APPENDIX A

Operations and Maintenance Plan

City of Newport Beach Public Works Department

Best Management Practice
Operation and Maintenance Plan

Big Canyon Habitat Restoration & Water Quality Improvement Project

January, 2016

Operations and Maintenance Plan

Big Canyon Restoration

Introduction

The proposed Big Canyon Habitat Restoration and Water Quality Improvement Project (project) is located within the City of Newport Beach, on a 6-acre site in the eastern portion of the 60-acre Big Canyon Nature Park. The project site is east of Upper Newport Bay and west and east of Jamboree Road and includes portions of Big Canyon Creek.

The project includes the implementation of a creek and riparian habitat restoration, habitat creation and enhancement, a bioretention cell and storm water treatment wetland, dry-weather flow diversions, culvert improvements, and trail planning in the upper portion of the Big Canyon Nature Park.

The project has several objectives, including:

- Restore and Enhance Riparian Habitat
- Improve Water Quality
- Reduce Flood/Erosion/Sedimentation Damage
- Encourage Public Participation and Provide Education
- Provide Recreational Opportunities

In order to meet these objectives, the proposed project includes the following elements:

- **Creek Restoration and Riparian Habitat Creation & Enhancement**- The project proposes to conduct creek restoration activities that will include floodplain restoration, streambank stabilization and habitat restoration. Floodplain restoration and streambank stabilization activities will result in increased flood flow attenuation, stabilization of the north bank of the main channel of Big Canyon Creek, and creation of an active braided riparian floodplain. The north creek bank at the inlet will be stabilized using natural bioengineering techniques. Riparian habitat will be restored directly downstream of the floodplain restoration area through the removal of invasive trees, soil remediation to reduce plant-limiting sodium levels, and replacement with native riparian species.

Riparian habitat creation activities will also be conducted directly to the southwest of the proposed water quality basin. This area will be graded down to allow for riparian trees to access existing groundwater. Riparian habitat enhancement will include removal of upstream and adjacent sources of Brazilian peppertree both east of Jamboree and north of the creek.

- **Stormwater Water Quality Treatment Bioretention Cell** – The project includes the construction of a water quality treatment bioretention cell that will treat wet weather flows from Jamboree Road and reduce the storm drain-associated vector habitat in Big Canyon Creek. The basin will be vegetated with Coastal Sage Scrub (CSS) on the outer banks and vegetated with native riparian forbs, grasses and shrubs in the inner basin. These species will have the ability to sequester toxins and tolerate flooded conditions for limited periods of time. The basin will be periodically maintained per an approved Operation and Maintenance Plan.
- **Dry Weather Water Quality Selenium Reduction Measures** – A dry weather flow diversion that re-routes flows of lower selenium concentration around identified sources of high selenium and return these better quality flows back into the creek will be constructed as part of this project. Dry weather flows will be diverted from an underground culvert on the east side of Jamboree Road and routed through an above ground pipe along the south bank of the creek and through the storm drain culvert under Jamboree Road. The pipe will discharge on the west side of Jamboree Road into the floodplain that will be graded as part of this project. Groundwater seeps that are sources of high selenium will be collected in a collection sump and diverted to the sanitary sewer.
- **Infrastructure Improvements** - The Project will also be constructed in coordination with infrastructure improvements by the Orange County Sanitation District (OCSD). The improvements include the extension and improvement of the existing access road along the toe of slope along the west side of Jamboree Road. The access road improvements will be used access and maintain the sanitary sewer manhole located to the north of the existing culvert outfall. The construction of the access road to and over the existing culvert under Jamboree Road requires the extension of the culvert. A stilling pool will be located at the end of the culvert extension to dissipate hydraulic energy as the stormwater transitions from flow in the culvert and discharges to the re-graded floodplain. This stilling pool will be periodically maintained to remove sediment and vegetation. Water from the stilling pool will exit via a rip rap energy dissipater. OCSD will also install a

permanent dousing station and access area located to the south of the proposed habitat creation area.

- **Community Access Improvements and Educational Opportunities** – The extended access road will provide an official trail where the public can learn about and enjoy the native habitats. In addition, an 8' wide bicycle path connector will be installed that provides access directly from Jamboree Road. In addition, the maintenance road at the top of the water quality basin will also be used as a side viewing trail with interpretive signs installed. The public will cross from the south to the north side of the creek via the OCSD constructed turn around area over the culvert, and follow a footpath on the north side of the creek. The footpath on the north side of the creek will continue within the CSS habitat, following existing ad-hoc trails that will be expanded to approximately 8' wide. Trails allow for educational opportunities regarding water quality and creek restoration activities, and through the installation of signage and as-needed fencing, will keep the public out of sensitive habitats.

Stormwater Wetland Basin Maintenance Standards

General Requirements

Maintenance is critical if stormwater wetland basins are to function as originally designed. A specific maintenance plan will be developed for the bioretention cell when the final design has been completed, outlining the schedule and scope of maintenance operations, as well as the documentation and reporting requirements. The following are general maintenance requirements:

1. The stormwater wetland basin should be inspected annually and inspections after major storm events are encouraged (wetland basin inspection and maintenance checklists will be developed specifically for the bioretention cell). Trash and debris should be removed as needed, but at least annually prior to the beginning of the wet season.

2. Site vegetation should be maintained as frequently as necessary to maintain the aesthetic appearance of the site and to prevent clogging of outlets, creation of

dead volumes, and barriers to mosquito fish to access pooled areas, and as follows:

- Vegetation, large shrubs, or trees that limit access or interfere with basin operation should be pruned or removed.

- Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.

- Invasive vegetation, such as Alligatorweed (*Alternanthera philoxeroides*), Halogeton (*Halogeton glomeratus*), Spotted Knapweed (*Centaurea maculosa*), Giant Reed (*Arundo donax*), Castor Bean (*Ricinus communis*), Perennial Pepperweed (*Lepidium latifolium*), and Yellow Starthistle (*Centaurea solstitalis*) must be removed and replaced with noninvasive species. Invasive species should never contribute more than 25% of the vegetated area. For more information on invasive weeds, including biology and control of listed weeds, look at the "encycloweedia" located at the California Department of Food and Agriculture website at: http://www.cdfa.ca.gov/wma, or the California Invasive Plant Council website at: http://portal.cal-ipc.org/weedlist.

- Dead vegetation should be removed if it exceeds 10% of area coverage. This does not include seasonal die-back where roots would grow back later in colder areas. Vegetation should be replaced immediately to maintain cover density and control erosion where soils are exposed.

3. Sediment buildup exceeding 6 inches over the storage capacity in the first cell should be removed. Sediments should be tested for toxic substance accumulation in compliance with current disposal requirements visual or olfactory indications of pollution are noticed. If toxic substances are encountered at concentrations exceeding thresholds of Title 22, Section 66261

of the California Code of Regulations, the sediment must be disposed of in a hazardous waste landfill.

4. Following sediment removal activities, replanting and/or reseeding of vegetation may be required for reestablishment.

Maintenance Standards

A summary of the routine and major maintenance activities recommended for the bioretention cell is shown in Table 1. Detailed routine and major maintenance standards listed in Table 2 and Table 3 are intended to be measures to determine if maintenance actions are required as identified through inspection. They are not intended to be measures of the facility's required condition at all times between inspections. These tables will be updated when the final design for the bioretention cell has been completed.

Table 1. Wetland Basin Routine and Major Maintenance Guide

Inspection and Maintenance Activities Summary	
Routine Maintenance	Removal trash and debris • Remove minor sediment accumulation near inlet and outlet structures • Stabilize/Repair eroded banks and fill in animal burrows if present • Remove any evidence of visual contamination from floatables such as oil and grease • Eliminate pests and conditions suitable for creating ideal breeding habitat • Install or repair pond liner to ensure that first cell maintains a permanent pool • Remove algae mats as often as needed to prevent coverage of more than 20% of pond surface • Mow berms routinely if applicable to maintain aesthetic appeal and to suppress weeds
Major Maintenance	Remove dead, diseased, or dying trees and woody vegetation that interfere with facility maintenance. • Correct problems associated with berm settlement • Repair berm/dike breaches and stabilize eroded parts of the berm • Repair and rebuild spillway as needed to reverse the effects of severe erosion • Remove sediment build up in forebay and main basin area to restore original sediment holding capacity • Regrade main basin bottom to restore bottom slope and eliminate the incidence of standing pools • Aerate compacted areas to promote infiltration if volume reductions are desired • Repair or replace gates, fences, flow control structures, and inlet/outlet structures as needed to maintain full functionality

Table 2. Routine Maintenance Standards – Stormwater Wetland Basins

Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Frequency
Trash & Debris	Any trash and debris which exceed 5 cubic feet per 1,000 sf of pond area (one standard garbage can). In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance. If trash and debris is observed blocking or partially blocking an outlet structure or inhibiting flows between cells, it should be removed quickly	Trash and debris cleared from site.	Annually prior to wet season After major storm events (>0.75 in/24 hrs) if spot checks of some basins indicate widespread damage/ maintenance needs
Sediment Accumulation	Sediment accumulation in basin bottom that exceeds the depth of sediment zone plus 6 inches in the sediment forebay. If sediment is blocking an inlet or outlet, it should be removed.	Sediment cleaned out.	
Erosion	Erosion of basin side slopes and/or scouring of basin bottom.	Slopes should be stabilized using appropriate erosion control measure(s) and repair methods.	
Oil Sheen on Water	Prevalent and visible oil sheen.	No oil sheen present.	
Noxious Pests	Visual observations or receipt of complaints of numbers of pests that would not be naturally occurring and could pose a threat to human or aquatic health.	Vectors controlled per local standards.	
Water Level	First cell empty, doesn't holdwater.	Line the first cell to maintain at least 4 feet of water. The first cell must remain full to control turbulence of the incoming flow and reduce sediment resuspension.	

Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Frequency
Aesthetics	Minor vegetation removal and thinning. Mowing berms and surroundings	Facility is well kept.	Monthly (or as dictated by agreement between City and landscape contractor)
Noxious Weeds	Any evidence of noxious weeds.	Eradicate all noxious weeds; control and prevent the spread of all noxious weeds. Use Integrated Pest Management techniques, if applicable. See http://www.ipm.ucdavis.edu/for more information.	

Table 3. Major Maintenance Standards – Stormwater Wetland Basins

Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Frequency
Tree Growth	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering, do not remove. Dead, diseased, or dying trees should be removed.	Trees do not hinder maintenance activities. Remove dead, diseased, or dying trees. (Use a certified Arborist to determine health of tree or removal requirements)	Annual or as needed (infrequent) After major storm events (>0.75 in/24hrs) if spot checks of some basins indicate widespread damage/ maintenance needs.
Settling of Berm	If settlement is apparent. Settling can be an indication of more severe problems with the berm or outlet works. A geotechnical engineer should be consulted to determine the source of the settlement if the dike/berm is serving as a dam.	Dike is built back to the design elevation.	

Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Frequency
Piping through Berm	Discernable water flow through basin berm. Ongoing erosion with potential for erosion to continue. A licensed geotechnical engineer should be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved and berm stability achieved.	
Tree and Large Shrub Growth on Downstream Slope of Embankments	Tree and large shrub growth on downstream slopes of embankments may prevent inspection and provide habitat for burrowing rodents.	Trees and large shrubs should be removed. All dead roots should be removed if practical. Otherwise, dead roots should be removed to a minimum of 36 inches below grade and replaced with cement grout to 12 inches below grade. The top 12 inches of the root holes should be filled with compacted, in-situ soils. The area facility engineer may require additional root removal if necessary for dam safety or maintenance purposes.	
Erosion on Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.	Rocks and pad depth are restored to design standards.	
Gate/Fence Damage	Damage to gate/fence, including missing locks & hinges	Gate/Fence repaired.	

Monitoring

The City will perform all necessary work to monitor the bioretention cell to demonstrate compliance with the success criteria established and described within this document. A separate sampling and analysis plan (SAP) will be prepared after the final design for the bioretention cell is complete. Annual Monitoring Reports will be prepared by the City

and be available for review. Analytical sampling and testing shall be performed in accordance with accepted testing methods and approved testing laboratory specified in the SAP. The Monitoring Reports shall contain, at a minimum, the following information:

- Name of Systems
- Date of Report
- Date of Monitoring
- Name of Monitoring Professional
- Analytical sampling and testing data to assess compliance with success criteria
- Any noted alterations, impacts, surface water quality changes, apparent new attributes or indicators (positive or negative) which suggest significant change has occurred or might occur in the future
- Any water pollution events such as reported spills and cleanup activities
- Estimated plant species diversity, coverage, and plant community changes
- Any noted wildlife activity on date of monitoring site
- Any noted human impacts such as dumping or vandalism

Long Term Management

The City will maintain the bioretention cell as a quality, ecologically sound wetland and will be responsible to manage the bioretention cell in perpetuity in accordance with the terms of the long-term management plans. The City will use the bioretention cell in accordance with the following long-term management plan and to maintain the bioretention cell as functioning wetlands. In this capacity, allowable uses for the CWTS include:

- Irrigation water
- Ecological and educational laboratory
- Water quality monitoring “facility”
- Ecological monitoring “facility”
- Marketing, promotional or demonstration example
- Limited plant materials and aquatic resources harvesting location

In any of these uses, public pedestrian (including that to accommodate the Americans with Disabilities Act or ADA) access will be allowed. As the science of wetlands and the maintenance of wetland systems continue to evolve, alterations in the long-term management plans may be anticipated. It will be the responsibility of the City to make any alterations.

Report and Record Keeping

The City will submit produce regular reports (frequency to be determined) describing the conditions of the bioretention cell and relating those conditions to the success criteria. The reports will contain the following:

- Topographical map and as-built plans showing location of the bioretention cell.
- Narrative summarizing the condition of the bioretention cell and all regular maintenance activities showing location of sampling plots, permanent photo points, location of transects, etc.
- Results of vegetation survey including visual estimates of % overall cover and % cover by vegetation survey layer, species diversity, % exotic vegetation in each vegetation layer, survival rate of planted vegetation, an estimate of natural revegetation, a measure of the relative percentages of indicator status species groupings, and plant vigor as measured by evidence of reproduction.
- Status of success criteria as noted in the Final Construction Plans and Specifications.
- Results of analytical sampling and testing other surveys such as bird, macroinvertebrate, amphibian, reptile, and mammal surveys that may be done incidentally or by others (when results are provided).

As-built reports will be generated at the conclusion of the construction of each phase of the development. These reports will confirm any changes that were required as a result of construction needs.

Long-term Maintenance and Inspection Plan

Regular maintenance is critical to the successful operation of the bioretention cell. Recommended operation and maintenance guidelines include:

- Inspections and maintenance to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 72 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats.

- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.

- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.

- Remove accumulated trash and debris in the basin at the start and end of the wet season.

- Inspect for standing water at the end of the wet season.

- Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.

- If erosion is occurring within the basin, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.

- To avoid reversing soil development, scarification or other disturbance should only be performed when there are actual signs of clogging, rather than on a

routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a very light tractor.

These criteria will be updated when the final design for the bioretention cell is complete.