



# MassDEP

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**Massachusetts Department of Environmental Protection  
Bureau of Water Resources  
Division of Watershed Management  
Watershed Planning Program**

## **STANDARD OPERATING PROCEDURE**

### **Assessment Unit Creation**

**CN 618.0**  
May 2025 – May 2027

**Prepared and  
Approved by:**

Handwritten signature of Timothy Gardner.

Timothy Gardner, GIS Analyst

**Date:** June 10, 2025

**Approved by:**

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Jasper Sha, QA Analyst

**Date:** June 10, 2025

**Approved by:**

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Richard Chase, Section Chief, Data Management &  
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**Date:** July 16, 2025

### **List of Revisions**



Revision Date	Revision	Pages #s	CN/ (Old CN if applicable)	Initials
June 10, 2025	Original		618.0	TG



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**Acronyms:**

Geographic Information System (GIS)  
Assessment Unit (AU)  
Combined Sewer Overflow (CSO)  
United States Geological Survey (USGS)  
National Hydrography Dataset (NHD)  
3DHP (3D Hydrography Program)  
National Pollutant Discharge Elimination System (NPDES)  
Surface Water Quality Standards (SWQS)

**Scope and Application:**

The delineation of discrete, representative Assessment Units (AUs) for water quality assessment.

**Summary of Method:**

Defining Assessment Units (AUs) by systematically utilizing the Surface Water Quality Standards (SWQS) and pertinent biological, chemical, and physical features to delineate AUs that are representative of homogenous waterbodies or portions of waterbodies.

**Personnel Qualification/Responsibilities:**

Individuals performing AU creation work should have experience with GIS software such as ArcGIS Pro

**Equipment, Supplies, and Reagents:**

GIS Software (ArcGIS Pro)

**Detailed Procedures:**Introduction

Individual waterbodies in the Commonwealth of Massachusetts are divided up for water quality assessment purposes into one or more Assessment Units (AUs). An AU is waterbody segment partitioned to represent homogeneity in physical, biological, or chemical conditions at a spatial scale appropriate to characterize the SWQS attainment status of each AU. AUs should represent a waterbody or a portion of a waterbody larger than the reach associated with a single monitoring station.

The delineation of AUs is organized around the central principle that an individual AU should represent a relatively homogenous waterbody or portion of a waterbody. Indications that a change in representativeness has occurred, for example, the presence of an outfall pipe, a transition to a saltwater regime, or a change in Surface Water Quality Standard (SWQS), prompt the end of one AU and the beginning of another one.

Hydrography Base

As of April 2025, AUs are georeferenced based on waterbodies or portions of waterbodies from the MassDEP 1:25k Hydrography dataset utilizing GIS software. Eventually, the georeferenced depictions of AUs may be based on an improved dataset, such as the anticipated 3DHP (3D Hydrography Program) from USGS, or other.

Surface Water Quality Standards (SWQS)

The basis of the minimum and maximum extents of AUs are the SWQS regulations and their associated georeferenced shapes.

A change in SWQS status immediately necessitates the end of an AU and the start of another. While a SWQS waterbody can be associated with multiple AUs, each AU must be associated with no more than one SWQS and waterbody.

If an AU is not associated with a specific SWQS, then the default Class is as follows:

1. Inland, freshwater: B



## 2. Coastal and marine, saltwater: SA

### Waterbody Types for AU Creation

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For the purposes of AU creation, waterbodies in Massachusetts can be categorized as:

1. Ponds/lakes (lacustrine): freshwater, no obvious run-of-river, retention time > 14 days
2. Streams/rivers (palustrine) – freshwater, flowing from upstream to downstream, retention time < 14 days, perennial portion of stream
3. Estuaries (estuarine) – saltwater, inclusive of salt ponds, coastal embayments, and proper estuaries

### AU delineation

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Various biological, chemical, or physical factors can necessitate the creation of multiple AUs vs. the creation of a single AU. These could potentially include:

#### Point-source (potential) pollution sources

Outfall pipes  
Stormwater drain outfalls  
NPDES discharge locations  
Wastewater treatment plant discharge locations  
Combined Sewer Overflows (CSOs)

#### Non-point-source (potential) pollution sources

Landscape changes (from urban to agricultural, etc.)  
Proximity to anthropogenic structures such as highway interchanges or other roadways

#### Anthropogenic structures

Dams/impoundments, regardless of effect on retention time  
Channelized portions of waterways  
Jetties/spits/piers/breakwaters

#### Landscape features

The beginning/end of tidal effects when approaching the freshwater/saltwater interface  
Confluences with other waterways

#### Delineations from other agencies

Massachusetts Department of Marine Fisheries (DMF) shellfish layer extents  
MassGIS Land Use / Land Cover extents

The presence of any one of these features may not necessitate the creation of a new AU (although some features, like point-source pollution sources, almost certainly will) but should at least trigger careful consideration regarding where an AU should begin and end.

### Waterbody Codes

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As of April 2025, AUs are associated with a specific waterbody in the SARIS/PALIS/CAMIS system. SARIS assigned unique identifiers to all perennial streams/rivers depicted on USGS topographic maps. PALIS assigned unique identifiers to approximately 3,000 ponds/lakes in Massachusetts. CAMIS was created to assign unique identifiers to coastal and estuarine waterbodies otherwise not identified in the SARIS and PALIS systems.



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#### Monitoring stations data

The GIS Analyst coordinates with Assessment staff to make changes to AUs as needed. Changes to AUs can be justified based upon updated stations data, changes in extents of shellfishing layers, new features identified along an AU, or other rationale.

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#### Tracking changes in AUs

As AUs are split into multiple, new AUs, multiple AUs are combined into singular AUs, or AUs are deleted, it is important to keep track of what changes have been made. These substantial modifications are tracked in the SegDef Microsoft Access Database (.mdb).

**Data & Records Management:** Geographic information is primarily stored in the GIS Analyst's geodatabases (.gdb) or shapefiles associated with each publication of the Integrated Report cycle. AU definitions are stored in the SegDef Microsoft Access database (.mdb) maintained by Kari Winfield.

**Data Software:** ArcGIS Pro, MS Access, R, Python