General

Wetlands are highly protected by law. Federal, state and local laws, and departmental policies require the Washington State Department of Transportation (WSDOT) to operate with “no net loss” of wetland function or acreage.

Special care must be taken in all steps of roadside management to ensure appropriate stewardship of wetlands and their associated buffers. Identification of wetland boundaries, categories and types, assessment of functions, and evaluation of impacts requires the expertise of a trained professional. Contact the region’s Environmental Office promptly for assistance. Water quality issues are addressed in the water quality chapter of this manual.

Any addition of fill material, or disturbance of existing soil in areas where water moves through or over the soil, has the potential to either disturb existing wetlands or create new wetlands. See the Hydraulics Manual and the Highway Runoff Manual for more information.

References

Construction Manual M 41-01, WSDOT
Design Manual M 22-02, WSDOT
Environmental Manual M 31-11, WSDOT
Highway Runoff Manual M 31-16, WSDOT
Hydraulics Manual M 23-03, WSDOT
Policy Catalog, “Transportation Wetland Conservation Policy,” WSDOT. (p.78)
Wetland Mitigation Sites Monitoring Report, WSDOT


Resources

Wetland training is available to anyone within the department who might encounter wetlands in the course of their work. Contact your training coordinator.

For wetlands identification and delineation, impact analysis, mitigation, conceptual design, and monitoring, call the region’s Environmental Office or the HQ Environmental Affairs Office.

For final site plan development, construction observation and inspection, and plant establishment, call the region’s (or HQ Design Office) Landscape Architect or Environmental Office.

Definitions

**compensatory mitigation**  The attempt to compensate for wetlands impacts. It usually involves the creation, preservation, restoration, or enhancement of a wetland to replace functions lost due to unavoidable impacts.

**constructed wetlands**  Areas “created or restored specifically to treat either point or nonpoint source pollution wastewater.”\(^1\) Although a constructed wetland might look the same as a created wetland, different regulations apply. Design and maintenance of constructed wetlands is determined according to their stormwater and hydraulic functions. Vegetation is used to maximize the desired functions.

**created wetlands**  Those wetlands that have been constructed on a nonwetland site specifically to compensate for wetland losses permitted under Section 404 of the Clean Water Act.\(^2\) Created wetlands can also be created to compensate for impacts under local permits or WSDOT directive. Wetlands can also be accidentally created as a result of construction activities.

**delineated wetland**  A wetland whose boundary has been identified by a qualified biologist using a standard delineation methodology evaluating soils, vegetation, and hydrology. A right of entry might be required to formally delineate a wetland for project purposes if it does not occur entirely on WSDOT right of way. The delineated boundary is flagged in the field and surveyed. The biology report will include the delineation survey with flag locations and numbering.

**ditches**  Narrow depressions designed to collect, convey, and discharge stormwater runoff from roadway surfaces, adjacent right of way, and groundwater discharge from adjacent slopes. Many ditches are diverted streams and creeks. Because of this hydraulic function, it

---

1 TRB, 1996
2 TRB, 1996
is not uncommon to see wetland (hydrophytic) vegetation growing in roadside ditches.

**exotic species** A species found in but not native to a particular area.

**groundwater** Water that occurs below the surface of the earth, which is contained in pore spaces. It is either passing through or standing in the soil and underlying strata and is free to move under the influence of gravity.³

**habitat** The environment occupied by individuals of a particular species, population, or community.⁴

**hydrology** The science that relates to the occurrence, properties, and movement of water on the earth. It includes water found in the oceans, lakes, wetlands, streams, and rivers, as well as in upland areas, above and below ground, and in the atmosphere.⁵

**impact** An action that adversely affects a wetland or other ecosystem; for example, road construction, timber clearing, or agricultural activities that result in wetland conversion or degradation.⁶

**indicator** One of the specific environmental attributes measured or quantified through field sampling, remote sensing, or compilation of existing data from maps or land use reports, used to assess ecosystem condition or functions or exposure to environmental stress agents.⁷

**invasive vegetation** Those (typically) nonnative plant species that will often outcompete native plant communities.

**jurisdictional wetlands** All naturally occurring wetlands, some wetlands unintentionally created as the result of construction activities, and those created specifically for the compensation of wetland losses. These wetlands are regulated by the Army Corps of Engineers and local jurisdictions. (Ditches created in non-wetland areas that support wetland vegetation are not considered jurisdictional wetlands.) Check with the Environmental Office for site specific clarification.

**monitoring** The collection of information after construction to assess if the replacement project is successful and to keep the regulatory agencies and construction agency informed about the status of the replacement project.⁸

---

³ TRB, 1996
⁴ TRB, 1996
⁵ TRB, 1996
⁶ TRB, 1996
⁷ TRB, 1996
⁸ TRB, 1996
natural wetlands  Those wetlands in existence due to natural forces alone, or unintentionally developed through construction or management practices which alter hydrology. Natural wetlands can be found in unusual areas, including filled areas, some ditches, inactive borrow pits, ponds, and agricultural fields. Natural wetlands are protected by federal, state, and local regulations as well as WSDOT’s internal policies. (See Division 2.)

nonjurisdictional wetlands  Nonjurisdictional wetlands include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, canals excavated in uplands, stormwater detention ponds, wastewater treatment facilities created in uplands, and certain agricultural activities and landscape amenities created in uplands. Grass-lined swales and wastewater treatment facilities can be constructed in wetlands but must be so designated and specifically designed for water treatment purposes. Mitigation will be required to compensate for the wetland lost to such a facility.

The Shoreline Management Act and Growth Management Act include as nonjurisdictional those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. WSDOT has a “no net loss” policy regarding wetlands and will mitigate impacts to wetlands created after that date.

pollutant  An element that enters a biological pathway or becomes concentrated to the extent that it might cause injury to living organisms or the functioning of environmental systems.

restoration  Ecological restoration is the process of assisting the recovery and management of ecological integrity. Ecological integrity includes a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices.\(^9\)

soil erosion  The part of the overall process of denudation that includes the physical breakdown, chemical dissolving, and transportation of material by agents such as water, wind, ice, and gravity.\(^10\)

wetland  Wetlands are defined under the Clean Water Act as “those areas that are inundated or saturated by surface or groundwater 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.” Areas do not

---

\(^9\) [http://nabalu.flas.ufl.edu/ser/definitions.html](http://nabalu.flas.ufl.edu/ser/definitions.html)

\(^10\) TRB, 1996
need to have surface water throughout the year to qualify as wetlands.\textsuperscript{11}

\textit{wetland banking} A form of compensatory mitigation where, typically, a large mitigation site is developed using creation and/or restoration. This is developed in advance of project wetland impacts. Credit is withdrawn from the bank to compensate for unavoidable wetland impacts. This is generally accomplished through a written agreement signed by regulatory agencies governing the use of the bank.

\textit{wetland buffer} The area adjacent to a wetland that serves to protect the wetland from outside influences. Wetland buffers also contribute to the integral functions of the wetland. Regulated buffer widths vary depending upon the quality of the wetland and guidelines established by the local jurisdiction under the state Growth Management Act. Required buffer widths will be identified in the project’s wetland/biology report. Wetland buffers must be shown on contract plans sheets. No work may occur within an identified wetland buffer area unless it has been approved by the appropriate permitting agency.

\textit{wetland functions} The physical, chemical, and biological processes that can be attributed to a wetland ecosystem. Wetland functions are generally grouped into three categories: (1) \textit{habitat} (providing the factors and conditions necessary to support wetland-dependent species); (2) \textit{water quality} (improving the quality of downstream surface and groundwaters through the uptake of contaminants, sediment retention, nutrient retention, supply, and so forth); (3) \textit{hydrology} (moderating surface and groundwater flows, including flood attenuation, maintenance of base flow, and so forth).\textsuperscript{12}

\section*{Planning}

\textit{Identification & Assessment}

Conduct a preliminary inventory in the vicinity of a project to identify the presence of wetlands as early as possible in the planning stage. This includes areas possibly impacted by the project. Identify jurisdictional and nonjurisdictional wetlands.

General information collected includes the wetland \textit{class} according to dominant vegetation type (such as forested, scrub-shrub, or

\begin{footnotesize}
\begin{enumerate}
\item Clean Water Act, 1972
\end{enumerate}
\end{footnotesize}
emergent) and water source. This is outlined in a national wetland classification system.13

To indicate their quality or rarity, wetlands are rated into categories (sometimes called classes): I, II, III, IV, with Category I being the highest quality. The higher the category the more important impact avoidance becomes and more extensive mitigation will be required. For more information see the Environmental Manual. A biologist identifies and rates wetlands. Ratings assist in determining appropriate buffers for the wetland and define replacement ratios for compensatory mitigation.

The rating includes:

- Size.
- Determination of rough boundaries.
- Class of wetland (forested, scrub-shrub or emergent).
- Diversity of plant communities.
- Habitat features.
- Connection to streams or other wetlands.
- Presence of threatened and endangered species.
- Quality of existing buffers or surroundings.

WSDOT policy is to delineate as a jurisdictional wetland (those wetlands regulated by the Corps of Engineers) all ditches that were constructed in a wetland, or in an area that once was a wetland.

In a farmed wetland, or agricultural field, under Natural Resource Conservation Service (NRCS) jurisdiction, the presence of wetland vegetation is not required.

Should any unintentionally created nonjurisdictional ditches occur within a project’s limits, identify them by type, location, and predominant features rather than by delineating and surveying them. Present this information in the Wetland/Biology Report.

**Wetland Indicators**

Wetlands must be considered in all phases of roadside management. An indication of any one of the three wetland parameters (wetland hydrology, wetland soils, or wetland vegetation) is considered a “Red Flag”. Consider the presence of these as possible wetland indicators, and do not discount the potential for wetland presence until investigated by a trained wetland biologist. Contact your region’s

13 Cowardin et al. 1979
Environmental Office or the HQ Environmental Affairs Office for further investigation.

The following is a partial list of indicators of potential wetland areas. Sites having any of these indicators must be examined further by a biologist prior to beginning work:

**Wetland Hydrology**

- Areas that have standing water at any time of the year
- Topographical low areas
- Areas near streams, lakes, or other shorelines
- Areas with water seeping out of a hillside
- Ditches that hold water long after rain events
- Ditches that flow to other water bodies such as streams, lakes, ponds, and the like.

**Wetland Soils**

- Areas where vehicles get stuck or leave ruts.
- Areas with dark, sticky soils.
- “Unsuitable soils” for construction or foundation.
- Highly organic soils.
- Clay soils that are pale gray or mottled.
- Sites within flood plains.
- Soils that give off a rotten egg smell when disturbed.

**Wetland Vegetation**

- Obvious wetland plants such as skunk cabbage, cattails, or spike rush.
- Trees such as alders, willows or western red cedars dominating low-lying areas.
- Shrub thickets in low-lying areas.

**Design**

*Project Definition*

Roadside wetland management involves created, constructed, and natural wetlands. Cost-effective wetland management includes:
• Thorough site analysis as early as possible in the project definition process, including an inventory of all wetlands.

• Early involvement of all partners in roadside management, including representation from environmental affairs, planning, design, construction, maintenance, and, if necessary, regulating agencies.

**Impacts**

Impact analyses are found initially in the Biology/Wetland Report, and later in more detail in the mitigation plan developed by the biologist. It addresses such factors as:

- Type of impact; permanent or temporary.
- Size of impact.
- Size of impact in relation to size of entire wetland.
- Assessment of impacts to functions provided by the wetland.
- Cumulative impacts from the entire project.

Functions provided by the wetland include flood attenuation, fish & wildlife habitat, water quality enhancement, groundwater recharge, erosion control and shoreline stabilization.

Uniqueness or geographic location might contribute to the wetland’s importance.

**Wetland Mitigation**

The department’s wetland policy requires that every project or activity must avoid wetland impacts to the greatest extent possible and then minimize any unavoidable impacts. Wetland impacts might be unavoidable when safety or practical construction and operation would be compromised. Evaluate impacts on a case-by-case basis to integrate project design with overall environmental, safety, and maintenance considerations.

Whenever a wetland will be impacted by project construction or any other roadside management activity, compensatory mitigation is required. Federal, state, regional, local laws, and/or departmental policies can mandate mitigation. Mitigation proceeds as follows:

1) Avoid the impact altogether
2) Minimize the impact
3) Reduce the impact over time
4) Rectify after impact
5) Compensate for the impact with mitigation

*Compensatory mitigation* usually involves the creation, restoration, or preservation and enhancement of a wetland to replace functions lost due to the unavoidable impact. The primary goal is to compensate for direct wetland losses and temporal impacts. Additional goals for mitigation are:

- No overall net loss of wetlands, as defined by acreage and function.
- Restoration and/or creation of wetlands where feasible.
- Increased quality and quantity of the wetlands base.

**Measures to Minimize Impacts**

Use all practicable measures to reduce and minimize wetland impacts. These include:

- Asymmetrical widening to avoid critical slopes, active slide areas, and wetlands.
- Alignment or profile shifts.
- Design deviations.
- Installing guardrails to avoid slope flattening that will encroach upon sensitive areas.
- Building retaining walls to minimize the fill footprint.
- Minimizing clearing limits to avoid impacting buffers.

**Design of Wetland Mitigation Sites**

The design phase of a wetland mitigation project includes:

- Inventory of any wetlands not identified in the planning stages
- Delineation
- Avoidance and minimization of impacts
- Selection of a mitigation site
- Impact assessment
- Development of mitigation ratios (replacement ratios)
- Permit negotiations with resource agencies
- Conceptual compensatory mitigation design
- Development of the final wetland mitigation plan
- Contract preparation
Site selection is probably the most important factor in the success of a mitigation site.

When considering location of wetland mitigation, consider long-term viability of the wetland. While mitigation can be done adjacent to the roadway this is often not the best location for long term operation and maintenance of the road, or for the ecological value of the wetland. Strongly consider mitigation sites that are not adjacent to the roadway. Partnering with other organizations and mitigation banking can help make this a practical alternative.

**Primary Considerations:**

- Include a biologist, a hydraulic engineer, and a landscape architect in the mitigation design team.
- Coordinate with the Area Maintenance Office.
- Knowledge gained from past projects might be relevant to the project. An annual monitoring report is available for reference. Consult with the HQ Environmental Office Monitoring Program to discuss results of monitoring past wetland mitigation sites.

The type of wetland being replaced, targeted functions, and site conditions drives design criteria.

The following steps will improve coordination between design and maintenance of created wetlands:

- Minimize the overlap between wetland buffers and the Design Clear Zone when wetlands are constructed adjacent to the roadway.
- Field-verify the wetland location with the area maintenance supervisor.
- Fence boundary with wildlife fence.
- Identify compensatory mitigation wetlands in all plans, including Right of Way Plans and Roadside Management Plans.

**Wetland Mitigation Banking Program**

WSDOT is using mitigation banking as a way to mitigate for future wetland impacts that are unavoidable. Wetland banking can allow for construction on a large site that can be used for multiple projects within the watershed. Because the impact is mitigated in advance of the project, there is no temporal loss of wetland functions. The wetland bank is constructed with advanced funding, which the project repays at the time of construction. Contact the Wetland Mitigation Banking unit in HQ Environmental Office for more information.
Construction of Mitigation Wetlands

Activities during construction include verifying appropriate hydrology, contour grading and other earthwork, erosion control, plant material inspection, possible soil amendment, and planting.

Primary Considerations:

- Erosion prevention is especially critical in wetlands, and adjacent to existing wetlands, streams and shorelines. Monitor erosion prevention measures to ensure continuous functioning during construction and until plants are established. See Division 7 for more information on erosion control methods. The stormwater site plan and/or the Temporary Erosion and Sediment Control Plan (TESC Plan) address necessary measures for erosion control.
- Minimize soil compaction by minimizing the amount of time equipment is on site and by working during a period in which the water table is at its lowest level, or by scarifying the area after coarse grading is complete.
- Grading activities: prior to final grading, designers check site conditions. Refer all questions or changes to the landscape architect or biologist on the team.
- Protect adjacent desirable vegetation using construction fencing.
- Consult with the landscape architect on weed control, soil amendments, plant material inspection, and planting techniques.
- Flag existing wetlands that are not to be disturbed by using construction fencing to keep construction equipment out of them.
- Refer to the Construction Manual for more information on construction practices.
- For mitigation wetlands that require formal monitoring, specify monitoring wells to be installed as part of the construction contract. Consult with Hydraulics to determine the best locations for these monitoring wells. Survey in the well locations and note on plans. Consult with environmental staff for the type of well needed.
- Consider installing wetland boundary signs. They are available from the region’s Environmental office or the HQ Environmental Affairs Office.

Monitoring

Monitoring compensatory wetland mitigation sites provides a systematic means of tracking the development of the site over time,
shows compliance with the terms of the permits, and provides feedback for future wetland mitigation planning and design. Although not all sites require formal monitoring, all sites are monitored on at least an informal basis.

Depending on permit requirements, some sites may be monitored for five years or more to ensure they have met the standards of success established in the permit. This inspection may include evaluation of:

- Delineation (to verify that wetland criteria has been met and that acreage meets or exceeds permit requirements)
- Hydrology
- Soils
- Vegetation survival
- Plant species diversity
- Percentage of vegetative cover
- Water quality
- Wildlife use
- Bird species diversity
- Identification of disturbances and problems

The extent of items monitored depends on the permit requirements. Observations are recorded along with recommendations for remediation requirements to fulfill the terms of the permit.

**Primary Considerations:**

- The HQ Monitoring Program assumes the lead in wetland monitoring for permit compliance and to gather information for use in future wetland mitigation planning and design.

For sites that do not require permits, the region’s Biologist may do monitoring.

- Periodic monitoring reports are required to be submitted to the regulating agencies. Current practice is to submit an annual report, but ultimately the permit determines the frequency.

- The Monitoring Program advises regions and other offices as to whether Standards of Success have been met. The Standards of Success are determined based on the original permit for any particular wetland and are determined in conjunction with the permitting agency.

- If Standards of Success are not met, the region’s environmental staff, biologists, and landscape architects will coordinate remedial
action with permitting agencies. This might require coordination with other disciplines.

Maintenance

**Wetland Mitigation Sites**

Compensatory mitigation sites are usually retained by WSDOT and maintained according to a management plan, or as needed, based on the monitoring report.

Except for the plant establishment period and trash pickup, no maintenance activities take place in created wetlands unless otherwise stated in the management plan, the contingency plan for the wetland, or the wetland monitoring report. In most cases, this restriction on maintenance activities also applies to the designed upland buffer around the wetland.

Long-term maintenance required in the management plan may include:

- Repairing damage to the site from vandalism, storms, or fire.
- Control of exotic and invasive weed species.
- Eradication of state-listed noxious weeds.
- Plant replacement, if necessary, to meet permitting requirements.
- Selective removal of some types of trees to facilitate the natural succession of desirable plant communities. This decision is made in conjunction with the Biologist and Landscape Architect.
- Other activities required to maintain a functioning wetland as determined by the region’s Environmental Office or the HQ Environmental Affairs Office.

**Primary Considerations**

- Establish a feedback loop for typical maintenance problems that might arise specific to the selected site. Include the region’s Environmental Office, HQ Monitoring, the design Biologist, and the Landscape Architect in that loop.
- Wetland vegetation is not to be sprayed, mowed, or cleared except when necessary to maintain designated roadside ditches or detention ponds. Designate herbicide restrictions near wetlands.
- In wetland mitigation sites, some vegetation management may be performed in accordance with management or contingency plans for the site.
Application of herbicides in wetland mitigation sites requires an aquatic certification on the applicator’s license. One must pass both the aquatic and pesticide tests to use pesticides in wetlands. The appropriate applicator’s permit is obtained from the Department of Agriculture. See the HQ Roadside Maintenance Office for more details and assistance in obtaining the permit.

- Develop a long-term maintenance plan with the cooperation of the Maintenance division, EAO Biology, HQ Monitoring, and the Landscape Architects.

**Ditches**

Operational activities may be allowed for maintenance of roadside ditches, upon notification of the region’s environmental office and obtaining permits, if necessary. Permit requirements depend upon several factors, including how wide the ditch is, the type of soil the ditch is in, connections with other wetlands or streams, and fish use of ditches during all or part of the year.

Identify all roadside ditches in plans, including Right of Way Plans and Roadside Management Plans.

Contact the region’s Environmental Office if there is any present or historical evidence of wetlands related to roadside ditches.

**Additional Sources of Information**

