known contamination on a property. The process for preparing and submitting the permit applications is often time-consuming and complex. For example, for some sites with contaminated soils, Ecology issues an Administrative Order that specifies measures and BMPs to which the applicant must certify adherence in order to receive permit approval. Therefore, it is recommended that Ecology provide one of the following:

- Coordination of a programmatic process that allows for Ecology to issue to applicants a standardized approach and requirements specific to arsenic and lead contamination management practices.
- Allowing an exclusion of the requirement for a CSGP administrative order specific to the contamination, if the model remedy and construction BMPs for reducing turbidity are implemented. A list of required BMPs to control erosion and sediment generated during construction would minimize potential for contaminated soil discharges to surface water.

Construction Best Management Practices

Construction BMPs are focused on reducing the potential exposure of the worker and the larger community to contaminated soil during construction activities. Standard construction BMPs for arsenic- and lead-impacted sites should be identified in the model remedy so that contractors can easily incorporate them into their operations. Recommended BMPs applicable to construction projects with arsenic and lead contamination focus on reducing soil migration and dust generation. Additionally, employing the BMPs outlined in Ecology's Stormwater Management Manual for Eastern Washington

will reduce the likelihood of runoff from a construction site. The following are the recommended construction BMPs:

- Minimize dust generation by watering down construction area, as needed.
- Ensure that significant soil is not tracked off site (e.g., manual removal of mud from tires, dedicated construction entrance).
- Place catch basin filter inserts into catch basins to reduce the number of particulates entering the stormwater system.

In addition to construction BMPs, it is recommended that the model remedy guidance reference applicable Washington State Labor & Industries requirements related to worker safety to safeguard against exposure to potential lead and arsenic in soil. Recommended worker safety defenses could also be included such as the following elements:

- Requirements to wash hands before eating or drinking on site and to wash boots at the end of the day, before leaving the site
- Requirements for workers to wear gloves while handling contaminated soil
- Assessment of requirements for complying with federal and state safety regulations

Best Management Practices for Existing Developments

It is not recommended that sampling at existing developments and residences be required. Recommendations for implementing BMPs at properties within the historical orchard footprint should be provided in the model remedy guidance. The following BMPs are suggested for these properties:

- Wash hands with soap after working or playing in the dirt.
- Ensure grass is kept up so no bare patches of soil are present
- Remove shoes before entering the home.
- Wash children's toys and pacifiers frequently.
- Wear shoes and gloves when gardening and working outdoors.
- Wash all fruits and vegetables before eating.
- Wash dirt off pets frequently.
- Create children's play areas (for example, raised sandboxes or rubber mats below play areas).
- Vacuum and dust the home at least weekly.

Cleanup Notification

Remedy Completion Report

For all completed cleanup, certification of a completed remedy (referred to as an RCR form) will be required. The RCR form will apply to **all** subdivisions, to be submitted prior to final subdivision approval; and to larger multifamily developments that are subject to SEPA, to be submitted prior to issuance of a certificate of occupancy. The intention of the RCR form is to provide clear, concise

information on how the model remedy approach was implemented on a property. It is intended that the RCR form be filled out and signed by a qualified professional. The following components are suggested for the RCR form and could be listed on a form with check boxes indicating completion:

- Map of the property (obtained from assessor database or similar) with sample locations
- Photos showing components of the completed cleanup action (maximum of ten)
- Analytical lab reports and tabulated data
- Brief description of implemented remedy (anticipated to be 1 to 2 pages in length)
- Signature of qualified professional confirming that the model remedy was used to complete the actions on the property

CCRs and Plat Notes

If a completed cleanup action leaves contamination in place (soft capping, hard capping), the following notes are required on the face of the plat, and the CCRs outlined below will be recorded with the County Auditor's office prior to final plat approval (for **all** subdivisions) or before a certificate of occupancy is issued for a multifamily development project.

The following notes shall be placed on the face of the plat prior to final subdivision approval:

a) The subject property has been reviewed for potential legacy pesticides in the soil by the State of Washington Department of Ecology. The State Department of Ecology has either not identified the subject property as containing legacy pesticides, or has confirmed to its satisfaction that applicable remedies to remove and/or mitigate potential harmful effects of legacy pesticides have been implemented.

b) Soils included on the areas identified as "Historical Orchard Area" likely contain lead and arsenic at concentrations exceeding Washington State cleanup standards. To prevent exposure, these soils have been covered with an orange marker material followed by a selected capping technique authorized by Ecology's *"Model Remedy for Central Washington LA Pesticide Contamination on Historical Orchards"* in areas that are not covered by a permanent surface (buildings, asphalt, concrete, rock or compacted gravel).

c) If you must dig into soils beneath the marker material, set aside the clean surface soil and use it to re-cover the area at the completion of your project.

d) All builders and future owners of homes located within the Historical Orchard areas identified hereon must comply with the conditions set forth in the *Covenants, Conditions and Restrictions* regarding activities within the Historical Orchard.

The following CCRs shall be recorded with the County Auditor's office prior to final subdivision approval:

a) During construction of residences on the Historical Orchard, the Developer will (or the Developer will require the builder to) implement the following:

i. Implement "Construction Best Management Practices" identified in the Model Remedy for Central Washington LA Pesticide Contamination on Historical Orchards".

ii. Implement the following safeguards to protect workers against exposure to potential lead and arsenic in soil:

(a) Requirements to wash hands before eating or drinking on site and to wash boots at the end of the day, before leaving the site

(b) Requirements for workers to wear gloves while handling contaminated soil

(c) Assessment of requirements for complying with federal and state safety regulations

iii. Place 6 inches of clean soil cover on top of soils in all landscaped areas that will be used by residents (e.g., grass lawns, play areas, parks, and developed common areas).

iv. Use clean dirt from the stockpile made available by the Developer, or other topsoil that has been tested for an appropriate suite of contaminants, including lead and arsenic, and approved by Ecology.

v. All areas of each residential lot within the Historical Orchard must be covered with one of the following surfaces:

(a) Permanent impermeable surfaces such as concrete, asphalt, building foundations or other permanent surfaces of at least 3 inches in thickness.

(b) 6 inches of clean soil on top of a marker material such as Tenax Guardian Visual Barrier.

(c) 6 inches of rock, compacted gravel, or other material approved by Ecology on top of a marker material as described above.

b) Based on historical agricultural use of the Property, the soil within that portion of the Property identified as Historical Orchard areas is likely to contain lead and/or arsenic contamination in shallow soils due to pesticide management practices that were legal prior to 1950. The following best management practices are important for managing risks associated with long-term regular contact with contaminated soil.

i. All fruit and vegetable gardens shall be in raised beds, with imported clean soil.

ii. Following the completion of each residence, including landscaping, further excavation and ground disturbing activities are prohibited, unless the area disturbed is properly capped with clean soil on top of a marker material or otherwise encapsulated with impervious surfaces.

iii. A marker has been placed on top of soils in areas that are capped with 6 inches of clean soil. If an Owner encounters the marker, all soil beneath that marker potentially contains impacted soils and must be buried, at depth, below 6 inches of clean soil.

iv. Wash hands with soap after working or playing in the dirt.

v. Ensure grass is kept up so no bare patches of soil are present

vi. Remove shoes prior to entering the home.

vii. Wash children's toys and pacifiers frequently.

viii. Wear shoes and gloves when gardening and working outdoors.

ix. Wash all fruits and vegetables before eating.

x. Wash dirt off pets frequently.

xi. Create children's play areas (for example, raised sand boxes or rubber mats below play areas).

xii. Vacuum and dust the home at least weekly.

SELF-CERTIFICATION

It is recommended that there be an option for self-certification of completed Model Remedy cleanup actions completed for smaller projects (single-family building permits and those smaller multifamily development projects that are exempt from SEPA) that would be required before a certificate of occupancy can be issued. These self-certification statements would be notarized and include the following:

- A statement of the awareness that the property is in an area affected by historical orchard practices and potential lead and arsenic contamination.
- And, either:
  - The requirements of CCRs and plat notes required by the model remedy have been implemented during construction; or
  - A cleanup technology as outlined in the recommended model remedy for on-site building construction has been implemented (for those existing lots that were subdivided and developed before our proposed new process went into effect)
- An acknowledgement that the presence of potential lead and arsenic contamination is required by state law to be disclosed at the point in time the property is sold.
- Signature of the property owner (for spec houses, this would be the builder/contractor; if it is a custom build, the homeowner and builder/contractor would have to sign).

APPENDIX C

SAMPLE SEPA COMMENTS & INFORMATIONAL LETTERS

Introduction

The following are SEPA comments and informational letters that Ecology has provided as examples of their communication that may be supplied to potential applicants for development projects. Once the recommended approach is finalized and ready for implementation, Ecology will develop a letter describing the new model remedy approach to local government permitting agencies to help with implementation of the new program. This letter will outline the new process including timeline and next steps, as well as providing information on how jurisdictions and applicants can access available resources and tools. It is also anticipated the below templates for SEPA comments and applicant letters will be provided to the jurisdiction so they can be shared with applicants as early as possible in their development permit process.

SEPA Comments

Below are sample comment letters that Ecology would submit during the development permit review process for projects subject to a review under the provisions of the State Environmental Policy Act (SEPA). The first example would be for a project application where the project proponent has not been in contact prior to submitting their applications to the local government, and/or that does not include any of the new Model Remedy provisions. The second example would be for a project application where the project proponent has been in contact with Ecology and has included the Model Remedy components in their application materials.

No Pre Application Contact with Ecology

"Thank you for the opportunity to comment on your proposed project.

Our information shows your project is located on a historical orchard where lead arsenate was frequently used as a pesticide, often resulting in shallow soil contamination from lead and/or arsenic. Before proceeding, your project is **required to conduct soil sampling** under the Model Toxics Control Act (Chapter 173-340 WAC).

The Department of Ecology has adopted a Model Remedy for lead and arsenic pesticide contamination in historical areas of Central Washington that outlines soil sampling and cleanup techniques, as well as providing additional measures to adequately manage human health impacts from exposure to contaminated soil. Ecology provides free initial sampling as well as free technical assistance to help with efficient and cost effective cleanup for your project, if necessary.

Compliance with the Model Remedy will ensure your project meets the minimum standards of the Model Toxics Control Act, and if implemented as described, your property will be successfully remediated to Washington State standards.

Please contact Jeff Newschwander, Project Coordinator, at 509-388-5223, to schedule your initial sampling and for further information."

Pre Application Contact with Ecology/Model Remedy Included

"Thank you for the opportunity to comment on your proposed project.

Our information shows your project is located on a historical orchard where lead arsenate was frequently used as a pesticide, often resulting in shallow soil contamination from lead and/or arsenic.

The provided project application materials demonstrate compliance with the Department of Ecology Model Remedy for lead and arsenic pesticide contamination in historical areas of Central Washington.

Compliance with the Model Remedy ensures your project meets the minimum standards of the Model Toxics Control Act, and if implemented as described, your property will be successfully remediated to Washington State standards.

Please contact Jeff Newschwander Project Coordinator, at 509-388-5223 for further information."

INFORMATIONAL LETTERS

The example letters below are those that could be provided to a lender to assist with securing a mortgage, based on any Model Remedy actions that may have been completed on the site.

Remediation Plan Developed

"Dear property owner:

Soil sampling results show that your property located at [address] has concentrations of lead and arsenic above state cleanup levels.

We appreciate the submittal of your soil remediation plan.

Your soil remediation plan meets the minimum standards of the Model Toxics Control Act. If your soil remediation plan is implemented as described, your property will be successfully remediated to Washington State standards.

Please contact Jeff Newschwander, Project Coordinator, at 509-388-5223 for further information."

Soil Sampling Has Occurred

"Dear property owner:

Thank you for sampling your property. Lead and/or arsenic are above state cleanup levels, and require cleanup.

We will work with you to make sure your property has a plan for cleanup that meets state regulations.

Please contact Jeff Newschwander, Project Coordinator, at 509-388-5223 for further information."

Soil Cleanup Has Occurred

"Dear property owner:

Thank you for completing cleanup of the property located at [address]. We have reviewed the report describing the cleanup, and find that it meets the standards of the Model Toxics Control Act.

Regulations require that you disclose this information to future buyers. It will also be available on Ecology's website at: https://apps.ecology.wa.gov/dirtalert/

We appreciate your commitment and willingness to address this issue.

Should you have additional questions, please contact Jeff Newschwander, Project Coordinator, at 509-388-5223."

APPENDIX D

SOIL BANK COST ESTIMATES

MAUL FOSTER ALONGI

Table 1
Clean Soil Bank Order of Magnitude Cost Estimate
Chelan County Department of Natural Resources

Item	Cost (low)	Cost (High)
Office	$5,000	$70,000
Basic soil testing equipment	$1,000	$15,000
Loader	$30,000	$100,000
Concrete eco blocks	$50,000	$50,000
Stormwater infrastructure	$3,000	$10,000
Perimeter fence and gates	$15,000	$25,000
Onsite gravel roads	$30,000	$30,000
Stabilization (winterizing)	$5,000	$10,000
Subtotal	$139,000	$310,000
Contingency (50%)	$69,500	$155,000
Total	**$200,000**	**$475,000**

MAUL FOSTER ALONGI

Table 2
Soil Repository Order of Magnitude Cost Estimate
Chelan County Department of Natural Resources

Item	Cost (low)	Cost (High)
Office	$5,000	$70,000
Loader	$30,000	$100,000
Excavator	$40,000	$80,000
Compactor	$5,000	$40,000
Concrete Eco Blocks	$50,000	$50,000
Perimeter fence and gates	$15,000	$25,000
Onsite gravel roads	$30,000	$30,000
Winterizing and Stabilization	$5,000	$5,000
Wheel Wash	$15,000	$15,000
Top Liner	$150,000	$300,000
Stormwater	$3,000	$10,000
Bottom Liner	None	$300,000
Subtotal	$348,000	$1,025,000
Total with contingency (50%)	$174,000	$512,500
Total	**$525,000**	**$1,600,000**

MAUL FOSTER ALONGI

Table 3
Soil Treatment Order of Magnitude Cost Estimate
Chelan County Department of Natural Resources

Item	Cost (low)	Cost (High)
Office	$5,000	$70,000
Basic Soil Testing Equipment	$1,000	$15,000
Loader	$30,000	$100,000
Excavator	$40,000	$80,000
Concrete eco blocks	$50,000	$50,000
Stormwater infrastructure	$3,000	$10,000
Perimeter Fence and Gates	$15,000	$25,000
Onsite gravel roads	$30,000	$30,000
Winterizing and Stabilization	$5,000	$10,000
Cover Structure	$7,000	$15,000
Truck Scales	$150,000	$250,000
Soil Hopper	$30,000	$60,000
Leaching Tank	$20,000	$40,000
Acid Tanks	$20,000	$40,000
Precipitation Tanks	$40,000	$60,000
Wash water Tanks	$20,000	$40,000
Sand Screws	$10,000	$45,000
Log Washers	$20,000	$45,000
Jigs	$10,000	$20,000
Filter press	$30,000	$60,000
Subtotal	$536,000	$1,065,000
Contingency (50%)	$268,000	$532,500
Total	**$800,000**	**$1,600,000**

APPENDIX E

DETAILED COMPARATIVE SCENARIO COST ESTIMATES

Table 1
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Single Family Home - MTCA Baseline Scenario	MAUL FOSTER ALONGI
Project: Legacy Pesticide Working Group	2815 2nd Avenue, Suite 540
Client: Chelan County Department of Natural Resources	Seattle, WA 98121
Project #/Task #: 1938.01.01	(206) 858-7620
Prepared By: Evelyn Lundeen, EIT	
Checked By: Michael Tarbert, EIT	www.maulfoster.com
Date: 12/3/2020	
Revision #:	

Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Mobilization/Demobilization	LS	$13,000	1	$13,000
Temporary Erosion and Sediment Controls	LS	$1,000	1	$1,000
Excavation				
Excavation and Material Handling	BCY	$10	740	$7,400
Confirmation Sampling	EA	$40	4	$160
Off-site Waste Transportation and Disposal	TON	$70	1,200	$84,000
Import and Place Backfill	LCY	$42	850	$35,700
Direct Construction Cost Subtotal				$141,260
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Tier II Sampling	LS	$200	1	$200
Project Management	LS	$8,000	1	$8,000
Remedial Design	LS	$21,000	1	$21,000
Construction Management	LS	$14,000	1	$14,000
Indirect Cost Subtotal				$43,200
Subtotal				$184,460
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$185,000**

NOTES:
BCY = bank cubic yard.
EA = each.
LCY = loose cubic yard.
LS = lump sum.

Table 2
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Single Family Home - Model Remedy Scenario	MAUL FOSTER ALONGI
Project: Legacy Pesticide Working Group	
Client: Chelan County Department of Natural Resources	
Project #/Task #: 1938.01.01	2815 2nd Avenue, Suite 540
Prepared By: Evelyn Lundeen, EIT	Seattle, WA 98121
Checked By: Michael Tarbert, EIT	(206) 858-7620
Date: 12/3/2020	
Revision #:	www.maulfoster.com

Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Soft Cap				
Demarcation fabric	SY	$2	250	$500
Import and place clean soil cap	LCY	$42	90	$3,800
Import and place sod	MSF	$410	6.7	$2,700
Direct Construction Cost Subtotal				$7,000
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Tier II Sampling	LS	$200	1	$200
Construction Management	LS	$700	1	$700
Indirect Cost Subtotal				$900
Subtotal				$7,900
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$8,000**

NOTES:
LCY = loose cubic yard.
LS = lump sum.
MSF = thousand square feet.
SY = square yard.

Table 3
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Small Subdivision - MTCA Baseline Scenario	MAUL FOSTER ALONGI
Project: Legacy Pesticide Working Group	2815 2nd Avenue, Suite 540
Client: Chelan County Department of Natural Resources	Seattle, WA 98121
Project #/Task #: 1938.01.01	(206) 858-7620
Prepared By: Evelyn Lundeen, EIT	
Checked By: Michael Tarbert, EIT	www.maulfoster.com
Date: 12/3/2020	
Revision #:	

Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Mobilization/Demobilization	LS	$45,400	1	$45,400
Temporary Erosion and Sediment Controls	LS	$6,000	1	$6,000
Excavation				
Excavation and Material Handling	BCY	$10	7,780	$77,800
Confirmation Sampling	LS	$40	20	$800
Off-site Waste Transportation and Disposal	TON	$70	11,670	$816,900
Import and Place Backfill	LCY	$42	8,940	$375,480
Direct Construction Cost Subtotal				$1,322,400
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Tier II Sampling	LS	$800	1	$800
Project Management	LS	$27,000	1	$27,000
Remedial Design	LS	$54,000	1	$54,000
Construction Management	LS	$36,000	1	$36,000
Indirect Cost Subtotal				$117,800
Subtotal				$1,440,200
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$1,440,000**

NOTES:
BCY = bank cubic yard.
EA = each.
LCY = loose cubic yard.
LS = lump sum.

Table 4
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Small Subdivision - Model Remedy Scenario	
Project: Legacy Pesticide Working Group	
Client: Chelan County Department of Natural Resources	
Project #/Task #: 1938.01.01	
Prepared By: Evelyn Lundeen, EIT	
Checked By: Michael Tarbert, EIT	
Date: 12/3/2020	
Revision #:	

MAUL FOSTER ALONGI

2815 2nd Avenue, Suite 540
Seattle, WA 98121
(206) 858-7620

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Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Soft Capping				
Demarcation Fabric	SY	$2	7,400	$12,580
Import and place clean soil cap	LCY	$42	940	$39,480
Import and place sod	MSF	$410	66.2	$27,100
Direct Construction Cost Subtotal				$52,100
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Design-Phase Sampling	LS	$800	1	$800
Project Management	LS	$3,000	1	$3,000
Remedial Design	LS	$5,000	1	$5,000
Construction Management	LS	$5,200	1	$5,200
Indirect Cost Subtotal				$14,000
Subtotal				$66,100
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$66,000**

NOTES:
LCY = loose cubic yard.
LS = lump sum.
MSF = thousand square feet.
SY = square yard.

Table 5
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Large Subdivision - MTCA Baseline Scenario	MAUL FOSTER ALONGI
Project: Legacy Pesticide Working Group	
Client: Chelan County Department of Natural Resources	
Project #/Task #: 1938.01.01	2815 2nd Avenue, Suite 540
Prepared By: Evelyn Lundeen, EIT	Seattle, WA 98121
Checked By: Michael Tarbert, EIT	(206) 858-7620
Date: 12/3/2020	
Revision #:	www.maulfoster.com

Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Mobilization/Demobilization	LS	$570,300	1	$570,300
Temporary Erosion and Sediment Controls	LS	$100,000	1	$100,000
Excavation				
Excavation and Material Handling	BCY	$10	97,800	$978,000
Confirmation Sampling	LS	$40	60	$2,400
Off-site Waste Transportation and Disposal	TON	$70	146,670	$10,266,900
Import and Place Backfill	LCY	$42	112,440	$4,722,480
Direct Construction Cost Subtotal				$16,640,100
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Tier II Sampling	LS	$2,500	1	$2,500
Project Management	LS	$285,000	1	$285,000
Remedial Design	LS	$342,000	1	$342,000
Construction Management	LS	$342,000	1	$342,000
Indirect Cost Subtotal				$971,500
Subtotal				$17,611,600
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$17,612,000**

NOTES:
BCY = bank cubic yard.
EA = each.
LCY = loose cubic yard.
LS = lump sum.

Table 6
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Large Subdivision - Model Remedy Scenario	MAUL FOSTER ALONGI
Project: Legacy Pesticide Working Group	
Client: Chelan County Department of Natural Resources	
Project #/Task #: 1938.01.01	2815 2nd Avenue, Suite 540
Prepared By: Evelyn Lundeen, EIT	Seattle, WA 98121
Checked By: Michael Tarbert, EIT	(206) 858-7620
Date: 12/3/2020	
Revision #:	www.maulfoster.com

Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Soil Consolidation				
Excavation and Material Handling	BCY	$10	1,200	$12,000
Soft Capping				
Place Demarcation Fabric	SY	$2	85,000	$144,500
Import and Place Backfill	LCY	$42	18,740	$787,080
Import and place sod	MSF	$410	765.2	$313,700
Direct Construction Cost Subtotal				$943,600
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Design-Phase Sampling	LS	$2,500	1	$2,500
Project Management	LS	$28,000	1	$28,000
Remedial Design	LS	$15,000	1	$15,000
Construction Management	LS	$56,700	1	$56,700
Indirect Cost Subtotal				$102,200
Subtotal				$1,045,800
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$1,046,000**

NOTES:
BCY = bank cubic yard.
LCY = loose cubic yard.
LS = lump sum.
MSF = thousand square feet.
SY = square yard.

Table 7
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Multifamily Development - MTCA Baseline Scenario	MAUL FOSTER ALONGI
Project: Legacy Pesticide Working Group	
Client: Chelan County Department of Natural Resources	
Project #/Task #: 1938.01.01	2815 2nd Avenue, Suite 540
Prepared By: Evelyn Lundeen, EIT	Seattle, WA 98121
Checked By: Michael Tarbert, EIT	(206) 858-7620
Date: 12/3/2020	
Revision #:	www.maulfoster.com

Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Mobilization/Demobilization	LS	$37,700	1	$37,700
Temporary Erosion and Sediment Controls	LS	$6,000	1	$6,000
Excavation				
Excavation and Material Handling	BCY	$10	6,450	$64,500
Confirmation Sampling	LS	$40	20	$800
Off-site Waste Transportation and Disposal	TON	$70	9,680	$677,600
Import and Place Backfill	LCY	$42	7,420	$311,640
Direct Construction Cost Subtotal				$1,098,200
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Tier II Sampling	LS	$800	1	$800
Project Management	LS	$23,000	1	$23,000
Remedial Design	LS	$45,000	1	$45,000
Construction Management	LS	$30,000	1	$30,000
Indirect Cost Subtotal				$98,800
Subtotal				$1,197,000
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$1,197,000**

NOTES:
BCY = bank cubic yard.
EA = each.
LCY = loose cubic yard.
LS = lump sum.

Table 8
Comparative Scenario Cost Estimate
Chelan County Department of Natural Resources

New Multifamily Development - Model Remedy Scenario	
Project: Legacy Pesticide Working Group	
Client: Chelan County Department of Natural Resources	
Project #/Task #: 1938.01.01	
Prepared By: Evelyn Lundeen, EIT	
Checked By: Michael Tarbert, EIT	
Date: 12/3/2020	
Revision #:	

MAUL FOSTER ALONGI

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Direct Construction Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Soft Capping				
Demarcation Fabric	SY	$2	4,800	$8,160
Import and place clean soil cap	LCY	$42	610	$25,620
Import and place sod	MSF	$410	43.1	$17,700
Direct Construction Cost Subtotal				$33,800
Indirect Costs	**Units**	**Unit Cost**	**No. of Units**	**Total**
Design-Phase Sampling	LS	$800	1	$800
Project Management	LS	$2,000	1	$2,000
Remedial Design	LS	$5,000	1	$5,000
Construction Management	LS	$3,400	1	$3,400
Indirect Cost Subtotal				$11,200
Subtotal				$45,000
CONSTRUCTION SUBTOTAL (rounded to the nearest thousand)				**$45,000**

NOTES:
LCY = loose cubic yard.
LS = lump sum.
MSF = thousand square feet.
SY = square yard.

APPENDIX F

EXAMPLE CONDITIONS OF APPROVAL

Below is language that is integral to success of the proposed recommended model remedy approach described in Chapter 3. This language is proposed to be included in the local government land use and building permit approval process.

Preliminary Approval Conditions Language: The following conditions of approval are included in the Notice of Decision for all subdivision applications (short and long),[1] and for each multifamily development project that is subject to SEPA review.[2]

1. The subject property is located in an area of known historical orchards and is likely to contain lead and/or arsenic contamination in shallow soils due to pesticide management practices that were legal prior to 1950. The boundary of the historical orchard that may contain the legacy pesticides, as identified by the Washington State Department of Ecology (Ecology) mapping resources, has been delineated on Exhibit "A" ("Historical Orchard Areas"). The project is required to comply with the *"Model Remedy for Central Washington LA Pesticide Contamination on Historical Orchards."* A Remedy Completion Report (Self Certification for short subdivision) shall be completed and submitted prior to final subdivision approval (Certificate of Occupancy for multifamily developments).
2. The following notes shall be placed on the face of the plat prior to final subdivision approval:
   A. The subject property has been reviewed for potential legacy pesticides in the soil by the State of Washington Department of Ecology. The State Department of Ecology has either not identified the subject property as containing legacy pesticides or has confirmed to its satisfaction that applicable remedies to remove and/or mitigate potential harmful effects of legacy pesticides have been implemented.
   B. Soils included on the areas identified as "Historical Orchard Area" likely contain lead and arsenic at concentrations exceeding Washington State cleanup standards. To prevent exposure, these soils have been covered with an orange marker material followed by a selected capping technique authorized by Ecology's *"Model Remedy for Central Washington LA Pesticide Contamination on Historical Orchards"* in areas that are not covered by a permanent surface (buildings, asphalt, concrete, rock or compacted gravel).
   C. If you must dig into soils beneath the marker material, set aside the clean surface soil and use it to re-cover the area at the completion of your project.
   D. All builders and future owners of homes located within the Historical Orchard areas identified hereon must comply with the conditions set forth in the *Covenants, Conditions and Restrictions* (CCRs) regarding activities within the Historical Orchard.
3. The following CCRs shall be recorded with the County Auditor's office prior to final subdivision approval:
   A. During construction of residences on the Historical Orchard, the Developer will (or the Developer will require the builder to) implement the following:

[1] Regulatory Authority for including conditions of approval for short and long subdivisions is based in part on RCW 58.17.110(1)(a), *"…appropriate provisions are made for, but not limited to, the public health, safety, and general welfare…"*

[2] Regulatory Authority for including conditions of approval for multifamily development projects subject to SEPA review is based in part on RCW 43.21C.030.

i. Implement "Construction Best Management Practices" identified in the Model Remedy for Central Washington LA Pesticide Contamination on Historical Orchards".

ii. Implement the following safeguards to protect workers against exposure to potential lead and arsenic in soil:

a. Requirements to wash hands before eating or drinking on site and to wash boots at the end of the day, before leaving the site.

b. Requirements for workers to wear gloves while handling contaminated soil

c. Assessment of requirements for complying with federal and state safety regulations

iii. Place 6 inches of clean soil cover on top of soils in all landscaped areas that will be used by residents (e.g., grass lawns, play areas, parks, and developed common areas).

iv. Use clean dirt from the stockpile made available by the Developer, or other topsoil that has been tested for an appropriate suite of contaminants, including lead and arsenic and approved by Ecology.

v. All areas of each residential lot within the Historical Orchard must be covered with one of the following surfaces:

    a. Permanent impermeable surfaces such as concrete, asphalt, building foundations or other permanent surfaces.

    b. 6 inches of clean soil on top of a marker material such as Tenax Guardian Visual Barrier.

    c. 6 inches of rock, compacted gravel, or other material approved by Ecology on top of a marker material as described above.

vi. Based on historical agricultural use of the Property, the soil within that portion of the Property identified as Historical Orchard Areas is likely to contain lead and/or arsenic contamination in shallow soils due to pesticide management practices that were legal prior to 1950. The following best management practices are important for managing risks associated with long-term regular contact with contaminated soil.

    a. All fruit and vegetable gardens shall be in raised beds, with imported clean soil.

    b. Following the completion of each residence, including landscaping, further excavation and ground disturbing activities are prohibited, unless the area disturbed is properly capped with clean soil on top of a marker material or otherwise encapsulated with impervious surfaces.

    c. A marker has been placed on top of soils in areas that are capped with 6 inches of clean soil. If an Owner encounters the marker, all soil beneath that marker potentially contains impacted soils and must be buried, at depth, below 6 inches of clean soil.

    d. Wash hands with soap after working or playing in the dirt

    e. Ensure grass layer is kept up so no bare patches of soil are present

f. Remove shoes prior to entering the home.

g. Wash children's toys and pacifiers frequently.

h. Wear shoes and gloves when gardening and working outdoors.

i. Wash all fruits and vegetables before eating.

j. Wash dirt off pets frequently.

k. Create children's play areas (for example, raised sand boxes or rubber mats below play areas).

l. Vacuum and dust the home at least weekly.