Appendix I-H:

Wetland Protection Guidelines

Note: This completely replaces the 2015 manual Appendix H

I-H.1 Scope and Principles for Wetland Protection

Purpose

These guidelines are intended to prevent diminishment of the functions and values of wetlands by avoiding alterations to the structural, hydrologic, and water quality characteristics of existing wetlands to the extent feasible during new development, redevelopment, and stormwater management projects.

New development, redevelopment, and stormwater management projects may decrease the function and value of a wetland by:

- Increasing the amount of water flow discharged to a wetland.
- Decreasing the amount of water flow discharged to a wetland.
- Increasing the amount of pollutants discharged to a wetland.

These decreases to wetland functions can happen even if the wetland is not physically altered for development or stormwater management purposes.

Wetland Rating System

A wetland identified as a receiving water of a project needs to be rated using the *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby, 2014) to determine its category and habitat score.

Wetlands in Washington State differ widely in their functions and values. The Washington State Wetland Rating System categorizes wetlands into four categories (I, II, III and IV) based on their sensitivity to disturbance, their rarity, our ability to replace them, and the functions they provide. Category I is the highest rated wetland and the most sensitive to disturbance and Category IV wetlands are the lowest rated, based on relatively low functions and values.

This Appendix uses categories and habitat scores for wetlands to determine the level of protection necessary to reduce the risk of loss of wetland functions and values.

The rating system does not replace a full assessment of wetland functions that may be necessary if wetlands are impacted and mitigation permits are required.

For more information on the wetlands rating system refer to the following webpage:

https://ecology.wa.gov/Water-Shorelines/Wetlands/Tools-resources/Rating-systems

Regulatory Authority

Wetlands are Waters of the State as defined under Chapter 90.48 RCW, Surface Waters of the State under Chapter 173-201A WAC, and may be Waters of the U.S. according to the 2015 Clean Water Rule and regulated under the Clean Water Act. This Appendix does not include guidance for wetland delineation, assessment, permitting, or restoration.

Clark County Code Chapter 40.440 regulates development projects within wetland and wetland buffers. Other state and federal agencies may also have jurisdiction over projects affecting wetlands, in particular, the U.S. Army Corps of Engineers.

Wetland Protection Levels

The level of protection required for existing wetlands is based on the wetland category, habitat score, and the wetland characteristics.

The levels of wetland protection outlined in this Appendix include:

- I-H.2 General Protection
- I-H.3 Protection from Pollutants
- I-H.4 Wetland Hydroperiod Protection

Information needs

The following information is needed to assess the impacts and risks to wetlands, and to determine the necessary protection level.

1. Size, boundary, and characteristics of the proposed project site, wetland contributing drainage area, and the wetland and its buffer.
2. Following Ecology's *Wetland Rating System for Western Washington: 2014 Update* (Hruby, 2014) determine:
    a. Wetland type.
    b. Wetland category.
    c. Wetland habitat score.
3. Presence of rare, endangered, threatened, or sensitive species.
4. Presence of breeding populations of native amphibian species.
5. Use an approved continuous flow simulation model.
    a. If the TDA Thresholds for Book 1, Section 1.5.7.2 MR #7 Flow Control are triggered, the project proponent may also need wetland field monitoring data if access to the wetland is legally available (See I-H.5 Wetland Hydroperiod Data Collection and Evaluation Procedures).

I-H.2 General Protection

All wetlands (Categories I, II, III and IV) must receive the following general protection:

1. Consult regulations issued under federal and state laws that regulate the discharge of pollutants to surface waters, including the Construction Stormwater General NPDES Permit.
2. Maintain the wetland buffer required by county and/or state and federal regulations.
3. Retain areas of native vegetation connecting the wetland and its buffer with nearby wetlands and other contiguous areas of native vegetation.
4. Avoid compaction of soil and introduction of invasive plant or animal species in the wetland and its buffer.
5. Take measures to avoid general physical impacts (e.g., littering and vegetation destruction). Examples are protecting existing buffer zones; discouraging access, especially by vehicles, by planting outside the wetland, and encouragement of stewardship and signage by landowners.
6. Any stormwater management practices, such as Runoff Treatment or Flow Control BMP implementation, must be done outside of the wetland buffer boundary, except limited circumstances where the wetland and/or buffer may be used for additional Runoff Treatment and/or Flow Control of stormwater (See I-H.6 Compensatory Mitigation of Wetlands)
7. Discharge from a BMP or project site should be dispersed using a method to diffuse the flow before entering the wetland buffer.
8. Consider fences to restrict human access, but make sure it doesn't interfere with wildlife movement. They should be used when wildlife passage is not a major issue and the potential for intrusive impacts is high. When wildlife movement and intrusion are both issues, the circumstances will have to be weighed to make a decision about fencing. Check with the local and/or state agencies to determine if fencing would be allowed.

I-H.3 Protection from Pollutants

All wetlands (Categories I, II, III and IV) must receive the following protection from pollutants:

1. Provide Construction Stormwater BMPs as directed in Book 1, Section 1.5.2 MR #2 Construction Stormwater Pollution Prevention Plan (SWPPP) to prevent sediment and other pollutants from entering the wetland.
2. Provide Source Control BMPs as directed in Book 1, Section 1.5.3 MR #3 Source Control of Pollution.
3. Provide On-Site Stormwater Management and use LID principles as much as practicable for the site, as directed in Book 1, Section 1.5.5 MR #5 On-Site Stormwater Management. LID principles and practices will help meet other wetland hydroperiod protection criteria and provide additional habitat.
4. Provide Runoff Treatment BMPs as directed in Book 1, Section 1.5.6 MR #6: Runoff Treatment to treat runoff prior to entering the wetland and its buffer.

   Note: If the thresholds for MR #6 Runoff Treatment are not met for a TDA, then it is not required to provide Runoff Treatment BMPs for that TDA to comply with MR #8 Wetlands Protection.

If the wetland is a special characteristic wetland (such as mature or old growth forest wetlands, bogs, or wetlands of high conservation value), implement Runoff Treatment BMPs with the most advanced ability to control nutrient loads. Consider using Runoff Treatment BMPs with infiltration and active biological filtration.

I-H.4 Wetland Hydroperiod Protection

Protection of many wetland functions and values depends on maintaining the existing wetland's hydroperiod. This means maintaining the annual fluctuations in water depth and its timing as closely as possible. If a project triggers the requirements for Flow Control BMPs per the TDA Thresholds in MR #7 Flow Control, the project must apply the following Wetland Hydroperiod Protection.

The Wetland Hydroperiod Protection is separated into two methods (Methods 1 and 2) that are dependent on the wetland category, and whether the project proponent has legal access to the wetland.

The first method requires a minimum one year of monitoring followed by continuous simulation modeling of the wetland stage (called Method 1). Method 1 shall be applied to the wetlands listed below.

- Category I or II depressional or riverine impounding (including special characteristics Category I or II) wetlands that the project proponent owns, or the project proponent has legal access to – for purposes of conducting monitoring in the wetland.

Method 1 takes into account wetland specific information and field data, therefore, it allows more detailed evaluation of effects of stormwater on wetland functions. In cases where the project proponent neither owns nor has legal access to the Category I or II wetlands receiving stormwater from a proposed project, Method 2 shall be used.

Method 2 uses a site discharge volume model to evaluate hydrologic changes in a wetland, with no additional wetland monitoring requirement. Method 2 shall be applied to the wetlands listed below.

- Category I or II wetlands that are off-site or the project proponent doesn't have legal access to conduct monitoring in the wetland,
- Category I or II riverine, slope or lake-fringe wetlands,
- Category III and IV wetlands with habitat score greater than 5,
- Category III and IV wetlands that provide habitat for rare, threatened, endangered or sensitive species,
- Category III and IV wetlands that contain a breeding population of any native amphibian species.
    - If the wetland has permanent or seasonal ponding or inundation, assume that it has a breeding population of native amphibians.
    - For seasonal ponding, if the wetland has surface ponding after May 1 of a normal water year or drier, assume that it has a breeding population of native amphibians.
    - See the Wetland Rating System for guidance on identifying field indicators.
    - Recent aerial images of surface water in the wetland during normal water year or drier year can also indicate presence of permanent or seasonal ponding.

Method 1: 1-yr Wetland Monitoring and Wetland Stage Modeling

Method 1 criteria and analysis is based on the presumption that a wetland has limited water level fluctuation and water holding capacity. The risk to the wetland will be minimal if the frequency and duration of water level fluctuation (WLF) in the wetland and the WLF timing post project remain as similar to pre-project levels as possible. Therefore, the criteria sets limits on the frequency and duration of stage excursions (greater WLF than the pre-project level), as well as on overall WLF after development. The criteria were developed based on studies in *Wetlands and Urbanization, Implications for the Future* (Azous and Horner, 1997).

One water year (October 1 through September 30) of field monitoring will characterize the existing WLF and water holding capacity of the wetland, and it will be used to calculate the allowable WLF by the proposed development.

A hydrologic assessment to measure or estimate elements of the hydroperiod under pre-project and post-project conditions should be performed with the aid of a qualified scientist or wetland specialist.

Criteria for Method 1

The project proponent must meet the following six Method 1 criteria in order to comply with the Wetland Hydroperiod Protection requirements.

Criteria 1. Mean Monthly WLF Limit

- If the pre-project (monitored) mean monthly WLF for a given calendar month is < 15cm (0.49ft, 5.91inch), the post-project mean WLF of the wetland for that calendar month may increase to no more than 20 cm (0.66ft, 7.87inch).
- If the pre-project (monitored) mean monthly WLF for a given calendar month is ≥ 15 cm (0.49ft, 5.91inch), the post-project mean monthly WLF of the wetland for that calendar month may increase by up to, but no more than, 5 cm (0.16ft, 1.97inch).
- Without one year of monitoring data, assume the pre-project mean monthly WLF for any month is ≥ 15 cm (0.49ft, 5.91inch), and the post-project mean monthly WLF of the wetland for that calendar month may increase by up to, but no more than, 5 cm (0.16ft, 1.97inch).

Criteria 2. Mean Annual WLF Limit

- If the pre-project (monitored) mean annual WLF is < 15cm (0.49ft), the post-project mean annual WLF of the wetland may increase to no more than 20 cm (0.66ft, 7.87inch).
- If the pre-project (monitored) mean annual WLF is ≥ 15 cm (0.49ft, 5.91inch), the post-project mean annual WLF of the wetland may increase by up to, but no more than, 5 cm (0.16ft, 1.97inch).
- Without one year of monitoring data, assume the pre-project mean annual WLF is ≥ 15 cm (0.49ft, 5.91inch), and the post-project mean annual WLF of the wetland may increase by up to, but no more than, 5 cm (0.16ft, 1.97inch)

Criteria 3. Frequency of Stage Excursions

- The frequency of stage excursions of 15 cm (0.49ft, 5.91inch) above or below the pre-project stage must not exceed an annual average of six.

Criteria 4. Durations of Stage Excursions

- The duration of stage excursions of 15 cm (0.49ft, 5.91inch) above or below the pre-project stage must not exceed 3 days per excursion.

  AND

  - *For a Wetland that Provides Habitat for Native Amphibians:* The stage excursions above or below the pre-project stage must not exceed 8 cm (0.26ft, 3.15inch) for more than 1 day in any 30-day period between January 1 and May 31. The hydroperiod limits characterize wetlands inhabited by breeding native amphibians and apply to breeding zones during the period of January 1 through May 31. If these limits are exceeded, then amphibian breeding success is likely to decline.

    OR

  - *For a Peat Wetland:* The duration of stage excursions in the post-project scenario cannot be above the pre-project stage for more than 1 day in any year, and applies to all zones over the entire year. If this limit is exceeded, then characteristic bog or fen wetland vegetation is likely to decline.

Criteria 5. Total Dry Period Change

- The total dry period (when pools dry down to the soil surface everywhere in the wetland) must not increase or decrease by more than two weeks in any year between the pre-project and post-project scenarios.

Criteria 6. Perennial to Ephemeral or Seasonal Avoidance

- Alterations to watershed and wetland hydrology that may cause perennial wetlands to become ephemeral or seasonal post-project must be avoided.
- If modeled wetland stage indicates that the wetland is perennial, the dry period at the post-project scenario should not exceed 1 day in any year.

Additional guidance, as well as an excel template to assist with the calculations to verify compliance with Method 1 is provided in I-H.5 Wetland Hydroperiod Data Collection and Evaluation Procedures.

Method 2: Site Discharge Modeling

An alternative way to predict the risk to the wetland hydroperiod from stormwater discharges is to assess the changes in total volume of flows into a wetland that result from the development project. The size of the wetland and its capacity are not known or needed to utilize Method 2. The risk to wetland functions will be assumed to increase as the total discharge volumes from the site into the wetland diverge from the pre-project conditions. The risk will be decreased if the divergence is smaller.

As stormwater generated at the project site passes through the wetland buffer, total discharge volumes from the site to the wetland are to be calculated at the outflow of the wetland buffer. The existing or required length and area of wetland buffer per local and/or state regulations around the wetland should be included as an element in the model under both pre-project (existing) and post-project scenarios.

Criteria for Method 2

The project proponent must ensure both of the following Method 2 criteria are met to comply with Wetland Hydroperiod Protection.

Criteria 1. Mean Daily Total Discharge Volumes from the Site

Total volume of water into a wetland on daily basis should not be more than 20% higher or lower than the pre-project volumes.

- Calculate the average of the total discharge volumes from the site for each day over the period of precipitation record in the approved model for pre- and post-project scenarios. There will be 365 (366 for a leap year) average daily values for the pre-project scenario and 365 (366 for a leap year) for the post-project. No day can exceed 20% change in volume.

Criteria 2. Mean Monthly Total Discharge Volumes from the Site

Total volume of water into a wetland on a monthly basis should not be more than 15% higher or lower than the pre-project volumes.

- Calculate the average of the monthly total discharge volumes from the site for each calendar month over the period of precipitation record in the approved model for pre- and post-project scenarios. No month can exceed 15% change in volume.

The guidance for implementing Method 2 and assessing the criteria above in the respective model is provided in Section I-C.5 Wetland Hydroperiod Data Collection and Evaluation Procedures.

I-H.5 Wetland Hydroperiod Data Collection and Evaluation Procedures

Method 1

Field Monitoring and Data Collection

Field monitoring data of the wetland must be collected to determine the existing pre-project hydroperiod, which will then be compared to model outputs to verify compliance with the Hydroperiod Protection Criteria. Without one year of hydroperiod monitoring, the minimum allowable WLF change can be used (see Criteria for Method 1 in I-H.4 Wetland Hydroperiod Protection and Steps to Verify Compliance with the Method 1 Hydroperiod Protection Criteria below).

An Ecology approved continuous simulation model will be needed for data analysis. Relevant historic monitoring information can also inform the pre-project condition of the wetland. The following lists describe the minimum required wetland specific information in order to implement the Method 1 Wetland Hydroperiod Protection guidance.

1. Contour Data or Water Storage Capacity

Bathymetry, or wetland contours, is indicative of the water storage capacity of the wetland that will be used in the model simulation.

If possible, the bathymetry of the wetland should be surveyed. LIDAR data or GIS analysis may also be used to provide approximate wetland contours.

In the absence of bathymetry data, approximate the bathymetry using the permanent ponding area and assume that the storage will occur on top of that area. This resulting storage area will be lower than the actual area, providing a more protective model.

2. Hydroperiod Monitoring

Collect at least one year of water levels using either a crest stage gage or continuous water level loggers with one hour time steps in the wetland. Crest gage water levels should be collected at least monthly over a year.

Average base stage = (Instantaneous stage at the beginning of interval + Instantaneous stage at the end of interval)/2

3. Flow Monitoring

The goal of this monitoring is to construct a relationship in the model to simulate how flows will be released from the wetland for each given stage. A simplified monitoring approach may be appropriate for a simple wetland flow regime. For instance, where a well-defined outlet controls the outflows from a wetland, instantaneous monitoring of the outflow for the typical range of flows may be sufficient. In this simple case, a velocity and cross-section and stage monitoring at the outlet can be sufficient to create the relationship for the model. These measurements may be performed in conjunction with the hydroperiod monitoring described above. Additional field visits timed with precipitation or dry periods may be necessary to ensure that the outflow relationship covers the range of modeled flows.

Ecology acknowledges that it can be challenging to determine the location(s) of flows to and from wetlands. In some cases, there will be a clear channel that is the source of the inflows and outflows, while in others, the water may disperse over a wide area. An alternative would be to gather nearly continuous (every 15 minute) rainfall data along with wetland stage data (hydroperiod monitoring) and adjust the storage and discharge rate within the model using these data. If the flow data or estimation in the model are not available, assume there is no surface outflow for the wetland (closed depression).

Chapter 8 of *Wetlands and Urbanization, Implications for the Future* (Azous and Horner, 1997) indicates that a complete wetland water balance includes precipitation, evapotranspiration, surface inflow, surface outflow, groundwater exchange, and change in wetland storage using a tipping-bucket gage and continuous flow measurements. The wetland assessment as part of this Method 1 needs to consider the more protective approach to develop that relationship. A scientist (e.g. wetland scientist or hydrologist) may determine that the groundwater flow is a significant characteristic of the outflow of the system. In this case the project proponent may need to determine the groundwater regime of the system.

Model Construction and Simulation

The project proponent should develop a stage-storage-discharge (SSD) table that represents the volume of water that ponds in the wetland and the flow rate of water that discharges from the wetland at a given stage.

Having a reliable SSD table that represents the wetland is essential to evaluate the effects of development in the model. Wetland bathymetry and contour data by field measurement or using equations to represent the volume-area-depth relations of wetlands and wetland flow monitoring data are critical to develop the SSD table for the wetland.

In the absence of actual wetland flow monitoring data, it may be possible to develop a SSD table for the wetland by combining the model simulated flows with the field data obtained on the wetland WLF (hydroperiod monitoring) data. This would require an iterative modeling process. The modeling iterations would involve manually changing the discharge rates in the SSD table until the resulting simulated WLF approach WLF from the field monitoring data. The project proponent or modeler should provide the details of how this estimated in its hydrologic assessment report, so that it can be reviewed by the local jurisdiction.

With an SSD table, the following are necessary for the model simulation to evaluate the discharge of development in the model and determine compliance with the Method 1 Wetland Hydroperiod Protection criteria.

- Pre-project condition land uses and associated acreage for the entire contributing area that drains to the wetland.

- Post-project condition land uses and associated acreage for the entire contributing area that drains to the wetland.
- Percentage of developing project area compared to total acreage of contributing area that drains to the wetland.

Pre-Project Simulation

1. Identify existing impervious and pervious surfaces that discharge to the wetland and use the model elements to represent the land use and associated acreage for all hydrologically contributing areas to the wetland.
2. Add the wetland buffer using the lateral flow soil basin, or include it as part of the contributing area land use.
3. Connect the runoff from the contributing basin(s) including interflow and groundwater to the SSD table that represents the wetland.
4. Set the outflow of the wetland as the Point of Compliance (POC).

Post-Project Simulation

1. Identify anticipated impervious and pervious surfaces that discharge to the wetland and use the model elements to represent the land use and associated acreage for all hydrologically contributing areas to the wetland.
2. Identify any Flow Control BMPs in the contributing area draining to the wetland and use the appropriate model elements to represent these facilities.
3. Add the wetland buffer using the lateral flow soil basin, or include it as part of the contributing area land use.
4. Connect the runoff from the contributing basin(s) (including the buffer) including interflow and groundwater to the same SSD table that was used in the pre-project scenario.
5. Connect flows from any Flow Control BMP elements through the downstream element(s) to SSD table that represents the wetland.
6. Connect any infiltration from Flow Control BMP elements to groundwater of SSD table (if applicable).
7. Set the outflow of the wetland as the POC.

The order of the steps above depends on the type of elements and their intended function and could change to be more representative of the contributing flow pathways to the wetland.

Once the model simulations are done for post and pre-project scenarios, export the SSD table stage data for the full period of record: daily, monthly and yearly average, and Max and Min stage.

These model outputs, together with monitored WLF, are to be used to verify compliance with the Method 1 Hydroperiod Protection Criteria in I-H.4 Wetland Hydroperiod Protection.

Steps to Verify Compliance with the Method 1 Hydroperiod Protection Criteria

Ecology has provided an excel template to assist with the calculations in the steps below. The excel template may be downloaded form the interactive online version of the 2019 SWMMWW.

1) Calculate the Existing WLF of Wetland using Monitored Water Levels

Using the measurements of crest or instantaneous stage during a series of time intervals over a year, calculate water level fluctuation (WLF) between measurements.

Calculate mean annual and mean monthly WLF as the arithmetic averages of a year and each month for which data are available.

Water level fluctuation (WLF) = Crest stage - Average base stage

2) Estimate the WLF by Continuous Simulation of Stages in the Model

Using modeled daily, monthly and yearly stages (average, max and min) for the full period of record, calculate daily, monthly or annual WLF as follows:

WLF = Max stage - average stage

3) Calculate Allowable WLF change

Allowable WLF change by the proposed project is determined by two factors: Monitored WLF of the wetland, and the size of the proposed project relative to the wetland's contributing basin area.

Allowable WLF change for the proposed project is calculated as follows:

- If monitored WLF is < 15 cm (0.49 ft, 5.91 inch),
    - Allowable WLF change for the wetland (A) = 20 cm (0.66 ft, 7.87 inch) – monitored WLF
    - **Allowable WLF change for the proposed project** = A / percentage of development by proposed project in the contributing basin area.
- If monitored WLF for a given calendar month is ≥ 15 cm (0.49 ft, 5.91 inch),
    - Allowable WLF of the wetland (A) for that calendar month may increase by up to, but no more than, 5 cm (0.1 6ft, 1.97 inch).
    - **Allowable WLF change for the proposed project** = 5 cm / percentage of development by proposed project in the contributing basin area.

For example, if the project develops 10 acres of a 100 acre basin (10 %), the project can cause no more than 10 % of total allowable WLF change in the wetland. If the total allowable WLF change for the wetland is 10 cm (0.32 ft, 3.94 inch), the allowable WLF change for the proposed site is 1.0 cm (0.032 ft, 0.394 inch).

4) Verify Compliance with the Criteria

Compare each modeled daily, monthly or annual WLF with the calculated allowable WLF (factored by percentage of development by proposed project in the contributing basin area). If any of the modeled WLF difference between pre-project and post-project scenarios exceeds the calculated allowable WLF change for the proposed project, it means the proposed project does not comply with Method 1 Wetland Hydroperiod Protection.

For criteria about durations and frequencies, assess individual modeled stage outputs to verify compliance.

Method 2

Model Construction and Simulation

When modeling, include the wetland buffer as the final element in both pre- and post-project scenarios, downstream of the project area including any Flow Control BMPs. The point of compliance (POC) should be assigned to capture the total (surface, interflow, and ground water) volume leaving the wetland buffer for both the pre-project and the post-project scenarios.

Pre-project simulation

1. Identify existing impervious and pervious surfaces that discharge to the wetland and use the model elements to represent these land areas.
2. Identify the wetland buffer area and use the lateral flow soil basin to represent the wetland buffer.
3. Connect the model elements to the wetland buffer ensuring that impervious land areas are connected to surface flows and that for any other model elements all flows (surface, interflow, and ground water) are connected.
4. Set the wetland buffer element as the most downstream element.
5. Set the POC at the outflow of the wetland buffer element including surface runoff, interflow, and ground water.

Post-project simulation

1. Identify anticipated post-project impervious and pervious surfaces that discharge to the wetland and use the model elements to represent these land areas.
2. Identify any Flow Control BMPs and use the appropriate the model elements to represent these facilities.
3. Identify the wetland buffer area and use the lateral flow soil basin to represent the wetland buffer.
4. Connect the model elements to the wetland buffer ensuring that impervious land areas are connected to surface flows and that for any other model elements all flows (surface, interflow, and ground water) are connected.
5. Connect any Flow Control BMP elements to the wetland buffer ensuring that surface flows are connected to surface water and any infiltration is connected to ground water.
6. Set the wetland buffer element as the most downstream element.
7. Set the POC at the outflow of the wetland buffer element including surface runoff, interflow, and ground water.

Once the model simulations are done for post and pre-project scenarios, verify compliance with the Method 2 Hydroperiod Protection Criteria.

Strategies to meet the Wetland Hydroperiod Protection Criteria

Consider the following strategies to minimize impacts on the wetland hydroperiod and to meet the criteria. The list is in order of preference:

- Increasing the retention of natural pervious cover.
- Reducing the level of development.
- Reducing the total amount of impervious surfaces.
- Increasing infiltration using on-site LID techniques.
- Increasing or maintaining larger wetland buffer zones.
- Increasing infiltration and/or storage capacity of Flow Control BMPs.

I-H.6 Compensatory Mitigation of Wetlands

It is always necessary to treat stormwater prior to discharge to a wetland and its buffer. Any required Runoff Treatment BMPs including the outlet structure must be provided outside of the wetland and its buffer boundaries. If outflow from a BMP or project site is concentrated, flow should be diffused prior to discharge into the buffer.

Compensatory Mitigation Required

When project proponents alter a wetland(s) as part of a Runoff Treatment and/or Flow Control BMP system, they must demonstrate that they have done everything possible to avoid and minimize impacts. Remaining impacts to wetland area and/or functions must be compensated according to Clark County Code Chapter 40.440, state and federal regulations.

Compensatory Mitigation Not Required

Treated stormwater may be beneficial to wetlands that have been heavily disturbed by human activities and can improve wetland hydrologic functions. In these cases, when all of the solid bullet criteria below are met, hydrologic alteration of the wetland to meet the requirements of a Flow Control BMP/facility is allowed without compensatory mitigation. This alteration will be considered a hydrologic functional restoration activity.

- The wetland is rated Category III or IV.
- The wetland has a habitat score of 5 or less.
- The wetland does not provide habitat for rare, threatened or endangered species.
- The wetland does not contain a breeding population of any native amphibians.
- The hydrologic functions of the wetland can be improved by modification. Generally, this means that constraints exist within the wetland (or surrounding area) that have altered natural hydrologic processes. The constraints are described in Charts 4 & 5 in *Selecting Wetland Mitigation Sites Using a Watershed Approach* (Hruby et al., 2009).

  Proponents must identify and address at least one of the following common constraints to document improvement of hydrologic functions:

  - Surface water flows have been diverted away from the wetland by prior development. Surface/subsurface water flows could be directed to the site to augment hydrologic inputs.
  - Ditches that artificially drain water from the wetland could be filled or plugged to retain water.
  - Drain tiles that artificially drain water from the wetland could be broken or removed to retain water.
  - Artificially placed fill that decreases surface water storage capacity could be removed to increase surface water storage capacity.
  - Dikes or berms that prevent overbank flooding could be breached or removed.

- Outlet culvert that is lower than the surrounding topographic depression could have its invert elevation raised to increase surface water storage

  OR

- The wetland is part of a priority restoration plan that achieves restoration goals identified in a Shoreline Master Program or other local or regional watershed plan.

- The wetland lies in the natural route of water and the discharge follows the natural routing.
- Successful demonstration that no net loss of wetland function and value occurs as a result of the structural or hydrologic modifications.
  - This includes the impacts from the machinery used for the construction. Heavy equipment can damage the soil structure of a wetland.
  - When the functions and values of a degraded wetland are improved by project alterations, the project proponent must specify which project activities would thus be self-mitigating.
  - Check with the agency(ies) issuing the permits for the modification(s) to determine which method(s) and/or analyses to use to determine no net loss of wetland functions and values.
  - Functions and values that are not replaced on site will have to be compensated for elsewhere.

I-H.7 Jurisdictional Planning for Wetland Protection from Stormwater

Ecology recommends that local jurisdictions plan and manage their resources to protect overall wetland functions and values, including their role in stormwater management. See 2019 SWMMWW Appendix I-C for guidance.

I-H.8 Wetland Protection Definitions

The following terms are applicable only to this Appendix.

Buffer

The area (either upland, open water, or another wetland) that surrounds a wetland or watercourse and that reduces adverse impacts to the ecosystem functions and values from adjacent development.

Compensatory mitigation

The stage of the mitigation sequence where impacts to wetland functions are offset (i.e., compensated for) through creation (establishment), restoration (re-establishment, rehabilitation), or enhancement of other wetlands. Because regulatory requirements and policies tend to focus on compensatory mitigation, the term "mitigation" is often used to refer to compensation, which is just one part of the overall mitigation sequence.

Constructed wetland

A wetland intentionally created from a non-wetland site for the purpose of water treatment.

Degraded wetland

A wetland (community) whose functions and values have been reduced as a result of human activities. For example, a wetland in which the vegetation, soils, and/or hydrology have been adversely altered, resulting in lost or reduced functions and values; generally, implies topographic isolation; hydrologic alterations such as hydroperiod alteration (increased or decreased quantity of water), diking, channelization, and/or outlet modification; soils alterations such as presence of fill, soil removal, and/or compaction; accumulation of toxicants in the biotic or abiotic components of the wetland; and/or low plant species richness with dominance by invasive weedy species.

Depressional wetland

Depressional wetlands occur in topographic depressions where the elevation of the surface within the wetland is lower than in the surrounding landscape. These wetlands often pond water at the surface but they can also be saturated without surface ponding.

Ephemeral wetland

Wetlands that temporarily hold water in the spring and early summer or after heavy rains. Periodically, these wetlands dry up, often in mid to late summer.

Estuarine wetland

Wetlands where salt tolerant plant species are dominant and the water regime is influenced by tidal action. The wetlands are usually partially enclosed by land with open, or partially obstructed access to open saline water. Salinity is greater than 0.5 ppt.

Hydrodynamics

The science involving the energy and forces acting on water or other liquids and the resulting impact on the motion of the liquid.

Hydroperiod

The seasonal occurrence of flooding and/or soil saturation; it encompasses the depth, frequency, duration, and seasonal pattern of inundation.

Invasive species

Nonnative organisms whose introduction causes or is likely to cause economic or environmental harm or harm to human, animal or plant health.

Landscape unit

An area of land that has a specified boundary used for planning purposes that defines an area of interrelated physical, chemical, and biological processes. A watershed or drainage basin is a common type of landscape unit. A ground water aquifer is another type of landscape unit.

Lake Fringe Wetlands

Lake Fringe wetlands are on the water side of the Ordinary High Water Mark (OHWM) of lakes where the area of open water next to a vegetated wetland is larger than 20 ac (8 ha), and more than 6.6 ft deep (2 m) over 30% of the open water areas.

Modification, Modified (wetland)

A wetland whose physical, hydrological, or water quality characteristics have been purposefully altered for a management purpose, such as by dredging, filling, forebay construction, and inlet or outlet control.

Peat Wetland

Unique, irreplaceable bogs and fens that can exhibit water pH in a wide range from highly acidic to alkaline, including fens typified by *Sphagnum* species, *Rhododendron groenlandicum* (Labrador tea), *Drosera rotundifolia* (sundew), and *Vaccinium oxycoccos* (bog cranberry); marl fens; estuarine peat deposits; and other moss peat systems with relatively diverse, undisturbed flora and fauna. Bog is the common name for peat systems having the *Sphagnum* association described, but this term applies strictly only to systems that receive water income from precipitation exclusively.

Perennial Wetland

Wetlands where at least a portion of their area has permanent surface water (i.e., flooded or inundated throughout the year), in a normal water year or wetter.

Polishing

Additional treatment of a waste stream that has already received one or more stages of treatment by other means.

Rare, threatened, endangered, or sensitive species

Plant or animal species that are relatively uncommon regionally, are nearing endangered status, or whose existence is in jeopardy and is usually restricted to highly specific habitats. Threatened, endangered or sensitive species are listed by federal or state authorities, whereas rare species are unofficial species of concern that fit the above definitions.

Regional

An action (here, for stormwater management purposes) that involves more than one discrete property.

Rehabilitation

The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural or historic hydrologic functions and processes of a degraded wetland. Rehabilitation results in a gain in wetland function but does not result in a gain in wetland area.

Riverine impounding wetland

Riverine impounded wetlands retain surface water significantly longer than the duration of the flood event. Riverine impounded wetlands tend to hold water for more than a week after a flood event. These wetlands are found in a topographic depression on the valley floor, or in areas where natural or human made barriers to downstream flow occur.

Riverine wetlands

Riverine wetlands occur in valleys associated with stream or river channels. They lie in the active floodplain of a river, and have important hydrologic links to the water dynamics of the river or stream. The distinguishing characteristic of riverine wetlands in Washington is that they are frequently flooded by overbank flow from the stream or river.

Seasonal wetland

A wetland that has water above the soil surface for a period of time (usually between two months to less than one year) during and/or after the wettest season but in typical years dries to or below the soil surface in warmer, drier weather.

Slope Wetlands

Slope wetlands occur on slopes where groundwater surfaces and begins running along the surface, or immediately below the surface. Water in these wetlands flows only in one direction (down the slope) and the gradient is steep enough that the water is not impounded. The downhill side of the wetland is always the point of lowest elevation in the wetland.

Stage excursion

A post-project departure, either higher or lower, from the water depth existing under a given set of conditions in the pre-development state.

Water Level Fluctuation (WLF)

This is a defining characteristic of a wetland. Water level fluctuation (WLF) during a monitoring interval is as follows:

Average base stage = (Instantaneous stage at beginning of interval + Instantaneous stage at end of interval)/2

Wetland functions

The ecological (physical, chemical, and biological) processes or attributes of a wetland. Functions are often defined in terms of the processes that provide value to society, but they can also be defined based on processes that are not value based. Wetland functions include food chain support, provision of ecosystem diversity and fish and wildlife habitat, flood flow alteration, ground water recharge and discharge, water quality improvement, and soil stabilization.

Wetland structure

The physical components of a wetland, both the abiotic (physical and chemical) and biotic (living).

Wetland values

Wetland processes or attributes that are valuable or beneficial to society (also see Wetland functions). Wetland values include support of commercial and sport fish and wildlife species, protection of life and property from flooding, recreation, education, and aesthetic enhancement of human communities.

Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention BMPs, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands. (Waterbodies not included in the definition of wetlands as well as those mentioned in the definition are still waters of the state.)