APPENDIX I

Creek Protection Plan and Hydrology Report

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CREEK PROTECTION MEASURES AND HYDROLOGY REPORT

A. Creek Protection Measures

List of Information Materials on Creek Protection provided to workers on the site

Prior to the start of construction, all construction personnel will receive a 'creek protection' course that will outline measures to be implemented onsite during work adjacent to Glen Echo Creek. Each worker will receive information on best management practices to be implemented, wet weather protection measures, litter prevention measures, and other requirements provided in permits and agreements from local, state, and federal agencies.

Litter Prevention Measures

Prior to the start of demolition and construction, a Waste Management Plan will be prepared and kept on site. Construction personnel, including subcontractors, will be educated to follow waste handling procedures including trash, food waste, and other solid waste. Dumpsters of sufficient size and number will be provided to contain solid waste generated by the project. All dumpsters or garbage bins will be secured each night. Solid waste storage areas will be located at least 25 feet from drainage facilities and/or Glen Echo Creek. The project site will be checked nightly for litter, trash and other debris left on site. Full dumpsters will be removed from the project site and disposed of off-site at an appropriate facility.

Dust Control Measures

During demolition and construction, dust control measures both onsite and off-site to remove tracked mud and debris from construction equipment entering and leaving the project area will be implemented. During demolition activities, water trucks will be onsite to help control dust. Water used for dust control activities will be contained onsite as outlined in the Stormwater Pollution Prevention Plan (SWPPP) being developed for the project (see *Erosion Control Measures*, below). Periodic construction monitoring will occur to ensure that the project is in compliance with the SWPPP and other measures.

Methods for Cleaning Tools and Equipment

All workers will be instructed that no cleaning of tools or equipment shall be done within 25 feet of Glen Echo Creek. If necessary, cleaning stations will be provided. No fueling or repairing of equipment will be conducted near the creek. All equipment used within 50 feet of the creek shall be in good repair with no oil or fuel leaks. A spill prevention plan will be maintained on site at all times, as outlined in the SWPPP prepared for the project (see *Erosion Control Measures*, below). . Information regarding tool cleaning will be provided to all construction personnel prior to the start of construction as described above.

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Construction Site Fencing

Construction fencing will be placed around the entire construction site, including Glen Echo Creek. No public access to the creek will be allowed during or after construction activities. Fencing shall be maintained at all times during construction. Weekly monitoring will occur and repairs to the construction fence will be made immediately.

Erosion Control Measures

To reduce and eliminate erosion within the bed and bank of Glen Echo Creek, temporary and permanent sediment and erosion control measures will be implemented to prevent sediment and other debris from entering the storm drain system and the creek.

Temporary Measures

Demolition of existing structures, construction of new facilities, and excavation for the new West Broadway Garage shall occur outside the wet season to the extent feasible. Prior to and during project demolition, grading, and construction activities, the project shall comply with all City of Oakland Grading Permit requirements and NPDES Permit requirements, including preparation of a grading plan that describes drainage, erosion, and sediment control measures that prevent pollutants from entering the storm drain system and/or Glen Echo Creek. Measures to be implemented include installation of silt fencing and/or straw wattles and catch basins. During demolition and construction, temporary erosion control measures will be implemented, including installation of silt fencing, straw wattles, and other appropriate methods to prevent erosion and sedimentation in Glen Echo Creek. Periodic construction monitoring will occur to ensure that the project is in compliance with these and other measures. Construction monitoring will also occur to identify the need for any additional temporary erosion control measures, if required.

- **Temporary Bypass Culvert:** Due to the close proximity of construction activities to Glen Echo Creek, a temporary bypass culvert will be installed within the 145 foot daylighted portion of the creek. The temporary bypass culvert will be installed during demolition and construction adjacent to the creek. The bypass culvert will prevent sediment and other debris from entering the active creek channel.

- **Preparation of StormWater Pollution Prevention Plan (SWPPP):** Prior to the start of construction, the project applicant and/or contractors shall prepare a Storm Water Pollution Prevention Plan (SWPPP) in coordination with the project's grading plan. The SWPPP will outline additional erosion and sediment control measures to be implemented during construction. Measures typically included in the SWPPP include, but are not limited to, the use of straw wattles, hay bales, and silt fencing. Other measures may include protection of storm drain inlets.

- **Installation of Silt Fencing and other Measures**: During demolition, excavation, and construction of new facilities, silt fencing will be installed at a location sufficient to prevent sediment or erosion into Glen Echo Creek. Silt fencing will be installed where conditions warrant protection, including below the toe of exposed or erodible slopes, downslope of exposed soil areas, around temporary soil stockpiles,

and along Glen Echo Creek. Silt fence fabric shall be woven polypropylene with sufficient width and tensile strength appropriate for the project site. Wood stakes shall be used to install and maintain the silt fencing. Staples will be used to fasten the fence fabric to the stakes. Silt fencing will be installed a least 1 meter from the toe of the slope of Glen Echo Creek. The bottom of the fence will be keyed in to prevent sediment from flowing beneath the silt fencing.

- **Hydroseeding**: Areas subject to soil disturbance will be hydroseeded to prevent erosion and sediment prior to installation of permanent restoration measures (i.e. installation of trees and shrubs) described below. Jute netting or other similar measures will be employed if necessary.

Permanent Measures

In order to provide increased bank stabilization on the eastern bank of Glen Echo Creek, the project includes the recontouring, regrading, and restoration of the eastern bank. Upon completion of construction of the West Broadway garage, the eastern bank will be recontoured and compacted using clean earthen fill. The final elevation of the eastern bank will be approximately 70 feet in elevation with a slope ratio of 2:1. The eastern bank will be revegetated with native riparian tree, shrubs, and herbaceous species to further stabilize the bank.

A Revegetation and Restoration Plan is being developed for the project. The RRP includes methods to restore Glen Echo Creek to a native riparian habitat. Also included in the RRP will be monitoring and reporting requirements. Typical monitoring requirements include bi-annual monitoring of plantings, establishment of photo points, and contingency measures to be implemented in the event the restoration project does not achieve stated restoration goals. Annual reports will be submitted to the City of Oakland, Army Corps of Engineers, Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG) as outlined by permits and agreements issued for the project.

Wet Weather Protection Measures

BMPs for wet weather will be implemented as outlined in the SWPPP prepared for the project. Wet weather BMPs include covering all soil piles, installation of silt fencing to prevent run off into the creek, and reduction of earth moving activities during and directly after storms. Periodic monitoring will occur to ensure this and other measures are being implemented properly.

Stockpile Locations

No stockpiles of soil or other debris is anticipated at this time. However, demolition of existing structures and excavation and construction for new facilities may require the stockpiling of soil and other debris onsite. If stockpiles are required, no soil or debris will be stockpiled within 25 feet of Glen Echo Creek. During wet weather season or on non-work days, stockpiles will be protected and covered to avoid runoff into storm drains or Glen Echo Creek. All soil stockpiles will have silt fencing installed around the

perimeter of the stockpile to prevent erosion or sediment from entering creeks and storm drain inlets.

Debris Collection From Site

Debris collection from the project site will occur as often as necessary to prevent debris from being stockpiled on site. Garbage and other solid waste will be removed as needed and not dumpsters or other debris containers will allowed to be full or overflowing onsite. During demolition of existing structures, debris will be removed immediately and off-hauled to an appropriate landfill (i.e. Class II and Class III materials).

B. Hydrology Report

5 year, 10 year, 25 year, and 100 year flows

The project will not result in any change in hydrology or alter flows. Therefore, pre-development and post-development flow conditions will be the same:

	Pre-Development	Post-Development
5 year	170 cfs	170 cfs
10 year:	203 cfs	203 cfs
25 year:	244 cfs	244 cfs
100 year:	408 cfs	408 cfs

5 year, 10 year, 25 year, and 100 year water surface elevation

The project will not result in any change in hydrology or alter flows. Therefore, pre-development and post-development water surface elevations (WSE) will be the same:

	Pre-Development	Post-Development
5 year	65.7	65.7
10 year:	66.0	66.0
25 year:	66.4	66.4
100 year:	67.4	67.4

Creek Profile

Profile of stream bed, WS E, and top of bank/ground elevation across the property and upstream and downstream for 100 feet in each direction (attach profile). **Figure 5** and **Figure 7** illustrate the pre-construction and post-construction profiles for Glen Echo Creek.

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Impact of Future Development in the Area

The proposed project is the only known development project in the area of Glen Echo Creek.

Creek Bank Stability (Before and After the Project)

Before Construction:
Currently, the eastern bank of Glen Echo Creek is stable, but there are signs of significant erosion in the past. Directly before the creek enters into the downstream culvert, there has been significant bank erosion that has been repaired by shot-crete. There is a brick headwall at the entrance of the culvert, and there appears to be other signs of repair work at the headwall.

The current slope of the eastern bank is approximately 1:1 and approximately ten feet higher in elevation than the western bank. There is no native vegetation on the eastern bank, and there is little or no herbaceous vegetation to help stabilize the bank. There are several large eucalyptus trees on the eastern bank of the creek that will be removed as part of the project.

The western bank appears to be geomorphologically stable with no signs of erosion. This bank is approximately 2:1 slope and is approximately 10 feet lower in elevation than the eastern bank.

After Construction:
As a part of the proposed project, the eastern bank will be graded and re-contoured to ensure future bank stability. During construction of the West Broadway parking garage, the eastern bank will be cut down to approximately 50 feet. Shoring will be installed at approximately 50 feet (30 feet below grade) to ensure bank stability along the western wall of the parking garage. After the parking garage is constructed, the eastern bank will be re-contoured to an approximate 2:1 slope.

Once the bank has been graded and re-contoured, native vegetation will be planted as outlined in the Revegetation and Restoration Plan submitted for the project. Vegetation to be planted includes native trees such as Alder, Big leaf maple, and Fremont cottonwood, and herbaceous plants that will develop a dense understory to further help stabilize the creek bank.

Upstream and Downstream Conditions (Before and After Project Construction)

Glen Echo Creek is culverted upstream and downstream of the project area. The conditions upstream and downstream of the project area will not be changed in any way as a result of the proposed project. During construction, when the temporary bypass culvert will be in operation, periodic monitoring will occur to ensure that no erosion or sedimentation is occurring as a result of the culvert.

Grading and recontouring the eastern bank and native revegetation of both banks will provide bank stability and will have no affect upstream and downstream of the project area as this portion of the creek is not contributing to sedimentation downstream of the project area.

Location of Major Drainage Facilities

Glen Echo Creek functions to convey stormwater flow and the creek is culverted underground upstream and downstream of the project area. **Figure 4** and **Figure 6** illustrate the location of the underground culverts in reference to the project area.

Cross Sections

Figure 5 and **Figure 7** illustrate the pre-project and post-project cross sectional profiles of Glen Echo Creek within the project area.

Proposed Improvements/Mitigation to the Creek

As part of the proposed project, several improvements to Glen Echo Creek will occur.

1. **Removal of non-native vegetation and eucalyptus trees**: The majority of vegetation within the active channel of Glen Echo Creek is non-native vegetation including English ivy. There are also several large eucalyptus trees that occur on the eastern bank. Restoration and revegetation will include installation of native riparian trees, shrubs, and understory vegetation to provide native riparian habitat within the daylighted reach.

2. **Grading and re-contouring of the eastern bank:** The eastern bank of Glen Echo Creek will be regraded, recontoured, and compacted to produce a more stable creek bank. Final slope ratio after restoration of the creek bank will be approximately 2:1. Top of bank elevation will be approximately ten feet lower than existing conditions and the new top of bank elevation will be approximately the same as the western bank providing for a more geomorphologically stable system. **Figure 4** illustrates existing conditions, including creek cross sectional profile. **Figure 6** illustrates post-construction conditions including creek cross-sectional profile.

3. **Native revegetation:** Once project construction has been completed and the eastern bank has been re-contoured, native vegetation will be planted, including Alder, Big leaf maple, and Fremont cottonwood. **Figure 8** illustrates the general landscaping plan for the entire project and **Figure 9** illustrates the specific restoration and landscaping plan for the project area. A list of trees, shrubs, and understory plants to be planted in the restoration area is also provided in **Figure 9**.

4. A Restoration and Revegetation Plan (RRP) has been prepared for the project and is included at the end of this report. The RRP outlines methods and measures that will restore the project area to a native riparian habitat. The RRP include

revegetation of native species, five year monitoring of the restoration site, and contingency measures in the event the restoration site is not meeting restoration goals.

Impact on Existing Vegetation or Wildlife within Riparian Corridor

Glen Echo Creek is an urban creek and contains little or no native riparian vegetation. As part of the proposed project, non-native vegetation, including large eucalyptus trees, will be removed and replaced with native trees, shrubs, and herbaceous plants to restore the reach to a native riparian habitat.

There will be a temporary impact to wildlife in the project are during construction. Because this is an urban creek, animals that typically use this area are those that are adapted to human presence such as raccoon, Virginia opossum and bird species. Construction of the West Broadway parking garage and installation of the temporary bypass culvert will result in a temporary loss of habitat for some wildlife species if they were to occur within the project area. However, post-construction restoration of the area will likely provide higher quality habitat for urban wildlife.