ArcGIS Pro: Publishing a Tile Service (Data Management)

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Document Release: Version 0.1

January 12, 2024

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Revision History

The table that follows summarizes the revision history of this document.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Release | Summary of Revisions | Date | Author(s) | Approver |
| Draft 0.1 | Draft content created | 01/11/2024 | Noe Diaz | N/A |
| Draft 0.2 | Technical edit and formatting |  |  | N/A |
| Draft 0.3 | Updated draft |  |  | N/A |
| Draft 0.4 | Technical edits from peer review |  |  | N/A |
| Draft 0.5 | Content edits |  |  | N/A |
| Draft 0.6 | Content corrections |  |  | N/A |
| Draft 0.7 | Quality assurance review |  |  | N/A |
| Final 1.0 | Accepted edits and baselined the document |  |  | N/A |

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# Introduction

## Purpose

This installation guide provides the information necessary for best practices in context to ArcGIS Enterprise Vector Tile Data Management.

## Scope

This document covers all required steps for best practices for Vector Tile Packaging.

## Document Conventions

Table 1‑1 describes the conventions used in this documentation.

Table 1‑1: Document Conventions

| Convention | Meaning |
| --- | --- |
| **🛈** | Indicates a note that supplements the information in the current section or about the procedure. |
| ! | Indicates an important note related to the current section or procedure. |
|  | Indicates that a section or procedure needs to be repeated. |
| Text > Text > Text | The arrow symbol (>) is used for navigation paths (e.g., **Start** > **Programs** > **Adlib** > **Express** > **Express Server**). All navigation paths in this document assume that Windows is set to display Classic View. |

# About This Guide

The content in this installation guide contains references to the software manufacturer’s online help documentation specific to ArcGIS Enterprise Publishing a Tile Service. These help topics are noted, where applicable, and the links to the specific topics are in alphabetical order in Appendix A.

## Brief Outline

1. Prepare Data: Ensure your data is in a projected coordinate system suitable for mapping.

2. Sign in to Portal: Open ArcGIS Pro and sign in to your ArcGIS Online or ArcGIS Enterprise portal.

3. Create Hosted Feature Service: In ArcGIS Pro, add your data layers to the map. Share the map as a web layer, and choose "Hosted Feature Layer."

4. Configure Feature Layer: Adjust the symbology, pop-ups, and other settings as needed. Enable editing if necessary.

5. Publish Feature Layer: Share the map again, but this time select "Tile Layer" as the output format. Configure the tile layer settings, including levels of detail and caching options.

6. Publish Tiled Service: Confirm the settings and publish the tile layer to your ArcGIS Portal.

7. View Tile Layer: Once published, you can view the tiled service in the ArcGIS Portal.

8. Manage Tiles: Use the 'Manage Tiles' option to configure caching settings, update tiles, or delete tiles if needed.

9. Configure Tiled Layer: Adjust settings like levels of detail, caching options, and tiling scheme.

10. Optimize Data: Simplify geometries and reduce unnecessary attributes for faster rendering.

11. Understand Levels of Detail (LOD): Configure LODs appropriately for your data to ensure optimal performance.

# About Publishing a Tiled Service

This comprehensive guide outlines the process of publishing a tiled service from ArcGIS Portal and ArcGIS Pro, with a specific focus on creating and managing a Hosted Feature Service. The guide covers essential steps, from preparing data and configuring layers to publishing and managing tiles. The detailed instructions provide insights into setting up attribute fields, defining pop-ups, and enabling editing if necessary. The best practices section emphasizes optimizing data, understanding levels of detail, and regularly updating content for optimal performance. By following these steps and recommendations, users can effectively create and maintain high-performance tiled services within the ArcGIS ecosystem, ensuring a seamless and efficient mapping experience.

# Creating Hosted Feature service

## Created Hosted Feature Service in ArcGIS Pro

In ArcGIS Pro, add your data layers to the map.

Share the map as a web layer, and choose "Hosted Feature Layer."

### Add Data Layers to the Map

Open your ArcGIS Pro project.

Add the data layers you want to publish as a hosted feature service to the map.

Make sure your layers have the appropriate symbology and labeling.

### Configure Layer Properties

Right-click on each layer in the Table of Contents.

Access the Layer Properties to configure symbology, labeling, and other display options.

Ensure that the layers are styled and symbolized as desired.

### Set Up Attribute Fields

Verify that attribute fields are appropriately named and contain relevant information.

Consider creating or modifying fields to enhance the usability of your data.

### Define Pop-ups

Configure pop-ups for your layers to provide additional information to users.

Customize the content and appearance of pop-ups for a better user experience.

### Enable Editing (Optional)

If your workflow involves allowing users to edit the data, enable editing on the layers.

Configure editing settings, such as permissions and validation rules, if necessary.

### Share as a web layer

Navigate to the "Share" tab on the ribbon.

Click on "Web Layer" and choose "Share As Web Layer."

### Choose Hosted Feature Layer

In the "Share As Web Layer" dialog, select the "Hosted Feature Layer" option.

This will allow you to publish your data as a hosted feature service on your ArcGIS Portal.

### Configure Feature Layer Settings

Provide a title, summary, and tags for your hosted feature layer.

Adjust settings such as sync, track changes, and allow schema changes according to your requirements.

### Configure Sharing Options

Set the sharing options to define who can access the hosted feature layer.

Choose whether to share it with everyone, your organization, or specific groups.

### Review and Share

Review the summary of your settings and configurations.

Click "Share" to publish the hosted feature layer to your ArcGIS Portal.

### Monitor Publishing Progress

Monitor the progress of the publishing operation in the Geoprocessing pane.

Once completed, you'll receive a notification, and the hosted feature layer will be available on your ArcGIS Portal.

This detailed process ensures that your data is properly configured and ready to be shared as a hosted feature service in ArcGIS Portal, allowing for efficient use in various applications and workflows.

# Configure Feature Layer

Adjust the symbology, pop-ups, and other settings as needed, and enable editing if necessary.

## Review Feature Layer

Open the map in ArcGIS Pro and ensure that you have added the necessary layers to your map.

### Adjust Symbology and Visualization

Customize the symbology and visualization options for each layer to ensure the map looks visually appealing. This includes choosing appropriate colors, symbols, and labels.

### Configure Pop-ups

Define pop-up configurations for the feature layer to display relevant information when users interact with the map. This could include attribute details, images, or charts.

### Define Attribute Fields

Review and refine the attribute fields associated with each layer. Ensure that the fields contain accurate and relevant information.

### Set Layer Properties

Access the layer properties and configure settings such as scale dependencies, labeling options, and any other properties that affect how the layer is displayed on the map.

### Enable Editing (If necessary)

f your workflow involves allowing users to edit the data, enable editing on the feature layer. However, exercise caution and ensure proper permissions are set to control who can edit the data.

### Define Time Settings

If your data has a time component, configure time settings for the feature layer. This allows users to visualize temporal changes in the data.

### Review Advanced Options

Explore advanced options available for the feature layer, such as setting up related tables, defining spatial indexes, and configuring subtypes.

### Check Data Source and Relationships

Verify that the data sources are correctly linked and that any relationships between layers are appropriately defined.

### Test the Feature Layer

Before publishing, thoroughly test the feature layer within ArcGIS Pro to ensure that it behaves as expected. Check for any display issues, data anomalies, or unexpected behavior.

### Document Configuration Settings

Document the configuration settings you have applied to the feature layer. This documentation will be useful for future reference and troubleshooting to add to this current document.

### Save your Work

Save your map document in ArcGIS Pro to preserve the configured settings. This ensures that you can easily go back and make modifications if needed.

Carefully configuring the feature layer in ArcGIS Pro, you optimize the data for publication as a tiled service. This step is crucial to ensure that the published tiles deliver the desired visual representation and functionality in the final web map.

# Publishing Feature Layer

Within the geodatabase, there is a hierarchy of users, with each level being based on what actions the user can perform. We have talked at length about the most powerful two of these users, the database administrator and the geodatabase administrator. These users are vital to the creation, management, and maintenance of the enterprise geodatabase.

## Share the map as a web layer

In ArcGIS Pro, open the map containing the layers you want to publish as a tile layer.

Navigate to the "Share" tab on the ribbon.

Click on "Web Layer" to initiate the sharing process.

### Choose Output Format

In the Share As Web Layer pane, select "Tile Layer" as the output format. This indicates that you want to create a tiled service.

### Configure Tile Layer Settings

A new set of options specific to tile layers will appear. Configure the following settings:

Tiling Scheme: Choose the tiling scheme that best fits your data. Common options include Web Mercator or WGS 1984.

Levels of Detail (LOD): Define the levels of detail for your tile layer. Consider the scale range and zoom levels that are relevant for your map.

Caching: Choose whether you want to cache the tiles on the server. Caching can significantly improve performance but requires storage space on the server.

Advanced Settings: Adjust advanced settings if needed, such as the maximum scale, minimum scale, and reference scale.

### Review and Confirm

Review the summary of your configuration settings. Ensure that everything is set up according to your requirements.

### Publish the Tile Layer

Click on the "Publish" button to start the publishing process.

ArcGIS Pro will package your map layers into a tile layer and upload it to your ArcGIS Portal.

### Monitor Publishing Progress

You can monitor the publishing progress in the "Share As Web Layer" pane. ArcGIS Pro will provide feedback on each step of the process.

### Verify the Published Tile Layer

Once the publishing process is complete, navigate to your ArcGIS Portal.

Verify that the new tile layer is available in your portal content. You should see it listed as a tile layer with the specified name.

|  |  |
| --- | --- |
| **🛈** | **Note:** The time it takes to publish the tile layer depends on factors such as the size and complexity of your data, network speed, and server performance. |

By following these detailed steps, you can successfully publish a tiled service from ArcGIS Pro, ensuring that your tile layer is configured with the appropriate settings for optimal performance and usability.

# Publishing Tiled Service

## Confirm Tile Layer Settings

Before publishing, review and confirm the settings for the tile layer.

Adjust the general settings, such as title, summary, and tags to provide meaningful information.

### Configure Tiling Scheme

Choose the tiling scheme that best suits your data. Common schemes include Web Mercator or WGS 1984.

Adjust the levels of detail (LODs) based on the scale at which you want your tiles to be generated.

### Set Cache Format

Specify the cache format for your tiles. Common formats include JPEG or PNG.

Consider the trade-off between image quality and file size when selecting the cache format.

### Define Caching Options

Configure caching options, such as full extent, update modes, and storage format.

Decide whether to cache all scales at once or cache on demand as users access different scales.

### Configure Advanced Options

Explore advanced options for fine-tuning the tile layer behavior, including image format optimization and compression settings.

### Review and Validate

Review all settings to ensure they align with your requirements and best practices.

Use the validation tools provided in ArcGIS Pro to identify any potential issues before publishing.

### Publish Tile Layer

Once satisfied with the settings, initiate the publishing process.

ArcGIS Pro will package the tile layer and upload it to your ArcGIS Portal.

### Monitor Publishing Progress

Monitor the publishing progress through the status window in ArcGIS Pro.

Address any errors or warnings that may arise during the publishing process.

### Confirm Successful Publishing

Once the publishing process is complete, confirm that the tile layer is successfully added to your ArcGIS Portal. Access the layer to ensure it displays as expected.

### Share with Others

If the tile layer is intended for public or group access, share it accordingly in your ArcGIS Portal.

Configure sharing settings to control who can access the tile layer.

### Use the Tiled Service

After successful publishing, users can consume the tiled service in various applications, including web maps and applications.

Incorporate the tile layer into your maps or share it with others for collaborative mapping.

By following these detailed steps, you can ensure a smooth and successful publishing process for your tiled service in ArcGIS Portal. Adjust settings based on your specific requirements and data characteristics to optimize the performance of the tile layer.

# Managing Tiles

Once you have successfully published the tiled service to your ArcGIS Portal, you can view and interact with it using the portal interface. Here are the steps:

## view Tile Layer

Log in to ArcGIS Portal: Open your web browser and navigate to your ArcGIS Portal.

Log in with your credentials.

### Access Content

In the portal home page, go to the "Content" tab. This is where all your published content is managed.

### Locate Tiled Service

Use the search or browse features to locate the tiled service you just published. The tile layer will typically have a thumbnail representing the map.

### Open Tiled Service Item

Click on the tiled service item to open its details page. Here, you can find information about the service, including its URL, layers, and usage statistics.

### View Map

In the details page, there is usually a "View" option that allows you to open the map associated with the tiled service. Click on it to visualize the map in the portal map viewer.

### Explore Layers

Explore the layers within the map to verify that the tiled service layers are rendering correctly. Zoom in and out to different levels of detail to ensure that the tiles are loading seamlessly.

### Access Additional Options

Depending on your portal settings, you might have additional options such as sharing, editing, or configuring the tiled service directly from the portal interface.

### Access Manage Tiles Option

In the item details page of the tile layer, look for an option like 'Manage Tiles' or 'Cache Settings.' This option allows you to configure and manage the tiles associated with the service.

### Configuring Caching Settings

Inside the 'Manage Tiles' section, you can configure caching settings. This includes specifying levels of detail (LOD) and defining the extent for which tiles will be generated. Consider the scale at which your data is most frequently viewed and adjust LOD accordingly.

### Update Tiles

If your data changes over time, you may need to update the tiles. In the 'Manage Tiles' section, there should be an option to update existing tiles. This ensures that the tile cache reflects the most current state of your data.

### Delete Tiles

In certain situations, you might need to delete tiles, especially if there are changes to the symbology, pop-ups, or if you want to force the regeneration of tiles. Deleting tiles will prompt the system to recreate them based on the updated configurations.

### Set Tile Expiry

Some systems allow you to set an expiration date for tiles. This is useful if your data is dynamic and you want to ensure users are always viewing up-to-date information. Expired tiles will be automatically regenerated.

### Adjust Performance Settings

Depending on your server and infrastructure, you might have options to adjust performance settings. This can include the number of instances used for caching, the processing extent, and other parameters that impact tile generation speed.

### Automate Tile Updates

For regularly changing data, consider setting up automated processes to update tiles at specific intervals. This ensures that your tiled service reflects the most recent state of your data without manual intervention.

### Embed Map

Obtain the embed code to share the map on websites or applications if needed. This can be useful for integrating the tiled service into external platforms.

### Monitor Usage

Check for usage statistics and performance metrics in the details page. This information can help you monitor the popularity and health of your tiled service.

By following these steps, you can easily access and visualize the tiled service within the ArcGIS Portal, ensuring that it meets your expectations and performs well for end-users. Effectively managing tiles, you can maintain optimal performance, keep your data up-to-date, and ensure a seamless experience for users accessing your tiled service in ArcGIS Portal.

# Optimize Data

Optimizing data is a crucial step in ensuring the efficient performance of your tiled services.

## Optimizing your Data

### Simplify Geometries

**Purpose:** Simplifying geometries helps reduce the complexity of features, leading to faster rendering times.

**How to Do It:** Use tools like "Simplify" or "Generalize" in ArcGIS Pro to simplify geometries.

Be cautious not to oversimplify, as it may impact the accuracy of your data.

### Remove Unnecessary Attributes

**Purpose:** Reducing the number of attributes in your dataset can significantly improve performance.

**How to Do It:** Identify and remove unnecessary or redundant attributes that are not essential for visualization or analysis.Keep only the attributes required for your map's purpose.

### Use Appropriate Data Types

**Purpose:** Choose the appropriate data types for your attributes to optimize storage and retrieval.

**How to Do It:** Use integer data types for whole numbers, and choose floating-point types for decimals. Avoid storing unnecessary precision in your data.

### Indexing

**Purpose:** Indexing can speed up queries and data retrieval.

**How to Do It:** Identify key fields that are frequently used in queries. Create indexes on these fields to improve data retrieval performance.

### Spatial Indexing

**Purpose:** Spatial indexing accelerates spatial queries.

**How to Do It:** Ensure that your data layers have a spatial index. Rebuild spatial indexes regularly for optimal performance.

### Generalization

**Purpose:** Generalization reduces the complexity of geometries while preserving essential characteristics.

**How to Do It:** Apply generalization techniques to simplify and improve the legibility of features at smaller scales. Experiment with different generalization settings to find the right balance.

### LOD (Level of Detailing)

**Purpose:** Understand and optimize levels of detail (LOD) for your data.

**How to Do It:** When sharing your map as a tile layer in ArcGIS Pro, you will have the option to configure LODs. Access the 'Configure Tile Layer' settings, and you'll find options to set the levels of detail. Configure LOD settings appropriately based on the scale at which features should be displayed. Avoid unnecessary levels of detail that may impact performance.

LOD defines the range of scales at which your map is visible. Each level corresponds to a specific scale, and as users zoom in or out, the map switches between different LODs to display appropriate detail. Assess your data and consider the range of scales at which users are likely to interact with the map. Determine the optimal LODs based on your data's characteristics and the expected usage patterns.

# Additional considerations

Define LODs Appropriately: Understand the scale at which users will interact with your map and configure LODs accordingly. Use different levels of detail for zoomed-in and zoomed-out views.

Improved Performance: Caching tiles reduces the need for on-the-fly rendering, resulting in faster map display times.

Reduced Server Load: Since tiles are pre-rendered, it reduces the load on the server, leading to improved scalability.

ArcGIS Pro: When publishing a tile layer from ArcGIS Pro, you'll have options to configure caching settings. Specify the levels of detail, choose the tiling scheme, and select caching options.

ArcGIS Portal: In the ArcGIS Portal, navigate to the 'Manage Tiles' section for your tile layer. Configure caching settings, including updating or deleting existing tiles.

Popular Scales: Identify scales that are commonly used by your audience and pre-cache tiles for those scales. This can significantly improve the user experience for frequently accessed areas.

Dynamic Data Layers: If your map includes dynamic data layers, understand how they interact with cached tiles. Consider caching the static layers separately to optimize performance.

Training: Train your team on the importance of tile caching and how to configure and maintain cached tiles effectively.

# FAQs

**What is Tile Caching?** Tile caching involves the pre-rendering and storage of map images at various scales (levels of detail) to improve the speed of map rendering in web applications.

**What’s the difference between a published tiled service and vector tile service?** The main difference between a published tiled service and a vector tile service lies in the type of data they serve and the way the data is represented in the form of tiles.

**Tiled Service:**

Data Representation: Tiled services, often associated with raster data, serve map images (tiles) at different scales (levels of detail). Each tile is a pre-rendered image that represents a portion of the map.

Data Type: Tiled services are suitable for raster data types, such as satellite imagery, scanned maps, or any data that can be represented as an image.

**Vector Tile Service:**

Data Representation: Vector tile services serve vector data in the form of tiles. Unlike raster tiles, vector tiles contain geometric and attribute data. They do not represent pre-rendered images but instead consist of vector features like points, lines, and polygons.

Data Type: Vector tile services are ideal for vector data, such as geographic features (points, lines, polygons), where the client-side rendering engine can style and symbolize the data dynamically.

*Key Differences:*

**Data Format:**

Tiled Service: Provides raster images.

Vector Tile Service: Provides vector data.

**Interactivity:**

Tiled Service: Limited interactivity, as it serves pre-rendered images.

Vector Tile Service: High interactivity; clients can style and interact with vector features dynamically.

**Data Size:**

Tiled Service: Generally larger file sizes, especially for high-resolution imagery.

Vector Tile Service: Smaller file sizes, as vector data can be more compact.

**Styling:**

Tiled Service: Styling is done on the server side during the tile creation process.

Vector Tile Service: Styling is often done on the client side, allowing for dynamic changes in visualization.

**Data Updates:**

Tiled Service: Requires re-caching for any changes in the underlying data.

Vector Tile Service: Can dynamically update styling and data without the need for re-caching.

**Use Cases:**

Tiled Service: Suited for static or less frequently updated raster data.

Vector Tile Service: Ideal for dynamic, frequently updated vector data, and offers a more interactive mapping experience.

**Considerations:**

Choose a tiled service for static raster data where interactivity is not a primary concern.

Opt for a vector tile service when working with dynamic, interactive, or frequently updated vector data.

Ultimately, the choice between a published tiled service and a vector tile service depends on the nature of your data and the level of interactivity and dynamism you require in your map applications.

###### References

**GIS Bibliography**

A comprehensive index of journal articles, conference proceedings, books, and reports related to GIS, including references and full-text materials. gis.library.esri.com

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