

Ecology

Water Impact Assessment

Objective
Avoid, Minimize, Mitigate
Impact Calculation
Compensatory Mitigation

OBJECTIVE

By following GDOT's processes for assessing impacts to waters, the Ecologist will accomplish the following:

- > Calculate transportation project impacts to federal aquatic resources; and
- > Calculate compensatory mitigation for such impacts under [Section 404 of the Clean Water Act \(CWA; 33 USC § 1344\)](#).

AVOID, MINIMIZE, MITIGATE

The CWA prohibits the discharge of dredged or fill material into wetlands, streams, and other federal aquatic resources unless a permit is issued by the US Army Corps of Engineers (USACE). For a proposed discharge, all appropriate and practicable steps must first be taken to avoid and minimize impacts to aquatic resources. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland, stream, and/or other aquatic resource functions. The USACE and US Environmental Protection Agency [Final Compensatory Mitigation Rule \(33 CFR § 332\)](#) clarifies how to provide compensatory mitigation for unavoidable impacts to federal aquatic resources.

IMPACT CALCULATION

Activities within federal aquatic resources associated with GDOT projects are regulated by the USACE and subject to Section 404 permit requirements. The Ecologist should calculate federal aquatic resources impacts with MicroStation or ArcGIS using DGN files provided by Design. If this software is not available, then impacts may be calculated from PDF plan sheets using Bluebeam or Adobe Acrobat. Wetland impacts are reported in acres and rounded to the nearest hundredth of an acre in the Ecology Resource Survey and Assessment of Effects Report (ERS AOE), including plan sheets. Stream impacts should be reported in linear feet and rounded to the nearest foot and in acres rounded to the nearest

hundredth of an acre in the ERS AOE, including plan sheets. For stream impacts smaller than 0.01-acre, report impacts rounded to the nearest thousandth of an acre within the ERS AOE, including plan sheets. An Ecologist with experience preparing Section 404 permit applications must review the calculations for consistency. The Ecologist should be aware that impacts submitted to the USACE for mitigation purposes are rounded differently. This is addressed in more detail in the *Section 404 Regional General Permits* guidebook. This guidebook and all other guidebooks and toolkits referenced throughout this document can be found at the link below.

Ecology Environmental Procedures Guidebooks,
GDOT Office of Environmental Services

Stream impact linear footage is measured along the centerline of the stream for the full extent of the impact along either bank. In the event of overlapping impact types on the same stream segment, the impact is only reported once for that segment using the most adverse impact. If any parallel footings would also be constructed for the bridge, then these footings should not be calculated as additional linear impact if they occupy the same stream segment as measured along the centerline. In other words, each linear foot of stream in the construction footprint is permitted and mitigated (if necessary) once and impact types shall not overlap one another. Examples showing colinear impacts are included in the *Section 20* toolkit, linked at the button above, on Sheets EX-004 and EX-005 (PDF pages 18 and 19). Impact type varies by aquatic resource (i.e., streams or wetlands) and is defined by the [*USACE Savannah District Standard Operating Procedure \(SOP\) for Compensatory Mitigation*](#).

Wetlands

The area of wetlands located within the cut/fill limits of a roadway project are calculated as permanent Discharge of Fill. Wetlands located beyond cut/fill limits, but within existing/required right-of-way (ROW)/easement are calculated as Clearing and Grubbing impact. Grubbing is considered a primary impact type by the USACE due to the nature of the ground altering activity, and GDOT is assuming grubbing would generally occur in ROW/easements; therefore, impacted wetlands within ROW/easements shall be considered permanent loss, unless the project includes a restoration plan (See *Section 404 Individual Permits* guidebook). Wetlands located within ROW/easement that are separated from roadway construction by orange barrier fence (OBF) would not incur impacts and are considered avoided by the project.

Streams

Streams located within cut/fill limits of a roadway project are considered permanently impacted by the project. The impact type depends on the specific activity proposed within the stream channel. Outfall/inlet reconstruction, piping (new placement or extension), and stream relocation are considered permanent Discharge of Fill. Placement of riprap within a stream channel above existing channel grade is considered permanent Discharge of Fill.

This is the presumed placement method for riprap along a stream bank for bank stabilization as well as to correct scour and bring the stream back to original grade; however, it may occasionally be mandated that riprap be embedded at existing grade, in which case, a lesser impact of permanent Primary Morphological Alteration may be used for mitigation. Streams located within ROW/easement that are beyond construction limits, including outfall protection, are considered avoided by the project. OBF must be installed to restrict construction access to streams, where feasible. However, OBF should not be shown crossing streams, but rather be tied to each bank. Refer to the examples in the *Impact Example Plan Sheets* toolkit, regarding OBF placement. Jetties and bulkheads placed within a stream for bridge construction shall typically be calculated as permanent Discharge of Fill. The Impact Duration discussion below provides further details.

Bridge Piles

Construction of bridge support piles using drilled caissons/shafts or poured concrete footings (pile cap or spread footings) are considered permanent Discharge of Fill. Driven pile bents with concrete encasements are also considered permanent Discharge of Fill. Casings for drilled caissons/shafts may be used by the contractor when caisson construction in the water requires collection of debris or spoils and may be temporary or permanent. They may also be required when adjacent soils are susceptible to collapse. However, this information may not be available during preparation of the ERS AOE. Therefore, for impact calculation and reporting, typical casing diameter = diameter of the permanent caisson/shaft plus 2 feet and is considered permanent Discharge of Fill.

Cofferdams

Construction of pile cap and spread footings often requires use of a cofferdam. Cofferdams are not typically required for drilled caissons/shafts or pile driven bents. A cofferdam is a temporary structure that encloses an area where permanent construction is to be located. Cofferdams are typically constructed from steel sheet pile sections and dewatered to provide a dry work area surrounding proposed bent location(s) to construct spread footings or pile cap footings. Situations may occur where the sheets are adequately driven, properly placed, and the contractor provides adequate pumping capacity and is still unable to dewater the cofferdam due to underlying substrates. This situation may require use of a concrete seal to allow for foundation footing construction in dry conditions. The concrete seal is typically not removed post-construction.

The need for a cofferdam would typically be identified by GDOT Construction personnel and shown on Section 20 – Construction Staging Plans. However, this information may not be available during preparation of the ERS AOE. Therefore, the entire cofferdam footprint is considered permanent Discharge of Fill for permitting and mitigation purposes. The Ecologist must coordinate with Bridge Design for cofferdam dimensions to be used for impact calculations. When calculating cofferdam impacts, use the dimensions of the cofferdam indicated in the Section 20 plans. If Section 20 plans are not available or cofferdam dimensions are not specified, add 2 feet to each side of the permanent structure when estimating impacts.

Exceptions may occur on projects and require additional consultation with Bridge Design to define alternative construction methodologies. Atypical situations may require construction methodology to be dictated in plans or contracts, such as known environmental constraints or existing bed condition. These may include, but are not limited to, presence of protected species, cultural resources, or [Section 4f of the Department of Transportation Act](#) resources (or a combination thereof), or a truncated construction timeline. Additional restrictions, such as requiring inert materials and/or lining cofferdam area with a geomembrane for ease of debris removal may be necessary to provide additional resource protection.

Use of an alternative cofferdam type may help avoid the need for Formal Section 7 [Endangered Species Act](#) consultation and/or reduce permitting and mitigation costs. However, agency coordination should be completed prior to submittal of the permit application to the USACE. Depending on substrate conditions and chosen methodology, an alternative cofferdam may be considered temporary fill or no impact. Alternative cofferdams must be discussed with Design and District Construction during the Avoidance and Minimization Measures Meeting and/or during subsequent avoidance and minimization measure meetings, as needed.

Alternative cofferdam options may include:

- > Oversized cofferdams to accommodate both bent construction and debris removal;
- > Alternatives to sheet pile cofferdams to minimize impacts. These cofferdams are placed on top of substrate to provide a water-tight work area and create less disturbance than sheet piles. Examples may include:
 - Porta-dam – system consisting of wedge-shaped steel profile stands that holds a geomembrane;
 - Inflatable cofferdams – water filled geomembrane tubes; and
 - Cubic-yard bag cofferdam – stacked geotextile bags filled with bulk material (gravel, sand, stone) with an impervious membrane in-between stacks of bags.
- > Earthen dams and sandbags are not considered cofferdams. These can either be an earthen dike around the construction area or a dam constructed from earth filled geotextile bags. This dike type is typically used where footings are located at or near the bank of a shallow stream and constructed in a half-moon shape around the excavation. Earthen dams constructed from earth filled bags are suitable for placement in shallow water directly on bedrock or where there is no overburden (i.e., all soils and associated materials above bedrock or other specific geologic feature).

Debris Containment Structures

Debris containment structures (also simply called “containment structures”) are often built around existing bents slated for removal and are generally not dewatered. These structures are considered temporary fill and require mitigation only when there is not a more dominant

colinear impact. Debris containment structures do not count towards permanent loss permit thresholds. The debris from the dismantled bridge is contained within the structure and collects on the streambed. The contractor is responsible for removing debris. There would be no 404 impact if the structure is used for sediment containment only. Coordinate with your Design team to determine the anticipated use of containment structures on the project.

Other Temporary Structures and Impacts

Although cofferdams and debris containment structures are among the most commonly used temporary structures, other temporary structures may be used on GDOT projects depending on the site conditions. Such structures include haul roads, work bridges/platforms, jetties, bulkheads, and barges. Please refer to the *Section 20* toolkit for additional information regarding these less common structures, their use and construction, and permitting and mitigation requirements. The *Section 20* toolkit also contains additional information about debris containment structures and cofferdams.

Culverts

For replacement of existing culverts, the reach of stream within the existing culvert (i.e., length of pipe) shall not be calculated as an impact. The extent of impact for culvert replacement is the stream segment located beyond the existing pipe, but within the footprint of the new pipe and limits of outfall protection, if applicable. Any associated fills and relocation impacts would also need to be considered. The same calculation methods would apply to extensions of existing culverts. For new culverts, the entire stream length from inlet to outfall protection is considered an impact.

In addition to the fill impacts associated with culverts and associated fills, stream diversion impacts may need to be considered when culverts are newly constructed, replaced, or extended along perennial or intermittent streams. Stream diversion impacts and permitting are discussed in detail in the *Stream Diversion* toolkit, found on the guidebooks page linked above.

Non-Regulated Activities

Certain activities within federal aquatic resources are typically not considered an impact and/or may not require mitigation. One example is the use of driven piles (without encasement) to support a bridge or other structure, which is not considered a permitted impact (i.e., activity regulated under the Section 404 permit program).

An example of impacts to federal aquatic resources that do not require mitigation are impacts to open waters, ditches, and canals; the only function of which is to move water from one point to another. Mitigation would generally not be required for impacts to these aquatic resources when that function is not adversely impacted. However, permanent impacts to open waters, ditches, and canals determined to be federal aquatic resources shall count towards applicable Section 404 permit loss thresholds and must be described in

permit application packages. The Ecologist should coordinate with the USACE when the function of these types of federal aquatic resources may be adversely impacted.

Permanent losses of open waters, ditches, and canals determined to be federal aquatic resources are limited to the minimum necessary to accomplish the primary activity for Regional Permits (RPs) 34 and 35, and loss thresholds do not apply to these RPs. However, permanent losses of all federal aquatic resources count towards loss thresholds for Nationwide Permits (See *Section 404 Nationwide Permits* guidebook for more information).

Non-regulated activities would need to be described in the ERS AOE or Addendum and outlined in the permit application avoidance and minimization section. If atypical situations beyond these examples arise, the Ecologist should consult with the USACE.

Impact Duration

The current *USACE Savannah District SOP for Compensatory Mitigation* includes three categories for impact duration:

1. Permanent/Reoccurring – Greater than or equal to one year (i.e., 365 days);
2. Short-Term – Less than 1 Year (i.e., less than 365 days, but greater than 90 days);
and
3. Temporary – Less than or equal to 90 days.

Most impacts to federal aquatic resources on GDOT projects are considered Permanent/Reoccurring, such as the Discharge of Fill or Clearing and Grubbing of wetlands within ROW/easement. Clearing of herbaceous wetlands may be considered Short-Term if there is no ground disturbance (i.e., grubbing) or if wetlands will be restored post-construction; however, these are rare scenarios. Refer to the *Section 404 Individual Permits* guidebook for additional information regarding Temporary Impacts and Restoration Plans.

Use of bulkheads, jetties, cofferdams, work bridges, debris containment, or other structures/fill for bridge construction access that are included on Section 20 Plans may be considered Temporary, Short-Term, or Permanent/Reoccurring depending on the length of time required for the structures to be present in-stream. The Ecologist should consult the Project Manager to schedule discussions with the Office of Construction regarding the duration of these structures. Please also refer to the *Section 20* toolkit for additional guidance and considerations regarding these structures. If structures for bridge construction access are Temporary or Short-Term in duration, removal within the prescribed time period becomes an Environmental Commitment and must be stipulated in a contractually binding way such as in plan notes, Special Provision (SP), or other contractual means. As noted in the *Section 20* toolkit, at a minimum, duration commitments must be stipulated via plan notes, and species-related commitments must be stipulated in a SP.

Additionally, stream diversion activities will typically be considered Temporary or Short-Term impacts. The Ecologist should consult the Design team regarding the duration of

these activities. The duration of stream diversion activities will be captured in a plan note in the General Notes (Series 4) plan sheets. Additional guidance is included in the *Stream Diversion* toolkit.

For a stream or wetland impact to be considered Temporary or Short-Term, the temporary material must not have replaced any portion of the federal aquatic resources or changed the bottom elevation of any federal aquatic resources upon completion of impact activities. If Design is unsure of whether a Temporary impact can be completed in less than 90 days, report duration as Short-Term. If Design is unsure of whether a Short-Term impact can be completed in less than 1 year, report as a Permanent/Reoccurring duration.

Some impacts that exceed 90 days (i.e., temporary duration) may not be considered permanent loss for permit thresholds provided the impacted federal aquatic resource is restored to preconstruction conditions and contours. Examples of impacts for GDOT projects that may be needed for greater than 90 days or more than 1 year include, but are not limited to, haul roads or rock jetties.

COMPENSATORY MITIGATION

Savannah District Nationwide Regional Conditions require compensatory mitigation for projects resulting in adverse impact to 0.1 acre or more of wetlands and/or 0.01 acre of non-tidal stream. For a total linear project, if the sum of impacts from all individual single and complete projects (i.e., crossings) meets or exceeds 0.1 acre of wetland and/or 0.01 acre of stream, mitigation is required for all impacts that would result from construction of the total linear project. [Savannah District Regional General Permit Special Conditions](#) require compensatory mitigation for projects resulting in adverse impact to 0.1 acre or more of wetlands and/or 100 linear feet of non-tidal stream. For a total linear project, if the sum of impacts from all individual single and complete projects (i.e., crossings) meets or exceeds 0.1 acre of wetland and/or 100 linear feet of stream, mitigation is required for all impacts that would result from construction of the total linear project. For a linear transportation project (e.g., interstate highway, state highway, county road, urban or suburban road) the total linear project includes all individual single and complete crossings of federal aquatic resources that are located between the beginning and end of the proposed project.

The Ecologist must consult the *Savannah District SOP for Compensatory Mitigation* to calculate compensatory mitigation requirements for impacts to federal aquatic resources. The 2018 SOP is based on the function of the resource in the landscape (high, moderate, or low functional capacity). This is assessed using the [Qualitative Assessment Worksheets](#). *The Qualitative Worksheet for Adverse Impacts* determines the required mitigation for each impact based on the resource quality and impact type, duration, and amount. Refer to the *Section 404 Regional General Permits* guidebook for entering impacts in SOP worksheets.

Qualitative Assessment

The Stream, Freshwater Wetland, and Saltwater Tidal Wetland Qualitative Assessments are based on aquatic resource conditions. The Ecologist completes these assessments in the

field for all delineated resources (See *Water Resource Delineation* guidebook). Contributing drainage basin conditions for *Stream and Freshwater Wetland Qualitative Assessments* are determined using US Geological Survey Streamflow Statistics and Spatial Analysis Tools for Water-Resources Applications website ([StreamStats](#)). Consult with the GDOT Ecologist or Ecology Team Leader prior to using an alternative method for evaluating contributing drainage basin conditions. For the *Saltwater Tidal Wetland Qualitative Assessment*, current aerial photography may be used to assist with evaluating the ratio of shoreline to wetlands, adjacent land use perimeter, and Wetland Assessment Area patch size. The Qualitative Assessments are intended to generate a Stream or Wetland Qualitative Functional Capacity Score that's entered in the *Qualitative Worksheet for Adverse Impacts* to calculate required mitigation credits.

Prior to completing qualitative assessments, the Ecologist must confirm on the [USACE Regulatory In lieu fee and Bank Information Tracking System \(RIBITS\) website](#) that current SOP worksheets are being used. The [USACE Savannah District Regulatory Division website](#) provides instruction to navigate to the 2018 SOP on RIBITS.

Qualitative Worksheet for Adverse Impacts

The *Qualitative Worksheets for Adverse Impacts* are used to calculate compensatory mitigation credits required for each proposed impact to federal aquatic resources. The Wetland or Stream Qualitative Functional Capacity Score for a resource must come from the Qualitative Assessment for that resource. The Impact Category is based on the type of stream or wetland impact. Duration is based on the length of time an impact persists.

The Qualitative Worksheets include two types of credits: 2018 credits and Legacy credits. The 2018 credits refer to stream or wetland credits required to be purchased from a mitigation bank that was established using the 2018 SOP for calculation of credits generated or has been converted to allow for these credits. The 2018 SOP includes five wetland credit classifications and three stream credit classifications for in-kind replacement of aquatic resources.

Legacy credits refer to stream or wetland credits required to be purchased from a mitigation bank that was established prior to the 2018 SOP and used a previous SOP for calculating mitigation credits generated. The conversion factor has been set to eight credits per acre for wetland adverse impacts, and 12 credits per linear foot for stream adverse impacts. The only exception to this Legacy credit status is for Saltwater and Freshwater Tidal Wetland credits in coastal areas. Legacy wetland credits servicing any portion of Georgia's 11 coastal counties (Brantley, Bryan, Camden, Charlton, Chatham, Effingham, Glynn, Liberty, Long, McIntosh, and Wayne) are considered out-of-kind for impacts to Saltwater and Freshwater Tidal Wetlands. In these circumstances, applicants may be required to provide compensation at a higher ratio (1.25:1 ratio) than in-kind credit purchases (Refer to 33 CFR 332.3(e) and (f) for more information).

Guidebook Revision History

| Revision Description | Relevant Sections | Revision Date |
|--|-------------------------|---------------|
| Initial Publication | All | 5/22/2019 |
| Updated Acronyms, Hyperlinks | All | 12/10/2020 |
| Updated Hyperlink Button | Impact Calculation | 4/22/2021 |
| Minor editorial revisions & hyperlinks | All | 10/26/2023 |
| Stream diversion discussion added | Impact Type | |
| Mitigation credit terminology updated | Compensatory Mitigation | |
| Minor editorial revisions & hyperlinks | All | 6/18/2025 |
| Update References to temporary access and Section 20 guidance | Impact Calculations | |