# NHD Reach Information from EIM Map Search

Version 1.2
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Geographic coordinates are required for all EIM field locations, to represent on a map where data was collected. The Lat/Long and Elevation Tool in the EIM Map Search can be used to get this information. For field locations associated with surface water features, there is an additional requirement to assign each location to a mapped feature in the National Hydrography Dataset (NHD). Washington State adopted the NHD as their standard hydrography in January 2011. The NHD is a digital representation of surface water features, maintained by the United States Geological Survey (USGS), for use in geographic information systems (GIS). Associating field locations in EIM to corresponding NHD surface water features allows for GIS tools to locate EIM data with respect to other surface water datasets in a consistent way, both within EIM and between other databases.

The features in the NHD are represented as either lines (watercourses like streams, rivers, and canals) or polygons (waterbodies like lakes, ponds, and estuaries). Each line segment and polygon has a unique identifier assigned to it, referred to as the NHD Reach Code. The Reach Code for linear features generally applies to the segment of the stream, river, or canal extending from one confluence (connection of two lines) to the next upstream confluence. Exceptions to this may occur as new tributaries are added along existing reaches. The Reach Code for polygonal features applies to the extent of the entire waterbody.

Linear features of the NHD represent a connected flow network. Data collected along this network can be associated not only with an entire segment or reach, but at discrete points along that reach. This association is made using the NHD Reach Measure. The Reach Measure describes a distance along a given segment represented by a Reach Code. The Reach Measure ranges from 0 (downstream/lower extent of the Reach Code) to 100 (upstream/upper extent of the Reach Code).

- Field locations in lakes, ponds, Puget Sound, or other waterbody polygons will have an NHD Reach Code, but not an NHD Reach Measure.
- Field locations in streams, mapped ditches, major rivers (i.e. the Columbia and Snake Rivers), and the Duwamish Waterway will have an NHD Reach Code and an NHD Reach Measure.
- When using the EIM Location Template to submit a new surface water location to EIM, the NHD Reach Code is entered into column L.
- When using the EIM Location Template to submit a new linear surface location to EIM, the NHD Reach Measure is entered into column M.
- The NHD Tool is separate from the Lat/Long and Elevation Tool because the NHD information is an association with the mapped surface water features, not the exact position of a field location. See below for more information on selecting the correct NHD Reach Code and Measure for your field locations.

To acquire the NHD information for locations in EIM, there is a tool built into EIM Map Search to generate the necessary NHD Reach Code and Measure:

The NHD Tool – This tool allows you to find the NHD Reach Code, NHD Reach Measure, waterbody or watercourse name, and the latitude and longitude coordinates of the selected

point location. This tool also allows you to create a table of this information for multiple locations, which can be downloaded and saved to your computer.

- Selecting this tool will automatically turn on the NHD Stream/River and Lake/Pond layers in the map.

## Getting NHD Reach Code values:

**1.** Go to EIM Search: https://fortress.wa.gov/ecy/eimreporting/

**2.** Click the map:


**3.** The Tools tab menu will be displayed, by default, towards the top of the map.


**4.** Find your site on the map using one, or both, of these options:

**a.** Zoom In and Pan Tools.

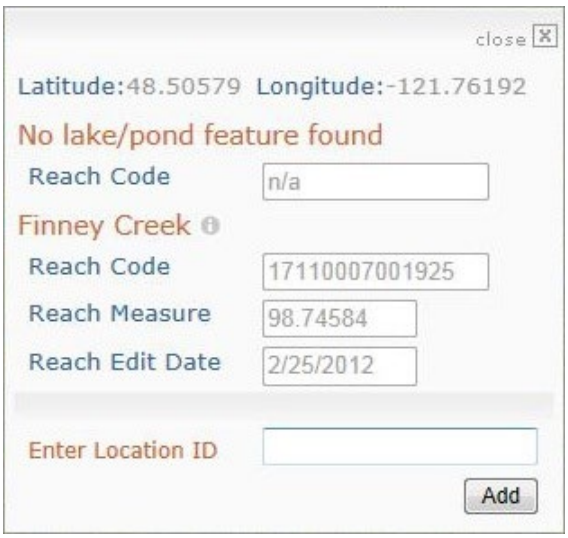
**b.** Select the Find tab Find and use the Find menu to zoom to coordinates, an address, Township/Range/Section, or map features close to your field location.

TIP *Zoom in as far as possible to improve the resolution of imagery and the accuracy of your point location.*

**5.** Select The NHD Tool from the Tools menu.

**6.** Click once on the map within the lake/pond/estuary or along the stream/river/canal/ditch feature that most accurately represents the point of your field location. A small, yellow point will temporarily be added to the map (shown here) and…

The NHD Tool information box will appear below the NHD Tool button on the Tool menu:



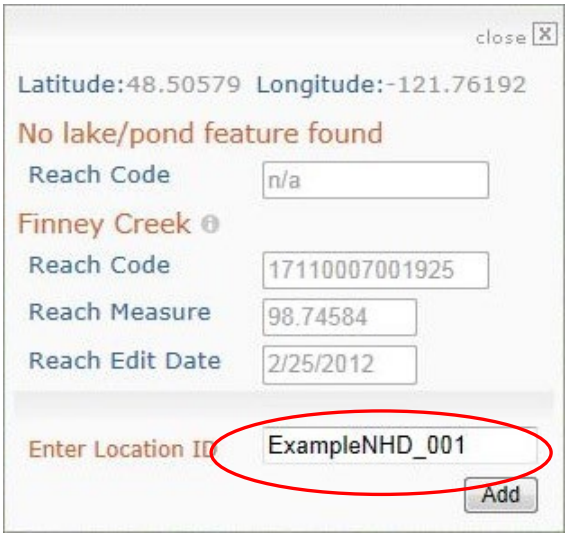

This information box displays:

- The decimal degree latitude and longitude coordinates of the point you selected on the map.
- The Geographic Names Information System (GNIS) name of any polygonal waterbody feature mapped at that point. If a feature without a GNIS name is selected, “Unnamed lake/pond” will be displayed.
- The NHD Reach Code of any polygonal waterbody feature mapped at that point.
- The GNIS name of any linear watercourse feature mapped at that point. If a watercourse without a GNIS name is selected, “Unnamed stream/river” will be displayed.
- The NHD Reach Code of any watercourse feature mapped at that point and the NHD Reach Measure along the selected reach.
- The Reach Edit Date, representing the last time the shape and/or location of the selected NHD feature was modified.

TIP

*The ⓘ button after the feature name (visible only when an NHD feature is found at the selected point) will highlight the feature with that reach code and zoom the map to the feature’s extent.*

**7.** If you would like to export the NHD Reach information for this point, type a Location ID in the NHD Tool information box in the “Enter Location ID” field (circled in the image below) and click the “Add” button.




TIP

*The value entered into this Location ID field does not have to exactly match the Location ID you use to submit data to EIM; however, if you do enter the Location ID you wish to use at this time, the resulting table values can be used to directly populate the EIM Location Template.*

8. This will add a record to the table at the bottom of the map (shown in the image below), with the entered Location ID value.


9. Continue this process until you have added all points for which you want NHD information.

TIP *You can press the* Clear List *button from the NHD Information table or the Clear All*  *tool at any point to clear the records.*

10. Click the Download CSV button when you have added all of the points for your field locations, to save a copy of the table to your computer.

## Entering NHD information into EIM:

If you have followed the steps above, you now have a table of NHD information for each point you added to the list. You can use these values to populate specific fields the EIM Location Template, used to submit Locations to the EIM database. The NHD Tool Download Table stores values in the following columns (shown on the left-hand side of the table below), which correspond to the following color coded columns in the EIM Location Template (shown on the right-hand side of the table below):

| NHD Tool Download Table | | | | EIM Location Template | |
|---|---|---|---|---|---|
| Column | Title | Example Values | | Column | Title |
| A | Location ID | ExampleNHD_001 | ExampleNHD_002 | A | Location_ID |
| B | Latitude Decimal Degrees | 48.50579 | 48.17375 | U | Latitude_Decimal_Degrees |
| C | Longitude Decimal Degrees | -121.76192 | -117.56961 | V | Longitude_Decimal_Degrees |
| D | Waterbody Name | n/a | Nelson Lake | | |
| E | Waterbody NHD Reach Code | n/a | 17020003003595 | L | NHD_Reach_Code |
| F | Watercourse Name | Finney Creek | Unnamed stream/river | | |
| G | Watercourse NHD Reach Code | 17110007001925 | 17020003007668 | L | NHD_Reach_Code |
| H | Watercourse NHD Reach Measure | 98.74584 | 44.93669 | M | NHD_Reach_Measure |
| I | Watercourse NHD Edit Date | 2/25/2012 | 1/18/2012 | | |

TIP *Microsoft® Excel® will typically display the NHD Reach Code value in the CSV formatted table exported by the NHD Tool as an exponential number (i.e. "1.702E+13," instead of "17020003003595"). Ensure that you are preserving the entire value of the NHD Reach Code when you enter this value, by converting the formatting of these cells to Text formatted cells and ensure that the column is displaying all 14 digits of this code.*

## Selecting the Correct NHD Reach Information:

Selecting the correct NHD Reach Code and Measure requires familiarity with the field locations and interpreting the current placement of the NHD features.

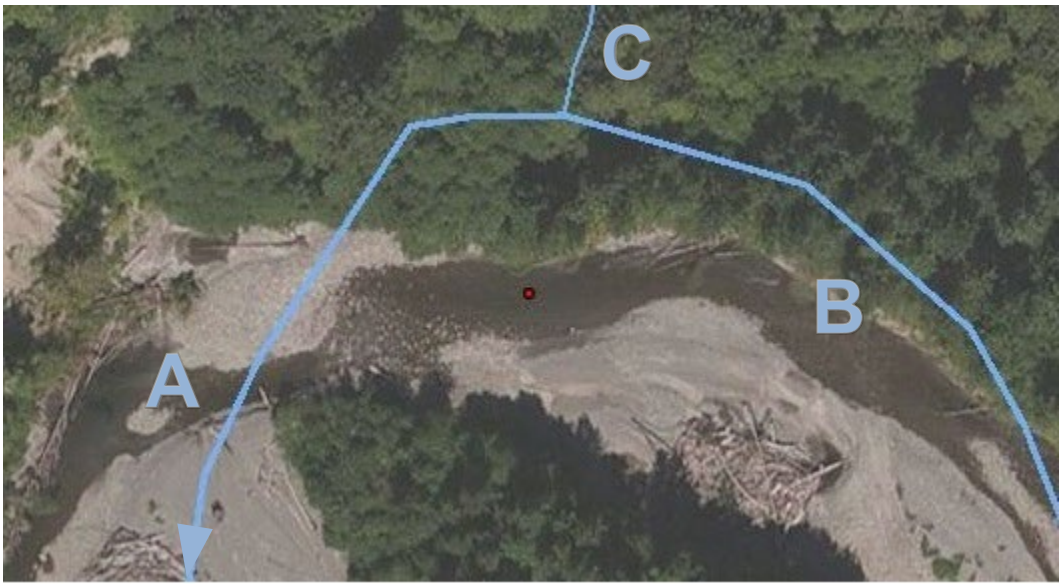
### Features not represented in the NHD

Not all field locations where surface water samples or measurements are collected will be represented in the NHD hydrography. The Pacific Ocean, the Strait of Juan de Fuca and northern Puget Sound are not represented as NHD waterbodies and therefore do not have an NHD Reach Code. Some small streams are not currently mapped in the NHD. If this is the case for your sampling location, simply do not provide an NHD Reach Code or Measure. Providing NHD information in these cases is inappropriate and confuses where the field location is actually located.

### Streams, Rivers, Canals, Ditches

The NHD information for field locations associated with linear features in the NHD may require additional interpretation. Streams may not be accurately mapped in the NHD and the NHD lines representing wide rivers and streams may be mapped significant distances away your field location. In these cases the coordinates of the field location will be different than the coordinates that represent the NHD Reach Measure location.

Consider the following example:



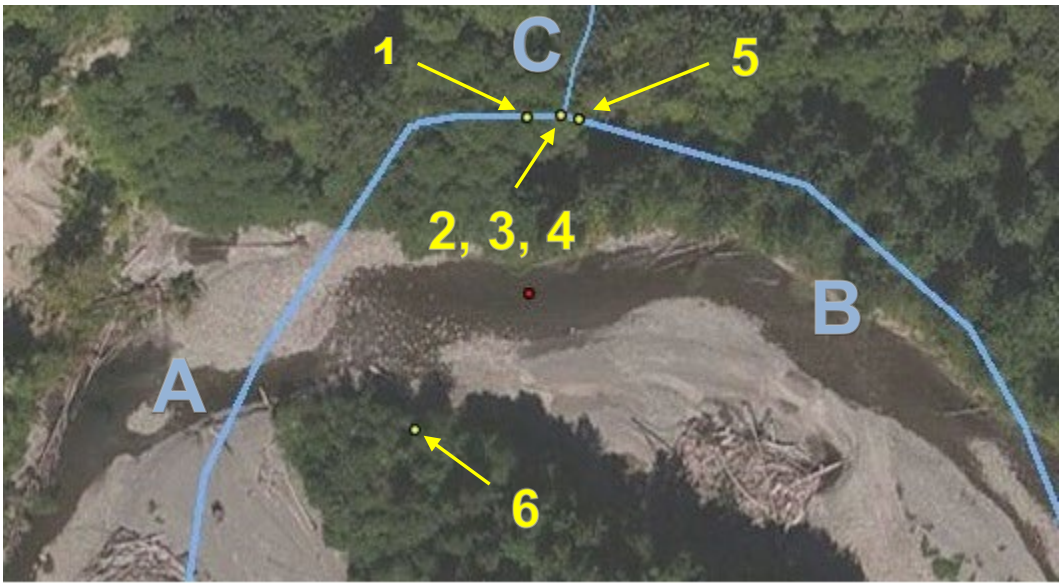

In this example, the field location (represented by the red point in the image above) represents a GPS-derived point, obtained in the field where a sample was collected. The light blue lines in the image represent the NHD at this location. There are three distinct NHD Reach Code values that can be obtained from the three NHD line segments (labeled A, B and C). The mainstem stream channel (represented by segments A and B) flows from right to left (blue arrow represents flow direction) and is inaccurately mapped at this location (over 120 feet to the north). There is also a right-bank tributary to the mainstem (represented by segment C) mapped in the NHD.

TIP

*The coordinates collected by the GPS are typically the ones that should be entered into the EIM Location Template. GPS coordinates, however, may not be an accurate representation for your field locations. If you wish to obtain different coordinates, please see the Get Lat/Long Coordinates and Elevations from EIM Map" help document for acquiring coordinates using the EIM Map Search Lat/Long Tool.*

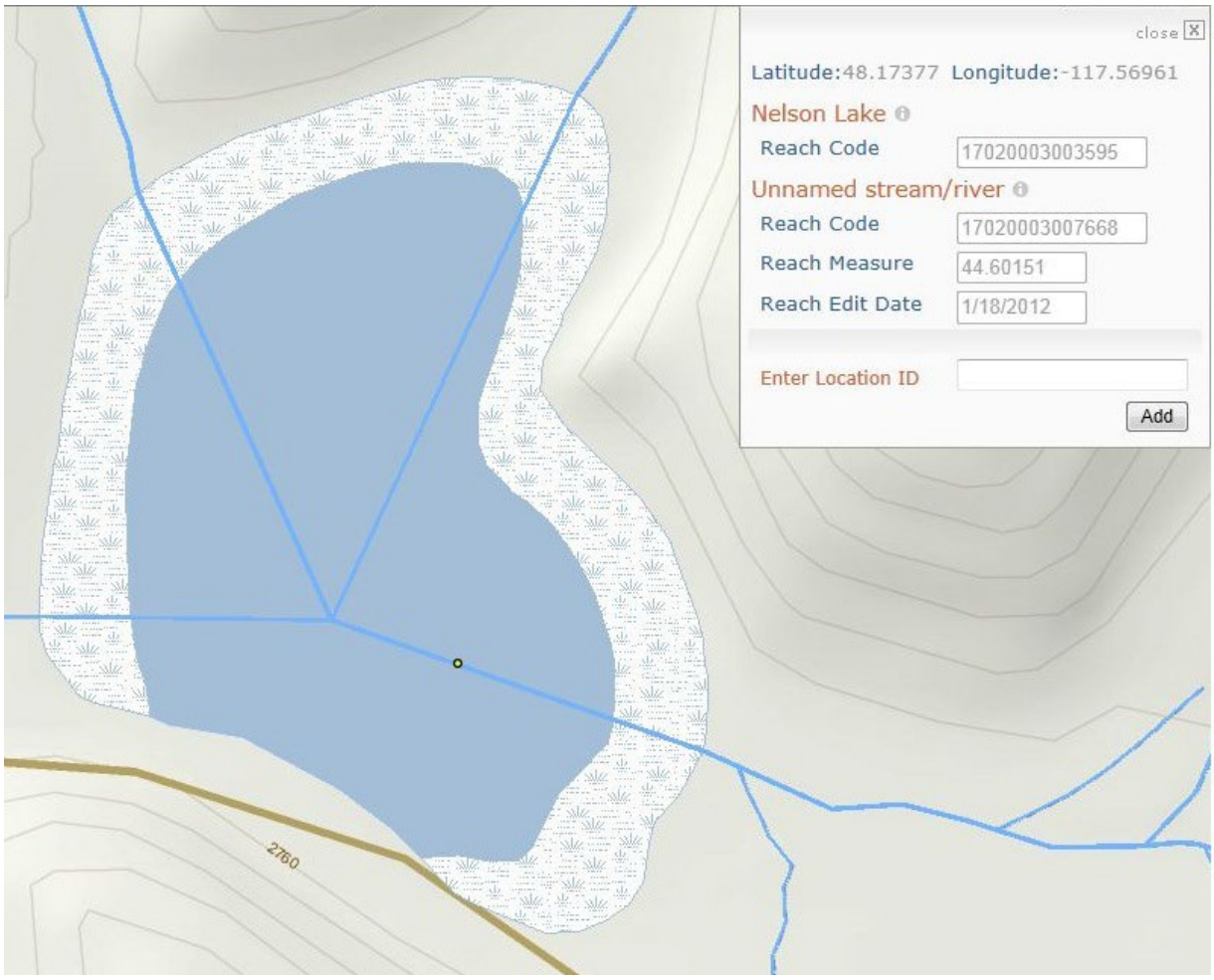
Knowledge of the actual field location will be necessary to appropriately assign the NHD Reach Code and Measure. The appropriate NHD Reach Code and Measure will depend on what the field location is intending to represent. There are six different correct scenarios that could result in different NHD Reach Codes and Measures needing to be assigned to this example location. The numbered scenarios below correspond to the labels for the four respective yellow points on the image below, representing approximate locations to click with the NHD Tool.

1. **The field location represents a sampling location within the mainstem channel, downstream from the right-bank tributary confluence.** In this case, use the NHD Tool to select a point along segment A that represents the closest association to the field location.
2. **The field location represents a sampling location at the confluence, within the mainstem channel, at or immediately downstream from the tributary.** In this case, use the NHD Tool to select a point along segment A immediately downstream from the confluence. Be sure to check that the NHD Reach Code returned is that of segment A and that the NHD Reach Code for segments B and C were not returned due to the proximity of where the tool selected.
3. **The field location represents a sampling location at the confluence, within the mainstem channel, immediately upstream from the tributary.** In this case, use the NHD Tool to select a point along segment B immediately upstream from the confluence. Be sure to check that the NHD Reach Code returned is that of segment B and that the NHD Reach Code for segments A and C were not returned due to the proximity of where the tool selected.
4. **The field location represents a sampling location at the confluence, within the right-bank tributary.** In this case, use the NHD Tool to select a point along segment C immediately upstream from the confluence. Be sure to check that the NHD Reach Code returned is that of segment C and that the NHD Reach Code for segments A and B were not returned due to the proximity of where the tool selected.
5. **The field location represents a sampling location within the mainstem channel, upstream from the right-bank tributary confluence.** In this case, use the NHD Tool to select a point along segment B that represents the closest association to the field location.
6. **The field location represents a sampling location on an unmapped tributary channel.** In this case neither the NHD Reach Code, nor NHD Reach Measure is applicable.



**Lakes, Ponds and other NHD waterbodies**

Selecting the NHD Reach Code to apply to a field location within a waterbody polygon of the NHD is relatively simple, as the NHD Reach Code of the feature applies to all field locations within that waterbody. It is important to realize, however, that the lines comprising the NHD water course features are mapped within the waterbody polygons that they flow into and out of, to maintain the network connectivity of water courses. This means that within the boundary of NHD waterbody features, the tool may return two NHD Reach Codes (as shown for the selected yellow point in the image below): one representing the waterbody, the other representing an artificial connection line.




Aside from the exceptions noted in the next section of this document, waterbody-associated field locations should always have the NHD waterbody's NHD Reach Code (17020003003595, in this example) entered into the NHD Reach Code field (column L) of the EIM Location Template, with no NHD Reach Measure value entered in column M. This will clearly identify that data associated with this field location was collected within the waterbody, as opposed to an inlet or outlet channel segment.

**Exceptions to the rules for NHD waterbodies**

Not all field locations associated with NHD waterbody features should have the NHD Reach Code of the mapped waterbody entered in EIM. **These exceptions include portions of major rivers that have been mapped as waterbodies such as lower Duwamish Waterway and the Columbia, Snake and Spokane Rivers.**

TIP

*In large rivers, be sure that the NHD Reach Code selected is that of the selected river (the GNIS name in the NHD Tool information box is correct) and not a tributary or unnamed tributary.*

## Revision History

| Revision Date | Revision No. | Summary of Changes | Reviser(s) |
|---|---|---|---|
| 8/8/13 | 1.0 | Original document | AO |
| 09/13/17 | 1.1 | Updated links and terminology “spreadsheet” to “template” | KC |
| 07/07/23 | 1.2 | Refined wording about exceptions in last paragraph of page 7 | KC |