COLUMBIA SLOUGH ALTERNATIVE REMEDIAL MEASURES WORK PLAN

June 2024

Interim DEQ Approval: October 30, 2023

Workplan Amendment Date: June 5, 2024

Prepared for

Oregon Department of Environmental Quality

Prepared by

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Abbreviations and Acronyms

ARM	Alternative Remedial Measure
BES	City of Portland Bureau of Environmental Services
BIPOC	Black, Indigenous, and People of Color
CEL	Community Engagement Liaison
CIP	Capital Improvement Program
City	City of Portland
DEQ	Oregon Department of Environmental Quality
FS	Feasibility Study
Interim Work Plan	Interim Columbia Slough Alternative Remedial Measures Work Plan
O&M	Operations and Maintenance
PBOT	Portland Bureau of Transportation
ROD	Record of Decision

SECTION 1

Schedule and Objectives

This *Columbia Slough Alternative Remedial Measures* (ARMs) *Work Plan* (Work Plan) was prepared by the City of Portland (City) in conformance with the Consent Judgment Statement of Work. This Interim Work Plan describes the process the City will use to select and implement ARMs within the Columbia Slough watershed.

In agreement with the Oregon Department of Environmental Quality (DEQ) 2005 Columbia Slough Sediment Record of Decision (ROD) (DEQ, 2005), ARMs will be selected that improve the Columbia Slough's watershed health (e.g., restoration work, floodplain connection, or property acquisition to protect riparian and wetland areas). ARMs may also augment existing or planned in-water or upland remediation work (e.g., cut/fill opportunities or beneficial research) and incorporate public benefits or improve equity-focused opportunities (e.g., access, educational, community, or recreational opportunities) for underserved communities.

The key deliverables and schedule are listed below:

Submittals	Schedule
Semi-Annual Progress Reports	To DEQ on or before the tenth day of the second and fourth quarter (April 10, October 10)
Interim Alternative Remedial Measures Work Plan	The Interim Work Plan was approved by DEQ on October 30, 2023, and becomes final upon execution of the Consent Judgment. The Interim Plan noted that if the Scope of Work for this task is modified pursuant to the Consent Judgment's public comment or judicial process, then the City would submit an amendment to this Work Plan to DEQ for approval within 45 days of the entry of the Consent Judgment to incorporate the relevant changes. The Consent Judgment was entered on May 8th, 2024, and the changes to the Interim Work Plan are provided in this final document.
Initial List of Alternative Remedial Measures	The Initial List of Alternative Remedial Measures will be submitted to DEQ within 1.5 years of entry of the Consent Judgement.
	DEQ will review and approve within 30 business days of receipt of list.

Submittals	Schedule
Alternative Remedial Measures Evaluation and Selection Report	A Final Alternative Remedial Measures Evaluation and Selection Report will be submitted to DEQ within 2 years of entry of the Consent Judgment.
	DEQ will review and approve within 45 business days of receipt of report.
Project Design, Construction Completion, and Final Implementation Summary Report	
ARMs will be installed, constructed, or otherwise substantially completed within 15 years of the entry of the Consent Judgment. Design and construction of ARMs will be phased over the 15-year duration of the Consent Judgment to accommodate the scale, complexities, costs, and opportunities of specific ARM actions. A Final ARM Implementation Summary Report will be prepared, and a copy of this report will be provided to DEQ to demonstrate project completion. If applicable, any as-built drawings will be provided and made publicly available through https://www.portlandmaps.com/.	

SECTION 2

Background

In July 2005, DEQ issued a ROD for the Columbia Slough to address contaminated sediments posing unacceptable risk to human health and various ecological receptors. The ROD (DEQ, 2005) describes the DEQ-selected remedial action approach for the Columbia Slough, which includes: source control, sediment hot spot cleanup, ARMs, natural recovery, institutional controls, and long-term monitoring.

The ROD states that where cleanup to baseline concentrations does not result in achievement of risk-based concentrations, an alternative for responsible parties is to complete "*. . .additional remedial measures at their site or in the Slough watershed in general geared toward achieving protectiveness in the Slough overall. . .*" (DEQ, 2005). Although language within the ROD focuses on measures that would "reduce contaminant inputs to the Slough," the Slough's watershed health could be improved through a variety of actions in addition to those that reduce environmental contaminants and improve sediment quality. ARMs that improve hydrology, physical habitat, water quality, and biological communities (i.e., *2005 Portland Watershed Management Plan* goals [BES, 2006]) can support the ecological endpoints of growth, survival, and reproduction identified by DEQ in its Ecological Risk Assessment guidance (DEQ, 2020). In addition, existing and/or planned in-water and upland remedies designed to reduce or limit exposure to contaminated media frequently require measures to restore, repair, or balance impacts to the environment in the vicinity of the construction or implementation area. Such measures serve to improve watershed health within the vicinity of the remedy footprint and can increase the long-term reliability of the remedy itself.

For this Interim Work Plan, ARMs are defined as an action or group of actions conducted within the Columbia Slough watershed that are determined to provide a known benefit to improve watershed health.

SECTION 3

Funding for ARMs Projects

The City will substantially complete one or more ARM projects within the Columbia Slough watershed within 15 years of entry of the Consent Judgment at a total Implementation Cost (defined below) not to exceed four million dollars. ARMs will be approved by DEQ in advance of implementation as part of the evaluation and selection process (see Section 4). Implementation Costs mean the following types of activities or purchases:

- Land acquisition or land easement acquisition for the purpose of ARM implementation;
- Construction work, including equipment, labor, permit fees, and materials;
- Research regarding Slough restoration or remediation (e.g., benthic invertebrate research, cut/fill evaluation, etc.) including sampling, analysis, and data management;
- Project design and planning not performed by City personnel;
- Pre-implementation characterization of project feasibility, including environmental investigations (sample collection and analysis), geotechnical investigations, data management and habitat evaluation; and
- Public activity/education events.

These activities may be performed by the City or by contractors at the City's discretion.

Implementation Costs do not include:

- Routine, ongoing City maintenance activities;
- City staff and administrative costs, including preparation of performance and reporting submittals required by this Interim Work Plan;
- Coordination between City project managers and DEQ regarding the ARMs;
- Community outreach conducted by the City; or
- DEQ oversight costs.

As a component of the selection process, the City will prepare an estimated budget for each ARM, detailing the expected Implementation Costs. Operations and maintenance (O&M) costs for the first 10 years of operation may be proposed to be part of the Implementation Costs if they are critical to functioning of the ARM and exceed routine City maintenance activities. Incurred Implementation Costs will be tracked and provided to DEQ in Semi-Annual Progress Reports. Satisfaction of the City's ARM performance obligation will be met based on incurred Implementation Costs and, if included, by proposed estimated long-term O&M costs for the first 10 years.

SECTION 4

ARM Proposal, Evaluation, and Selection Process

The ARM selection process will seek to maximize the impact or benefits to improve watershed health within the amount of the City's implementation obligation.

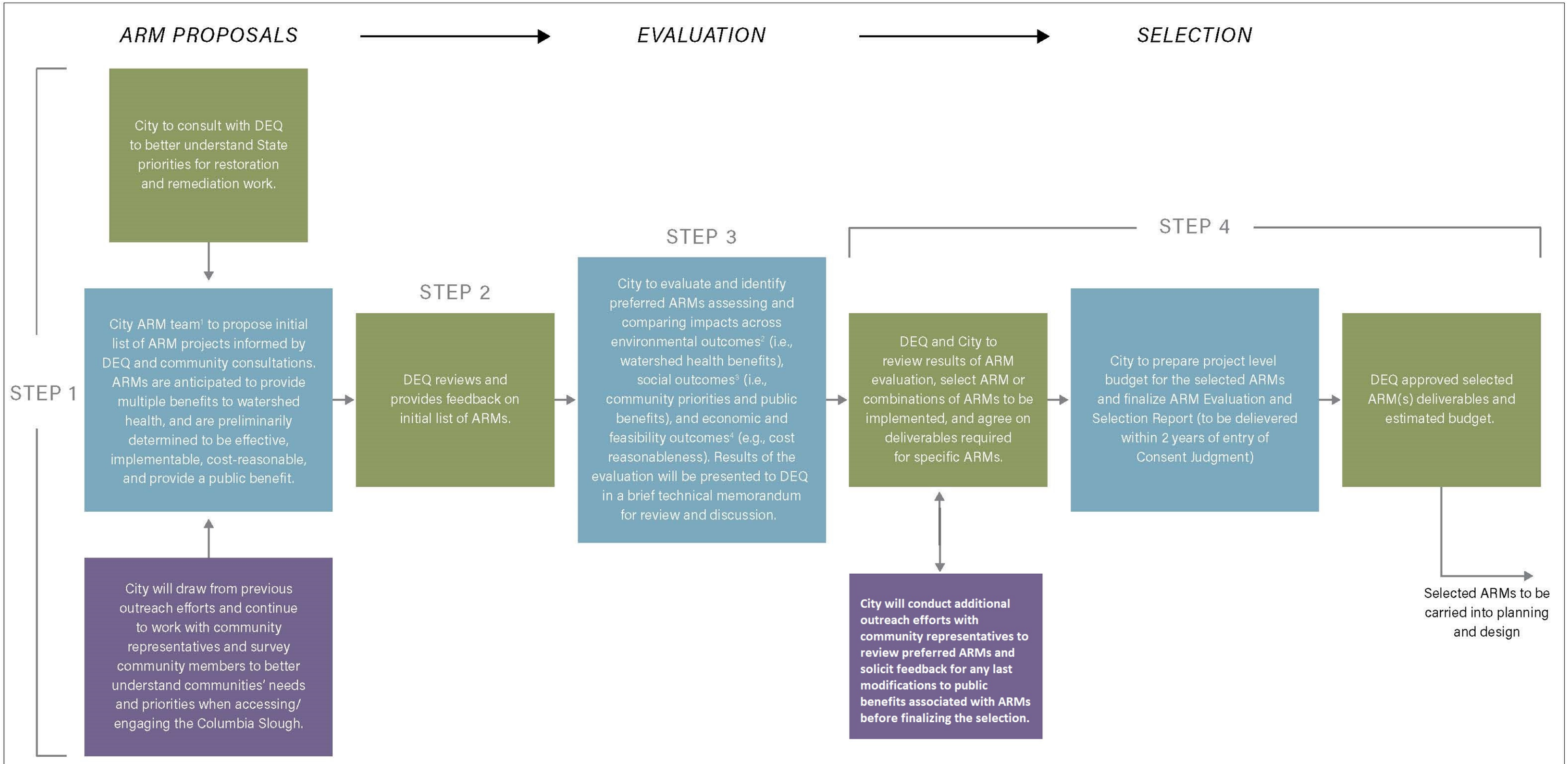
The selection process consists of the following steps and deliverables:

1. **Initial ARM Proposals.** The City will generate an initial list of ARM proposed projects that are informed by the City's and DEQ's existing expertise of Columbia Slough watershed health issues, as well as community priorities identified in community consultations and public outreach efforts. The City will draw from previously conducted community outreach and may conduct additional outreach as warranted. The City will conduct a preliminary evaluation of the ARM proposals to identify a focused list of project proposals that maximize watershed health improvements, provide clearly identified and needed community benefits, and/or meet multiple City and DEQ watershed health objectives. The initial list of ARM proposals along with proposed evaluation criteria for watershed health uplift and social benefits as described in further detail in Step 3 will be provided to DEQ within 1.5 years of entry of the Consent Judgment.
2. **DEQ reviews and provides feedback on the initial list of ARM(s).** DEQ will provide feedback on proposed ARM projects and evaluation criteria within 30 business days of receipt of the initial list of ARM proposals.
3. **Evaluation and identification of preferred ARM(s)**. Similar to a triple bottom line analysis, the City will perform a balancing evaluation of the initial ARM proposals as modified by DEQ input that compares watershed health benefits, social benefits, and economic feasibility with DEQ-approved evaluation criteria as described in Step 1.
    a. Watershed health is measured against select Columbia Slough watershed health criteria identified as priorities by both the City and DEQ (e.g., riparian habitat restoration and flood plain connectivity).
    b. Social benefits include family, cultural, and recreational opportunities; safe access to the Slough; opportunities for job or skill training; and other needs and priorities identified during community consultations and public outreach efforts.
    c. Economic feasibility is based on preliminary cost estimates (i.e., typically within +50% to - 30% if implemented) with the goal of achieving the greatest impact from the allotted funds. The City will prepare an estimated budget of life-cycle costs, including implementation costs, for each of the ARM(s) so that the cost-benefit can be evaluated and compared between each proposed action.

The City will prepare a draft ARMs Evaluation and Selection Report summarizing the evaluation of each ARM proposal for DEQ review. The draft report will include recommended alternatives.

4. **Selection of preferred ARM(s).**
    a. DEQ and the City will confer and select the ARM(s) to be implemented. DEQ and the City will agree on the deliverables required for specific ARMs as warranted (e.g., standard design deliverables for a construction project or sampling plans for research projects).
    b. The City will then make any necessary revisions to the evaluations for the selected ARM(s) (e.g., updates to package of ARM proposals, life-cycle costs, etc.) and submit a final ARMs Evaluation and Selection Report to DEQ within 2 years of entry of the Consent Judgment.
    c. DEQ will approve the final report with the deliverables and estimated budget for the selected ARM(s).

The steps and evaluation processes are discussed below in Sections 4.1 through 4.4. Key deliverables and decision points within the selection process are also depicted in Figure 1.



LEGEND

- City Deliverable/Evaluation
- DEQ Consultation or Approval
- Community Consultation

NOTES

1. City has personnel with expertise specifically focused on the Columbia Slough including biologists, revegetation, fisheries, and watershed health.
2. ARM proposals to be evaluated for watershed health benefits. Evaluation criteria will include Columbia Slough watershed health criteria identified by the City and DEQ as priorities in previous studies (e.g., riparian habitat restoration, floodplain connectivity, etc.).
3. Social outcomes will include community priorities and public benefits including family, cultural, and recreational opportunities, safe access to the slough, and opportunities for job/skills training and mentorship. Social outcome criteria will be informed from community outreach work conducted by the City.
4. Feasibility Study level cost estimates will be generated for each ARM proposal to determine cost reasonableness and assess combination of ARMs that can provide greatest impact for the allotted money.

FIGURE 1

Alternative Remedial Actions Evaluation and Selection Process

Interim Columbia Slough Alternative Remedial Measures Work Plan

GSI Water Solutions, Inc.

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4.1 Step 1. Initial ARM Proposals

Through the City's Watershed Revegetation, Stormwater Compliance, Coordinated Site Assessment, Property Management, and Columbia Slough Sediment programs, among others, the City employs biologists, watershed specialists, revegetation experts, and other personnel with expertise on assessing, protecting, and improving the health of the Columbia Slough watershed. The City has conducted many successful projects within the Columbia Slough watershed (e.g., Wilkes Creek Headwaters, Ramsey and Lower Slough Refugia, placement of engineered large woody debris) to improve overall watershed health. The City's ARM team will identify projects within the Columbia Slough watershed that are meaningful and would provide multiple benefits to watershed health. All identified projects will be vetted and discussed with DEQ to pull in further technical knowledge and insight. Additionally, project proposals will be further informed by consultation with community representatives, as described below and conceptually shown in Figure 2.

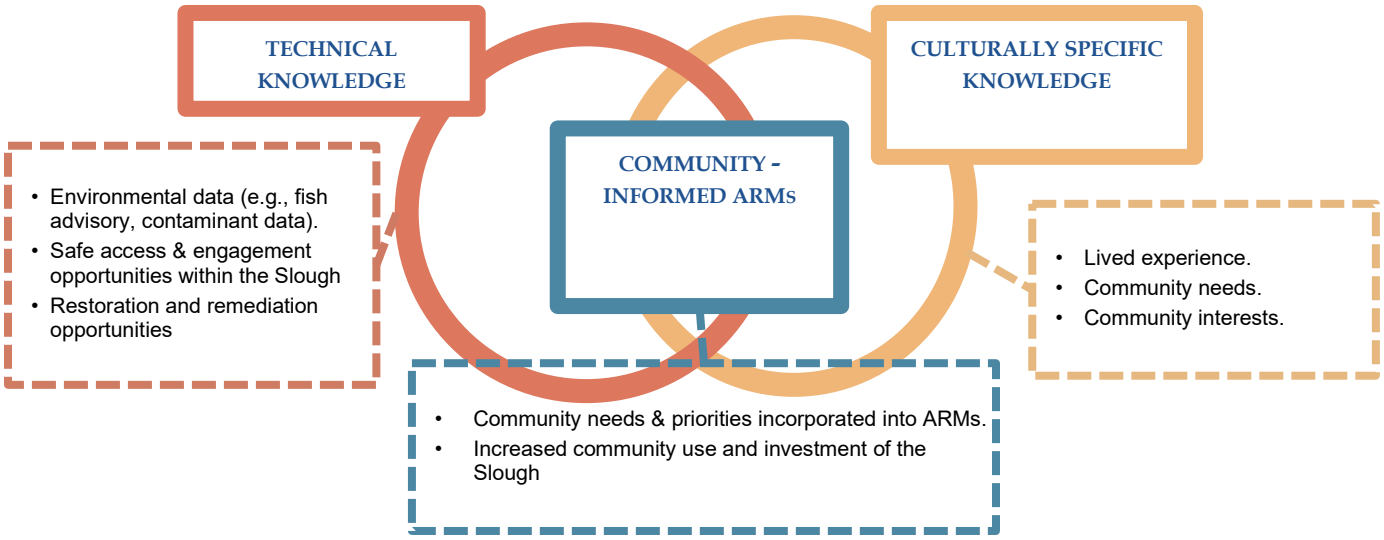

Figure 2: Community-Informed ARM Proposals

4.1.1 Consultation with DEQ

The City will consult with DEQ to better understand DEQ's restoration and remediation priorities in different reaches of the Slough as well as to identify additional ARM opportunities within the Columbia Slough watershed.

4.1.2 Consultation with Community Representatives

The City has been engaged with immigrant; refugee; and Black, Indigenous and People of Color (BIPOC) communities who access the Slough for fishing, recreation, and cultural events. In 2018, the City worked with its Community Engagement Liaison (CEL) Program in developing a questionnaire to collect information from refugee and immigrant communities that were thought to be fishing or consuming fish from the Columbia Slough. Results were used to develop appropriate outreach and educational materials for community members. In 2022, the City continued working with the CEL Program to better understand where and how

individuals and communities access and engage with the Slough and what activities and opportunities are important for those community representatives. This work was expanded to include other BIPOC communities and is ongoing. Gathering this community data is an important aspect of developing ARM proposals that incorporate relevant public benefits and meet the City's equity and environmental justice goals.

During the project-identification stage, the City will continue its efforts to better understand underserved communities' needs and priorities with regards to the Columbia Slough and will solicit feedback as to how ARM proposals or components of ARM proposals can address some of these needs and priorities.

4.2 Step 2. Proposals for Evaluation

Based on the City's consultations with DEQ and community representatives, the City will compile an initial list of ARM proposals and complete a preliminary evaluation to identify project proposals that maximize ecological uplift/watershed health benefits, provide clearly identified community benefits or address community needs, and/or meet multiple DEQ and City identified watershed health objectives. Projects must also appear to be implementable, and cost-reasonable. Following the preliminary evaluation, the City will provide a focused list of ARM project proposals along with proposed evaluation criteria to DEQ within 1.5 years of entry of the Consent Judgment. The City will subsequently meet with DEQ to review the list and receive any feedback on the focused list of ARM project proposals or proposed evaluation criteria to be carried forward into the evaluation phase (see Section 4.3). DEQ will provide feedback within 30 business days of receipt of the initial list of ARM proposals.

4.3 Step 3. ARM Evaluation and Identification of Preferred ARMs

The initial list of ARMs will be evaluated to select the preferred ARMs. This process will assess impacts across environmental outcomes (i.e., watershed health), economic or feasibility outcomes, and social outcomes or public benefits. The evaluation process across each outcome is detailed in the following sections.

4.3.1 Environmental or Watershed Health Outcomes

Each evaluated ARM proposal must meet the minimum criteria of providing identified benefits to improve watershed health. Although the overall environmental impact of a given proposal may not be definitively quantifiable, each proposal will be assessed across specific watershed health criteria identified as priorities for the Columbia Slough by the City (BES, 2006) and DEQ (2013). These criteria may include the following as applicable:

- Hydrology improvements
- Floodplain connectivity
- Riparian habitat restoration and connectivity
- Non-native species management (e.g., carp harvesting) and essential habitat
- Critical salmonid habitat
- Fish and wildlife passage
- Stream accessibility

- Water quality, including water temperature
- Wetland protection or enhancement
- Toxics reduction/contaminated media remediation
- Beneficial environmental research
- Potential cut/fill credit
- Source control improvements, including restoration of wetlands and drainageways

Each ARM proposal will be evaluated across applicable priority watershed health criteria such as those listed above to assess potential environmental impacts and benefits.

4.3.2 Social Outcomes or Public Benefits

The City and DEQ are committed to providing public benefits (e.g., improving access, educational opportunities, and community/recreational opportunities) for local communities that have been historically overlooked or disadvantaged by public policy and resource management decisions and have been most impacted by the degradation of the Slough's watershed health. An engaged community is more likely to protect and invest in the Slough, and ARMs would benefit from incorporating community feedback, community priorities, and opportunities for underserved communities who access or would access the Columbia Slough. Such integration is in line with the City's core values of anti-racism, equity, transparency, communication, collaboration, and fiscal responsibility. Selection of the preferred ARMs will include an evaluation of social outcome and public benefit criteria and may include:

- Public health and public safety;
- Family, community, and cultural event opportunities;
- Recreational opportunities;
- Improved and safe access to the Slough;
- Job/skills training or opportunities;
- Education and mentorship opportunities; or
- Other social outcomes identified through the consultation process.

As part of the assessment of social outcomes and public benefits, the City will continue to work with community representatives to help identify community priorities, needs, and preferred project proposals.

4.3.3 Economic or Feasibility Outcomes

Similar to DEQ Feasibility Study (FS) Guidance (DEQ, 2006), ARM proposals will be evaluated across cost and feasibility balancing factors to determine the most effective use of the allotted budget for ARMs. Accordingly, ARM proposals will be evaluated against economic and feasibility criteria, including:

- Cost reasonableness (i.e., relative to watershed health improvements);
- Effectiveness;
- Long-term reliability;
- Implementability; and
- Implementation risk.

To evaluate economic feasibility and cost reasonableness, full life-cycle cost estimates, including implementation costs, for each ARM proposal will be estimated using standard engineering or cost estimating procedures in line with DEQ's FS Guidance (DEQ, 2006) with the goal of being within +50% to - 30% of project costs if implemented.

4.3.4 Comparing ARM Proposals

ARM proposals will be compared to assess their relative benefits. Proposals showing the greatest benefits (e.g., multiple long-term benefits across different outcome areas) proportional to the costs can be identified as preferred ARMs. Through the evaluation process, the City and DEQ may determine that certain evaluation criteria should be prioritized when comparing alternatives.

The City will present the preferred ARMs in a technical memorandum to DEQ for review and discussion.

4.4 Step 4. ARM Selection

DEQ and the City will confer and mutually agree on the ARMs or combinations of ARMs to be implemented. DEQ and the City will concur on the appropriate deliverables and whether a revised project-level budget should be prepared. Prior to finalizing the selection of ARMs, the City will conduct additional outreach with community representatives to share the preferred list of ARMs, detail how the ARMs incorporate community needs and priorities identified from previous community outreach efforts, and solicit feedback for any last modifications to the public benefits associated with ARMs before finalizing the selection. The selection of ARMs, associated deliverables, and budget will be presented in an Alternative Remedial Measures Evaluation and Selection Report. DEQ will approve the recommended ARM(s) deliverables and estimated budget in the final report, and selected ARMs will be carried into planning and design.

If a selected ARM is subsequently determined to not be feasible or the cost is determined to not be reasonable, the City and DEQ will reevaluate the list of initial and preferred ARMs to identify a feasible and cost-effective alternative or modification to already selected ARMs. The City and DEQ may also evaluate supplemental funding sources, such as grants, or partnerships, to implement a preferred ARM(s), if the estimated budget exceeds four million dollars in implementation costs.

SECTION 5

Planning and Design of ARMs

Development of effective, feasible, implementable, and cost-reasonable ARMs will generally be accomplished in two phases, which include planning and, if applicable, engineering design, as described below.

5.1 Planning

ARMs approved by DEQ will enter a more detailed phase of planning carried out by a qualified team of City personnel. These may include personnel in the City of Portland Bureau of Environmental Services' (BES's) Integrated Planning Group, Watershed Revegetation Group, Stormwater Compliance Group, or other applicable City staff most appropriate for planning purposes. The planning effort will result in recommendations for comprehensive, integrated ARMs as outlined in the ARM Evaluation and Selection Report. In some instances (e.g., research efforts or land or easement acquisition for the purpose of habitat protection or other beneficial future land uses), further design efforts may not be required for these projects. In other instances (e.g., ARM detailing floodplain connectivity and restoration efforts), engineering design is warranted and would be conducted according to Section 5.2. As part of this phase of planning, pre-project conditions will be documented.

5.2 Engineering Design

If engineering or design is required to implement the ARM, the City or its contractor will conduct the following tasks as applicable:

- Project Management: Manage resources for timely delivery, to ensure project quality, to develop and encourage an effective project team, and to report project progress.
- Field and Research Activities: Perform or review investigations of existing conditions before beginning the design process. These investigations will be site- or project-specific and may include:
    - Field surveys to document location and elevation of City and private utilities.
    - Identification of wetland areas.
    - A Phase I/Phase II Environmental Site Assessment report or research of existing environmental reports for the project area to identify the potential presence of contaminated media or areas of concern.
    - Habitat surveys, geotechnical investigations, or other field surveys to support project design, seismic resiliency, and inform site-specific recommendations.
- Design Process: The design process will generally follow the BES typical 30%, 60%, 90% and Final Design process with review periods following each milestone.

***30% Design*:** The 30% Design process defines the components required for construction of the ARM: confirming the project size, location, and number, identifying infrastructure and utility conflicts, considering long-term O&M requirements and impacts to City budgets, and identifying and framing big-picture decisions that influence project design, cost or implementation. Key elements may include:

- 30% Construction Plans
- 30% Construction Cost Estimates
- Permits – Determine if any permits are required.
- Portland Bureau of Transportation (PBOT) Coordination – If applicable, BES will coordinate with PBOT to manage any right-of-way conflicts.
- Property Acquisition – If property acquisition is required for implementing ARMs, the City will negotiate acquisition terms before design of the ARM.
- Public Notice–Inform any adjacent property owners, neighborhood community groups, and others about project schedules and goals.

DEQ Review for Approval of 30% Design: The City's Columbia Slough Sediment Program will provide updates to DEQ on each project on a regular basis as needed to facilitate a timely review. In the event the City adopts an expedited Capital Improvement Program (CIP) project delivery model, DEQ's review for approval may occur at the 60% Design or based on other mutually agreed upon documents.

DEQ will strive to review the design documents within the City's typical review schedule of 15 to 20 business days and provide written comments for consideration and incorporation into the 60% Design. The City will provide a written response to DEQ comments within 15 business days for each ARM design.

60% Design: The 60% Design process will incorporate design review comments and comments received during the City's Streamlining process meeting. Culmination of activities within this task is 60% Design documents and initial notification of utilities.

90% Design: The 90% Design process is a refinement of the 60% Design level of deliverables. The 90% Design process is a continuation of refinement of the design incorporating comments received from the 60% Design review. In addition to refining the design elements, any applicable sediment and erosion control plan will be developed as part of this task.

Final Design: The Final Design process will incorporate all remaining design comments into the construction documents. The Final Design report will be prepared based on City design standards, and final documents routed for signatures.

Advertise for Bid: Where applicable, ARM design efforts will be put out to bid in conformance with City requirements.

Construction Period: This task includes providing technical support to the Construction Services group throughout the construction period.

The City will inform DEQ regarding the status of planning, design, and construction for each identified ARM project on a semi-annual basis (see Section 6.1). A Semi-Annual Progress Report will be prepared (see Section 6.1) and submitted to DEQ in April and October of each year.

SECTION 6

System Operations and Maintenance Plan

If applicable, the design team will prepare an ARM-specific, Operations and Maintenance (O&M) Plan. This plan will include the following as appropriate:

- Description and photos of the ARM.
- Clear maintenance expectations, activities, and inspection and maintenance schedules.
- Identify the BES group responsible for ARM inspections and maintenance and the type of expertise that will be needed for distinct O&M activities.
- Inspection and maintenance procedures (e.g., an example O&M inspection checklist).
- Maintenance documentation procedures.

This plan will be provided to the appropriate BES team to ensure proper maintenance throughout the ARM's lifecycle. The City will enter the maintenance schedule into the BES Hansen database (or equivalent asset management system) to trigger maintenance activities, if required.

SECTION 7

Project Deliverables

7.1 Semi-Annual Progress Reports

The City will submit Semi-Annual Progress Reports to DEQ regarding the status of planning, design, and implementation/construction for each selected ARM until the ARM(s) are substantially implemented. The brief progress report will include, as appropriate:

- ARM planning/design phase;
- Budget updates;
- Design issues or project impediments (if any);
- Required permits;
- Need for property acquisition or easements; and
- Public concerns.

If budgetary issues are anticipated, DEQ and the City will confer as early as possible to modify the selected ARM(s) or add or delete ARM(s), and/or secure alternative funding (grants, partnerships) to ensure that the optimum benefits are achieved and the City's expenditure for implementation is within the allotted budget.

7.2 Initial List of ARMs

The City will provide an initial list of ARM proposed projects and evaluation criteria and subsequently meet with DEQ to review the results of the ARM proposals, and receive any feedback on ARMs or the evaluation process to be carried forward into the evaluation phase.

7.3 ARM Evaluation and Selection Report

The City will submit a draft ARM Evaluation and Selection Report detailing the review and comparison of ARM proposals brought forward by the City in consultation with DEQ and community representatives. The report will resemble a focused FS. The City and DEQ will review and make any necessary changes to the draft document, and a final ARM Evaluation and Selection Report will be delivered to DEQ within 2 years following entry of the Consent Judgement. ARM design work will not begin until DEQ approves the final ARM Evaluation and Selection Report, including ARM deliverables and estimated budgets.

7.4 Final ARM Implementation Summary Report and As-Built Drawings

The City will prepare a Final ARM Implementation Summary Report and, if applicable, as-built drawings for each ARM to meet internal BES requirements. A copy of this report will be provided to DEQ to demonstrate project completion. Any as-built drawings will be publicly available through https://www.portlandmaps.com/. The Final ARM Project Report will document applicable capital, construction, and implementation costs.

7.5 Project Completion

Upon substantial completion of the ARM(s) and submittal of required deliverables for the ARM(s), DEQ will issue a certificate of completion to the City for the individual ARM or the total ARM obligation, as appropriate.

SECTION 8

References

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