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Pacific Islands Water Science Center

Red Hill Synoptic Groundwater-Level Surveys and Seepage Runs, December 23, 2021 to February 4, 2022

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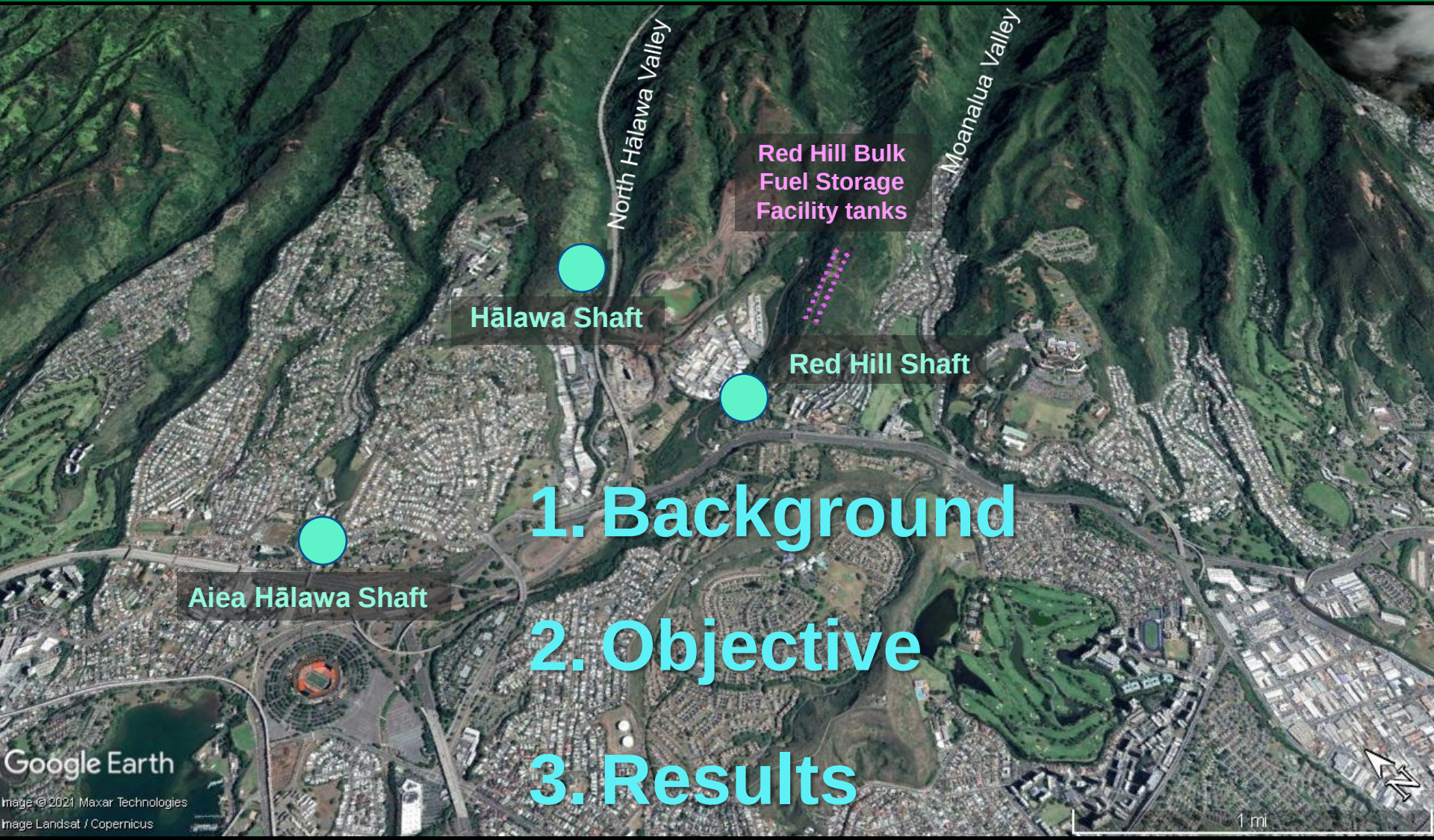
Hawai‘i Commission on Water Resource Management
February 15, 2022, virtual meeting

U.S. Department of the Interior
U.S. Geological Survey

Outline



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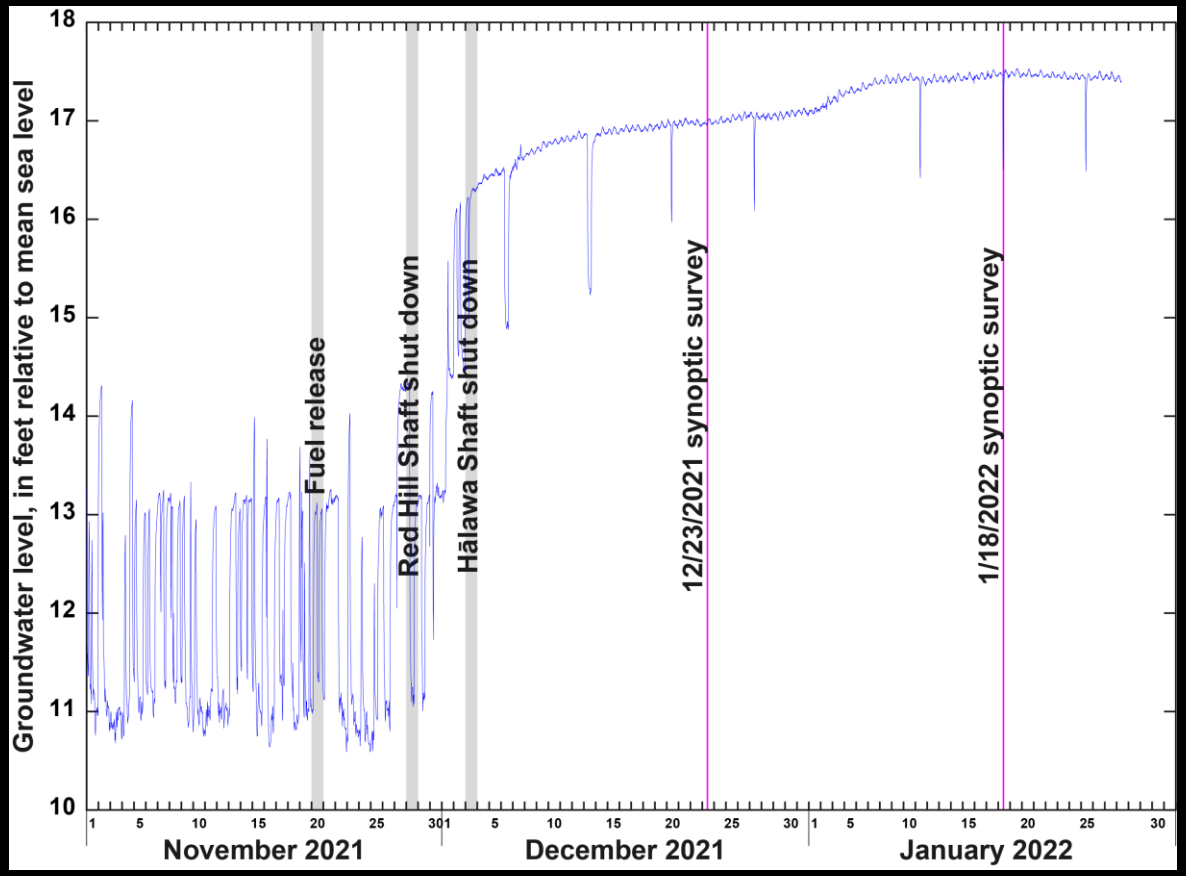
Background

1. Red Hill Bulk Fuel Storage Facility fuel release, November 20, 2021
2. Red Hill Shaft shut down, November 28, 2021
3. Hālawa Shaft shut down, December 3, 2021

Hālawa Shaft hydrograph



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Objective

1. Measure groundwater levels in the Red Hill area while large production wells are shut down

2. Measure streamflow conditions prior to and during U.S. Navy discharge of granular activated carbon (GAC) filtered water from Red Hill Shaft into South Hālawa Stream

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Multi-Agency Synoptic Groundwater-Level Surveys

1. Measured groundwater levels in 30 wells during a 3-hour period (9:00 a.m. to 12:00 p.m. Hawai‘i Standard Time)
2. Followed standard protocol using calibrated measuring tapes
3. Provided data in publicly accessible database at https://waterdata.usgs.gov/nwis

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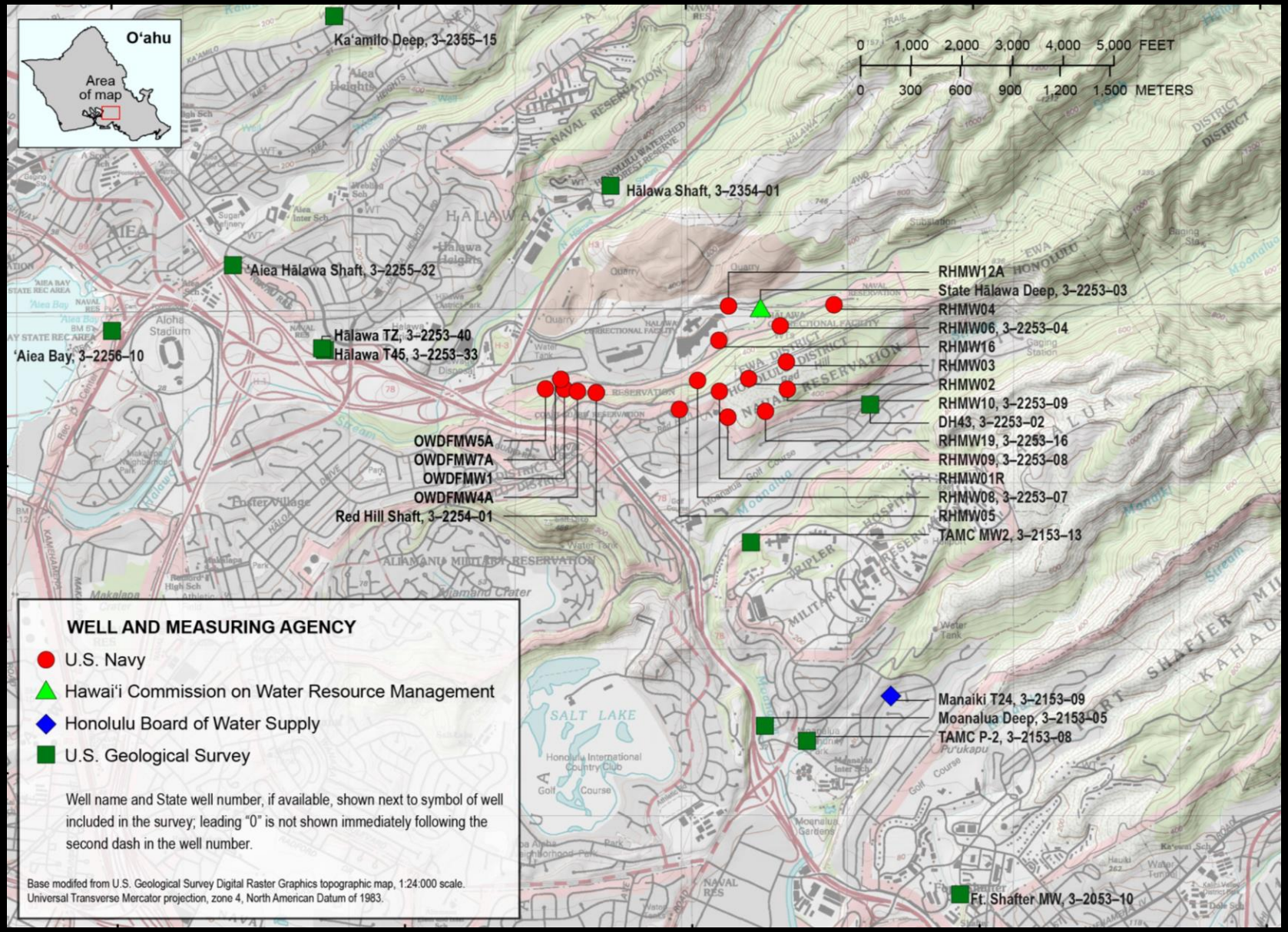
Synoptic Survey Wells, 12/23/2021



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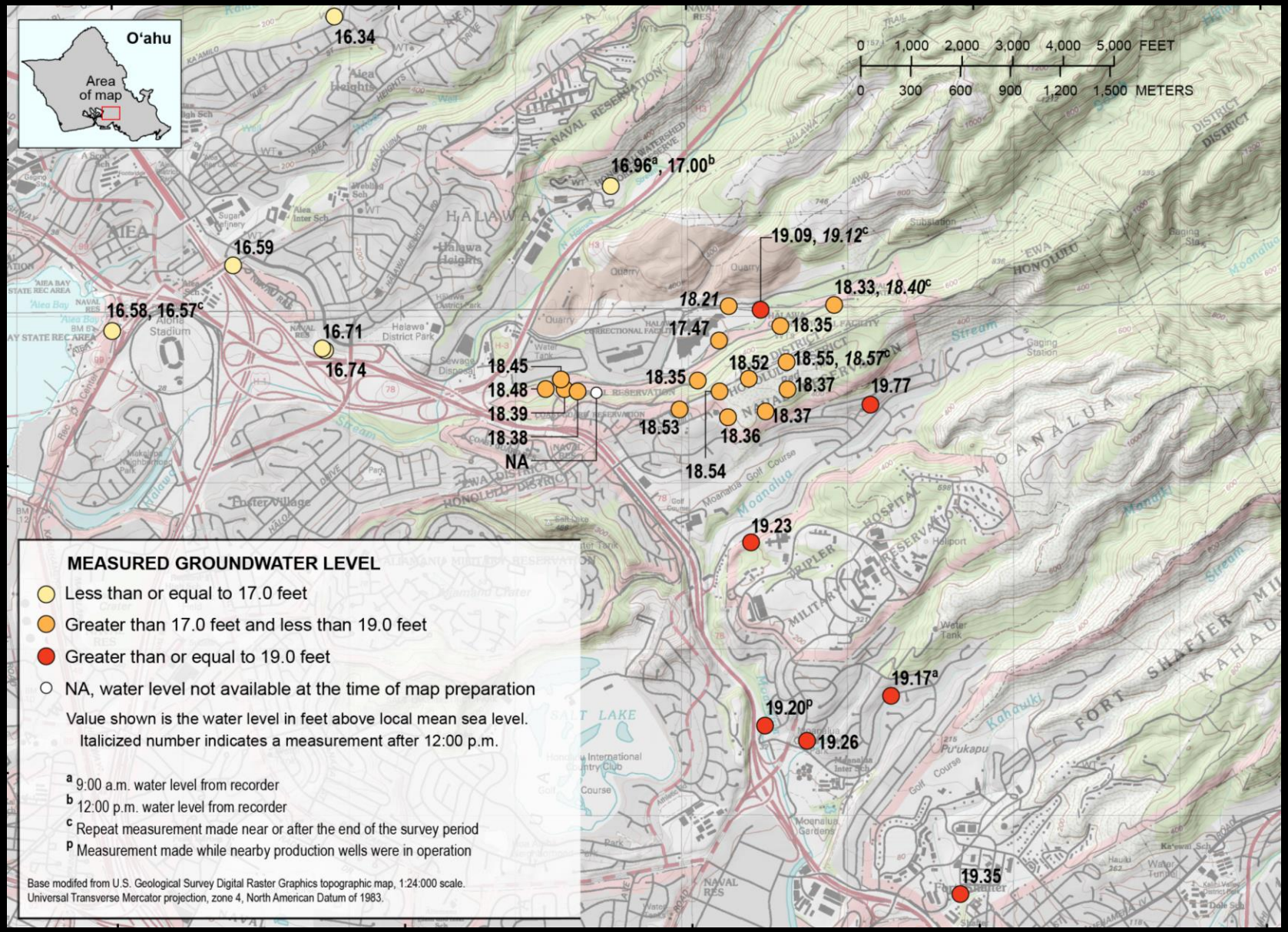
Synoptic Survey Groundwater Levels, 12/23/2021



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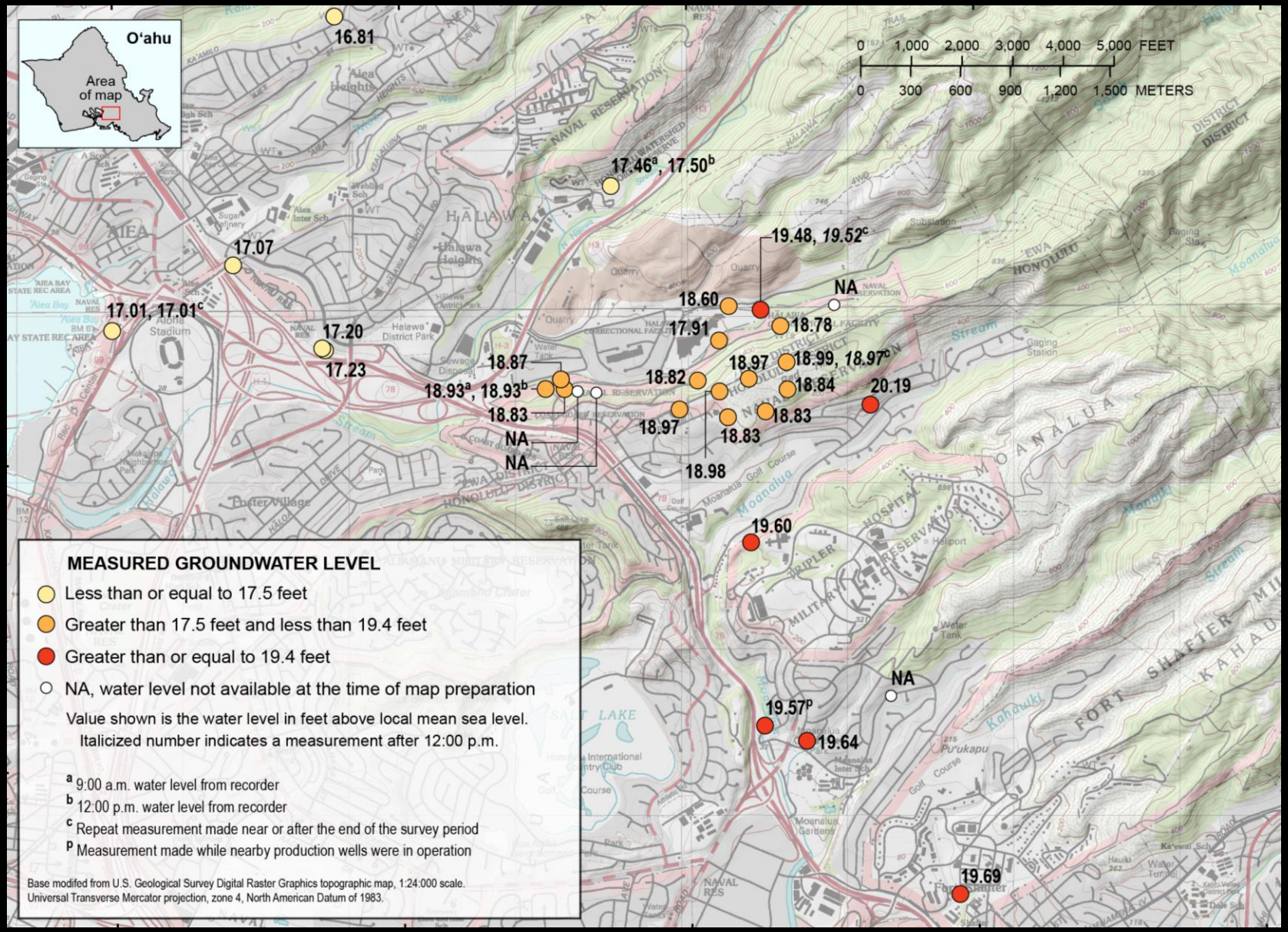
Synoptic Survey Groundwater Levels, 1/18/2022



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Synoptic Survey Uncertainties and Limitations

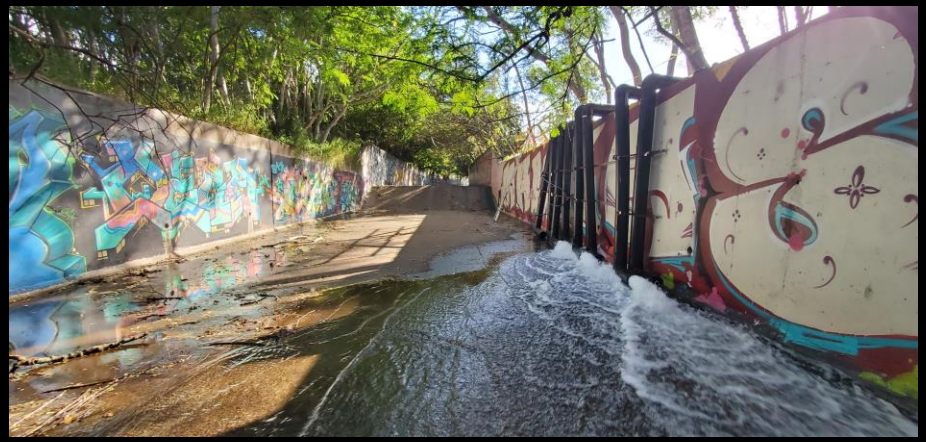
1. Surveyed altitudes of measuring points may be uncertain
2. Deep wells may not be perfectly vertical
3. Measuring tapes need to be recalibrated
4. Hydrologic conditions during the survey may be changing
5. Human errors

Seepage Runs

1. Measured streamflow at selected sites in a stream reach/section on the same day, generally during low-flow conditions (seepage run)

2. Difference in streamflow between two sites indicates water gain or loss in the stream reach between sites (provided no diversions, tributaries, or other inflows/outflows affect streamflow in the reach)

3. Provided data in publicly accessible database at https://waterdata.usgs.gov/nwis



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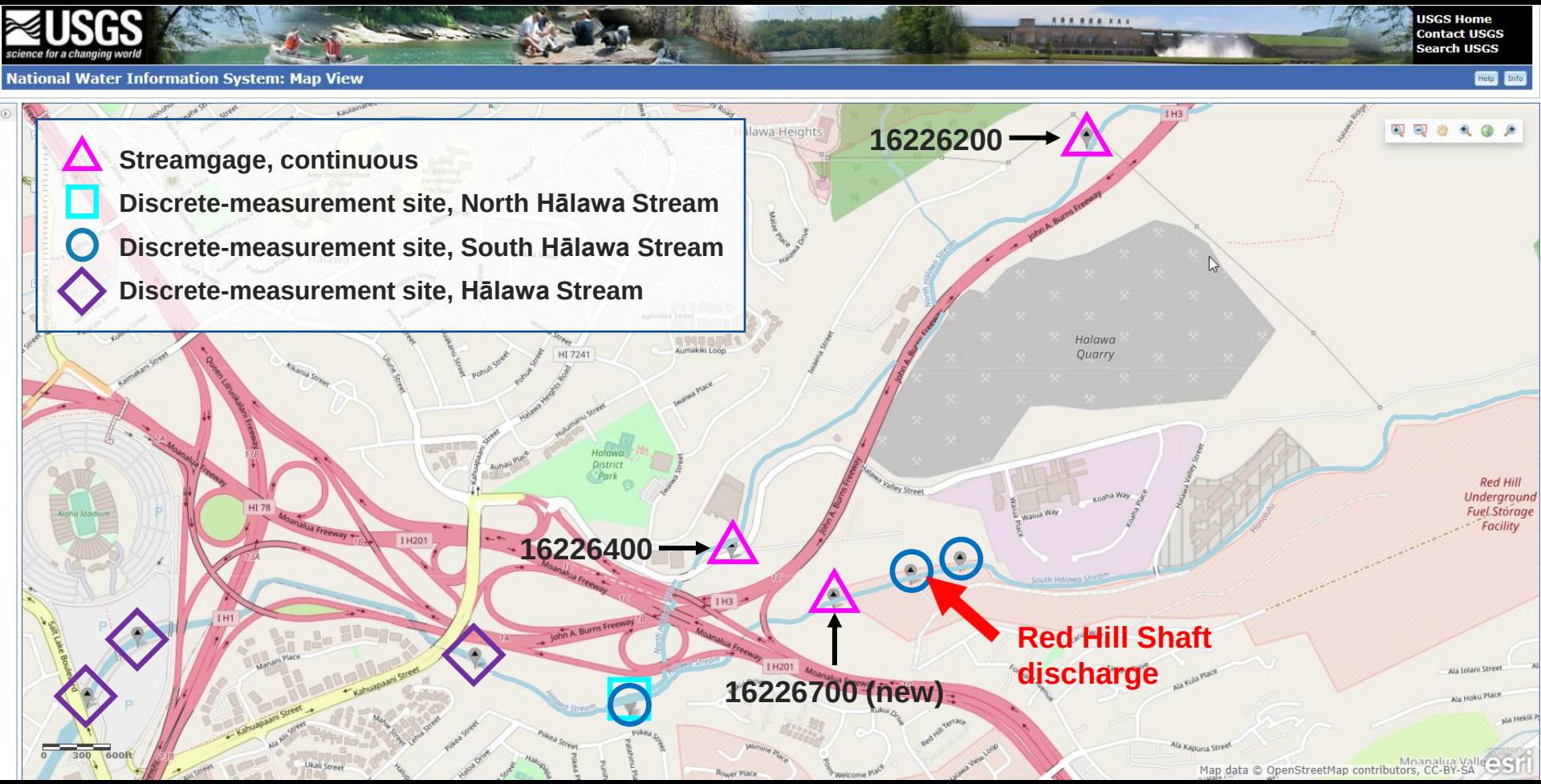
Hālawa Stream Sites



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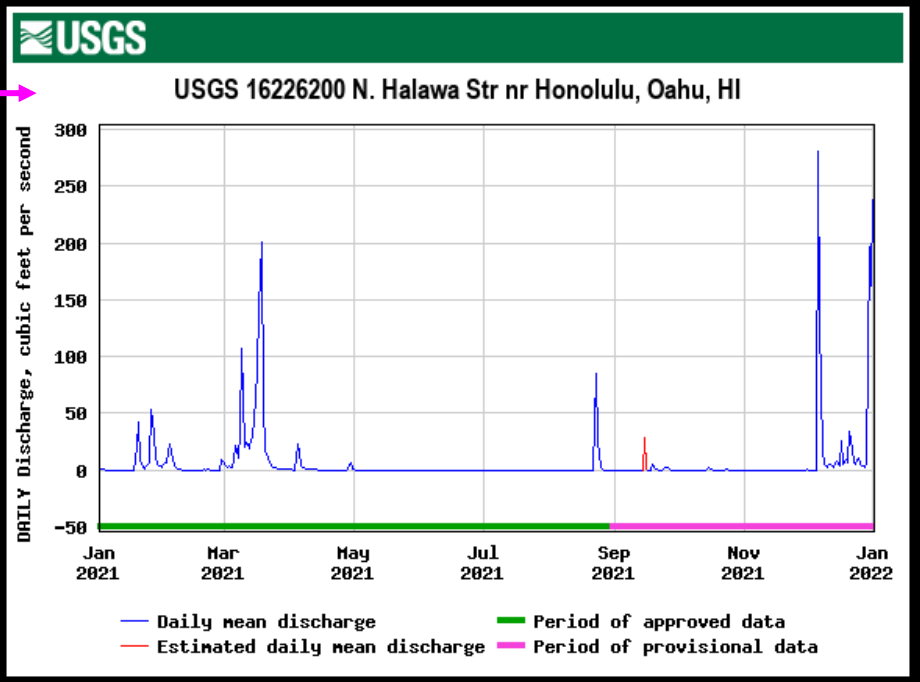
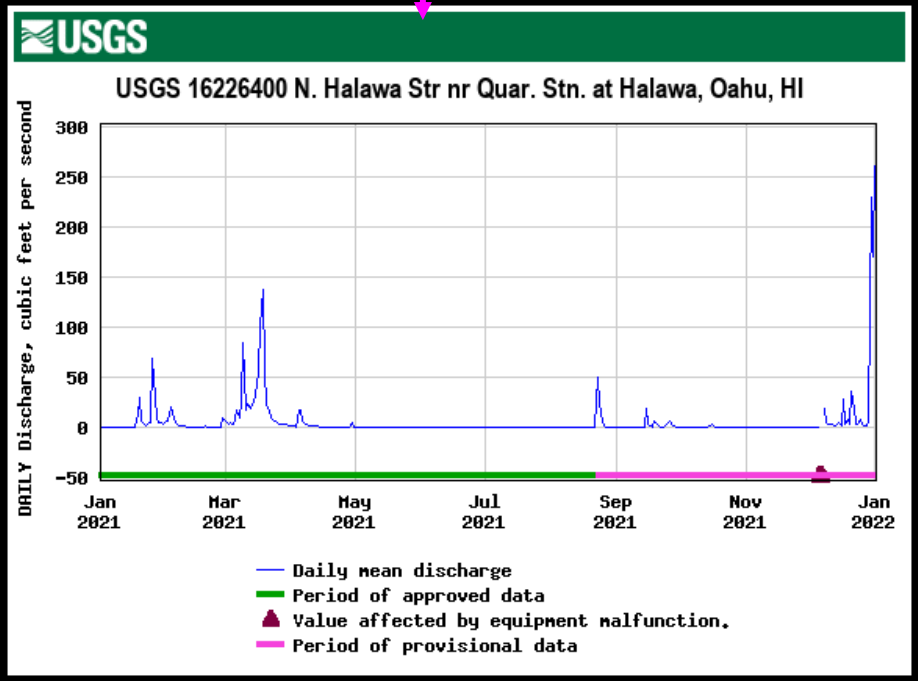
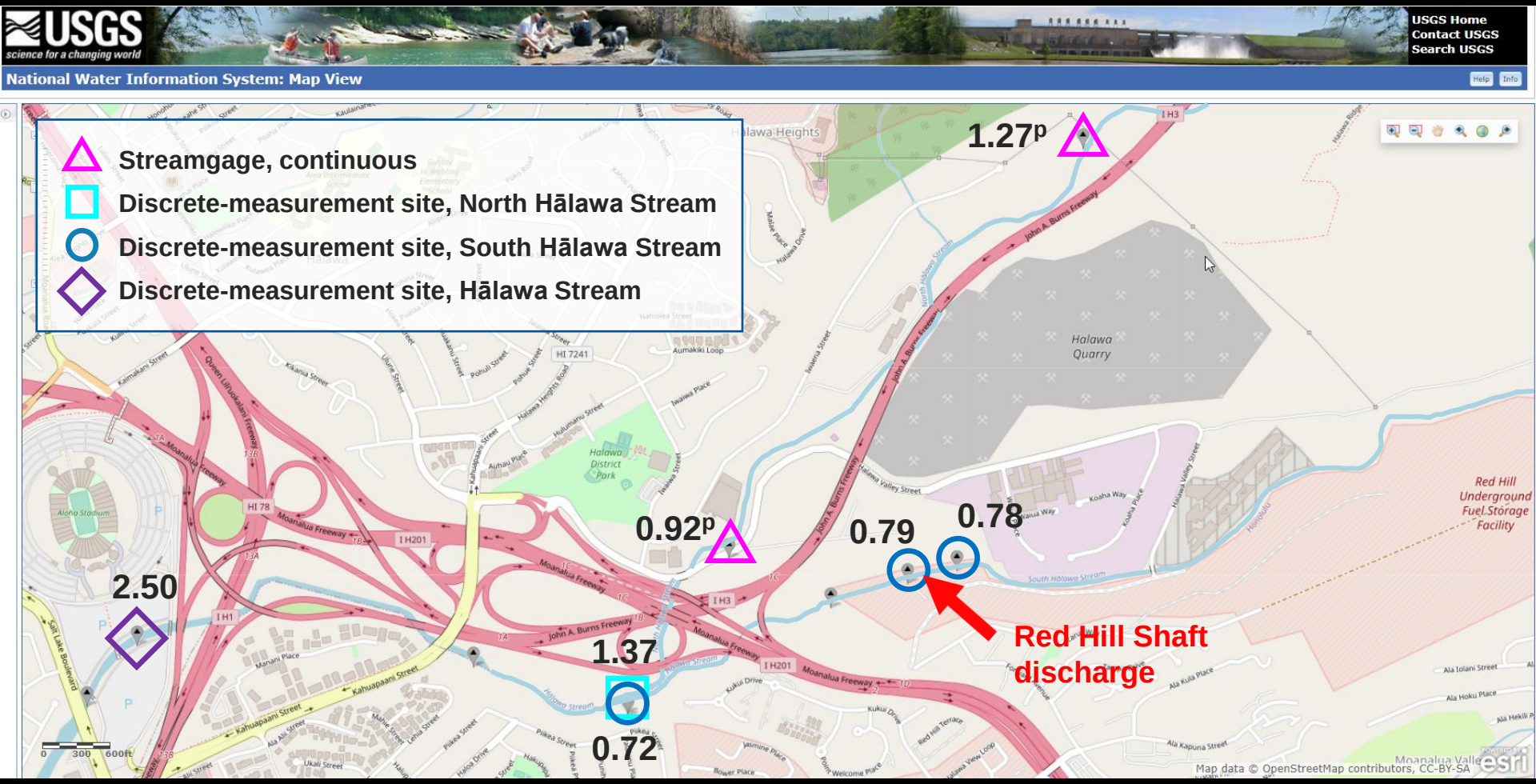
Intermittent Streamflow at North Hālawa Streamgages





Pre-Discharge Seepage Run, 12/28/2021



Indicated discharge values are in million gallons per day

pProvisional daily mean value

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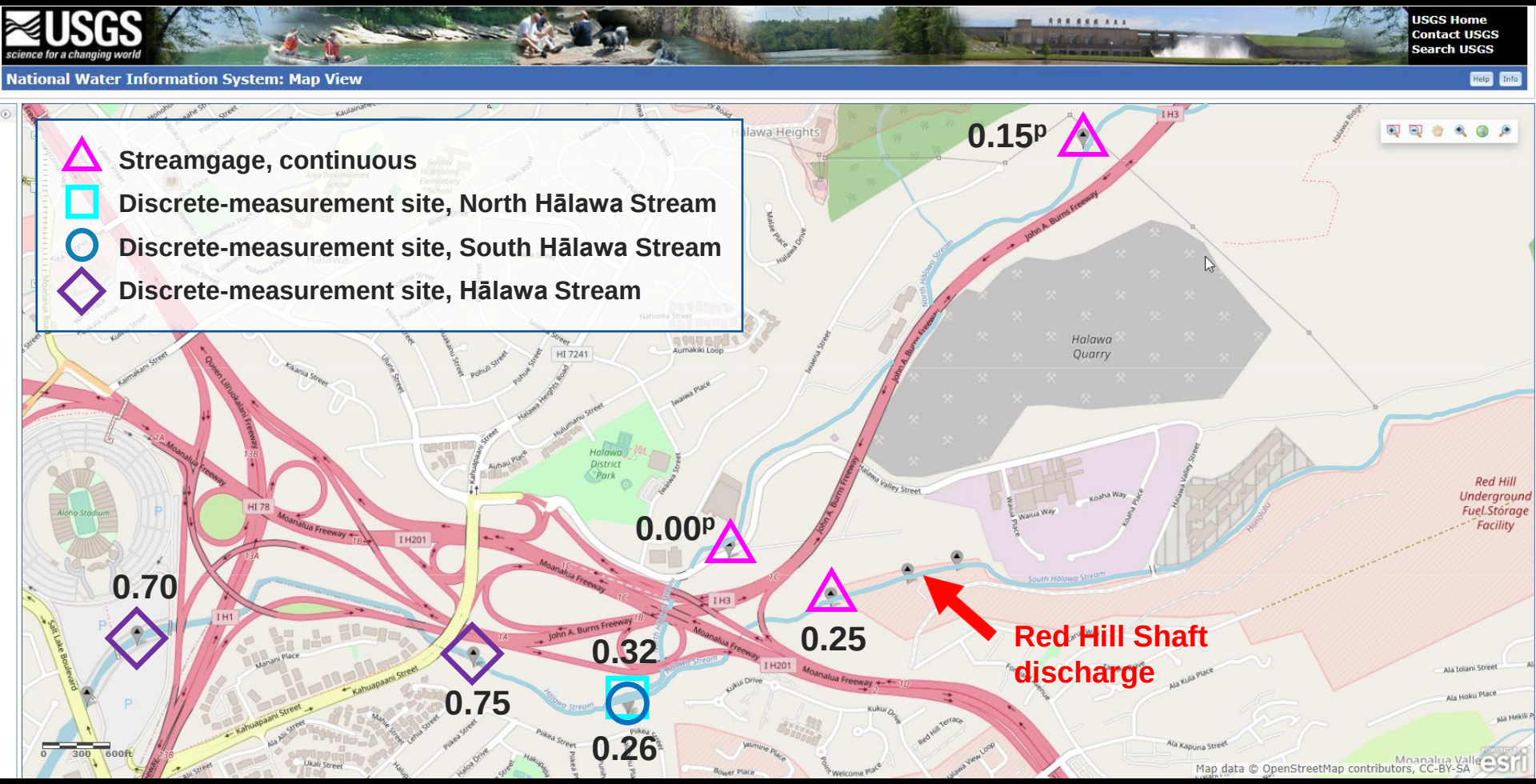
Pre-Discharge Seepage Run, 1/19/2022



Indicated discharge values are in million gallons per day

pProvisional daily mean value

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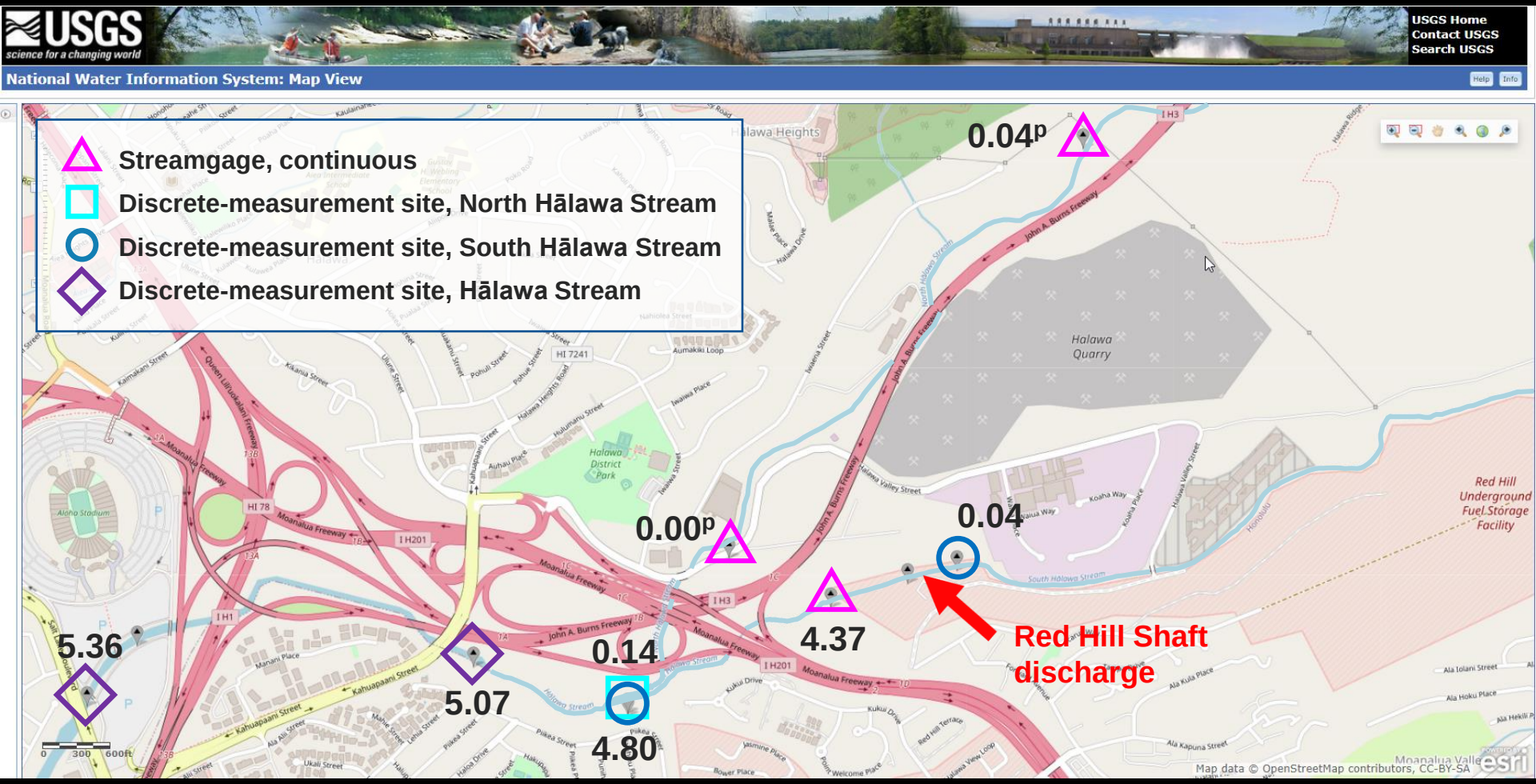
Post-Discharge Seepage Run, 2/4/2022



Indicated discharge values are in million gallons per day

pProvisional daily mean value

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Summary and Conclusions

1. Synoptic groundwater-level surveys provide a snapshot of conditions at the time of the measurements
    - Water levels generally highest southeast of Moanalua Valley and lowest northwest of North Hālawa Valley
    - Water levels on January 18, 2022, are higher than water levels on December 23, 2021
2. Seepage runs were made following a period of rainfall during December 2021
    - Continuous data from streamgages indicates intermittent flow in North Hālawa Stream
    - Streamflow is spatially and temporally variable

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Mahalo

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