Maps

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Chapter 1

Overview

Topics:

- Overview of the Maps Module
- Access the Maps Page
- Map Query Workflow

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Overview of the Maps Module

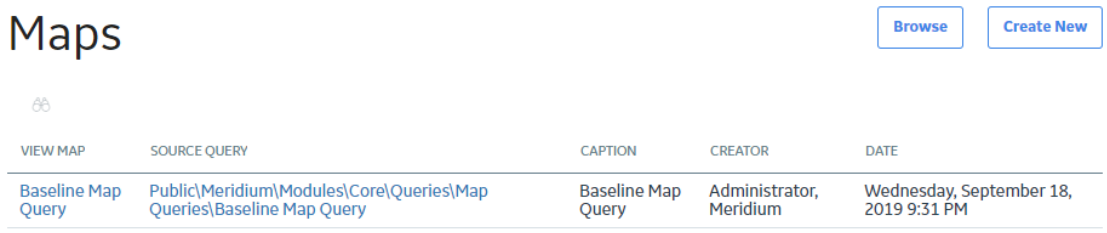
The Maps module uses SQL queries to construct dynamic maps that make data more tangible and easier to interpret.

Access the Maps Page

Procedure

1. In the **Applications** menu, navigate to the **TOOLS** section, and then select **Maps**.

   The **Maps** page appears.



   The **Maps** page contains the following items:

   - **Browse**: This allows you to select a preexisting query from the catalog.
   - **Create New**: This allows you to create a query using the **Design** or **SQL** workspace.
   - : This allows you to search preexisting queries.
   - **View Map**: This grid column contains the names of the existing Map queries. Select the name of the query whose visual map you want to view.
   - **Source Query**: This grid column contains the filepaths of each stored query. Select a hyperlink to access the **Results** workspace for that query.

2. On the **Maps** page, select **Browse**.
   The **Select a query from the catalog** window appears.
3. Navigate to `\\Public\Meridium\Modules\Core\Queries\Map Queries`.
   The Map queries appear.
4. Select the **Baseline Map Query**, and then select **Open**.
   On a new page, the Baseline Map Query map appears. You can now modify the Baseline Map Query as needed.

Map Query Workflow

This workflow provides the basic, high-level steps for using this module. The steps and links in this workflow do not reference every possible procedure. For more procedures, see the links in the Related Information section.

1. Use the GIS Data Loader to load your geospatial data into APM

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2. Modify the Baseline Map Query

The baseline Map query is highly customizable, and more complex queries can be created using the following additional steps:

1. Create an Expression
2. Create a Prompt with a List of Query Results
3. Create a Hyperlink

You can also use the following type of SQL query to further customize your map and the data displayed on it.

- About Select Queries

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Chapter 2

Workflow

Topics:

- Core Analysis: Geospatial Analysis
- Start
- Design a Query
- Open the Query in Maps
- Review Query Results
- Opportunity Exists?
- Manage Performance Recommendations

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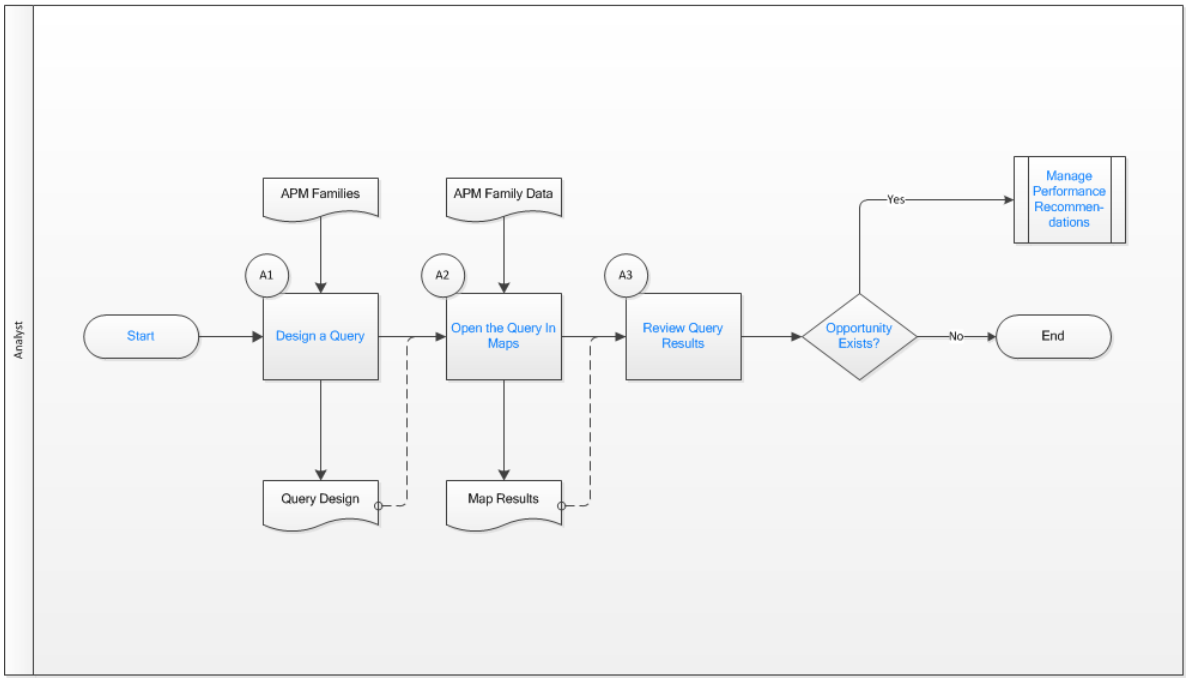
Core Analysis: Geospatial Analysis

Geospatial Analyses (Maps) leverage APM data to identify opportunities for business improvement. When the process identifies such an opportunity, a Performance Recommendation is raised to communicate the need and track the required work. You can use the Maps Workflow process to identify opportunities or needs for improvement based on generated queries that identify bad actors or high-impact failures.

In the following workflow diagram, the blue text in a shape indicates that the corresponding description has been provided in the sections that follow the diagram. For more information, refer to the Interpreting the Workflow Diagrams topic in the APM Product Workflows documentation.

Note: For information on the personas associated with a APM module, refer to the APM Product Workflows documentation.



1. Start on page 5
2. Design a Query on page 6
3. Open the Query in Maps on page 6
4. Review Query Results on page 6
5. Opportunity Exists? on page 6
6. Manage Performance Recommendations on page 6

Start

Persona: Analyst

To satisfy a specific business problem, a APM User initiates a map analysis that applies standard data analysis techniques.

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Design a Query

Persona: Analyst

To satisfy a specific business need, design a map query to select specific data from APM entities. Multiple entities can be included in the map query design to extract related records.

Open the Query in Maps

Persona: Analyst

Execute the map query to produce results, and open the resulting map. The user can modify the map query design to achieve the desired result.

Review Query Results

Persona: Analyst

Analyze the map query results. The map query can be designed to identify bad actors or high impact failures for further analysis. In the analysis of query records, consult other forms of APM data.

Opportunity Exists?

Persona: Analyst

If a APM User identifies an opportunity or need for improvement, then a Performance Recommendation is raised to communicate the need and track the required work. Otherwise, the workflow ends.

Manage Performance Recommendations

Persona: Analyst

If a APM User identifies an opportunity or need for improvement, then a Performance Recommendation is raised to communicate the need and track the required work.

Go to the Manage Performance Recommendations workflow.

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Chapter 3

Baseline Maps Query

Topics:

- About the Baseline Maps Query
- Modify a Map Query

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About the Baseline Maps Query

The Maps module helps provide a visual companion to illustrate your data in a way that is dynamic and easy to understand.

The Maps module is built using the same SQL queries used throughout APM to allow maximum flexibility.

The Baseline Map Query is located in the Catalog under `\\Public\Meridium\Modules\Core \Queries\Map Queries`.

The Baseline Map Query comes with five fixed columns:

Column	Parameter	Description
1	Unique ID	The first column has a unique identifier for the information included in the Maps query. Typically, it is an Entity Key for a specific piece of data.
2	Functional Location	This column contains the functional location of the objects being mapped.
3	Region	This column contains the geospatial data for the value being mapped.
4	Color	This column contains the color value for the data that is being mapped. You can use either hex or RBG values.
5	Marker	This column contains the value for the geospatial marker. This field is not case sensitive, and it can be any of several shapes, including: • dot • circle • square • diamond • triangle • alphabetic character • alphanumeric character

Beyond the five baseline columns, there is no limit to the number of additional columns that can be added to the query.

Beyond the five baseline columns, any additional columns of information queried will appear on the visual map, on an inset window, when an entity is selected.

If a hyperlink is included on any additional columns beyond the five baseline columns, it will appear on the visual map, on an inset window, when an asset or location is selected.

Queries are highly flexible and incredibly customizable. For more information about how to use queries in APM, refer to the Query section of the documentation.

Note:

- Maps will only load data sets with five hundred points or fewer on mobile devices, and three thousand points on other devices.

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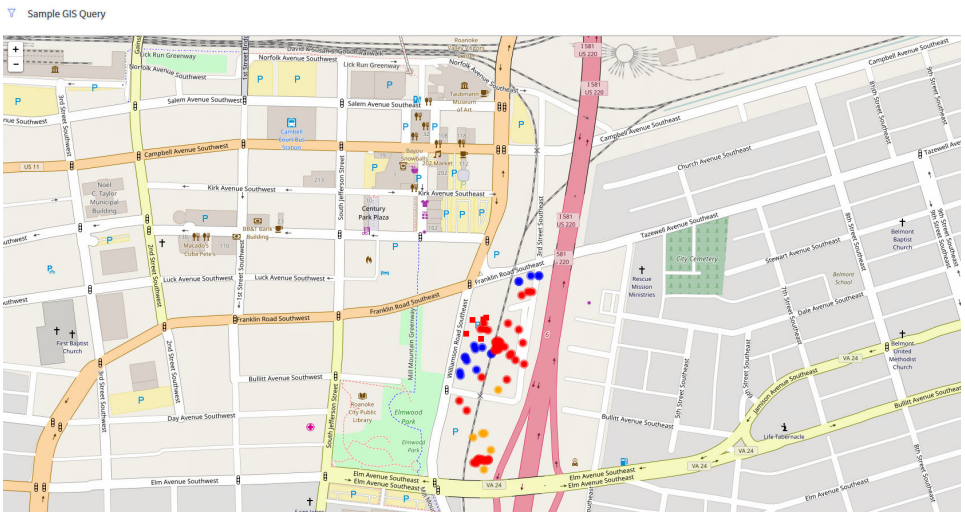
Example: Sample GIS Query

Since the Baseline Map Query is flexible and easily customizable, the following example is a demonstration of how a Map query can be customized from baseline to provide valuable visual information.

The following visual map is based on a customized Baseline Map Query.

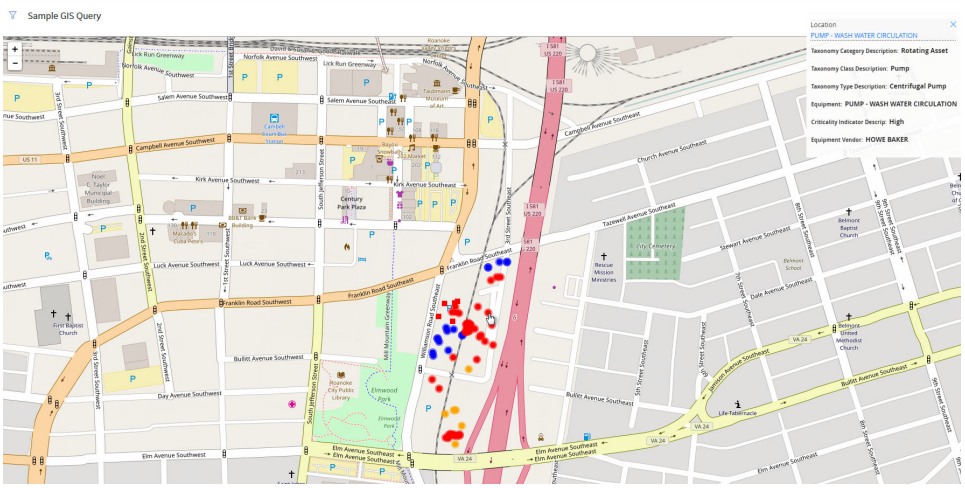


Six additional columns have been added to the five baseline columns, to create the following additions:

- The marker color indicates the Criticality level of the asset.
- The shape of the marker is determined by the Equipment Vendor.
- A hyperlink is added to the **Location** column that links to the asset in Record Manager.
- A hyperlink is added to the **Equipment** column that points to the asset in Asset Health Manager.

Interacting with the Map: Record Explorer

Supposed you were to select an asset on the Map, as shown in the following image:



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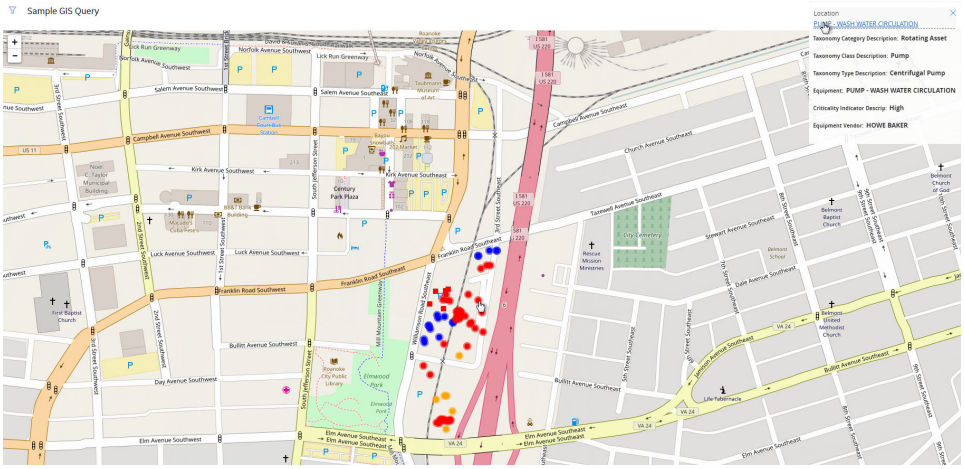
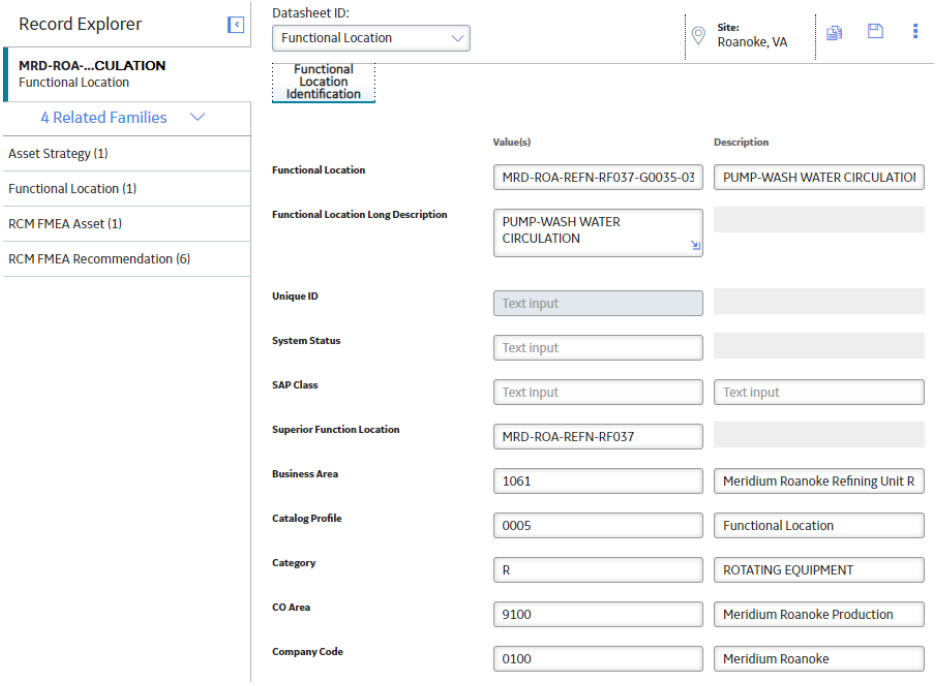
On the upper-right corner of the map, you would see that the location **PUMP - WASH WATER CIRCULATION** had been selected. If you were to select the **Location** link on the inset window, as shown in the following image...



...then, on a new page, the datasheet for the Functional Location would appear.



From here, you could continue working with your asset in Record Explorer as normal.

Interacting with the Map: Asset Health Indicator

As in the previous example, suppose you were to select an asset on the Map.

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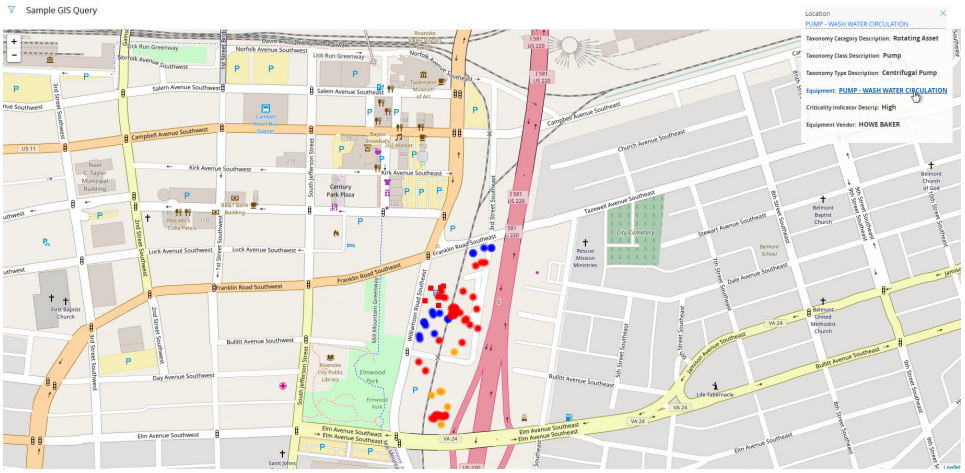
This time, if you were to select the **Equipment** link on the inset window...



...then, on a new page, an Asset Health Summary would appear.

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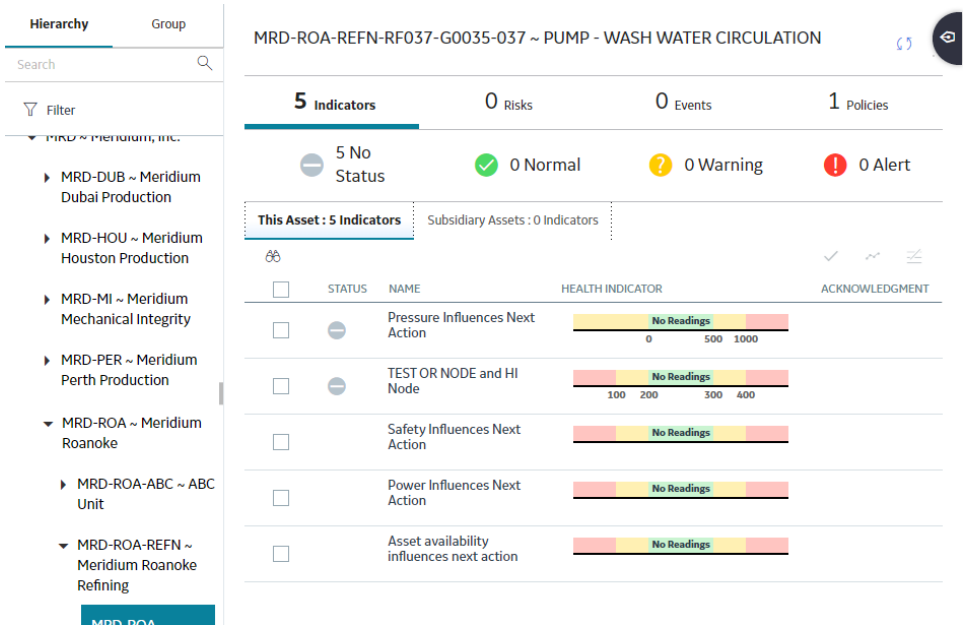

From here, you could continue working with your asset in Asset Health Management as normal.

Replicating this Example: Modifying the Baseline Maps Query in SQL

Important: This documentation assumes that you are starting with the Baseline Map Query provided by APM, and that you have already used a data loader to add the appropriate geolocation data to your system. To run this query successfully, you will have to modify the element names in the code below to reference data that exists in your APM system.

The following SQL code was used to create the Sample GIS Query described in this topic.

```
SELECT [MI_FNCLOC00].ENTY_KEY "Entity Key"
, [MI_FNCLOC00].[MI_FNCLOC00_FNC_LOC_DESC_C] "Location"
,
(? :gis :h :caption='format' :id=format :format :defaultv
alue='json') "Region"
, Decode([MI_EQUIP000].[MI_EQUIP000_CRITI_IND_DESC_C],
'High', 'Red', 'Med', 'Orange', 'Low', 'Blue', 'Black')
"Color"
, Decode([MI_EQUIP000].[MI_EQUIP000_EQUIP_VNDR_C],
'FOSTER WHEELER', 'Square', 'Circle') "Marker"
, [MI_EQUIP000].[SC_EQUIP000_TAX_CATEG_DESC_C] "Taxonomy
Category Description"
, [MI_EQUIP000].[SC_EQUIP000_TAX_CLASS_DESC_C] "Taxonomy
Class Description"
, [MI_EQUIP000].[SC_EQUIP000_TAX_TYPE_DESC_C] "Taxonomy
Type Description"
, [MI_EQUIP000].[MI_EQUIP000_EQUIP_SHRT_DESC_C]
"Equipment"
, [MI_EQUIP000].[MI_EQUIP000_CRITI_IND_DESC_C]
"Criticality Indicator Descrip"
, [MI_EQUIP000].[MI_EQUIP000_EQUIP_VNDR_C] "Equipment
Vendor"
FROM [MI_FNCLOC00]
 JOIN_SUCC [MI_EQUIP000]
```


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```
ON {MIR_FLHSEQ}
 JOIN MI_ENTY_GEO_DATA
   ON MI_ENTY_GEO_DATA.enty_key = [MI_FNCLOC00].ENTY_KEY
WHERE ([MI_FNCLOC00].ENTY_KEY IN
((? :gis :caption='bounding region' :id=region)) AND
[MI_EQUIP000].[SC_EQUIP000_TAX_CLASS_DESC_C] = 'Pump'
AND [MI_EQUIP000].[MI_EQUIP000_EQUIP_VNDR_C] IS NOT NULL)
```

Modify a Map Query

Procedure

1. Access the **Maps** page.
2. In the row for the query that you want to modify, select the link in the **Source Query** column.

   On a new page, the selected query appears.
3. Using the **Design** or **SQL** workspace, modify the query as needed.

   Note: Consult the Map Query Workflow for additional steps that can be used to modify the Map query.

   Note: Depending on the regular expressions used, some queries may only be modified in the **SQL** view.
4. If you want to overwrite the currently selected query, then select .

   Important: Selecting this option overwrites the currently selected Map query.

   -or-

   If you want to save the query as a new Catalog item, then select . Then, on the window that appears, navigate to the folder in which you want to save the file, and then select **Save**.

   The modified Map query is saved.

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Chapter 4

Admin

Topics:

- About GIS Configuration
- Access the GIS Configuration Page
- Configure the Map Tile Server

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About GIS Configuration

The Geographic Information System (GIS) feature of APM is used to store and display geospatial data associated with different entities. The map tiles required for this functionality are provided by utility mapping service providers. The GIS feature is designed to work in conjunction with the mapping service provider of your choice. You can select a mapping service provider or modify the provider to which you have subscribed in the **GIS Configuration** page.

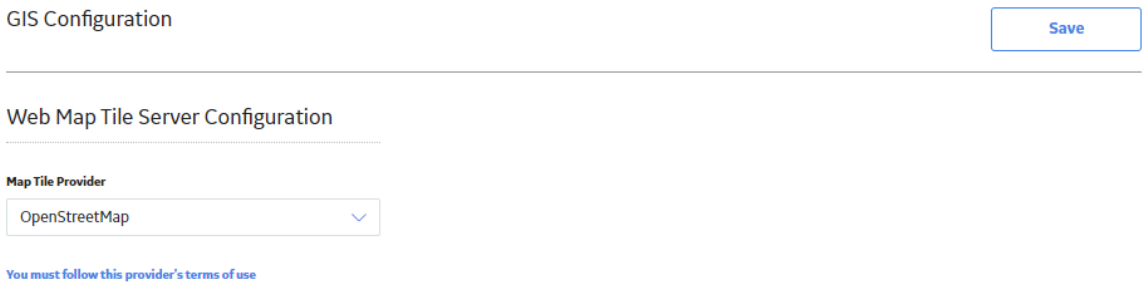
You must be a Super User or a member of the MI Configuration Role Security Group to modify the GIS configuration.

Access the GIS Configuration Page

Procedure

In the **Applications** menu, navigate to **ADMIN** > **Operations Manager** > **GIS Configuration**.

The **GIS Configuration** page appears.



Next Steps

- Configure Map Tile Server

Configure the Map Tile Server

Procedure

1. Access the **GIS Configuration** page.
2. In the **Map Tile Provider** box, select the appropriate provider, and then select **Save**.

   Tip: You can also enter the URL of a custom map tile provider.

   Note: The default map tile provider is OpenStreetMap, which is a free service. Depending on the map tile provider, you may have to enter an API key before you can select **Save**.

   Important: You must accept and adhere to the terms of service of the provider for the map tiles to appear correctly.

   The map tile server is configured.

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Chapter 5

Data Loader

Topics:

- About the Geographic Information System (GIS) Data Loader
- About the GIS Data Loader Requirements
- About the GIS Data Loader Data Model
- About the GIS Data Loader General Loading Strategy
- About the GIS Data Loader Workbook Layout and Use
- About the GIS Data Loader Load Verification

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About the Geographic Information System (GIS) Data Loader

The GIS Data Loader allows geospatial data associated with existing APM entities to be imported into the GIS data model, so that information about the entities can be displayed in the Maps module in APM. You can load geospatial data using the provided Excel workbook.

About the GIS Data Loader Requirements

To use the GIS Data Loader, you must have existing entity records, for example, the Functional Locations or Equipment, that you want to associate with the geospatial data. To use the geospatial data in the Maps module, your organization must have completed the GIS Configuration steps.

Mapping

The GIS Data Loader inserts geospatial data in the MI_ENTY_GEO_DATA table and associates it with existing entities in APM. Entities are identified by mapping from specified cells in the Excel workbook to the ENTITY_KEY field. The data loader evaluates the data provided in the Excel workbook in the following order:

1. ENTITY_KEY + FAMILY_ID
2. ENTY_ID + FAMILY_ID
3. FAMILY_ID + ID_FIELD + ID

Note: The column positions in the spreadsheet should not be moved and the captions should not be changed.

Note: If data is not provided, the cell should be left empty.

About the GIS Data Loader Data Model

The following data model illustrates the records that the Data Loader supports.

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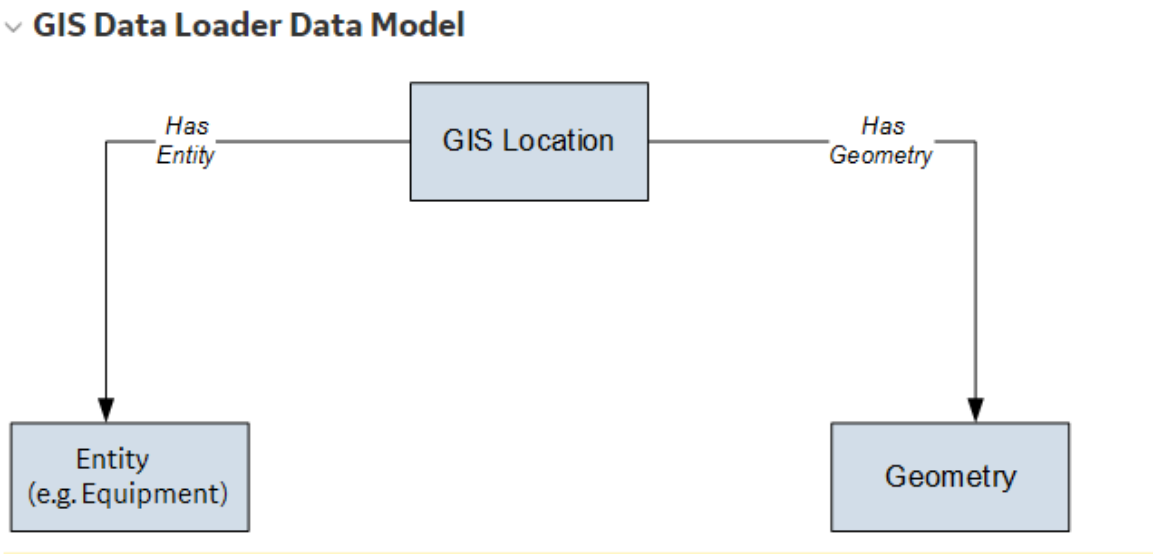
GIS Data Loader Data Model



Note: In the diagram, GIS Location refers to the name of a database table. You can relate each GIS Location to an Entity of any family in APM. Geometry represents the actual data for GIS Location. The Has Entity and Has Geometry are not relationship families defined in APM. They are the relationships in an internal database and the purpose is same as the relationships between entity families.

About the GIS Data Loader General Loading Strategy

The imported data must load in a specific sequence to successfully populate fields, create records, and link data to the predecessor and successor records.

Best Practices

When importing data using the GIS Data Loader, you must use the following Best Practices:

- To identify an existing record to associate with the geospatial information, use one of the following options:
  - Specify the ENTITY_KEY and FAMILY_ID values.
  - Specify the ENTITY_ID and FAMILY_ID values. If ENTITY_KEY is not provided, the data loader will search for the ENTITY_KEY matching the ENTITY_ID.
  - Specify the FAMILY_ID, ID_FIELD, and ID values. If ENTITY_KEY and ENTITY_ID are not provided, the data loader will search for an ENTITY_KEY matching the specified values.
- If there is no existing record for the referenced Entity Key in the MI_ENTY_GEO_DATA table, and you provide valid geospatial data, a new record will be created in the MI_ENTY_GEO_DATA table.
- If there is an existing record for the referenced Entity Key in the MI_ENTY_GEO_DATA table, and you provide new valid geospatial data, the existing record in the MI_ENTY_GEO_DATA table will be updated.
- If there is an existing record for the referenced Entity Key in the MI_ENTY_GEO_DATA table, and you provide no geospatial data (i.e. the cell is empty), the record will be deleted from the MI_ENTY_GEO_DATA table.
- If the identifying values (i.e. either ENTY_ID + FAMILY_ID or FAMILY_ID + ID_FIELD + ID) provided in the worksheet match more than one entity record, the record in the MI_ENTY_GEO_DATA table will be associated with the first matching entity record that is found. If this occurs, a warning will be added to the import log.

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- Geospatial data in the GEOD_DATA column should conform to the geometry spatial data type.

  Note: Valid geospatial data format is dependent on your APM database type. Points must specify Longitude first, then Latitude, in degrees. For example, the geospatial data for a point in Roanoke, Virginia, USA is defined as. POINT (-79.9372289704512 37.2698054035023) in SQL Server 2016.

Load Sequence

When importing data using the data loader workbook, you must use the following workflow:

1. Download the data loader workbook provided by GE Vernova.
2. Identify the data requirements for exporting the data into the data loader workbook.
3. Extract data from APM and your GIS applications to populate the data loader workbook.
4. Provide batch numbers in the first column of the worksheet in the data loader workbook.
5. Import data into APM.
6. Monitor the status of the data load, and verify the results in the log.
7. Conduct tests in APM to ensure that the imported data loaded accurately.

For each row in the data loader workbook, the GIS Data Loader will insert, update, or delete a row in the geospatial data table in the APM system.

About the GIS Data Loader Workbook Layout and Use

In order to import data using the GIS Data Loader, APM provides an Excel workbook, `Geographic Information System (GIS).xlsx`, which supports the Maps tool in APM. This workbook must be used to perform the data load.

The following table lists the worksheets that are included in the GIS Data Loader workbook.

Worksheet	Description
GIS	The only worksheet used by the GIS Data Loader. It is used to load geospatial data for existing entities.

The following table lists the fields in the workbook:

GIS Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Batch ID	BATCH_ID	Character (50)	You must specify a Batch ID for each row in the worksheet.
Entity Key	ENTITY_KEY	Numeric	You can use this column to specify the Entity Key field of the APM entity that you want to associate with the GIS data.
Entity ID	ENTITY_ID	Character (255)	You can use this column to specify the Entity ID of the APM entity that you want to associate with the GIS data.

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Field Caption	Field ID	Data Type (Length)	Comments
Family ID	FAMILY_ID	Character (50)	You must specify the Family ID of the APM entity that you want to associate with the GIS data.
Family ID Field	ID_FIELD	Character (50)	You can use this column to specify the Field ID of the field which will be used to identify the APM entity record that you want to associate with the GIS data.
ID	ID	Character (255)	You can use this column to specify the identifying value in the Family ID Field of APM entity record that you want to associate with the GIS data.
Geometry	GEOD_DATA	Character (4000)	You can use this column to specify the GIS data to be associated with the APM entity. If this column contains a null value, any existing GIS data associated with the APM entity will be deleted.

About the GIS Data Loader Load Verification

About This Task

After loading data, you must perform the following steps in APM to ensure the integrity and accuracy of the data imported from the data loader workbook:

- Review the details of the import job. These details will indicate if any errors or warnings occurred during the data load. The log helps you identify any records that are not loaded.
- Run a query to view the geospatial data that was uploaded. You can use the baseline Map Query that is stored in the `\\Public\Meridium\Modules\Core\Queries\Map Queries\` folder, as a reference.

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