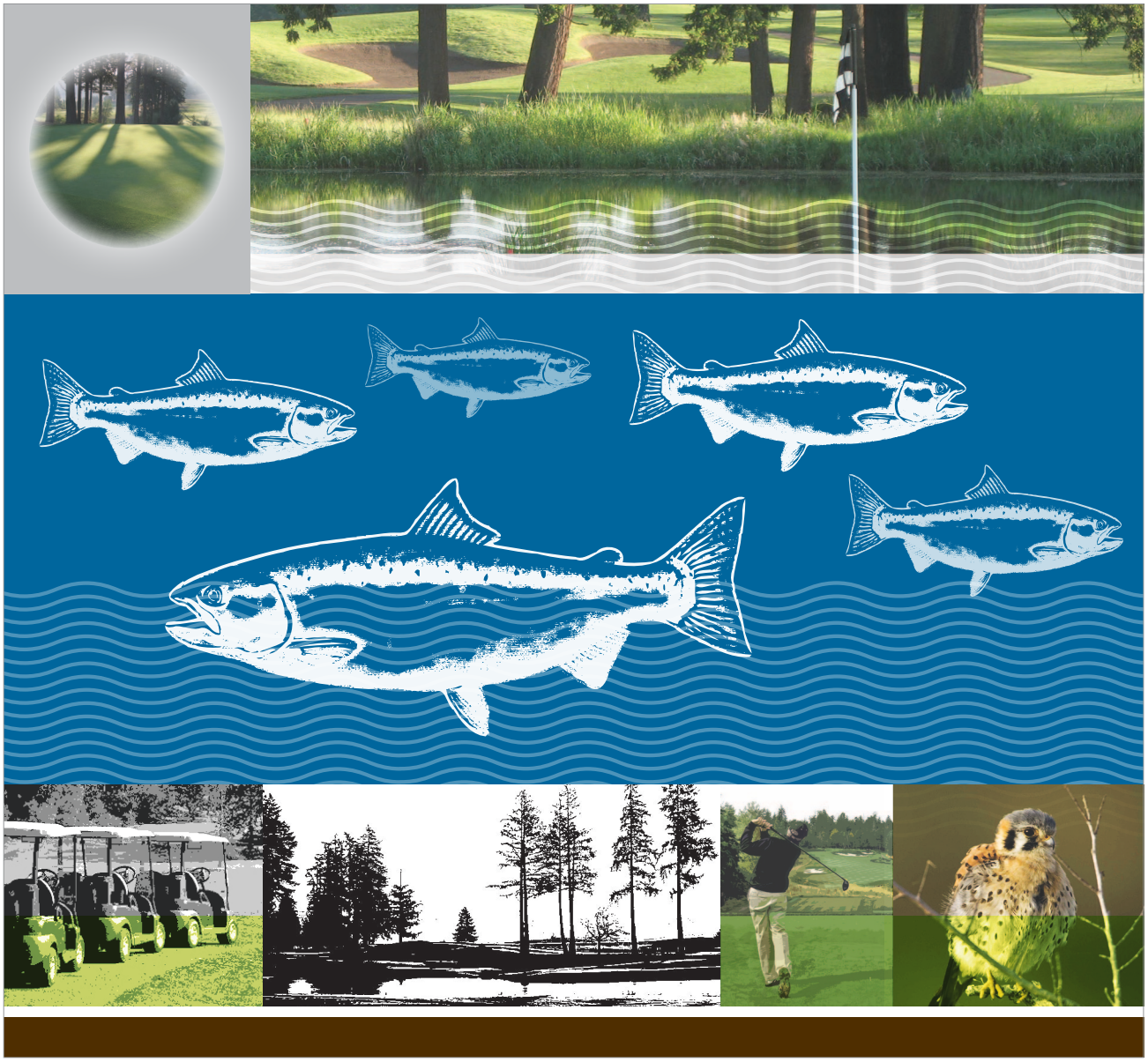
SALMON-SAFE
CERTIFICATION STANDARDS FOR GOLF COURSES



Version 1.3

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with special thanks to

Stewardship Partners
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Executive Summary

The Salmon Safe Golf Course Certification Standards are a guide for golf course owners and superintendents interested in designing, constructing, operating and managing golf courses in a manner that protects watersheds and enhances fish and wildlife habitat.

Golf courses offer both unique opportunities and challenges for watershed protection. Because natural habitat features like streams and wetlands enhance the aesthetic qualities and technical challenges of a golf course, habitat conservation is often compatible with good golf course design and management. Improvements in turf maintenance practices such as irrigation, fertilization, ad pesticide application can result in far-reaching watershed benefits.

Salmon-Safe is an independent, nonprofit organization devoted to restoring agricultural and urban watersheds so that salmon can spawn and thrive. Founded as a project of Pacific Rivers, Salmon-Safe became an independent organization in 2002 and is based in Portland, Oregon.

Salmon-Safe and Stewardship Partners, our Puget Sound-based implementation partner in working with Northwest golf courses, bring a unique, project-specific, collaborative approach to sustainable golf course certification. For certification candidates, an interdisciplinary evaluation team of qualified experts works with landowners and managers during each step of the certification process. This team is "on-call" for the life of the project, to work with the client in navigating certification standards and performance requirements. To complete the certification process, the interdisciplinary team conducts an onsite inspection of the golf course prior to final certification. After certification, Salmon-Safe ensures the long-term environmental performance of certified sites through an annual verification process. This process reviews landscape management practices, habitat restoration progress, facility performance and other program elements to make sure the project is functioning as designed.

The Golf Course Certification Standards are organized into six key stewardship management categories:

- instream habitat protection and restoration
- riparian, wetland and locally significant vegetation protection and restoration
- stormwater management
- water use management (irrigation activities)
- erosion prevention and sediment control
- chemical and nutrient containment

The standards are primarily for certification of existing golf courses that incorporate habitat-based improvements into their golf course management and maintenance practices. The standards can also guide development of new golf courses and expansion of existing facilities (see Appendix B). They represent the most recent effort by Salmon-Safe to promote land use practices that emphasize landscape-level conservation and protection of biological diversity.

Introduction

Salmon-Safe's golf course certification program is a collaborative effort between Salmon-Safe, our Seattle-based implementation partner Stewardship Partners, and the Northwest golfing community to improve environmental stewardship of golf courses.

Since 1996, Salmon-Safe has successfully defined and promoted ecologically sustainable land management that protects water quality and aquatic biodiversity throughout the Pacific Northwest. Beginning with the 2004 certification of the 10,000-acre Portland Park system, including its four municipal golf courses, Salmon-Safe has successfully certified a number of high profile urban projects in Oregon and Washington including the Nike World Headquarters Campus, Portland State University, Oregon Convention Center, Washington State Department of Ecology's headquarters campus, Port of Seattle's park system, and other corporate, municipal, and institutional sites across the region.

This document presents draft standards for certification of golf courses, including an overview of the process used to evaluate certification candidates. Salmon-Safe's golf course standards constitute a set of best management practices (BMP's) for operating, maintaining and constructing golf course facilities in a way that enhances fish and wildlife habitat and protects watershed health.

The Salmon-Safe certification program focuses on salmonid species (i.e., salmon and trout) and their habitat requirements. Salmonid species are key indicator species in the Pacific Northwest, because their health is connected to the health of ecosystems that include a variety of aquatic and upland wildlife species.

The Salmon-Safe Golf Course Certification Standards are adapted from the Salmon-Safe Park and Natural Areas Certification Standards and Residential Development Certification Standards, both of which have been peer reviewed by scientists, technical experts, representatives of environmental organizations, and other interested parties. The Golf Course Standards focus on operation and management of existing golf courses, but also provide guidance for new facility upgrades within existing golf courses (see Appendix B).

Organization and Methodological Basis for Standards

Certification standards and processes are discussed as follows:

- **Evaluation Process for Certification:** The evaluation process used for meeting Salmon-Safe certification standards. This section is primarily for use by golf course owners or superintendents. optimizing water use;
- **Certification Standards:** Specific standards and related performance requirements that must be met for the project to be considered for Salmon-Safe certification. This section is primarily for use by golf course superintendents and site designers.

- **Appendix A:** A summary of documentation needed for certification.
- **Appendix B:** Guidance on certification of new golf course facilities and upgrades or improvements to existing courses.
- **Appendix C:** Guidance on developing an Integrated Pest Management (IPM) plan.
- **Appendix D:** Salmon-Safe's list of high hazard pesticides most harmful to salmon and other aquatic species.

Methodology

The certification standards are used to evaluate the extent to which existing golf course design and infrastructure protect and restore terrestrial and aquatic ecosystems, in the context of providing high-quality recreational opportunities and an aesthetically pleasing experience for users.

The certification standards are specifically designed to provide benchmarks that limit or avoid impacts to watershed and habitat quality. Each standard includes performance requirements that provide more specific guidance and express the desired outcome for habitat conditions.

The performance requirements are organized into six habitat-related management categories:

G.1 Instream habitat protection and restoration

Applies to certain stream types that occur within the boundary of the golf course. This category focuses on assessing the condition of the actual channel, including the streambed and bank, and correcting deficiencies where feasible. Both physical and biological conditions that contribute to habitat quality are considered for these standards.

G.2 Riparian/wetland/ vegetation protection and restoration

Measures taken to protect areas closest to surface water bodies—riparian vegetation zones and wetlands. This category focuses on assessing the condition of riparian and wetland vegetation, and correcting deficiencies where feasible. Also applies to areas with locally significant vegetation. The performance requirements may vary according to stream type.

G.3 Stormwater management

Management of stormwater runoff on a golf course. Impervious surface and drainage systems from roads, parking lots, buildings and lawn areas compacted by heavy equipment can contribute to flooding and increase the rate, volume and frequency of peak flows in streams, which can degrade stream habitat. Stormwater from developed landscapes can also contain

contaminants such as oils, heavy metals, pesticides and fertilizers that degrade water quality. This management category introduces standards that minimize the amount of stormwater generated on site and improve the quality of stormwater runoff.

G.4 Water use management

The use of water for irrigating vegetation and/or other landscape management activities. Water withdrawals can adversely affect salmonid habitat, primarily by reducing instream flows. Excessive irrigation water may also serve as a medium to transport contaminants. Impacts can be minimized by selecting alternative water sources that do not reduce instream flows, reducing the use of water (for example, through efficient irrigation or use of drought-tolerant landscaping), and harvesting water for irrigation from rainfall or building gray water systems.

G.5 Erosion prevention and sediment control

Sediment delivery into fish-bearing streams is a major cause of habitat degradation, particularly for salmonid spawning areas. Stream bank erosion and upland surface soil erosion are the principal sources of sediment. This category evaluates upland sources of erosion, as bank erosion is addressed in the instream channel management category above. Effective erosion control design and maintenance practices are intended to protect soils from movement.

G.6 Chemical and nutrient containment

Salmon survival depends on clean water, free from harmful levels of fertilizers (nutrients), pesticides (herbicides, insecticides, fungicides and other biocides), stormwater runoff pollutants and organic waste. These contaminants can travel long distances in stormwater runoff from a development to receiving streams. The principal methods to avoid contamination of salmon-bearing waters are to minimize overall inputs of these contaminants, restrict the type of inputs, and develop an acceptable method of application through a comprehensive management program, such as an integrated pest management plan.

Certification Standards Summary

To aid in understanding how certification requirements relate to golf course management, standards and performance requirements are grouped below by stewardship management category. See the Certification Standards section for more information.

Turf management

- Fertilizer/pesticide Use (G.6.1)
- Stormwater Management (G.3.1)
- Water Conservation and Irrigation (G.4.1)
- Turf Selection (G.4.2.3)

Water features

- Constructed Stormwater Treatment Wetlands (G.2.2.2.3.iv)
- Onsite Stormwater Management (G.3.1)
- Artificial Ponds (G.1.1.3.i)

Impervious Surfaces—*pro shop, clubhouse, parking, maintenance buildings*

- Stormwater Management (G.3.1)
- Water Conservation and Stormwater Re-use (G.4.2.3)

Tees and greens

- Fertilizer/Pesticide Use (G.6.1)
- Stormwater Management (G.3.1)
- Water Conservation and Irrigation (G.4.1)

Fairways

- Fertilizer/Pesticide Use (G.6.1)
- Stormwater Management (G.3.1)
- Water Conservation and Irrigation (G.4.1)
- Stream Crossings (G.1.2)

Golf cart paths

- Surfacing of Paths (G.3.1.4.i)
- Stream Crossings (G.1.2)
- Paths in Riparian Buffers (G.2.1.2)
- Path-related Erosion Control (G.5.1.2)

Golf course layout and design

- Use of Natural Contours for Drainage (G.3.1.2)
- Riparian Buffers (G.2.1)
- Stream Channels (G.1.1, G.1.2)
- Wetlands (G.2.2)

Evaluation Process for Certification

Scope

The evaluation process for Salmon-Safe golf course certification is an in-depth assessment of the golf course's overall management policies and operations, to determine if they are consistent with best management practices for protecting watershed health and enhancing fish and wildlife habitat. Restoration and enhancement projects are also assessed in the field to determine if identified impacts are being addressed.

Part A of the Certification Standards lists the general standards that must be met by the golf course for certification (General Standards). Part B of the Certification Standards lists additional standards and associated performance requirements that are specific to six management categories that relate to the habitat needs of salmonids (Habitat Specific Standards). Part B standards include provisional and non-provisional standards. Non-provisional standards (indicated with an R symbol) are mandatory standards that must be met (where applicable). Provisional standards should be met to the greatest extent operationally feasible, but the evaluation team has discretion to conditionally certify these standards.

Throughout the standards, the phrase "to the greatest extent operationally feasible" is used. This phrase describes the actual potential for incorporating standards and performance requirements into site development or operational activities. A mixture of economic, technical, biological, cultural, aesthetic and other reasonable factors are used to determine the "operational feasibility" of implementing a standard at a given site location. Ultimately, the operational feasibility of implementing certain standards and performance requirements rests on the judgment of the interdisciplinary evaluation team and is evaluated on a case-by-case basis.

Evaluation Team

Golf course assessments are conducted by a team of two or three qualified, independent experts hired by Salmon-Safe. The evaluation team will be well-versed in aquatic ecological science, turf management and IPM.[1] To conduct the evaluation, the team conducts a detailed assessment of the golf course's overall design and management related to habitat and water quality protection. The team also conducts a field review of the golf course design and habitat conditions to evaluate whether management practices are consistent with Salmon-Safe's site-specific certification standards.

[1] The interdisciplinary evaluation team has specific expertise in salmonid and riparian habitat and restoration, integrated pest management, and stormwater treatment. In building an evaluation team, the goal is to maximize the credibility of the evaluation process by employing individuals with recognized regional expertise in relevant disciplines, capable of independent, objective judgment.

The Evaluation Process

The evaluation process is designed to inform the evaluation team about existing golf course design, construction and management practices. The golf course practices are reviewed by the evaluation team to determine whether they are consistent with the Salmon-Safe certification standards. Using the certification standards described in Parts A and B below, the team evaluates a golf course by:

(1) reviewing golf course management policies and operations by interviewing golf course superintendents and staff and reviewing the summary reports and inventories provided by the golf course (see documents listed in Appendix A);

(2) conducting a field assessment of overall golf course operations and management to assess and verify information regarding golf course management. Because some management actions conducted at a specific golf course may not be visually verifiable (e.g., chemical application methods), golf course staff will accompany the evaluation team to indicate and explain recent management activities at the golf course; and

(3) conducting a field assessment of ongoing restoration projects and other conditions for certification on the golf course.

Decision Rule for Certification

Certification is awarded when both the evaluation team and Salmon-Safe are satisfied that the golf course meets all relevant certification standards and performance requirements. Specifically, the candidate golf course must:

(1) meet all requirements described in Part A of the Certification Standards and all non-provisional standards in Part B; and

(2) meet all provisional standards and requirements described in Part B of the certification standards or provide written agreement to comply with conditions stipulated by the evaluation team to address any observed non-conformance with standards or performance requirements.

If candidate golf course does not fully meet the certification standards and performance requirements, the evaluation team will stipulate one or more certification conditions that must be completed to the satisfaction of the evaluation team during the 5-year certification period. The team also may stipulate one or more preconditions to be completed before formalizing certification.

Maintaining Certification

Salmon-Safe certification is valid for 5 years, subject to annual verification of satisfactory progress in meeting any certification conditions. Annual verification requirements require preparation of an annual site summary report. This report typically includes a characterization of site conditions and observed performance, verification of incorporation of policies and procedures identified during certification, photo documentation of site condition at select photo points, and other elements agreed upon at the time of certification. After the initial 5-year certification period, courses may be recertified through a process consisting of a project site audit and assessment.

CERTIFICATION STANDARDS

Part A: General Standards for Certification

(1) The Golf course is not in violation of national, state or local environmental laws or associated administrative rules or requirements, as determined by a regulatory agency in an enforcement action.[2]

(2) Standard management practices used in day-to-day golf course maintenance, such as turf management, do not jeopardize salmon or their habitat.

R (3) All pesticide use occurs within the context of an integrated pest management program as documented in a comprehensive written plan (see Appendix A—elements required of an IPM plan consistent with Salmon Safe certification).

(4) Satisfactory progress is being made to address landscape design and infrastructure features that degrade salmon habitat such as pavement areas, road crossings or concrete-lined streams. These restoration efforts may include those required by the evaluation team to address deficiencies and efforts already being undertaken by golf course management. This progress may include prioritized project lists for the golf course, master plans for specific projects, and other planning documents as determined by the review team.[3] There is demonstrated progress in correcting management deficiencies.

(5) Summary reporting is adequate to document compliance with Salmon-Safe standards. See Appendix A for a list of written summary reports, documents and data required for golf course assessment.

R (6) The golf course allows monitoring by a third party authorized and instructed by Salmon-Safe and fully cooperates with such monitoring as much as possible, given staffing and funding constraints. The evaluation team may request that golf course management conduct water quality or other monitoring where critically needed to assess the efficacy of existing management practices in meeting Salmon-Safe standards. The evaluation team will carefully weigh the need for the monitoring against the golf course management's guidance regarding the practicality and economic feasibility of the proposed monitoring.

R (7) A policy addressing golf course upgrade design is in place. This policy requires that significant new golf course improvements be consistent with Salmon-Safe standards, including restoration goals as feasible, considering public use mandates and considerations. Appendix B summarizes standards that must be met for golf course upgrades and improvements. For example, golf course plans

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[2] R symbol indicates that conformance with the criteria is required as a pre-condition for certification. Standards listed without an R symbol are mandatory, but may be implemented over time.

[3] An evaluation of buildings located on golf course property is not included in Salmon-Safe certification.

demonstrate that they implement low-impact development (LID) designs such as use of permeable paving surfaces and localized stormwater BMP's (e.g., rain gardens) where appropriate and the greatest extent operationally feasible. To evaluate conformance, the evaluation team will review the policy and a sampling of planned golf course improvements.

Part B: Habitat-specific Requirements for Certification

Part B organizes standards and performance requirements into six management categories. These requirements are intended for use by golf course owners or superintendents as part of the Salmon-Safe certification process. The standards are designated with the prefix "G.1" through G.6"; the "G" designation is used to denote standards and performance requirements associated with golf course development and operation, in contrast to the numbered standards used in previous Salmon-Safe documents (e.g., Salmon-Safe 2005; Salmon-Safe 2008).

Core Certification Standards

The Core Certification Standards lists standards and performance requirements organized into six management categories, each covering a set of conditions important to conserving salmonid habitat. The standards are designated with alphanumeric prefixes "G.1" through "G.6". The "G" designation is used to denote standards and performance requirements associated with golf courses, which contrasts with other Salmon-Safe certification project or site types (e.g., "U" which denotes an urban core certification standard).

G.1 Instream Habitat Protection/Restoration

This management category applies to certain stream types that occur within the boundary of the golf course. It focuses on assessing the condition of the actual channel, including the streambed and bank, and correcting deficiencies where feasible. Both physical and biological conditions contributing to habitat quality are considered for these standards.

Standard G.1.1: Overall, channel and instream conditions are acceptable. Key deficiencies have been identified, inventoried, evaluated and resolved. Stream channels provide salmonid habitat via naturally stabilized stream banks, meandering channel form, and large and small wood structures where hydrologically and geomorphically appropriate.

This standard applies to both known and potential fish-bearing streams and non-fishbearing perennial or intermittent streams greater than 2 feet in bankfull width that are connected to fish bearing streams.

To determine whether streams are fish-bearing, StreamNet has fish data for the Pacific Northwest, including GIS mapping of fish data by stream, watershed, county and other criteria (http://www.streamnet.org/). State agencies, such as Washington Department of Fish and Wildlife (http://wdfw.wa.gov/fish/management/) and Oregon Department of Fish and Wildlife (http://www.dfw.state.or.us/fish/) have additional resources. Depending on the golf course location, local agencies, such as counties, cities and/or drainage districts, may have additional information on fish usage.

Performance requirements

G.1.1.1 Inventory

i. An accurate map of fish species distribution (existing and potential distribution of native salmonid species) and stream channel types on golf course property has been developed. At a minimum, these stream channel types shall include: a) fish-bearing streams, b) potential fish-bearing streams, and c) non-fish-bearing streams greater than 2 feet in bankfull width and connected to a fish-bearing or potential fish-bearing stream. The map also identifies Endangered Species Act

(ESA) Critical Habitat for salmon and steelhead as mapped by NOAA Fisheries where applicable http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/.

ii. Onsite stream channel deficiencies have been identified and mapped, based on the best professional judgment of a qualified professional (typically a geomorphologist, water resource engineer or fish biologist). Bank stability and channel incision have been characterized across the site. Onsite floodplain and channel migration zones have been mapped.

iii. Existing watershed-specific restoration or recovery plans and local salmonid recovery programs have been investigated by expert interview or planning document review. See salmon recovery plans, in glossary, for examples of sources. Opportunities to incorporate objectives of these plans and programs into golf course management policy have been identified.

G.1.1.2 Channel Protection

Channel manipulation, except for habitat restoration, is avoided to the greatest extent operationally feasible. Existing channels are protected from new impacts such as filling and excavation, straightening, unnecessary additional stream crossings, unnecessary removal of wood, or disconnection of off-channel wetlands and ponds.

G.1.1.3 Restoration Efforts

A plan is being implemented that shows significant progress toward repairing existing stream channel deficiencies identified in G.1.1.1 and G.1.1.2 to the greatest extent operationally feasible, as follows:

i. Where geomorphically appropriate, stream banks and the edges of other related water bodies are stabilized by native vegetation.

ii. The stream has an intact natural channel and floodplain, existing off-channel habitats remain connected, and no large wood has been unnecessarily removed.

iii. Incised or eroded stream banks have been stabilized using bioengineering methods to the greatest extent operationally feasible.

iv. Large wood and/or beaver dams provide channel structure and habitat, where suitable. When geomorphically appropriate and in accordance with natural and historical conditions, habitat improvement projects specify the use of large woody debris that has been salvaged from the site or has been harvested sustainably from an offsite location.

v. Artificial ponds located in fish-bearing or potentially fish-bearing stream channels are removed to the extent operationally feasible. Ponds that remain are reconstructed if necessary to provide adequate fish passage and habitat, and to maintain stream temperatures and oxygen levels within applicable state water quality standards.

Standard G.1.2: Key issues with regard to instream barriers, stream crossings and man-made features have been identified, evaluated and resolved. Road and trail crossings of streams that are on golf course property are minimized and have a minimal effect on instream habitat, fish passage, and constriction of flood conveyance. Permits are obtained and mitigation conducted for impacts, if any, to jurisdictional waters.

This standard applies to both known and potential fish-bearing streams (see Standard G.1.1 for fish data sources.

Performance requirements

G.1.2.1 Inventory

i. Onsite stream crossings have been inventoried and evaluated. For reference, consider Washington Department of Fish and Wildlife guidance (WDFW 2000; WDFW 2003) to determine priorities for fish passage and flood conveyance.

ii. Instream barriers to fish passage have been inventoried, described and located on a map. Human-made structures or conditions with the potential to degrade instream habitat quality like levees, embankments, bank reinforcement or other features, have been inventoried.

G.1.2.2 Restoration Efforts

A plan is being implemented that shows significant progress toward repairing existing deficiencies, to the greatest extent operationally feasible, in the following areas:

i. Unnatural barriers to fish and wildlife have been removed or plans are in place for removal.

ii. No new levees are proposed. Existing levees have been removed (or moved) and floodplains are restored to the greatest extent operationally feasible.

iii. Stream crossings avoid creating obstructions and encumbrances to fish, wildlife, woody debris, and sediment passage to the greatest extent operationally feasible.[4]

iv. Bridges are used rather than culverts or fords to the greatest extent operationally feasible. Natural bottom culverts are selected for use over other types.

v. Wood used in new stream crossing structures is not treated with chemicals, such as creosote, copper chromated arsenic or other copper based preservatives, potentially harmful to aquatic life to the greatest extent operationally feasible.

vi. Where fairways cross streams, they minimize impacts to the stream.

[4] WDFW (2003).

G.2 Riparian/Wetland/Vegetation Protection and Restoration

The focus of this management category is on measures taken to protect areas closest to surface water bodies–riparian vegetation zones and wetlands. It also applies to areas with locally significant vegetation (see glossary). The performance requirements may vary according to stream type.

Standard G.2.1: Riparian buffers are maintained, restored and unimpeded by structures or improvements. Riparian areas are in good condition, maintain and restore stream health, and provide shade, wood recruitment, leaf litter supply, stream bank stability and cover, and filtration of sediment.

Performance requirements

G.2.1.1 Inventory

i. Onsite riparian areas are identified, mapped and described by width of existing buffer and stream length of riparian vegetation free from intrusions from roads, utilities and other clearings (i.e., riparian continuity).

ii. Damaged, exposed or at-risk areas, including areas devoid of vegetation, areas containing significant populations of noxious weeds, and/or areas of turfgrass extending to channel banks have been identified and mapped to identify riparian areas in need of restoration.

iii. Typical local and watershed riparian habitat extent, quality and conditions have been characterized by species composition and estimated percent cover in the tree canopy, shrub layer and herbaceous layer, especially in areas adjacent to, immediately upstream from, or immediately downstream of the site.

iv. Typical local terrestrial riparian species (vegetation, birds, mammals, reptiles, and amphibians) have been characterized via interviews with local experts, review of relevant documents or other methods.

v. A site inventory of common local terrestrial riparian wildlife species (birds, mammals, reptiles and amphibians) and their sign has been conducted at least once during the breeding or growing season to determine the presence or absence of species on site. Locations identified in the survey that likely provide high habitat value and/or may harbor sensitive species have been mapped.

G.2.1.2 Riparian Zone Width

i. Impacts on riparian functions affecting water quality or quantity, floodplain condition, stream shading and contiguous riparian canopy connectivity shall be minimized to the greatest extent operationally feasible in any undeveloped

natural area within 200 feet of a stream or river channel migration zone (CMZ), or within the riparian protection areas cited in adopted local, regional, or state plans, whichever distance is larger. Within 200 feet of a stream or river CMZ, any effect on riparian function is minimized and mitigated to offset functional impacts resulting from other uses. For developed areas, including fairways and other landscaped areas managed for golf, impacts to riparian function are minimized within 50 feet of the stream or river channel migration zone.

ii. Acceptable mitigation may include native plantings, enhancement of remaining buffers, or removal of barriers. Trails are generally an accepted use within these riparian areas unless they are obvious sources of sediment or bank instability.

G.2.1.3 Vegetation

Riparian zones are dominated by vegetation that provides bank stability and shade, at a minimum.

G.2.1.4 Restoration Efforts

A comprehensive program is underway to identify and implement riparian restoration priorities, to the greatest extent operationally feasible, in the following areas:

i. An average riparian buffer of 50 feet is provided between landscaped areas of the golf course (fairway, tee, putting green) and the CMZ. Area within the buffer is flagged and marked as water hazard, lateral water hazard, environmental zone or out of bounds.

ii. Where riparian buffers do not meet the widths specified in G.2.1.4 (i), buffers are enhanced by removal of invasive plant species, revegetation with native plants, or removal of existing structures or impervious surfaces to restore riparian functions identified in G2.1.2.

iii. Where viable, provisions are made to restore off-channel habitat and/or provide additional flood storage.

iv. Connectivity between riparian, wetland, upland habitats is maximized to the greatest extent operationally feasible. Life histories of local species are maintained by connecting riparian, wetland and upland habitats in a manner that supports habitat needs. Impediments to habitat connectivity, including fencing, buildings or other barriers, are avoided.[5]

[5] Work with a qualified biologist or a state or local fish and wildlife agency to identify significant local species and habitats.

Standard G.2.2: Wetlands are protected, avoided, restored or created to improve stream habitat by providing off-channel salmonid habitat, improved water quality and/or additional floodplain storage to the greatest extent operationally feasible. Permits are obtained and mitigation conducted for impacts to jurisdictional wetlands and waters. R

Performance requirements

G.2.2.1 Inventory

i. Wetlands are identified, classified and mapped. Classification of existing wetlands includes types of impacts and whether the wetland historically or currently provides fish habitat.

ii. Conditions within 100 feet of each wetland are characterized by vegetation composition, land use characteristics and topography.

iii. Typical local wetland species (vegetation, birds, mammals, reptiles and amphibians) have been characterized via interviews with local experts, review of relevant documents or other methods.

iv. A site inventory of common local wetland species (birds, mammals, reptiles, and amphibians) and their sign has been conducted at least once during the breeding or growing season to determine or estimate presence/absence of species on site. Locations identified in the survey that likely provide high habitat value and/or may harbor sensitive species have been mapped.

G.2.2.2 Wetland Protection

Existing wetlands are avoided and protected from development or site improvements, to the greatest extent operationally feasible and as required by local, state and federal regulatory agencies (e.g. Oregon Department of State Lands; US Army Corps of Engineers; Washington Department of Ecology; and/or local jurisdictions). Management or public impacts that are detrimental to wetland native vegetation, soils or water quality are minimized. Development near wetlands is avoided to the greatest extent operationally feasible. If 100 percent avoidance is not possible, the effect on wetlands and wetland buffers is minimized and mitigated to offset functional impacts and as required by local, state and federal regulatory agencies (e.g., Oregon Department of State Lands; US Army Corps of Engineers; Washington Department of Ecology; and/or local jurisdictions) .Acceptable mitigation may include native plantings, enhancement of remaining buffers, improved wetland hydrology, removal of barriers to movement and, where appropriate, fencing to protect buffers.

G.2.2.3 Restoration Efforts

Plans are being implemented that show significant progress toward improving wetland condition and function, to the greatest extent operationally feasible, in the following ways:

i. Degraded wetlands are restored, or new wetlands created, to improve floodplain habitat, off-channel salmonid habitat and/or other wetland functions (e.g., water quality, flood storage or infiltration), to the greatest extent operationally feasible.

ii. Wetland buffers are established to protect wetland functions affecting water quality and quantity, floodplain condition, and contiguous habitat connectivity. Where wetland buffers are inadequate under existing conditions, buffers are restored by revegetation or removal of existing detrimental structures or impervious surfaces. Buffers are managed to respond to needs of known local wetland fauna that require accessible adjacent or nearby upland habitat during their life cycles.

iii. Wetland habitats and their buffers are spatially connected by locally appropriate, contiguous native vegetation, to the greatest extent operationally feasible. These areas are also connected to other natural areas as part of a landscape-scale, conservation framework for enhanced habitat connectivity.

iv. Constructed stormwater treatment wetlands (see G.3) do not disrupt the normal function of natural wetlands, but can be used to accept or redirect water to wetlands in order to enhance wetland function.

G.3 Stormwater Management

Effective stormwater management is critical for all forms of development, including golf courses. This management category introduces standards that minimize the amount of stormwater generated on site and improve the quality of stormwater runoff. Uncontrolled or poorly managed stormwater can degrade stream habitat (through flooding and/or increases in the volume, velocity and frequency of peak flows), decrease summer base flows, increase erosion and sediment transport, and cause water quality problems by washing pollutants such as oils, heavy metals, pesticides and fertilizers into receiving waters. Golf courses have a relatively low percentage of impervious surface area, typically consisting of parking areas, the clubhouse and maintenance areas. Golf courses can effectively manage their stormwater by meeting the performance requirements below.

Standard G.3.1: The golf course is designed to minimize stormwater runoff and minimize the footprint of onsite impervious surfaces.

Performance requirements

G.3.1.1 Inventory

i. Impervious and semi-pervious (e.g., gravel or pavers) surfaces, and other areas contributing to stormwater runoff, are mapped. A summary report provides an estimate of the percent of impervious surface (pavement, roofs, hard-packed gravel) based on site plans, record drawings (as-builts) aerial photographs or field measurements.

ii. Information on existing stormwater infrastructure, if any, has been collected from record drawings, site mapping or field inspection. This includes locations of stormwater conveyance channels, pipes, catch basins, outlets, and low-impact development stormwater facilities. Any existing stormwater mitigation projects, such as reduction in pavement, detention ponds or biofiltration swales, are called out and identified.

iii. Site topography has been mapped and a drainage area assessment conducted. This information shows major stormwater catchments and locations of receiving stormwater drains or streams, if present.[6] Areas suitable for low impact development stormwater facilities (based on soil infiltration capacity) have been mapped.

iv. Any known or potential offsite drainage or stormwater resources entering the site from an adjacent property have been identified based on drainage or topographic maps or field inspection. Offsite areas contributing to onsite hydrology have been characterized in terms of impervious and pervious area, water quality concerns, and any proposed changes in offsite conditions that may affect stormwater flow or water quality on site.

[6] An existing site stormwater management plan, if updated and unavailable, is generally sufficient to meet performance requirements R.1.3.1(i), R.1.3.1(ii) and R.1.3.1(iii), and can be provided to the Evaluation Team as a substitute for these requirements.

G.3.1.2 Drainage Routes

Primary stormwater drainage routes within golf courses and location of receiving stormwater drains and streams have been documented and considered in management activities, such as pesticide application, mowing and implementation of stormwater treatment projects.

G.3.1.3 Water Quality Monitoring

A regular monitoring plan has been established for water quality testing in stormwater ponds and naturally occurring water bodies (where they occur on the golf course grounds). Written records are maintained and the monitoring plan includes adaptive management measures that will be implemented if monitoring indicates that golf course conditions or activities are reducing or impairing water quality. The plan specifies additional monitoring if visual signs of water quality degradation, known spills or other water quality hazards are evident in streams, watercourses or stormwater facilities. Parameters to be monitored will be determined by the certification team and may include: dissolved oxygen; pH; temperature; specific conductivity; nitrogen (nitrate) soluble orthophosphate; and other constituents known to be of concern in the local watershed (identified on the state 303(d) list under the Clean Water Act).

G.3.1.4 Restoration Efforts

A plan is being implemented that shows significant progress toward decreasing effective impervious area (EIA) and improving stormwater management within the golf course to the greatest extent operationally feasible, in the following ways:

i. Impervious surfaces (pavement) are reduced to the greatest extent operationally feasible. Strategies include reducing the number of parking spaces (subject to local requirements), reducing parking space and/or roadway widths, and/or using permeable paving materials for parking lots.

ii. Stormwater management systems for roadway, parking lot and building runoff treat stormwater close to the source. Rather than concentrating runoff and releasing it to the storm drainage system or large-scale detention facilities, stormwater is managed using dispersion and infiltration and localized stormwater facilities. Examples of system components include rain gardens; infiltration trenches, roof rainwater collection cisterns and vegetated rooftops. To avoid the risk of catastrophic failure during high flow events, stormwater facilities are designed with adequate bypass/overflow measures where appropriate.[7]

iii. Stormwater facilities are planted with native or adapted vegetation adapted to the fluctuating water conditions characteristic of stormwater facilities. Large retention/detention areas that may surface drain into stream systems are shaded from solar access and associated potential for thermal gain.

[7] Note: general guidance for effective stormwater facility design may be found in the *Stormwater Management Manual for Western Washington*, or other similar documentation (Ecology 2005).

iv. Stormwater facilities pose no fish trap hazard during normal or high flow conditions. Stormwater facilities are outfitted with screens to prevent fish from entering stormwater management facilities.

v. Where consistent with the needs of local species, stormwater facilities incorporate habitat feature improvements, integrate with the existing natural areas matrix, and support connectivity between habitats.

G.4 Water Use Management

Water withdrawals for irrigation can adversely affect salmonid habitat, primarily by reducing instream flows. Impacts can be minimized by selecting alternative water sources that do not reduce instream flows, by reducing the use of water (for example, through efficient irrigation or use of drought-tolerant landscaping), and harvesting water for irrigation from rainfall, where approved by local jurisdictions.

Standard G.4.1: The selected source of irrigation water results in the least potential impact to in-stream flows of fish-bearing streams to the greatest extent operationally feasible.

Performance requirements

G.4.1.1 Site Water Inventory

An existing site water infrastructure inventory as it relates to water use and disposal has been completed.

i. Availability of public water sources has been investigated to aid in avoiding the use of surface water rights, to the greatest extent operationally feasible. Information on existing sanitary/wastewater infrastructure, if any, has been collected from record drawings, site mapping or field inspection.

ii. Local jurisdictional code as it relates to reuse of gray water and black water has been reviewed and documented, for reference during future development.

G.4.1.2 Drought Planning

Withdrawals of surface water sources are managed to avoid impact to salmonids in the source stream, particularly during times of below-average precipitation.

Standard G.4.2: Water conservation measures reduce irrigation water use to the minimum necessary to support maintenance of golf course grounds.

Performance requirements

G.4.2.1 Water Conservation Plan

The golf course develops a conservation plan to conserve water by focusing watering in limited areas of the golf course.

i. The plan lists activities to perform, provides a schedule for activities, and identifies responsible parties. Adaptive management triggers actions that respond to changes in performance. The water conservation plan shall include a drought management plan that details how significant reductions will be achieved during times of below-average precipitation.

ii. Golf Course policy formalizes responsibility to implement and enforce all aspects of the water conservation plan.

G.4.2.2 Water Use Monitoring

A water use monitoring plan is implemented and annual summary reporting is available to the public. Reporting documents a decline in water use per acre for the system over a 5-year period or explains why no further efficiencies are feasible.

G.4.2.3 Restoration Efforts

A plan is being implemented that shows significant progress, to greatest extent operationally feasible, toward increased water conservation, in the following areas:

i. Landscape vegetation has been selected and located appropriate to site conditions.

   (a) Drought-tolerant plants that require minimal (if any) irrigation are used in landscaping to the greatest extent operationally feasible. Plants with high water demands have been avoided. Where suitable, drought-tolerant native vegetation is selected over nonnative plants, especially near habitat buffers. No invasive species, as defined by local and state agency weed lists, are used at all.

   (b) On parts of the property not including the golf course, open lawn is minimized to the greatest extent operationally feasible or is composed of drought-tolerant alternative seed mixes.

   (c) Construction details specify the use of compost and mulch during installation of new plant material to reduce irrigation requirements.

ii. Water conservation practices are used during site maintenance to the greatest extent operationally feasible.

   (a) Automated soil moisture sensors and other water-conserving techniques are part of the irrigation plan. Irrigation delivers water based on specific vegetation requirements, rate of infiltration, evapotranspiration and other factors.

   (b) Stormwater reuse and gray water reuse systems, if compatible with code and regulatory requirements, are used. Water may be reused within building water systems, irrigation or any water use that reduces consumption.

G.5 Erosion Prevention and Sediment Control

Sediment delivery into fish-bearing streams is a major cause of habitat degradation, particularly for salmonid spawning areas. Stream bank erosion and upland surface soil erosion are the principal sources of sediment. This management category evaluates upland sources of erosion, as bank erosion is addressed in the instream channel management category above. Effective erosion control design and maintenance practices protect soils from movement.

Standard G.5.1: Soil is protected from erosion and generation of sediment that could enter surface water bodies. Soils protection is accomplished by vegetative cover, mulch or other methods to prevent offsite movement of sediment.

Performance requirements:

G.5.1.1 Inventory

An existing site water infrastructure inventory as it relates to water use and disposal has been completed.

i. Soil maps have been reviewed, if available. Areas that appear to have hydric soils, high erodibility and/or steep slopes are field-investigated

ii. Unstable or highly erodible areas, including existing erosion and sedimentation problem areas have been identified and mapped. These include existing slumps or failures, steep slopes and unstable soils.

iii. Any existing onsite soil tests or geotechnical bores are available to the project team.

G.5.1.2 Trail Systems

Earthen trails are protected by mulch, water bars, closures or other BMP's as necessary to prevent erosion. Golf course management actively seeks out and decommissions unauthorized trails.

R *G.5.1.3 Vegetative Cover*

No area larger than 100 square feet is comprised of bare or disturbed soils, particularly areas that show evidence of sediment transport to streams or off site in stormwater.

G.5.1.4 Restoration Efforts

An existing site water infrastructure inventory as it relates to water use and disposal has been completed.

i. Bare or exposed soils are temporary features only, to be vegetated with plant types consistent with Standard G.4.2.3. Erosion control seed mixes are composed of native species or other suitable species that contribute to soil stability and soil quality.

ii. Site improvements, including buildings, roads, bridges or other features, are protected by BMP's as necessary to prevent erosion. Earthen trails or cart paths, especially those in designated buffers, are protected by mulch, water bars, closures or other BMP's, as needed to prevent erosion and sediment transport.

iii. Permanent erosion control features, in the form of site grading, flow control, and landscaping, are strategically placed to prevent turbid stormwater from leaving the site.

iv. Unstable or highly erodible areas have been identified and mapped. If they are within the limits of typical course play, they are marked as ground under repair or out of bounds. These include existing slumps or failures, steep slopes and unstable soils.

v. Golf course soils are regularly enhanced by amending soils with organic content and/or aerating as needed to improve soil health.

G.6 Pest Management and Nutrient Containment

Salmon survival depends on clean water, free from harmful levels of fertilizers (nutrients), pesticides (herbicides, insecticides, fungicides and other biocides), stormwater runoff pollutants, and organic waste. These contaminants can travel long distances in stormwater runoff from a development to receiving streams. The principal methods to avoid contamination of salmon-bearing waters are to minimize overall inputs of these contaminants, restrict the type of inputs, and develop an acceptable method of application through a comprehensive management program, such as an integrated pest management plan.

Standard G.6.1: In the interests of improving site water quality and ecosystem health, an integrated pest management and nutrient containment plan is in place.

Performance requirements:

G.6.1.1 Integrated Pest Management and Nutrient Containment Plan

An integrated pest management plan or policies are developed to promote management practices that reduce the impact of or eliminate the need for pesticides. Pesticide use must not result in contamination of stormwater or streams in amounts harmful to salmon or aquatic ecosystems. These practices generally include careful monitoring and scouting of insects, weeds and disease; use of non-spray control methods (cultural practices and mechanical controls); use of reduced impact pesticide controls; and/ or managing specific sites without the use of pesticides. The plan has been adopted into the golf course's management policy to formalize implementation and enforcement over time. The IPM plan must comply with the following guidelines:

i. Type of pesticides—All use of pesticides within the golf course property, including on waterways, waterway buffers and uplands, is limited by an IPM program addressing the specific policies on the method of use, application type, rate, frequency, location and amount. Only those pesticides included on a limited use list developed by the golf course as part of a comprehensive IPM approach can be used. These pesticides will only be used when there is no undue risk of harm to salmon and aquatic ecosystems. This limited use list is reviewed and adjusted on an annual basis by golf course management to ensure that potential environmental harm is minimized. Pesticides may be added or removed from the list at the time of review.

R ii. Minimize aquatic impacts from high hazard pesticides—The use of any pesticide on the Salmon-Safe List of High Hazard Pesticides requires written explanation for each pesticide used that details the methods of use, including timing and location, that demonstrate that the hazards to aquatic systems are negligible (Appendix D: Salmon-Safe High Hazard Pesticide List).

R iii. **Restricted use zones**—Pesticide use is specially managed within waterways and adjacent waterway buffer areas. For the purposes of pesticide application, the buffer zone is defined as a corridor of land that is 60 feet in width on each side of a stream or other body of water. Measurement of this buffer zone begins at the edge of the water line at the time of application, and is measured horizontally as if on a map. Anticipated seasonal or weather-related changes affecting water level will be included in the decision-making process when dealing with buffer zones. However, the width of the buffer zone is location-specific and playability of the golf course is considered in defining individual buffer zones. Separate action thresholds must be defined for the application of pesticides where the buffer zones are less than 60 feet.

iv. **Pesticide treatment of trees**—Within riparian buffer zones, pesticides are used only on rare occasion for treating tree pests or diseases. Injection of pesticides within tree tissues or paintbrush application are the only application methods for trees allowed in riparian buffer zones.

R v. **Application equipment**—Within riparian buffers, pesticide application for vegetation other than trees is done by hand and using low-volume, low-pressure, single-wand sprayers, wiping, daubing and painting equipment, or injection systems. The methods used minimize fine mists and ensure that the applied materials reach targeted plants or targeted soils surfaces.

vi. **Pesticide drift**—Great care is taken to ensure that pesticide drift does not reach nearby surface waters by using appropriate equipment and methods. Spray applications are not allowed in the buffer area when wind speed is above 5 mph or wind direction would carry pesticides toward open water. No spraying is conducted during a temperature inversion, unless a suitable application method is identified to eliminate any potential negative effects.

vii. **Reduction Program**—An IPM plan or policies are being implemented that promote management practices that reduce the impact of, the unnecessary reliance upon, or eliminate the need for pesticides. These practices generally include careful monitoring and scouting of insects, weeds and disease, use of non-spray control methods including cultural practices and mechanical controls, as well as managing specific sites without the use of chemical pesticides.

viii. **Pesticide applicator licensing**—All persons applying pesticides must be currently licensed as private pesticide applicators by the Oregon or Washington Departments of Agriculture, as appropriate. Licensed personnel must be specifically endorsed for any of the state-defined categories of pest control they undertake, such as aquatic endorsement for all aquatic pest control activities.

ix. **Pesticide storage, rinsates, disposal**—The golf course operation has rigorous policies in place to ensure that no contamination of stormwater or streams occurs due to the storage and cleaning of equipment, or the disposal of pesticides and conforms to all applicable permit and regulatory requirements related to hazardous material storage. Source control BMP's include keeping chemicals under cover and using spill containment devices.

x. **Pesticide tracking system**—Detailed records are maintained for all pesticide applications on the part of the golf course staff, including applications to aquatic areas and buffer zones, consistent with state requirements.

R xi. **Pesticide application timing**—Pesticides are not applied when it is raining (unless otherwise directed by label instructions), or when there is a potential for transport by runoff to stormwater drains or streams. Decisions regarding scheduling of pesticide applications should account for the expected impacts of anticipated storm events.

G.6.1.2 Nutrient Management Requirements within the Plan

The potential for nutrient and lime use to contaminate stormwater and streams can be minimized through a program that uses alternative cultural and mechanical practices to maintain soil fertility, uses fertilizers with discretion based on soil fertility and plant needs, uses slow-reacting fertilizers, and ensures proper application of fertilizer and lime in terms of amounts and timing. The nutrient containment plan should comply with the following guidelines:

R i. **Types of fertilizers**—Fertilizer types are tailored to the existing soil conditions and plant requirements. Slow release organic fertilizers, low application rates of soluble fertilizers, or compost are generally used. Fertilizers must be selected through a state-approved screening and approval process to ensure the fertilizer does not contain toxic contaminants. The Washington Department of Agriculture maintains a database of commercial fertilizer products that includes data on total metals concentrations in fertilizers (http://agr.wa.gov/PestFert/ Fertilizers/FertDB/Product1.aspx). If soluble fertilizers are used, the timing and rate of application are carefully considered (see below).

R ii. **Fertilizer application amounts**—In general turf and shrub bed areas, soluble fertilizer rates of application are limited to no more than 0.5lb N/1,000 square feet at any one time with restraints on timing to minimize fertilizer in stormwater runoff.

iii. **Low fertilizer landscaping**—Plants with low-fertilizer requirements are used for landscaping to the greatest extent operationally feasible.

iv. **Focused use**—Fertilizer is used only on high- and moderate-intensity use areas, such as flowerbeds, turf and planting beds, and some plantings associated with construction and restoration projects, if at all. Lime is used to adjust pH to optimize nutrient availability to plants where suitable, in a manner that does not pose impacts to water quality.

R v. **Buffer zone width**—Fertilizer and lime use is highly restricted within a waterway (riparian or wetland) buffer zone.

R vi. **Use within watercourse buffers**—Fertilizer use in buffer zones of waterways is restricted depending on the intensity of application and type of fertilizers.

The allowable use of fertilizer also varies depending on whether it is being used for routine maintenance or for restoration and construction projects. However, the width of the buffer zone is location-specific and playability of the golf course is considered in defining buffer zones. See 6.6.1.ii above.

vii. Soil testing—Periodic soil testing is used to determine the need for fertilizer (phosphorus and potassium) and lime relative to appropriate benchmarks established by golf course management. Testing is conducted a minimum of twice per year. Golf course operation maintains historic records of soil test results.

viii. Soil fertility—Practices, such as onsite mulching of leaf and grass clippings, are used to reduce the need for fertilizer.

ix. Summary report—A summary report of annual fertilizer use is provided that shows consistent improvements in fertilizer use and application via implementation of the IPM plan, taking into account the changes in acreage managed, specific uses, and other relevant factors.

G.6.1.3 Material and Waste Storage and Handling

i. Material storage—The golf course stores all materials that could potentially contaminate streams or stormwater in a secure dry location.

ii. Materials handling—is done in dry areas and where spills can be cleaned up without risk of contamination of stormwater or streams.

iii. Contamination prevention policy—The golf course has rigorous policies in place to ensure that no contamination of stormwater or streams occurs due to storage, cleaning of equipment, or disposal of materials and these policies are adhered to by golf course personnel and contractors.

G.6.1.4 Other Contaminant Management within the Plan

i. Other contaminant management—Other contaminants, such as animal and chemical waste, should not contaminate stormwater or streams leaving the golf course.

ii. Animal waste control—The golf course fosters management and education policies regarding dog or other domestic animal waste control that are effective in minimizing the contamination of stormwater or streams. For example, dogs may be restricted to certain areas of the golf course property.

iii. Wildlife waste control program (geese, ducks)—If necessary and the greatest extent operationally feasible, a management program is implemented to ensure that duck and goose waste does not contaminate stormwater or streams.

APPENDIX A | Documents Required for Certification of Existing Golf Courses

Below is a list of documentation and plans typically required for evaluation during the Salmon-Safe certification process. All listed submittals may not be required for all projects seeking certification. The evaluation team works with applicants to determine which submittals are required for each development.

Site Assessment Summary/Information

The golf course site information shall consist of maps and explanatory text documenting habitat features on the golf course as described in the main text of this document. This includes (at a minimum):

- existing stream channels
- existing wetlands and buffers
- existing channel deficiencies
- stream crossings
- channel migration zones
- floodplains
- soils, including infiltration capacity and highly erodible soils

Golf Course Management Overview

Overview information should identify specific management zones on the golf course, describe measures for protecting these zones and document the following, as described in the main text of this document:

- no-spray zones
- riparian buffers
- tees, greens and other "high maintenance" areas subject to high fertilizer use (discuss liners and underdrains)
- rough (describe mowing practices, chemical application limitations)
- fairways (describe soil management techniques, mowing)

Integrated Pest Management Summary/Information

Provide an integrated pest management plan and related documentation, including pesticide use records or a summary covering the past three years.

Irrigation Management Summary

Provide an irrigation management overview, including total water use for the past 3-5 years.

Water Quality Monitoring Summary

Describe the parameters, sampling methods, quality assurance practices and reporting for water quality monitoring.

Stormwater Management Summary

Describe the periodic inspections and maintenance activities for stormwater management facilities. For vegetated facilities, visual inspections are adequate. Visually inspect for erosion, especially at inlets. Inspect for other areas of bare soil and evidence of poor plant health (brown or sparse leaves, insufficient plant density). Maintenance practices shall include cleaning and repairing eroded areas, replanting or reseeding bare areas, and adjusting plant selection if plants are not thriving. A stormwater management plan, showing the location of stormwater treatment and flow control facilities, drainage paths for stormwater runoff from impervious areas, and other pertinent information, may be requested from the Evaluation Team.

APPENDIX B

Standards for New Golf Courses and Improvements to Existing Certified Golf Course Facilities

New golf courses and improvements or retrofits at existing golf courses must meet all of the certification requirements for existing golf courses described within the main text of this document. The following criteria may also apply:

I. Site Selection Criteria

To be eligible for certification, golf course expansion areas (for existing golf courses) or the site selected for new golf course development must comply with the following:

- Development on the site selected for the proposed golf course location will not result in harm to high quality salmon habitat, riparian habitat or other significant natural features
- Previously disturbed sites have been given preference for new golf course development, rather than similar, undisturbed sites during site selection
- The proposed project must comply with all applicable local, state and federal environmental protection laws.

II. Site Planning and Design Criteria

The following additional restrictions apply:

Standard G.2 Riparian/Wetland/Vegetation Protection and Restoration
Standard G.2.1 Riparian Protection and Restoration

Standard G.2.1.2 *Riparian Zone Width*

i. Development of club house, pro shop, parking areas and other facilities with impervious surfaces near riparian areas is avoided to the greatest extent operationally feasible. These facilities are constructed outside of riparian protection areas cited in adopted local or state plans or a minimum of 200 feet from stream channel migration zones (CMZ's), whichever distance is larger. If 100 percent avoidance is not possible, the effect on riparian buffers is minimized and mitigated to offset functional impacts affecting water quality, water quantity, food web, microclimate, floodplains, riparian canopy connectivity and habitat. Acceptable mitigation may include native plantings, enhancement of remaining buffers, or removal of instream or wildlife barriers.

Standard G.3.1.5 *Grading and Layout*

Site layout responds to site conditions in a way that conserves contiguous existing vegetation, minimizes impervious or semi-pervious areas, eliminates effective (or connected) impervious area, and minimizes stormwater runoff.

i. To the greatest extent operationally feasible, golf course design utilizes natural contours to preserve drainage patterns and contain stormwater on site. Existing drainage patterns (e.g., depressions, natural swales) are maintained to the greatest extent operationally feasible unless there are existing problems, such as flooding, channelization, or improperly functioning stormwater infrastructure.

ii. Noninvasive vegetation and soils are left undisturbed to the greatest extent operationally feasible. Disturbed locations are selected over undisturbed locations during overall site planning for building, infrastructure and other improvement locations. Locally significant patches of onsite native vegetation identified during the site inventory are left undisturbed. To the greatest extent operationally feasible, these patches of existing vegetation are spatially connected to other habitat elements via appropriate, native vegetation as a functioning conservation framework. Staging areas during construction are planned to be as efficient as possible to minimize disturbance area.

iii. Buildings are clustered to the greatest extent operationally feasible to conserve identified habitat areas and other open space, as well as facilitate greater overall infiltration of precipitation.

iv. Roadway alignment maximizes contiguous open space and limits encroachment on natural resources. Parking areas are deliberately aggregated and are limited in size.

v. Impervious rooftop areas and building footprints are minimized to the greatest extent operationally feasible.

vi. Building materials are selected to minimize pollutants in runoff. Uncoated galvanized metal, zinc-coatings, or copper roofs and/or downspouts may release metals that pose risks to fish and are expressly avoided.

Standard G.3.1.6 *Planning*

Stormwater management planning results in clear benefits to water quality, volume and flow control.

Performance Requirements

i. The project strives to store, treat and infiltrate stormwater on site. This is accomplished by low impact development design, using infiltration, and reusing stormwater for non-potable uses (e.g., irrigation) to the greatest extent operationally feasible.

ii. Any development or redevelopment project with a footprint that exceeds 5,000 square feet shall use site planning, design, construction and maintenance strategies for the property to maintain or restore, to the maximum extent operationally feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.

iii. The project design minimizes contaminant loading of downstream receiving waters, especially for dissolved metals, sediment, nutrients, water temperature, and other contaminants of concern in the watershed.

iv. Adequate provision during site planning has been made for low impact development techniques that intercept stormwater near the point of origin to minimize the need for centralized stormwater management facilities to the greatest extent operationally feasible. Careful grading design avoids concentrating stormwater flows.

III. Site Construction and Management Criteria

The following additional standards apply to the existing golf course standards described within the main text of this document:

Standard G.1 In-stream Habitat Protection/Restoration
Standard G.1.3 Fish Protection During Construction

Standard G.1.3.1 *Protection Measures*

i. Fish and wildlife exclusion/protection measures are in place during construction near water bodies. For work below the ordinary high water line where fish may be harmed or entrapped during construction, work area isolation barriers such as cofferdams, silt curtains, or other devices are used at all times and Applicant has coordinated with agencies to perform in-water work only when permitted and follows BMP's specified by those permits. During in-water construction, a fisheries biologist or other qualified specialist is available on site in the event of accidental fish entrapment and to inspect fish protection BMP's.

Standard G.2 Riparian/Wetland/Vegetation Protection and Restoration
Standard G.2.3 Protection of Sensitive Natural Resources During Construction

i. Intensive construction activities with the potential to disturb sensitive wildlife occur outside the height of the terrestrial breeding season (typically May–July) to the greatest extent operationally feasible. This applies in particular to construction in or near locally significant habitats, known nesting locations, and designated surface water buffer zones where sensitive species may be present.

ii. A tree protection plan has been developed with the aid of a certified arborist for use during construction. In addition to site-specific tree protection provisions, this plan should adhere to the following requirements:

- Project work limits are clearly defined by a temporary construction fence, to protect tree drip lines and vegetation not-to-be disturbed.
- Riparian areas, wetland areas, identified locally significant vegetation and corresponding buffers are marked and protected from construction encroachment through the use of construction fences and signage.
- Pre-construction meetings are held on site so that contractors understand project work limits and other construction restrictions.
- Where necessary, disturbed native plants, woody substrate and soils are salvaged and reused on site to the greatest extent operationally feasible.

Standard G.3 Stormwater Management
Standard G.3.2 Stormwater Construction and Maintenance

Standard G.3.2.1 *Short- and Long-Term Impacts*

Construction practices avoid or reduce short- and long-term negative stormwater impacts resulting from construction.

i. Construction practices eliminate stormwater runoff and sediment transport into surface waters during construction. Salmon-Safe's construction-phase stormwater management plan (available upon request) is used on site.

ii. Vegetation disturbance, soil excavation and compaction are avoided or minimized to the greatest extent operationally feasible during construction.

iii. LID facilities are fully protected from soil compaction and receiving sediment during construction. Runoff is routed around vegetated stormwater facilities until vegetation is established.

iv. If concrete materials are used within or over-water, they should be washed (or weathered) before their use to avoid impacting the pH of receiving waters.

Standard G.3.2.2 *Long-Term Stormwater Management Plan*

Golf course management has adopted a long-term stormwater management plan as a concise written document to formalize the existing low impact development practices.

i. The plan provides a post-construction maintenance plan to ensure that installed low impact development stormwater control features are working as designed. The plan lists activities to perform, provides a schedule for activities, identifies visual and other indicators of performance problems, and identifies responsible parties. Adaptive management triggers actions that respond to changes in performance.

ii. The plan guides the design and construction of any future improvements, so that they comply with the Salmon-Safe Certification Standards defined in this document. The plan identifies areas with soils with high infiltration rates appropriate for future low impact development stormwater BMP's that should be protected to the greatest extent operationally feasible during construction of future improvements.

Standard G.4 Water Use Management
Standard G.4.2 Operational Considerations

Standard G.4.2.4 *Equipment Cleaning and Fueling*

i. Equipment cleaning and fueling occurs in designated areas sufficiently away from riparian and wetland resources or their buffers to avoid accidental runoff, contamination, or other impacts on water and natural resources.

Standard G.4.2.5 *Surface Water Withdrawals*

i. No surface water withdrawals are made in association with site construction activities.

Standard G.5 Erosion Prevention and Sediment Control
Standard G.5.1 Soil Protection

Standard G.5.1.5 *Zero Sediment Runoff*

i. Construction practices limit soil erosion and minimizes sedimentation during construction to the greatest extent operationally feasible. Visible or measurable sediment or pollutants do not exit the site or enter the public right of way. Measures to prevent erosion and control sedimentation are installed

according to plans, monitored and maintained regularly, and left in place until the site is stabilized.

Standard G.6 Pest Management and Nutrient Containment

Standard G.6.2 Pest Management and Nutrient Containment During Construction

Standard G.6.2.1 *Construction Staging*

i. The staging area for the project is located outside of any designated riparian, wetland, or other buffer for storage and maintenance of equipment, vehicles, chemicals, or other materials that could reasonable pose a risk to sensitive aquatic habitats.

Standard G.6.2.2 *Equipment and Vehicle Maintenance*

i. An equipment and vehicle cleaning, fueling, and maintenance plan is used during construction to limit the import and export of invasive plant seeds, petroleum, or other toxic substances to and from the site.

Standard G.6.2.3 *Chemical Use*

Use of pesticides or other chemicals is expressly avoided to the greatest extent operationally feasible, especially within riparian and wetland buffer areas.

i. Mechanical removal of invasive plants is chosen over chemical treatment to the greatest extent operationally feasible.

ii. No pesticides listed in Appendix D: Salmon-Safe High Hazard Pesticide List are used to the greatest extent feasible (except in accordance with the standard exemption policy described in Appendix D).

APPENDIX C | Integrated Pest, Nutrient and Chemical Management Plan Guidance

A Salmon-Safe Integrated Pest Management Plan contains the following key content:

i. Pest control strategy to ensure that prevention and physical, mechanical, or biological control methods are evaluated for use before pesticides are used. Pest control strategies will be re-evaluated a minimum of once a year.

ii. Criteria for choosing any method of pest control include any potential negative impacts to aquatic systems.

iii. Limited Use List of pesticides approved for use in aquatic buffers with annual review based on available information on impacts to aquatic systems.

iv. Training and education in pest management techniques and IPM plan.

v. Buffer zone width and restrictions for use of pesticides within buffer zones.

vi. List of pesticides used on trees and discussion of methods (including equipment, frequency, timing, location, and formulation and amount used).

vii. Precautions taken to prevent pesticide drift.

viii. Pesticide applicator licensing requirements.

ix. Pesticide storage, rinsate and disposal policies.

x. Pesticide tracking system.

APPENDIX D | Salmon-Safe List of High Hazard Pesticides

Certain pesticides are a serious threat to salmon and other aquatic life. In addition, pesticide formulations can contain other ingredients that are potentially more toxic than the active ingredients, such as non-ionic surfactant nonylphenols, their parent compounds, or nonylphenol polyethoxylates found in the spreader R11. In addition to killing fish, certain pesticides at sub-lethal concentrations can stress juveniles, alter swimming ability, interrupt schooling behavior, cause salmon to seek sub-optimal water temperatures, inhibit seaward migration, and delay spawning. All of these behavioral changes ultimately affect survival rates.

The table on page 38 lists many of the pesticides known or suspected to cause problems for salmon and other aquatic life. The list includes chemicals that could be used for site management purposes that are listed with the U.S. Environmental Protection Agency (EPA) in various risk categories. Use this list to identify pesticides that require special consideration. Please note that this table lists only some of the currently available and commonly used pesticides.

A golf course using any of the pesticides indicated as "High Hazard" may be certified only if written documentation is provided that demonstrates a clear need for use of the pesticide, that no safer alternatives exist, and that the method of application (such as timing, location, and amount used) represents a negligible risk to water quality and fish habitat. In certain situations, water quality monitoring may be used to demonstrate site-specific fate and transport properties and/or to show that use of certain pesticides does or does not affect water quality.

Salmon-Safe List of High Hazard Pesticides

Note: This table lists only some of the currently available and commonly used pesticides.

SALMON-SAFE LIST OF HIGH HAZARD PESTICIDES			
INSECTICIDES			
abamectin *	dimethoate (3)	methamidophos (3)	propargite * (7)
acephate	esfenvalerate *	malathion * (1)	spirodiclofen *
bifenthrin *	ethoprop (3)	methidathion	spirotetramat
carbaryl (2)	fenamiphos * (3)	methomyl (2)	tefluthrin *
chlorantraniliprole	fenbutatin-oxide *+ (7)	methyl parathion	terbufos *
chlorpyrifos *+ (2)	fenpyroximate *	naled * (3)	thiacloprid
cyfluthrin *	fipronil *	novaluron	tralomethrin *
cypermethrin *	imidacloprid	permethrin *	zeta-cypermethrin
diazinon *+ (1)	indoxacarb	phorate *+ (3)	
diflubenzuron (7)	lambda-cyhalothrin *	phosmet * (3)	
FUNGICIDES			
azoxystrobin *	copper sulfate**	maneb *	thiram
bensulide	fenarimol	picoxystrobin *	trifloxystrobin *
captan	folpet *	propiconazole	triflumizole
carboxin	iprodione	pyraclostrobin *	
chlorothalonil * (4)	mancozeb	quintozene (PCNB)	
HERBICIDES			
2,4-D (4)	dithiopyr	norflurazon+	thiobencarb
alachlor	diuron+ (4)	oryzalin (5)	triallate
atrazine	fluazifop-p-butyl	oxadiazon+	triclopyr BEE (4)
bromoxynil *	isoxaben	oxyfluorfen	trifluralin+ (5)
copper sulfate**	linuron (4)	pendimethalin+ (5)	paraquat dichloride
dichlobenil	metolachlor	pentachlorophenol (PCP)*	simazine
diclofop-methyl			

Very Highly Acutely Toxic and/or Highly Acutely Toxic[1] to fish and/or aquatic invertebrates. Based on EPA's Aquatic Life Benchmarks[2].

Pesticide names followed by a number in parentheses indicates the specific NOAA /NMFS Biological Opinion where it was assessed for jeopardy and/or habitat destruction/modification to endangered salmonids in accordance with the Endangered Species Act ***(https://www.epa.gov/endangered-species)***, regarding the 37 pesticides listed in the Washington Toxics Coalition (WTC) court settlement. Completed BiOps listed below[3].

* Active ingredients being Very Highly Acutely Toxic (LC50 or EC50 <100 ug/L) to BOTH fish and aquatic invertebrates

\+ Active ingredients determined to generally have very high potential for risk of off target movement through surface runoff, based on the pesticide's adsorption to soil/sediment and its field dissipation half-life (persistence) ***http://ccpestmanagement.ucanr.edu/files/237465.pdf***

**Salmon-Safe limited use restrictions apply to any copper containing pesticide, including copper hydroxide, copper ammonium hydroxide, copper carbonate, copper oxide and others.

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Salmon-Safe High Hazard Pesticides List | List and Table References with Additional Notes

1. US EPA Toxicity Classification	Acute Aquatic LC50 or EC50 (ug/L)
Practically Nontoxic	> 100,000
Slightly Nontoxic	> 10,000; <=100,000
Moderately Toxic	> 1,000; <=10,000
Highly Toxic	**> =100; <=1,000**
Very Highly Toxic	**< 100**

These ratings are based on acute toxicity and do not account for chronic and/or possible sublethal effects:

- Fish acute toxicity is generally the lowest 96-hour LC50 or EC50 in a standardized test, commonly using rainbow trout, fathead minnow or bluegill.
- Acute invertebrate toxicity values are usually the lowest 48 or 96-hour LC50 or EC50 in a standardized test commonly using midge, scud or daphnia.

2. Both EPA-established acute and chronic aquatic benchmarks are available on the EPA website:
https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-pesticide-registration

In addition to inherent toxicity, the overall assessment of the risk of a specific pesticide to aquatic water quality should consider a number of other factors: Pesticide Properties (e.g., water solubility, soil adsorption, half-life), Environmental Properties (e.g., soil makeup, climate) and Management Practices (e.g., application methods, use rate, irrigation, no-till). These properties and their possible interactions are discussed in detail in the following UC publications: http://anrcatalog.ucanr.edu/pdf/8119.pdf and http://ccpestmanagement.ucanr.edu/files/237465.pdf

The 28 Threatened or Endangered species listed in the Biological Opinions (BiOps) are described as Evolutionarily Significant Units (ESU) and are species, location/habitat and temporally specific. For example, Chinook salmon are assessed as 9 separate ESU's in the BiOps: (1) Chinook salmon (Puget Sound); (2) Chinook salmon (Lower Columbia River); (3) Chinook salmon (Upper Columbia River Spring-run); (4) Chinook salmon (Snake River Fall-run); (5) Chinook salmon (Snake River Spring/Summer-run); (6) Chinook salmon (Upper Willamette River); (7) Chinook salmon (California Coastal); (8) Chinook salmon (Central Valley Spring-run); and (9) Chinook salmon (Sacramento River Winter-run).

Refer to the Biological Opinions for a detailed list and description of each ESU and their geographic range
http://www.nmfs.noaa.gov/pr/consultation/pesticides.htm

Refer to the NOAA/NMFS Biological Opinion Schedule on the NOAA Fisheries website
http://www.nmfs.noaa.gov/pr/consultation/pesticide_schedule.htm

Variances and Variance Requests

A golf course using any of the pesticides indicated as "High Hazard" may be certified only if written documentation is provided that demonstrates a clear need for use of the pesticide, that no safer alternatives exist and that the method of application (such as timing, location and amount used) represents a negligible hazard to water quality and fish habitat. All variances must be approved in advance by Salmon-Safe.

For more information about the variance process, or to request a variance form, please contact Salmon-Safe at **info@salmonsafe.org.**

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Glossary

303(d) list

Under the Clean Water Act (CWA), the 303(d) list is the list of waters (streams and lakes) identified as impaired for one or more pollutants and that do not meet one or more water quality standards. The CWA is administered by the U.S. Environmental Protection Agency, with authority often designated to a state agency for local implementation. In Oregon, the 303(d) list is maintained by the Oregon Department of Environmental Quality (Oregon DEQ).

Best management practices (BMP's)

Schedules of activities, prohibitions of practices, maintenance procedures, and structural or management measures that prevent or reduce the release of pollutants and other adverse impacts on the environment.

Buffer

Land (of a specified width) adjacent to a water body or other sensitive area, in which special management restrictions to protect habitats are applied.

Certification standards

A set of specific guidelines or BMP's developed by Salmon-Safe for golf course owners, superintendents and designers with an interest in the design, construction, maintenance, and operation of golf courses in a manner that protects imperiled salmonid species and other associated aquatic and terrestrial habitat elements.

Channel migration zone (CMZ)

The CMZ is the area where the active channel of a stream is prone to movement over time. CMZ's are also known as "flood hazard" or "floodway fringe" areas, and are generally considered to be spatially equivalent to the 100-year flood plain, i.e. the floodplain area subject to a one percent or greater chance of flooding in any given year.

Critical habitat

"Critical habitat" is defined under the federal ESA as: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. More information and maps of critical habitat in Oregon and Washington may be obtained from the NOAA Fisheries Northwest Regional Office: *http://www.nwr.noaa.gov/ESA-Salmon-Listings/Index.cfm*

Evaluation team

Golf course assessments are conducted by qualified independent experts hired by Salmon-Safe. The evaluation team is well versed in aquatic ecological science, environmental engineering and landscape and stormwater management.

Large woody debris (LWD)

Wood that is naturally occurring or artificially placed in streams. LWD is essential to a healthy stream because it provides habitat diversity and protects against flooding. Many streams negatively affected by human use lack a necessary amount of LWD.

Locally significant vegetation

Patches of vegetation determined to be of substantial value relative to the surrounding nearby condition. Vegetation may be determined to be locally significant by the Evaluation Team. Locally significant vegetation may provide a particularly good example of a local vegetation type at a given state or maturity, represent types of vegetation not typically encountered in the local area or at the outer edge of its typical geographic distribution, have higher than average biodiversity value, be relatively large and/or contiguous in comparison to other local patches of vegetation size and/or scale, provide valuable local wildlife corridor or passage value, support important parts of the life history of local species, and/or harbor significant natural resource or cultural heritage values.

Management category

In the context of these certification standards, six primary management categories have been defined to express the desired outcome of habitat conditions in a given project area: (1) in-stream habitat protection and restoration; (2) riparian, wetland, and locally significant vegetation protection and restoration; (3) stormwater management; (4) water use management (irrigation activities); (5) erosion prevention and sediment control; and (6) chemical and nutrient containment.

National wetlands inventory (NWI)

A nationwide inventory and mapping database of wetland habitat, as maintained by the U.S. Fish and Wildlife Service. http://www.fws.gov/nwi/

New golf course development

In the context of these Certification Standards, new development refers to new, unbuilt golf course facilities that are anticipated but that have not been constructed.

Performance requirement

Specific, measurable criteria that represent the desired outcome for habitat conditions associated with a project. Performance requirements are a subset of their broader certification standards.

Riparian habitat

Characterized by vegetated areas along bodies of surface water, including streams, wetlands and lakes. Typically, riparian habitats are distinct from upland areas, demonstrating an obvious difference in vegetation types, densities and structure.

Salmon recovery plans

Salmon recovery plans may include, but are not limited to ESA salmon recovery plans, available at: http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/ for the four recovery domains delineated by NOAA Fisheries (Puget Sound, Willamette/Lower Columbia, Oregon Coast,

and Interior Columbia); the *Oregon Plan for Salmon and Watersheds* (http:// www.oregon-plan.org/); the *State of Washington Salmon Recovery Plan Implementation: A Report on High-Priority State and Federal Actions Needed to Implement Salmon Recovery Plans* (http://www.governor.wa.gov/gsro/) and local agency salmon recovery plans

Salmon-Safe

Salmon-Safe is an independent, nonprofit organization devoted to restoring agricultural and urban watersheds so that salmon can spawn and thrive. Founded as a project of the Pacific Rivers Council (now Pacific Rivers), Salmon-Safe became an independent organization in 2002. Salmon-Safe is based in Portland, Oregon.

TMDL (Total Maximum Daily Load)

A calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources.

Wetlands

Areas that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support hydric soils and vegetation typically adapted for life in hydric soil conditions. Wetlands are regulated at the federal, state, and local levels. Where the term wetland(s) is used in the standards, it is referring to naturally-occurring wetlands, or wetlands restored or created specifically as mitigation for impacts to natural wetlands. Wetland standards do not apply to constructed stormwater treatment wetlands.

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