

Appendix F MITIGATION PLAN

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1-1 Introduction

The Washington Park Reservoir Improvements Project (Project) has succeeded in avoiding significant impacts to most natural resources at the site, as described in the Impact Evaluation (Appendix C). The remaining impacts are limited to one area of the site, to the west of the lower reservoir, where grading and construction work will require the removal of second growth fir trees. The Portland Water Bureau (PWB) proposes to mitigate the loss of trees and related resources and functions through extensive plantings of native trees, shrubs and groundcover vegetation, and extensive removal and management of invasive species. The total area proposed for invasive species treatment and native plantings is approximately 4.9 acres within the environmental zone. The total disturbance area within the environmental zone is approximately 2.5 acres (1.6 acres in resource area and 0.9 acres in transition area).

This appendix describes the details of the proposed mitigation plan. Mitigation plan drawings referenced in this appendix are found in the Proposed Design Drawing (Appendix B).

This appendix is organized into the following sections (following the code organization):

- Resources and functions to be restored
- Agency coordination
- Construction timetables
- Operations and maintenance practices
- Monitoring
- Mitigation Planting Standards

1-2 Resources and Functions to Be Restored

The project site is located within the *Southwest Hills Resource Protection Plan (SHRPP)* area, specifically Resource Site #112, Canyon Road East. The Impact Evaluation (Appendix C) describes the resources and functions that may be impacted by the proposed design. These resources and functions include open space, scenic, recreation, wildlife habitat, seasonal creeks, groundwater and forest. Under the preferred alternatives described in the Impact Evaluation, no significant detrimental impacts are anticipated to open space, scenic, recreation, seasonal creeks or groundwater resources. The required grading and tree removal at the West Slope resource area will have significant, if temporary, impacts to forest and habitat resources.

The proposed mitigation plan focuses on three key strategies to restore and enhance forest and habitat resources:

1. Invasive Species Management: Large-scale removal and management of English ivy, Himalayan blackberry, English hawthorn and other invasive species. These species can outcompete their native counterparts, threatening the health and vitality of forest and wildlife habitat resources. Invasive species management is proposed both inside and outside environmental zones.
2. Forest Revegetation with Native Plantings: Extensive planting of native tree, shrub and herbaceous vegetation to diversify forest habitat functions, restore forest canopy, and replace lost or degraded forest understory.
3. Habitat Diversification: Creation of a native meadow on the hillside bordered by a lowland habitat area to add habitat diversity to the site.

These proposed mitigation steps will also improve the scenic quality of site, diversifying the native flora visible both from the edges of the site and from within the site. Recreational opportunities will be enhanced as improved walkways and access roads are reopened for public use. This access will generally be to the edges of resource areas, no new encroachment into these areas is planned. All of the site entrances and most of the access roads and walkways, including the reflecting pool promenades, are set back from resources areas.

Table 1 provides a summary of the proposed site restoration and mitigation measures designed to replace any loss of resources within environmental zones. Figure 1 shows the location of the environmental subareas noted in Table 1.



Figure 1. Environmental Subareas

Table 1. Impact and Mitigation Summary

Project Component	Description	Disturbance	Impact to Functional Values	Site Restoration and Mitigation
East Knoll Construction Staging	Temporary staging of construction trailers and equipment.	Minor, temporary disturbance to grass area bordering Jefferson Street.	No significant resource impacts anticipated.	Site will be revegetated with native plants following completion of construction.
South Slope Repair walkway & retaining wall Rehabilitate stormwater pipe Proposal meets exemption 33.430.080.C.1.	The concrete walkway and retaining wall are in disrepair and will be rebuilt. The existing stormwater pipeline will be rehabilitated.	Minor excavation above wall to allow retaining wall reconstruction and rehabilitation of pipeline.	No significant detrimental resource anticipated. Restored public access to promenade improves recreational values.	Site conditions to be restored following construction. Native seed mix will be applied in any disturbed soil areas along upper edge of retaining wall.
West Slope Temporary Construction Conveyor	A two-way temporary construction conveyor will bring materials between the higher and lower elevation work areas.	Two options under review for construction feasibility. Removal of up to 11 trees and temporary disturbance of up to 5,500 sq. ft.	Temporary degradation of forest and habitat functions during construction. New native plantings and invasive species management will restore these functions. These plantings include 35 trees and 53 shrubs, with the remaining area planted with native groundcover. No significant impacts to other functions anticipated.	Site will be revegetated with native plants following completion of construction.
West Slope Install 18-inch stormwater pipeline and ditch	Install 18-inch stormwater pipeline from Dam 3 down slope to area north of Pump Station 1.	Small area disturbed for pipe construction, with potential loss of two trees (same trees in path of conveyor, above).	No significant detrimental impacts to functional values anticipated. At risk trees will be removed for construction of conveyor (above). Restoration of native meadow (on invasive dominated slope) will improve wildlife habitat functions.	Area temporarily disturbed during construction of piping will be restored to native meadow with native seed mix following construction.

Project Component	Description	Disturbance	Impact to Functional Values	Site Restoration and Mitigation
<p>West Slope Olmsted Viewpoint with Relocated Fencing</p> <p>Viewpoint is outside E-zone; relocated fence is in transition area and meets standards.</p>	<p>Historic view along Sherwood Blvd. will be improved. Fence realigned on slope, out of the line of view. Sight obscuring exotic plants replaced with low native plants.</p>	<p>Relocated section of fence will have minor impact, and invasive species will be replaced with natives.</p>	<p>No significant detrimental impacts to functional values anticipated. Improved viewpoint enhances scenic values.</p>	<p>Invasive/exotic species will be removed on the slope below the viewpoint. Native shrubs and groundcover will replace them.</p>
<p>West Slope Landslide Mitigation</p>	<p>Fill toe of historic landslide and restore western slope of hillside to profile similar to what existed prior to reservoir construction. Includes vegetated retaining walls on slope.</p>	<p>Placement of approx. 2 acres of fill within existing disturbance area. Removal of 17 trees in the area southwest of Pump Station 1.</p>	<p>Tree removal will temporarily degrade forest and habitat functions. New native plantings and invasive species management will restore these functions. These measures include 55 trees, 82 shrubs and 1.4 acres of groundcover. All invasive species within this area will be removed. No significant impacts to other functions anticipated.</p>	<p>Restored slope with native meadow, trees and shrubs combined with invasive species removal and creation of lowland habitat will improve forest and wildlife habitat functions.</p> <p>Restored hillside topography will help mitigate landslide and limit future habitat disturbance.</p>
<p>West Slope Driveway (Murray Street) & Stormwater Pipeline Replacement</p>	<p>Replace existing driveway (Murray Street) in roughly same alignment as existing street.</p> <p>Replace 12-inch stormwater pipeline along/below Murray Street.</p>	<p>Disturbed area is landslide mitigation fill (described above). Replacement of west leg of Murray Street will require removal of 3 trees, and may impact up to 18 trees that are proposed to be protected but mitigated.</p>	<p>No significant detrimental impacts to functional values anticipated. If protected and mitigated trees cannot be saved, removal will temporarily degrade forest and habitat functions. New native plantings and invasive species management will restore these functions. These measures include 48 trees, 72 shrubs, with any disturbed areas planted with native groundcover.</p> <p>Restored public access along Murray Street will improve recreational values.</p>	<p>Area temporarily disturbed during construction of piping and driveway will be restored to native meadow with native seed mix following construction. Proposed native tree and shrub plantings and invasive species removal will occur regardless of whether any trees need removal.</p>

Mitigation Measures

Invasive Species Control

Invasive plant species, include nuisance trees, shrubs and groundcovers, degraded natural areas by crowding out, killing, and/or preventing the establishment of native plants. This is a particular issue at the project site where monocultures of English ivy and Himalayan blackberry are common. Plant communities degraded by invasive plants are typically less biologically diverse and less structurally complex. Conversely, healthy, diverse, and complex native plant communities provide significantly greater ecological benefits, including stormwater interception, wildlife habitat, and erosion control.

PWB plans to control invasive plants and promote the establishment of native plant communities through the use of an integrated pest management (IPM) approach. The IPM approach includes cutting, mowing, seeding, pulling, mulching, and judicious herbicide application. This approach is consistent with Portland Parks & Recreation’s IPM policy, a nationally recognized program. Target invasive species for removal and management within the environmental zone include:

- Canada thistle (*Cirsium arvense*)
- Climbing clematis (*Clematis vitalba*)
- English hawthorn (*Crataegus monogyna*)
- English holly (*Ilex aquifolium*)
- English ivy (*Hedra helix*)
- Himalayan blackberry (*Rubus armeniacus*)

Since the extent of the soil’s native seed bank is not known, native seed germination will be monitored by PWB’s botanist following removal of ivy and over invasives. Application of new native seed to invasive removal areas will occur as directed by the botanist, based on the results of this monitoring. Proposed groundcover plants include a mix of native grasses, forbs and low shrubs as shown in Table 2 (and Appendix B).

The total area proposed for treatment and revegetation is approximately 4.9 acres within the environmental zone.

Table 2. Native Plants for Invasive Removal Sites

Latin Name	Common Name	Size/Rate
Grasses		
<i>Bromus carinatus</i>	California Brome	3 lbs/acre PLS
<i>Bromus sitchensis</i>	Sitka Brome	3 lbs/acre PLS
<i>Bromus vulgaris</i>	Columbia Brome	3 lbs/acre PLS
<i>Elymus glaucus</i>	Blue Wild Rye	2 lbs/acre PLS
<i>Elymus tracycaulis</i>	Slender Wheatgrass	2 lbs/acre PLS

Latin Name	Common Name	Size/Rate
<i>Festuca californica</i>	California Fescue	2 lbs/acre PLS
<i>Festuca occidentalis</i>	Western Fescue	2 lbs/acre PLS
<i>Hordeum brachyantherum</i>	Meadow Barley	3 lbs/acre PLS
Forbs		
<i>Achillea millefolium</i>	Common Yarrow	1 lbs/acre
<i>Clarkia rhomboidea</i>	Common Clarkia	0.25 lbs/acre
<i>Lupinus latifolius</i>	Broadleaf Lupine	0.25 lbs/acre
<i>Prunella vulgaris var. lanceolata</i>	Selfheal	0.25 lbs/acre
<i>Tellima grandiflora</i>	Fringe Cup	0.25 lbs/acre
Shrubs		
<i>Arctostaphylos uva-ursi</i>	Kinnikinnick	1 gallon, 7 per 50sf
<i>Berberis nervosa</i>	Dull Oregongrape	1 gallon, 7 per 50sf

Select trees requiring removal will be left within environmental resource areas where they can be done so safely and without causing significant new disturbance. The extremely steep slopes at this site and in nearby forest areas limit how much large wood can be left safely on site.

Native Tree and Shrub Plantings

The proposed native plantings within the West Slope resources area are intended to improve the structural and species diversity of the forest, restore forest canopy, and replace lost or degraded forest understory. A total of 378 native trees and 565 native shrubs are proposed, as indicated in Table 2, and in the Mitigation/Planting Plan (see sheet series 4.2 in Appendix B). The proposed tree mitigation follows the city's tree replacement standards. PWB proposes to exceed these standards by overplanting to improve planting success rates (see Sheet 4.2.1 in Appendix B). Tree replacement Table 430-3 in the environmental code would require 247 trees and 390 shrubs.¹

Species composition of the forest tree and shrub plantings is described in Table 3 below. Supplemental (temporary) irrigation is planned during the plant establishment phase. Any temporary irrigation of native plantings outside of the disturbance area will be limited to manual or above ground systems. Actual plant species may be adjusted depending on planting site conditions, existing site vegetation, and availability of plant stock. All plantings will be native to the Portland area.

Planting plans are designed to complement existing native trees and shrubs and consider localized variations in hydrology. Planted trees and shrubs will be staked or labeled to identify plant locations during maintenance activities.

Planting will be phased over several years depending on location and extent of invasive species infestation. Construction disturbance areas and other areas with minimal invasive species

¹ PWB is overplanting to increase planting success rates and its goal is to mitigate with 247 *healthy* trees and 390 *healthy* shrubs to meet Table 430-3 standards.

cover are expected to be planted first. Areas with greater invasive species cover will be planted after adequate invasive species control has been achieved.

Table 3. Forest - Revegetation Trees and Shrubs (2.5 acres)

Species	Common Name	Quantity	Size
Trees			
<i>Acer macrophyllum</i>	Bigleaf maple	47	½" cal
<i>Pseudotsuga menziesii</i>	Douglas-fir	237	½" cal & 1.5-2.5" cal
<i>Thuja plicata</i>	Western redcedar	79	½" cal
<i>Tsuga heterophylla</i>	Western Hemlock	15	½" cal
Total Trees		378	
Shrubs			
<i>Amelanchier alnifolia</i>	Western Serviceberry	29	1 gal
<i>Mahonia aquifolium</i>	Oregon grape	113	1 gal
<i>Holodiscus discolor</i>	Ocean-spray	28	1 gal
<i>Rosa nutkana</i>	Nootka Rose	113	1 gal
<i>Symphoricarpos albus</i>	Snowberry	282	1 gal
Total Shrubs		565	

Upland Prairie

Native grasses and forbs will be seeded in approximately 1.4 acres of land within the environmental zones, including the areas graded for landslide mitigation. Native grass established from seed will prevent erosion as well as aid in vegetation management by competing with invasive plants. Species composition of native seed mix is described in Table 4.

Table 4. Upland Prairie Mix

Latin Name	Common Name	Rate
Upland Prairie Sun Seed Mix		
Grasses		
<i>Bromus carinatus</i>	California Brome	3 lbs/acre PLS
<i>Danthonia californica</i>	California Oatgrass	4 lbs/acre PLS
<i>Elymus tracycaulis</i>	Slender Wheatgrass	2 lbs/acre PLS
<i>Festuca californica</i>	California Fescue	2 lbs/acre PLS
<i>Koeleria macrantha</i>	Prairie Junegrass	1 lbs/acre PLS
Forbs		
<i>Achillea millefolium</i>	Common Yarrow	0.5 lbs/acre PLS
<i>Clarkia rhomboidea</i>	Common Clarkia	0.25 lbs/acre PLS
<i>Prunella vulgaris var. lanceolata</i>	Selfheal	0.25 lbs/acre PLS
<i>Lupinus latifolius</i>	Broadleaf Lupine	0.5 lbs/acre PLS
Upland Prairie Shade Tolerant Seed Mix		
Grasses		
<i>Bromus carinatus</i>	California Brome	2 lbs/acre PLS

Latin Name	Common Name	Rate
<i>Bromus sitchensis</i>	Sitka Brome	3 lbs/acre PLS
<i>Elymus glaucus</i>	Blue Wild Rye	3 lbs/acre PLS
<i>Festuca californica</i>	California Fescue	1 lbs/acre PLS
<i>Festuca occidentalis</i>	Western Fescue	2 lbs/acre PLS
Forbs		
<i>Gilia capitata</i>	Bluefield Gilia	0.25 lbs/acre PLS
<i>Lupinus latifolius</i>	Broadleaf Lupine	0.25 lbs/acre PLS
<i>Prunella vulgaris var. lanceolata</i>	Selfheal	0.25 lbs/acre PLS
<i>Tellima grandiflora</i>	Fringe Cup	0.25 lbs/acre PLS

1-3 Agency Coordination

Agency coordination was initiated in June 2013 and is ongoing. Contacts specific to environmental resources have primarily involved the City of Portland Bureaus of Development Services (BDS) and Environmental Services (BES). PWB and design team members met multiple times with BDS and BES staff since 2013 to review progress steps during the design process and address agency questions. PWB and design team members have also coordinated with Portland Parks and Recreation (PP&R) on the project design and construction process. All interested agencies were consulted at a City Pre-Application conference held on May 13, 2014. Written and/or oral comments were received from City Bureaus at this meeting. In addition to BDS and BES, comments were received from the Bureau of Transportation, the Fire Bureau and PWB shown in the Pre-Application Conference Summary Notes (Appendix G).

State agency coordination has included meetings and communications with the State Historic Preservation Office (on historic and archeological resources), Oregon Department of Environmental Quality (NPDES construction permit), Oregon Water Resources Department (dam safety requirements), and the Oregon Department of Transportation (Highway 26 and associated rights-of-way).

1-4 Operations and Maintenance Practices

The proposed planting project will be managed for plant survival and ecological function. Based on site visit observations and monitoring results, PWB will assess site conditions, native plant establishment success, and invasive species regrowth and prescribe one to three (1-3) vegetation management treatments annually. Competing and non-native, invasive vegetation will be suppressed by mechanical and other IPM methods for the first three years to ensure that installed native plants are free to grow. Native trees and shrubs will be well established and self-sustaining after three years. Table 5 provides a tentative schedule of revegetation tasks.

Table 5. Schedule of Revegetation Tasks*

Season	Task	Details
Generally, Summer/Fall/ Winter	Tree removal	Removal of construction impact trees.
Winter/Spring	Non-Native Vegetation Removal	Removal and control of non-native invasive plants.
Fall/Spring	Seed Application	Application of native grass seed immediately after construction.
Winter/Spring	Planting	Installation of woody plant materials in construction disturbance areas and other areas.
Year-round following project completion	Maintenance and Monitoring	Vegetation management and control of non-native invasive vegetation by mechanical cutting, manual pulling, and herbicide application. Annual monitoring.
* Schedule is subject to change depending on actual construction schedule.		

PWB proposes a three-year establishment and monitoring period for plantings, consistent with BDS standard conditions. This will facilitate the survival and growth of the mitigation plantings. The operations and monitoring program for the site will be defined in collaboration with the CM/GC. This program is likely to include:

- Site visits weekly for the first two months following planting acceptance and monthly, thereafter, to observe site conditions.
- Monitoring tasks, such as watering, resetting trees and shrubs, reseeding, and weed control will occur as-needed during the three-year establishment period.

These measures will support the establishment of planted trees and shrubs and seeded areas. If new conditions arise that are detrimental to development of the native plant community, PWB or the landscape contractor will generate action items to address or compensate for them, consistent with the native planting requirements in the environmental zone.

1-5 Monitoring

Monitoring is a key step in the adaptive management process. Comprehensive monitoring includes quantitative assessment of plant survival/mortality and an inventory of groundcover species composition and cover. Qualitative monitoring includes narrative observations and treatment recommendations. Monitoring results may indicate need for additional treatments to reduce plant mortality or further enhance planting areas. Monitoring may also identify areas where additional interplanting is necessary to achieve the target stocking level.

PWB or its landscape contractor will monitor required plantings for three years to ensure survival and replacement performs as planned. In order to track the success of areas seeded with native grasses and forbs, PWB will also monitor the percent cover of native groundcovers where they are seeded.

PWB or its contractor will provide an annual monitoring and maintenance report to demonstrate success of the mitigation plan. The report will contain the number and species of planted trees that have died. The report will also provide a list of replacement trees and other plantings that were installed for any required trees that died and an estimate of percent cover of invasive species (e.g., English ivy, Himalayan blackberry, English hawthorn). Photo documentation from photopoints identified in the first year's report will provide a visual record of performance at defined locations.

These reports will be provided to the Land Use Services Division of the Bureau of Development Services. The first report will be submitted within 12 months following approval of the post-construction inspection and acceptance of the required mitigation plantings. Subsequent monitoring reports will be submitted every twelve months following the date of the first monitoring report, until the monitoring period ends.

1-6 Mitigation Planting Standards

Proposed plantings will follow the standards for mitigation plantings. In short, the following actions are proposed:

- Plant source. Mitigation plantings will be nursery-propagated plants. All woody and seeded plant material will be non-clonal and obtained from Willamette Valley genetic sources.
- Plant materials. The Mitigation Plan specifies that plant materials are used for restoration purposes. Therefore, standard nursery practices including the use of fungicides and tree staking will be avoided.
- Nuisance plants. No nuisance plants listed on the Portland Plants List will be planted at the site. Moreover, the mitigation plan includes extensive removal and management of nuisance plants including English hawthorn, Himalayan blackberry, English ivy, and other nuisance plants.
- Landscaped area preparation. The Mitigation Plan includes removal of invasive and exotic species prior to soil preparation and planting.
- Installation. Plant materials will generally not be staked, except for larger trees at exposed locations.
- Irrigation. No permanent irrigation system is planned within environmental zone areas. Temporary irrigation may be provided during the plant establishment period to ensure plant survival.
- Disturbed areas will be seeded with a native seed mix.
- Monitoring and reporting. Within one year of the completion of mitigation, PWB will prepare an as-built report documenting any changes made during the construction process. During the three-year monitoring period, an annual monitoring report will be

prepared and submitted to BDS, documenting the performance of the mitigation plan over the previous year.

1-7 Conclusion

In order to achieve project drivers that include replacing an existing reservoir with a reliable, below ground, landslide-isolated reservoir, some established trees will need to be removed. The proposed mitigation plan combines new native tree, shrub and herbaceous plantings with extensive invasive species removal and management within the environmental zone. Proposed plantings include 378 native trees, 565 native shrubs and a diverse mix of native grasses and forbs. Native grasses and forbs will cover remaining areas, including areas graded for landslide mitigation. The total area proposed for invasive species treatment and native revegetation is approximately 4.9 acres. The restored forest habitat will improve wildlife forage and nesting opportunities. The new native vegetation will also increase habitat diversity and year-round cover for wildlife. Native meadow and lowland habitats will further diversify habitat values. In combination, the mitigation measures described in this plan will provide a net increase in the functional values of the environmental resources at the project site.

The proposed Mitigation Plan, with associated drawings contained in Appendix B, demonstrates that this proposal will fully compensate for any significant detrimental impacts on resources and functional values within the environmentally zoned areas of the site.