

**Division of Watershed Management
Department of Environmental Protection
627 Main Street, Second Floor
Worcester, MA**

Standard Operating Procedure

Title: Site Evaluation Guidelines for the Massachusetts Probabilistic Monitoring and Assessment Program (MAP²), Wadeable Rivers and Streams

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NOTICE

The goal of the Massachusetts Probabilistic Monitoring and Assessment Program (MAP²) is to provide a comprehensive assessment of the condition of “waters” in Massachusetts through the implementation of probabilistic sampling designs. As of 2010, wadeable rivers and streams are the only water resource in Massachusetts that has an implemented probabilistic sampling design. It is planned that additional probabilistic sampling designs will be completed and implemented for lakes and estuaries when sufficient resources are available.

This document contains an overview of the process involved in locating a sampling site, evaluating the site, and selecting appropriate alternate sites when necessary. It is adapted from the guidelines developed and followed in the National Rivers and Streams Assessment conducted by USEPA (USEPA, 2007). **Methods described in this document are to be used specifically in work relating to probabilistic sites on wadeable rivers and streams.**

SITE EVALUATION PROCESS

This document is provided to clarify all of the steps involved in the process of locating and evaluating a probabilistically-selected sampling site on wadeable rivers and streams. Survey coordinators will obtain their assigned sites from the site manager and be responsible for completing the site evaluation process for each assigned site. There are 4 steps involved in the site evaluation process (Figure 1):

1. Locate the site in GIS and adjust the site to a 1:24,000 scale.
2. Verify the representativeness and accessibility of the site (Desktop Reconnaissance).
3. Obtain access permission from landowners.
4. Verify the representativeness and accessibility of the site (Site Visit).

The site evaluation process will be conducted during the summer of the year preceding the sampling year and completed no later than October 31st (i.e. site evaluation completed by October 31, 2009 for sites sampled in 2010). The information regarding site evaluation decisions will be maintained on a master site evaluation spreadsheet by the site manager.

Survey coordinators should complete a site evaluation field sheet (Attachment 1) and assemble a dossier containing important location and access information for each site they are assigned by the site manager. The dossier should contain the appropriate maps, contact information for access permission, copies of permission letters (if applicable), and access instructions.

LOCATE THE SITE

Wadeable river and stream sampling sites were selected from the stream network represented on 1:100,000 scale National Hydrography Dataset – Plus (NHD-Plus) GIS coverage, following a systematic random point selection process developed by the EPA Office of Research and Development-Western Ecology Division. The site will typically be designated as the beginning of the reach (moving upstream) if the indicator being sampled or measured requires a reach wide approach (i.e. macroinvertebrates, chlorophyll a).

The NHD-Plus is based on 1:100,000-scale Digital Line Graphs and, therefore, will not match exactly with 1:24,000-scale GIS coverages. Adjusting the site location to a 1:24,000-scale will improve the site evaluation process. The NHD-Plus should be used to locate important features such as confluences or bends in the channel to assist in the relative adjustment of the site location to a 1:24,000-scale GIS coverage (USGS topographic maps or high resolution NHD). For example, if the site is located 100 meters upstream from the confluence of the Nashua River and the Squannacook River on the 1:100,000-scale coverage than move it to the same relative location on the 1:24,000-scale coverage. **Only important features from the NHD-Plus should be used in the adjustment process.** Record the latitude and longitude of the site at the 1:24,000-scale on the site evaluation field sheet.

If the site is not on the stream network represented in the 1:100,000 NHD-Plus, reject the site and notify the site manager by email detailing the reasons for the rejection. This situation will be extremely rare since the NHD-Plus coverage is used in the site selection process. The site manager will allocate the next alternate site to the appropriate survey coordinator.

PRELIMINARY SITE VERIFICATION – DESKTOP RECONNAISSANCE

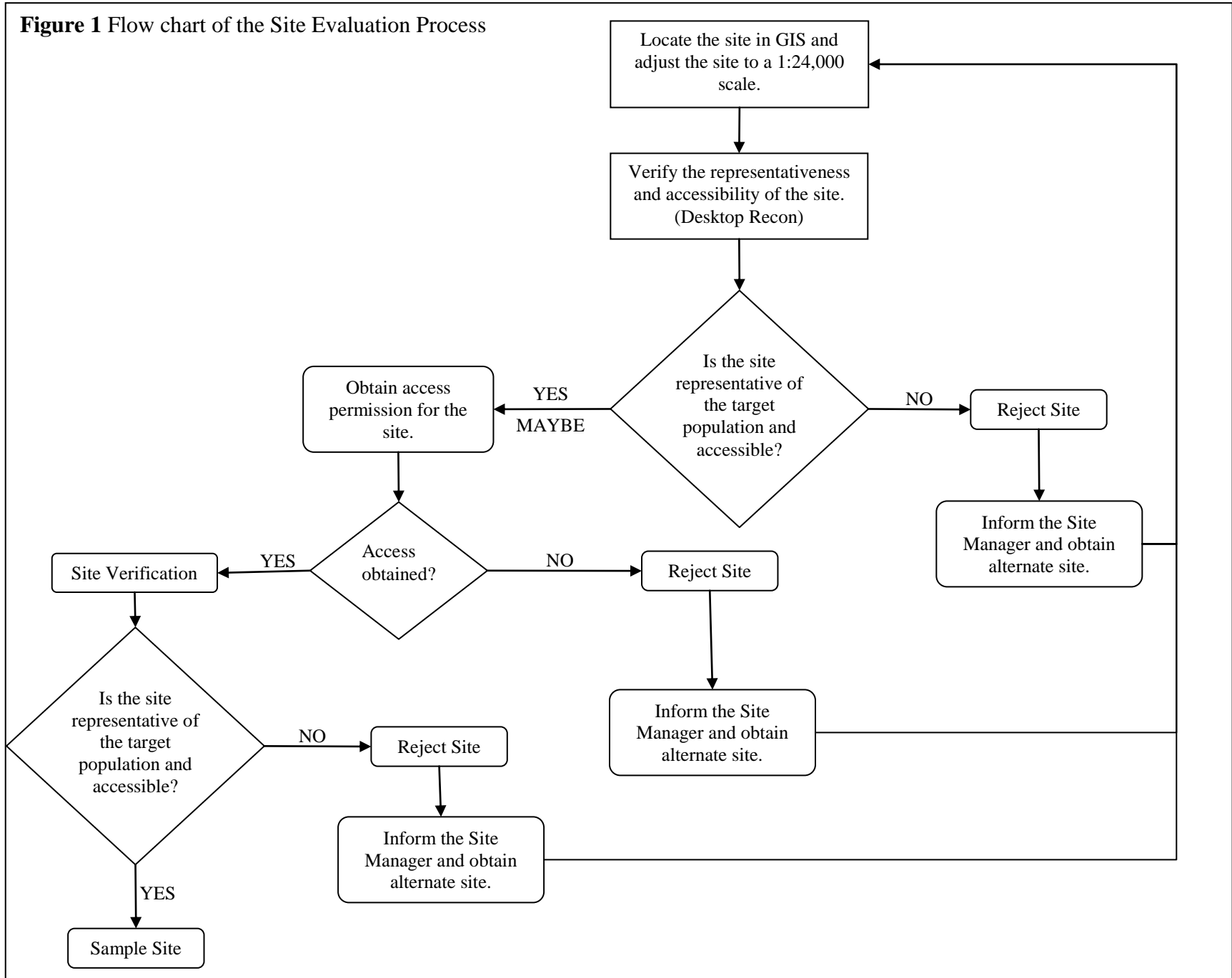
Desktop reconnaissance involves using existing maps, GIS coverages and aerial photos to make a predetermination if a site is not representative of the target population (non-target) or inaccessible. The primary purpose of desktop reconnaissance is to efficiently reject those sites that are **obviously** non-target or inaccessible prior to expending the resources necessary to obtain landowner permission and conduct site visits. **If there is doubt, err on the side of caution, obtain landowner permission and conduct a site visit.**

The target population is defined as all wadeable, 1st – 4th Strahler Order, non-tidal, perennial river miles within the Commonwealth of Massachusetts. The sites that are determined to be non-target or inaccessible will be categorized based on the reason for rejection. Some of the non-target categories are impossible to verify using desktop reconnaissance and will require a site visit. Note the non-target category on the site evaluation field sheet.

Non-Target Population Categories (permanent condition; stream becomes non-target)

- Not Wadeable (NW) - There is continuous water flow and > 50% of the sample reach is not wadeable. Wadeable is defined as shallow enough that a representative sample of the indicator can be safely collected during the index period under normal hydrological condition. This non-target category must be verified with a site visit.
- Dry Channel (DC) - A discernible stream channel is present but there is no water anywhere within a 150-m reach centered on the site. If there is information that the lack of water is the result of human alteration do not reject the site but still request an alternate site from the site manager. This non-target category must be verified with a site visit.
- Wetland (WE) - There is standing water present, but no definable stream channel upstream or downstream of the site during low flow conditions. In cases of wetlands surrounding a recognizable stream channel, define the site as target but restrict sampling to the stream channel.
- Map Error (ME) - No evidence that a water body or stream channel was ever present at the coordinates provided for the site.
- Impounded Stream Man-Made (ISM) OR Impounded Stream Natural (ISN) - The stream is submerged under a lake or pond due to man-made or natural (e.g., beaver dam) impoundments. If the impounded stream is still wadeable, do not reject the site. However, note that the site is impounded.
- Other (O) - The site is non-target for reasons other than those above. Examples include underground pipelines or a non-target canal. A site must meet both of the following criteria to be classified as a non-target canal:
 1. The channel is constructed where no natural channel has ever existed.
 2. The sole purpose/usage of the reach is to transfer water. There are no other uses of the waterbody by humans (e.g., fishing, swimming, or boating).

Figure 1 Flow chart of the Site Evaluation Process



Inaccessible Site Categories

- Access Permission Denied (APD) - Access to the site is denied by the landowners.
- Physically Inaccessible (PI) - Site is unlikely to be sampled by anyone due to physical barriers that prevent access to the site (e.g., cliffs). In determining if a physical barrier exists, safety and not time and effort should be the primary factor. Rejecting a site based solely on the time it will take to access the site will bias the overall design and should only be done in the most extreme circumstances.

If desktop reconnaissance **definitively** shows that a site is non-target or inaccessible, reject the site and notify the site manager by email detailing the reasons for the rejection. The site manager will allocate the next alternate site to the appropriate survey coordinator.

OBTAIN LANDOWNER PERMISSION

It is likely that to access the site, the sampling crew will be required to cross private property. Obtaining landowner permission to access their property is a critical step in the site evaluation process and cannot be skipped. The steps for obtaining landowner permission are as follows.

1. Determine the different options for accessing the site using GIS coverages, aerial photos, and pictometry. Create a map for each access option. If the access options involve public land, right of ways and/or walking within the confines of the annual high water mark of the stream channel, the following steps can be skipped.
2. Identify the landowner(s) that will need to be contacted for access permission on each option. There are several tools that can be used to identify the landowner(s). A GIS layer is available from MassGIS that contains parcel and landowner information for some towns. Many towns have their own interactive maps or databases. A web search on the town name and assessor can identify those sites. There is a webpage that consolidated a lot of those links, <http://www.appraisercentral.com/st/massasses.htm> but it is not all inclusive so a web search may bring additional information.
3. Mail a standard letter to each landowner identified explaining the probabilistic sampling program and informing them that we may be contacting them to discuss access permission (Attachment 2). Include a map of the site with their property identified in the letter.
4. Contact the landowner(s) by phone or in person during a site visit to obtain final permission. Note the landowners name and contact information, whether permission was granted, and any special conditions on the site evaluation field sheet. Also note when an attempt to contact the landowner was made and failed.

If access permission is denied, reject the site and notify the site manager by email detailing the reasons for the rejection. The site manager will allocate the next alternate site to the appropriate survey coordinator.

FINAL SITE VERIFICATION – SITE VISIT

The final site verification is completed during a site visit. The purpose of the site visit is to make a final determination if the site is non-target or inaccessible and gather access information. The access information gathered during the site visit will allow others to find the site again in the spring of the following year. The site verification steps are as follows.

1. Find the site location in the field corresponding to the 1:24,000 scale site coordinates and maps of the site. If it is not possible to access the site due to physical barriers, note it on the site evaluation field sheet and reject the site. If it is possible to access the site, record the routes taken and other directions on the site evaluation field sheet or attach a map that displays the route.
2. Use a GPS receiver to confirm the latitude and longitude of the site with the coordinates for the site. Make sure the GPS unit is set to reference the NAD 83 geospatial data set. Record these coordinates on the site evaluation form.
3. Use all available means to ensure that you are at the correct location as marked on the map including: 1:24,000 USGS map, topographic landmarks, county road maps, local contacts, etc.
4. Wade upstream from the site and determine whether the site is non-target using the categories detailed in the Site Verification-Desktop Reconnaissance section. If wading upstream indicates that the site is non-target then wade downstream from the site. If both the upstream and downstream reaches are non-target then reject the site.
5. Flag the site and the access route as appropriately so that the site can be located again without the aid of a GPS unit. If the situation requires (i.e. dense vegetation) and approved by the landowner, attempt to create a path using a lopper and machete.

If the site is rejected during the final verification process, notify the site manager by email detailing the reasons for the rejection and the landowner(s) who granted access permission to inform them that the site will not be sampled. The site manager will allocate the next alternate site to the appropriate survey coordinator.

**Massachusetts Department of Environmental Protection/Division of Watershed Management
 Probabilistic Site Evaluation
 Wadeable Rivers and Streams**

Evaluator _____

2010

Sheet _____ of _____

General Information	
Site ID:	Lat/Long: (Design File)
Step 1. Locate Site and Coordinates Adjustment (1:24,000-Scale) (Attach Site Map)	
Reject Site? <input type="checkbox"/> No <input type="checkbox"/> Yes	Lat/Long: (Adjusted)
Describe how the site coordinates were adjusted to 1:24,000-scale OR provide details on the reason(s) for rejection?	
River:	Town:
Site Description	Watershed:
Step 2. Preliminary Verification – Desktop Reconnaissance	
Reject Site? <input type="checkbox"/> No <input type="checkbox"/> Yes	If yes, circle the non-target category. WE ME ISM ISN PI O
Estimate the level of effort that will be required to sample the site OR provide details on the reason(s) for rejection?	
Step 3. Obtain Land Owner Access Permission (Attach map with land owner information for each access option.)	
Access Denied? <input type="checkbox"/> No <input type="checkbox"/> Yes	See land owner access permission log on the back of this sheet.
Step 4. Final Site Verification (Attach map showing access path and relevant land owner information)	
Reject Site? <input type="checkbox"/> No <input type="checkbox"/> Yes	If yes, circle the non-target category. NW DC WE ME ISM ISN PI O
GPS Set to NAD83? <input type="checkbox"/> No <input type="checkbox"/> Yes	Lat/Long: (Field)
Describe how the site will be accessed OR provide details on the reason(s) for rejection OR other notes?	
<small>NW=Non-Wadeable, DC=Dry Channel, WE=Wetland, ME=Map Error ISM=Impounded Man-Made, ISN=Impounded Natural, PI=Physically Inaccessible, O=Other</small>	

Step 3. Land Owner Permission Log

Access Option	Name	Address	Phone	Contact Attempts	Permission Granted?
					<input type="checkbox"/> No <input type="checkbox"/> Yes
					<input type="checkbox"/> No <input type="checkbox"/> Yes
					<input type="checkbox"/> No <input type="checkbox"/> Yes
					<input type="checkbox"/> No <input type="checkbox"/> Yes
					<input type="checkbox"/> No <input type="checkbox"/> Yes
					<input type="checkbox"/> No <input type="checkbox"/> Yes
					<input type="checkbox"/> No <input type="checkbox"/> Yes

Notes/Comments/Sketches

Large empty rectangular area for notes, comments, or sketches.

ATTACHMENT 2

(Date)

Dear Landowner:

The Massachusetts Department of Environmental Protection (MassDEP) is conducting an environmental assessment of rivers and streams across the Commonwealth of Massachusetts. A computer was used to randomly select the sites for assessment. A total of approximately 150 sampling sites in rivers and streams were selected for sampling from 2010 through 2014. Water quality chemistry, aquatic life, and habitat will be evaluated at each site. The findings of the study will not be used for enforcement or regulatory purposes.

We will be contacting you by phone prior to the site visit to obtain permission to access the sampling site from your property. We have enclosed a copy of a topographic map(s) with the site(s) identified by an "X" at the specific point on the stream to be sampled. We realize that working on your property is a privilege and we will respect your rights and wishes at all times.

If you have any questions concerning this request, please contact me (phone number). We are looking forward to hearing from you.

Sincerely,

(Name)

Survey Monitoring Coordinator