Appendix E: Summary of Technical Work Completed for the Oregon Water Data Portal Phase 2

The technical team for the Oregon Water Data Portal Phase 2 made substantial progress in platform selection, data standards, data integration, and portal development. The following summary integrates key actions, decisions, and outcomes from the technical team throughout the biennium.

Platform exploration and selection

- The team evaluated multiple front-end and data management platforms, including Socrata/Data & Insights, ESRI Hub, ESRI Experience Builder, CKAN, and custom web applications (ReactJS, Angular, Vue).
- Following exploratory testing and evaluation, ArcGIS Hub was chosen as the primary platform for the pilot portal because it closely aligns with Oregon's enterprise geospatial infrastructure, offers robust data federation features, and facilitates seamless integration with ArcGIS Online and Enterprise resources. Additionally, ArcGIS Hub's capability to create a context-specific site and assign a custom domain URLs for hosting the OWDP further supported its selection as the preferred solution.
- Future evaluation of the pilot portal based on the ArcGIS Hub as the long-term platform should be done to assess the strengths and weaknesses in fulfilling the OWDP long term vision in subsequent phases.

Data standards and interoperability

- A sub-group focused on data standards, referencing the Oregon Open Data Technical Standards Manual and the Internet of Water recommendations.
- The team worked to harmonize metadata, tagging, and schema standards across agencies, aiming for minimum required fields and consistent geospatial references.
- Efforts included developing template upload systems for tabular data and mapping data types to corresponding standards, with ongoing coordination between technical and subject matter expert teams.
- The team leaned toward adopting the IoW standard for data ingest and interoperability, including semantic web identifiers and cross-organization data dictionary alignment.

Data integration and harvesting

The Oregon Water Data Portal utilizes a modern, standards-based architecture to deliver near real-time access to water observation data across the state. The system integrates the FROST Server-an implementation of the OGC SensorThings API-with pygeoapi, an open-source framework for serving geospatial data via OGC APIs.

Core components and data flow

- The FROST Server ingests and manages sensor data from multiple Oregon water data providers. For this pilot, automated data pipelines were established to collect stream gauge flow and temperature data from the Oregon Water Resources Department, as well as temperature data from the Oregon Department of Environmental Quality's AWQMS database.

- All ingested data is stored in a robust, scalable PostgreSQL/PostGIS database, enabling efficient support for both time-series and spatial queries.
- pygeoapi serves as the API gateway, connecting directly to the FROST Server and exposing the sensor data through standardized OGC API endpoints.

Key capabilities

- Near real-time data ingestion from distributed water data providers.
- Interoperability with external systems and applications via open standards.
- Scalable deployment, leveraging cloud-native technologies for reliability and performance.

To demonstrate the capabilities of this integrated architecture, custom Python scripts were developed to utilize pygeoapi for updating feature services, which are then incorporated into web maps featured on the Oregon Water Data Portal. This approach ensures that water information is timely, accessible, and reliable for researchers, policymakers, and the public, supporting informed decision-making and resource management.

Initial data and content development

Given the choice of using ESRI's Hub as the presentation level for the OWDP, adding existing water related content on the State's ArcGIS Online Organization was straightforward by sharing existing content with the same group that the OWDP Hub site uses for content. This made the ability to quickly add a number of authoritative datasets from the State's GeoHUB straightforward and allowed for the stewards to still maintain control of their resource versus making a duplicate for the water data portal.

In addition to existing datasets available through the State's ArcGIS Online, additional seed datasets were identified by Internet of Water for adding to the OWDP. This included, 3D Hydrographic Data, National Inventory of Dams (Oregon subset), OWRD hydrologic data (streamgages, groundwater), and layers from the Oregon Explorer's Oregon Water Map Viewer (Beta).

A topic hierarchy and tagging/thesaurus structure were established to improve discoverability and organization within the portal. Due to current limitations of the ArcGIS Hub site, the tagging structure is only visible in the Atlas viewer and not in Hub site searches. This limitation has been reported to ESRI for future enhancement.

Portal development

A sub group was formed to develop the OWDP site structure and look and feel. The sub-group determined that due to the inability of the Hub site to facet searches based on the tagging structure developed by Internet of Water that creating some site navigation along the high levels of the tagging structure might be another way to guide users in finding data and tools and provide the opportunity to educate users on the water category topics. External subject matter experts were brought in to review the water categories of groundwater, surface water, water quality, water quantity, and infrastructure.

The ESRI Hub site includes support and recommendations to comply with accessibility standards. The pages were run through accessibility checks to ensure conformance with current best practices.

Map viewer development

One deliverable from this phase of the project was to develop a geospatial component to view data in the OWDP. Selecting the ESRI Hub site as the platform provides built-in geospatial viewing of data in feature services and allows for the download of some data. In addition to the built-in functionality, a map viewer that could view multiple data at the same time was desired. Multiple map viewer platforms were explored including

Experience Builder and VertiGIS Web Viewer. In the end, using an ESRI Instant Application with the Atlas template provided a simple way to view layers and web maps shared in the Oregon Water Data Portal content group in a map viewer where users can add any layer available in the OWDP to an interactive map. The resulting map viewer is called the [Oregon Water Data Portal Atlas](#).

In summary, the OWDP technical team delivered a standards-driven, interoperable, and automated pilot portal using ArcGIS Hub, successfully integrating priority water datasets from multiple agencies and establishing a scalable foundation for future expansion and long-term sustainability.

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age, sex, religion, sexual orientation, gender identity, or marital status in the administration of its programs and activities. Visit DEQ's [Civil Rights and Environmental Justice page.](#)