Pond 5 is located immediately east of Pond 8. This triangular pond received water pumped from Pudding Creek, which was then transferred to Pond 8. Pond 5 currently receives only surface runoff from the upgradient paved areas and potentially emergent groundwater during the wet season. Stormwater is actively pumped from Pond 5 into Pond 8, when necessary, to prevent overflow. The pond is predominately open water but does support cattails and ruderal vegetation along its margin and steep banks.

4.3.2 Related Site Closure and Site Development Activities and Objectives

The following activities associated with the MPC remediation and demolition will occur in the Maple Creek stream restoration area or influence restoration activities:

- Surface water discharge to Pond 8 from the Alder Creek and Maple Creek drainages will be rerouted around Pond 8 to the OU-E lowland wetland. This will likely occur in two steps: the first to route flow around the northeast corner of Pond 8 and the second to shift the restored MCRC to its final position cutting across the northeast corner of Pond 8 following Pond 8 closure.

- The culverted Maple Creek drainage will be restored to create the 1,500-foot-long MCRC.

- The northern end of the MSRA will be regraded to connect with the restored MCRC and provide a stable stream channel and confluence with the existing MSRA drainages (i.e., Wetlands J, K, D-1, and D-2; Figure 2-3c).

- Impacted sediment in the MSRA drainage channel (i.e., Wetland L; Figure 2-3c) and soil in the restoration of the affected channel will be remediated.

- Alder Creek drainage will be connected to the MCRC and OU-E Lowland wetland.

- Pond 5 (Figure 4-2) will be connected hydraulically to the MCRC through the Alder Creek drainage outfall.

- Transportation and utility routing between the north and southern portions of the site will need to be designed to accommodate the restored MCRC.

4.3.3 Proposed Restoration Design

The various components of the Maple Creek restoration activities are described in the following sections.

4.3.3.1 Maple Creek Riparian Corridor

To create a continuous ecological system between the OU-E lowland and the existing MSRA, the MPC Restoration Project preferred alternative proposes to daylight the culverted Maple Creek storm drain in a flow path similar to the historical Maple Creek. Due to the expected increase of intensity of flows in the Maple Creek channel, compared to those likely historically present, the channel will need to flow slightly to the north and west of its historical location (Figure 4-1) to reduce channel grade and to allow for energy dissipation of the water flow as the new channel enters the OU-E lowland. The new MCRC will contain three distinct habitat components: stream channel, riparian floodplain, and riparian upland. These components are further described below.

Restored Stream Channel

The new Maple Creek channel will create approximately 1,500 linear feet of stream channel with a 180-foot-wide riparian corridor (approximately 0.68 acre). The new Maple Creek stream channel will be the primary conduit for site and City surface flow to the OU-E lowland, and is described below:

- The new Maple Creek channel will have an overall slope of approximately 2 percent with intermittent rock weirs (e.g., boulder arches) installed to form pool, glide, and riffle habitats and encourage flow dispersal on to the channel floodplain. The channel will be approximately 10 feet wide at the bottom and approximately 2 feet deep with 2:1 (horizontal to vertical distance) slopes meeting the adjacent floodplain. The new Maple Creek channel will be designed to convey estimated peak channel forming flow (i.e., between the 1.5- and 2-year return period storm). A conceptual cross-section of the new stream channel is presented as cross-sections A and B on Figure 4-3.

- Flow within the new Maple Creek channel will be dominated by storm flow from the City and the site during the rainy season. During the dry season, Maple Creek drainage conveys modest base flow from the Maple Creek watershed and Maple Street Riparian Area. This flow will be supplemented by emergent groundwater because the proposed channel bottom is expected to be below the groundwater table during the dry season. Figure 4-4 shows the channel bottom profile and the representative dry season (i.e., October) groundwater level measurements for 2010.

- The channel bottom will be constructed of cobble and gravel of an appropriate diameter to withstand sheer stress of predicted flows and to prevent mass erosion and downcutting of the channel.

- Vegetation is not expected to grow in the newly created stream channel except along the channel margins in areas where slower flow conditions occur near geomorphic flow control features.

Riparian Flood Plain

A substantial component of the MCRC will be the riparian floodplain created adjacent to the new Maple Creek stream channel. The riparian floodplain will transmit stream flow during storms exceeding the channel forming flow, will mitigate volume and velocity of overland stormflows into the aquatic habitat present in the stream channel, and will provide allochthonous organic input to the aquatic ecosystem. The riparian floodplain will contain two aquatic sub-habitats (seasonal and seep riparian wetlands) as defined by typical groundwater levels in relation of the riparian floodplain surface elevation. Approximately 0.69 acre of seasonal riparian wetlands and 1.36 acres of seep riparian wetlands will be created in the Maple Creek riparian floodplain. Distinguishing characteristics of the riparian floodplain and two sub-habitats are described below:

- The riparian floodplain will be designed to transmit peak flow of the 100-year return period storm with a minimum of 1 foot of freeboard above the high water mark. Depressional areas will also be graded in the floodplain to pond surface water as storm flows recede. Width of the floodplain on either side of the channel will vary as the stream channel meanders within the floodplain. However, the floodplain will total approximately 60 feet in width. The riparian floodplain will abut the riparian upland slopes that transition to the surrounding existing grade. Cross-sections A and B on Figure 4-3 present two conceptual cross-sections of the riparian floodplain as the stream channel meanders from left to right.

- The riparian floodplain will consist of two sub-habitats: seep riparian wetlands and seasonal riparian wetlands. Approximately the first 500 linear feet of the new riparian floodplain are defined as seasonal riparian wetlands in the conceptual design, as the primary source of hydrology will be overflow from the creek channel during the rainy season. The remaining 1,000 linear feet of riparian floodplain is defined as seep riparian wetland in the conceptual design because the floodplain surface will be approximately 1 foot below the current dry season groundwater table (Figure 4-3).

- Following maturation of the restored system, soils comprising the floodplain areas are expected to be sand to sandy loams derived primarily from the existing soil profile in the restoration area.

- The riparian floodplain is expected to be dominated by herbaceous and woody plant communities, with shrubs and low trees dominating the canopy, saplings dominating the understory, and herbaceous wetland vegetation dominating the groundcover. Vegetation comprising the seasonal and seep wetland areas is expected be similar with species more adapted to continually saturated conditions being more prevalent in the riparian seep wetland areas. The depressional areas in the floodplain will likely retain water for longer periods than other areas of the floodplain and will likely provide habitat for more obligate wetland species. Revegetation of the riparian floodplain will occur through a combination of planting, seeding, and natural recolonization. Table 4-1 presents typical species that would be expected to occur

in the riparian floodplain area. However, species that would be planted following construction may vary slightly depending on availability from local/regional nurseries.

- Riparian floodplain habitat will provide ecological functions typical of small perennial coastal stream systems, including wildlife and aquatic habitat, groundwater exchange, carbon sequestration and storage, carbon export to the adjacent aquatic system, nutrient sequestration and storage, sediment retention, and stormwater retardation.

Riparian Upland

The upland riparian habitat will occupy approximately 50 feet on each side of the riparian floodplain areas. Approximately 3.29 acres of riparian upland will be created in the MCRC. The riparian upland will mitigate volume and velocity of overland storm flows to the aquatic habitat present in the stream channel and riparian floodplain wetlands by retarding surface flow as it drains from the surrounding elevations to the riparian floodplain areas.

- The transition slope between the riparian floodplain and the surrounding existing grade will be a minimum of 3:1 (horizontal to vertical distance) to provide stability. Cross-sections A and B on Figure 4-3 present conceptual cross-sections depicting riparian upland transition slopes and areas as they extend onto the existing grade.

- Following maturation of the restored system, soils comprising the floodplain areas are expected to be sandy loams composed predominantly of existing site soils.

- The upland habitat is expected to be dominated by a tall woody canopy, a relatively open shrub understory, and herbaceous groundcover. Vegetative species present in the riparian upland are expected to be those more adapted to dry conditions. However, deep-rooted species more accustomed to wetter habitats will likely appear as the slope transitions from the existing grade to the riparian floodplain. Revegetation of the riparian upland will occur through a combination of planting, seeding, and natural recolonization. Table 4-1 presents typical species that would be expected to occur in the riparian upland area. However, species that would be planted following construction may vary slightly depending on availability from local/regional nurseries.

- Riparian upland habitat is expected to provide the following ecological functions: wildlife habitat, carbon sequestration and storage, carbon export to the adjacent aquatic system, nutrient sequestration and storage, surface runoff retardation, and sediment retention.

Collectively, the MCRC (i.e., stream channel, floodplain, and riparian upland) will provide the following ecological functions:

- Wildlife riparian habitat and a migration corridor between the Soldier Bay, the OU-E wetland, and MSRA; the riparian corridor will provide vertical structure and cover, which is lacking on the site

- Aquatic habitats in the form of perennial stream, perennial seep, floodplain depressional wetlands, and seasonal floodplain wetlands

- Water quality benefits related to groundwater exchange, nutrient storage and cycling, sediment retention, and stormwater and surface runoff retardation

- The stream system is not expected to provide habitat for fish due to the upstream culverting and lack of upstream freshwater fish habitat and existing populations

4.3.3.2 Maple Street Riparian Area

Remediation and Maple Creek restoration activities in the MSRA include excavation of impacted sediment in the Wetland L stream channel, removal of the culvert connecting Wetland L to the current Maple Creek channel, and enhancement of Wetland J to create a more stable and ecologically functional confluence for the Maple Creek drainage from the City with Wetland L and drainage D-1.

Remediation of Wetland L sediment will remove surface sediment impacted by site-related constituents and ash from the previously adjacent Ash pile, which was remediated in September 2006. The location, extent, and methods of remediation will be defined in the OU-E Remedial Action Plan (pending). Following sediment treatment, the remediation action area will be restored to existing grade and revegetated with native plants suitable for the habitat areas.

The objective of the Wetland J/Maple Creek Confluence activities is to create a stable entrance to the restored MCRC for the Maple Creek drainage from the City and tie in the other surface drainages from the MSRA (i.e., Wetland L and Drainage D-1; Figure 2-3c). This area will receive short duration and high intensity storm flows generated by the impervious surfaces in Basin C during the wet season, and base flow and emergent groundwater throughout the wet and dry seasons. The preferred alternative includes the following:

- The existing segment of the Maple Creek channel that passes through Wetland J (Figure 2-2c) will be broadened and the near-vertical banks will be regraded to provide more stable conditions (Figure 4-5, Cross-section C-C'). This cross-section should only be viewed as conceptual, as detailed survey information is necessary to evaluate current elevations of the channel bottom, morphology of the channel cross-sections, and elevations of the adjacent abandoned floodplain. Approximately, 0.05 acre (400 linear feet) of the Maple Creek channel will be enhanced.

- Rip rap and cobble will be placed at the discharge for the Maple Creek drainage pipes adjacent to Highway 1 to raise the initial channel elevation and dissipate the energy of the laminar piped flow to retard channel incision that is currently occurring.

- The culvert and overlying soil that connects Wetland L to Wetland J will be removed, and the southwest portion of Wetland J will be regraded to establish stable channel slopes and banks transitioning into the confluence at the head of the restored MCRC. Approximately 150 linear feet (0.01 acre) of stream channel and 0.18 acre of riparian habitat will be created.

- The created MSRA tributary channel will have a narrow herbaceous seep wetland floodplain adjacent to the creek with an upland transition area dominated by herbaceous and shrub vegetation with some overstory woody plants.

- Existing invasive wetland and riparian plants will be removed within the construction footprint.

- Vegetation to be planted in the new MSRA tributary section will be similar to that proposed in the Maple Creek riparian floodplain and riparian upland, as discussed in Section 4.3.2.1 and presented in Table 4-1. However, species that would be planted following construction may vary slightly depending on availability from local/regional nurseries.

- Regraded slopes will be a minimum of 3:1 (horizontal to vertical distance) for stability and will be further evaluated as more detailed survey data for the Maple Creek corridor is obtained. Figure 4-5 (Cross-sections D-D' and E-E') presents conceptual cross-sections of the new MSRA tributary channel as it transitions to the current surrounding grade. These cross-sections should only be viewed as conceptual, as detailed survey information is necessary to evaluate current elevations of the channel bottom, morphology of the channel cross-sections, and elevations of the adjacent abandoned floodplain.

Habitat restoration and enhancement actions in the MSRA will provide following ecological benefits:

- Daylighting of approximately 150 feet of stream channel and creation of the Wetland J and Wetland L confluence

- Retardation of Maple Creek channel incision and improved management of storm flow discharge from the Basin C Maple Creek storm drain

- Connection of the existing MSRA habitat to the restored MCRC

- A reduction in the prevalence of exotic/invasive riparian and aquatic plants within the construction footprint

4.3.3.3 Alder Creek Drainage

The Alder Creek drainage currently conveys base flow and stormwater runoff from Basin D in the City to the northeast corner of Pond 8. The Alder Creek drainage is expected to provide approximately 40 percent of the inflow to the OU-E lowland wetlands. The MPC Restoration Project preferred alternative does not include daylighting Alder Creek, but does not preclude such an action in the future. During construction of the MCRC, approximately the last 100 feet of the Alder Creek drainage pipe will be removed and a new pipe segment will be added to redirect the Alder Creek flows to a constructed outfall in the MCRC (Figure 4-2). Design of the outfall will be determined during the engineering phase of work.

Although daylighting the Alder Creek drainage is not considered in the preferred alternative, the proposed action does not preclude daylighting Alder Creek in the future.

4.3.3.4 Pond 5

Pond 5 currently does not have a hydrologic connection to other aquatic features on the site. The preferred alternative originally proposed to relocate Pond 5 and provide equivalent or enhanced aquatic features at a point in the MPC Restoration Project where they could be an integral part of the ecosystem. The CCC has indicated that, although isolated, Pond 5 could not be relocated, but should remain at its current location and size and be connected hydraulically to the MCRC. To achieve this objective, a flow control weir will be installed in the northwest corner of Pond 5, and the spillage will be conveyed via pipeline to the Alder Creek drainage outfall in the MCRC.

Herbaceous and woody riparian vegetation will be planted in a 30-foot buffer around Pond 5 to provide enhanced ecological function for the buffer, retard surface flow, and facilitate sediment deposition.

4.4 South Ponds Channel

Basin S and sub-catchment O-2 surface runoff is conveyed to Pond 8 via several drainages ditches and culverts (Figure 2-2). Surface flow from these areas will need to be rerouted before Pond 8 sediment management, closure, and dam removal can occur. The South Ponds (i.e., Pond 1 through 4) are located in OU-E, approximately 1,200 feet south of the OU-E lowland area (Figures 2-3 and 2-3c). The MPC Restoration Project preferred alternative proposes to daylight the western end of the stream channel that historically drained the Basin S and South Ponds area and discharged to the Pacific Ocean over the coastal bluff. Figure 4-6 presents the conceptual design for the South Ponds channel restoration.

4.4.1 Current Conditions

The South Ponds are former industrial ponds that were part of the wastewater treatment system for the site. They are not USACE jurisdictional waters/wetlands, but may be waters of the state and/or coastal ESHAs (ARCADIS 2011a). The South Ponds are the central aquatic feature in an on-site drainage area of approximately 68 acres referred to as Basin S (Figure 2-2). The area north of the South Ponds is dominated by impervious surfaces (primarily asphalt and concrete foundations). The South Ponds receive runoff from the Consolidation Cell located to the south and east of Pond 4. The Consolidation Cell is contained within the area demarcated as having ongoing construction activities on Figure 2-3c. The largest portion of the Basin S watershed consists of compacted dirt with ruderal vegetation, and a large portion of this area drains to Pond 3 northwest (NW) through drainage ditches and swales. Basin S eventually drains into the southwest end of Pond 8 through a series of small surface drainages and subsurface pipes. The foundations of the former log ramp and log debarker are located immediately northwest of the western end of Pond 3 NW. The City Waste Water Treatment Plant (WWTP) and the north extent of the southern CCT property are directly west of the South Ponds area along the coastal bluffs.

The 1873 Geodetic Survey Map (Figure 2-1) indicates that prior to development of the site, an unnamed stream channel discharged off of the coastal bluff face at two locations between the current locations of the WWTP and west end of Pond 8. During development of the site, the stream channel was piped, backfilled, and graded. Rip rap was placed at the mouth of the historical stream channel and concreted over at the coastal bluff face (Appendix B).

4.4.2 Related Site Closure and Site Development Activities and Objectives

The following activities associated with the MPC remediation and demolition will occur in the South Pond channel restoration area or influence MPC restoration activities:

- Surface runoff and emergent groundwater generated in the approximately 78-acre Basin S and O-2 watershed area currently drains into the southwest end of Pond 8. This surface flow will need to be rerouted prior the management of sediment in Pond 8.

- Storm drains that currently capture storm water runoff from the area immediately south of the Planer building and direct the flow to Pond 8 may be rerouted to the proposed South Pond channel.

- An unnamed historic stream channel shown on the 1873 Geodetic Survey Map (Figures 2-1and 4-1) will be restored between the South Ponds and the historic creek mouth at the coastal bluff within the Open Space area designated in the Mill Site Specific Plan (Figure 4-6). For discussion purposes, the channel is referred to herein as "South Ponds Channel" and will be a component of the "South Ponds Riparian

Corridor." Restoration of the South Ponds Riparian Corridor will create approximately 650 linear feet of stream channel and 0.95 acre of riparian habitat.

4.4.3 Proposed Restoration Design

The MPC Restoration Project requires that surface drainage from Basin S be rerouted to bypass Pond 8. To accommodate the rerouting of surface drainage, the preferred alternative proposes to create a new stream channel and riparian corridor that will reestablish a portion of the historical drainage for the South Ponds area. The restored stream channel and associated riparian corridor will transmit surface water from the South Ponds and the surrounding site drainage basin to the historic creek mouth at the coast bluff prior to stabilization of Pond 8. Habitat types that will be created in the South Ponds area include stream channel, riparian floodplain, and riparian upland habitat. These habitats are described in more detail below.

Stream Channel

The surface water flow from the South Ponds will flow through the current culvert and discharge to the restored South Ponds Channel, which will flow in the approximate historical location of the stream that drained this area prior to site development. The South Ponds Channel will be approximately 650 feet long and provide 0.13 acre of stream habitat. Surface runoff from other parts of Basin S and O-2 will enter the stream channel within the daylighted section.

- The South Ponds Channel will have an overall slope of approximately 2 to 3 percent. The channel will be approximately 3 feet wide at the bottom and approximately 1 foot deep with 3:1 (horizontal to vertical distance) slopes meeting the adjacent floodplain. The channel will be designed to hold peak channel forming flows (i.e., between the 1.5- and 2-year return period storm). A conceptual cross-section of the new channel is presented as cross-section F-F' on Figure 4-6.

- Flow within the South Ponds Channel will be dominated by surface water flow from the site during the rainy season. During the dry season, emergent groundwater will provide base flow, and all of the channel bottom is expected to be below the groundwater table during the dry season in wet and normal water years. Figure 4-6 shows the channel bottom profile and the estimated groundwater level measurements for 2010 (direct measurements from groundwater monitoring wells were not available for this area).

- The channel bottom will be constructed of cobble and gravel of an appropriate diameter to withstand sheer stress of predicted flows and to prevent mass erosion and down cutting of the channel.

- No vegetation is expected to grow in the stream channel with the exception of the shallow margins of the stream where it transitions to the channel floodplain.

Riparian Flood Plain

A riparian floodplain will be created adjacent to the South Ponds Channel. The riparian floodplain will transmit flow during storms exceeding the channel forming flow, will mitigate volume and velocity of stormflows to the aquatic habitat present in the stream channel, and the associated riparian vegetation will provide allochthonous organic input to the aquatic ecosystem. The riparian floodplain will contain seep riparian wetlands, as defined by typical groundwater levels in relation of the riparian floodplain surface elevation. Approximately 0.12 acre of seep riparian wetland will be created in the South Ponds Riparian Corridor. Distinguishing characteristics of the seep riparian wetland are described below:

- The floodplain will be designed to transmit peak flow of the 100-year 24-hour return period storm with a minimum of 1 foot of freeboard above the estimated high water mark. Width of the floodplain on either side of the channel will vary as the stream channel meanders within the floodplain. However, the floodplain will be approximately 8 feet in total width. The riparian floodplain will abut the riparian upland slopes that transition to the surrounding existing grade. Figure 4-6 presents a conceptual cross-section of the South Ponds riparian floodplain.

- The South Ponds riparian floodplain will be composed of seep riparian wetlands. The 650 linear feet of riparian floodplain is defined as seep riparian wetlands in the conceptual design because the floodplain surface will be approximately 1 foot below the dry season groundwater table during most water years.

- Following maturation of the restored system, soils comprising the floodplain areas are expected to be sandy loams.

- The South Ponds riparian floodplain will to be dominated by herbaceous and woody plant communities, with shrubs and low trees dominating the canopy, saplings dominating the understory, and herbaceous wetland vegetation dominating the groundcover. Vegetation comprising the seasonal and seep wetland areas is expected will be species adapted to the continually saturated conditions that will be prevalent in the riparian seep wetland areas. Riparian floodplain revegetation will occur through a combination of planting, seeding, and natural recolonization. Table 4-1 presents typical species that would be expected to occur in the riparian floodplain area. However, species that would be planted following construction may vary slightly depending on availability from local/regional nurseries.

Riparian Upland

The riparian upland associated with the South Ponds riparian corridor will mitigate volume and velocity of stormflows to the wetland and aquatic habitats present in the floodplain and stream channel and will retard surface flow as it drains from the surrounding elevations to the riparian floodplain areas. The upland riparian

habitat will be approximately 30 feet to each side of the riparian floodplain areas (Figure 4-6). Approximately 0.83 acre of riparian upland will be created in the South Ponds riparian corridor.

- The transition slope from the riparian floodplain to the surrounding existing grade will be a minimum of 3:1 (horizontal to vertical distance) to provide stability. Figure 4-6 presents a conceptual cross-section depicting riparian upland transition slopes and areas as they extend onto the existing grade.

- Following maturation of the restored system, soils in the floodplain areas are expected to be sandy loams.

- The upland buffer is expected to include tall woody canopy with shrubby understory and herbaceous groundcover near the eastern end with the tall woody overstory diminishing as the channel flows westward towards the coastal bluff. Vegetative species present in the riparian upland are expected to be those more adapted to dry conditions. However, deep-rooted species more accustomed to wetter habitats will likely appear as the slope transitions from the existing grade to the riparian floodplain. Revegetation will occur through a combination of planting, seeding, and natural recolonization. Table 4-1 presents typical species that would be expected to occur in the riparian upland area. However, species that would be planted following construction may vary slightly depending on availability from local/regional nurseries.

Ecological functions provided by the South Ponds Channel, riparian floodplain, and upland include: wildlife habitat and migration corridor, seasonal and perennial aquatic habitat, surface runoff retardation, sediment retention, water quality improvement, groundwater exchange, nutrient storage, and cycling.

The proposed daylighting of the historic stream channel is consistent with CCC policy for restoration of historic ecological habitat features, LCP policies, and the proposed Mill Site Specific Plan land use policies for the Mill Pond Open Space District. The stream channel and associated riparian habitat will provide an aesthetically pleasing contribution to the open space and provide a visual buffer between the central portion of the MPC and the City WWTP.