ESRI
EXTERNAL

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DHIS2 to ArcGIS Connector

DHIS2 to ArcGIS Connector App v0.1 and DHIS2 Custom Data Feed v0.1

User Manual

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Contents

Introduction

Background

In recent years, geospatial data and visualization have become integral to analysis, decision-making, and communication. The **DHIS2 to ArcGIS Connector App**—developed using the DHIS2 app development framework—enables users to seamlessly integrate their DHIS2 data into the ArcGIS system through a live, no-code connection. Available in the **DHIS2 App Hub**, this app bridges the gap between DHIS2 data management and the powerful spatial analytics and visualizations in the ArcGIS System.

The app addresses a critical need for interoperable systems that enhance the value of data. It augments the capabilities of the DHIS2 Maps app and unlocks new opportunities for data storytelling, decision support, and stakeholder engagement.

For additional information on ArcGIS access, DHIS2 users can explore Esri's offerings **here**.

This app is an open-source project powered by Esri but is not a supported Esri Product. Learn more about contributing to the project at the **Esri GitHub for the DHIS2 to ArcGIS Connector App** and **Esri GitHub for the DHIS2 Custom Data Feed**.

Prerequisites

Before you begin, ensure you have:

- A **DHIS2 instance** (2.37 or higher recommended)
- An **ArcGIS Enterprise account** (11.4 or higher recommended) with Custom Data Feed Runtime configured on the hosting server
    - Note: If you have an ArcGIS Enterprise instance that does not have Custom Data Feeds configured, follow these instructions to configure them on your hosting server (administrative access required)
- Setting up the DHIS2 to ArcGIS Connector app requires admin access to the ArcGIS Enterprise instance. Once the app has been set up and configured, all users in the DHIS2 – ArcGIS Enterprise environments will have access to use the connector app.

DHIS2

DHIS2 is a free and open-source platform for collecting, reporting, analyzing and disseminating aggregate and individual-level data. Most commonly used for health data, DHIS2 can be implemented for individual health programs or as a national-scale health management information system. Officially recognized as a Digital Public Good, DHIS2 is also used in sectors such as education, logistics, sanitation, and land management, among others.

DHIS2 is widely used globally, particularly in low-resource settings, to strengthen health and other information systems and improve data-driven decision-making. Its open-source nature, flexibility, and scalability make it a valuable tool for managing data and improving outcomes. Looking ahead, the use cases of DHIS2 are expanding to education, land administration, and logistics. For full DHIS API Documentation and use please visit: (https://docs.dhis2.org/en/home.html)

The ArcGIS System

ArcGIS is a comprehensive geographic information system (GIS) developed by Esri that enables users to create, manage, analyze, and share spatial data. ArcGIS delivers industry-leading mapping and analytics to your infrastructure and the cloud. It provides powerful tools for mapping and visualizing data, uncovering patterns, and making data-driven decisions across sectors such as health, environment, urban planning, logistics, and more.

ArcGIS includes a suite of products that work across desktop, web, mobile, and enterprise environments—such as ArcGIS Online, ArcGIS Pro, and ArcGIS Enterprise—allowing users to build interactive maps, dashboards, and geospatial applications. Whether used for field data collection, real-time monitoring, or predictive modeling, ArcGIS supports evidence-based planning and collaboration with location intelligence at its core.

ArcGIS Enterprise

ArcGIS Enterprise is Esri's comprehensive geospatial platform designed for organizations that need to manage, analyze, and share spatial data securely within their own IT environment. It includes powerful tools for mapping, data visualization, spatial analytics, and collaboration. Built on a scalable architecture, ArcGIS Enterprise supports advanced workflows, real-time data integration, and customizable apps—all while maintaining control over data privacy, infrastructure, and user access.

This app allows DHIS2 users to leverage their data in the ArcGIS system using a direct connection to an ArcGIS Enterprise instance that maintains data hosting in their DHIS2 instance. The app uses a no-code interface to allow for seamless interoperability. The connection is formed through custom data feeds. View the GitHub repository for the [DHIS2 Custom Data Feeds] (https://github.com/ArcGIS/dhis2-custom-data-feeds) for more information.

Privacy and Security

The ArcGIS Connector uses OAuth 2.0 for secure user authentication with your ArcGIS Enterprise deployment. For more information, please see the documentation. Access to data within the app respects the user permissions defined in DHIS2, ensuring users only see what they're authorized to view. The connector establishes a live, authenticated data feed from DHIS2 to the ArcGIS system—without duplicating or storing the data externally. Unless explicitly exported or copied, all data remains securely within the DHIS2 instance. Any changes made—such as edits or deletions—are automatically reflected in ArcGIS, preserving data integrity and synchronization.

Setting up the DHIS2 Custom Data Feed in ArcGIS Enterprise

Install Custom Data Feeds

To use the dhis2 CDF providers, you must install Custom Data Feeds onto your ArcGIS Server Machine and install the ArcGIS Enterprise SDK on your development machine. Your development machine can be your own laptop.

In general, you install Custom Data Feeds by:

1. Install the ArcGIS Server Custom Data Feeds Runtime on each machine in your ArcGIS Server site.
2. Install the ArcGIS Enterprise SDK on your development machine. **Make sure that the optional CDF command line tool (CDF CLI) is installed**.
3. Ensure that the version of Node.js on your machine is compatible with your version of ArcGIS Enterprise.
    - Refer to the documentation for supported Node.js versions
    - In a terminal, you can check your node version with the command `node -v`
4. Ensure that the CDF CLI is installed. In a terminal, run the command `clf -h`.

- If you see a "command not found" error, you may need to activate the CDF CLI.

Complete instructions for installing Custom Data Feeds are available in the ArcGIS Developer Documentation.

Configure and Publish Your Provider

After installing the ArcGIS Server Custom Data Feeds runtime and setting up your development machine, you must configure your providers.

1. **Create your Custom Data App on your Development Machine**
    1. Open a terminal and navigate to the directory where you will configure your dhis2 Custom Data Feed providers.
    2. Run the command `cdf createapp <app-name>`.
2. **Install the dhis2 Custom Data Feed Providers**
    1. In your terminal, navigate to the new directory created by the CDF CLI. This directory should matched what you passed as `<app-name>`
    2. Create a new directory named `providers` and navigate to it in your terminal
    3. Clone this repo *into* the providers directory e.g. (be sure to include ".") `git clone https://github.com/ArcGIS/dhis2-custom-data-feeds.git .`
        1. Your `providers` directory should now contain a sub directory for each dhis2 cdf provider.
    4. In your terminal navigate to each provider directory (e.g. `analytics`) and run the command `npm install`

Configure the Providers

5. Open your CDF App directory in your IDE of choice
6. Go the `config` directory create a new file named `default.json`
7. Open `default.json` and add the following:

```
{ "DHIS2_KEY": "YOUR_ACCESS_TOKEN", "DHIS2_API":
"DHIS2_API_URL" }
```

Be sure to set `DHIS2_API` as the full base url to your dhis2 instance's Web API e.g. `https://<your-dhis2-instance>/dhis/api/40`

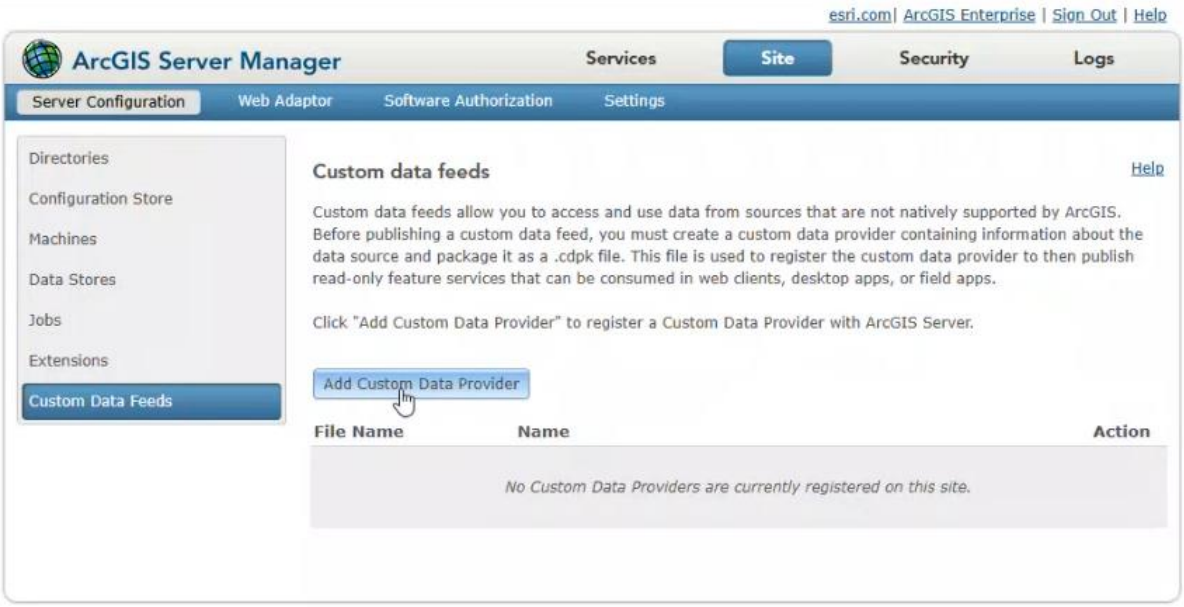
Publish the Provider

1. In your terminal, stop the node server if it is running.
2. In your terminal, navigate to the directory created by the CDF `createapp` command
3. For each provider, run the command `cdf export <provider-name>`. The `<provider-name>` is the name of the provider's directory e.g `anlaytics`
4. For each provider you should now see a file named `<provider-name>.cdpk` e.g. `analytics.cdpk`

Register Your Custom Data Feed Provider

1. Download the latest version of the DHIS2 Custom Data Feed from GitHub.
2. In the browser, navigate to https://[arcgisenterprisename].com/server/manager
3. Log in with the administrator credentials.
4. Select **Site**.
5. Select **Server Configuration**.
6. Navigate to **Custom Data Feeds**.

7. Select **Add Custom Data Provider**.



8. Add the .cdpk file you created in step 4 of [Publish the Provider]

9. The Custom Data Provider should now connect directly to DHIS2 once you add the app and configure the connection.

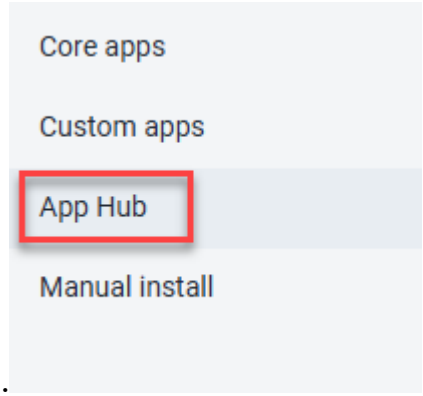
Using the DHIS2 to ArcGIS Connector App

Install the App

1. Log in to your DHIS2 Training Instance.
2. Navigate to **App Management**.

App Management

3. Open the **DHIS2 App Management**.

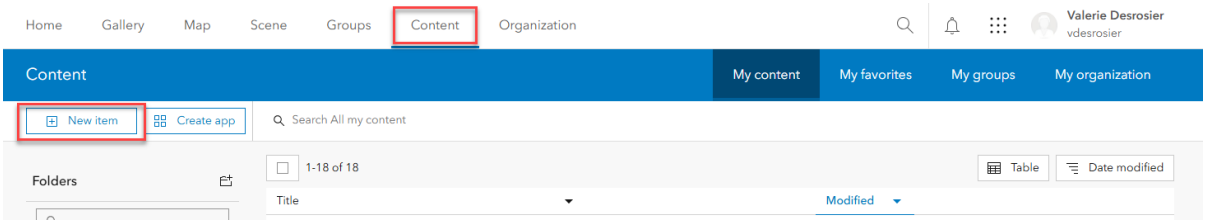


4. Navigate to the **App Hub**.
5. In “Search AppHub Apps” search for the **DHIS2 to ArcGIS Connector app** and add it.
6. Once added, you will find it in your list of DHIS2 apps.

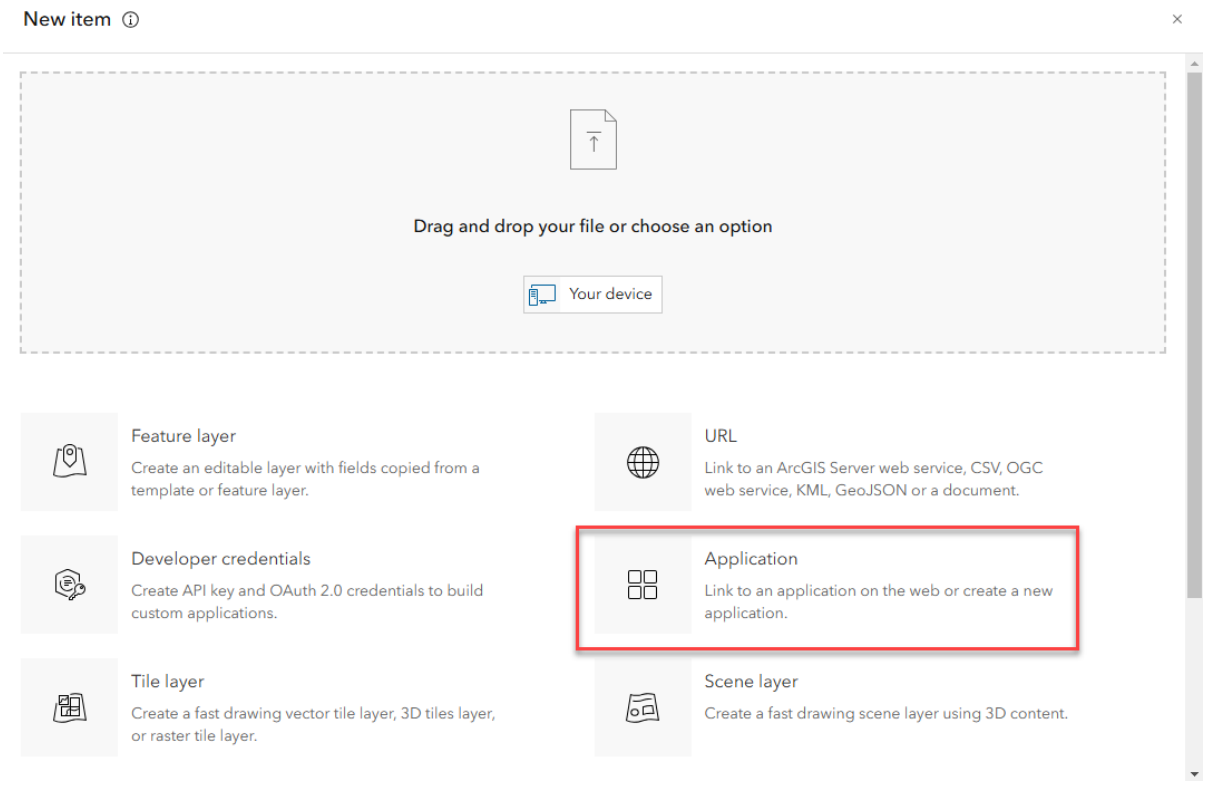
Configure the DHIS2 and ArcGIS Connection

DHIS2 ArcGIS Connector

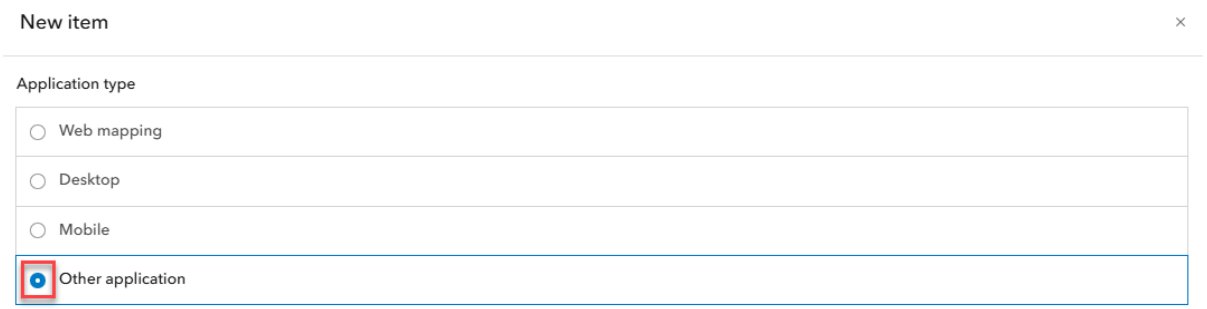
1. Open the **DHIS2 to ArcGIS Connector** app.
2. On the first launch, you will be prompted to configure the connection.
3. The **configuration page** provides documentation and setup instructions.
4. Open a new tab in the same browser and log in to your **ArcGIS Enterprise** account.
5. Navigate to **Content** and select **Create a New Item**.



6. Choose **Application** as the item type.

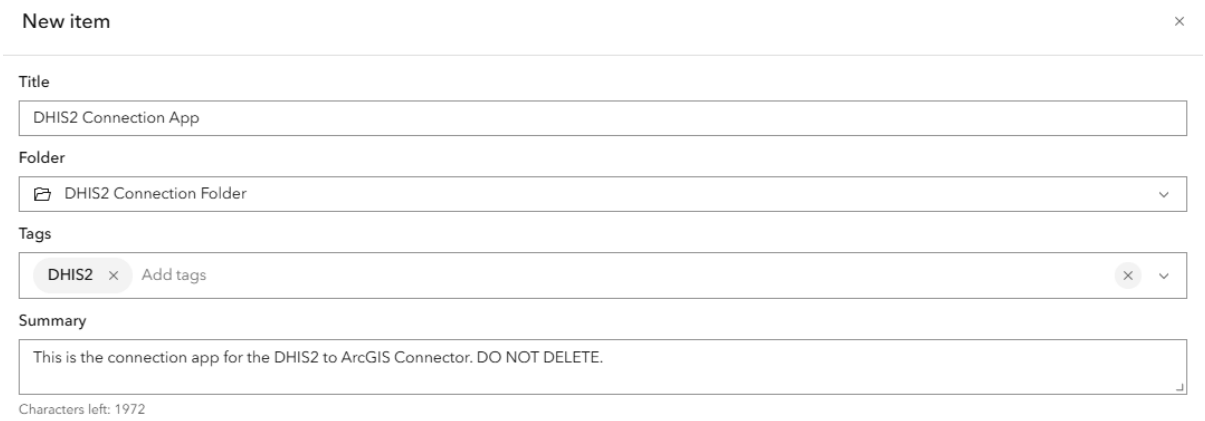


7. Select **Other Application**, then click **Next**.



8. Name the application with a unique title (e.g., “DHIS2 Connection App”).

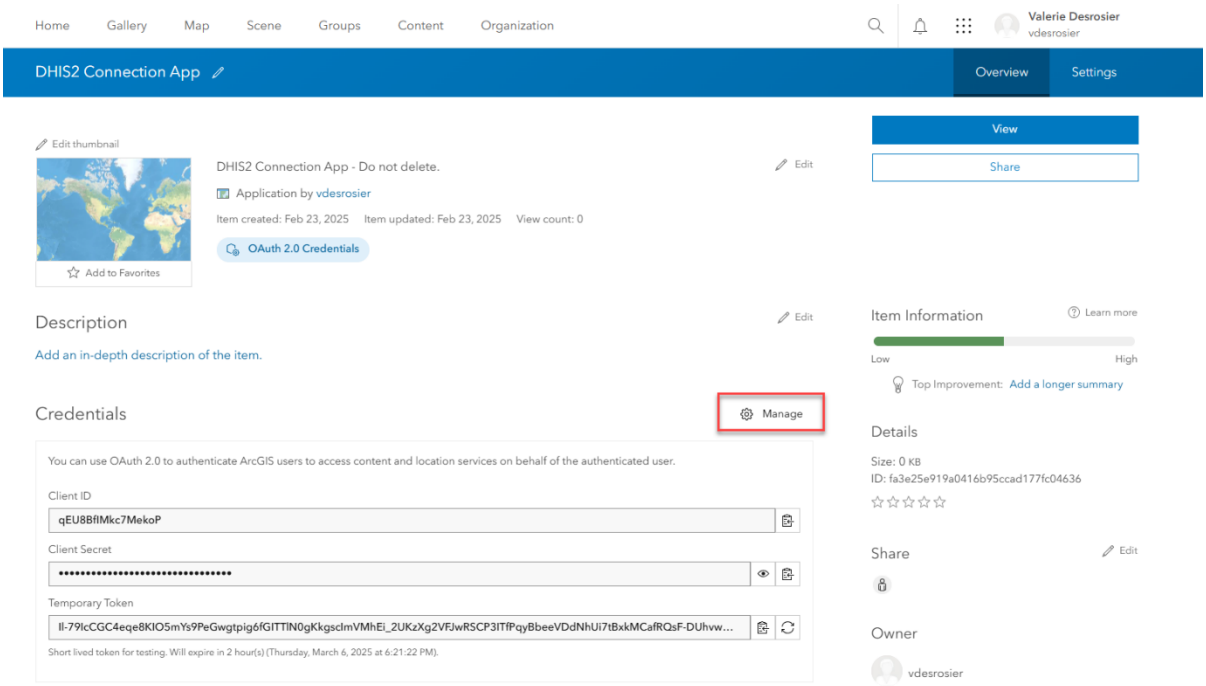
9. Select a folder, add tags, and provide a summary.



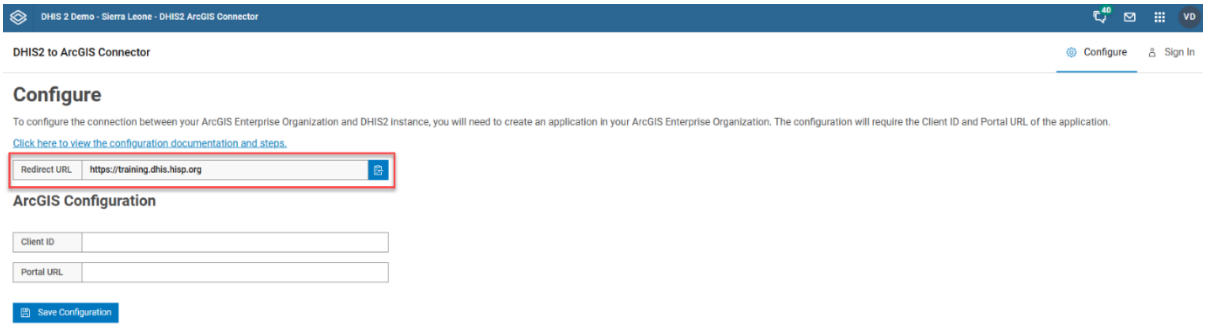
10. Click **Save**.

Configure the OAuth Credentials

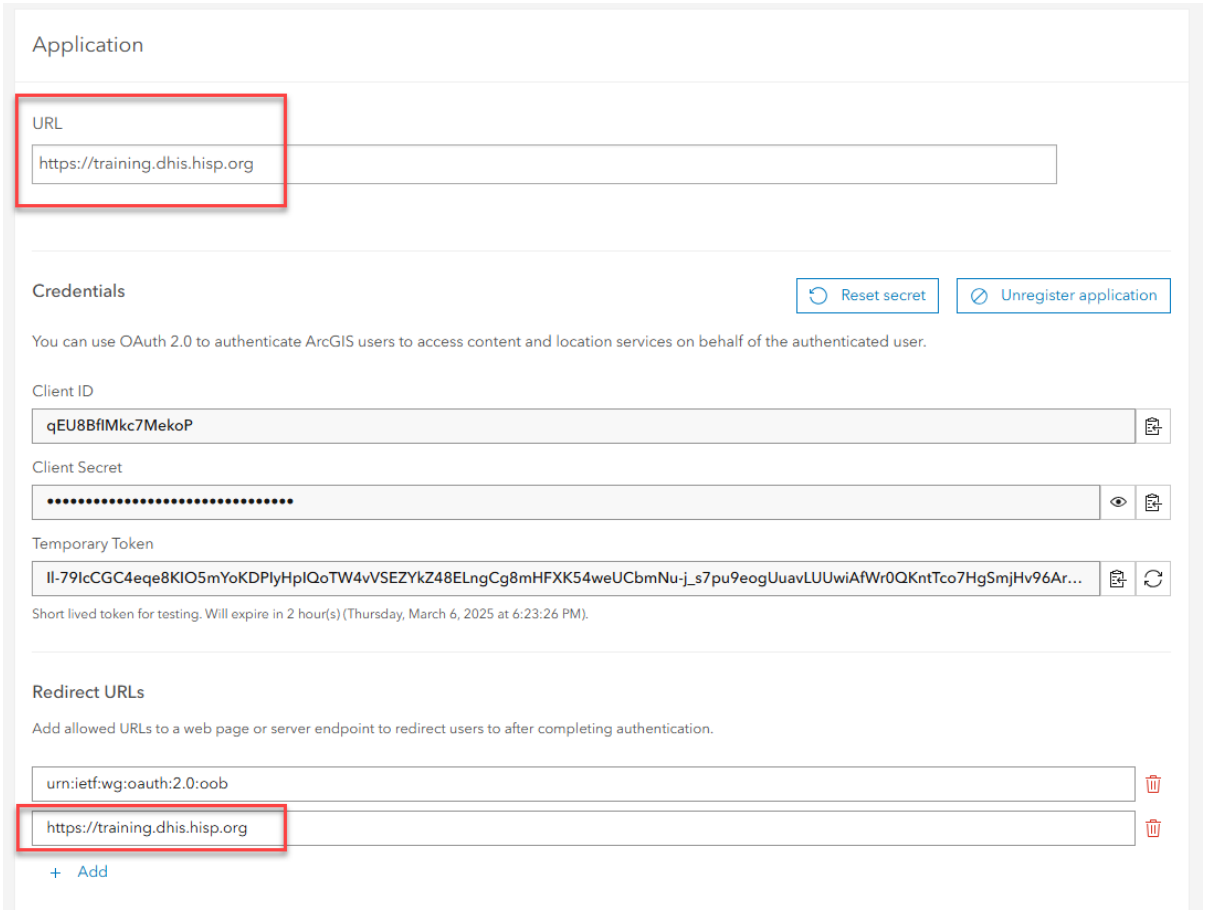
1. After creating the application, open it in your content.
2. Locate the **Credentials** section on the item page. Click **Manage**.



3. On your DHIS2 tab, copy the **redirect URL** from the DHIS2 configuration page.

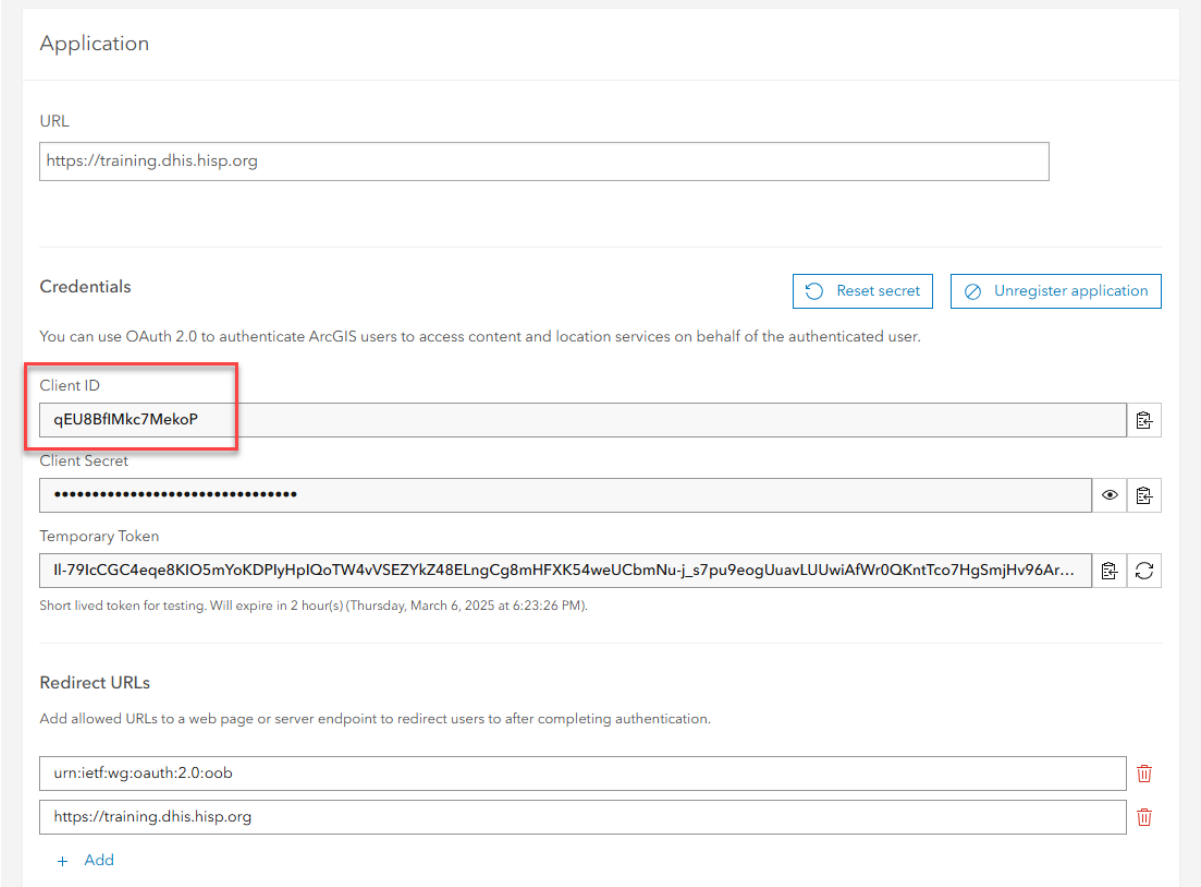


4. Return to the ArcGIS tab. Paste this URL into the **Application URL** and **Redirect URL** fields in ArcGIS.

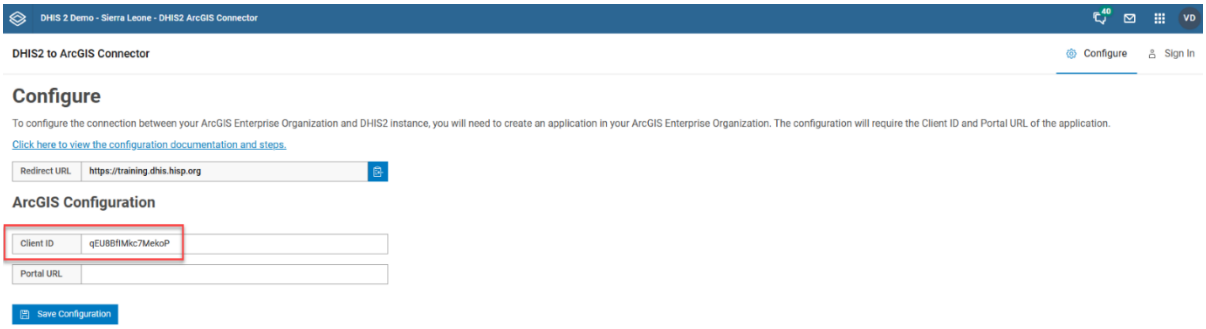


5. Click **Save**.

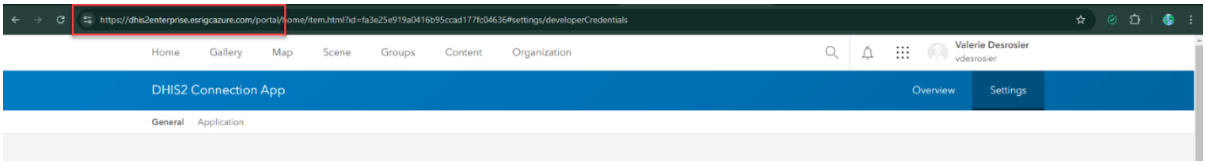
6. Copy the **Client ID** from ArcGIS.



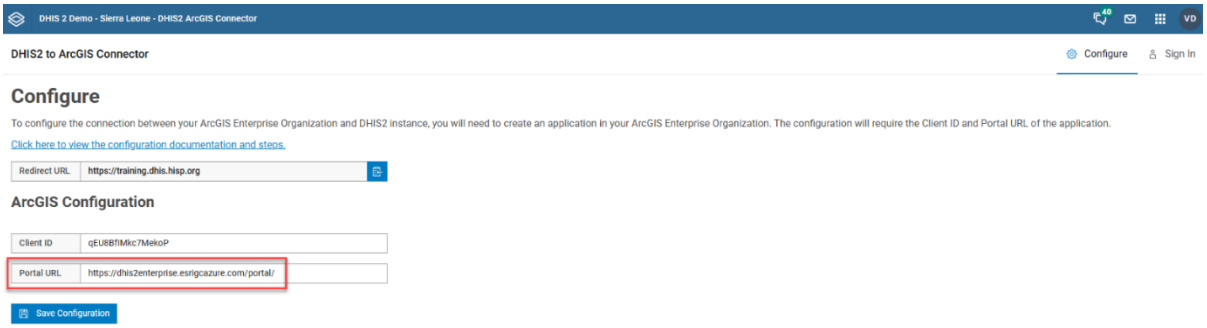
7. Return to the DHIS2 window, paste it into the DHIS2 Connector configuration.



8. Copy the **Portal URL** from ArcGIS (including /portal at the end).

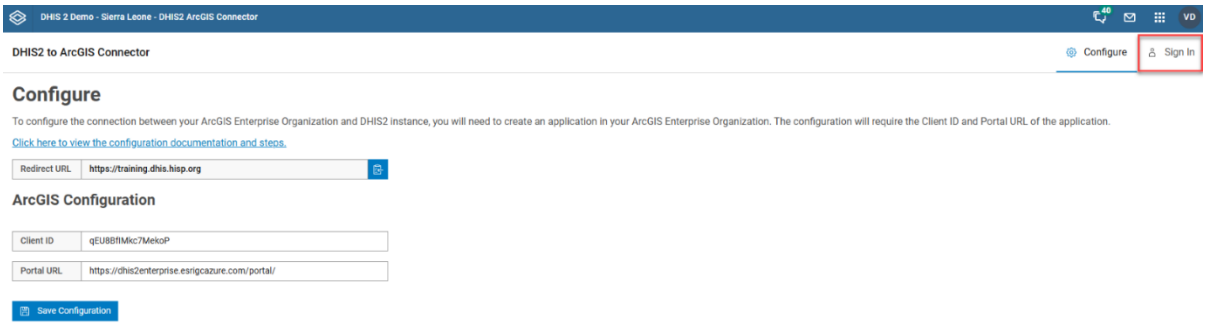


9. Paste it into the DHIS2 configuration page.

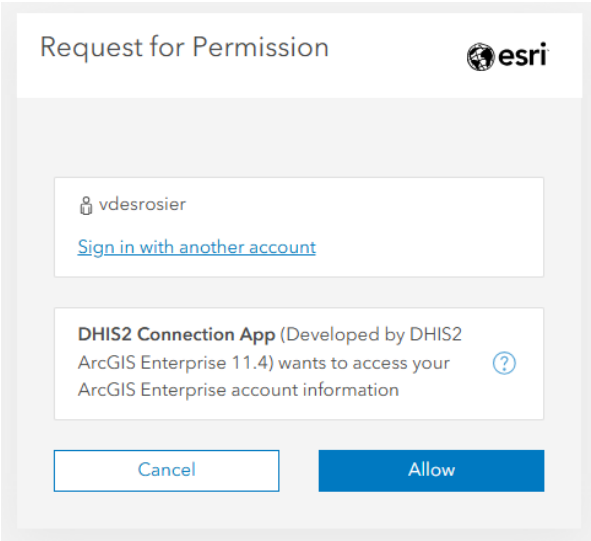


10. Click **Save Configuration** to update the settings.

11. After saving, go to the **sign-in page**.



12. Allow permissions when prompted by ArcGIS.

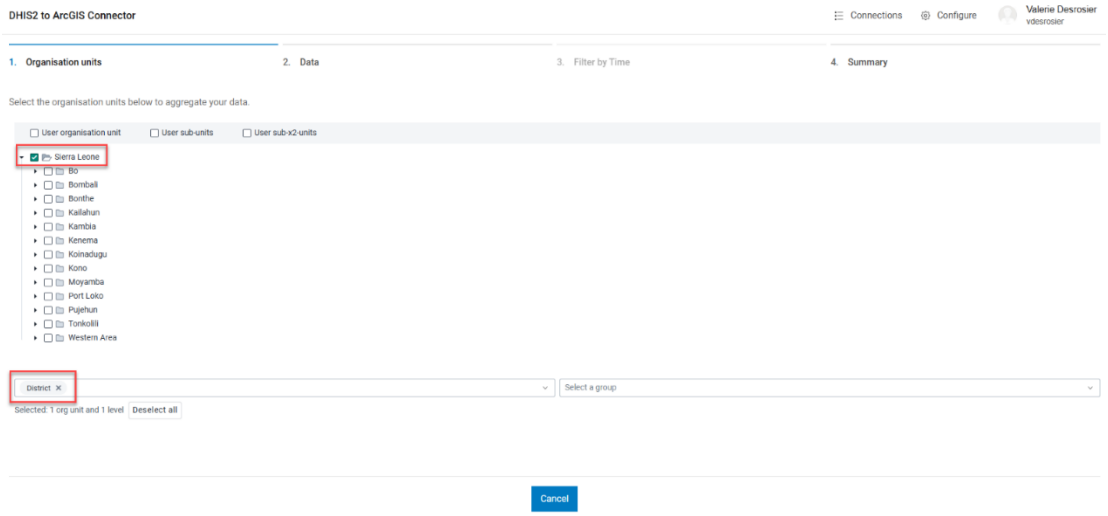


13. If already logged in, the system will detect your account automatically.
14. If needed, sign in with a different ArcGIS account.

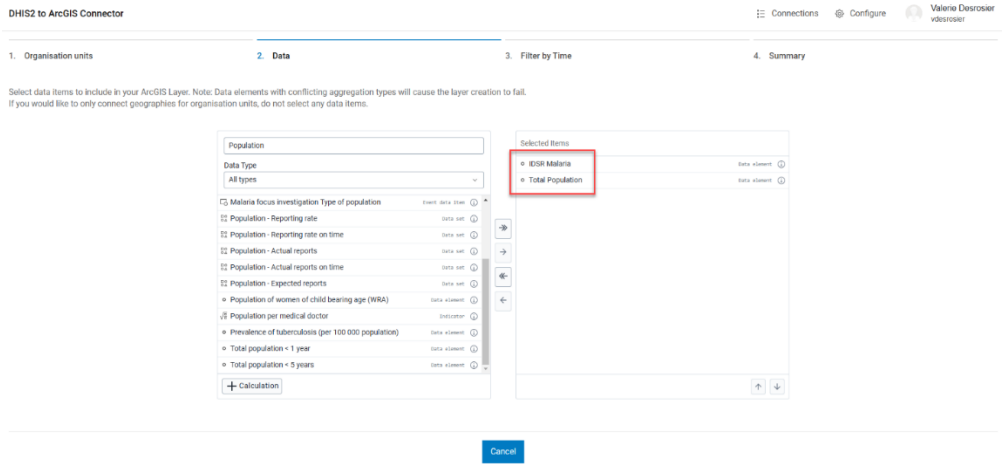
How to Create a Data Connection

1. In DHIS2, open the **DHIS2 to ArcGIS Connector** app.

2. If no existing connections are available, click **Add a New Connection**.
3. In the connection setup window:
    a. Step 1. Organisation Units
        i. **Select Organization Units** (e.g., Sierra Leone → Districts)

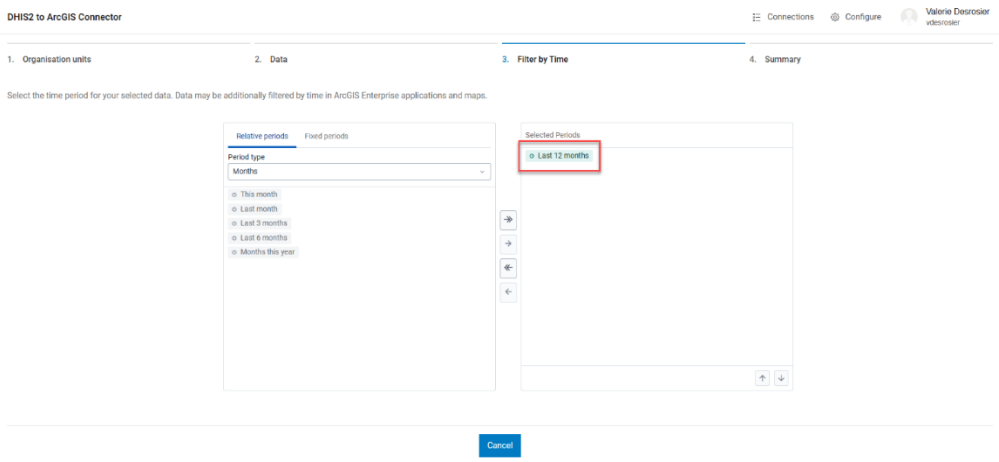


    b. **Select** Step 2. Data
        i. **Choose Data Elements** (e.g., IDSR Malaria, Population).

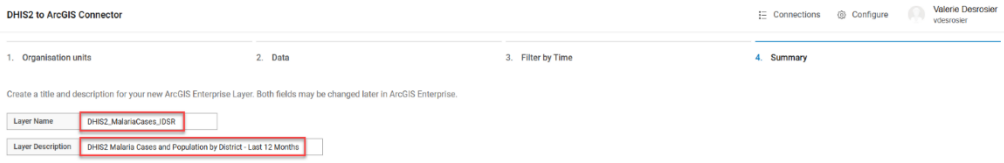


    c. **Select** Step 3. Filter by Time

i. **Specify the Time Range** (e.g., Last 12 Months).



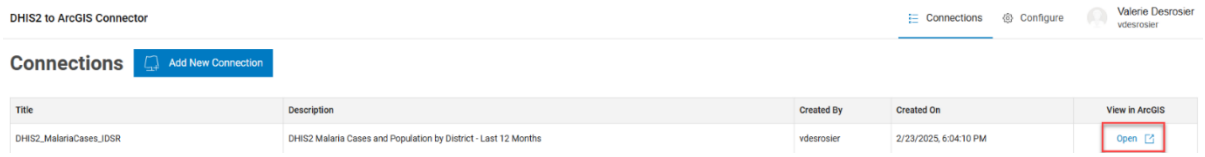
4. **Select** Step 4. Summary
    a. In the summary window:
        i. Provide a **unique layer name** for ArcGIS. (Note: best practices are to not include spaces or special characters)
        ii. Provide a **Layer Description** for the data.



        iii. Click **Create Connection**.

Verify and Access Data in ArcGIS Enterprise

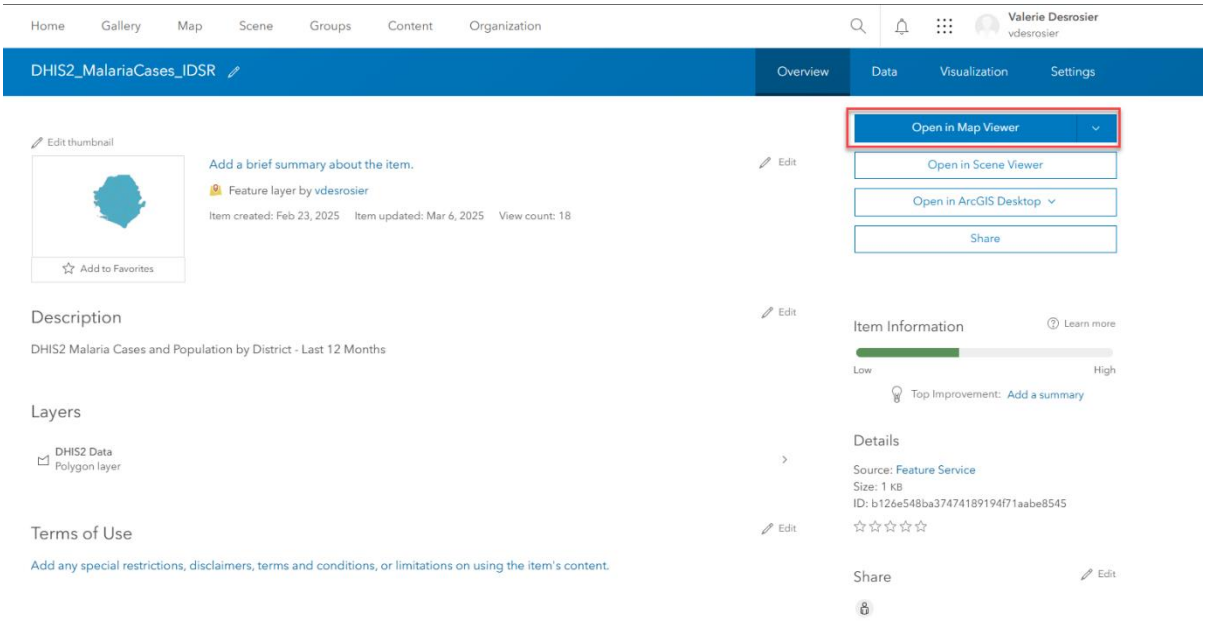
1. Once the connection is created, if needed, refresh the connection list in DHIS2. The resulting layer will appear at the top of the list.
2. Select **View in ArcGIS – Open**.



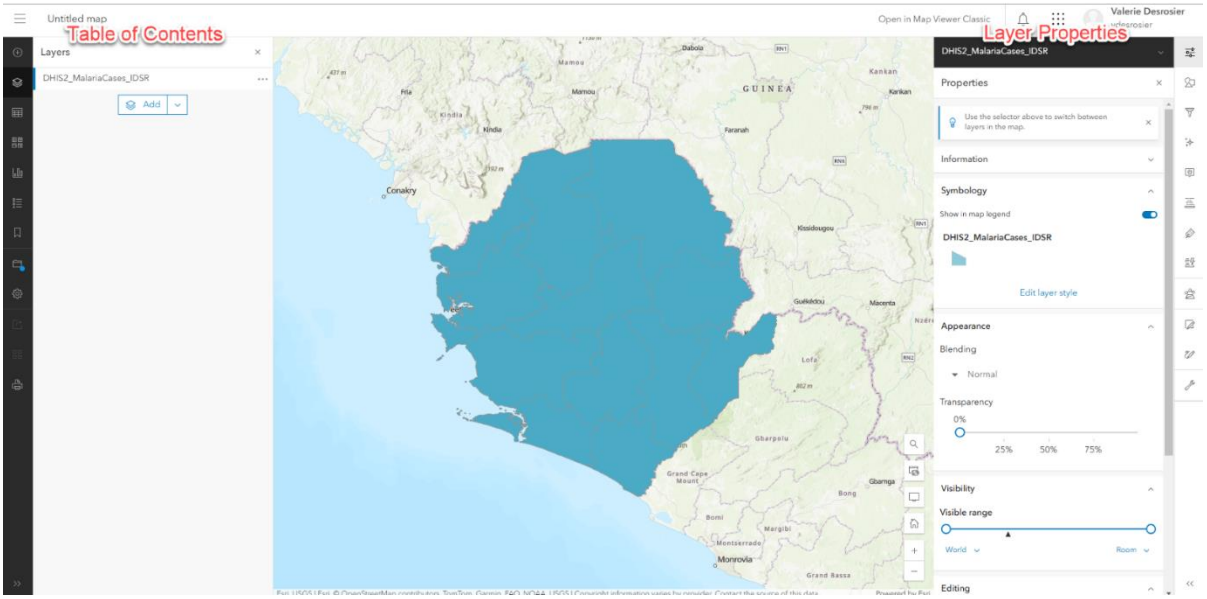
3. This will open the **ArcGIS Enterprise organization**.

Visualize Data in ArcGIS Enterprise

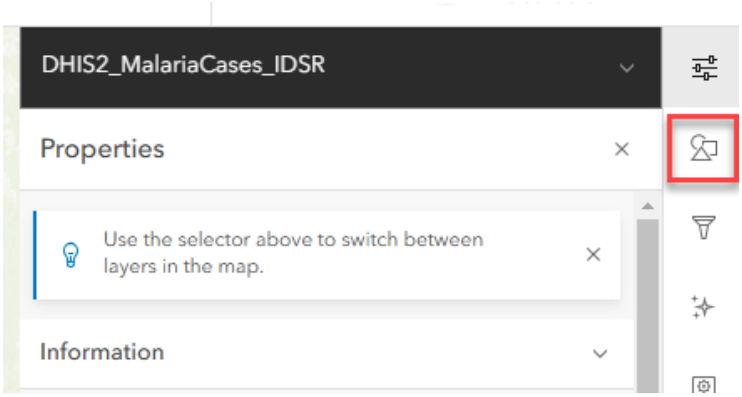
1. On the item page, select Open in Map Viewer.



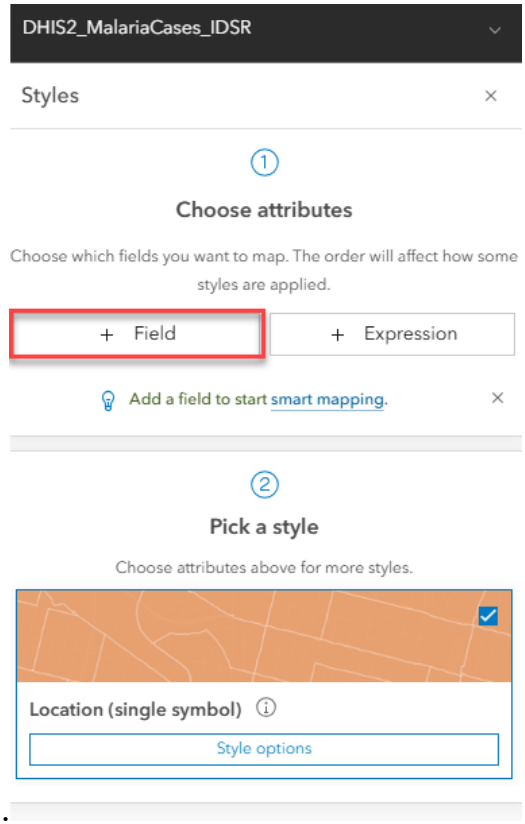
2. A new map will open and the properties of your new layer will be on the right side of the screen with the table of contents on the left.



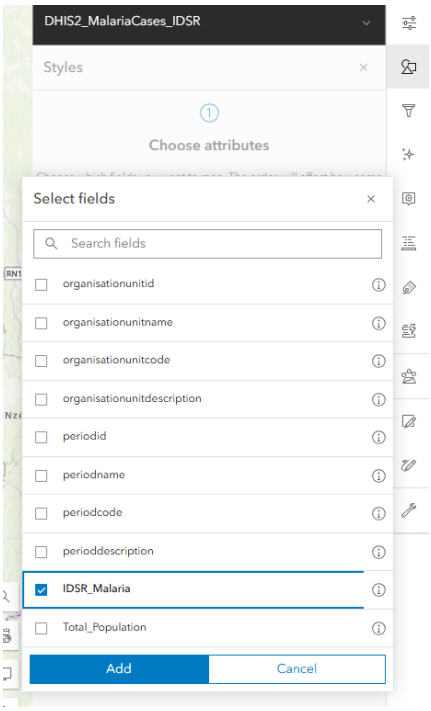
3. Open the **Styles** properties on the right to:



   a. Apply **Smart Mapping** for data visualization.
   b. Create **Choropleth Maps** based on values (e.g., malaria cases).
   c. Compare multiple datasets (e.g., Malaria Cases vs. Population).
   d. Use **relationship comparison** for dual dataset analysis.

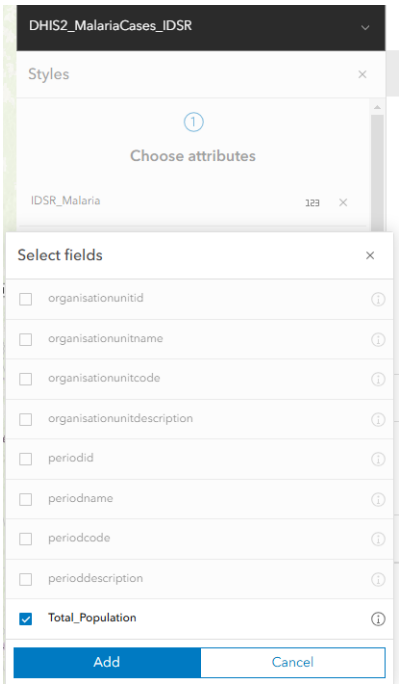


4. Select **add Field**.
5. Select **IDSR_Malaria**. Click **Add**.



6. Select Style Options to view different available mapping options.
7. To view symbolizing multiple data elements at once, select **add field** again.

8. Select **Total_Population.** Click **Add**.

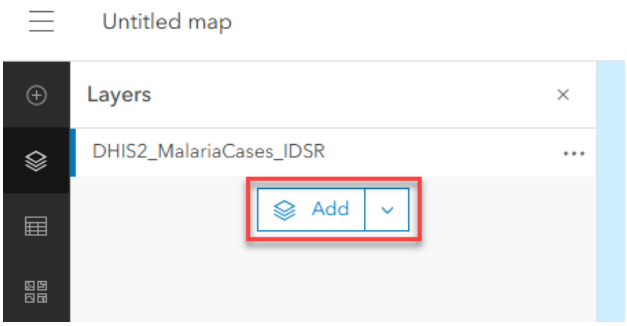


9. Explore the new symbol options.

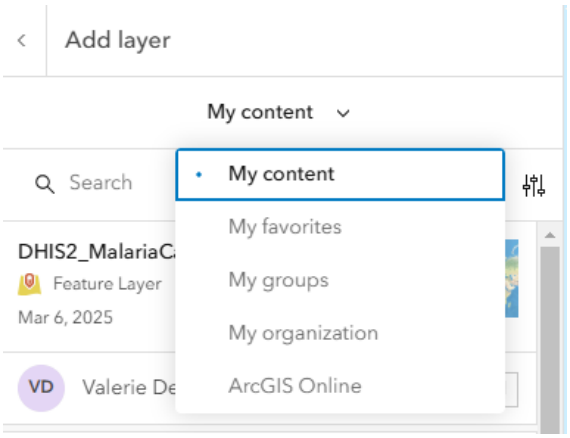
10. To learn more, follow this tutorial on designing symbology in ArcGIS: https://learn.arcgis.com/en/projects/design-symbology-for-a-thematic-map/arcgis-online/

Enhance your Analysis with Additional Data

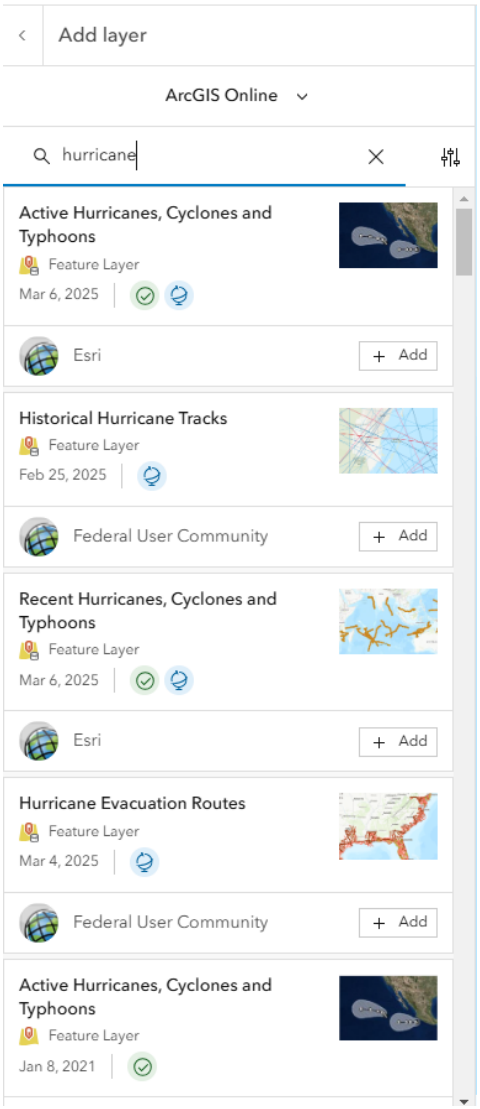
1. In your **Table of Contents**, select **Add**.



2. Browse for more of your own content to add to the map, content from your Organization, or content from **ArcGIS Online** and the **ArcGIS Living Atlas of the World** for additional data layers.



3. Add layers from sources such as:
    a. ArcGIS Living Atlas (e.g., hurricanes, climate data).
    b. NASA, NOAA, and other major organizations.



4. Explore what's available in the Living Atlas here: https://livingatlas.arcgis.com/en/home/

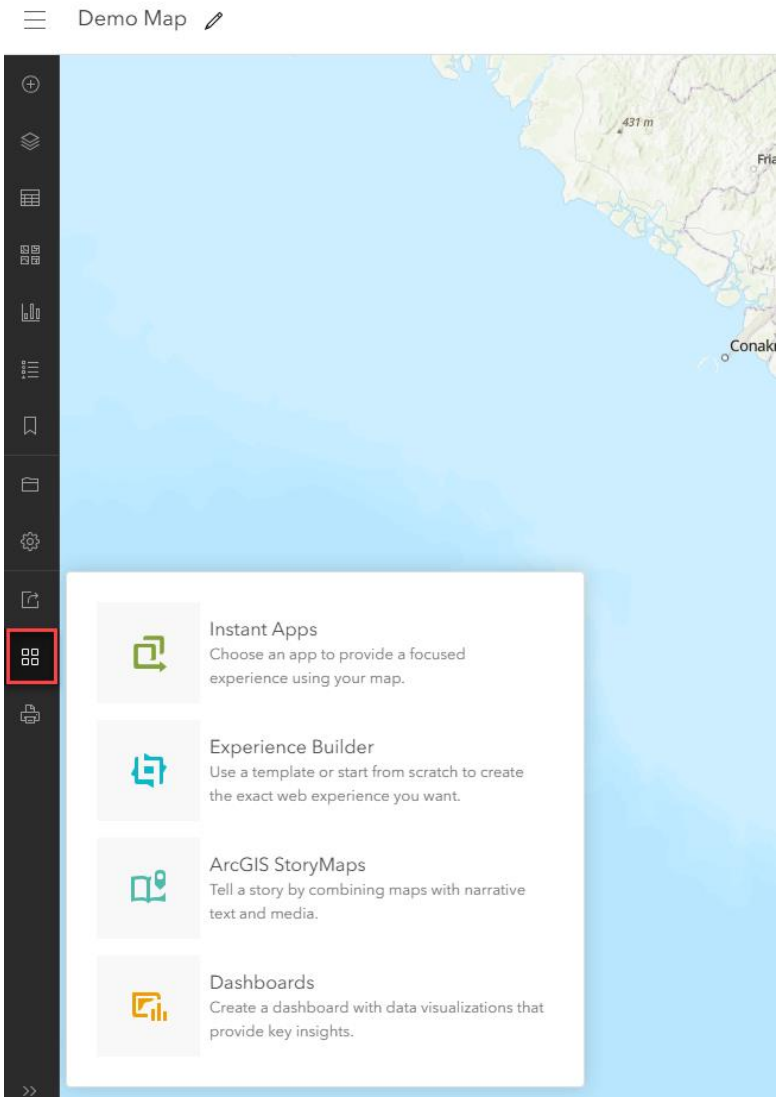
Perform Advanced Analytics

1. Use **ArcGIS analysis tools in your online map** for:
    a. Aggregating points.
    b. Summarizing nearby locations.
    c. Conducting **drive-time** or **walk-time** analysis.
    d. Creating **buffer zones**.
    e. Etc.
2. Save results for further visualization.

3. To get started with analysis, follow this tutorial on siting a new hospital location: https://learn.arcgis.com/en/projects/site-a-new-hospital/

Create Web Applications from your DHIS2 Data

1. Save your map  and immediately use your map to create an app such as:
    a. **Instant Apps** for simple sharing.
    b. **Experience Builder** for interactive applications.
    c. **Story Maps** for storytelling with spatial data.
    d. **Dashboards** for real-time analytics.



e. For training on dashboards, follow this tutorial to create an example disease dashboard: https://learn.arcgis.com/en/projects/create-a-covid-19-dashboard/

Next Steps and Additional Resources

For additional information on ArcGIS access, DHIS2 users can explore Esri's offerings **here**.

Esri offers a variety of training resources to help users develop GIS skills, whether they are beginners or experienced professionals. Many training materials are available through **Esri Academy**, which includes self-paced tutorials, instructor-led courses, and learning plans. However, most resources in Esri Academy require an **Esri account**, and some may require an organizational subscription or additional purchase.

For those looking for more industry specific learning opportunities, Esri also provides **tutorials**, which typically walk users through hands-on exercises using Esri software. Like Esri Academy, these tutorials generally require an account and access to ArcGIS software.

For completely free learning that does not require an Esri account or software access, Esri offers **Massive Open Online Courses (MOOCs)** throughout the year. These MOOCs cover various GIS topics, such as spatial analysis, cartography, and imagery analysis. They are open to everyone, include interactive lessons, and provide temporary access to necessary Esri software during the course.

Suggested Training Opportunities:

- Welcome to the ArcGIS System StoryMap
- Getting Started with ArcGIS Online
- Introduction to MapViewer
- Learn About Designing Symbology in Maps
- Hands On Learning – Map a Historic Cholera Outbreak
- Get Started with Analysis – Site a New Hospital
- Using Analysis for Accessibility - Shelter Access in Hawaii
- Using Analysis for Accessibility – Food access in DC
- Create a Dashboard - Wildfire Tracking Example
- Create a Dashboard – COVID-19 Example
- Create a StoryMap
- Collect Data in the Field with Survey123
- Suitability Modeling in ArcGIS Pro

Visit the **Health GIS Hub** for real-world examples.

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