San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

Annual Self-Certification Checklist Instructions

BIORETENTION SWALE
(AKA: Conveyance Swale; Vegetated Swale; Grassy Swale)

NOTE: These instructions are intended to be a companion piece to the Annual Self-Certification Checklist. The information contained herein is to be used to help the preparer of the Annual Self-Certification Checklist accurately conduct an inspection and properly complete the form.

Abbreviations: SMR: San Francisco Stormwater Management Regulations and Design Guidelines; SCP: Stormwater Control Plan; SMO: San Francisco Stormwater Management Ordinance; BMP: Best Management Practice (Vegetated Swale/Bioswale); GI: Green Infrastructure

Item #	Inspection Item Description	Inspection Instructions and Explanation
1	Unpleasant odors	**Area of Concern:** Several maintenance-related factors can lead to anaerobic soil conditions that create unpleasant odors in GI installations. Any installation that consistently fails to draw down completely within 48 hours can become anaerobic. The buildup of bacteria in anaerobic soils, along with decaying organic materials, can cause these odors. **Maintenance Solution:** See Item #2 below for more information on ponded water and extended drawdown time.

Item #	Inspection Item Description	Inspection Instructions and Explanation
2	Extended drawdown time (Ponded water > 48 hrs)	**Area of Concern:** Ponded water resulting from extended drawdown times beyond 48 hours can lead to several problems such as lack of filtration capacity, unpleasant odors, plant die-off, and creation of mosquito habitats. Ponded water and drawdown failure can be caused by the following: • crusting or sealing of the bioretention soil surface via accumulation of fine-grained soil, organic matter, etc. • heavily compacted bioretention soil • large amounts of sediment accumulation in the bioretention soil • blocked, clogged, or broken underdrains • blocked or clogged outflow structures and/or sand traps • the improper use of weed barrier fabric or geotextiles in the planter structure **Maintenance Solution:** Infiltration testing can determine if soil compaction or sediment clogging may be the cause of the problem, which can be remedied by scarifying, tilling, shallow or deep aerating, or by replacing the soil in extreme cases. Inspecting the underdrain for clogging can be done visually by looking for standing water in the cleanout or by running a garden hose into the cleanout and determining if the water flows freely or backs up and overtops the cleanout pipe. Video inspection of the underdrain pipe may be performed to determine the source of the underdrain failure. Inspecting the outflow structure or sand trap can be done by removing the lid or grate from the structure and visually inspecting for standing water or excessive debris accumulation. Clogged underdrains and outflow structures can be cleared by jetting or snaking the underdrain pipe or culvert that connects the structure to the sewer and by removing accumulated debris and sediment from the bottom of the structure with hand tools or by use of a vactor truck. If weed barriers are determined to be the cause of ponding, removal of the weed barrier within the footprint of the vegetated swale is required. The removal of clogged subsurface geotextiles requires the excavation of the bioretention soil.
3	Excessive trash / debris accumulation	**Area of Concern:** Excessive trash or debris accumulation causes problems in GI installations that extend beyond poor aesthetics. Trash and debris accumulation can inhibit plant growth, clog or inhibit the infiltration capacity of the bioretention soil, and clog outflow structure grates. Clogged or inhibited infiltration capacity could lead to extended drawdown times and unwanted ponding. Additionally, clogged outflow structure grates can lead to overflowing and flooding. **Maintenance Solution:** All trash and debris should be removed from vegetated swales before the start of the rainy season (October 15) or as frequently as site conditions dictate. All material should be discarded at an appropriate facility.
4	Visible surface contaminants / pollution	**Area of Concern:** Visible surface contaminants and pollution can range from inert substances that can cause bioretention soil clogging to hazardous substances that impact plant, environmental, or human health. Examples of inert contaminants are masonry, plaster or concrete “washout,” and masonry or roadway saw cutting slurry and residue. Examples of hazardous contaminants are petroleum-based substances, caustic chemicals, pesticides, and herbicides. These pollutants can often be identified by sight or smell when they become deposited on the surface of a vegetated swale. **Maintenance Solution:** If pollutants are detected, investigations must be conducted to determine the source of the contaminant, mitigate that source, and then take steps to clean up the contamination. For inert substances, cleanup can typically be conducted by regular maintenance personnel by simply scraping off and discarding the contaminated material at an appropriate facility. If bioretention soil is removed by the cleanup process, any lost bioretention soil materials must be replaced. Hazardous substance cleanup will require specially trained and licensed contractors and special disposal conforming to local and national laws and regulations.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
5	Vandalism / catastrophic damage to components or entire system	**Area of Concern:** Vandalism can range from minor issues like graffiti or tearing out/stealing of plants to destruction of the entire irrigation system. Catastrophic damage can result from vehicles driving into or through the vegetated swale, trampling caused by large amounts of pedestrians or animals walking through the BMP, or construction/repair of nearby utilities and structures that impact the BMP. **Maintenance Solution:** Repair of vandalism can consist of simply removing graffiti or planting individual replacement plants. Catastrophic damage can involve completely reconstructing the BMP.
6	Unauthorized modifications	**Area of Concern:** Unauthorized modifications consist of any changes to a BMP that deviate from the approved construction documents included in the project's SMR Maintenance Agreement Exhibit B. These modifications can take place during construction (i.e., soil or plant substitutions with inferior components) or can happen after the BMP is constructed (i.e., reducing the footprint of the BMP to accommodate an addition to a nearby structure). **Maintenance Solution:** The SMR Maintenance Agreement Exhibit B recorded on the deed of the property provides the original approved construction documents that can be referred to and used to determine if modifications have been made. All unauthorized modifications must be corrected by returning the BMP to its original configuration, as described in the approved construction documents contained in the SMR Maintenance Agreement Exhibit B.
7	Excessive weed growth	**Area of Concern:** Noxious and invasive weeds must be removed when they cover more than 25% of the BMP surface. Noxious and invasive weeds are highly damaging to the natural and built environment. These weeds interfere with the beneficial use of the land, degrade biodiversity, and reduce the effectiveness of the vegetated swale. **Maintenance Solution:** Best practices call for weed removal on a monthly basis, regardless of cover percentage. Weed removal must include the entire root structure and the weeds must be disposed of at an appropriate facility to prevent spreading of invasive species. California's Pest Prevention System (PPS) and the California Food and Agricultural Code (FAC) Appendix D set regulations and laws pertaining to weed removal and disposal.
8	Sediment accumulation at curb cut, forebay, or planter low points	**Area of Concern:** Sediment accumulation in BMPs is normal and expected. Sediment and debris can collect in the curb cut (or inlet structure), in the forebay (or rock cobble energy dissipater), or at the low point of vegetated swales. **Maintenance Solution:** Steps must be taken to remove sediment accumulation on an annual basis (or more often, depending on site conditions) to keep the BMP functioning properly. This built-up sediment must be removed to ensure water can flow freely into and through the BMP as well as to maintain bioretention soil infiltration capacity. Typical removal methods consist of scraping up sediment with shovels and properly disposing of the sediment at an approved facility.

Item #	Inspection Item Description	Inspection Instructions and Explanation
9	Erosion at inlet, outlet, overflow, check dams, swale bottom, or side slopes	**Area of Concern:** Inflow, outflow, and water movement through a vegetated swale may cause erosion and scouring of the planter surface over time or immediately after construction during the plant grow-in period. Erosion and subsequent sediment deposition can be detrimental to the bioretention soil infiltration capacity, cause damage to plants, and create clogging in underdrains and outflow structures. **Maintenance Solution:** Repair measures must include identifying and correcting the cause of the erosion by adding flow dispersal measures to reduce channelized flow (i.e., rock cobble or rip-rap level spreader, etc.), repairing the erosion damage, and removing any sediment created by the erosion process.
10	Inlet, outlet, or overflow structure blockage	**Area of Concern:** Trash, debris, and poorly-sited or overgrown plant material can create blockages at the inlet and outlet points or at the overflow structure of vegetated swale inhibiting the flow of water into, through, or out of the facility. Inlet blockages can cause stormwater flows to bypass the BMP or only allow partial flows into the BMP, creating a situation where the BMP is non-functioning or underperforming. Inlet, outlet, and overflow structure blockages can also create excessive ponding within and around the BMP, potentially leading to hazardous conditions and property damage. **Maintenance Solution:** Blockages must be cleared before the start of the rainy season (October 15), before each forecasted storm if site conditions require, and/or as frequently as site conditions dictate. Trash and debris must be removed by hand or with hand tools and disposed of at an appropriate facility. Poorly-sited or overgrown plant material can be transplanted to another location within the BMP or discarded as compost. Overflow structure grates, sumps, and traps must be cleared of debris by hand, hand tools, or a vactor truck.
11	Irrigation system damaged, leaking, or out of adjustment	**Area of Concern:** Damaged or leaking irrigation systems are identifiable by the presence of ponded water or wet spots in the planter during dry periods, Malfunctioning irrigation systems can also be identified by dry areas in the planter and evidence of browning or wilting plants that show signs of under-watering. Systems that are out of adjustment are identifiable by observation during the irrigation cycle. Sprinkler head patterns must be observed to determine that the spray pattern does not deposit water on surrounding paved surfaces or nearby structures. **Maintenance Solution:** Irrigation systems must be maintained year-round by a qualified professional. This maintenance includes the repair of leaks, the adjustment of irrigation head spray patterns to avoid buildings and paved surfaces and the inspection, testing, and certification of backflow prevention devices. It is recommended that irrigation systems in vegetated swale are only utilized through the plant establishment and warranty phases of the project. Once the plant material has been established and out of warranty, continued irrigation should not be necessary if proper plants were specified for the installation.
12	Dead, diseased, dying, or missing plants	**Area of Concern:** Plants play an important role in the function of a bioretention system. In addition to supporting evapotranspiration, plant roots help aerate the soil and minimize soil compaction, replenish organic materials in the soil, and provide a habitat for beneficial bacteria that aid in the biological breakdown and mitigation of pollutants deposited by stormwater into the bioretention soil. For a vegetated swale to function properly, it needs consistent and healthy plant cover. Bare spots resulting from missing plants give invasive weeds an opportunity to grow. **Maintenance Solution:** Dead, diseased, dying, or missing plants must be replaced. If a large amount of plants have died off, consult with a horticultural expert on the cause of the die-off, and remedy the cause before replanting.

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13	Mulch – large bare spots / eroded mulch areas	**Area of Concern:** Rock and organic mulch helps to minimize weed growth, prevent erosion, and scour of the planter surface, and helps prevent the soil surface from losing moisture and crusting during dry periods. **Maintenance Solution:** Any bare spots on the planter surface where the bioretention soil is visible must be re-covered with mulch. The added mulch must meet the specs of the material thickness and type used during construction. If the facility was installed with organic mulch, do not substitute bark, “gorilla hair,” or recycled kiln dried lumber type mulches as replacement materials because these types of mulches are floatable materials than can cause other maintenance problems in vegetated swales (i.e., clogging of the overflow structure). If the facility was installed with rock mulch, select a replacement product of similar or larger size to resist washing out. Do not substitute rock mulch materials with high fines content or recycled materials.
14	Vegetation obstructing line of sight at roadway or intersection	**Area of Concern:** If vegetated swales are located close to a roadway or intersection, overgrown plants may cause a hazardous condition by blocking the vision of motorists, bicyclists, and pedestrians. **Maintenance Solution:** Regular pruning on a quarterly basis can alleviate obstructed lines of sight, while maintaining the desired plant coverage in the facility. Pruning should only be done by trained landscape professionals in accordance with established horticultural practices and standards.
15	Vegetation blocking in-flow at curb cut / inlet structure (if applicable)	**Area of Concern:** Poorly sited, spreading, or overgrown plant material can create blockages at the inlet point of a vegetated swale. This plant material can block stormwater flows from entering the facility, potentially causing stormwater to pond upstream of the inlet or bypass the unit entirely. If stormwater cannot enter the vegetated swale, or less than the designed volume of stormwater is able to enter, the function of the facility will be significantly diminished. **Maintenance Solution:** Any plant material that blocks the inlet of a facility must be pruned, thinned, transplanted elsewhere in the planter, or removed and discarded. Pruning, thinning and transplanting should only be done by trained landscape professionals in accordance with established horticultural practices and standards.
16	Vegetation blocking Operation & Maintenance of other components	**Area of Concern:** Poorly-sited, spreading, or overgrown plant material can interfere with or block the Operation & Maintenance (O&M) of other key components of a vegetated swale. Some of the bioretention components that may interfere with O&M are: outlet structures, underdrains, and irrigation components. **Maintenance Solution:** Any plant material that blocks the O&M of key components of a facility must be pruned, thinned, transplanted elsewhere in the planter, or removed and discarded correctly. Pruning should only be done by trained landscape professionals in accordance with established horticultural practices and standards.

Item #	Inspection Item Description	Inspection Instructions and Explanation
17	Structural damage (planter edges, check dams, or outlet structure)	**Area of Concern:** Minor damage to structural components such as curbs, walls, trench drains, and outlet structures should be repaired on a yearly basis. More significant structural damage, such as damage caused by auto accidents, nearby construction work, or natural disasters must be repaired as soon as possible. **Maintenance Solution:** Minor repairs can consist of, but are not limited to, patching chips and cracks to concrete structures and resetting outlet structure frames and grates. Major repairs can consist of removal and replacement of damaged curbs, walls, outflow structures, or structural bracing and supplemental reinforcement of failing structural components.
18	Rodent damage / burrowing	**Area of Concern:** Rodent damage and animal burrows in vegetated swales can cause structural, landscape, and stormwater flow-based issues. Burrows can undermine structural components, leading to unwanted settlement. Burrows may also create preferential flow paths through the section of a vegetated swale that differ significantly from the designed flow path, causing piping and erosion problems in the bioretention soil. Rodents can also damage plants and plant root systems. **Maintenance Solution:** If rodent / animal damage is observed, consult with a licensed professional pest control service for eradication, or trapping and relocation, as appropriate.
19	Mosquitos or mosquito larvae observed	**Area of Concern:** Ponded water resulting from extended drawdown time beyond 48 hours may lead to the development of a mosquito habitat. **Maintenance Solution:** See Item #2 above for remedies to extended drawdown times. For more information on mosquito control visit http://www.sfdph.org/dph/eh/WestNile/default.asp or http://www.sfmosquito.org/. If mosquitos or mosquito larvae are observed, please contact the San Francisco Environmental Health Vector Control Program at (415) 252-3806, or email EnvHealth.DPH@sfdph.org. Also, consult with a licensed professional pest control service for eradication, as appropriate.

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Annual Self-Certification Checklist Instructions

UNLINED BIORETENTION

(AKA: Unlined bioretention cell, bioretention basin, bioretention planter, flow-through planter, stormwater planter, rain garden, bioretention swale)

NOTE: These instructions are intended to be a companion piece to the Annual Self-Certification Checklist. The information contained herein is to be used to help the preparer of the Annual Self-Certification Checklist accurately conduct an inspection and properly complete the form.

Abbreviations: SMR: San Francisco Stormwater Management Regulations and Design Guidelines; SCP: Stormwater Control Plan; SMO: San Francisco Stormwater Management Ordinance; BMP: Best Management Practice (Bioretention Planter); GI: Green Infrastructure

Item #	Inspection Item Description	Inspection Instructions and Explanation
1	Unpleasant odors	**Area of Concern:** Several maintenance-related factors can lead to anaerobic soil conditions that create unpleasant odors in GI installations. Any installation that consistently fails to draw down completely within 48 hours can become anaerobic. The buildup of bacteria in anaerobic soils, along with decaying organic materials can cause these odors. **Maintenance Solution:** For more information on ponded water and extended drawdown time, see Item #2 below.

Item #	Inspection Item Description	Inspection Instructions and Explanation
2	Extended drawdown time (Ponded water > 48 hrs.)	**Area of Concern:** Ponded water resulting from extended drawdown times beyond 48 hours can lead to several problems such as; lack of filtration capacity, unpleasant odors, plant die-off, and creation of mosquito habitats. Ponded water and drawdown failure can be caused by the following: • crusting or sealing of the bioretention soil surface via accumulation of fine-grained soil, organic matter, etc. • heavily compacted bioretention soil • large amounts of sediment accumulation in the bioretention soil • blocked, clogged or broken underdrains • blocked or clogged outflow structures and/or sand traps • the improper use of weed barrier fabric or geotextiles in the planter structure **Maintenance Solution:** Infiltration testing can determine if soil compaction or sediment clogging may be the cause of the problem, which can be remedied by scarifying, tilling, shallow or deep aerating, or by replacing the soil in extreme cases. Inspecting the underdrain for clogging can be done visually by looking for standing water in the cleanout, or by running a garden hose into the cleanout and determining if the water flows freely, or backs up and overtops the cleanout pipe. Video inspection of the underdrain pipe may be performed to determine the source of the underdrain failure. Inspecting the outflow structure or sand trap can be done by removing the lid or grate from the structure and visually inspecting for standing water or excessive debris accumulation. Clogged underdrains and outflow structures can be cleared by jetting or snaking the underdrain pipe or culvert that connects the structure to the sewer, and by removing accumulated debris and sediment from the bottom of the structure with hand tools or by use of a vactor truck. If weed barriers are determined to be the cause of ponding, removal of the weed barrier within the footprint of the bioretention planter is required. The removal of clogged subsurface geotextiles requires the excavation of the bioretention soil.
3	Excessive trash / debris accumulation	**Area of Concern:** Excessive trash or debris accumulation causes problems in GI installations that extend beyond poor aesthetics. Trash and debris accumulation can inhibit plant growth, clog or inhibit the infiltration capacity of the bioretention soil and clog outflow structure grates. Clogged or inhibited infiltration capacity could lead to extended drawdown times and unwanted ponding. Additionally, clogged outflow structure grates can lead to overflowing and flooding. **Maintenance Solution:** All trash and debris should be removed from bioretention planters before the start of the rainy season (October 15), or as frequently as site conditions dictate. All material should be discarded at an appropriate facility.
4	Visible surface contaminants / pollution	**Area of Concern:** Visible surface contaminants and pollution can range from inert substances that can cause bioretention soil clogging, to hazardous substances that impact plant, environmental, or human health. Examples of inert contaminants are masonry, plaster or concrete “washout,” and masonry or roadway saw cutting slurry and residue. Examples of hazardous contaminants are petroleum based substances, caustic chemicals, pesticides and herbicides. These pollutants can often be identified by sight or smell when they become deposited on the surface of a bioretention planter. **Maintenance Solution:** If pollutants are detected, investigations must be conducted to determine the source of the contaminant, mitigate that source, and then take steps to clean up the contamination. For inert substances, cleanup can typically be conducted by regular maintenance personnel by simply scraping off the contaminated material and discarding at an appropriate facility. If bioretention soil is removed by the cleanup process, any lost bioretention soil materials must be replaced. Hazardous substance cleanup will require specially trained and licensed contractors and special disposal requirements conforming to local and national laws and regulations.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
5	Vandalism / catastrophic damage to components or entire system	**Area of Concern:** Vandalism can range from minor issues like graffiti or tearing out/stealing of plants, to destruction of the entire irrigation system. Catastrophic damage can result from vehicles driving into or through the bioretention planter, trampling caused by large amounts of pedestrians or animals walking through the BMP, or construction/repair of nearby utilities and structures that impact the BMP. **Maintenance Solution:** Repair of vandalism can consist of simply removing graffiti and planting individual replacement plants. Repair of catastrophic damage can involve completely reconstructing the BMP.
6	Unauthorized modifications	**Area of Concern:** Unauthorized modifications consist of any changes to a BMP that deviate from the approved construction documents included in the project's SMR Maintenance Agreement Exhibit B. These modifications can take place during construction (i.e., soil or plant substitutions with inferior components), or can happen after the BMP is constructed (i.e., reducing the footprint of the BMP to accommodate an addition to a nearby structure). **Maintenance Solution:** The SMR Maintenance Agreement Exhibit B recorded on the deed of the property provides the original approved construction documents that can be referred to and used to determine if modifications have been made. All unauthorized modifications must be corrected by returning the BMP to its original configuration, as described in the approved construction documents contained in the SMR Maintenance Agreement Exhibit B.
7	Excessive weed growth	**Area of Concern:** Noxious and invasive weeds must be removed when they cover more than 25% of the BMP surface. Noxious and invasive weeds are highly damaging to the natural and built environment. These weeds interfere with the beneficial use of the land, degrade biodiversity, and reduce the effectiveness of the bioretention planter. **Maintenance Solution:** Best practices call for weed removal on a monthly basis, regardless of cover percentage. Weed removal must include the entire root structure, and the weeds must be disposed of at an appropriate facility to prevent spreading of invasive species California's Pest Prevention System (PPS) and the California Food and Agricultural Code (FAC) Appendix D set regulations and laws pertaining to weed removal and disposal.
8	Sediment accumulation at curb cut, forebay or planter low points	**Area of Concern:** Sediment accumulation in BMPs is normal and expected. Sediment and debris can collect in the curb cut (or inlet structure), in the forebay (or rock cobble energy dissipater), or at the low point of bioretention planters. **Maintenance Solution:** Steps must be taken to remove sediment accumulation on an annual basis (or more often, depending on site conditions) to keep the BMP functioning properly. This built-up sediment must be removed to ensure that water can flow freely into and through the BMP, as well as to maintain bioretention soil infiltration capacity. Typical removal methods consist of scraping up sediment with shovels and properly disposing of the sediment at an approved facility.

Item #	Inspection Item Description	Inspection Instructions and Explanation
9	Erosion at inlet, outlet, overflow, check dams or side slopes	**Area of Concern:** Inflow, outflow and water movement through a bioretention planter may cause erosion and scouring of the planter surface over time, or immediately after construction during the plant grow-in period. Erosion and subsequent sediment deposition can be detrimental to the bioretention soil infiltration capacity, cause damage to plants, and create clogging in underdrains and outflow structures. **Maintenance Solution:** Repair measures must include identifying and correcting the cause of the erosion by adding flow dispersal measures to reduce channelized flow (i.e. rock cobble or rip-rap level spreader, etc.), repairing the erosion damage and removing any sediment created by the erosion process.
10	Inlet, outlet or overflow structure blockage	**Area of Concern:** Trash, debris, and poorly-sited or overgrown plant material can create blockages at the inlet and outlet points, or at the overflow structure of bioretention planters, inhibiting the flow of water into, through, or out of the facility. Inlet blockages can cause stormwater flows to bypass the BMP or only allow partial flows into the BMP, creating a situation where the BMP is non-functioning or underperforming. Inlet, outlet, and overflow structure blockages can also create excessive ponding within and around the BMP, potentially leading to hazardous conditions and property damage. **Maintenance Solution:** Blockages must be cleared before the start of the rainy season (October 15), before each forecasted storm if site conditions require, and/or as frequently as site conditions dictate. Trash and debris must be removed by hand or with hand tools, and disposed of at an appropriate facility. Poorly-sited or overgrown plant material can be transplanted to another location within the BMP, or discarded as compost. Overflow structure grates, sumps, and traps must be cleared of debris by hand, hand tools, or a vactor truck and disposed of at an appropriate facility.
11	Irrigation system damaged, leaking or out of adjustment	**Area of Concern:** Damaged or leaking irrigation systems are identifiable by the presence of ponded water or wet spots in the planter during dry periods, Malfunctioning irrigation systems can also be identified by dry areas in the planter and evidence of browning or wilting plants that show signs of under-watering. Systems that are out of adjustment are identifiable by observation during the irrigation cycle. Sprinkler head patterns must be observed to determine that the spray pattern does not deposit water on surrounding paved surfaces or nearby structures. **Maintenance Solution:** Irrigation systems must be maintained year round by a qualified professional. This maintenance includes the repair of leaks, the adjustment of irrigation head spray patterns to avoid buildings and paved surfaces. It also includes the inspection, testing and certification of backflow prevention devices. It is recommended that irrigation systems in bioretention planters are only utilized through the plant establishment and warranty phases of the project. Once the plant material has been established and out of warranty, continued irrigation should not be necessary if proper plants were specified for the installation.
12	Dead, diseased, dying, or missing plants	**Area of Concern:** Plants play an important role in the function of a bioretention system. In addition to supporting evapotranspiration, plant roots help aerate the soil and minimize soil compaction, replenish organic materials in the soil, and provide a habitat for beneficial bacteria that aid in the biological breakdown and mitigation of pollutants deposited by stormwater into the bioretention soil. For a bioretention planter to function properly, it needs consistent and healthy plant cover. Bare spots resulting from missing plants give invasive weeds an opportunity to grow. **Maintenance Solution:** Dead, diseased, dying, or missing plants must be replaced. If a large amount of plants have died off, consult with a horticultural expert on the cause of the die-off, and remedy the cause before replanting.

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13	Mulch – large bare spots / eroded mulch areas	**Area of Concern:** Rock and organic mulch helps to minimize weed growth, prevents erosion and scour of the planter surface, and helps prevent the soil surface from losing moisture and crusting over during dry periods. **Maintenance Solution:** Any bare spots on the planter surface where the bioretention soil is visible must be re-covered with mulch. The added mulch must meet the specs of the material thickness and type used during construction. If the facility was installed with organic mulch, do not substitute bark, "gorilla hair," or recycled kiln dried lumber type mulches as replacement materials, because these types of mulches are floatable materials than can cause other maintenance problems in bioretention planters (i.e. clogging of the overflow structure). If the facility was installed with rock mulch, select a replacement product of similar or larger size to resist washing out. Do not substitute rock mulch materials with high fines content or recycled materials.
14	Vegetation obstructing line of sight at roadway or intersection	**Area of Concern:** If bioretention planters are located close to a roadway or intersection, overgrown plants may cause a hazardous condition by blocking the vision of motorists, bicyclists, and pedestrians. **Maintenance Solution:** Regular pruning on a quarterly basis can alleviate blocked lines of sight, while maintaining the desired plant coverage in the facility. Pruning should only be done by trained landscape professionals, in accordance with established horticultural practices and standards.
15	Vegetation blocking in-flow at curb cut / inlet structure	**Area of Concern:** Poorly-sited, spreading, or overgrown plant material can create blockages at the inlet point of a bioretention planter. This can block stormwater flows from entering the facility, potentially causing stormwater to pond upstream of the inlet or bypass the unit entirely. If stormwater cannot enter the bioretention planter, or less than the designed volume of stormwater is able to enter, the function of the facility will be significantly diminished. **Maintenance Solution:** Any plant material that blocks the inlet of a facility must be pruned, thinned, transplanted elsewhere in the planter, or removed and disposed of. Pruning, thinning, and transplanting should only be done by trained landscape professionals, in accordance with established horticultural practices and standards.
16	Vegetation blocking Operation & Maintenance of other components	**Area of Concern:** Poorly-sited, spreading, or overgrown plant material can interfere with or block the Operation & Maintenance (O&M) of other key components of a bioretention planter. Some of the bioretention components that may interfere with O&M are: outlet structures, underdrains, and irrigation components. **Maintenance Solution:** Any plant material that blocks the O&M of key components of a facility must be pruned, thinned, transplanted elsewhere in the planter, or removed and disposed of correctly. Pruning should only be done by trained landscape professionals, in accordance with established horticultural practices and standards.

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17	Structural damage (planter edges, check dams or outlet structure)	**Area of Concern:** Minor damage to structural components such as curbs, walls, trench drains and outlet structures should be repaired on a yearly basis. More significant structural damage, such as damage caused by auto accidents, nearby construction work, or natural disasters must be repaired as soon as possible. **Maintenance Solution:** Minor repairs can consist of, but are not limited to, patching chips and cracks to concrete structures, and resetting outlet structure frames and grates. Major repairs can consist of removal and replacement of damaged curbs, walls, outflow structures, or structural bracing and supplemental reinforcement of failing structural components.
18	Rodent damage / burrowing	**Area of Concern:** Rodent damage and animal burrows in bioretention planters can cause structural, landscape and stormwater-flow based issues. Burrows can undermine structural components, leading to unwanted settlement. Burrows may also create preferential flow paths through the section of a bioretention planter that differ significantly from the designed flow path, causing piping and erosion problems in the bioretention soil. Rodents can also damage plants and plant root systems. **Maintenance Solution:** If rodent / animal damage is observed, consult with a licensed professional pest control service for eradication, or trapping and relocation, as appropriate.
19	Mosquitos or mosquito larvae observed	**Area of Concern:** Ponded water resulting from extended drawdown time beyond 48 hours may lead to the development of a mosquito habitat. **Maintenance Solution:** See Item #2 above for remedies to extended drawdown times. For more information on mosquito control visit http://www.sfdph.org/dph/eh/WestNile/default.asp or http://www.sfmosquito.org/. If mosquitos or mosquito larvae are observed, please contact the San Francisco Environmental Health Vector Control Program at (415) 252-3806 or email EnvHealth.DPH@sfdph.org. Also, consult with a licensed professional pest control service for eradication, as appropriate.

DO NOT SUBMIT WITH CHECKLIST

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LINED BIORETENTION

(AKA: lined bioretention cell, bioretention basin, bioretention planter, flow-through planter, stormwater planter, rain garden, bioretention swale)

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1	Unpleasant odors	**Area of Concern:** Several maintenance-related factors can lead to anaerobic soil conditions that create unpleasant odors in GI installations. Any installation that consistently fails to draw down completely within 48 hours can become anaerobic. The buildup of bacteria in anaerobic soils, along with decaying organic materials can cause these odors. **Maintenance Solution:** For more information on ponded water and extended drawdown time, see Item #2 below.

Item #	Inspection Item Description	Inspection Instructions and Explanation
2	Extended drawdown time (Ponded water > 48 hrs.)	**Area of Concern:** Ponded water resulting from extended drawdown times beyond 48 hours can lead to several problems such as: lack of filtration capacity, unpleasant odors, plant die-off, and creation of mosquito habitats. Ponded water and drawdown failure can be caused by the following: • crusting or sealing of the bioretention soil surface via accumulation of fine-grained soil, organic matter, etc. • heavily compacted bioretention soil • large amounts of sediment accumulation in the bioretention soil • blocked, clogged, or broken underdrains • blocked or clogged outflow structures and/or sand traps • the improper use of weed barrier fabric or geotextiles in the planter structure **Maintenance Solution:** Infiltration testing can determine if soil compaction or sediment clogging may be the cause of the problem, which can be remedied by scarifying, tilling, shallow or deep aerating, or by replacing the soil in extreme cases. Inspecting the underdrain for clogging can be done visually by looking for standing water in the cleanout or by running a garden hose into the cleanout and determining if the water flows freely or backs up and overtops the cleanout pipe. Video inspection of the underdrain pipe may be performed to determine the source of the underdrain failure. Inspecting the outflow structure or sand trap can be done by removing the lid or grate from the structure and visually inspecting for standing water or excessive debris accumulation. Clogged underdrains and outflow structures can be cleared by jetting or snaking the underdrain pipe or culvert that connects the structure to the sewer, and by removing accumulated debris and sediment from the bottom of the structure with hand tools or by use of a vactor truck. If weed barriers are determined to be the cause of ponding, removal of the weed barrier within the footprint of the bioretention planter is required. The removal of clogged subsurface geotextiles requires the excavation of the bioretention soil.
3	Excessive trash / debris accumulation	**Area of Concern:** Excessive trash or debris accumulation causes problems in GI installations that extend beyond poor aesthetics. Trash and debris accumulation can inhibit plant growth, clog or inhibit the infiltration capacity of the bioretention soil and clog outflow structure grates. Clogged or inhibited filtration capacity could lead to extended drawdown times and unwanted ponding. Additionally, clogged outflow structure grates can lead to overflowing and flooding. **Maintenance Solution:** All trash and debris should be removed from bioretention planters before the start of the rainy season (October 15), or as frequently as site conditions dictate. All material should be discarded at an appropriate facility.
4	Visible surface contaminants / pollution	**Area of Concern:** Visible surface contaminants and pollution can range from inert substances that can cause bioretention soil clogging, to hazardous substances that impact plant, environmental, or human health. Examples of inert contaminants are masonry, plaster or concrete “washout,” and masonry or roadway saw cutting slurry and residue. Examples of hazardous contaminants are petroleum based substances, caustic chemicals, pesticides and herbicides. These pollutants can often be identified by sight or smell when they become deposited on the surface of a bioretention planter. **Maintenance Solution:** If pollutants are detected, investigations must be conducted to determine the source of the contaminant, mitigate that source, and then take steps to clean up the contamination. For inert substances, cleanup can typically be conducted by regular maintenance personnel by simply scraping off the contaminated material and discarding at an appropriate facility. If bioretention soil is removed by the cleanup process, any lost bioretention soil materials must be replaced. Hazardous substance cleanup will require specially trained and licensed contractors and special disposal requirements conforming to local and national laws and regulations.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
5	Vandalism / catastrophic damage to components or entire system	**Area of Concern:** Vandalism can range from minor issues like graffiti, tearing out or stealing plants, to destruction of the entire irrigation system. Catastrophic damage can result from vehicles driving into or through the bioretention planter, trampling caused by large amounts of pedestrians or animals walking through the BMP, or construction/repair of nearby utilities and structures that impact the BMP. **Maintenance Solution:** Repair of vandalism can consist of simply removing graffiti and planting individual replacement plants. Repair of catastrophic damage could consist of completely reconstructing the BMP.
6	Unauthorized modifications	**Area of Concern:** Unauthorized modifications consist of any changes to a BMP that deviate from the approved construction documents included in the project's SMR Maintenance Agreement Exhibit B. These modifications can take place during construction (i.e., soil or plant substitutions with inferior components) or can happen after the BMP is constructed (i.e., reducing the footprint of the BMP to accommodate an addition to a nearby structure). **Maintenance Solution:** The SMR Maintenance Agreement Exhibit B recorded on the deed of the property provides the original approved construction documents that can be referred to and used to determine if modifications have been made. All unauthorized modifications must be corrected by returning the BMP to its original configuration as described in the approved construction documents contained in the SMR Maintenance Agreement Exhibit B.
7	Excessive weed growth	**Area of Concern:** Noxious and invasive weeds must be removed when they cover more than 25% of the BMP surface. Noxious and invasive weeds are highly damaging to the natural and built environment – these weeds interfere with the beneficial use of the land and reduce the effectiveness of the bioretention planter. **Maintenance Solution:** Best practices call for weed removal on a monthly basis, regardless of cover percentage. Weed removal must include the entire root structure and the weeds must be disposed of at an appropriate facility to prevent spreading of invasive species. California's Pest Prevention System (PPS) and the California Food and Agricultural Code (FAC) Appendix D set regulations and laws pertaining to weed removal and disposal.
8	Impermeable liner visible and/or damaged	**Area of Concern:** Impermeable liners are intended to remain buried with bioretention soil and mulch protecting the liner from impact damage and photodegradation from exposure to sunlight. **Maintenance Solution:** If the liner becomes exposed through the settlement of the bioretention soil or by erosion at the sides of the planter, then soil and/or mulch should be added to keep the liner covered. If the liner has been damaged, such as having holes, cracks, splits, or open seams, then the damage must be repaired with a patch to ensure that the liner remains watertight.

Item #	Inspection Item Description	Inspection Instructions and Explanation
9	Liner attachment damaged or sealant missing (if applicable)	**Area of Concern:** Impermeable liner attachment points must remain fastened and sealed to adjacent concrete structures (if applicable) to prevent ponded water from leaking between the liner attachment point and the adjacent concrete structure. **Maintenance Solution:** If the liner attachment hardware has become loose, detached from the surrounding concrete structure, or is damaged, then steps must be taken to mechanically re-attach the hardware to the concrete and reseal the joint with the appropriate caulk or mastic sealant. If the liner sealant at the joint between the attachment hardware and the concrete structure is cracked, damaged, or missing, then the joint between the hardware and the surrounding concrete structure must be resealed with the appropriate caulk or mastic sealant.
10	Sediment accumulation at curb cut, forebay, or planter low points	**Area of Concern:** Sediment accumulation in BMPs is normal and expected. Sediment and debris can collect in the curb cut (or inlet structure), in the forebay (or rock cobble energy dissipater), or at the low point of bioretention planters. **Maintenance Solution:** Steps must be taken to remove sediment accumulation on an annual basis (or more often, depending on site conditions) to keep the BMP functioning properly. This built-up sediment must be removed to ensure that water can flow freely into and through the BMP, as well as to maintain bioretention soil infiltration capacity. Typical removal methods consist of scraping up sediment with shovels and properly disposing of the sediment at an approved facility.
11	Erosion at inlet, outlet, overflow, or side slopes	**Area of Concern:** Inflow, outflow, and water movement through a bioretention planter may cause erosion and scouring of the planter surface over time or immediately after construction during the plant grow-in period. Erosion and subsequent sediment deposition can be detrimental to the bioretention soil infiltration capacity, cause damage to plants, and create clogging in underdrains and outflow structures. **Maintenance Solution:** Repair measures must include identifying and correcting the cause of the erosion by adding flow dispersal measures to reduce channelized flow (i.e., rock cobble or rip-rap level spreader, etc.), repairing the erosion damage, and removing any sediment created by the erosion process.
12	Inlet, outlet, or overflow structure blockage	**Area of Concern:** Trash, debris, and poorly-sited or overgrown plant material can create blockages at the inlet and outlet points, or at the overflow structure of bioretention planters, inhibiting the flow of water into, through, or out of the facility. Inlet blockages can cause stormwater flows to bypass the BMP or only allow partial flows into the BMP, creating a situation where the BMP is non-functioning or underperforming. Inlet, outlet, and overflow structure blockages can also create excessive ponding within and around the BMP, potentially leading to hazardous conditions and property damage. **Maintenance Solution:** Blockages must be cleared before the start of the rainy season (October 15), before each forecasted storm if site conditions require, and/or as frequently as site conditions dictate. Trash and debris must be removed by hand or with hand tools, and disposed of at an appropriate facility. Poorly-sited or overgrown plant material can be transplanted to another location within the BMP or discarded as compost. Overflow structure grates, sumps, and traps must be cleared of debris by hand, hand tools, or a vactor truck and disposed of at an appropriate facility.
13	Irrigation system damaged, leaking, or out of adjustment	**Area of Concern:** Damaged or leaking irrigation systems are identifiable by the presence of ponded water or wet spots in the planter during dry periods. Malfunctioning irrigation systems can also be identified by dry areas in the planter and evidence of browning or wilting plants that show signs of under-watering. Systems that are out of adjustment are identifiable by observation during the irrigation cycle. Sprinkler head patterns must be observed to determine that the spray pattern does not deposit water on surrounding paved surfaces or nearby structures. **Maintenance Solution:** Irrigation systems must be maintained year round by a qualified professional. This maintenance includes the repair of leaks, the adjustment of irrigation head spray patterns to avoid buildings and paved surfaces. It also includes the inspection, testing and certification of backflow prevention devices. It is recommended that irrigation systems in bioretention planters are only utilized through the plant establishment and warranty phases of the project. Once the plant material has been established and out of warranty, continued irrigation should not be necessary if proper plants were specified for the installation.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
14	Dead, diseased, dying, or missing plants	**Area of Concern:** Plants play an important role in the function of a bioretention system. In addition to supporting evapotranspiration, plant roots help aerate the soil and minimize soil compaction, replenish organic materials in the soil, and provide a habitat for beneficial bacteria that aid in the biological breakdown and mitigation of pollutants deposited by stormwater into the bioretention soil. For a bioretention planter to function properly, it needs consistent and healthy plant cover. Bare spots resulting from missing plants give invasive weeds an opportunity to grow. **Maintenance Solution:** Dead, diseased, dying, or missing plants must be replaced. If a large amount of plants have died off, consult with a horticultural expert on the cause of the die-off, and remedy the cause before replanting.
15	Mulch – large bare spots / eroded mulch areas	**Area of Concern:** Rock and organic mulch helps to minimize weed growth, prevents erosion and scour of the planter surface, and helps prevent the soil surface from losing moisture and crusting during dry periods. **Maintenance Solution:** Any bare spots on the planter surface where the bioretention soil is visible must be re-covered with mulch. The added mulch must meet the specs of the material thickness and type used during construction. If the facility was installed with organic mulch, do not substitute bark, “gorilla hair,” or recycled kiln dried lumber type mulches as replacement materials because these types of mulches are floatable materials than can cause other maintenance problems in bioretention planters (i.e., clogging of the overflow structure). If the facility was installed with rock mulch, select a replacement product of similar or larger size to resist washing out. Do not substitute rock mulch materials with high fines content or recycled materials.
16	Vegetation obstructing line of sight at roadway or intersection	**Area of Concern:** If bioretention planters are located close to a roadway or intersection, overgrown plants may cause a hazardous condition by blocking the vision of motorists, bicyclists, and pedestrians. **Maintenance Solution:** Regular pruning on a quarterly basis can alleviate blocked lines of sight, while maintaining the desired plant coverage in the facility. Pruning should only be done by trained landscape professionals in accordance with established horticultural practices and standards.
17	Vegetation blocking in-flow at curb cut / inlet structure	**Area of Concern:** Poorly-sited, spreading, or overgrown plant material can create blockages at the inlet point of a bioretention planter. This can block stormwater flows from entering the facility, potentially causing stormwater to pond upstream of the inlet or bypass the unit entirely. If stormwater cannot enter the bioretention planter, or less than the designed volume of stormwater is able to enter, the function of the facility will be significantly diminished. **Maintenance Solution:** Any plant material that blocks the inlet of a facility must be pruned, thinned, transplanted elsewhere in the planter, or removed and disposed of. Pruning, thinning, and transplanting should only be done by trained landscape professionals in accordance with established horticultural practices and standards.

Item #	Inspection Item Description	Inspection Instructions and Explanation
18	Vegetation blocking Operation & Maintenance of other components	**Area of Concern:** Poorly-sited, spreading, or overgrown plant material can interfere with or block the Operation & Maintenance (O&M) of other key components of a bioretention planter. Some of the bioretention components that may interfere with O&M are: outlet structures, underdrains, and irrigation components. **Maintenance Solution:** Any plant material that blocks the O&M of key components of a facility must be pruned, thinned, transplanted elsewhere in the planter, or removed and disposed of correctly. Pruning should only be done by trained landscape professionals in accordance with established horticultural practices and standards.
19	Structural damage (planter edges, check dams, or outlet structures)	**Area of Concern:** Minor damage to structural components such as curbs, walls, trench drains and outlet structures should be repaired on a yearly basis. More significant structural damage, such as damage caused by auto accidents, nearby construction work, or natural disasters must be repaired as soon as possible. **Maintenance Solution:** Minor repairs can consist of, but are not limited to, patching chips and cracks to concrete structures, and resetting outlet structure frames and grates. Major repairs can consist of removal and replacement of damaged curbs, walls, outflow structures, or structural bracing and supplemental reinforcement of failing structural components.
20	Rodent damage / burrowing	**Area of Concern:** Rodent damage and animal burrows in bioretention planters can cause structural, landscape, and stormwater flow-based issues. Burrows can undermine structural components, leading to unwanted settlement. Burrows may also create preferential flow paths through the section of a bioretention planter that differ significantly from the designed flow path, causing piping and erosion problems in the bioretention soil. Rodents can also damage plants and plant root systems. **Maintenance Solution:** If rodent / animal damage is observed, consult with a licensed professional pest control service for eradication, or trapping and relocation, as appropriate.
21	Mosquitos or mosquito larvae observed	**Area of Concern:** Ponded water resulting from extended drawdown time beyond 48 hours may lead to the development of a mosquito habitat. **Maintenance Solution:** See Item #2 above for remedies to extended drawdown times. For more information on mosquito control visit http://www.sfdph.org/dph/eh/WestNile/default.asp or http://www.sfmosquito.org/. If mosquitos or mosquito larvae are observed, please contact the San Francisco Environmental Health Vector Control Program at (415) 252-3806 or email EnvHealth.DPH@sfdph.org. Also, consult with a licensed professional pest control service for eradication, as appropriate.

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Annual Self-Certification Checklist Instructions

INFILTRATION TRENCH
(AKA: soakage trench)

NOTE: These instructions are intended to be a companion piece to the Annual Self-Certification Checklist. The information contained herein is to be used to help the preparer of the Annual Self-Certification Checklist accurately conduct an inspection and properly complete the form.

Abbreviations: SMR: San Francisco Stormwater Management Regulations and Design Guidelines; SCP: Stormwater Control Plan; SMO: San Francisco Stormwater Management Ordinance; BMP: Best Management Practice (Infiltration Trench); GI: Green Infrastructure

Item #	Inspection Item Description	Inspection Instructions and Explanation
1	Unpleasant odors	**Area of Concern:** Several maintenance-related factors can lead to anaerobic conditions that create unpleasant odors in GI installations. Any installation that consistently fails to draw down completely within 48 hours can become anaerobic. The buildup of bacteria in an anaerobic section of the facility, along with decaying organic materials, can cause these odors. **Maintenance Solution:** For more information on ponded water and extended drawdown time, see Item #2 below.
2	Extended drawdown time (Ponded water > 48 hrs.)	**Area of Concern:** Ponded water resulting from extended drawdown times beyond 48 hours can lead to several problems such as reduced filtration capacity, unpleasant odors, plant die-off, and creation of mosquito habitats. Ponded water and drawdown failure can be caused by the following: • large amounts of sediment accumulation in the infiltration trench aggregate • blocked clogged or broken underdrains • blocked or clogged outflow structures and/or sand traps • the improper use of geotextiles in the infiltration trench Inspecting the underdrain for clogging can be done visually by looking for standing water in the cleanout or by running a garden hose into the cleanout and determining if the water flows freely or backs up and overtops the cleanout pipe. Alternately, video inspection of the underdrain pipe may be performed to determine the source of the underdrain failure. Inspecting the outflow structure or sand trap can be done by removing the lid or grate from the structure and visually inspecting for standing water or excessive debris accumulation. **Maintenance Solution:** Clogged underdrains and outflow structures can be cleared by jetting or snaking the underdrain pipe or culvert that connects the structure to the sewer and by removing accumulated debris and sediment from the bottom of the structure. The removal of clogged subsurface geotextiles requires the removal of the infiltration trench aggregate.

Item #	Inspection Item Description	Inspection Instructions and Explanation
3	Excessive trash / debris accumulation	**Area of Concern:** Excessive trash or debris accumulation causes problems in GI installations that extend beyond poor aesthetics. Trash and debris accumulation can inhibit plant growth, clog, or inhibit the infiltration capacity of the aggregate and clog outflow structure grates. Clogged or inhibited infiltration capacity could lead to extended drawdown times and unwanted ponding. Additionally, clogged outflow structure grates can lead to overflowing and flooding. **Maintenance Solution:** All trash and debris should be removed from facility before the start of the rainy season (October 15) or as frequently as site conditions dictate. All material should be discarded at an appropriate facility.
4	Vandalism / catastrophic damage to components or entire system	**Area of Concern:** Vandalism can range from minor issues like graffiti and tearing out/stealing plants to destruction of the entire irrigation system. Catastrophic damage can result from vehicles driving into or through the facility, trampling caused by large amounts of pedestrians or animals walking through the BMP, or construction/repair of nearby utilities and structures that impact the BMP. **Maintenance Solution:** Repair of vandalism can consist of simply removing graffiti or planting individual replacement plants. Repair of catastrophic damage can consist of completely reconstructing the BMP.
5	Visible surface contaminants / pollution (if applicable)	**Area of Concern:** Visible surface contaminants and pollution can range from inert substances that can cause aggregate clogging to hazardous substances that impact plant, environmental, or human health. Examples of inert contaminants are masonry, plaster or concrete “washout,” and masonry or roadway saw cutting slurry and residue. Examples of hazardous contaminants are petroleum-based substances, caustic chemicals, pesticides, and herbicides. These pollutants can often be identified by sight or smell when they become deposited on the surface of a facility. **Maintenance Solution:** If pollutants are detected, investigations must be conducted to determine the source of the contaminant, mitigate that source, and then take steps to clean up the contamination. For inert substances, cleanup can typically be conducted by regular maintenance personnel by simply scraping off the contaminated surface material and discarding it at an appropriate facility. If aggregate is removed by the cleanup process, any lost aggregate materials must be replaced. Hazardous substance cleanup will require specially trained and licensed contractors and special disposal conforming to local and national laws and regulations.
6	Unauthorized modifications	**Area of Concern:** Unauthorized modifications consist of any changes to a BMP that deviate from the approved construction documents included in the project’s SMR Maintenance Agreement Exhibit B. These modifications can take place during construction (i.e., aggregate or plant substitutions with inferior components) or can happen after the BMP is constructed (i.e., reducing the footprint of the BMP to accommodate an addition to a nearby structure). **Maintenance Solution:** The SMR Maintenance Agreement Exhibit B recorded on the deed of the property provides the original approved construction documents that can be referred to and used to determine if modifications have been made. All unauthorized modifications must be corrected by returning the BMP to its original configuration, as described in the approved construction documents contained in the SMR Maintenance Agreement Exhibit B.
7	Sediment accumulation on trench surface (if applicable)	**Area of Concern:** Sediment accumulation in BMPs is normal and expected. Sediment and debris can collect in the curb cut (or inlet structure), in the forebay (or rock cobble energy dissipater), or at the low point of the facility. **Maintenance Solution:** Steps must be taken to remove sediment accumulation on an annual basis (or more often, depending on site conditions) to keep the BMP functioning properly. This built-up sediment must be removed to ensure that water can flow freely into and through the BMP, as well as to maintain aggregate infiltration capacity. Typical removal methods consist of scraping up sediment with shovels and properly disposing of the sediment at an approved facility.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
8	Inlet, outlet, or overflow structure blockage	**Area of Concern:** Trash, debris, and poorly-sited or overgrown plant material can create blockages at the inlet and outlet points or at the overflow structure of facilities, inhibiting the flow of water into, through, or out of the facility. Inlet blockages can cause stormwater flows to bypass the BMP or only allow partial flows into the BMP, creating a situation where the BMP is non-functioning or underperforming. Inlet, outlet, and overflow structure blockages can also create excessive ponding within and around the BMP, potentially leading to hazardous conditions and property damage. **Maintenance Solution:** Blockages must be cleared before the start of the rainy season (October 15), before each forecasted storm if site conditions require, and/or as frequently as site conditions dictate. Trash and debris must be removed by hand or with hand tools and discarded at an appropriate facility. Poorly-sited or overgrown plant material can be transplanted to another location within the BMP or discarded as compost. Overflow structure grates, sumps, and traps must be cleared of debris by hand, hand tools, or a vactor truck and disposed of at an appropriate facility.
9	Structural damage (trench edges or outlet structure)	**Area of Concern:** Minor damage to structural components such as curbs, walls, trench drains, and outlet structures should be repaired on a yearly basis. More significant structural damage, such as damage caused by auto accidents, nearby construction work, or natural disasters must be repaired as soon as possible. **Maintenance Solution:** Minor repairs can consist of, but are not limited to, patching chips and cracks to concrete structures and resetting outlet structure frames and grates. Major repairs can consist of removal and replacement of damaged curbs, walls, outflow structures, or structural bracing and supplemental reinforcement of failing structural components.
10	Mosquitos or mosquito larvae observed	**Area of Concern:** Ponded water resulting from extended drawdown times beyond 48 hours may lead to the development of a mosquito habitat. **Maintenance Solution:** See Item #2 above for remedies to extended drawdown times. For more information on mosquito control visit http://www.sfdph.org/dph/eh/WestNile/default.asp or http://www.sfmosquito.org/. If mosquitos or mosquito larvae are observed, please contact the San Francisco Environmental Health Vector Control Program at (415) 252-3806, or email EnvHealth.DPH@sfdph.org. Also, consult with a licensed professional pest control service for eradication, as appropriate.

DO NOT SUBMIT WITH CHECKLIST

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Annual Self-Certification Checklist Instructions

PERMEABLE PAVEMENT

(AKA: pervious paving, porous pavement, permeable unit pavers, pervious concrete, pervious asphalt, grass pavers, green parking, porous turf blocks)

NOTE: These instructions are intended to be a companion piece to the Annual Self-Certification Checklist. The information contained herein is to be used to help the preparer of the Annual Self-Certification Checklist accurately conduct an inspection and properly complete the form.

Abbreviations: SMR: San Francisco Stormwater Management Regulations and Design Guidelines; SCP: Stormwater Control Plan; SMO: San Francisco Stormwater Management Ordinance; BMP: Best Management Practice (Permeable Pavement); GI: Green Infrastructure

Item #	Inspection Item Description	Inspection Instructions and Explanation
1	Surface ponding evident / significantly reduced infiltration rate	**Area of Concern:** Several maintenance related issues can lead to a reduced infiltration rate and surface ponding in permeable pavement installations. Pavement clogging can prevent stormwater from flowing through the pavement surface and reaching the aggregate storage layer beneath. Additionally, if the aggregate storage layer fails to draw down completely within 48 hours, subsequent rainfall may begin to pond on the pavement surface as the volume of water builds up in the pavement section. To determine if surface ponding is being caused by clogging, a test for the infiltration rate of the permeable pavement surface must be conducted. The following test procedures cover the three most common permeable pavement types: • Permeable Pavers - Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement Systems - ASTM C1781/C1781M - 13 • Pervious Concrete and Porous Asphalt - Standard Test Method for Infiltration Rate of In Place Pervious Concrete - ASTM C1701/C1701M - 09 **Maintenance Solution:** If it is determined that the surface ponding is a result of pavement clogging, then steps must be taken to clean the pavement surface and restore permeability. Permeable pavements can be cleaned by vacuuming or vacuuming combined with pressure washing. For more information on ponded water and extended drawdown time of the aggregate storage layer, see Item #4 below.
2	Silt and sediment deposited on pavement surface	**Area of Concern:** Excessive silt and sediment accumulation causes significant problems in permeable pavement installations. Silt and sediment will clog or inhibit the infiltration capacity of the pavement surface. Clogged or inhibited filtration capacity could lead to surface ponding and flooding. **Maintenance Solution:** All silt and sediment should be removed from permeable pavement by vacuuming before the start of the rainy season (October 15) and at least twice per year, or as frequently as site conditions dictate, and discarded at an appropriate facility.

Item #	Inspection Item Description	Inspection Instructions and Explanation
3	Trash and large debris accumulation on pavement surface	**Area of Concern:** Excessive trash or debris accumulation causes problems in permeable pavement installations that go beyond poor aesthetics. Trash and debris accumulation can clog or inhibit the infiltration capacity of the pavement surface and clog outflow structure grates. Clogged or inhibited filtration capacity could lead to surface ponding. Clogged outflow structure grates can lead to overflowing and ponding. **Maintenance Solution:** All trash and debris should be removed from permeable pavement before the start of the rainy season (October 15) or as frequently as site conditions dictate, and discarded at an appropriate facility.
4	Extended drawdown time of the aggregate storage layer > 48 hrs.	**Area of Concern:** If properly designed and built, extended storage aggregate drawdown times beyond 48 hours in permeable pavement installations can be related to several problems such as: • blockage or clogging of the underdrains, outflow, or overflow structure (if applicable). • clogging of the aggregate storage layer, choking layer, or bedding layer • clogging of geotextiles (if applicable) Inspecting the underdrain for clogging can be done visually by looking for standing water in the cleanout or by running a garden hose into the cleanout and determining if the water flows freely or backs up and overtops the cleanout pipe. Alternately, video inspection of the underdrain pipe may be performed to determine the source of the underdrain failure. Inspecting the outflow structure or sand trap can be done by removing the lid or grate from the structure and visually inspecting for standing water or excessive debris accumulation. **Maintenance Solution:** Clogged underdrains and outflow structures can be cleared by jetting or snaking the underdrain pipe or culvert that connects the structure to the sewer, and by removing accumulated debris and sediment from the bottom of the structure. If aggregate or geotextile clogging is suspected, further investigation must be conducted to verify the problem. The removal of clogged subsurface aggregates and geotextiles requires the removal of the pavement surface and reconstruction of the permeable pavement system.
5	Excessive oil staining on pavement surface	**Area of Concern:** Oil leaks from vehicles can create staining on the pavement surface. This staining can cause the pavement surface to have a reduced infiltration capacity and may even create contamination issues depending on the quantity of oil that created the stain and how far the oil seeped into the pavement. **Maintenance Solution:** Oil stains must be pressure washed from the pavement when the percentage of the stained surface reaches 10% of the square footage of the overall permeable pavement surface or as often as site conditions dictate. Larger stains may require the removal and replacement of the affected pavement surface and possibly some of the subsurface aggregates. See Item #14 below for larger spills and contamination issues. Hydrocarbon/oil pan drippings may be remediated by the use of products such as S-200 Oilgone from International Environmental Products, LLC, or equivalent.
6	Weed growth in paver joints / expansion joints	**Area of Concern:** Noxious and invasive weeds must be removed when they cover more that 10% of the pavement surface. Noxious and invasive weeds are highly damaging to pavements and the natural and built environment. These weeds interfere with the structural stability of the pavement, reduce infiltration, and increase the amount of debris that is deposited on the pavement surface. **Maintenance Solution:** Best practices call for weed removal on a monthly basis, regardless of cover percentage. Weed removal must include the entire root structure and the weeds must be discarded at an appropriate facility to prevent spreading of invasive species. California's Pest Prevention System (PPS) and the California Food and Agricultural Code (FAC) Appendix D set regulations and laws pertaining to weed removal and disposal.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
7	Cracks and displacement / settlement of permeable pavement / broken pavers	**Area of Concern:** See item #s 11, 12, 13, and 19
8	Destabilized contributing landscape areas / erosion of surrounding landscape areas (if applicable)	**Area of Concern:** All surrounding landscaped areas that contribute runoff to the permeable pavement surface must be stabilized with turf, mulch, or groundcover plantings to eliminate erosion and sources of silt and sediment that can be conveyed onto the permeable pavement surface and cause clogging. Sediment-laden runoff must be physically blocked and diverted from draining onto the permeable pavement by curbs, berms, sandbags, straw wattles, and/or silt fencing. **Maintenance Solution:** Any bare spots adjacent to the permeable pavement where soil is visible must be re-covered with turf, mulch, or groundcover plantings ASAP. The added plantings or mulch must meet the material thickness and type specified in the design. Temporary erosion and sedimentation controls can also be installed to immediately protect the adjacent permeable pavement until the replacement plantings are fully grown-in. Alternatively, these surrounding landscaped areas can be graded away from the permeable pavement.
9	Destabilized contributing paved areas / spalling* and raveling* of adjacent standard pavement (if applicable)	**Area of Concern:** Adjacent standard pavements that drain onto permeable pavements can be sources of silt, fines, and sediment that can clog permeable pavement surfaces. These standard pavement surfaces must be cleaned regularly to eliminate or minimize the clogging risk that they pose to the adjacent permeable pavement. Standard asphalt pavement is the largest contributor of fines, silt, and sediment, especially during the first two years after installation as the asphalt surface weathers and sheds sand/fine aggregates from its surface. Additionally, structurally deficient adjacent pavements (both concrete and asphalt) that are undergoing spalling or raveling can contribute large amounts of fines silt and sediment to the adjacent permeable paving. **Maintenance Solution:** Deteriorating pavements must be repaired as soon as possible to minimize further degradation. A similar situation will also occur when adjacent pavements undergo grinding / milling and resurfacing / repaving. During these operations, the adjacent permeable pavement must be protected from the resurfacing / repaving operations.

Item #	Inspection Item Description	Inspection Instructions and Explanation
10	Unauthorized modifications	**Area of Concern:** Unauthorized modifications consist of any changes to a permeable pavement installation that deviate from the approved construction documents. These modifications can take place during construction (i.e., pavement or aggregate substitutions with inferior components) or can happen over time after the permeable pavement is constructed (i.e., reducing the footprint of the permeable pavement to accommodate an addition to a nearby structure). The SMR Maintenance Agreement Exhibit B recorded on the deed of the property provides the original approved construction documents that can be referred to and used to determine if modifications have been made. **Maintenance Solution:** All unauthorized modifications must be corrected by returning the BMP to its original configuration, as described in the approved construction documents contained in the SMR Maintenance Agreement Exhibit B.
11	Utility cuts / other surface repairs evident and improperly patched (if applicable)	**Area of Concern:** Underground utility repairs or construction can require the cutting and removal of sections of permeable pavements to provide access to subsurface facilities. The removal and replacement process must be correctly completed to ensure that the structural integrity and function of the permeable pavement is not compromised. **Maintenance Solution:** While working on permeable pavement, all surrounding surfaces must be protected from sediment and fines created by the utility work. Saw cutting work must be performed by wet cutting, vacuumed, and the saw cutting residue must be washed off the surface after vacuuming before it is allowed to dry. The following is the required patching standard for the three most common permeable pavement surfaces: • Permeable Interlocking Concrete Pavers (PICP) – the PICP surface must be replaced in-kind, preferably with the pavers that were removed from the utility cut area to eliminate a variation in color between the existing in-place pavers and new pavers added to the patch. The patch size must be increased by two times the shortest dimension of the excavation beyond the outside edge of the excavation to ensure a smooth transition from the undisturbed pavers to the patched paver area. All subsurface aggregate that was removed to access the subsurface facility must be replaced in-kind with new materials, matching the existing section thicknesses (excavated aggregates must not be reused due to the possibility of contamination with dirt and fines). The new patch must also be left slightly higher than the surrounding existing surface (1/4" to 3/8") to allow for settlement of the patch. • Pervious Concrete – Every effort must be made to replace the surface in-kind. Small patches can be replaced with standard non-pervious concrete (by permission and approval from the SFPUC) if the patch size is 10% or less than the entire permeable surface that was disturbed. Otherwise, the entire pavement surface must be removed and replaced to the nearest joint and/or the patch size must be increased by two times the shortest dimension of the excavation beyond the outside edge of the excavation to ensure a smooth transition from the undisturbed pavers to the patched paver area. All subsurface aggregate that was removed to access the subsurface facility must be replaced in-kind with new materials, matching the existing section thicknesses (excavated aggregates must not be reused due to the possibility of contamination with dirt and fines). The new patch must also be left slightly higher than the surrounding existing surface (1/4" to 3/8") to allow for settlement of the patch. • Porous Asphalt – Every effort must be made to replace the surface in-kind. Small patches can be replaced with standard non-porous asphalt (by permission and approval from the SFPUC) if the patch size is 10% or less than the entire permeable surface that was disturbed. The patch size must be increased by two times the shortest dimension of the excavation beyond the outside edge of the excavation to ensure a smooth transition from the undisturbed pavers to the patched paver area. All subsurface aggregate that was removed to access the subsurface facility must be replaced in-kind with new materials, matching the existing section thicknesses (excavated aggregates must not be reused due to the possibility of contamination with dirt and fines). The new patch must also be left slightly higher than the surrounding existing surface (1/4" to 3/8") to allow for settlement of the patch.
12	Permeable pavement surface raveling and spalling / deterioration	**Area of Concern:** Structurally deficient permeable pavements that are undergoing spalling or raveling degradation can contribute large amounts of fines, silt, and sediment that can cause clogging and a lack of infiltration capacity. These deteriorating pavements must be repaired as soon as possible to minimize further degradation. Additionally, large pieces of aggregate that break off from the pavement surface can create further damage to the permeable pavement surface as these loose aggregates are driven or walked over, further abrading the deteriorating surface. **Maintenance Solution:** Loose materials must be removed by sweeping or vacuuming.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
13	Potholes forming / pavers missing	**Area of Concern:** See Item #12 above for minor pothole formation. See Item #19 below for major pothole formation and severe structural deterioration. **Maintenance Solution:** Surface repairs must be handled in the same manner as a utility cut patch, minus the removal and replacement of the sub-base and base aggregate, unless the structural deterioration was determined to be caused by base failure. If a base failure is suspected, consult with a licensed civil and geotechnical engineer for repair options.
14	Loss of paver jointing material (if applicable)	**Area of Concern:** Gapped PICP rely on jointing material (typically fine aggregate like AASHTO #8, #89, or #9) to provide structural stability and an initial filtering of sediment and fines before those materials reach and clog the aggregate bedding layer beneath the pavers. Over time, traffic and vacuuming can reduce the amount of jointing material. **Maintenance Solution:** Jointing material must be replenished periodically over the life of the installation as frequently as site conditions dictate or after pressure washing. The replacement jointing material must meet the same specs as the material that was used during installation.
15	Visible surface contaminants / pollution	**Area of Concern:** Visible surface contaminants and pollution can range from inert substances that can cause permeable pavement clogging to hazardous substances that impact plant, environmental, or human health. Examples of inert contaminants are masonry, plaster or concrete “washout,” and masonry or roadway saw cutting slurry and residue. Examples of hazardous contaminants are petroleum-based substances, caustic chemicals, pesticides, and herbicides. These pollutants can often be identified by sight or smell when they become deposited on the surface of a permeable pavement. If pollutants are detected, investigations must be conducted to determine the source of the contaminant, mitigate that source, and then take steps to clean up the contamination. **Maintenance Solution:** For inert substances, cleanup can typically be conducted by regular maintenance personnel by simply scraping off, pressure washing, vacuuming, and discarding the contaminated material at an appropriate facility. Hazardous substance cleanup will require specially trained and licensed contractors and special disposal conforming to local and national laws and regulations.

Item #	Inspection Item Description	Inspection Instructions and Explanation
16	Catch basin / overflow structure blockage	**Area of Concern:** Trash, debris, and sediment can create blockages at the overflow structure or catch basins built into permeable pavement systems, inhibiting the flow of water out of the facility or inhibiting the emergency overflow measures designed into the project. Catch basin and overflow structure blockages can create excessive ponding within and around the area of the permeable pavement installation, potentially leading to hazardous conditions and property damage. **Maintenance Solution:** Blockages must be cleared before the start of the rainy season (October 15), before each forecast storm if site conditions require, and/or as frequently as site conditions dictate. Trash and debris must be removed by hand or with hand tools and disposed of at an appropriate facility. Overflow structures and catch basin grates, sumps, and traps must be cleared of debris by hand, hand tools, or vactor truck.
17	Underdrain blockage (if applicable)	**Area of Concern:** Inspecting the underdrain for clogging can be done visually by looking for standing water in the cleanout or by running a garden hose into the cleanout and determining if the water flows freely or backs up and overtops the cleanout pipe. Alternately, video inspection of the underdrain pipe may be performed to determine the source of the underdrain failure. **Maintenance Solution:** Clogged underdrains can be cleared by jetting or snaking the underdrain pipe or culvert that connects the structure to the sewer and by removing accumulated debris and sediment from the bottom of the pipes.
18	Vegetation damage / bare spots and/or weed growth in turf paver or grass paver type systems (if applicable)	**Area of Concern:** Vegetation plays an important role in the function of a turf or grass paver system. In addition to evapotranspiration, plant roots help aerate the soil and minimize soil compaction, replenish organic materials in the soil, and provide a habitat for beneficial bacterial that aids in the biological breakdown and mitigation of pollutants deposited by stormwater into the planting medium. For a turf or grass paver system to function properly, it needs consistent and healthy plant cover. Bare spots created by missing plants give invasive weeds an opportunity to grow. This invasive weed growth will crowd out the beneficial plant species over time, reducing the effectiveness of the turf or grass paver system. **Maintenance Solution:** Dead, diseased, dying, or missing plants must be replaced. If a large amount of plants have died off, consult with a horticultural expert on the cause of the die-off and remedy the cause before replanting.
19	Structural damage (curbs, pavement edging, overflow or underdrain structure)	**Area of Concern:** For minor structural damage, refer to Item #s 11, 12, and 13 above. More significant structural damage, such as damage caused by auto accidents, nearby construction work, or natural disasters must be repaired as soon as possible. **Maintenance Solution:** Major repairs can consist of removal and replacement of the entire permeable pavement surface, damaged curbs, pavement edging, overflow or underdrain structures, or structural bracing and supplemental reinforcement of failing structural components.

***Definitions:** Spalling - Cracking, breaking or chipping of joint/crack edges. Usually occurs within about 2 ft. of joint/crack edge.
Raveling - The progressive disintegration of an asphalt layer from the surface downward as a result of the dislodgement of aggregate particles. It usually starts with the loss of fine aggregate (fines) and advances to the loss of larger aggregate sizes.

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RAINWATER HARVESTING
(AKA: rainwater collection, rainwater reuse, Cisterns and associated components)

NOTE: These instructions are intended to be a companion piece to the Annual Self-Certification Checklist. The information contained herein is to be used to help the preparer of the Annual Self-Certification Checklist accurately conduct an inspection and properly complete the form.

SAFETY NOTE: Rainwater harvesting cisterns/tanks are confined spaces. A confined space is a space that has limited openings for entry or exit, is large enough for entering and working, and is not designed for continuous worker occupancy. Refer to and follow all OSHA requirements and regulations before entering a confined space. Visit https://www.osha.gov/SLTC/confinedspaces/ for more information.

Abbreviations: SMR: San Francisco Stormwater Management Regulations and Design Guidelines; SCP: Stormwater Control Plan; SMO: San Francisco Stormwater Management Ordinance; BMP: Best Management Practice (Rainwater Harvesting System); GI: Green Infrastructure

Item #	Inspection Item Description	Inspection Instructions and Explanation
1	Unpleasant odors	**Area of Concern:** Any rainwater harvesting system vault or tank that consistently fails to draw down completely within 48 hours can become anaerobic. The buildup of bacteria inside the tank, along with decaying organic material and trash, can cause these odors. **Maintenance Solution:** For more information on ponded water and extended drawdown time, see Item #17 below.
2	Lids, access hatches, ladders, etc. damaged / inoperative / inaccessible / missing	**Area of Concern:** Inspection and maintenance tasks rely on unobstructed access to all rainwater harvesting system components, including the storage tank structure. Access to these components is facilitated by lids, access hatches, ladders, etc. **Maintenance Solution:** Note if there are any accessibility issues with any system components and take steps to correct the issue and restore accessibility.
3	Catchment surface condition	**Area of Concern:** Inspect the catchment area for sediment / debris accumulation and algae growth. Also check for obstructions, such as damaged or dislodged roofing materials that may block or redirect flows from the conveyance system. **Maintenance Solution:** Clear any debris and sediment accumulation to eliminate the chance of clogged or blocked gutters or pretreatment devices. If algae growth is evident, disconnect the downspouts or conveyance structures from the rainwater harvesting system and wash the algae from the roof. Repair any damaged roofing materials.

Item #	Inspection Item Description	Inspection Instructions and Explanation
4	Conveyance system condition	**Area of Concern:** Conveyance systems have multiple inspection points: • Inspect gutters, downspouts, piping, connection, and mounting hardware to ensure that these items are structurally sound and are not leaking. • Ensure that these conveyance structures maintain positive drainage and that no back-pitch conditions exist. **Maintenance Solution:** • Remove accumulated debris and clogs. Also ensure that overhanging vegetation is trimmed back from the roof to maintain a 24" clear zone. • Eliminate rust, mold, and algae from gutters • Check downspouts for animal intrusions, clogs or overgrowth that could obstruct drainage.
5	Pretreatment device / first flush diverter damaged, offline, or missing	**Area of Concern:** To provide floatable and sediment capture from stormwater upstream of the rainwater harvesting system, a pretreatment device must be in place and working properly. To ensure that pretreatment devices are online and working properly during dry weather, run a garden hose or other water source into a nearby cleanout or inlet to test that water enters and exits the pretreatment device before accumulating in the rainwater harvesting system. **Maintenance Solution:** If the pretreatment device is clogged by debris or sediment accumulation, remove that accumulation by hand or by vactor truck.
6	Pretreatment device / first flush diverter clear of debris	**Area of Concern:** Sediment accumulation in pretreatment devices is normal and expected. However, steps must be taken to remove sediment accumulation on an annual basis (or more often, depending on site conditions) to keep the pretreatment device functioning properly. **Maintenance Solution:** Sediment and debris can collect in the sump area (sediment storage area). This accumulated sediment and debris must be removed by hand or by vactor truck before the start of the rainy season (October 15) or as frequently as site conditions dictate, and discarded at an appropriate facility.
7	Storage tank condition	**Area of Concern:** Inspect tank inlets and outlets to ensure that there are no blocked, clogged, disconnected, or leaking components. Ensure that lid seals are tight and in good condition. Check to make sure that the tank structure is not leaking and that the foundation, base, or support legs are stable and seismic bracing is securely fastened to the tank. For aboveground tanks, ensure that the tank remains opaque to eliminate photosynthesis and algae blooms inside the tank. **Maintenance Solution:** Note if tank components are damaged and take steps to correct the issue and restore the component's function.
8	Visible contaminants / pollution in tank or within the catchment area	**Area of Concern:** Visible surface contaminants and pollution can range from inert substances to hazardous substances that impact environmental or human health. Examples of inert contaminants are masonry, plaster or concrete "washout," and masonry or roadway saw cutting slurry and residue. Examples of hazardous contaminants are petroleum-based substances, caustic chemicals, pesticides, and herbicides. These pollutants can often be identified by sight or smell when they become deposited in a rainwater harvesting tank. If pollutants are detected, investigations must be conducted to determine the source of the contaminant, mitigate that source, and then take steps to clean up the contamination. **Maintenance Solution:** For inert substances, cleanup can typically be conducted by regular maintenance personnel by simply scraping off or pressure washing / vactoring and discarding the contaminated material at an appropriate facility after drawing down and emptying the tank. Hazardous substance cleanup will require specially trained and licensed contractors and special disposal conforming to local and national laws and regulations.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
9	Sediment accumulation in tank	**Area of Concern:** Sediment can accumulate in rainwater harvesting tanks and clog outflow structures, which could lead to excessive drawdown times. Clogged outflow structures can lead to overflowing and flooding. **Maintenance Solution:** All sediment should be removed from tank before the start of the rainy season (October 15) or as frequently as site conditions dictate, and discarded at an appropriate facility.
10	Treatment system (filters, UV lamp) operational and properly maintained	**Area of Concern:** Treatment system components are essential to public health and safety. Check to ensure that all connections within the treatment system remain watertight and free from leakage and all components are operating properly. **Maintenance Solution:** Empty filter screen chambers and inspect for damage. Wash the screens before reinserting. Inspect sand filters for clogging and conduct a backwash or clear as per manufacturer's recommendations. Remove and replace bag filters and/or cartridge filters as recommended by the manufacturer. Ensure that the UV lamp is operational. Replace lamp element if needed.
11	Piping, valves, vents, drains or baffles damaged, blocked or leaking	**Area of Concern:** Rainwater harvesting tanks can contain many piping components that play key roles in the function of the installation. Inlet and outlet piping that directs stormwater to and from the tank, vent pipes and cleanouts that provide maintenance access and provide air movement and venting, along with baffles to separate floating and settled debris from the rainwater are all key components. If any of these components are damaged, the function of the tank may be compromised. **Maintenance Solution:** Note if piping components are damaged and take steps to correct the issue to restore the component's function.
12	Backflow preventer / air gap operational (if make-up system is included)	**Area of Concern:** The backflow assembly must be tested annually by a licensed professional and the results must be reported to the SFPUC Water Quality Division's Cross Connection Control Program. For more information on backflow prevention device testing, visit: http://sfwater.org/index.aspx?page=359. **Maintenance Solution:** Note any backflow preventer issues and ensure that the assembly is maintained by a qualified professional.
13	Structural damage of vault / tanks, conveyance system or treatment system	**Area of Concern:** Minor damage to structural components such as walls, floors, baffles, and lids should be repaired on a yearly basis. These minor repairs can consist of, but are not limited to, patching chips and cracks to concrete structures. More significant structural damage, such as damage caused by nearby construction work or natural disasters must be repaired as soon as possible. **Maintenance Solution:** Major repairs can consist of removal and replacement of damaged lids, walls, floors, baffles, or outflow structures. It can also include structural bracing and supplemental reinforcement of failing structural components.

Item #	Inspection Item Description	Inspection Instructions and Explanation
14	Vandalism / catastrophic damage to components or entire system	**Area of Concern:** Vandalism can range from minor issues like graffiti to tearing out/stealing major system components. Catastrophic damage can result from natural events and disasters or construction or repair of nearby utilities or structures that impact the system. **Maintenance Solution:** Repair of vandalism or catastrophic damage can consist of simply removing graffiti or complete reconstruction of the system if catastrophic damage occurs.
15	Unauthorized Modifications	**Area of Concern:** Unauthorized modifications consist of any changes to a vault that deviate from the approved construction documents. These modifications can take place during construction or can happen over time after the vault is constructed. The SMR Maintenance Agreement Exhibit B recorded on the deed of the property provides the original approved construction documents that can be referred to and used to determine if modifications have been made. **Maintenance Solution:** All unauthorized modifications must be corrected by returning the system to its original configuration, as described in the approved construction documents contained in the SMR Maintenance Agreement Exhibit B.
16	Distribution Systems / Irrigation system condition	**Area of Concern:** Distribution systems can be routed to both indoor non-potable uses (such as toilet flushing and HVAC/cooling towers) and outdoor non-potable uses (such as irrigation, car washing, and ornamental water features). These systems can include pumps, pressure tanks, and valves which must be inspected and maintained. Malfunctioning irrigation systems can also be identified by dry areas and evidence of browning or wilting plants that show signs of under-watering. Systems that are out of adjustment are identifiable by observation during the irrigation cycle. **Maintenance Solution:** Irrigation system sprinkler head patterns must be adjusted to ensure that the spray pattern does not deposit water on surrounding hard surfaces or nearby structures. Irrigation systems must be maintained year-round by a qualified professional. This maintenance includes the repair of leaks, the adjustment of irrigation head spray patterns to avoid buildings and paved surfaces, and the inspection, testing, and certification of backflow prevention devices. Damaged or leaking distribution systems should be repaired immediately.
17	Pre rainy season drawdown - verify that system has adequate capacity	**Area of Concern:** Extended drawdown times that are beyond 48 hours in rainwater harvesting tanks can lead to several problems such as: unpleasant odors, lack of capacity to accommodate runoff from successive storms, and creation of mosquito habitats. Ponded water and drawdown failure can be caused by the following: • large amounts of sediment or debris accumulation in the vault • blocked, clogged, or broken drains • blocked or clogged outflow structures and/or sand traps • damaged or malfunctioning distribution systems **Maintenance Solution:** See the Inspection instructions and explanation for Item #s 7, 8, 9, 10, 11, 14 and 15 for issues that could cause extended drawdown times.

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Item #	Inspection Item Description	Inspection Instructions and Explanation
18	Mosquitos or mosquito larvae observed	**Area of Concern:** Ponded water resulting from extended drawdown time beyond 48 hours may lead to the development of a mosquito habitat. **Maintenance Solution:** See Item #2 above for remedies to extended drawdown times. For more information on mosquito control visit http://www.sfdph.org/dph/eh/WestNile/default.asp or http://www.sfmosquito.org/. If mosquitos or mosquito larvae are observed, please contact the San Francisco Environmental Health Vector Control Program at (415) 252-3806, or email EnvHealth.DPH@sfdph.org. Also, consult with a licensed professional pest control service for eradication, as appropriate.

NOTE: SFDPH is the permitting agency for the operation of Alternate Water Source Systems in Residential Buildings containing three or more dwelling units, in Non-Residential Buildings and where alternate water systems are shared across property lines or in multiple structures. Therefore, all buildings except one and two unit residential buildings must comply with the most current version of the *SFDPH Director's Rules and Regulations Regarding the Operation of Alternate Water Source Systems*. For more information on Alternate water Source Systems, visit: http://www.sfdph.org/dph/EH/Water/nonPotable.asp

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Annual Self-Certification Checklist Instructions

SUBSURFACE INFILTRATION SYSTEM (Aggregate Filled)
(AKA: dry well, stormwater drainage well, stormwater injection well, infiltration gallery, seepage pit)

NOTE: These instructions are intended to be a companion piece to the Annual Self-Certification Checklist. The information contained herein is to be used to help the preparer of the Annual Self-Certification Checklist accurately conduct an inspection and properly complete the form.

Abbreviations: SMR: San Francisco Stormwater Management Regulations and Design Guidelines; SCP: Stormwater Control Plan; SMO: San Francisco Stormwater Management Ordinance; BMP: Best Management Practice (Dry Well); GI: Green Infrastructure

Item #	Inspection Item Description	Inspection Instructions and Explanation
1	Unpleasant odors	**Area of Concern:** Several maintenance-related factors can lead to unpleasant odors in GI installations. Any dry well that consistently fails to draw down completely within 48 hours can become anaerobic. The buildup of bacteria inside the dry well, along with decaying organic material and trash can cause these odors. **Maintenance Solution:** For more information on extended drawdown time, see the Inspection instructions and explanation for Item #3 below.

2	Surface ponding over dry well location	**Area of Concern:**
		Surface ponding over the dry well location is an indication of a failure somewhere in the system. Several factors can lead to surface ponding, including:
		• Reduced infiltration capacity due to:
		  ○ Sediment build up in the dry well
		  ○ Contaminants that have blocked infiltration surfaces in the dry well such as cement slurry
		  ○ Over compaction around the dry well structure
		  ○ Root intrusion that has blocked aggregate void space
		• Clogged outflow or emergency overflow structures or pipes
		Maintenance Solution:
		For more information on extended drawdown time, see Item #3 below.

3	Water in inspection cleanouts during dry season / extended drawdown time > 48 hrs.	**Area of Concern:** Ponded water and extended drawdown times beyond 48 hours in dry well installations can lead to several problems such as unpleasant odors, lack of capacity to accommodate runoff from successive storms, and creation of mosquito habitats. Ponded water and drawdown failure can be caused by the following: • large amounts of sediment or debris accumulation in the dry well • blocked, clogged, or broken drains • blocked or clogged outflow structures and/or sand traps Inspecting the outflow structure or sand trap can be done by removing the lid or opening the access hatch and visually inspecting for standing water or excessive debris accumulation. **Maintenance Solution:** Clogged outflow structures can be cleared by jetting or snaking the underdrain pipe or culvert that connects the structure to the sewer, and by removing accumulated debris and sediment from the bottom of the structure.
Item #	**Inspection Item Description**	**Inspection Instruction and Explanation**
5	Visible contaminants / pollution on interior surfaces of cleanout pipe	**Area of Concern:** Visible surface contaminants and pollution can range from inert substances to hazardous substances that impact environmental or human health. Examples of inert contaminants are masonry, plaster or concrete “washout,” and masonry or roadway saw cutting slurry and residue. Examples of hazardous contaminants are petroleum-based substances, caustic chemicals, pesticides and herbicides. These pollutants can often be identified by sight or smell when they become deposited in a dry well. **Maintenance Solution:** If pollutants are detected, investigations must be conducted to determine the source of the contaminant, mitigate that source, and then take steps to clean up the contamination. For inert substances, cleanup of aggregate filled dry wells may require removal and replacement of the contaminated aggregate and discarding the contaminated material at an appropriate facility. Hazardous substance cleanup will require specially trained and licensed contractors and special disposal conforming to local and national laws and regulations.
6	Pretreatment device damaged or bypassed / offline	**Area of Concern:** To provide floatable and sediment capture from stormwater upstream of the dry well, a pretreatment device must be in place and working properly. **Maintenance Solution:** To ensure that pretreatment devices are online and working properly during dry weather, run a garden hose or other water source into a nearby cleanout or inlet to test that water enters and exits the pretreatment device before accumulating in the dry well. If the pretreatment device is missing, unhooked or damaged, replace with a new device.
7	Sediment build-up in pretreatment device / device clogged	**Area of Concern:** Sediment accumulation in pretreatment devices is normal and expected. However, steps must be taken to remove sediment accumulation on an annual basis (or more often, depending on site conditions) to keep the pretreatment device functioning properly. **Maintenance Solution:** Sediment and debris can collect in the sump area (sediment storage area). This accumulated sediment and debris must be removed by hand or by vactor truck before the start of the rainy season (October 15), or as frequently as site conditions dictate, and discarded at an appropriate facility.

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8	Inlet, outlet, and/or emergency overflow blockage	**Area of concern:** Trash and debris can create blockages at the inlet and outlet points, or at the overflow structure of dry wells, inhibiting the flow of water into, through or out of the facility. Inlet blockages can cause stormwater flows to bypass the dry well, or only allow partial flows into the dry well, creating a situation where the dry well is non-functioning or underperforming. Outlet pipe and outlet structure blockages can create excessive ponding within and around the dry well, potentially leading to hazardous conditions and property damage. **Maintenance Solution:** Blockages must be cleared before the start of the rainy season (October 15), before each forecast storm if site conditions require, and/or as frequently as site conditions dictate. Trash and debris must be removed by hand or with a vactor truck and disposed of at an appropriate facility. Overflow structure grates, sumps and traps must be cleared of debris by hand or vactor truck and discarded at an appropriate facility.

Item #	Inspection Item Description	Inspection Instruction and Explanation
9	Piping or cleanouts damaged	**Area of Concern:** Detention dry wells can contain many structural components that play key roles in the function of the installation. Inlet and outlet piping that directs stormwater to and from the dry well, vent pipes, and cleanouts that provide maintenance access and provide air movement and venting are all key components. If any of these components are damaged, the function of the dry well may be compromised. **Maintenance Solution:** Note if these components are damaged, and take steps to correct the issue and restore the component's function.
10	Surface settlement over the dry well location	**Area of Concern:** Improper backfilling during construction can lead to surface settlement that develops suddenly when the dry well first fills with stormwater or slowly over time from a repeated cycle of filling of the dry well and the subsequent infiltration of stormwater. This settlement can cause hazardous surface conditions if the dry well is located under or near a pedestrian area or accessible lawn area. **Maintenance Solution:** Note and monitor any settlement and have the settled surfaces repaired as soon as possible to reduce trip and fall hazards.

11	Unauthorized modifications	**Area of Concern:** Unauthorized modifications consist of any changes to a dry well that deviate from the approved construction documents. These modifications can take place during construction or can happen over time, after the dry well is constructed. The SMR Maintenance Agreement Exhibit B recorded on the deed of the property provides the original approved construction documents that can be referred to and used to determine if modifications have been made. **Maintenance Solution:** All unauthorized modifications must be corrected by returning the dry well to its original configuration, as described in the approved construction documents contained in the SMR Maintenance Agreement Exhibit B. Take steps to correct the issue to restore to the original condition.
12	Mosquitos / larvae observed in surface ponding*	**Area of Concern:** Ponded water resulting from extended drawdown times beyond 48 hours may lead to the development of a mosquito habitat. **Maintenance Solution:** See Item #3 above for remedies to extended drawdown times. For more information on mosquito control visit http://www.sfdph.org/dph/eh/WestNile/default.asp or http://www.sfmosquito.org/. If mosquitos or mosquito larvae are observed, please contact the San Francisco Environmental Health Vector Control Program at (415) 252-3806, or email EnvHealth.DPH@sfdph.org. Also, consult with a licensed professional pest control service for eradication, as appropriate.