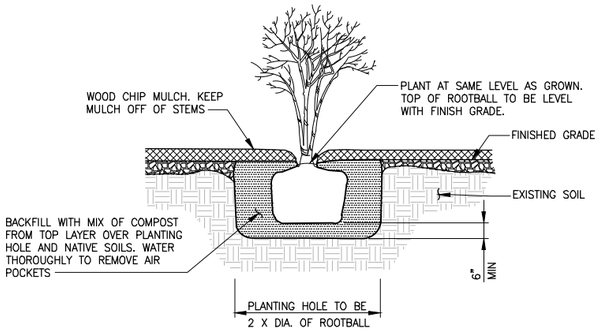
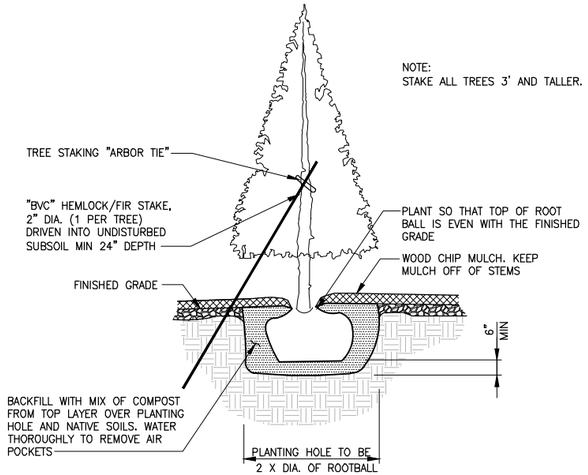
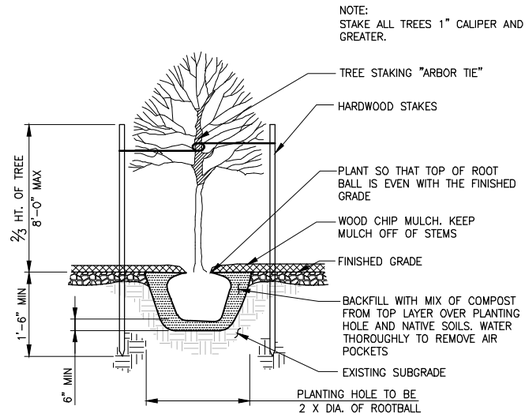


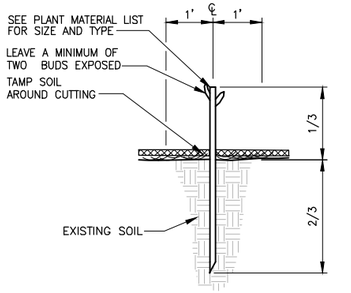
SHRUB AND SMALL TREE PLANTING
DETAIL 1
NO SCALE



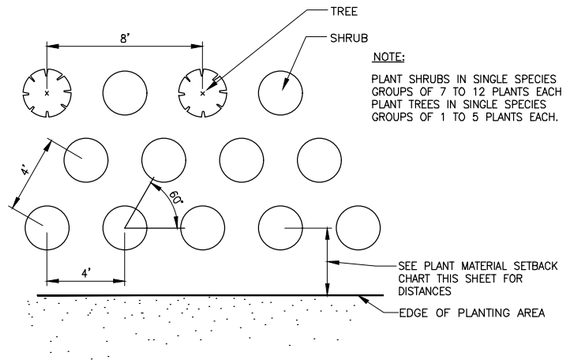
CONIFEROUS TREE PLANTING
DETAIL 2
NO SCALE



DECIDUOUS TREE PLANTING DETAIL
DETAIL 3
NO SCALE

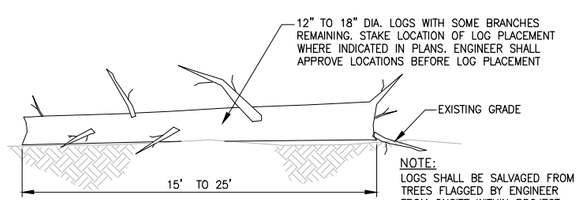


LIVE STAKE INSTALLATION
DETAIL 4
NO SCALE



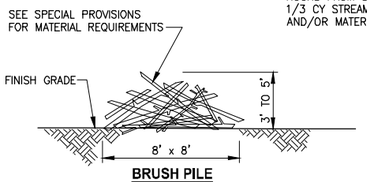
NOTE:
PLANT SHRUBS IN SINGLE SPECIES GROUPS OF 7 TO 12 PLANTS EACH PLANT TREES IN SINGLE SPECIES GROUPS OF 1 TO 5 PLANTS EACH.

TYPICAL TREE AND SHRUB SPACING
DETAIL 5
NO SCALE

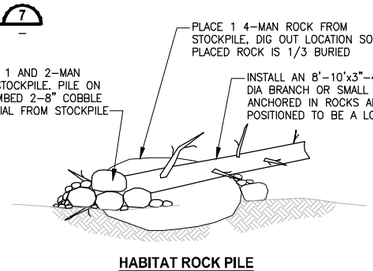


NOTE:
LOGS SHALL BE SALVAGED FROM TREES FLAGGED BY ENGINEER FROM ONSITE WITHIN PROJECT CLEARING LIMITS.

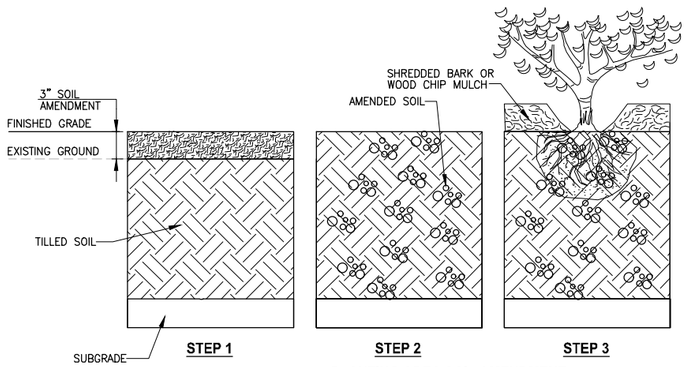
HABITAT LOG
DETAIL 7
NO SCALE



BRUSH PILE
DETAIL 8
NO SCALE



HABITAT ROCK PILE
DETAIL 9
NO SCALE



STEP 1
TILL, DISC OR RIP SOIL IN PLANTING AREAS TO 10" DEPTH. PLACE 3" OF SOIL AMENDMENT OVER SOIL SURFACE.

STEP 2
TILL SOIL AMENDMENT INTO TOP 10" OF ENTIRE PLANTING ZONES NATIVE SOIL AFTER CLEARING AND GRUBBING.

STEP 3
INSTALL PLANTS FOLLOWED BY 3" WOOD CHIP MULCH.

PLANTING AREA SOIL AMENDMENT-SEQUENCE OF WORK
DETAIL 6
NO SCALE

PLANT MATERIAL LIST

SHORELINE SETBACK AND WETLAND BUFFER ENHANCEMENT AND ADDITION PLANTING (AREAS SSE, WBE, WBA)		
COMMON NAME	BOTANICAL NAME	NOTES
TREES		
AMELANCHIER ALNIFOLIA	WESTERN SERVICEBERRY	SPACE TREES 8 TO 10-FEET ON CENTER
ACER MACROPHYLLUM	BIG LEAF MAPLE	
PICEA SITCHENSIS	SITKA SPRUCE	
PRUNUS EMARGINATA	BITTER CHERRY	
PSUEDOTSGA MENZIESII	DOUGLAS FIR	
THUJA PLICATA	WESTERN RED CEDAR	
TSUGA HETEROPHYLLA	WESTERN HEMLOCK	
SHRUBS		
ACER CIRCINATUM	VINE MAPLE	SPACE SHRUBS 4 TO 6-FEET ON CENTER
CORYLUS CORNUTA	WESTERN HAZEL	
HOLODISCUS DISCOLOR	OCEAN SPRAY	
OEMLARIA CERASIFORMIS	INDIAN PLUMB	
PHYSOCARPUS CAPITATUS	PACIFIC NINEBARK	
ROSA NUTKANA	NOOTKA ROSE	
SYMPHORICARPOS ALBUS	SNOWBERRY	
WETLAND ENHANCEMENT PLANTING AREAS (AREA WE)		
TREES		
FRAXINUS LATIFOLIA	OREGON ASH	SPACE TREES 8 TO 10-FEET ON CENTER
PICEA SITCHENSIS	SITKA SPRUCE	
SALIX L. SSP. LASIANDRA	PACIFIC WILLOW	
SALIX SCOULERIANA	SCOULERS WILLOW	
THUJA PLICATA	WESTERN RED CEDAR	
SHRUBS		
CORNUS ALBA	RED-TWIG DOGWOOD	SPACE SHRUBS 4 TO 6-FEET ON CENTER
LONICERA INVOLUCRATA	BLACK TWINBERRY	
MALUS FUSCA	PACIFIC CRAB APPLE	
PHYSOCARPUS CAPITATUS	PACIFIC NINEBARK	
ROSA PISOCARPA	CLUSTERED ROSE	
SALIX SITCHENSIS	SITKA WILLOW	
STREAM BUFFER ENHANCEMENT PLANTING AREAS (AREA SBE)		
TREES		
PICEA SITCHENSIS	SITKA SPRUCE	SPACE TREES 8 TO 10-FEET ON CENTER
SALIX L. SSP. LASIANDRA	PACIFIC WILLOW	
SALIX SCOULERIANA	SCOULERS WILLOW	
THUJA PLICATA	WESTERN RED CEDAR	
SHRUBS		
ACER CIRCINATUM	VINE MAPLE	
CORNUS ALBA	RED-TWIG DOGWOOD	SPACE SHRUBS 4 TO 6-FEET ON CENTER
LONICERA INVOLUCRATA	BLACK TWINBERRY	
PHYSOCARPUS CAPITATUS	PACIFIC NINEBARK	
SALIX SITCHENSIS	SITKA WILLOW	
SYMPHORICARPOS ALBUS	SNOWBERRY	
LOW GROW SHRUB PLANTING AREAS		
HEMEROCALLIS FULVA	DAYLILY	SPACE PLANTS 2.5-FEET ON CENTER
MAHONIA REPANS	CREEPING MAHONIA	
FRAGARIA CHILOENSIS	SAND STRAWBERRY	
LOW GROW SHRUB PLANTING AREAS (SHADY LOCATIONS ONLY)		
GAULTHERIA SHALLON	SALAL	SPACE PLANTS 2.5-FEET ON CENTER
POLYSTICHUM MUNITUM	SWORD FERN	

PLANT MATERIAL SETBACK CHART

	GUARDRAIL BARRIER	EDGE OF ROADWAY	PATHS, TRAILS	WALL	FENCE	SIGNS	EXISTING TREE, TRUNK	EXISTING VEGETATION MASS
EVERGREEN TREE	15'	15'	10'	8'	8'	15'	10'	–
ORNAMENTAL/NATIVE DECIDUOUS TREE	6'	6'	10'	8'	8'	15'	10'	–
MEDIUM AND LARGE SHRUBS – GREATER THAN 3' TALL	5'	5'	8'	3'	3'	6'	5'	5'
SMALL SHRUB – LESS THAN 3' TALL	3'	5'	5'	2'	3'	2'	5'	5'

TYPICAL MINIMUM DISTANCE SETBACKS ARE TO THE CENTER STEM OR TRUNK OF PLANT MATERIAL UNLESS OTHERWISE DIRECTED BY THE ENGINEER DURING LAYOUT AND STAKING OF PLANT LOCATIONS.

CITY OF SAMMAMISH APPROVAL

City Engineer — Date

Community Development — Date

REVISED 60 % REVIEW SUBMITTAL
NOT FOR CONSTRUCTION

REVISIONS	DATE	BY

DESIGNED J. SWENSON
DRAWN B. PURGANAN
CHECKED P. JOHANNESSEN
APPROVED Y. HO

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

FILE NAME BL1521075P19T03LA-05
JOB No. 554-1521-075 P19 T03
DATE JULY 2017

PRELIMINARY

STATE OF WASHINGTON
JENS SWENSON
LICENSED LANDSCAPE ARCHITECT
JENS SWENSON
LICENSE NO. 656
EXPIRES ON

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ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES
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P 206.394.3700
WWW.PARAMETRIX.COM

PROJECT NAME
EAST LAKE SAMMAMISH MASTER PLAN TRAIL SOUTH SAMMAMISH SEGMENT B
SAMMAMISH, WA

MITIGATION PLANTING DETAILS

SHEET NO. 156 OF 158

LA22

Mitigation Goals, Objectives, and Performance Standards

The overall goal of the mitigation effort is to replace the habitats and functions lost as a result of the project. The proposed mitigation will accomplish this by enhancing 0.65 acre of wetland, increasing the buffer of 8 wetlands by 1.53 acres, enhancing 0.75 acre of wetland buffer, enhancing 0.24 acre of stream buffer, replacing 8 fish barrier culverts on 6 Type F streams with pipes that are fish passable, and enhancing 0.09 acre of shoreline setback. In addition, mitigation for 0.22 acre of permanent wetland impacts will occur at an off-site approved mitigation bank, and thus, this mitigation will not be carried forward in the following sections. Specific goals and objectives formulated to achieve this result are presented below.

Mitigation Goals

The mitigation goals are:

- Enhance 0.65 acre of wetland.
- Increase and enhance the buffer of 8 wetlands by 1.53 acres.
- Enhance 0.75 acre of wetland buffer.
- Enhance 0.24 acre of stream buffer.
- Replace 8 fish barrier culverts on 6 Type F streams with fish passable culverts.
- Enhance 0.09 acre of shoreline setback.

Achievement of these goals is expected to provide the following improvements to wetland, stream, wetland buffer, stream buffer, and shoreline setback functions:

- Provide additional fish habitat by removing fish barriers, increasing open stream channel, and opening up available upstream habitat.
- Increase the production of organic matter by planting trees and shrubs in the created/restored wetland, enhanced wetland, increased wetland buffer, enhanced wetland buffer, enhanced stream buffer, and enhanced shoreline setback.
- Increase fish and wildlife habitat and improve biological diversity by planting with a variety of native wetland and buffer plant species and installing habitat features (habitat logs and brush piles).

Mitigation Objectives and Performance Standards

Wetlands

Objective 1: Enhance by planting native species a minimum of 0.65-acre forested and scrub-shrub wetland at the enhanced wetland areas.

Performance Standards:

Year 1	Survival of planted woody species in enhanced wetland areas will be at least 80 percent.
Year 2	Record percent cover of native woody species in enhanced wetland area to establish a baseline for areal cover.
Year 3	Native woody species will achieve a minimum of 25 percent areal cover, including desirable native volunteers, in the enhanced wetland areas.
Year 5	Native woody species will achieve a minimum of 50 percent areal cover, including desirable native volunteers, in the enhanced wetland areas.
Year 7	Native woody species will achieve a minimum of 70 percent areal cover in the enhanced wetland areas.
Year 10	Native woody species will achieve a minimum of 80 percent areal cover in the enhanced wetland area.

Streams

Instream Habitat

Objective 2: Replace existing fish barrier culvert at the (six) trail crossings on Pine Lake Creek, Stream 0155, Ebright Creek, Zackuse Creek, George Davis Creek, Stream 0143L, and (two) downstream road crossings on Pine Lake Creek and Zackuse Creek with fish passage culvert to open up available upstream habitat.

Performance Standards:

Year 1, 2, 3, and 5	Constructed habitat elements including the new fish passable culverts, regraded channels, and streambed material will remain in place as constructed at all 8 culvert replacement sites.

Wetland and Stream Buffers Areas

Objective 3: Establish a minimum of 2.28-acre forested and scrub-shrub wetland buffer, and 0.24-acre forested stream buffer at the increased/enhanced wetland buffer and enhanced stream buffer areas.

Performance Standards:

Year 1	Survival of planted woody species in increased/enhanced wetland buffer and enhanced stream buffer areas will be at least 80 percent.
Year 2	Record percent cover of native woody species in increased/enhanced wetland buffer and enhanced stream buffer areas to establish a baseline for areal cover.
Year 3	Native woody species will achieve a minimum of 25 percent areal cover in the increased/enhanced wetland buffer and enhanced stream buffer areas.
Year 5	Native woody species will achieve a minimum of 50 percent areal cover in the increased/enhanced wetland buffer and enhanced stream buffer setback areas.
Year 7	Native woody species will achieve a minimum of 70 percent areal cover in the increased/enhanced wetland buffer and enhanced stream buffer areas.
Year 10	Native woody species will achieve a minimum of 80 percent areal cover in the increased/enhanced wetland buffer and enhanced stream buffer areas.

Shoreline Setback Areas

Objective 3: Establish a minimum of 0.09-acre forested habitat at the shoreline setback areas.

Performance Standards:

Year 1	Survival of planted woody species in enhanced shoreline setback areas will be at least 80 percent.
Year 2	Record percent cover of native woody species in enhanced shoreline setback areas to establish a baseline for areal cover.
Year 3	Native woody species will achieve a minimum of 25 percent areal cover in enhanced shoreline setback areas.
Year 5	Native woody species will achieve a minimum of 50 percent areal cover in enhanced shoreline setback areas.
Year 7	Native woody species will achieve a minimum of 70 percent areal cover in enhanced shoreline setback areas.
Year 10	Native woody species will achieve a minimum of 80 percent areal cover in enhanced shoreline setback areas.

Invasive Species

Objective 4: Limit invasive non-native species throughout the mitigation site planting areas.

Performance Standards:

Year 1, 2, 3, 5, 7, and 10	Himalayan blackberry, cutleaf blackberry, Scotch broom, English ivy, reed canarygrass, and hedge false bindweed will not exceed 20 percent areal cover in all planting areas.
Year 3	100 percent removal of Japanese knotweed by Year 3 in the Wetland 22CD buffer enhancement area.

Wildlife Habitat

Objective 5: Provide wildlife habitat.

Performance Standards:

Year 1, 2, 3, 5, 7, and 10	Increase in areal cover of native woody species in all mitigation areas, as measured in Objectives 1, 2, and 3, to be used as a surrogate to indicate increasing habitat functions.
Year 1, 3, 5, 7, and 10	Increase in species richness of native species over preexisting conditions in all mitigation areas, as measured in Objectives 1, 2, and 3, to be used as a surrogate to indicate increased habitat functions.
Year 1, 2, 3, 5, 7, and 10	Installed habitat features are present and functional.

Anthropogenic Disturbance

Objective 6: Protect the mitigation sites from anthropogenic disturbance.

CITY OF SAMMAMISH APPROVAL	
City Engineer	Date
Community Development	Date

REVISED 60 % REVIEW SUBMITTAL
NOT FOR CONSTRUCTION

	REVISIONS	DATE	BY

DESIGNED J. SWENSON
DRAWN B. PURGANAN
CHECKED P. JOHANNESSEN
APPROVED Y. HO

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

FILE NAME BL1521075P19T03LA-05
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PROJECT NAME
EAST LAKE SAMMAMISH
MASTER PLAN TRAIL
SOUTH SAMMAMISH SEGMENT B
SAMMAMISH, WA

MITIGATION NOTES

SHEET NO. 157 OF 158
LA23

PATH: U:\PSG\Projects\Clients\1521-KingCo\554-1521-075-ELST\99Svcs\CADD\Phase 19\T03 Civil\Dwg\
PLOTTED BY: purganbut DATE: Friday, July 07, 2017 5:55:38 PM
LAYOUT: LA23

Performance Standards:

Year 1 through 10	Conduct qualitative monitoring to assess the status of the sites yearly during the 10-year monitoring period to monitor for human disturbance, including but not limited to filling, trash, and vandalism.
Year 1 through 10	Install and maintain fences and appropriate signs along the trail adjacent to each site to identify their protected status.

Record Drawings

Record drawings and/or a report documenting the as-built or installed conditions will be prepared after construction and plantings are complete. The report will include the following components: (1) drawings that clearly identify the boundaries of the mitigation areas; (2) locations of the sampling and monitoring sites (including photo-point locations); (3) locations of hydrology monitoring stations; (4) photographs of the mitigation sites; and (5) an analysis of any changes to the mitigation plan that occurred during construction. A copy of the as-built report will be sent to the City and USACE within 60 days of completion of construction and planting.

Monitoring

The mitigation areas will be monitored during and after construction. During construction, monitoring will ensure that the BMPs are observed to minimize impacts, and the on-site construction work (including grading and planting) will be coordinated to ensure that the sites are constructed as designed.

After construction is completed, long-term monitoring will be performed annually to ensure that the goals and objectives of the mitigation are being met. Monitoring of the mitigation areas will be performed over a 10-year period by a qualified professional (SMC 21A.50.145; 21A.50.300).
A combination of quantitative and qualitative monitoring activities will be used to assess the management objectives and associated performance standards described in the mitigation plan. Activities will include site visits to monitor unnatural site disturbance, photographs to document site development, and data collection for the quantitative evaluation of performance standards. The results of the monitoring will be submitted to the permitting agencies.

Appropriate contingency measures will be developed, as needed, by a qualified professional to ensure that the sites develop healthy vegetation that meets the obligations described in this mitigation plan and the associated permits.

Quantitative Monitoring

The following bulleted items describe the methods to be used for the quantitative monitoring, monitoring schedule, and report deadlines.

- The planting sites will be assessed by an appropriate quantitative vegetative field assessment methodology. The line intercept method will be used for determining percent areal cover for woody and invasive species. Plant richness will be determined by a count of native tree and shrub species.
- Quantitative vegetation assessments will follow the same method in each consecutive monitoring year.
- Quantitative vegetation assessments will be performed between June 15 and September 15 of each monitoring year.
- Monitoring reports will be sent to agencies requiring monitoring reports by February 15 of the following year.
- Permanent photographic stations will be established to monitor the development of the sites. Photographs will be taken along transect lines and from vantage points that capture the general mitigation area. All photographs will be labeled to identify locations.

Qualitative Monitoring

Qualitative monitoring will be conducted as follows:

- A qualified professional will qualitatively assess the constructed habitat elements including the new fish passable culverts, regraded channels, and streambed material for the first 3 years.
- Qualitative assessment will be performed yearly to visually assess the health of plants and identify areas that may need control of non-native invasive species or other maintenance activities.
- During all qualitative monitoring years, photographic documentation of the sites will occur from permanent photograph stations.

Maintenance

The proposed mitigation is intended to achieve the performance standards with minimal ongoing maintenance. However, King County will manage and maintain the site for 10 years, or until all performance standards are met and the site is closed with the approval of permitting agencies.

As mentioned previously, King County Parks has a formal maintenance program for its trail mitigation projects. The County understands that regular maintenance is necessary to achieve its mitigation commitments in public trail corridors.

Planted vegetation species are adapted to varying site conditions in the Puget Sound lowland, although supplemental irrigation may be needed during the first two growing seasons after installation to ensure the long-term survival of the plants. The need for irrigation will be evaluated based on the conditions observed during the establishment period.

To ensure rapid establishment of the plant community, trees and shrubs will be planted closer together than would generally occur in natural mature stands. Some natural mortality is expected to occur during the monitoring period. All dead and downed woody material will be left in place to provide microhabitats for wildlife. Plants will be replaced as needed to meet performance standards.

Maintenance to control nuisance species in the mitigation areas will likely be necessary. During the monitoring period, if it becomes evident that invasive species are impeding establishment of desirable native plants, measures will be implemented to control nuisance species. A progressively aggressive approach will be used to control nuisance species. Control measures will first include hand cutting and/or grubbing and removal; if this fails, an environmentally sensitive herbicide (e.g., Rodeo or equivalent) may be applied.

Contingency Measures

Adaptive management is driven by the monitoring results and the performance standards. If the performance standards are not met, adaptive management activities will be implemented to achieve the desired condition. Management activities may include implementation of contingencies described in Table 5-5, or other appropriate measures. Site conditions will be evaluated to determine the cause of the problem and the most appropriate countermeasure.

Information from the annual monitoring program will be used to identify any maintenance and/or corrective actions. If problems are identified in monitoring, King County biologists will determine the cause of the problem and implement proper maintenance or corrective activities. These activities will be discussed in the annual monitoring report.

Performance Security/Financial Assurance

This mitigation project will be sponsored by King County. The County will implement a suitable mechanism to ensure that the project is implemented successfully and monitored for a minimum of 10 years, or until the project mitigation is deemed a success by achieving its performance standards.

Site Protection

The County owns the property underlying the mitigation sites. They will protect the mitigation sites in perpetuity through a legal mechanism that permits maintenance and monitoring of the mitigation area. This mechanism shall be retained by the County and may be submitted to the USACE after permit issuance, if required. In addition, permanent fencing and/or signs indicating that the area is a natural or sensitive or critical area to be protected from disturbance will be posted along the boundaries of each mitigation area.

Table 5-5. Contingency Measures for the Mitigation Sites

Problem	Contingency Measure
Less than 80% of planted woody species survive in Year 1	King County biologists (or other qualified biologist) will assess the sites to determine what conditions are preventing the plants from thriving. Appropriate measures will be taken to correct any conditions that are limiting growth. Plants will be replaced with appropriate native species to achieve the Year 1 standard. Additional measures (such as providing additional protection) will be considered if necessary.
Percent cover for woody species not met during Years 3, 5, or 7	King County biologists (or other qualified biologist) will assess the sites to determine what conditions are preventing the plants from thriving. Appropriate measures, such as increased weed control or extra plantings, will be taken to correct any conditions that are limiting growth.
Invasive species exceed percent cover threshold	Implement/revise invasive species control plan.
Performance standards not met at Year 10	Continue the monitoring regime for 1 additional year. The sites will continue to be evaluated every year until each site has met the stated performance standards associated with management objectives. Other contingency measures may be implemented during this period.

Long-term Management Plan

The mitigation sites are located on King County property. After attainment of performance standards and acceptance of the mitigation project by the USACE, the County will implement a long-term management plan for the sites as part of trail operations, if required.

Site management activities will include noxious weed control, damage repair from vandalism, trash removal, and signage maintenance.

Monitoring reports or technical memoranda will document annual management activities and identify key issues and actions needed for the following year. Reports are anticipated to be submitted every year to the USACE, by the end of the calendar year, for the first 10 years following attainment of performance standards.

The County will issue a letter of assurance to cover long-term management costs of the mitigation site to the USACE ensuring the County's compliance with the long-term management plan.

CITY OF SAMMAMISH APPROVAL	
City Engineer	Date
Community Development	Date

REVISED 60 % REVIEW SUBMITTAL
NOT FOR CONSTRUCTION

	REVISIONS	DATE	BY

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PROJECT NAME
EAST LAKE SAMMAMISH
MASTER PLAN TRAIL
SOUTH SAMMAMISH SEGMENT B
SAMMAMISH, WA

MITIGATION NOTES

SHEET NO. 158 OF 158
LA24