

# Configure Roads & Highways Interface

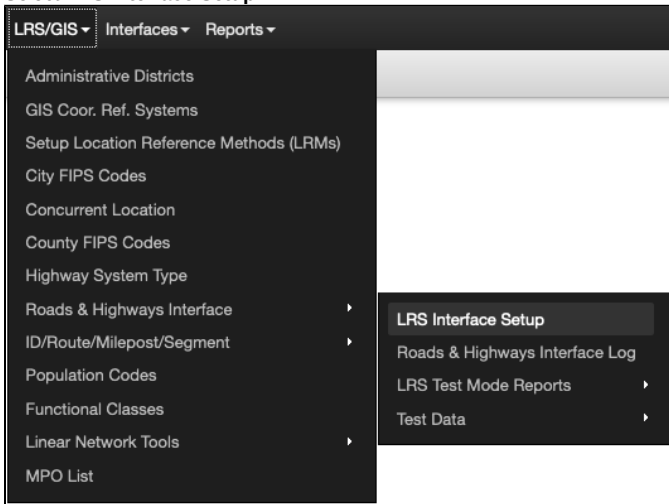
To configure the R & H interface to work with other systems, follow the steps below:

- [Configure the Interface on the AgileAssets System](#)
- [Configure LRMs on the AgileAssets System](#)
- [Make a Connection between ArcCatalog and the AgileAssets System](#)
- [Register External Events with Roads and Highways](#)
- [Register the Roads & Highways database with ArcGIS Server](#)
- [Create Roads and Highways Export Network Web Service](#)
- [Create Roads and Highways Relocate Events Web Services](#)
- [Create LastEditDate Web Service](#)
  - Command Line Option:
  - ArcMap Option:
- [Complete Interface Configuration on the AgileAssets System](#)
- [Install native FGDB libraries](#)
- [Make at least one event table temporal](#)
- [Configure Excluded Tables and Interface Type](#)

## Configure the Interface on the AgileAssets System

On standard systems, the configuration page for this interface is accessed by following the steps below:

1. Click **LRS/GIS** in the top ribbon
2. Select **Roads & Highways Interface**
3. Select **LRS Interface Setup**



The screenshot shows the 'LRS Interface Setup' page in the AgileAssets System. The page has a top ribbon with 'System', 'Utilities', 'Setup', 'FDC', 'Tools', 'Network', 'Reports', and 'LRS/GIS'. The 'LRS/GIS' dropdown is open, showing 'Roads & Highways Interface' and 'LRS Interface Setup'. The 'LRS Interface Setup' page has three sections: 'Export Network Setup', 'Relocate Events Setup - Event Categories', and 'Relocate Events Setup - Member Tables'. The 'Export Network Setup' section has a table with columns for Export Network URL, Time Zone, System ID, SRID, Execution Wait (s), Execution Timeout (s), Download Timeout (s), and LastEditDate service link. The 'Relocate Events Setup - Event Categories' section has a table with columns for Base Events Table Name, Relocate Events URL (Points), Relocate Events URL (Lines), Default Event Table?, Execution Wait (s), Execution Timeout (s), and Download Timeout (s). The 'Relocate Events Setup - Member Tables' section has a table with columns for Source Table and a dropdown menu for PMS\_TRAFFIC.

| Export Network URL | Time Zone   | System ID                | SRID  | Execution Wait (s) | Execution Timeout (s) | Download Timeout (s) | LastEditDate service link |
|--------------------|-------------|--------------------------|-------|--------------------|-----------------------|----------------------|---------------------------|
|                    | US/Mountain | AgileAssets Asset Managi | 26913 | 5                  | 7200                  | 1200                 |                           |

| Base Events Table Name | Relocate Events URL (Points) | Relocate Events URL (Lines) | Default Event Table?                | Execution Wait (s) | Execution Timeout (s) | Download Timeout (s) |
|------------------------|------------------------------|-----------------------------|-------------------------------------|--------------------|-----------------------|----------------------|
| AGILE_EVENTS           |                              |                             | <input checked="" type="checkbox"/> | 5                  | 7200                  | 1200                 |
| SPECIAL_EVENTS         |                              |                             | <input type="checkbox"/>            | 5                  | 7200                  | 1200                 |

| Source Table |
|--------------|
| PMS_TRAFFIC  |

The configuration page is divided into the following three panes:

- **Export Network Setup:** (top pane) configures the part of the interface that imports the LRS. Note that there is one and only one record for this pane. You can modify the following fields:
  - **Export Network URL** – This is the URL of the Roads and Highways Export Network web service. This can be left blank at this point in the configuration
  - **Time Zone** – Set this to match the time zone configured in the Roads and Highways instance
  - **System ID** – Pick the system associated with the base LRM being updated by the interface
  - **SRID** – This number indicates the map projection used for the Network in Roads & Highways - a full list of these map projections is stored in the mdsys.cs\_srs table in Oracle
  - **Execution Wait (s)** – The number of seconds the system waits before checking job status of the web service job again. The standard is 5 seconds
  - **Execution Timeout (s)** – The number of seconds the system will wait from when the web service job is submitted until the job is finished. The standard is 7200 seconds (2 hours)
  - **Download Timeout (s)** – The number of seconds the system waits for the download of the web service job results to complete. The standard is 1200 seconds (20 minutes)
  - **LastEditDate service link** – This is the URL of the LastEditDate web service. This can be left blank at this point in the configuration because it is addressed in the Complete Interface Configuration on the AgileAssets System step.
- **Relocate Events Setup - Event Categories:** (middle pane) configures different event categories and allows you to select which event tables belong to each category in the following pane. Categories can be configured for each different set of event behaviors that you want to employ for different event tables.

**Note:** To insert or delete a field in this pane, the database privileges assigned to the AgileAssets application must be set to allow the creation and deletion of tables.

The views created by this pane are the views that need to be registered with Roads and Highways and used in the creation of Relocate Events web services. You can insert records into this pane and modify the following fields:

- **Base Events Table Name** – This is the base name of the two views created when a record is inserted in this pane. This base name will have "\_PTV" appended to it for point events and "\_LNV" appended to it for linear events.
- **Relocate Events URL (Points)** – This is the URL of the Roads and Highways Relocate Events web service for the point events associated with this category. This can be left blank at this point in the configuration.
- **Relocate Events URL (Lines)** – This is the URL of the Roads and Highways Relocate Events web service for the linear events associated with this category. This can be left blank at this point in the configuration because it is addressed in the [Complete Interface Configuration on the AgileAssets System](#)
- **Default Event Table?** – By checking this option, it means that all event tables that are not specifically assigned to other categories will automatically be assigned to this category. There can be no more than one category with the default event table option checked. So, check this field if this is the default event category.
- **Execution Wait (s)** – Then number of seconds the system waits before checking job status of the web service job again. The standard is 5 seconds.
- **Execution Timeout (s)** – The number of seconds the system will wait from when the web service job is submitted until the job is finished. The standard is 7200 seconds (2 hours).
- **Download Timeout (s)** – The number of seconds the system waits for the download of the web service job results to complete. The standard is 1200 seconds (20 minutes).
- **Relocate Events Setup - Member Tables:** (bottom pane) configures which event tables are associated with each category in the Event Categories pane. The user first selects a category in the middle pane and then can enter the following field to be assigned to that category:
  - **Source Table** – The user can insert from the pick list of event tables that they want associated with the selected event category. Each event table can be associated with at most one category. If the category chosen in the middle pane is the default category do not fill in any records in this field.

## Configure LRMs on the AgileAssets System

This step correlates the LRMs in the AgileAssets system with the Networks implemented in Esri Roads and Highways.

To configure this, navigate to the LRM Setup page by following the steps below:

1. Click **LRS/GIS**
2. Select **Setup Location Reference Methods (LRMs)**

For each LRM in the LRSS pane identify the number assigned to it on the Roads and Highways system in the dLRSNetworks domain and enter that number in the Net\_LRM\_ID field in the AgileAssets LRM Setup window. (Note: The Net\_LRM\_ID field may not be visible in the top pane. You must open design mode to add this field and then make it visible and editable.)

System > LRS/GIS > Setup Location Reference Methods (LRMs) ☆ Save Reload

**LRMs** Actions ▾

| Basic LRS?                          | * LOC REF NAME | Att. | Comments | User Update | Date Update |
|-------------------------------------|----------------|------|----------|-------------|-------------|
| <input checked="" type="checkbox"/> | Basic LRS      |      |          |             |             |

1 of 1 total rows >>>

**Columns** Actions ▾

| Column ID     | Column Label  | COLUMN ID TO | COLUMN LABEL TO | * LRS column type  | Initial Value | Show "To"?                          | Order | NET ORDER ID | NET LOOKUP TABLE | NET LOOKUP ID COLUMN | NET LOOKUP NAME COLUMN |
|---------------|---------------|--------------|-----------------|--------------------|---------------|-------------------------------------|-------|--------------|------------------|----------------------|------------------------|
| ROUTE_ID      | Route ID      |              |                 | Location Attribute |               | <input checked="" type="checkbox"/> | 1     |              |                  |                      |                        |
| LANE_DIR      | LRS Direction |              |                 | Location Across    | 0             | <input checked="" type="checkbox"/> | 4     |              |                  |                      |                        |
| LANE_ID       | Lane          |              |                 | Location Across    | 0             | <input checked="" type="checkbox"/> | 5     |              |                  |                      |                        |
| PERPEN_OFFSET | Offset        |              |                 | Location Across    | 0             | <input checked="" type="checkbox"/> | 6     |              |                  |                      |                        |
| OFFSET_FROM   | BMP           | OFFSET_TO    | EMP             | Location Measure   |               | <input checked="" type="checkbox"/> | 7     |              |                  |                      |                        |

1 of 5 total rows >>>

Also, in cases where an LRM has more than one route identification field (marked as Location Attribute in the bottom screen) you may need to assign each of these fields a value in the `Net_Order_ID` field. This specifies the preferred order of the route identification fields.

**Note:** The `Net_Order_ID` field may not be editable in the bottom pane. You may have to go into design mode to make it editable.

## Make a Connection between ArcCatalog and the AgileAssets System

In ArcCatalog, make a database connection to the Oracle instance underlying the AgileAssets implementation. The directions for creating an Oracle database connection can be found on the Esri website at <http://desktop.arcgis.com/en/arcmap/latest/manage-data/gdbs-in-oracle/connect-oracle.htm>.

**Database Connection** [X]

Database Platform: Oracle ▾

Instance: agiledbp:1521/agiledbp

Authentication Type: Database authentication ▾

User name: ams\_WV\_07\_00\_LRS

Password: ●●●●●●●●●●

☒ Save user name and password

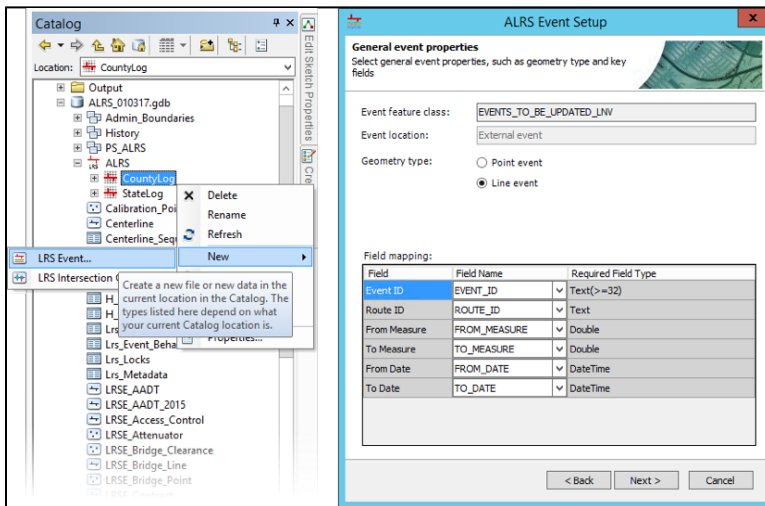
[About Database Connections](#) OK Cancel

## Register External Events with Roads and Highways

For each record entered into the **Relocate Events Setup - Event Categories** pane of the LRS Interface Setup window on the AgileAssets system, you will have two External event views that must be registered to the Advanced Linear Referencing System (ALRS). The names of the External Event views are created from the Base Events Table Name field of each record plus `"_PTV"` appended to it for point events and `"_LNV"` appended to it for linear events.

The directions for registering External events to Roads and Highways can be found on the Esri website (<http://desktop.arcgis.com/en/arcmap/latest/extensions/roads-and-highways/registering-an-external-event-source.htm>). Make sure to complete the following:

- Register the `"_PTV"` events as point events and the `"_LNV"` events as linear events.
- These event views should be registered as External events.
- Point events only need the MEASURE field assigned to its single measure.



**Note:** The external events need to be registered to the Network that is checked as the **Basic LRS**.

## Register the Roads & Highways database with ArcGIS Server

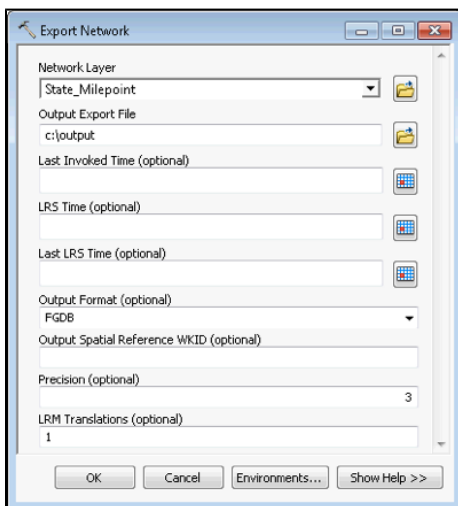
In almost all cases this step will have already been done, but it is listed here for completeness. However, the instructions for registration can be found on the Esri website (<http://server.arcgis.com/en/server/latest/publish-services/windows/registering-your-data-with-arcgis-server-using-manager.htm>).

## Create Roads and Highways Export Network Web Service

There are two main steps to creating the Export Network web service. First you must run the geoprocess, and then share the results of that geoprocess as a web service.

The directions for running the geoprocess and creating the web service can be found on the Esri website (<http://desktop.arcgis.com/en/arcmap/latest/extensions/roads-and-highways-server/deploying-network-export-tool-as-a-service.htm>).

1. In the **Export Network** dialog, select the base LRM of the AgileAssets system (as indicated by the Basic LRS check mark in Section 2.2).
2. When specifying the Output Export File make sure to include a full name with a directory path (e.g. C:\Temp\Export).
3. Select **FGDB** for output format.
4. Select the precision (number of digits to the right of the decimal point) that matches the precision of measures in the Setup\_Network\_Lines table in the AgileAssets system.
5. The LRM Translations value must be a comma-delimited list of the numbers that Roads and Highways assigns to the networks that correspond to any alternate LRMs in the AgileAssets system. These numbers are listed in the dLRSSystems domain. And if there are no alternate LRMs that need to be handled via the Interface, then leave the LRM Translations field blank.
6. Leave the following fields blank: Last Invoked Time, LRS Time, Last LRS Time, and Output Spatial Reference WKID.

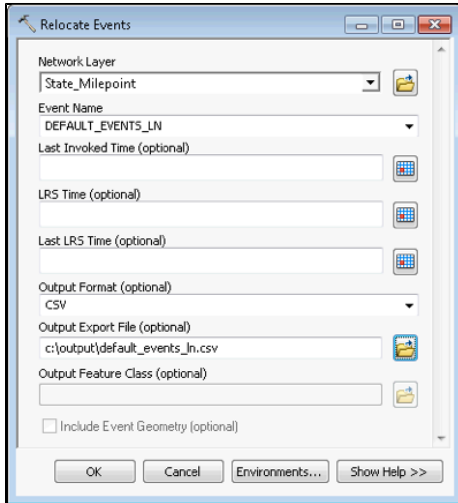


## Create Roads and Highways Relocate Events Web Services

Create a Relocate Events web service for each External event registered in the [Register External Events with Roads and Highways](#) step. There are two main steps to creating a Relocate Events web service. First, you must run the geoprocess, and then share the results of that geoprocess as a web service. Both steps must be run for each registered External event.

The directions for running the geoprocess and creating the web service can be found on the Esri website at <http://desktop.arcgis.com/en/arcmap/latest/extensions/roads-and-highways-server/deploying-relocate-event-tool-as-a-service.htm>. Enter the network that corresponds to the base LRM in the AgileAssets system into the Network Layer. Select the Event Name for the external event associated with this iteration. Select CSV for the output format. And when specifying the Output Export File make sure to include a full name with a directory path (e.g. C:\Temp\Rel\_Events\_Pt).

Suggestion: when creating the web service and using the **Service Editor** dialog, under **Parameters** you may want to pick a Message Level of "Info" as this provides more meaningful error messages.



## Create LastEditDate Web Service

These steps create a LastEditDate web service, which allows the AgileAssets-Roads & Highways Interface to retrieve the latest edit date from the Lrs\_Edit\_Log table in Roads and Highways geodatabase. Follow the steps below to publish the web service and enter the URL into the Interface.

**Note:** To use this function, make sure the Lrs\_Edit\_Log table is registered as versioned in an enterprise geodatabase.

1. Create and register the SDE connection to the R&H geodatabase, or the folder location that contains the file geodatabase with the ArcGIS Server, if they are not already registered.
2. Download the **zip** file from the ftp site where the build artifacts are stored. Extract it to a folder.
3. Publish the service using either the command line option or ArcMap option, described as follows.

### Command Line Option:

- Open a command line window from the folder that contains the script and use the **py** python script in command to publish the service. **publish.py**'s parameters are as follows:

```
-l    ArcGIS server admin address, e.g., https://arcgis.server.example.com/arcgis/admin/ Don't forget /arcgis
/admin/
-u    Admin username to access the server, e.g., siteadmin
-p    The password to the admin user
-s    If you are using a file geodatabase, this is the path leading to the file geodatabase, e.g., C:
\Data\WORKSPACE\RH_GDB.gdb. If you are using an enterprise geodatabase, this is the path to the SDE connection
file, e.g., C:\Data\WORKSPACE\WS_SDE.sde
-w    The workspace folder, e.g., C:\Data\WORKSPACE
-t    The exact table name for LRS Edit Log table. If you are using a file geodatabase, this is Lrs_Edit_Log.
If you are using an enterprise geodatabase, this should include the database and schema prefix, e.g., RH_DEMO.
RH_DEMO.Lrs_Edit_Log
-n    The name of the service (optional), e.g., LastEditDate. By default, it is Last_Edit_Date_Service.
-f    The ArcGIS Server folder where the service needs to be published, e.g., RH_Interface
```

For example:

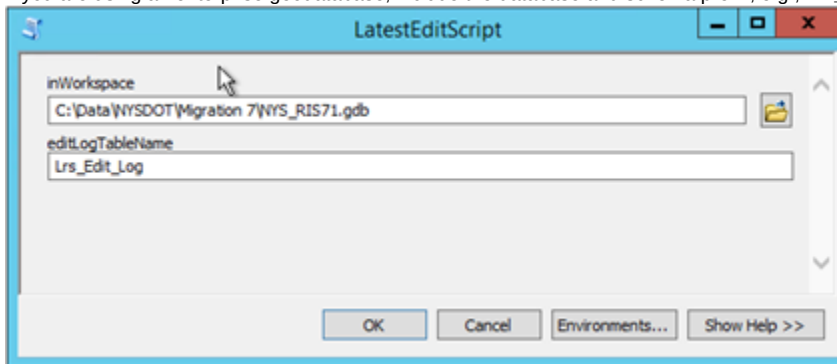
```
Python publish.py -l https://arcgis.server.example.com/arcgis/admin/ -u siteadmin -p password -s C:
\Data\WORKSPACE\WS_SDE.sde -w C:\Data\WORKSPACE -t RH_DEMO.RH_DEMO.Lrs_Edit_Log -f RH_Interface
```

If the command line finishes without any error or warning messages, the service is successfully published.

```
Initializing...
Importing toolbox...
Running toolbox script...
(datetime.datetime(2021, 11, 19, 08, 05, 09),)
Creating SDDraft...
Analyzing SDDraft...
----MESSAGES----
----WARNINGS----
----ERRORS----
Creating service from draft...
Publishing to https://dwarcv11.agileassets.com/arcgis/admin/
Done. Service published!
```

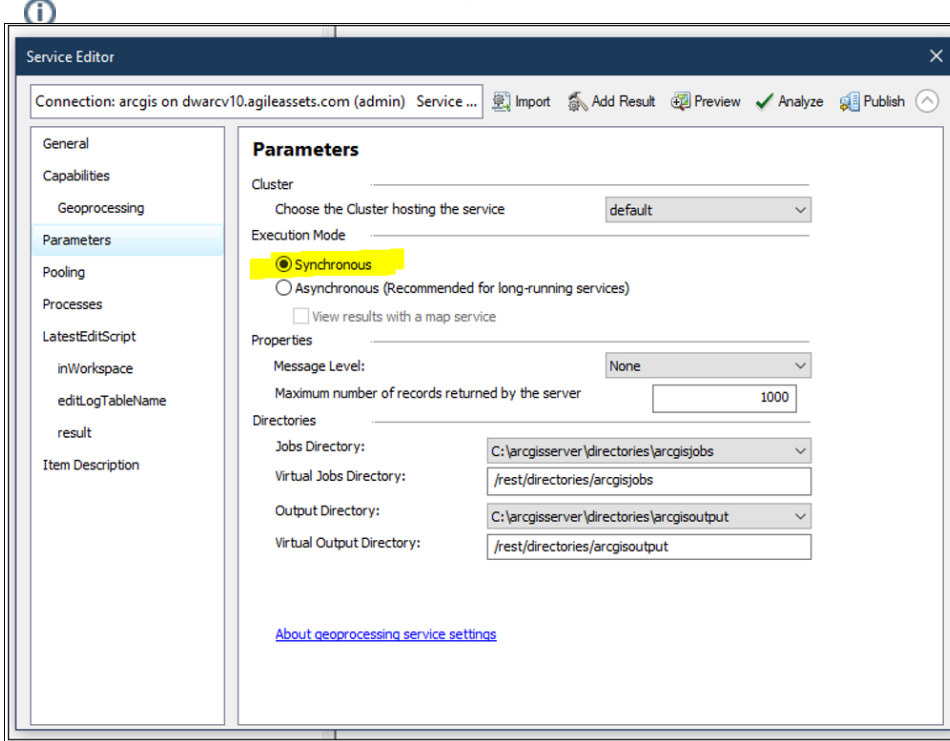
### ArcMap Option:

1. Open the folder in ArcMap, and open the **tbx** toolbox to display the **LastEditScript**
2. Double click the **LastEditScript** script under the **tbx** to open it.
3. For *inWorkspace* parameter:
  - If you are using a File Geodatabase, select the file geodatabase.
  - If you are using an enterprise geodatabase, select the SDE connection file with **default** version (or whatever version was used with the Export Network and Relocate Events web services).
4. For *editLogTableName* parameter:
  - If you are using a File Geodatabase, put **Lrs\_Edit\_Log** to this parameter.
  - If you are using an enterprise geodatabase, include the database and schema prefix, e.g., **RH\_DEMO.Lrs\_Edit\_Log**.



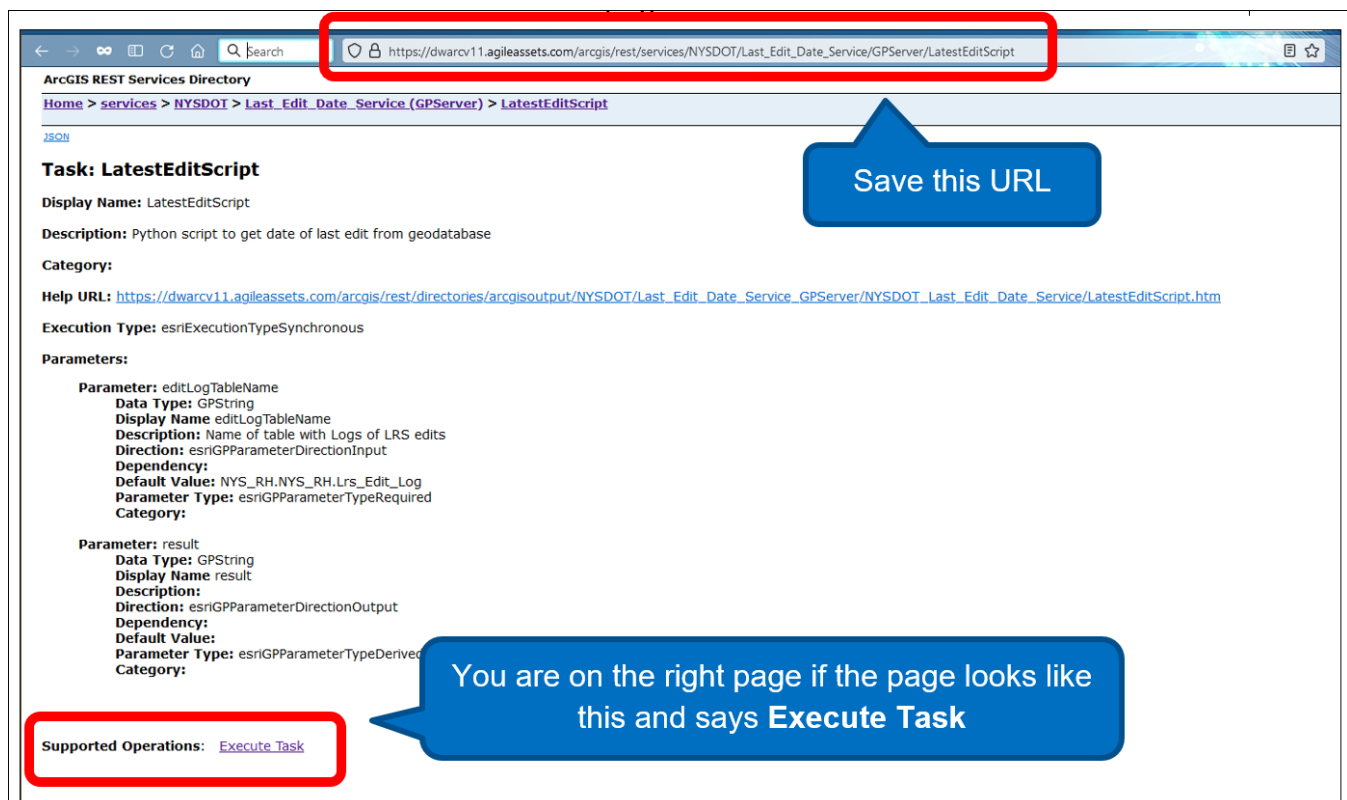
5. Click OK to run the tool, Follow [this instruction](#) and finish publishing the web service.

**Note:** For this GP service, make sure to select the **Synchronous** mode under the Parameter tab:



Once the service is published, follow these steps to obtain the URL to the service:

1. Adjust the permission of the service in ArcGIS Server Manager and set it to **Public (Available to Everyone)**.
2. Save the URL. The URL is the webpage that has a **Execute Task** text at the bottom:



## Complete Interface Configuration on the AgileAssets System

On the standard AgileAssets system, you can return to the LRS Interface Setup window by following the steps below:

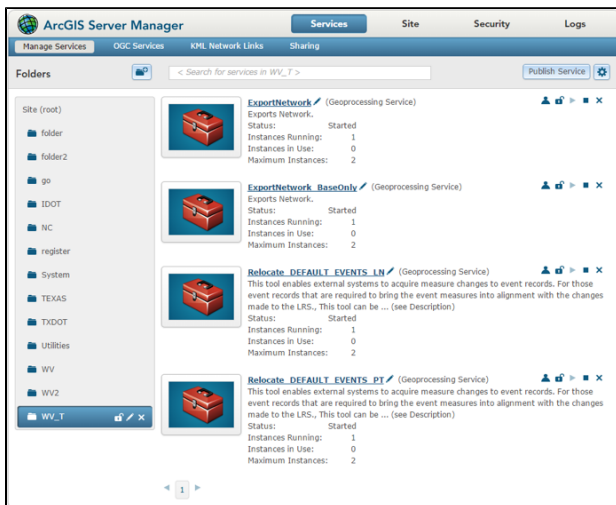
1. Click **LRS/GIS**
2. Select **Roads & Highways Interface**
3. Select **LRS Interface Setup**

To fill in the URLs that were left empty in an earlier step, follow the steps below:

The screenshot shows the 'LRS Interface Setup' page. The top pane is 'Export Network Setup' with a table containing one row for 'Export Network URL'. The middle pane is 'Relocate Events Setup - Event Categories' with a table containing two rows: 'EVENTS\_TO\_BE\_UPDATED' and 'SPECIAL\_EVENTS'. The bottom pane is 'Relocate Events Setup - Member Tables' with a table containing one row for 'SUPPORT\_INVENTORY'.

In the Export Network URL field on the top pane, enter the URL associated with the Export Network web service that you created. To find the URL to enter here, do the following:

- In a separate browser page, visit the ArcGIS Server Manager website for this instance.
- Inside ArcGIS Server Manager, go to **Services > Manage Services**.
- On this page, choose the folder where you placed the web service, and then click the **Export Network** web service (or whatever you named your service in the Create Roads and Highways Export Network Web Service step).
- Click **Capabilities** on the left-hand panel.
- Click the URL next to the phrase "Rest URL".
- Click the phrase **Export Network** under the heading
- Copy the URL from the address bar of the browser and paste it into the **Export Network URL** field of the LRS Interface Setup page.
  - If your ArcGIS server is configured to require authentication, you may need to add a proxy prefix to the start of the URL you just entered.



In the **LastEditDate Service Link** field on the top pane, enter the URL associated with the LastEditDate web service that you created. This is the URL created in the Create LastEditDate Web Service step.

- If your ArcGIS server is configured to require authentication, you may need to add a proxy prefix to the start of the URL you just entered.

In the **Relocate Events URL (Points)** field and in the **Relocate Events URL (Lines)** field on the middle pane, enter the URL associated with the Relocated web services that you created for each of these event categories. To find the URL to enter here, do the following for each event category:

- In a separate browser page, open the ArcGIS Server Manager website for this instance.
- Inside ArcGIS Server Manager, go to **Services > Manage Services**.
- On the new page, choose the folder where you placed the web service, and then click the **Relocate Events** web service you are working on.
- Click **Capabilities** on the left panel.
- Click the URL next to the phrase **Rest URL**.
- Click the phrase **Relocate Events** under the heading



- Copy the URL from the address bar of the browser and paste it into the appropriate **Relocate Events URL** field of the LRS Interface Setup page.
  - If your ArcGIS server is configured to require authentication, you may need to add a proxy prefix to the start of the URL you just entered.

## Install native FGDB libraries

One of the outputs of ESRI's Roads & Highways web services is an ESRI File GeoDatabase (FGDB). In order for our system to be able to read ESRI File GeoDatabases, native libraries must be installed.

For Linux-based servers, these libraries are named:

- so – This library is written and provided by [Numbered list](#)
- ESRI, as part of the File GeoDatabase API, v. 1.4.
- so – This library is written and provided by ESRI, as part of the File GeoDatabase API, v. 1.4.
- so – This library is written and provided by AgileAssets and depends on the other libraries provided by ESRI.

For Windows-based servers, these libraries are named:

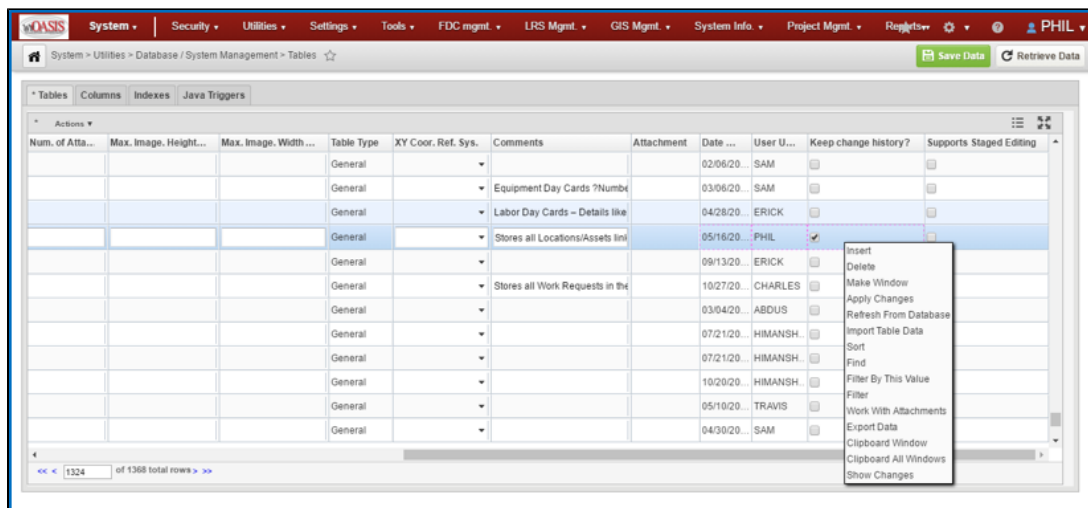
- FileGDBAPI.dll – This library is written and provided by ESRI, as part of the File GeoDatabase API, v. 1.4.
- dll – This library is written and provided by ESRI, as part of the File GeoDatabase API, v. 1.4.
- dll – This library is written and provided by ESRI, as part of the File GeoDatabase API, v. 1.4.
- dll – This library is written and provided by AgileAssets and depends on the other libraries provided by ESRI.

The implementation steps are as follows:

1. Obtain the AgileAssets libraries. The available AgileAssets libraries are listed above. Contact AgileAssets support and provide them with operating system details of your server.
2. Obtain the ESRI libraries. The Esri libraries are provided on Esri's download page.
  - Go to [http://www.esri.com/apps/products/download/index.cfm?fuseaction=#File\\_Geodatabase\\_API\\_1.4](http://www.esri.com/apps/products/download/index.cfm?fuseaction=#File_Geodatabase_API_1.4)
  - Download the appropriate package for the required operating system.
  - Unpack the package.
  - Find the required libraries in the FileGDB\_API/lib directory.
3. Install the libraries. Create a directory on the application server and put all required libraries (from both Esri and AgileAssets) in that directory. Make note of the directory name. For the examples below we used /usr/local/tomcat/geo\_libs.
4. Create a script that lets the application server know the whereabouts of these libraries. Replace "/usr/local/tomcat/geo\_libs" in the directions below with the location of your libraries as appropriate.
  - For Linux:
    - If a file named setenv.sh does not exist in the Tomcat bin directory, then create it and make it executable.
    - For Linux, add ONE of these lines to setenv.sh:
      - For versions of Java below 7 and if LD\_LIBRARY\_PATH is already set on the system:
      - LD\_LIBRARY\_PATH=\$LD\_LIBRARY\_PATH:/usr/local/tomcat/geo\_libs
      - For versions of Java below 7 and if LD\_LIBRARY\_PATH is not already set on the system:
      - LD\_LIBRARY\_PATH=/usr/local/tomcat/geo\_libs
      - For Java 7 and above, the LD\_LIBRARY\_PATH needs to be exported and set this way:
      - export LD\_LIBRARY\_PATH="/usr/local/tomcat/geo\_libs"
      - export LD\_LIBRARY\_PATH=/usr/local/lib:\${LD\_LIBRARY\_PATH}
      - JAVA\_OPTS="-Djava.library.path=/usr/local/tomcat/geo\_libs"
  - For Windows:
    - If a file named setenv.bat does not exist in the Tomcat bin directory, then create it and make it executable.
    - Add this line to setenv.bat:
      - Set PATH = %PATH%;\usr\local\tomcat\geo\_libs
5. Restart Tomcat.

## Make at least one event table temporal

Because Roads and Highways keeps track of the dates associated with each edit the AgileAssets side of the interface needs to have fields to store this data. Those fields are created when at least one linearly-referenced table is set to **Keep Change History**.



To make a table temporal, follow the steps below:

1. Go to **System > Utilities > Database/System Management > Tables** (or wherever this window is on your implementation).
2. Find a linearly-referenced table (one that has route and measures) and select its row in the table.
3. Scroll to the far right of the window and place a check mark in the **Keep Change History**
4. Right-click the row to bring up the context menu and select **Apply Changes**.
5. A dialog may appear asking you to give a beginning birth date for your existing records in this table. By default it is 1/1/1900. Give it a date of your choosing and click **OK**.
6. Next a dialog will appear asking if it is OK to process the script needed to make the table temporal. Click **OK**. This process will likely take several minutes depending on the number of records in the table.
7. After the script completes click the **Save Data** button and this task is complete.

## Configure Excluded Tables and Interface Type

An AgileAssets support person will work with you to make sure that the proper settings are made for tables to be excluded from the interface job and that your system is set to use the Roads & Highways Interface type.