

# Environmental Impacts

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## 4.1 Introduction

The Innovative Wet Weather Program, or Proposed Action, includes a range of projects with a common goal: to improve water quality and watershed health in Portland. This would be accomplished by reducing CSOs, reducing stormwater runoff volume and peak inflows to the sewer system, managing associated pollutants, and continuous improvement through monitoring the effectiveness of green solutions. Many of the projects involve construction or other activities that may affect the physical environment. Construction and operation of stormwater facilities require short-term disturbances and hydraulic changes, but will improve surface water quality over the long term by treating stormwater. Other projects share the long-term goal of improving water resources but have little or no direct environmental impact. For example, stormwater monitoring will enable the city to study the characteristics of urban stormwater discharges with the objective of increasing the ability to control stormwater and surface water pollution. However, stormwater monitoring itself has negligible environmental impact.

This chapter describes the potential environmental impacts from funded IWWP projects, and compares them to the No Action alternative. Chapter 2 of this environmental assessment provides descriptions of typical projects and project examples (see Figure 2.1-1). The IWWP project categories are:

- Water quality-friendly streets and parking lots (green streets)
- Downspout disconnections
- Eco-roofs
- Monitoring and feasibility studies
- Educational efforts
- Grant and project management

Grant and project management includes the city's grant matching project – the Tanner Creek Stream Diversion Project (Phase 3). The potential environmental effects of the Tanner Creek Stream Diversion Project (Phase 3) were evaluated in a separate environmental assessment entitled, *Tanner Creek Basin Environmental Assessment* (City of Portland, May 1997). The environmental effects of that IWWP project were determined to be not significant and they are not considered further in this document.

Of the six IWWP project categories, three – monitoring and feasibility study, educational efforts, and grant and project management – are presumed to have no associated environmental consequences because they do not require ground-disturbing activities. Therefore, these IWWP projects are not evaluated further in this chapter.

The remaining three project categories – green streets, downspout disconnections, and eco-roofs – require at least some physical actions, which could produce environmental effects. These are referred to in this document as the construction projects.

Table 4.1-1 summarizes the typical components and physical actions associated with the three action-oriented construction project categories. Also, Table 4.1-1 suggests some of the design approaches to wet weather management that are identified in the *Stormwater Management Manual* (BES, 2002), although actual designs will vary among projects.

TABLE 4.1-1. GENERIC PHYSICAL ACTIONS ASSOCIATED WITH THE THREE ACTION-ORIENTED CONSTRUCTION PROJECT CATEGORIES.

<b>IWWP Project Category</b>	<b>Primary Components</b>	<b>Design Criteria in <i>Stormwater Management Manual</i><sup>1</sup></b>	<b>Physical Actions</b>
<b>Green Streets</b>	<ul style="list-style-type: none"> <li>• Streetscapes</li> <li>• Parking lot retrofits</li> <li>• Water quality facilities</li> <li>• Vegetated swales and areas</li> <li>• Stormwater conveyance systems</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetated swales</li> <li>• Grassy swales</li> <li>• Vegetated filters</li> <li>• Planter boxes</li> <li>• Vegetated infiltration basins</li> <li>• Sand filters</li> <li>• Soakage trenches</li> <li>• Lowered Planter Strip</li> <li>• Porous pavement</li> <li>• Side Swale</li> <li>• Trees</li> </ul>	<ul style="list-style-type: none"> <li>• Earthwork</li> <li>• Paving</li> <li>• Concrete work</li> <li>• Erosion control</li> <li>• Revegetation</li> <li>• Irrigation</li> <li>• Traffic control</li> <li>• Operation (e.g., pollutant loading, sediment management)</li> </ul>
<b>Downspout Disconnections</b>	<ul style="list-style-type: none"> <li>• Catch basins</li> <li>• Stormwater collection pipelines</li> <li>• Stormwater bioswales</li> <li>• Stormwater planters</li> </ul>	<ul style="list-style-type: none"> <li>• Vegetated swales</li> <li>• Vegetated filters</li> <li>• Vegetated basins</li> </ul>	<ul style="list-style-type: none"> <li>• Minor earthwork and structural work</li> <li>• Landscaping</li> <li>• Erosion control</li> </ul>
<b>Eco-Roofs</b>	<ul style="list-style-type: none"> <li>• Commercial, industrial, and institutional roof retrofits</li> </ul>	<ul style="list-style-type: none"> <li>• Eco-roofs</li> <li>• Roof gardens</li> </ul>	<ul style="list-style-type: none"> <li>• Facility construction</li> </ul>

<sup>1</sup> *Stormwater Management Manual 2.0* (BES, 2002).

## 4.2 Air Quality/Noise

### 4.2.1 Impacts to Air Quality/Noise from the Proposed Action

Intended effects of green streets, downspout disconnection, and eco-roof projects are to return water to the atmosphere through interception and absorption by plants, then evaporation and transpiration. Other intended effects are to reduce urban heat islands, which occur when there is a high percentage of pavement that causes local air to increase in temperature. Green streets projects would reduce urban heat island effects by planting trees that shade streets, parking lots, and roofs.

All construction projects could have short-term, mitigable impacts to local air quality. While construction is in progress, a short-term increase in motor vehicle use would produce localized and temporary increases in vehicle exhaust emissions (such as NO<sub>x</sub>, CO, NMHC, and, to a lesser extent, particulate matter and sulfur oxide (SO<sub>x</sub>)). Given the limited area and duration of construction, air quality impacts from construction vehicles would be minor, particularly from downspout disconnection and eco-roof projects.

Dust emissions could occur during IWWP construction projects from clearing, excavation, grading, stockpiling, and operation of heavy equipment. Vehicles entering and exiting the project areas would produce minor increases in particulate emissions. Dust emissions would vary depending on the level of activity, the type of operation, and weather conditions. The green streets projects are more likely to generate noticeable amounts of dust than downspout disconnection and eco-roof projects.

No significant odor-related impacts are anticipated from the IWWP projects, including the water quality facilities. Odors from sewage overflows would become less frequent where CSOs are reduced. Asphalt and concrete operations would cause temporary odors that are detectable near the project sites.

Eco-roofs provide about 25 percent reduction in noise transmission compared to alternate roof types. Projects that promote vegetation provide some long-term buffering of ambient noise.

Project construction would produce short-term, mitigable noise impacts. Construction noise would be generated by the operation of heavy, diesel-powered excavation and grading equipment; large dump and cement trucks; and other gasoline-powered equipment, such as portable power generators, jackhammers, or pavement cutters. To a lesser extent, construction workers would generate noise as they commute in automobiles to and from project job sites. However, the noise environment in most urban neighborhoods is dominated by local traffic and other local noise sources, so most project noise impacts only would be detectable near the sites and during construction. After the projects are constructed, project-related noise would cease except for minor and infrequent facility and landscape maintenance activities.

#### 4.2.2 Impacts to Air Quality/Noise from No Action

The No Action alternative would produce no air quality or noise-related effects. Air and noise quality in the program area would continue to be dominated primarily by existing land uses and transportation infrastructure.

#### 4.2.3 Mitigation

**Air.** Erosion and sediment control prevents soil and dust from leaving a construction site and migrating into the air, the storm drainage system, or bodies of water. The city requires that all ground-disturbing activities include erosion and sediment control, even if a development permit is not required. The city's erosion and sediment control regulations are found in Title 10 of the Portland City Code. Required practices follow the *Erosion Control Manual* (City of Portland, 1994), which provides technical guidance for temporary and permanent erosion prevention and sediment control to be used by site designers, developers, contractors, and local government agencies during the construction process, before, during, and after clearing, grubbing, grading and excavation. The control practices could include watering, covering stockpiles, dirt and dust removal, and reducing freefall distances. The erosion and sediment control regulations require a minimum of four inspections: preconstruction inspection, interim compliance inspections and monitoring, permanent erosion and sediment control inspection, and final/follow-up erosion and sediment control inspection (approximately 6 months after construction is completed).

**Odor.** Potential odor problems would be addressed by the City's *Combined Sewer Overflow Management Plan (Final Facilities Plan; December 1994)*.

**Noise.** All construction activities would comply with City of Portland noise control regulations (Title 18, Nuisance Abatement and Noise Control). Furthermore, all engine-powered equipment would be required to have mufflers installed according to manufacturer specifications, and all equipment would be required to comply with pertinent EPA equipment noise standards.

For major work, BES would develop a plan for public involvement and outreach in consultation with the affected neighborhood. BES would use this public involvement program to identify ways to schedule construction activities to reduce construction noise and traffic annoyances in the neighborhood during the time that construction would occur. The city would work with neighborhood associations and business groups to schedule construction to minimize interference with community events and business activities, and it would maintain close communication with the neighborhood to keep it updated on the project's construction schedule.

### 4.3 Water Resources

#### 4.3.1 Impacts to Water Resources from the Proposed Action

IWWP construction projects would reduce the volume and extend the timing of stormwater runoff (flow control), improve runoff quality, and increase surface infiltration. Some of the runoff would flow overland or to the stormwater system after detention and treatment, but much of this water would be intercepted or infiltrate into the ground. All of these projects involve vegetation planting and the provision of areas to promote soil infiltration by stormwater.

All projects would provide improved flow control (stormwater detention and retention) by collecting water from developed areas in a designated system, then returning the water to a conveyance system at a slower rate (detention) and lower volume (retention) than when it entered the system. The facilities would help infiltrate or retain water onsite. Managing flows in this way attempts to mimic the site's rainfall runoff response that occurred before development (see Figure 4.3.1-1). Flow control would reduce the potential for stream bank

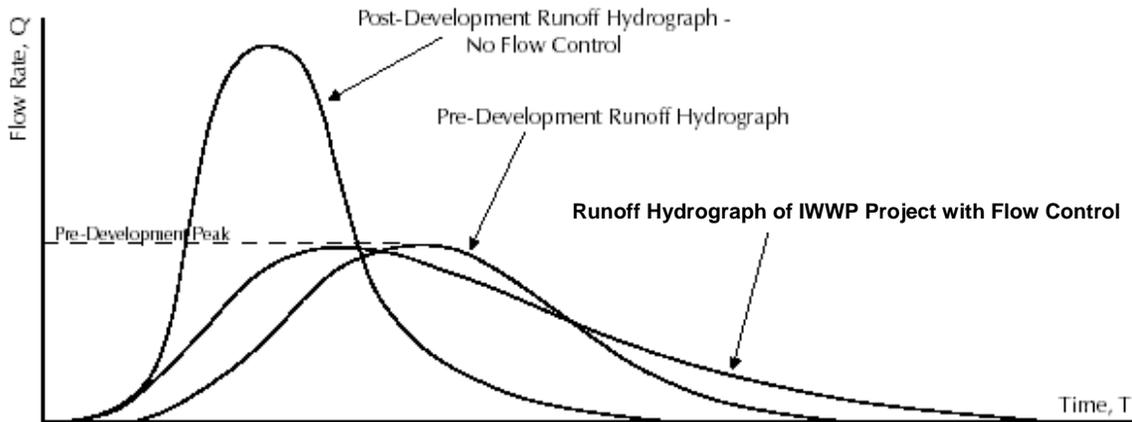


FIGURE 4.3.1-1. EFFECT OF IWWP PROJECTS ON THE STORMWATER RUNOFF HYDROGRAPH

and stream channel erosion, reduce upstream and downstream flooding problems, and help to keep water out of Portland’s combined sewer systems.

Of the water that infiltrates to ground, some would eventually return to the atmosphere, but other water would enter shallow groundwater. However, negative groundwater quality impacts from the IWWP are expected to be minor, and projects would not have the effect of significantly increasing flow to groundwater.

Pollutant removal efficiencies of vegetated swales vary, but many swales perform well compared with alternative stormwater management practices (Table 4.3-1). Metals removal is particularly good. Although Davis and others (1998) reported somewhat lower removal effectiveness, they too indicated important levels of stormwater improvement.

TABLE 4.3-1. POLLUTANT REMOVAL EFFECTIVENESS OF STORMWATER MANAGEMENT PRACTICES FOR PARKING LOTS.

Stormwater Management Practice	Pollutant Removal Effectiveness (%)					
	Total Susp. Solids	Total Phosphorus	Total Nitrogen	Metals	NO <sub>x</sub>	Bacteria
Vegetated Swales <sup>1</sup>	N/A	65	49	95-97		
Vegetated Swales <sup>2</sup>	81	29	49	51-71	38	58
Dry Swales <sup>1</sup>	93	83	92	70-86		
Surface Sand Filters <sup>1</sup>	87	59	32	49-80		
Infiltration Trench <sup>1</sup>	N/A	100	100	N/A		

<sup>1</sup> Winer, 2000

<sup>2</sup> Davis et al., 1998

Short-term, indirect impacts from IWWP projects could include temporary increases in sediment and turbidity from construction impacts, but these potential effects are controllable through mitigation. Long-term benefits of the projects are summarized in the following sections.

### Green Streets

Green Street projects incorporate design criteria to reduce stormwater runoff, retain existing natural habitat, and add more vegetation at transportation corridors. They use trees and other types of vegetation planted in pervious surfaces that capture and detain stormwater instead of delivering it directly to the city's stormwater conveyance system. Some of the captured water returns directly to the atmosphere via evaporation and transpiration by plants, which relieves storm and CSO flows.

Porous pavement at water quality-friendly streets (for example, the N. Gay Avenue project) enables stormwater to infiltrate through otherwise impervious surfaces. Parking lot retrofits provide similar water quality benefits. Their shallow vegetated swales or planter strips (the Oregon Health & Science University project, for example) increase pervious surfaces and vegetated soil areas. They increase stormwater detention and quality before discharging to a stormwater conveyance system, CSO, natural area, or receiving water (for example, the Oregon Zoo project). When incorporated into projects, restoration of native plant communities, vegetation maintenance, slope bioengineering, and stream habitat improvement further improve water quality. Water quality improvement occurs by using

tree shade to reduce water temperatures, stabilizing slopes to prevent or control erosion and scour, reducing sediment delivery to streams, improving the productivity of riparian and aquatic habitats, and promoting diverse and productive biotic communities (an example would be the Cathedral Park project).

Shallow vegetated swales and vegetated areas (such as with the Kelly Elementary School project) are incorporated into the urban fabric to treat and detain stormwater near its source before discharging it to a stormwater conveyance system or receiving water, releasing water to the atmosphere, or letting it infiltrate to the ground.

Water quality facilities would be designed to remove pollution from stormwater before pollutants can enter waterbodies, many of which are already impaired. The facilities could be natural or engineered structures. Natural structures are constructed primarily of natural materials such as soil, rock, and vegetation, and mimic natural water quality improvement processes. Compact, engineered structures constructed of man-made materials for enhanced treatment performance are used where space is limited. All facilities would need to be maintained during operation to remain fully functional.

Revegetation associated with green street projects aims to restore degraded stream banks and upland areas. The restoration work improves water quality, controls erosion, and reduces stormwater pollution by improving vegetation health.

### **Downspout Disconnections**

The downspout disconnection projects redirect stormwater from storm drains onto vegetated surfaces adjacent to the downspout, preventing stormwater from directly entering the city's stormwater conveyance system. Several Portland district schools have been identified for disconnections. The stormwater from buildings is rerouted to lawns, gardens, and swales where it is detained and treated by soil, plants, and shallow detention basins before it could enter storm sewers or combined sewers (an example is the Good Samaritan Hospital Recycling Center project). Stormwater detention reduces peak stormwater flows and, in turn, helps to reduce the magnitude and frequency of CSO events.

### **Eco-Roofs**

Eco-roofs capture and detain stormwater on buildings (such as the Rejuvenation Hardware Warehouse). Plants return some of the captured water directly to the atmosphere via evaporation and transpiration before it could enter the city's stormwater conveyance system. Captured stormwater is detained and treated by soil and plants before it could enter storm sewers or combined sewers, which would reduce peak stormwater flows and, in turn, help to reduce the magnitude and frequency of CSO events. Eco-roofs can reduce stormwater runoff by about 60 percent (City of Portland, March 2000).

## **4.3.2 Impacts to Water Resources from No Action**

Under the No Action alternative, water quality and the natural environment of the city's watersheds would degrade. This alternative is considered unreasonable because it does not meet the following underlying needs for the IWWP actions:

- The Willamette River and its tributaries would continue to be water quality impaired, thus increasing the potential harm to salmonids and other beneficial uses of the city's water resources.
- Until the city meets its CSO goals, CSOs would continue, thus undermining water quality for fish, macroinvertebrates, and humans.
- Flood management would continue to be a problem.

### 4.3.3 Mitigation

Temporary impacts to water quality could occur during in-water construction projects and projects that require work in drainageways and stormwater flowpaths. However, temporary water quality impacts during construction would be mitigated through several mechanisms:

- IWWP projects will follow the City's *Stormwater Management Manual* (BES, 2002).
- All projects would undergo Portland Bureau of Planning land use and permit reviews.
- Portland has two environmental overlay zones – the environmental protection zone and the environmental conservation zone. These overlay zones are designed to implement state land use goals for the conservation of water quality and other resources. They serve to ensure protection of streams, wetlands, and riparian areas; however, most IWWP projects would be located in uplands.
- Erosion and sedimentation controls would be implemented in accordance with City of Portland specifications. In addition, new construction would follow the City of Portland's *Erosion Control Manual* (City of Portland, 1994). Appropriate erosion control, construction methods, and mitigation would be addressed during the project design and permitting processes.
- City of Portland *Local Street* standards would be followed to address many issues facing stormwater management for green streets, parking lot retrofits, and urban streetscaping.
- Existing or updated City of Portland *Tree and Landscape* standards would be implemented to complement IWWP projects (Portland Code Titles 33, 17, 24, and 20).
- Some projects could require federal, state, or city permits. Those projects would undergo environmental review by the designated agencies to ensure that impacts would be avoided, minimized, and mitigated. Endangered Species Act and Magnuson-Stevens Act consultations would occur, if necessary, during federal regulatory processes.
- City project managers and cooperating property owners would comply with DEQ's underground injection control program if underground injection control structures are used in a project.
- The City of Portland's Endangered Species Act Program would provide technologies and directions for ensuring water quality and habitat protection.
- Ongoing city water quality sampling studies would monitor groundwater quality and quantity. If any adverse impacts to groundwater quality or quantity are observed, BES

would develop mitigation actions in consultation with DEQ. The existing city groundwater monitoring network would be used to monitor potential groundwater effects.

## 4.4 Geology and Soils

### 4.4.1 Impacts to Geology and Soils from the Proposed Action

IWWP projects, and the investment in them, could be damaged or harmed by geologic hazards. Although the probability of damage to the proposed IWWP projects resulting from fault ground displacement or seismic shaking is believed to vary across the city, generally it is low. Seismic activity can shake structures and cause soil movements in the form of liquefaction of saturated soils, settlement of unsaturated soils, lateral spreading, and dynamic slope instability. These soil movements can cause damage to constructed facilities, slumps in streambanks, and interruptions in established water flow patterns.

Landslides in natural slopes under static conditions have a low probability of occurrence, but prior development may increase landslide risks. Soft or loose soils are primarily a concern for foundations because settlement of weak soils can cause foundation damage.

For green streets, downspout disconnections, and eco-roofs, the risks of faults, seismic shaking, or landslides and the related soil movements can be considered relatively minimal because the proposed structures generally are not lifeline facilities and are easily repaired. On the other hand, geologic hazards have the potential to cause important impacts to larger sewer separation projects if they become damaged.

IWWP projects could disturb geology and soils. Construction projects could disturb the native soils, introduce new fill materials, or destabilize geologic hazard areas at the project sites. Potential direct negative effects include soil erosion and muddied streets from construction vehicles. The adverse effects would be of short duration, lasting about as long as the construction period. Other potential negative effects would be long term, such as contamination of native soils from introduction of fill materials.

The introduction of stormwater to the ground in landslide-prone areas could pose a problem for soil stability, particularly in the west hills (for example, the Oregon Zoo). In addition, it is possible that portions of sewer separation projects could increase risks associated with geologic hazards where they cause deep cuts or fills across geologically unstable areas, or they could discharge stormwater down slopes.

The positive effects of the projects would be long term. Direct positive impacts include reduced soil erosion as a result of controlling and directing stormwater flows, reducing impervious surfaces, bioengineering, revegetating, armoring erosion-prone sites, and amending soils and landscaped sites.

### 4.4.2 Impacts to Geology and Soils from No Action

Geologic hazards related to faults and seismicity exist in the Portland area whether or not the proposed IWWP's projects are constructed. The short-term direct effects related to disturbing geology and soil during construction would not occur if no action is taken.

However, the consequences of no action would be continued deterioration of the soil and water resources and the habitats they support.

### 4.4.3 Mitigation

The IWWP projects would be designed and constructed to meet minimum seismic design criteria. Ground improvements would be implemented if necessary to mitigate the effects of seismic shaking.

Where appropriate, projects would recreate more natural hydrological processes and institute slope stabilization where hazards are known to exist. The potential for landsliding at constructed slopes would be minimized through engineering design and the use of suitable materials placed at stable grades and heights. Soil evaluations would be used to determine acceptable sites for stormwater infiltration.

The presence or absence of soft or loose soils would be evaluated by drilling soil borings or excavating test pits before construction of major structures. Mitigation methods could include relocating the projects away from soft soils, excavating the soft soils and replacing them with compacted fill, or mechanically stabilizing the earth. If ground improvement is required at a project site, the most practical, cost-effective method would be selected and applied. If it is not possible to mitigate impacts, another site would be selected.

Soil impacts would be minimized by salvaging and reapplying topsoil at pipeline construction sites. Equipment access at construction sites would be limited to minimize soil compaction and disturbance, and compacted soils would be restored to support revegetation. Disturbed surfaces would be returned to their original grades or reconstructed. Using clean fill materials would prevent potential contamination of native soils by introduction of fill materials. Soil erosion would be mitigated by minimizing the amount of area cleared and stripped of vegetation during construction, implementing erosion control measures, preventing soil from leaving the construction site, and revegetating the project areas as soon as practicable. In addition, new construction would follow the City of Portland's *Erosion Control Manual* (City of Portland, 1994) and *Stormwater Management Manual* (BES, 2002).

## 4.5 Floodplains and Wetlands

### 4.5.1 Impacts to Floodplains and Wetlands from the Proposed Action

The IWWP projects could have minor direct or indirect impacts on floodplains and wetlands; however, most projects would occur within the urban landscape where few floodplains and wetlands exist. Generally, the construction projects would be sited upgradient of floodplains and wetlands to avoid them and would treat water before discharging to them. Occasionally, floodplain or wetland encroachment might be unavoidable. Where unavoidable, affected wetlands typically would be small, isolated, stormwater-driven, or artificially created on poorly drained lands.

Typical impacts to floodplain surfaces would be small, and floodplain storage capacity would be unaffected. Trenching, pipeline construction, clearing, and grubbing could cause temporary, mitigable floodplain or wetland impacts. Sewer separations projects such as the

Tanner Creek Stream Diversion Project would not drain existing wetland and stream systems because post-separation groundwater and stormwater flows would be sufficient to maintain them. Generally these projects would not result in structures that would displace or impede floodwaters in a floodplain.

Action projects that increase pervious surfaces, soil infiltration, vegetation interception, length of flow paths, stream channel roughness, and stormwater detention would contribute to a more natural hydrograph for floodplains of receiving waters. In other words, the projects could reduce peak stormwater discharges and increase the flood control capabilities within floodplains and wetlands. Simultaneously, construction projects may reduce the velocity of potentially soil- and sediment-scouring stormwater discharges to receiving waters.

Upgrades to stormwater pipelines and culverts would improve flow conveyance, debris passage, and flood dissipation. Under Phase 3 of the Tanner Creek Stream Diversion Project, for instance, the potential interbasin stormwater transfer from the Montgomery stormwater basin to the Tanner stormwater basin would alleviate flooding in the Montgomery neighborhood.

Improved quality of treated stormwater discharges and revegetation projects could improve the habitat quality of floodplains and wetlands. Sewer separation and the downspout disconnections would reduce the number of CSO events, improving water quality and reducing the amount of floatables that could be deposited in adjacent wetland areas.

#### 4.5.2 Impacts to Floodplains and Wetlands from No Action

Under the No Action alternative, floodplains and wetlands would be unchanged. They would not benefit from improved water quality, stormwater flow control, or native revegetation efforts.

#### 4.5.3 Mitigation

All projects would undergo Portland Bureau of Planning land use review. In addition, new construction would follow the City of Portland's *Erosion Control Manual* (City of Portland, 1994) for erosion and sedimentation control and the *Stormwater Management Manual* (BES, 2002) for new stormwater facilities to protect downstream floodplains and wetlands.

If wetlands or waters could be affected, the projects would undergo environmental review by the U.S. Army Corps of Engineers and Oregon Division of State Lands to ensure that impacts are avoided, minimized, and mitigated. Water quality facilities would be built on uplands if possible. Appropriate resource replacement mitigation would be required to prevent net losses. Mitigation for wetland loss could involve wetland restoration, creation, or enhancement; improved flow; removal of existing fill in waterways; increased habitat and cover for fish and wildlife; native revegetation; or better fish movement opportunities. All projects are expected to be self-mitigating.

## 4.6 Vegetation and Habitats

### 4.6.1 Impacts to Vegetation and Habitats from the Proposed Action

All IWWP construction projects would increase the quality and quantity of vegetation at project locations. At a minimum, new and disturbed ground surfaces would be covered with plants for permanent erosion control or water quality improvements. Slope bioengineering would aim to introduce or increase vegetation on steep or unstable slopes and streambanks (for example, the Oregon Health & Science University project). Trees would be planted in and around impervious surfaces where few or no trees exist, such as urban streets, parking lots, and urban landscapes. Generally, the extent of vegetation increases as the amount of pervious surface increases. The productivity of some vegetated areas would benefit from soil amendments and irrigation.

Revegetation would increase the diversity of vegetation and the representation of native plant communities. Vegetation maintenance could involve replanting, interplanting, weed and brush control, watering, pruning, thinning, and animal damage control. Prohibited species, such as Himalayan blackberry, reed canarygrass, and English ivy, would be controlled. The quality and extent of natural habitats should increase commensurately with vegetation efforts. All habitat types could benefit.

An indirect program benefit to vegetation would be the future development and refinement of city standards for urban landscaping and green streets design, in part based on program monitoring.

### Threatened and Endangered Plant Species

Impacts are not expected to six potentially occurring federally listed plant species for the following reasons:

- The species generally do not occur in the urban landscapes where projects would be implemented.
- The species known to be present in Portland are rarely encountered and their locations are well documented in the Oregon Natural Heritage Program Database.
- Some species are not known to exist in Portland.
- Project-level botanical investigations would be performed at potential wetland sites, which would have the highest likelihood of occurrence.

### 4.6.2 Impacts to Vegetation and Habitats from No Action

Under the No Action alternative, there would be no minor temporary adverse impacts from IWWP projects. However, there also would be no vegetation and habitat improvement activities, such as urban street and parking lot plantings, native species restoration, control of prohibited plant species, wetland creation and enhancement, and stream habitat improvement. The current mixes of vegetation and habitats would remain.

### 4.6.3 Mitigation

All projects would undergo Portland Bureau of Planning land use review. Projects would be designed to avoid existing trees and mature vegetation where practicable. Native species from the *Portland Plant List* (City of Portland, June 1998) would be used in most revegetation efforts. Vegetation monitoring and maintenance would be performed to increase the probability of plant survival and successful revegetation throughout the regulatory, warranty, and plant establishment periods.

## 4.7 Fish and Wildlife

### 4.7.1 Impacts to Fish and Wildlife from the Proposed Action

#### Fish

Activities associated with construction projects could temporarily increase sedimentation and turbidity, which would have temporary negative impacts to fish.

Tree planting in green streets, retrofitted parking lots, vegetated swales and areas, revegetation areas, and riparian areas provide shading, which help reduce solar heating of surface water and maintain water temperatures. Tree planting and bioswales help to reduce the amount of stormwater that falls to the ground and runs off, moderate surface flows by natural detention, and reduce pollutant loading and turbidity.

The downspout disconnections and eco-roof projects benefit fish because they reduce CSOs and, thereby, improve water quality.

Potential impacts would be evaluated in detail during project-level federal and state environmental permitting, Endangered Species Act consultation, and Magnuson-Stevens Act consultation.

#### Threatened and Endangered Fish Species

The funded IWWP projects are unlikely to negatively affect federally-listed fish species. The known and probable project locations do not include stream segments that support listed fish or species of concern. Direct impacts to the Willamette and Columbia rivers would be completely avoided. More natural flow patterns benefit headwaters and tributary drainages, but changes in flows would not be measurable in receiving waters that support listed fish. Water quality improvements would be realized downstream in waters inhabited by listed species.

Coastal cutthroat trout, formerly proposed for listing as threatened but not currently listed, occur at number of the potential tributary streams that could be affected by the program. Potential impacts would be evaluated in detail during project-level federal, state, and city environmental permitting.

#### Wildlife

By improving water quality, removing toxic substances and pollutants from stormwater, and increasing the diversity and productivity of streams, wetlands, and riparian areas, the IWWP should have beneficial effects on wildlife in riparian areas and adjacent upland areas.

Any temporary adverse impacts from construction to wildlife would be short term, localized, and readily mitigated.

Through Green Street projects, tree planting would diversify and improve the wildlife habitat in urban environs and along drainage corridors. Tree planting and naturescaping in neighborhoods and at Green Street and parking lot retrofits increase natural habitat and habitat connectivity. Associated water quality facilities could include a variety of water treatment options, such as vegetated swales and wetlands, that would increase the wildlife habitat in the area.

Some attracted wildlife could include less desirable types, such as rodents and mosquitoes. However, animal pests prefer sites with prolonged inundation or stagnant water. Such conditions generally would be limited to catch basins, wetland enhancements, and possibly stream daylighting, but primarily at sites where these species already occur. Water quality facilities and swales generally would not attract pest species because they are designed to drain, holding water only long enough for treatment or detention.

The downspout disconnections and eco-roof projects improve water quality by reducing the incidence of CSOs, and the improved water quality benefits wildlife. The managed stormwater flows provide a more varied hydrology and promote a wider diversity of habitats.

### **Threatened and Endangered Wildlife Species**

Adverse impacts to the three federally listed wildlife species are unlikely. Colombian white-tailed deer mainly occur along the Columbia River, which is not a location targeted by the IWWP. The northern spotted owl occurs primarily in interior forest habitats with old forest attributes, which generally are not found in the urban landscapes where IWWP projects would be implemented. The streaked horned lark, which is a candidate species, is unlikely to be affected because it nests in native grasslands and prairies, which are nearly absent in Portland.

The project could affect bald eagles in two general ways: (1) bald eagles in the IWWP area could be disturbed; and (2) the IWWP projects could improve habitat over the life of the project. Bald eagles are not known to nest or roost near potential project sites in urban areas of the city, but could occasionally fly overhead and may occasionally perch near the project sites. However, project sites probably will be in commercial, industrial, and institutional land use areas that are continually subjected to high levels of noise and human disturbance.

On the basis of the information available, it appears that, overall, the species of concern found in the potential project areas would benefit from the IWWP, which is designed to improve water quality and restore habitats. IWWP projects such as tree planting and revegetation create more diverse habitats for special status wildlife.

#### **4.7.2 Impacts to Fish and Wildlife from No Action**

Under the No Action alternative there would be no short-term impacts from construction, such as noise, erosion, siltation, and temporary disturbance of existing habitat. However, water quality would not improve as quickly, and the city's waterways would continue to be water quality limited, which would directly affect fish and aquatic species and the wildlife

that rely on these species. Toxic contaminants would continue to bioaccumulate in the food chain.

### **4.7.3 Mitigation**

Construction at waters and wetlands would require federal and state permits and would be managed to minimize impacts to fish and wildlife (for example, by limiting turbidity, using sediment controls and traps, and reseeding disturbed areas). Erosion and sediment control measures and plans required by applicable permits and biological opinions would minimize impacts to fish and prevent temporary negative impacts resulting from increases in water turbidity or losses in aquatic habitat. The environmental permitting processes would be undertaken once the project locations and designs are known; impacts and mitigation could be determined in more detail at that time.

## **4.8 Land Use**

### **4.8.1 Impacts to Land Use from the Proposed Action**

Impacts to land use include changes of zoning or use. Although the city does not anticipate land use impacts, there is a low probability that land use impacts could occur if connected uses are severed (for example, through stream daylighting) or if existing uses are displaced (through new stormwater facilities, riparian area setbacks, etc.). More likely, parking areas may be displaced by vegetated areas and water quality facilities.

No property or easements would be acquired or condemned with funds of the IWWP's EPA grant. It is very unlikely that IWWP projects would trigger a change in current district zoning, although some facilities may be located in public easements.

On the contrary, the program would enable existing land uses to become more compatible with their environmental settings, or it would enhance the ability of future projects to better manage water resources and comply with water resource regulations.

### **4.8.2 Impacts to Land Use from No Action**

Under the No Action alternative, the current land uses and land use designations would remain unchanged.

### **4.8.3 Mitigation**

No land use land use impacts are anticipated. However, in the event of a proposed land use change, no change would occur without the property owner's consent. Furthermore, any change in land use designations would require public involvement and approval.

## **4.9 Cultural Resources**

### **4.9.1 Impacts to Cultural Resources from the Proposed Action**

The IWWP construction projects have the potential to cause short-term, but mitigable, adverse impacts to archaeological sites. Ground-disturbing operations such as grading and excavation could disturb archaeological sites if they are present. The greatest probability of

encountering archeological deposits during construction is at undeveloped sites. It is not likely that cultural resources would be encountered because most project sites are in the built environment or at previously disturbed properties.

Although the State Historic Preservation Office (SHPO) and the City of Portland maintain inventories of cultural and historic resource sites, searches of their records were not conducted for this programmatic environmental assessment. IWWP projects were not reviewed in terms of their potential to affect known cultural resource sites because the exact locations of many project sites have not been determined and the potential to affect archaeological resources is generally site specific. However, as specific projects are known, particularly those that involve ground-disturbing activities, the City will consult with SHPO and provide EPA with documentation of consultation activities.

Significant adverse impacts to cultural resources are unlikely for several reasons. First, all proposed IWWP actions are subject to compliance with the National Historic Preservation Act. Second, as projects are defined and proceed into design and permitting, further investigative work (for example, records searches at the SHPO and field inventory) would help identify any cultural resources that may be present. Third, sites potentially eligible for listing in the National Register of Historic Places would be formally evaluated, and those sites determined eligible for listing would be avoided or impacts would be mitigated in accordance with federal regulations and guidelines. Further, in the event that cultural resource sites are discovered during construction, the City of Portland's construction contract requirements set forth procedures that protect the sites.

#### 4.9.2 Impacts to Cultural Resources from No Action

The No Action alternative would prevent construction-related impacts to archaeological sites, and the sites would continue to remain undisturbed except for natural degradation. In cases where archaeological sites are easily detectable, unauthorized artifact collection or vandalism could be a problem.

#### 4.9.3 Mitigation

The effects of IWWP projects on cultural resources would be considered during the detailed siting and design of the IWWP projects. Each area of new construction or subsurface disturbance would be investigated in accordance with applicable laws and regulations. A summary of applicable state, federal, and local laws, regulations, and planning directives that govern cultural resource management is provided by the *Cultural Resources Protection Plan* (City of Portland, 1996).

Because the IWWP projects receive federal funding from EPA, they are subject to relevant federal environmental regulations that require assessment of the effects of their actions on sites listed or eligible for listing in the National Register of Historic Places (for example, Section 106 of the National Historic Preservation Act and subsequent regulations 36 CFR 800 and 36 CFR 60 and 61). All activities are coordinated through the SHPO and the President's Advisory Council on Historic Preservation, Native American tribal governments, and other interested individuals, as necessary. The SHPO maintains the statewide inventory of historic and archaeological resources as well as sites listed or eligible for inclusion in the National Register of Historic Places. The SHPO promulgates

archaeological survey and reporting standards and facilitates consultations with local tribes. Also, under state law, the SHPO is the lead agency for protecting Oregon's archaeological resources that are located on public lands or that can be affected by federal actions.

The process that will be followed to reduce impacts to cultural resources is to conduct inventories, evaluations, and mitigation (City of Portland, 1996). There are some exceptions to this, especially with respect to Native American burials or traditional cultural properties. For most projects, the first step is to ascertain if there are, in fact, cultural resources that would be affected by the undertaking. A qualified archaeologist would check archaeological site records on file with the SHPO (records search). The archaeologist would then conduct a field inventory (that is, a site discovery).

The City of Portland (1996) has adopted standard specifications for construction contracts that spell out procedures for the protection of cultural resources that are inadvertently discovered by construction crews. The protocol spells out the specific duties of city staff, the consulting archaeologist, and the construction contractors, and the role of interested tribes.

## **4.10 Recreation**

### **4.10.1 Impacts to Recreation from the Proposed Action**

A number of parking lot retrofit projects target city parks. The projects would not have negative impacts on recreation, except possible short-term access restrictions during project construction.

The IWWP projects have a positive impact on water-based recreation in the city because they would improve water quality and aquatic habitats. For example, overflows from combined sewers, which contribute to poor water quality, fish contamination, and health threats, would be reduced. Projects that increase the area or aesthetics of open spaces or improve habitat quality through vegetation restoration and enhancements, such as Green Streets and sewer separations, have a positive impact on passive recreation. A few projects may improve recreation opportunities by enhancing access or connectivity between recreation destinations. For example, the proposed Stormwater Infiltration Feasibility Study at Centennial Mills could produce concept plans for improving connectivity between open space along the Willamette River and inland parks. The vegetation enhancements associated with vegetated swales and areas would augment recreation experiences at those locations.

### **4.10.2 Impacts to Recreation from No Action**

If No Action is taken, no adverse impacts to recreation would occur, but the recreational benefits of the IWWP projects probably would not occur.

### **4.10.3 Mitigation**

No recreation mitigation is proposed because no significant recreational impacts are expected to occur.

## 4.11 Human Health and Safety

### 4.11.1 Impacts to Human Health and Safety from the Proposed Action

IWWP projects may invoke construction safety issues. Human health and safety have the potential to be adversely affected in the short term by construction. Short-term effects are related to typical construction activities and the potential of encountering hazardous materials during construction. Threats to human health and safety as related to construction activities include trip/slip hazards posed by disorderly maintenance of equipment and materials, fall hazards around open excavations, and collision hazards near heavy construction equipment.

In the long term, human health and safety would be positively affected by the IWWP projects. Long-term effects are related to the impact of the projects on the quality of water in the city's waterways.

Human health and safety hazards associated with the presence of hazardous materials in soil or water include inhaling, ingesting, or making skin contact with materials that cause short- or long-term negative health effects. A threat to human health and safety may exist for construction workers when potentially hazardous materials are encountered during project construction. Hazardous constituents may be present at any of the proposed IWWP project sites because of historical and present urban, commercial, and industrial uses of the area. Members of the public in or near construction areas also could be exposed to potentially hazardous materials. In addition, hazardous materials present a threat to human health and safety when stored onsite, transported on public rights-of-way, or disposed of in solid or hazardous waste landfills.

It is possible that some IWWP projects could attract pathogens, mosquitoes, or other vectors of disease, although most would have little effect on existing populations. Other IWWP projects would remove potential pathogens and mosquito breeding sites. Most health risks are primarily endemic. However, West Nile virus, already in 46 states, could be detected in Oregon within months. West Nile virus is an infection that lives in birds and is spread to humans by mosquitoes that have fed on an infected bird. National health experts do not believe that West Nile virus will be a health emergency for residents of Multnomah County. Many people who are exposed never become sick. In rare cases, however, the virus can cause serious illness or even death.

In general, the potential for negative effects on human health and safety would be of short duration during construction of the IWWP projects and would be fully mitigable. However, the positive benefits of constructing the projects would be long term and would include reducing health and safety risks for humans, reducing flooding frequency, improving water quality and wildlife habitat, and improving the value of the city's water resources.

### 4.11.2 Impacts to Human Health and Safety from No Action

No construction activity-related hazards to human health and safety would occur if the IWWP projects are not constructed. Hazards to human health and safety resulting from disturbance, characterization, handling, storage, transportation, and disposal of potentially hazardous materials or sediments also would not occur if the projects are not constructed.

However, the consequences of no action would result in long-term, continued poor quality of water and continued risks to human health and safety. Stormwater and CSO discharges vary from event to event, but frequently contain high levels of bacteria, metals, and toxic constituents. Also, local flooding problems would remain untreated.

### 4.11.3 Mitigation

Construction safety hazards would be mitigated by following the standard safe work practices set forth by the Occupational Safety and Health Association (OSHA) and other state and local rules and regulations, examples of which follow:

- The construction site would be clearly identified, and access by the public would be restricted by a method appropriate to the project site (for example, fencing, barricading, signage, or flagging).
- Traffic control, if needed, would be performed according to applicable city, state, and federal Department of Transportation requirements.
- Utilities would be located before any excavation is performed.
- Construction personnel would wear work clothing, including long pants, steel-toed boots, hard hat, gloves, safety glasses, and hearing protection, where needed.
- Personnel would wear orange safety vests if heavy equipment is involved in the construction.
- Equipment and materials would be stored in an orderly, organized, and secure manner.
- All personnel would be made aware of emergency procedures, the chains of communication and responsibility, the nearest telephone, and the nearest hospital.
- Equipment would be maintained in good condition, be fitted with reverse beepers, and be operated in a safe manner (within the limitations of the equipment) by trained operators.
- Trenches would be shored or sloped in stable configurations with a method of egress provided, in accordance with OSHA, state, and local rules and regulations.
- All excavations would be clearly marked with blockades, signs, or construction tape and covered if the excavation cannot be filled in before the end of the workday.
- Construction vehicle wheels would be cleaned of debris before entering public roadways.

Potential hazards to human health and safety posed by the presence of hazardous materials would be mitigated by the following methods:

- Hazardous materials and spill control would be installed, if practicable, to capture potentially hazardous substance in the runoff.
- The location of each IWWP project with respect to listed sites would be verified, and the potential for the presence of hazardous materials at the project site would be evaluated by means of a site reconnaissance, a review of listed sites, and a review of DEQ files.

- An OSHA-compliant health and safety plan would be prepared for IWWP projects that (based on the detailed review of listed sites) involve the potential for exposure to hazardous materials. These plans address general and project-specific practices and procedures for the protection of public and worker health and safety.
- A health and safety coordinator with responsibility for administering the health and safety plan would be assigned to each project of the IWWP that involves the potential for exposure to hazardous materials.
- Each project of the IWWP would be implemented using OSHA health and safety-trained personnel at sites where hazardous materials may be encountered, in accordance with the health and safety plan.
- Conditions at project sites where hazardous constituents are suspected to be present would be field-monitored, and if monitoring indicates that unknown conditions are encountered, sampling and characterization would be conducted.
- Construction personnel would wear personal protective equipment (PPE) appropriate for the type, concentration, and quantity of hazardous constituent(s) present at the site.
- All potentially hazardous project-derived wastes would be stored, characterized, and disposed of in accordance with applicable local, state, and federal rules and regulations.

Potential diseases of human health posed by the presence of mosquitoes or other vectors of disease would be mitigated by the following methods:

- All stormwater management facilities described in the *Stormwater Management Manual* (BES, 2002) are design to drain within 48 hours of a peak storm.
- Public health officials monitor the West Nile virus and other infectious diseases. The City of Portland works with Multnomah County Vector and Nuisance Control to monitor and control mosquitoes in stormwater ponds, local wetlands and streams, and the public drainage system. If mosquitoes carrying disease such as West Nile virus are detected, the Multnomah County Health Department provides guidance to the City of Portland and works directly with Vector Control to implement more aggressive control measures if needed. If a public health threat is imminent, adulticides (pesticides which suppress the flying, biting adult mosquitoes) may be used.

## 4.12 Traffic/Transportation

### 4.12.1 Impacts to Traffic/Transportation from the Proposed Action

IWWP projects have the potential to cause adverse short-term construction-related traffic/transportation impacts, including restricted access. Eco-roofs, many downspout disconnections, and projects involving habitat improvement or slope bioengineering usually would be constructed away from roads. On the other hand, green streets, parking lot retrofits, sewer separations, and some downspout disconnections would require in-street construction, which would involve partial road closures, local detours and traffic rerouting, limited availability of alternate routes, and loss of business (this would be the case with the, N. Gay Avenue project). The amount of traffic could shift among roads and arterials within

the immediate vicinity of the particular project. Short-term impacts on transportation and traffic would include introduction of commuting work crews and slow-moving and heavy or oversized vehicles to local roads, along with removal of pavement to facilitate access to storm and sewer pipes.

For the most part, construction impacts would vary on a daily or seasonal basis depending on the nature of the specific project being constructed. In general, road construction activities could result in short-term increases in travel time for motorists and transit riders and cause temporary increases in response time for emergency vehicles. Temporary or permanent parking lot displacements could increase walking distances for affected commuters (at the Oregon Zoo project, for example). However, traffic/transportation effects would be limited in extent and duration.

Generally, road condition and function would be improved according to city roadway and urban street standards. All IWWP stormwater management facilities would have adequate access for low-frequency operation and maintenance activities. Each facility would have an access route at least 8 feet wide, not to exceed 10 percent in slope. Where structural surfaces are needed to support maintenance vehicles, access routes would be constructed of gravel or another permeable paving surface.

#### **4.12.2 Impacts to Traffic/Transportation from No Action**

Under the No Action alternative, none of the construction projects that make up the IWWP would occur, and neither would the short-term construction-related impacts described above.

#### **4.12.3 Mitigation**

Construction activities would be coordinated with the Portland Department of Transportation to develop plans to minimize traffic impacts. A Work Zone Traffic Control Plan would be prepared in accordance with the City of Portland's General Technical Requirements, Section 202 (Temporary Traffic Control). The traffic plan would ensure that construction could proceed with the least possible obstruction and inconvenience to the public and would protect pedestrian and vehicular traffic.

In addition to the measures required in Section 202, the City of Portland would prepare and deliver notices to affected residents and businesses within the project area indicating when construction is likely to occur. If particularly heavy construction traffic is expected during particular times, separate notices would be sent to local residents and businesses indicating the schedule.

### **4.13 Socioeconomics**

#### **4.13.1 Impacts to Socioeconomics from the Proposed Action**

Minor disruption to business patronage could occur during construction of IWWP projects; however, construction projects would benefit local employment.

All surface access and excavation for project components would take place on city property, existing road rights-of-way, temporary easements, public property, and private property.

No property would be acquired by using funds from the EPA grant. All projects, especially those on private property, would be conducted only with the property owner's or manager's approval and cooperation. Once construction is completed, all roads would be restored to fully operational conditions.

Generally, no negative impacts would occur from operation of facilities. Project funding would not cause rate increases for city services. The project site owners probably would incur facility maintenance costs; however, the costs could be similar to, and sometimes less than, traditional stormwater management practices. Consequently, the projects are not anticipated to be a financial burden to minority and low-income populations. Positive operational impacts would be associated with improvements in water quality resulting from more natural stormwater hydrology patterns, improved stormwater quality treatment, and reduction in the frequency and volumes of CSOs. Contaminants of concern with respect to human health are projected to decrease.

The City of Portland has a high proportion of environmental justice, or minority and low-income, populations. However, there would not be negative operational impacts or adverse impacts to any minority or low-income populations in the project areas. The project locations would be selected primarily by the needs for improved stormwater management, water quality improvement, and flood and CSO reduction.

No impacts related to population growth would occur. The program is designed to improve stormwater management, reduce CSO releases, and improve water quality. No additional sewer capacity beyond what has been already planned for by the City of Portland would be provided by the program. The program would minimally decrease flows to the city's treatment plants and reduce capital costs for upgrading the existing treatment plants and collection system.

Green streets and projects involving vegetation planting and revegetation in urban neighborhoods would benefit the communities by providing shade and improved aesthetics. Urban trees provide environmental, community, wildlife, and visual benefits. Tree planting would provide amenities that would benefit residential neighborhoods with incomes below the median for the Portland area. The downspout disconnection and eco-roof projects would directly benefit the participating communities by providing jobs for area residents.

#### **4.13.2 Impacts to Socioeconomics from No Action**

No IWWP projects would be constructed under this alternative. As a result, there would be no disruptions to business activity.

#### **4.13.3 Mitigation**

No socioeconomic mitigation is proposed because no significant socioeconomic impacts are expected to occur.

## 4.14 Financing the Program

The city's IWWP matching funds are already budgeted and accounted for through the rates citizens pay for sewer services. No rate increases or fee assessments would occur as a result of this program. Also, no loans will be taken to supplement the IWWP budget.

## 4.15 Cumulative Environmental Impacts

The IWWP is intended to generate improvements to water resources and watershed health across the city's watersheds. Ideally, the overall program improvements and environmental benefits would be greater than the sum of the individual projects; however, no quantitative evaluation of cumulative benefits has been performed. Unfortunately, there are many more innovative wet weather project opportunities in Portland to improve urban water resources than can be funded under the current project.

Although analyses have not been conducted to assess the potential cumulative negative impacts, the proposed IWWP projects, even in conjunction with independent past, present, and future development projects within Portland's watersheds and communities, are not expected to contribute to significant cumulative negative effects for the resources addressed in this EA; that is, negative impacts would not exceed the sum of negative effects from the individual projects.

**Air Quality/Noise.** The individual IWWP projects could be implemented at the same time that other IWWP, city, or private development projects are under construction within a watershed or community. However, the potential construction effects would be short-term and subject to city, state, and federal environmental regulations for construction.

**Water Resources.** The cumulative impacts to water quality from the IWWP projects would generally improve surface water quality in the city. The innovative wet weather projects planned for the watersheds are designed to correct the impacts of past activities and to anticipate and prevent future impacts. No cumulative negative impacts to groundwater are expected.

**Geology and Soils.** No cumulative effects are anticipated from multiple projects within a watershed. If all of the proposed projects take place at the same time, a short-term cumulative decrease in water quality could occur in receiving waters as a result of soil erosion from all of the sites combined. However, this potential cumulative effect would be mitigated by following mandated erosion control procedures.

**Floodplains and Wetlands.** No cumulative impacts to floodplain or wetlands are expected from the IWWP because no permanent project-specific impacts to these resources are expected.

**Vegetation and Habitats.** The various components of the IWWP would increase and diversify vegetation at project locations in Portland neighborhoods. The program would mandate native species revegetation.

**Fish and Wildlife.** The various components of the IWWP increase and improve fish and wildlife habitats in the city and foster biological diversity. Overall, cumulative effects on fish and wildlife habitat and on threatened and endangered species are positive.

**Land Use.** The City of Portland gradually undergoes land use changes within the framework of the city's land use program and relevant plans and zoning codes. The IWWP would not contribute to the land use transformation of the city; instead, the IWWP would help improve habitat and water quality values at project locations.

**Cultural Resources.** To the extent that potential short-term construction-related effects on cultural resource sites are avoided or mitigated through compliance with applicable laws, regulations, or planning mandates, construction of these projects should have no potential cumulative impacts on cultural resources.

**Recreation.** The various components of the IWWP in conjunction with other efforts to improve water quality and develop open space would increase passive recreation opportunities in the city. Generally, impacts on recreation would be positive and limited to the direct effects of individual projects; however, a few projects could disproportionately improve recreation opportunities by enhancing access or connectivity between recreation destinations. For example, the Centennial Mills Feasibility Study could improve connectivity between open space along the Willamette River and inland parks.

**Human Health and Safety.** The cumulative adverse effect of constructing several or all of the projects at the same time would be negligible because prevention and mitigation measures would be incorporated into the projects. In addition, if more than one project is constructed in a given area, preventive and mitigation measures would be coordinated among the projects. The long-term cumulative impacts of all of the IWWP projects would be positive. The projects improve water quality for beneficial uses, which benefits human health and safety.

**Traffic/Transportation.** Short-term cumulative construction-related effects on transportation are not anticipated because the individual IWWP projects would cause relatively small disturbances and impacts would be mitigated through coordination and planning with the Department of Transportation.

**Socioeconomics.** Various components of the IWWP, in conjunction with other efforts to improve water quality in the city, would have socioeconomic impacts. Generally, these impacts would be positive, especially with respect to neighborhoods and community livability.

## 4.16 Compliance with Environmental Laws and Executive Orders

Use of federal funds awarded by EPA to the Innovative Wet Weather Program must comply with the applicable federal regulations listed in Table 4.16-1.

TABLE 4.16-1. LIST OF REGULATIONS APPLICABLE TO THE INNOVATIVE WET WEATHER PROGRAM

<b>Federal</b>
Clean Water Act
Clean Air Act
Fish and Wildlife Coordination Act (16 U.S.C. 1451)
Noise Control Act
Endangered Species Act
Magnuson-Stevens Fishery Conservation and Protection Act
<b>Executive Orders</b>
Protection of Wetlands (E.O. 11990)
Floodplain Management (E.O. 11988)
Protection of Children from Environmental Risk (E.O. 13045)
Environmental Justice (E.O. 12898)
Consultation and Coordination with Indian Tribal Governments (E.O. 13084)

There are currently no planned or identified IWWP projects that would require a federal permit for construction. The only required permits to construct the current list of IWWP projects would be those required by the city of Portland through the city’s Bureau of Development Services. The IWWP will apply for any necessary federal permits associated with current or future project construction.

### 4.17 Irreversible and Irretrievable Commitment of Resources

Construction activities require a one-time expenditure of government funds and the use of energy (primarily fossil fuels) is not retrievable. The projects would occur primarily within the urban areas of the City of Portland, primarily on city property, the property of other public entities, or property owned by cooperating private parties. Therefore, permanent irreversible and irretrievable loss of biological resources is not expected to occur.

Some nonrenewable materials would be used in the construction of IWWP projects. For example, concrete and steel would be used to construct pipelines, eco-roofs, water control structures, green streets, and parts of the vegetated swales and areas.

However, some of the projects would make use of natural processes using renewable resources rather than mechanical processes using nonrenewable materials. For example, the vegetated swales are designed to use the ability of soil and plants to remove pollutants to treat stormwater instead of relying upon conventional, mechanized wastewater treatment. Overall, the goal of the IWWP is to restore the natural productivity and diversity of the city's waterways.

## 4.18 Short-Term Use of the Environment versus Maintenance of Long-Term Productivity

During construction, there would be a temporary disruption of traffic and an increase in noise and dust, which could temporarily inconvenience nearby residences and businesses. These impacts would be mitigated by proper construction techniques, traffic control to prevent accidents, minimizing delays, ensuring access to homes and businesses, and using properly muffled motorized equipment. Also during construction, there could be short and controlled incidents of erosion and sediment transport from sites, but these would be mitigated by appropriate erosion and sediment control standards. In aggregate, the completed projects should provide direct improvements to water quality and habitats in the city.

The IWWP would require the use of some nonrenewable resources and would involve some short-term mitigable environmental impacts. In the long term, however, the IWWP would help to restore the environmental health of the urban watersheds by improving their water quality and the diversity and extent of natural habitats. These actions would lead to long-term increases in the health and ecological productivity of the water resources environment.