BOUSTEAD
Geospatial Technologies

Feature Layer Enrichment

GEOVONIC™ CONNECT FOR ArcGIS®

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1 SUMMARY

Geovonic™ Connect for ArcGIS® is an easy-to-use extension for users of ArcGIS web mapping applications, allowing your users to surface information and interact with your business systems via a map-driven interface, with no custom coding required.

Using the Geovonic Connect, application authors can provide capabilities for users to view data that is retrieved in real-time from third-party applications and databases based on feature selections on a web map, launch business systems directly from a map feature, and generate reports combining information from both the map and your applications.

1.1 Purpose of this Document

This document provides Geovonic Connect administrators with a detailed technical reference for the **Feature Layer Enrichment** capability. It explains what the feature does, how it works, and how to configure and use it effectively within your environment. The document also outlines restrictions and performance considerations to ensure administrators can make informed decisions about when and how to enable Feature Layer Enrichment.

1.2 Intended Audience

This guide is intended for **Geovonic Connect administrators**, typically GIS professionals or GIS system administrators responsible for configuring integrations and managing feature layers. A working knowledge of ArcGIS feature layers, data enrichment concepts, and Geovonic Connect administration is assumed.

2 OVERVIEW OF FEATURE LAYER ENRICHMENT

2.1 Concepts and Benefits

Feature Layer Enrichment extends the value of your ArcGIS feature layers by dynamically augmenting feature attributes with data retrieved from connected business systems. Instead of preloading or copying external attributes into GIS, each feature is “enriched” on demand by querying the target system when the map is displayed.

This means a map feature representing a road, pipeline, asset, or parcel can be symbolised, labelled or filtered based on live business data in your ArcGIS web maps without duplicating that information in the GIS database. As an application author, you can include information such as work orders, inspection status or financial details inside your map pop-ups and tables.

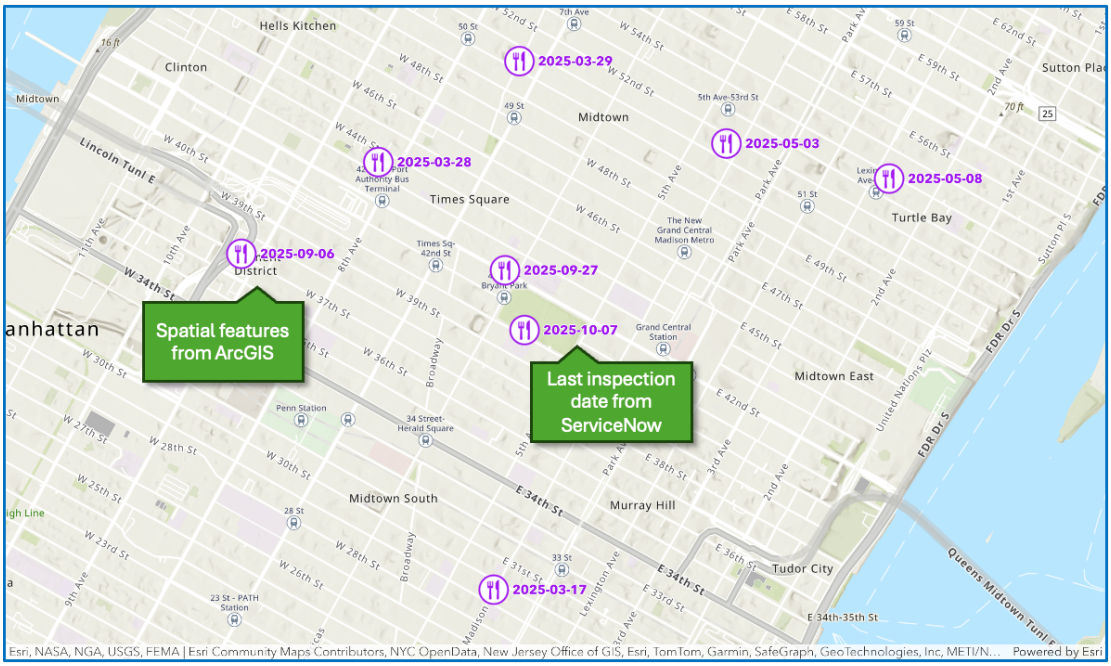

Figure 1 - Map feature labels from connected business system

Key benefits include:

- **Real-time insights**: always display up-to-date business attributes alongside GIS features.
- **Reduced duplication**: avoid storing the same data in multiple systems.
- **Streamlined workflows**: empower users to make better decisions with enriched feature information in a single map interface.

Enrichment is enabled and managed through the **Geovonic Connect administration console**, giving administrators control over where and how it is applied.

2.2 Example Use Cases

Feature Layer Enrichment is useful in a variety of GIS and business workflows, for example:

- **Field Mobility:** Add business system data to pop-ups in ArcGIS Field Maps to provide real-time insight into work order status.
- **Utilities:** Enable operators to view substations labelled with live load values, giving instant visibility into network performance without leaving the GIS map.
- **Capital Works:** Enable staff to view capital works projects symbolised by their live project stage (Planning, In Progress, Completed), giving instant visibility into project progress without reloading data into GIS.

2.3 Data Flow and Processing Logic

When an administrator enables **Feature Layer Enrichment (FLE)** on a configured **Layer Link**, Geovonic Connect creates a **proxy service** that replaces the original ArcGIS feature layer in the map. From the perspective of the web map, this proxy behaves like a standard feature service, but behind the scenes, it enriches features with additional data before returning them.

The following diagram shows the data flow for requests via the FLE proxy service. The numbers on the diagram reflect the description below.

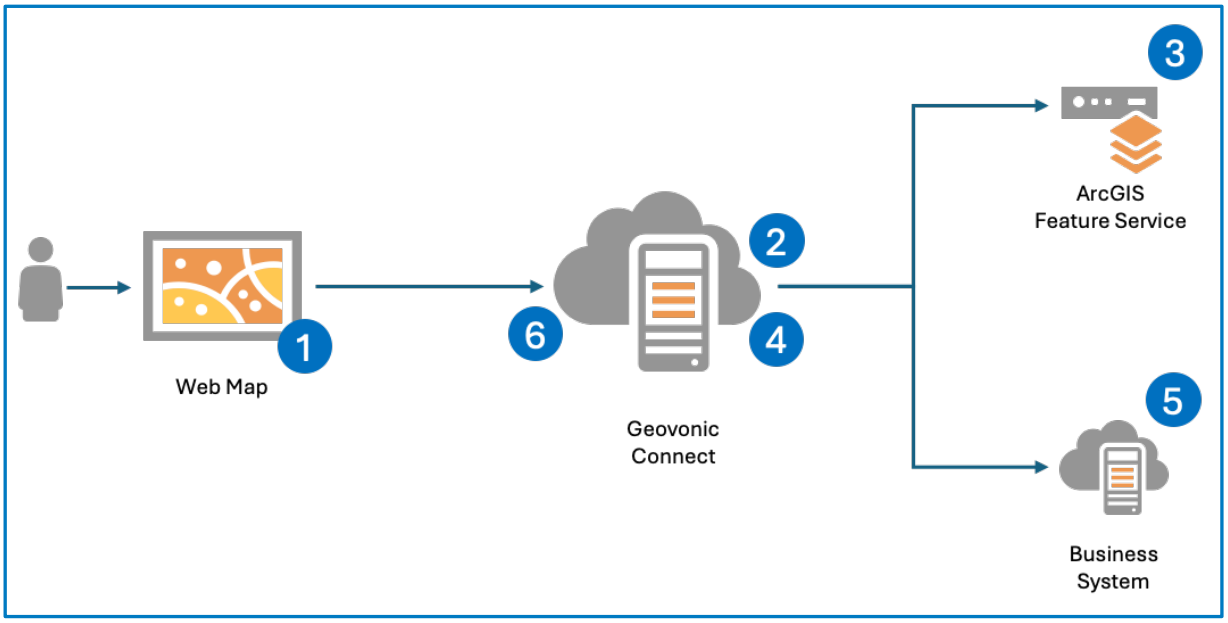

Figure 2 - Feature Layer Enrichment Request Flow

1. The map sends a query to the enriched feature layer (the Geovonic Connect proxy).
2. Geovonic Connect forwards the same query to the underlying ArcGIS feature service to fetch the base features.
3. The ArcGIS feature service returns the features matching the request parameters

4. As the features are returned, Geovonic Connect evaluates the Layer Link definition and issues a **per-feature query** to the connected business system.
5. The results from the business system are appended to each feature's attributes.
6. The enriched feature set is returned to the map, which treats it as a normal ArcGIS feature layer with additional fields.

Caching behaviour:

- If caching is enabled on the Layer Link, Geovonic Connect still queries the ArcGIS feature layer, but some enrichment requests may be satisfied from cache.
- Features that have a cached record available do not trigger a call to the connected business system, instead using the data stored in the cache.
- This reduces the number of calls made to the connected business system and speeds up map response times.
- **Time-to-Live (TTL):** Administrators can configure a TTL value for the cache. TTL defines the maximum age of an enrichment record before it is considered stale and refreshed from the connected business system.

Key point: For the GIS user, the enriched layer looks and behaves like any other ArcGIS feature layer. The enrichment is transparent and requires no special client-side configuration.

3 ENABLING FEATURE LAYER ENRICHMENT

3.1 Administrator Prerequisites

Before enabling Feature Layer Enrichment:

- **Global setting:** The administrator must first go to the **global Settings panel** in Geovonic Connect and enable *Feature Layer Enrichment*. This is **off by default** so that administrators review restrictions and performance considerations before use.
- **Layer Link:** Ensure a Layer Link has already been created and tested successfully.
- **ArcGIS service:** Verify the underlying ArcGIS feature layer is accessible and suitable for enrichment (manageable feature counts).

3.2 Steps in the Geovonic Connect Console

1. Open the Layer Link you want to enrich.
2. In the Layer Link settings, toggle **Feature Layer Enrichment** to **Enable**.
3. Copy the **Feature Layer URL** that is generated.
    - Option A: **Add feature layer to portal** – registers the proxy service as a new item in your ArcGIS portal, automatically storing the credentials with the item.
    - Option B: **Open in ArcGIS web map** – opens the enriched layer directly in a web map for quick testing.
4. Save your changes.

At this point, Geovonic Connect is publishing a **proxy feature service** that can be added to ArcGIS maps in place of the original layer.

If you used the **Add feature layer to portal** option, the proxy layer is available as a portal item for easy discovery and reuse. Credentials are bound to the portal item so end users don't need to manage them manually.

3.3 Additional Configuration Options

When enabling FLE, administrators can configure:

- **Caching and TTL** – Enable caching and select a cache duration (Time-to-Live) to control how long enrichment results are reused before refreshing.
- **Credentials** – Add or rotate credentials for the proxy layer. A new credential can be created manually (e.g., if old credentials are forgotten or need to be rotated). For security, passwords are shown only once when created.
- **Access Controls** – Restrict the enriched layer to specific ArcGIS groups for security.

4 USING FEATURE LAYER ENRICHMENT

4.1 Adding Enriched Layers to your Map

Once an administrator has enabled Feature Layer Enrichment and published the proxy service:

- Add the **proxy feature layer** to your ArcGIS web map or ArcGIS Pro project in place of the original ArcGIS feature service.
- The proxy layer will behave like any other feature service layer, with additional attributes from the connected business system available for use.
- These enrichment attributes can be used for **pop-ups, labels, filters, and symbology**.

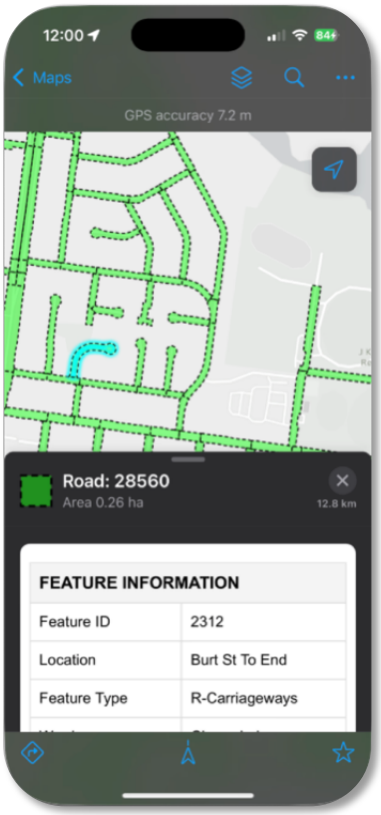

Figure 3 - ArcGIS Field Maps showing attributes from connected business system

4.2 Using Enriched Layers

From the map user's perspective, enrichment happens automatically:

- When a map query (pan, zoom, identify, or filter) is executed, Geovonic Connect retrieves features from the ArcGIS layer and appends enrichment attributes before returning them.
- End users do not need to configure enrichment directly. They simply consume the proxy layer.

Enriched attributes appear in the layer just like native fields. You can:

- Configure **pop-ups** to display live business system values alongside GIS attributes.
- Apply **symbology** based on enriched attributes (e.g., project stage, status).
- Create **filters or labels** that reflect current business system data.

4.3 Working with Popups

In some cases, you may only need Feature Layer Enrichment data to appear in **pop-ups**, without using it for symbology, labelling, or filtering. Enriching all visible features in the map may add unnecessary load if the only requirement is to show details when a feature is clicked.

The same pop-ups work across the Esri product range including ArcGIS Field Maps.

A recommended pattern is to use **two copies of the layer** in your map:

1. **Visible Layer (without enrichment)**
    - Add the original ArcGIS feature layer to your map.
    - This layer is used for symbology and labelling.
2. **Hidden Layer (with enrichment)**
    - Add the proxy feature layer created by Geovonic Connect with Feature Layer Enrichment enabled.
    - Set this layer to **hidden** so it does not render on the map.
    - This layer still responds to queries, making its enriched attributes available in Arcade expressions.

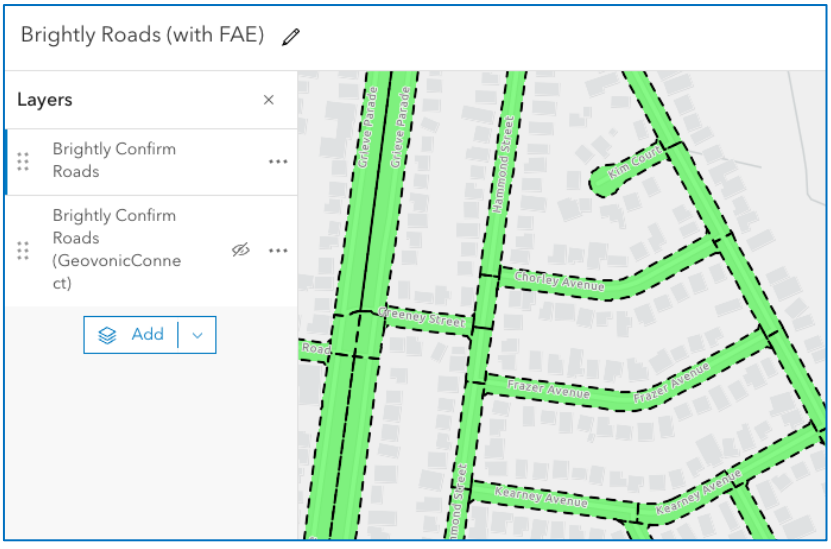

Figure 4 - Using a hidden layer to add FLE to popups

On the visible layer, configure the pop-up to use an Arcade expression to look up enrichment attributes from the hidden layer whenever a user clicks on a feature in the visible layer.

```
var featureLayer = FeatureSetByName($map, "Roads (Hidden)")
var theEnrichedFeature = First(
  Filter(featureLayer, `central_asset_id = ${$feature.central_asset_id}`)
)
```

In this example, the hidden layer is called "*Roads (Hidden)*". Any unique field available on the layer (such as OBJECTID) could be used for the Filter query.

With this in place, you can use Arcade expressions like `${theEnrichedFeature.assetStatus}` when displaying the pop-up information in your HTML output.

Benefits of this approach

- **Performance-friendly** – Enrichment requests are only triggered when a user opens a popup, not for every feature drawn on the map.
- **Cleaner maps** – You can keep symbology, labels, and filters tied to static GIS attributes, while still exposing enriched business system data in popups.
- **Flexible** – You can enrich popups with multiple hidden layers if needed (e.g., project status, asset condition).

See the Esri website for more information on using Arcade expressions in map popups.

5 TROUBLESHOOTING AND SUPPORT

5.1 Restrictions and Performance Considerations

5.1.1 Query-per-Feature Processing

Feature Layer Enrichment operates on a **query-per-feature basis**. For every feature returned by the ArcGIS feature layer, Geovonic Connect issues an enrichment request to the connected business system.

- **Batching:** Where the connected system's API or query language supports it, Geovonic Connect will batch multiple feature lookups into a single request. This reduces the number of calls but does not eliminate the load on the downstream system.
- **System impact:** Large feature queries can generate significant request volumes or heavy queries against the connected system. Administrators should assess the potential impact on downstream performance and apply safeguards such as filters, scale thresholds, or caching.

5.1.2 One Layer Link Result per Feature

Feature Layer Enrichment always appends **exactly one set of attributes** to each ArcGIS feature.

- **No Result**: If the Layer Link query returns no records, the ArcGIS feature is still included in the response, but all enrichment fields will be empty.
- **Multiple Results**: If the Layer Link query returns more than one record, only the **first record** is used to populate enrichment attributes. All other results are ignored.

Because of this behaviour, FLE works best when the Layer Link query is designed to return a **single matching record** per feature (for example, the status of an asset rather than a list of all related work orders).

5.1.3 Recommended Feature Counts

Feature Layer Enrichment performs best when the number of features in each query is **modest** (tens or hundreds, not thousands). It is not suitable for layers that consistently return large result sets.

- **Multiple queries per extent:** ArcGIS web maps often send **several feature layer queries** for a single map extent. Each pan or zoom triggers new queries, multiplying the load on the Geovonic Connect proxy and downstream business systems. Rapid navigation across the map can quickly escalate the number of enrichment requests.
- **Point feature caution:** Some ArcGIS web maps are configured to **load all point features** from a layer at startup, even if those points are outside the visible extent. When combined

with FLE, this behaviour can cause thousands of enrichment calls to be generated immediately, overloading the proxy service and connected system.

- **Best practice:** Where point features are involved, administrators should test map behaviour carefully and use filters, scale thresholds, or generalisation techniques to avoid unintentional mass enrichment requests.

5.1.4 Optimisation Strategies

To reduce the performance impact of enrichment, administrators can apply the following strategies:

- **Scale thresholds** – Configure layers so enrichment only applies when users are zoomed in to a scale where feature counts are reasonable.
- **Attribute and spatial filters** – Limit queries to subsets of features (e.g., a single suburb, project category, or asset type).
- **Caching with TTL** – Enable caching to reuse enrichment results for features that don't change frequently. Configure an appropriate TTL (Time-to-Live) to balance freshness with performance.
- **Network latency** – Minimise network latency between Geovonic Connect and the target business systems. If using the Relay Service, ensure it is hosted close to the target business systems.

5.1.5 Security and Access Controls

- **Credentialed Layer Link access:** Enrichment calls are executed using the **credentials configured on the Layer Link** (e.g., service account/API key). Configure **least-privilege** roles/scopes so only the minimum required data can be retrieved.
- **ArcGIS group access:** Geovonic Connect administrators can configure a Layer Link to be accessible only to specific groups within their ArcGIS portal. This ensures that enriched layers are visible only to authorised users and helps control load on downstream systems.
- **Data minimisation:** Return only the attributes needed for the workflow; avoid broad "`select * from`" patterns to reduce exposure and payload size.
- **Key hygiene:** Rotate credentials regularly and follow your organisation's secret-management policies (expiry, revocation, audit).

5.2 Common Issues and Resolutions

5.2.1 Slow map performance

- *Cause:* Large numbers of features being enriched at once, especially point layers or full-extent queries.

- *Resolution:* Apply scale thresholds, filters, or caching. Limit enrichment to layers with manageable feature counts.

5.2.2 Empty enrichment attributes

- *Cause:* The Layer Link query returned no results.
- *Resolution:* Confirm that the join key (e.g., asset ID, parcel number) matches between the ArcGIS feature and the connected business system.

5.2.3 Unexpected attribute values

- *Cause:* The Layer Link query returned multiple results, but only the first record was applied.
- *Resolution:* Review the Layer Link query. Ensure it returns at most one record per feature.

5.2.4 Authentication errors

- *Cause:* Credentials used by the Layer Link are invalid, expired, or misconfigured.
- *Resolution:* Rotate or update credentials in the Geovonic Connect console. Use least-privilege accounts where possible.

5.2.5 Access denied in ArcGIS

- *Cause:* The enriched proxy service is not shared with the appropriate ArcGIS groups.
- *Resolution:* Update sharing settings in the Geovonic Connect console to include the relevant portal groups.

5.3 Getting Assistance

If issues persist after local troubleshooting:

- Consult the **Geovonic Connect documentation** for detailed guidance on configuring Layer Links and enrichment.
- Raise a support request with the **Geovonic Connect support team**, providing:
    - The URL of the proxy feature service.
    - The affected map or application.
    - A copy of relevant log entries or error messages.