

EIM Help - Converting Local Elevation Datums to NAVD88

Version 2.0

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Note: Use this only if your wellhead elevations were surveyed to a local datum (like 100 ft).

Ecology requires that wellhead elevations be submitted to EIM in addition to horizontal coordinates. For resource protection wells (per WAC 173-160-400), wellhead elevations are usually measured at the top of the inner well casing. EIM uses wellhead elevations and depth to water measurements to calculate groundwater elevations across the state.

In order to compare water level elevations, wellhead elevations must be surveyed or normalized to a common datum. The Washington State standard is the North American Vertical Datum of 1988 (NAVD88). Its reference point is located in Quebec, Canada.

Ecology recognizes that many sites such as gas stations have commonly used a site-specific or “local” datum for wellhead elevations. A local datum is where one well or other point on the site, known as a benchmark, is assigned an arbitrary elevation. Often times this is 100 feet. Wells on the site are surveyed relative to that benchmark. This is OK for the purposes of that particular site, but when you try and look at water level elevations across multiple sites, it doesn’t work.

Therefore, **Ecology no longer accepts wellhead elevations surveyed to local datums. We strongly recommend that wellhead elevations be surveyed relative to NAVD88 from the start.** You can also have your original survey tied in to a NAVD88 benchmark. In cases where this is not possible, local datum elevations can be converted using the EIM map. This document explains how to do that.

How to convert a local elevation to a NAVD88 elevation using the EIM map

1. Go to **EIM Search** in your web browser
<https://fortress.wa.gov/ecy/eimreporting/>

2. **Click map to search**



3. Find your site on the map by
 - a. Zooming in or
 - b. clicking  at the top of the map. This allows you to search in several ways:

Find Location close X

Zoom to Area:		Zoom to Address:	
City	<input type="text" value="-choose-"/>	Address	<input type="text"/>
County	<input type="text" value="-choose-"/>	City	<input type="text"/>
Marine Region	<input type="text" value="-choose-"/>	State	<input type="text" value="WA"/>
Waterbody (by WRIA)	<input type="text" value="-type name-"/>	Zip	<input type="text"/>
Watercourse (by WRIA)	<input type="text" value="-type name-"/>	Find	
Watershed (WRIA)	<input type="text" value="-choose-"/>	Zoom to Lat/Long:	
Zoom to T/R/S:		Latitude	<input type="text"/>
Township	<input type="text" value="01N"/>	Longitude	<input type="text"/>
Range	<input type="text" value="02E"/>	Find	
Section	<input type="text" value="01"/>	Zoom to River Mile:	
Find		River Name	<input type="text" value="American River"/>
		River Mile	<input type="text" value="6"/>
		Find	

4. Once you find your site, **click the Lat/Long Tool** from the toolbar at the top of the map:



5. **Click on a well** on the map at your site. Chose a well where you know the height of the well casing. (For flush-mount wells, the casing is below land surface). You will see a yellow dot like the one below.



- In this pop-up box, **type a Location ID** (ex. “Baseline Elevation”), then **click Add**.

close X

Latitude: 47.67611 Longitude: -122.37612

Elevation: 162 feet

Enter Location ID

Add

- At the base of the map your record will appear. **Click Download CSV**.

Record #	Location ID	Coordinate System	Latitude	Longitude
1	Baseline Elevation	LAT/LONG	47.67611	-122.37612

- A ZIP file will open automatically.

- Open the ZIP file.** Inside you’ll find a spreadsheet containing the **land surface elevation** of the well you clicked. The elevation generated by the EIM map is relative to the NAVD88 datum. **Use this elevation in Step 10 below.**

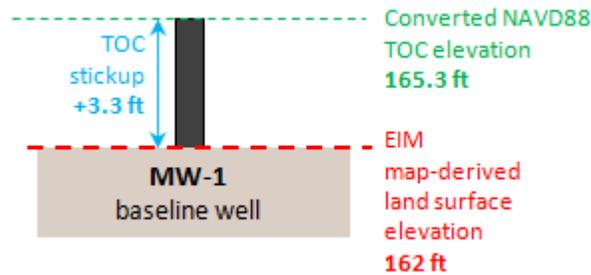
	A	B	C	D	E	F	G
1	Location ID	Coordinate System	Latitude Decimal Degrees	Longitude Decimal Degrees	Horizontal Datum	Horizontal Coordinate Accuracy	Horizontal Coordinate Collection Method
2	Baseline Elevation	LAT/LONG	47.67611	-122.37612	3	6	13

	H	I	J	K	L	M	N
	Elevation of	Elevation	Elevation Units	Elevation Datum	Elevation Accuracy	Elevation Collection Method	Notes
	Land Surface	162	FT	1	4	12	

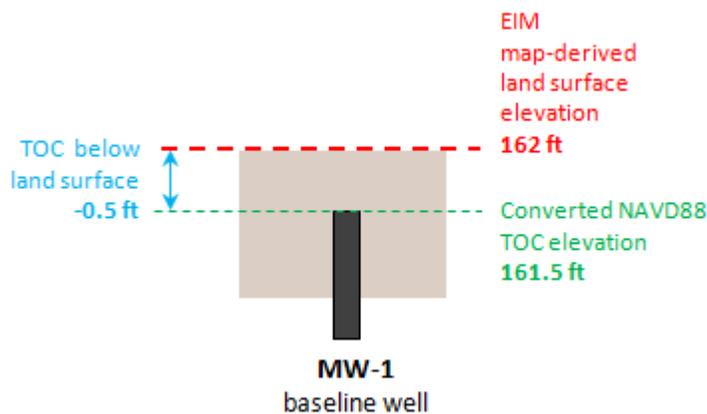
10. (Optional, especially for flush-mount wells) **Calculate the NAVD88 top of casing (TOC) elevation for your baseline well** by adding the inner casing stickup to the EIM map-derived land surface elevation. For flush-mount wells you will be “adding” a negative number. The casing stickup can be measured in the field or sometimes obtained from the well log.

Equation	Examples	
	Well w/casing stickup	Flush-mount well
EIM map-derived land surface elevation	162 ft	162 ft
+ Casing stickup (baseline well)	+ 3.3 ft	+ (-0.5) ft
Converted NAVD88 TOC elevation (baseline well)	165.3 ft	161.5 ft

Well with casing stickup



Flush-mount well

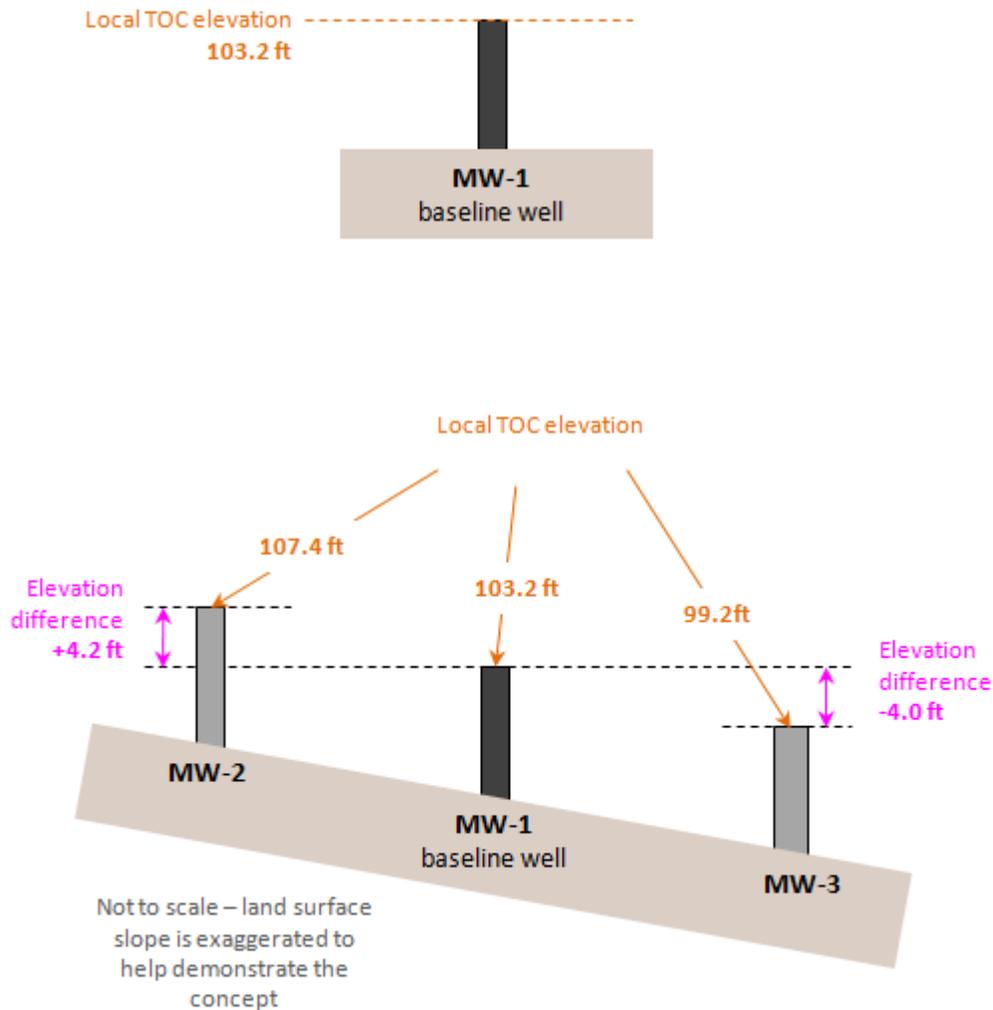


Diagrams not to scale

11. Convert other well TOCs to the new elevation.

- A. First, calculate the relative difference in TOC elevation between your baseline well and the well you want to convert. Use your existing local TOC elevations for this. The concept is the same for wells with casing stickup and flush-mount wells.

Equation	Examples	
$\begin{array}{r} \text{Local TOC elevation (MW-n)} \\ - \text{Local TOC elevation (baseline well)} \\ \hline \text{Local TOC elevation difference} \end{array}$	Well at higher elevation than baseline well	Well at lower elevation than baseline well
	$\begin{array}{r} 107.4 \text{ ft (MW-2)} \\ - 103.2 \text{ ft (MW-1)} \\ \hline 4.2 \text{ ft} \end{array}$	$\begin{array}{r} 99.2 \text{ ft (MW-3)} \\ - 103.2 \text{ ft (MW-1)} \\ \hline -4.0 \text{ ft} \end{array}$



- B. Second, add the EIM map-derived NAVD88 TOC elevation for the baseline well and the local TOC elevation difference to get the converted NAVD88 TOC elevation for MW-n.

Equation	Examples	
Converted NAVD88 elevation (baseline well) + <u>Local TOC elevation difference</u> Converted NAVD 88 TOC elevation (MW-n)	Well at higher elevation than baseline well	Well at lower elevation than baseline well
	165.3 ft (MW-1) + 4.2 ft 169.5 ft (MW-2)	165.3 ft (MW-1) + (-4.0) ft 161.3 ft (MW-3)

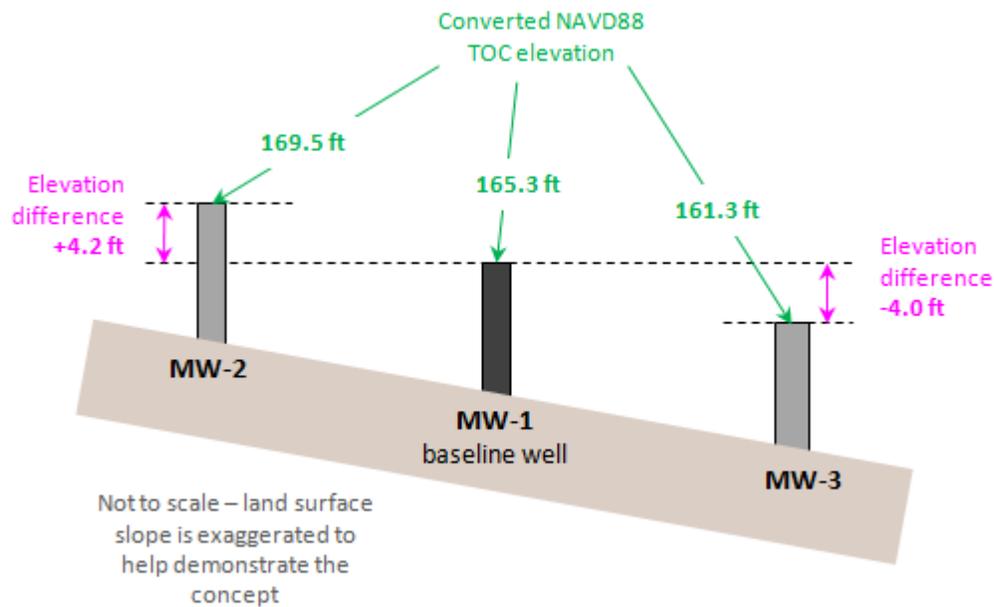


Chart of conversion examples:

Well (MW-n)	Local TOC elevation (ft)	Local TOC elevation difference (ft)	EIM map-derived NAVD88 TOC elevation (ft)	Converted NAVD88 TOC elevation (ft)
MW-1 (baseline)	103.2	0	165.3	165.3
MW-2	107.4	+4.2	----	169.5
MW-3	99.2	-4.0	----	161.3

12. Fill in your well elevation metadata. Use the EIM metadata values that came in the spreadsheet in Step 9 (above).

- **Elevation Datum = 01** - N. American Vertical Datum of 1988 (NAVD88)
- **Elevation Accuracy = 04** – 10 ft (3 m)
- **Elevation Collection Method = 03** - digital elevation model OR **12** - LIDAR (airborne laser)

Put the following under **Location Description** = “**Converted local elevation to NAVD88 using EIM map.**”

Other Elevation Tools

VDatum

A free software tool designed to vertically transform geospatial data among a variety of tidal, orthometric and ellipsoidal vertical datums. Examples are conversions between tidal measurements, NGVD29 datum, and NAVD88 datum. <http://vdatum.noaa.gov/>

USGS Elevation Web Service:

This service is used by the EIM map to determine an elevation and metadata at a specific location:

http://gisdata.usgs.net/xmlwebservices2/elevation_service.aspx?op=getElevation

If you know your location in Decimal Degrees, insert the Y_Value (Latitude) and the X_Value (-Longitude).

Revision History

Revision Date	Revision No.	Summary of Changes	Reviser(s)
5/25/12	1.0	Original Document	CN
7/3/12	1.1	Made Step 10 optional	CN
8/1/13	2.0	Updates to incorporate new EIM Search tool.	CN