Guidance for Tidal Wetland Mitigation Plans

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This document is meant to serve as a guide for applicants who are required to submit a mitigation plan for a tidal wetlands mitigation project. As outlined in the Code of Maryland Regulation (COMAR) 26.24.05 Tidal Wetlands Mitigation section, a mitigation plan must be submitted to the Maryland Department of the Environment (MDE), Tidal Wetlands Division for approval before the issuance of a Tidal Wetlands license/permit that authorizes the alteration of tidal wetland resources.

The level of detail required by the mitigation plan will vary with both the scale and scope of the impacts and project. Details related to more specific tidal mitigation projects are included in this document.

Disclaimer: This guidance document is meant to fulfill the mitigation plan requirements for MDE project approval. This guide may not necessarily fulfill the requirements of a mitigation plan for tidal impacts as required by the U.S. Army Corps of Engineers (USACE or ACOE). Information needed within mitigation plans for the ACOE should be coordinated with the ACOE reviewer.

1. Introduction/Mitigation Objectives

A brief description of the impact project that includes:

- Location (address and latitude/longitude coordinates)
- Resource type impacted (e.g. shallow water habitat, submerged aquatic vegetation (SAV), natural oyster bar (NOB), etc)
- Amount impacted (square feet/acreage)
    - Include area of each type of resource impacted if more than one

A description of the proposed mitigation site that includes:

- A vicinity map of the mitigation location relative to the impact site
    - Address and latitude/longitude coordinates
    - Whether it is on-site or off-site
    - Whether it is located within the same 8-digit or 6-digit State watershed
- Area proposed to be provided (square feet/acreage)
    - For example: “Minimum of 10 acres”, not “will be 10 acres”
- Mitigation type (restoration, creation, enhancement, or other)
- Required mitigation ratio and calculation of the required mitigation area (square feet/acreage)
- How the anticipated functions of the mitigation project will address watershed needs

Broad statement of the intended outcome of the mitigation project

- Discuss what is needed to achieve these goals
- This should consider the replacement or improvement of the acreage and functions of the resources proposed to be impacted by the permit/license.

2. Site Selection

A description of the factors considered during the site selection process

- The factors should include consideration of watershed needs, on-site alternatives where applicable, and practicability of accomplishing an ecologically self-sustainable tidal wetland mitigation project site

A summary of the site search process

- Before an applicant proposes a mitigation site outside the 8-digit State watershed of impact or an out-of-kind mitigation, they must provide a site search approved by the Tidal Wetlands Division. This site search must include:
- Summary of each site
    - Name
    - Location
    - Description:
        - Area in square feet
        - Site characteristics relevant to mitigation

            - E.g. open/unforested, no SAV, hydric soils, high water table, adjacent to existing wetlands, etc.
        - List of possible mitigation activities
    - Justification
        - Provide information about why the site was or was not chosen
- Description of additional correspondence with other entities/agencies who may have potential information about mitigation opportunities
    - E.g. NRCS, county government, environmental consulting firms, etc.

a. Site location preference

As per regulations, the order of preference for a mitigation site location is as follows in order of most to least preferred. Before an applicant can move to the next option on the list, they must document that they were unable to find mitigation in the more preferred location:

- On-site mitigation - adjacent to impacted area or on the same property
- Off-site mitigation:
    - Within the same 8-digit State watershed as the impacted wetland
    - Within the same 6-digit State watershed or 8-digit Federal Hydrologic Unit Code (HUC)
    - Within the adjacent 8-digit HUCs, of the same drainage basin and physiographic region
        - Should only be considered when there is ecological justification that it will replace the lost acreage and function of the impacts

b. Feasible site

A “feasible” site:

- Should appear to be technically feasible for a wetland mitigation project
    - Determined by remote data/online resources
        - E.g. GIS (Watershed Resources Registry, Coastal Atlas, MDNR MERLIN etc.)
    - Should be technically feasible based on the remote data
        - E.g. a marsh creation site should have shallow water depths, appropriate sunlight for vegetation, adequate separation from navigation channels, firm bottom material, etc.
    - Other factors (adjacent vegetation communities, shoreline conditions for vegetation growth, etc.)
        - E.g. a project proposing Phragmites eradication where there will be remaining areas of adjacent Phragmites is unlikely to be approved, due to low success rates.
        - E.g. an unprotected shoreline experiencing high wave energy is unlikely to have successful vegetation growth
- Have sufficient access for construction equipment
    - Steep slopes or surrounding forest may limit equipment access
    - Access paths should be designed to minimize tree removal

- Areas disturbed for access should be restored at the end of construction (e.g. marsh mats should be removed and elevations restored, wetland vegetation should be planted where damaged, etc.)
- Adequate water depths for work completed offshore by barge

c. Watershed approach for compensatory mitigation

The 2008 Federal Mitigation Rule describes the watershed approach as being a process where mitigation decisions are made that support the sustainability or improvement of watershed aquatic resources. The Mitigation Rule goes on to say "it involves consideration of watershed needs, and how locations and types of compensatory mitigation projects address those needs. A landscape perspective is used to identify the types and locations of compensatory mitigation projects that will benefit the watershed and offset losses of aquatic resource functions and services caused by activities authorized by DA permits. The watershed approach may involve consideration of landscape scale, historic and potential aquatic resource conditions, past and projected aquatic resource impacts in the watershed, and terrestrial connections between aquatic resources when determining compensatory mitigation requirements for DA permits." The watershed approach has a strong preference for the mitigation being within the same watershed as the impact AND where it is most likely to replace lost functions of the impacted watershed. Mitigation proposals should discuss how the mitigation site was located based on a watershed approach.

Watershed-scale features and development trends should be considered in siting a mitigation project. Consider:

- Watershed needs
- Habitat diversity
- Connectivity
- Present and historic aquatic resource conditions and impacts
- Land use trends
- Adjacent uses (e.g. development pressure, invasive species)

Mitigation goals should address watershed needs for habitat protection, flood management, or water quality improvements as identified in the State Wildlife Action Plan, Habitat Conservation Plan, Watershed Resources Registry, etc.

An environmental justice (EJ) assessment should also be conducted using MDE's EJ Screening Tool. It should explain how the impact and mitigation sites may impact EJ communities defined as "underserved" or "overburdened".

d. Site connectivity

The site should be well connected within the landscape to provide maximum function. Sites should be connected to existing tidal wetlands or where tidal wetlands previously existed. Mitigation areas not connected to tidal wetlands or tidal waterways are unlikely to be approved.

Sites should address the needs of the watershed, and those that could provide public access, recreation, or education opportunities are also encouraged.

e. Satisfying the requirements of multiple programs

The same mitigation area cannot be used to satisfy both the MDE mitigation requirement and another program requirement (e.g. Critical Area, Forest Conservation, Total Maximum Daily Load, CREP, etc.) unless the impacted area is the same. For example, if the tidal wetland impact resulting in the MDE mitigation requirement also results in a Critical Area requirement, the permit reviewer will determine if the mitigation site can be used for both. Funds obtained from a public grant or sources outside of the permittee/licensee may not be used to fund a mitigation project.

f. Potential impacts to other resources

Mitigation sites should identify potential negative impacts to other relevant resources (e.g. historic properties and cultural resources, federal and state-listed rare, threatened, and endangered species and their habitats, upland forest, shallow open water, tidal/nontidal wetlands, submerged aquatic vegetation, or natural oyster bars). As with the impact project, mitigation site impacts should be avoided or minimized during site selection. MDE will review these impacts and contact appropriate agencies to address these concerns.

g. Likelihood of success

i. Wetland creation

The mitigation site should be designed based on what is appropriate for the proposed location. With the exception of “normal” living shoreline mitigation sites, MDE will require that the design is based on a reference site. These reference sites should be approved by MDE. Having an appropriate reference helps determine at what elevation the vegetation grows successfully. Without knowing the right elevation, there is a risk of having to make major changes to the original plan, including regrading, to ensure native wetland vegetation coverage.

Designed elevations should be within the range of reference elevations for proposed wetland communities (i.e. high marsh and low marsh).

Restoration is generally considered more feasible and sustainable than creation of wetlands. Wetland enhancement projects should only be considered if there is a high likelihood of long-term success without long-term use of herbicides.

Sites are not likely to be successful if there are concerns with surrounding existing or future land use (e.g. pollutant sources, invasive species, future development, consistency with local planning documents, etc.).

ii. Habitat for benthic species

The following is a list of parameters that should be considered for a reef or benthic habitat improvement project:

- Existing benthic communities
- Existing fish species (both resident and migratory)
- Water depth
- Substrate (has to be hard enough so that reefs do not sink from their own weight)
- Slope (reefs are difficult to establish on steep slopes)
- Accessibility for construction

iii. Oyster reefs/seeding

The following is a list of parameters that should be considered for a oyster reef creation project:

- Current or past oyster habitat
- Water depth
- Salinity and flow of the water appropriate for sustaining oyster growth
- Substrate (has to be hard enough so that reefs do not sink from their own weight)
- Slope (reefs are difficult to establish on steep slopes)
- Accessibility for construction
- Sufficient water depths

iv. SAV restoration/creation

Successful SAV restoration/creation projects are difficult to achieve. A crucial rule of thumb is to plant in similar conditions from which the seeds or plants were harvested. It's important to target SAV beds with high genetic diversity to create resilient, restored beds. This can be done by gathering seeds from a few different locations (e.g. collecting seeds 20 meters apart).

The following is a list of parameters that influence SAV establishment and growth:

- Water depth
- Water clarity
- Salinity
- Water velocity and waves
- Temperature
- Sediment organic content and grain size

3. Site Protection Instrument

This is often not required for tidal wetland mitigation sites. However, if a mitigation site is required by the USACE, a site protection mechanism may be required.

4. Baseline Information

A description of both the impact and mitigation sites shall be provided including:

- Historical and existing plant communities
- Hydrology and bottom substrate conditions (sandy and firm vs. mucky and soft)
- Landscape position and topography
- Aquatic ecological communities (which is driven by landscape setting)
- Loss of functions and services of the impact site
- Gain of functions and services of the mitigation site
- Jurisdictional determination
- Existing structures
- Land use conflicts (e.g. airports)
- Photographs of the chosen mitigation site pre-construction

A map should be included showing the location of the mitigation site relative to the impact site or the geographic coordinates for those sites. It should include characteristics appropriate to the type of resource proposed to be created.

An existing conditions plan sheet should also be included with:

- A vicinity map showing the mitigation project location, existing land use, and zoning
- Existing mean high water line (MHWL) and mean low water line (MLWL; referenced to 0.0 ft)
- All existing natural resources, including vegetated wetlands and SAV, on the applicant's property and adjacent riparian properties
    - If existing tidal wetlands vegetation is present, include the mean higher high water line (MHHWL)
    - Existing acreage of vegetated tidal wetlands and wetland type (e.g. emergent, scrub-shrub, forested)
    - Existing acreage of nontidal wetlands and wetland type (e.g. emergent, scrub-shrub, forested)
- Existing water depths marked as contours, including the mean high water line, or spot depths
- Property lines and property lines extended channelward
- Existing or planned easements within or adjacent to the site (e.g. utility easements, Forest Conservation Easements, etc.)
- Forest boundary, specimen trees, relevant structures, fence lines, etc.
- A narrative discussing the current quality and proposed impacts for each aquatic resource (vegetated tidal wetlands, open water, shallow water habitat, natural oyster bar (NOB), submerged aquatic vegetation (SAV), etc.)

a. SAV restoration/creation considerations

Details should be provided regarding the source and type of SAV to be placed in restoration area

- Name of aquatic nursery or greenhouse (if using adult plants)

- Donor bed(s) information (if using seeds)
    - Map of the location (latitude/longitude coordinates)
    - Verification that the donor bed meets the density and stability requirements
    - Donor beds must be at least five years old and have a density of 70-100% as mapped by the Virginia Institute of Marine Science (VIMS)
    - Extent of SAV to be removed (approximate number of seeds, volume of reproductive material (number of bushel baskets, or square meters of bed area from which reproductive material is harvested)). Note that the entire SAV plant should not be harvested from the donor bed - only the reproductive propagules as per the instructions in *Small-scale SAV Restoration in Chesapeake Bay: A Guide to the Restoration of Submerged Aquatic Vegetation (SAV) in Chesapeake Bay and its Tidal Tributaries*.
- How many seeds per acre will be used
- Authorization for collecting seeds and/or shoots - copy of permit from MD DNR
- Note: All SAV seeds or mature plants used in SAV restoration in Maryland must be sourced from within the Chesapeake Bay and within the region - ideally within the same creek or river - where the restoration work is to take place.

5. Determination of Mitigation Ratio

The mitigation ratio is determined by the impacted wetland/resource type and the type of mitigation proposed. A brief explanation and a table should be provided to explain how the required mitigation area was calculated.

Example: Project impacts open water habitat and emergent tidal wetlands, and the proposed mitigation project is marsh creation. Additional information about required mitigation ratios can be found here: Tidal Mitigation

Impacted Area	Mitigation Ratio for Impacted Resource	Mitigation Multiplier (for out-of-kind and enhancement)	Minimum Required Mitigation Area
2,216 sf open water	1:1	Yes (x 2 for out-of-kind)	4,432 sf of marsh creation (2,216 sf x 1 x 2)
104 sf emergent tidal wetlands	2:1	No (in-kind creation)	208 sf of marsh creation (104 sf x 2 x 1)

6. Mitigation Work Plan

The work plan should include detailed written specifications and work descriptions for the project.

a. Wetland creation

It must include:

- The geographic boundaries of the project
- Construction methods
- Timing and sequence of construction
- Methods for establishing the desired plant community
- Plans to control invasive species
- If required, proposed grading plan (including the elevation and slopes of the substrate)

b. Habitat for benthic species

It must include:

- The geographic boundaries of the project
- Reef construction methods
    - Include type of reef (i.e. fishing, nursery, research, interstate, and/or special management zone reefs)
    - Material used
    - Reef characteristics (configuration, profile, interstitial space)
        - Higher complexity of artificial reefs can support high densities of organisms
- Timing and sequence of reef construction
- Amount of oyster spat deployed (if applicable)
- Timing and sequence of oyster spat seeding (if applicable)

c. Oyster reefs/seeding

It must include:

- The geographic boundaries of the project
- Reef construction methods
- Timing and sequence of reef construction
- Amount of oyster spat deployed (if applicable)
- Timing and sequence of oyster spat seeding (if applicable)

d. SAV restoration/creation

It must include:

- The geographic boundaries of the project
- Number of seeds collected
- Timing of seed collection
- Methods for seed processing and storage
- Testing of the seed viability and germination rates

- Methods and timing of seed dispersion

7. Maintenance Plan

a. Wetland creation

Provide a description and schedule of maintenance requirements to ensure the project is set to meet the outlined performance standards.

A Mitigation Monitoring Report (MPP) shall be submitted. This will include the following information:

- Project identifying information (State Agency Interest number, Tidal Wetlands License number, site address, project name)
- Date of inspections
- Project completion date
    - If the project hasn't been completed, please provide a current status of the project and disregard the remaining requirements
- Estimate of percent plant coverage by dominant species
- Photographs showing the current condition of the site
- If performance standards are not met, the MMP should also include a description of the performance standards that are not being met and proposed remediation measures. This may include:
    - A description of limiting factors to plant growth if native vegetation coverage is not met
    - A description of limiting factors to controlling invasive species growth if invasive coverage is not met
    - A description of the remedial actions that will be taken to meet the native coverage and/or invasive coverage requirements

b. Habitat for benthic species

Provide a description and schedule of maintenance requirements to ensure the project is set to meet the outlined performance standards. Note that maintenance may not be required for an artificial reef creation project. However, maintenance activities may be required if there is no increase in biomass on the substrate upon completion of the monitoring period.

c. Oyster reefs/seeding

Provide a description and schedule of maintenance requirements to ensure the project is set to meet the outlined performance standards. Note that maintenance may not be required for an oyster reef creation/seeding project. However, maintenance activities may be required if there is no increase in biomass on the substrate upon completion of the monitoring period. Current State monitoring protocols for oyster reefs require that area be surveyed every three years. Additional oyster spat-on-shell may need to be added periodically to ensure their continued viability.

d. SAV restoration/creation

Provide a description and schedule of maintenance requirements to ensure the project is set to meet the outlined performance standards. When restoring SAV, it may be necessary to add additional seeds in the years following the original planting to achieve restoration success as defined in the performance standards below.

8. Performance Standards

Performance standards are based on the goals of the mitigation site. Please refer to the "Performance Standards and Monitoring Protocol for Tidal Wetland Mitigation" (document coming soon) document for the latest performance standards for tidal wetland mitigation projects.

9. Monitoring Requirements

This section must clearly state what will be monitored so MDE can determine progress towards performance standards. It should describe the methodologies that will be used to monitor performance standards. Monitoring should involve both qualitative (description based on observation) and quantitative (based on sampling and measurement) methods.

There should be a section outlining the monitoring requirements for this project which includes:

- Time and frequency of monitoring activities
- Methods to be used for monitoring
- Parties responsible for conducting the monitoring
- Parties responsible for submitting the mitigation monitoring reports
- Frequency for submitting monitoring reports
- Biological (of invertebrates and fish populations), fishing success, and socioeconomic assessments if creating habitats for benthic species

Mitigation monitoring reports may include supporting documents such as the following:

- Narrative
    - Overview (1 page)
    - Requirements (1 page)
    - Summary Data (~4 pages)
    - Map/Plan (1 page)
    - Conclusion (1 page)
- Supporting data
    - As builts
    - Maps
    - Photographs
    - Assessment results
    - Raw data and interpretation

If this project also requires mitigation for the ACOE, please refer to the following outline and coordinate with the ACOE reviewer.

The first monitoring report is due the year the mitigation planting occurs, unless it occurs after April 15th of that year, in which case, the first monitoring report will not be due until the end of the next year. For each monitoring report, vegetative monitoring shall be conducted between June 15 and September 30, and the site visits should preferably be during a period with normal hydrologic conditions. The outline of what should be included in the monitoring report can be found at MDE's Wetlands and Waterways Program website.

If the permittee/licensee is required in the authorization to submit an as-built report/survey to MDE, it shall be submitted within 60 days following completion of the construction and planting of the mitigation site or as otherwise specified in the authorization. As-built reports/surveys should depict the completed portions of the mitigation site, including a plan view of the constructed/restored wetlands with locations of all the permanent sampling and photo stations, the survey of the finished grades, cross sections of the planting zones and densities. This report will describe the site's performance relative to the performance standards and will be used as a baseline measure for deviations from the approved mitigation plan. It should also include photographs of the completed mitigation site taken from designated photo stations.

For more information on what to include in tidal mitigation monitoring reports, refer to the "Performance Standards and Monitoring Protocol for Tidal Wetland Mitigation" (document coming soon) document.

10. Long-Term Management Plan

Note: This section is only required when the ACOE requires mitigation. Larger mitigation projects may require a more extensive long-term management plan, as deemed appropriate on a site-specific basis, than smaller mitigation projects.

Provide a description of how the mitigation project will be managed after performance standards have been met and mitigation monitoring by MDE has finished to ensure long-term sustainability. Details should be provided on the long-term financing mechanisms and the party responsible for long-term maintenance (long-term steward).

11. Adaptive Management Plan

If an adaptive management plan will be included in the authorization, a description of activities associated with that plan and who will be responsible for implementing it should be provided. Adaptive management is a strategy that addresses any unforeseen changes in site conditions, such as local land use development, heavy storms, rapid spread of invasive species on site, etc. This plan should include a "trigger level" and an associated "potential management response". For example, if 15% of the relative vegetation cover is invasive species during monitoring, then glyphosate will be sprayed late July-October to control for the invasives. This serves as an

action plan should any circumstances negatively impact the site's success during the monitoring period. Some adaptive management techniques will require prior authorization from MDE.

12. Financial Assurances

Note: This section may only be required when the ACOE requires mitigation.

Provide a description of the financial assurances that will be provided to guarantee that the mitigation project will be completed and meet performance standards. For mitigation projects not required by the USACE, a bond may be recommended to ensure project completion. These requirements will vary depending on the project.

13. Other Information

a. Coordination with other agencies

Early in the approval process, coordination with other agencies, such as the Maryland Department of Natural Resources (DNR) Wildlife and Heritage Service, U.S. Fish and Wildlife Service (USFWS), and Maryland Historical Trust (MHT), is recommended to determine if sensitive resources (e.g. Rare, Threatened, or Endangered species or historical artifacts) are present at the proposed mitigation site. Results from this initial review, in the form of scoping letters or iPaC reports, should be provided. Coordination with other agencies for any other issues should also be included.

b. Permits required for a mitigation site

The permittee/licensee is responsible for getting any applicable permits/licenses for the proposed mitigation project. Projects that would impact tidal/nontidal wetlands, wetland buffers, waterways, and floodplains may require another permit from MDE, especially if located off-site. A pre-application meeting can help determine if an authorization is required for the mitigation project. The authorization may have been included in the original permit or as a modification to the original permit. Note: other additional permits, for activities such as grading, erosion and sediment control, stormwater management, Notice of Intent, etc., will also be required.

All required permits/licenses, including any applicable federal, state, or local permits, must be acquired prior to construction of the mitigation site.

c. Additional resources

i. For more information about artificial reef management guidelines, check out this guide by DNR: dnr.maryland.gov/fisheries/documents/Maryland_Artificial_Reef_Plan62607.pdf

ii. Bortone et al. (2000) provide a comprehensive description of fish and invertebrate evaluation methods: Artificial Reef Evaluation | With Application to Natural Marine Habitat (taylorfrancis.com)

iii. For more information about oyster reef creation, check out the webpage created by South Carolina's DNR about building oyster habitats: Building Oyster Habitats (sc.gov)

iv. For more information about monitoring artificial oyster reefs, check out this resource by the Oyster Restoration Workgroup: RestorationMonitoring.indb (oyster-restoration.org)

v. For more information about artificial reef management guidelines, check out this guide by NOAA: https://media.fisheries.noaa.gov/dam-migration/noaa_artificial_reef_guidelines.pdf

vi. All SAV mitigation/restoration should follow the technical guidance described in *Small-scale SAV Restoration in Chesapeake Bay: A Guide to the Restoration of Submerged Aquatic Vegetation (SAV) in Chesapeake Bay and its Tidal Tributaries*, available at the Chesapeake Bay Program's SAV Workgroup webpage at: https://www.chesapeakebay.net/who/group/submerged-aquatic-vegetation-workgroup .

vii. For other information about SAV restoration:
   1. www.eastcoastsavcollaborative.com
   2. SAV Monitoring Program (chesapeakebay.net)
   3. Chesapeake Bay SAV Watchers Program