



Transmittal Letter, October 5, 2023

To: Jason Fine, Technical Officer, jmfine@usgs.gov

Cc: Sherri Bredesen, Contracting Officer, sbredesen@usgs.gov

From: Viki Zoltay, Hydrologist, Office of Water Resources, Department of
Conservation and Recreation, Commonwealth of Massachusetts

Subject: Final Report, G21AC10417 titled Continued Modernization and Maintenance of the
Massachusetts NGWMN

Mr. Fine:

Please find enclosed an electronic copy of the Final Report for Grant G21AC10417 titled
Continued Modernization and Maintenance of the Massachusetts NGWMN.

Sincerely,

Viki Zoltay
Hydrologist, DCR Office of Water Resources

COMMONWEALTH OF MASSACHUSETTS · EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS

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Executive Office of Energy & Environmental Affairs

Brian Arrigo, Commissioner
Department of Conservation & Recreation

Final Report

Project Summary Information

- 1. Project Title:** Continued Modernization and Maintenance of the Massachusetts NGWMN.

Work included the upgrading to real-time data provision for 32 existing monitoring wells in the network. In addition, research was completed to compile all available metadata for all wells in the Massachusetts network.
- 2. Technical Contact:** Viki Zoltay, Hydrologist
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- 3. Authorized Institutional Representative** Norma Forgione, Federal Funds Officer
Massachusetts Department of Conservation and Recreation
Administration and Finance
251 Causeway Street
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617-626-1368, Norma.Forgione@state.ma.us
- 4. Effective Grant Dates:** July 15, 2021 – July 14, 2023
- 5. Data Provider Status:** Existing Data Provider. The MA groundwater observation program, with records back to 1936, pre-dates the NGWMN. As part of the state cooperative program the USGS has provided data to the NGWMN since it was formed in 2013. The NGWMN utilized most of the Massachusetts observation wells already being measured in 2013. This is the second NGWMN grant being completed by Massachusetts.

Completed Work

We contracted with the University of Massachusetts – Amherst and completed the following tasks for this grant under Objective 3:

- Located and entered metadata for the 125 Massachusetts wells in the network from a variety sources including USGS electronic and paper files, University of Massachusetts-Amherst paper files, Massachusetts Department of Environmental Protection database, the state surficial geology map and field trips.
- Provided two electronic files to the USGS New England Water Science Center: 1) well characteristics with color coding for missing fields and 2) well lithology noting the source of newly populated fields
- USGS New England Water Science Center is now working on uploading these data to NWIS which will then populate the NGWMN database at the next refreshing of data

We completed the following tasks for this grant under Objective 6A:

- Contracted with Campbell Inc. and purchased 32 transducers, 32 data loggers, 32 solar panels, 27 sets of cellular telemetry parts, 32 rechargeable batteries, and 4 weather resistant enclosures;
- Contracted with FTS for 5 sets of satellite telemetry parts; and
- Began installing telemetry equipment in the 32 wells specified in the proposal.
- The table below shows the upgrade status of each well including planned completion for each well that is not yet upgraded to real-time. Multiple challenges were encountered as described in the table and under the next section, Deviations from Proposal.

Site Number	Site name	Status
411555070021901	MA-NBW 228 NANTUCKET, MA	Upgraded
413525070291904	MA-MIW 29 MASHPEE, MA	Upgraded 09/14/23
414026070572801	MA-NGW 116R NEW BEDFORD, MA	de-watering at airport, not useable well. MA-MJW 76 414102070510701 will be upgraded to replace this well.
414154070165002	MA-A1W 247R BARNSTABLE, MA	In process of being upgraded- Need formal property rights, have verbal agreement.
414518070015801	MA-BMW 21R BREWSTER, MA	Upgraded 03/08/23
414518070435701	MA-WFW 51 WAREHAM MA	Landownership contact has been contacted, waiting for gage shelter construction approval. The well is located in the front yard of private residence.
414706071045001	MA-F3W 23R FREETOWN, MA	Upgraded 03/09/23

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Site Number	Site name	Status
415217070393102	MA-PWW 494 PLYMOUTH MA	Upgraded 12/13/22
415228070554601	MA-LKW 14 LAKEVILLE MA	In the process of upgrading- well is in a current construction zone, will be done with a temp set up incase construction begins
415449071155201	MA-ATW 83R ATTLEBORO, MA	In process of being upgraded- site is located on future soccer field, will be done with a temp set up incase construction begins
420056070575701	MA-EBW 30 EAST BRIDGEWATER MA	In process of upgrading, need formal property rights
420317070432901	MA-D4W 80 DUXBURY MA	Upgraded 12/13/22
420355070520201	MA-HGW 76R HANSON MA	To be upgraded
420912072042801	MA-OTW 7R OTIS, MA	Upgraded 3/21/23
420924072422602	MA-WVW 152 WESTFIELD MA	To be upgraded
421228072585301	MA-BEW 9 BLANDFORD MA	To be upgraded
421438071165601	MA-DVW 10R DOVER, MA	Upgraded 02/24/21
421550073025101	MA-A3W 12 BECKET, MA	Upgraded 3/20/23
421851071312601	MA-SSW 12 SOUTHBOROUGH, MA	Upgraded 12/8/22
422103072241102	MA-PDW 23 PELHAM, MA	Upgraded 05/16/23
422520071483001	MA-SYW 177 STERLING MA	Upgraded 11/17/22
422559072332402	MA-S6W 68 SUNDERLAND MA	Upgraded 9/27/23
422627071154002	MA-LTW 104 LEXINGTON MA	Upgraded 12/05/22
422650071213801	MA-CTW 167R CONCORD MA	Upgraded 12/05/23
422819071065701	MA-XOW 14 WINCHESTER MA	Well located in backyard of private residence, verbal confirmation, need formal confirmation.
423257071243702	MA-WWW 160 WESTFORD, MA	Upgraded 02/25/21
423311072355801	MA-DFW 44R DEERFIELD MA	To be upgraded

Site Number	Site name	Status
423339072524101	MA-HMW 8 HAWLEY MA	Upgraded 08/23/22
423503073075401	MA-CJW 2 CHESHIRE, MA	awaiting land owner response
423641071102501	MA-AJW 462 ANDOVER, MA	To be upgraded
423845070542501	MA-TQW 1 TOPSFIELD, MA	Landowner does NOT want a real time gage shelter on property. Equipment will be moved to reactivated well MA-XGW 4 421120070562801
424322070592201	MA-GCW 168R GEORGETOWN, MA	Well impacted by pumping. Will be replaced with WZW 216 -424806070572101. Adding to CRN

Deviations from Proposal

The completed work above includes deviations from the proposal in that 7 additional locations were able to have cellular telemetry rather than satellite telemetry. As such 7 sets of additional cellular telemetry parts were bought and the satellite telemetry sets were reduced by 7. See tables below for details. All telemetry equipment were part of in-kind funding.

ORIGINAL:

cell telemetry - cell 210	\$900.00	20
cell telemetry - whip antenna	\$42.00	20
cell telemetry - null modem	\$11.00	20
satellite telemetry - SatLink3 Lite, minus data logger cost	\$1,656.00	12

REVISED

cell telemetry - cell 210	\$900.00	27
cell telemetry - whip antenna	\$42.00	27
cell telemetry - null modem	\$11.00	27
satellite telemetry - SatLink3 Lite, minus data logger cost	\$1,656.00	5

Once the equipment was bought, we had two significant issues with respect to upgrading NGWMN wells to real-time. One was contacting property owners to secure permission given the visual impact of telemetry equipment and the second was wells impacted since their original designation as CRN/NGWMN wells. There are 17 wells that were successfully upgraded and are serving real time data. Five wells have been resolved for issues and are awaiting upgrading. There are 10 wells that have property permission and/or impact issues. Where impact was detected or a property owner denied permission, an alternate, existing CRN well was designated for real-time transmission as noted in the previous table of well status summary. USGS New England Water Science Center in collaboration with state staff are screening all CRN/NGWMN wells for impact and will remove those with confirmed impacts from both 'least impacted' networks (i.e., CRN and NGWMN). We are also screening wells that have been installed since the original 1990s CRN/NGWMN designation that may qualify for 'least impacted' status and

hopefully cover gaps left by wells that are now impacted. This screening process for inclusion/exclusion of wells due to impact requires the installation of hobo sensors to record data in monthly, manually measured wells for a few months and the analysis of the resulting data. To complete this for the entire network was not originally planned and has proven to take a long time to complete; however, it is necessary in order to continue to provide quality data for both CRN and NGWMN.

We anticipate that in the next 6 months all the reconnaissance work regarding impact levels in wells will be completed and we will send an updated list of CRN wells to the NGWMN. In the same time frame, we also anticipate completing remaining property permissions and upgrading them to real-time. The result will be a newly verified network of 'least impacted', real time wells for the CRN and NGWMN.

Finally, not all funds were expended because the estimates provided by the USGS New England Water Science Center proved higher than rates available to the State.