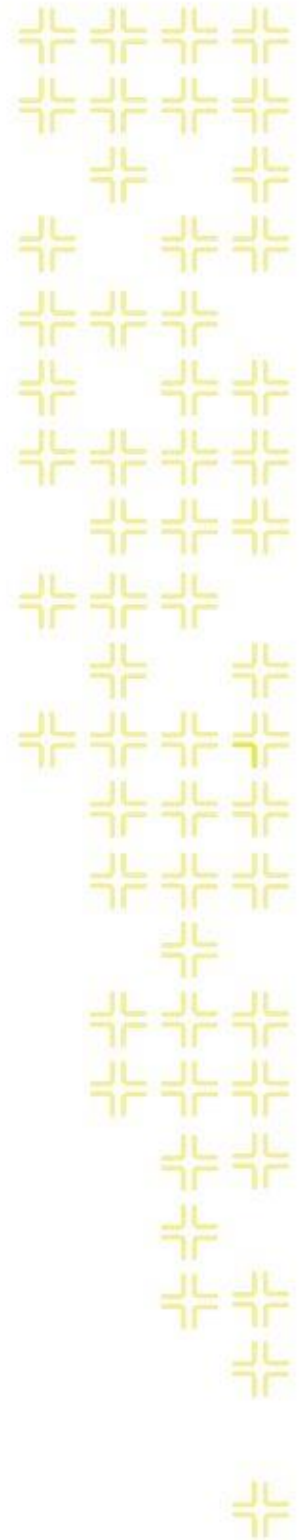




TRAINING GUIDE

# Overview of Lucity Spatial



# Overview of Lucy Spatial

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In this session, we'll cover the key components of Lucy Spatial.

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## Lucity Spatial

Since version 2014 Lucity offers the ability to store work order and work request spatial components directly in the Lucity database. Storing the spatial component (geometry) in the Lucity database allows for faster analysis, better efficiency, and more flexibility when showing these locations in a map.

### Requirements

A few requirements must be met before implementing Lucity Spatial:

- The Lucity Work database must be one of the following:
  - SQL Server 2008 or higher
  - Oracle with MDSYS.SDO\_GEOMETRY data type enabled
- The Lucity Services must be installed
- Each Lucity linked feature class must be assigned to a default map service
- Lucity linked feature classes must be one of the following geometry types:
  - Point
  - Line (including multi-line features)
  - Polygon (including multi-polygon features)
- System Settings in UI Admin must be configured:
  - The *Enable Lucity Spatial* system setting must be set to TRUE
  - The *Max amount of days to process spatial history* must be set to a value greater than 0
- A default Geocoding Service must be defined
  - With version 2016r2 this is set in UI Admin's GIS Services
  - The geocoding service must be on version 10.2 or higher (supporting single line input)

### Notes:

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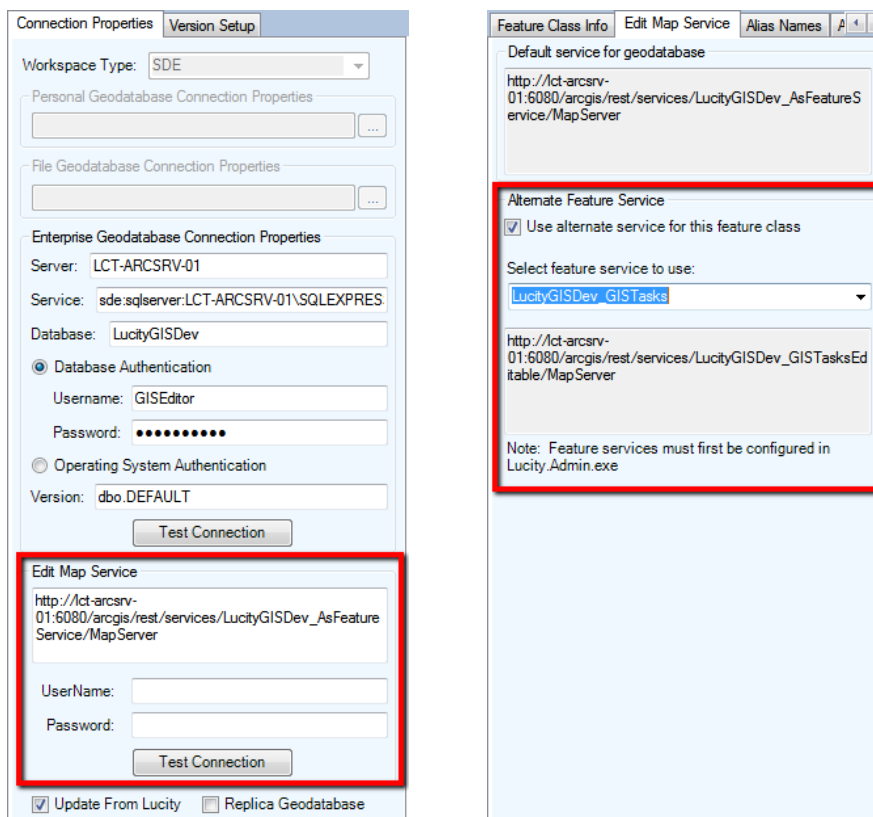
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## Setup

### Assign default map services

The Lucy Spatial Updater service interacts with map services in order to obtain an asset's geometry to store in the Lucy database. To obtain the geometry for an asset the following process is followed:

1. Determine the list of feature classes linked to a given asset type
  2. Do the following for each feature class until the asset geometry is returned:
    - a. Determine the map service
      - i. If a map service is defined at the feature class level then that one will be used.
      - ii. If a map service isn't defined at the feature class level then the one defined at the geodatabase level will be used.
    - b. Query the map service for the asset
      - i. If it exists, return the geometry
      - ii. If it doesn't exist, move to the next feature class
- The geodatabase map service is defined in the Geodatabase Configuration Tool in ArcCatalog. It is listed under the Connection Properties tab when you have a geodatabase node selected.
  - A service defined at the feature class level will be listed under the Edit Map Service tab when you have the feature class node selected.



## Configure System Settings

In UI Admin, system settings the following must be configured:

1. On the General tab, set the Enable Lucy Spatial to TRUE

System Settings

Appearance | Designer Automation | Documents | Email | General | GIS 3rd Party Integrations | GIS Desktop | GIS Edit Integration | GIS Routing | GIS Web

Description	Value
Allows access to web services with certificate errors	TRUE
Days to keep data in login auditing table (0 to maintain all history)	90
Days to keep data in the event track table (0 to maintain all history)	30
ELA Email to send expiration warning emails to	bvandusen@lucity.com
ELA number of days before expiration when warnings begin	40
Enable Lucy Spatial	TRUE
Inactive User License Expiration in Minutes (recommended value=60)	60
List of values that are not allowed in search filters to reduce risk of getting ha...	(insert   update   delete   truncate   reconfigure   union   sysobjects   waitforxp_c...
Location of the Lucy help files for this system	http://help.lucity.com/webhelp
Max amount of days to process spatial history	1000
Minimum Length For Passwords (Must be 1 or greater)	3

Save Cancel

2. On the General tab, adjust the Max amount of days to process spatial history (must be greater than 0).
  - a. Example: If you enter 180, the Lucy Spatial Updater will process all work orders/requests modified today and within the last 180 days.
  - b. Note: The Lucy Spatial Updater service is reliant on back end configuration that was added to the Lucy database in 7.4. Therefore, depending on your upgrade history there could be a few years' worth of locations that have the potential to be processed.

## Configure Default Geocoding Service

In UI Admin's GIS Services, the following must be configured:

1. On the Utility Services tab, configure a geocoding service with Lucy and make sure to set a default as shown in the red outline below:

GIS Services

Map Services | Utility Services | Work Zone Services

Geocoding Services

Name	Url	Service is secure?	Proxy Url
EsrWorldLocator	https://geocode.arcgis.com/arcgis/rest/services/World/GeocodeServer	<input type="checkbox"/>	
LucyLocator	http://demo.lucity.net/arcgis/rest/services/GeoLocate/GeocodeServer	<input checked="" type="checkbox"/>	

Add Geocoding Service... Delete...

Default Geocoding Service: EsrWorldLocator

Geometry Service

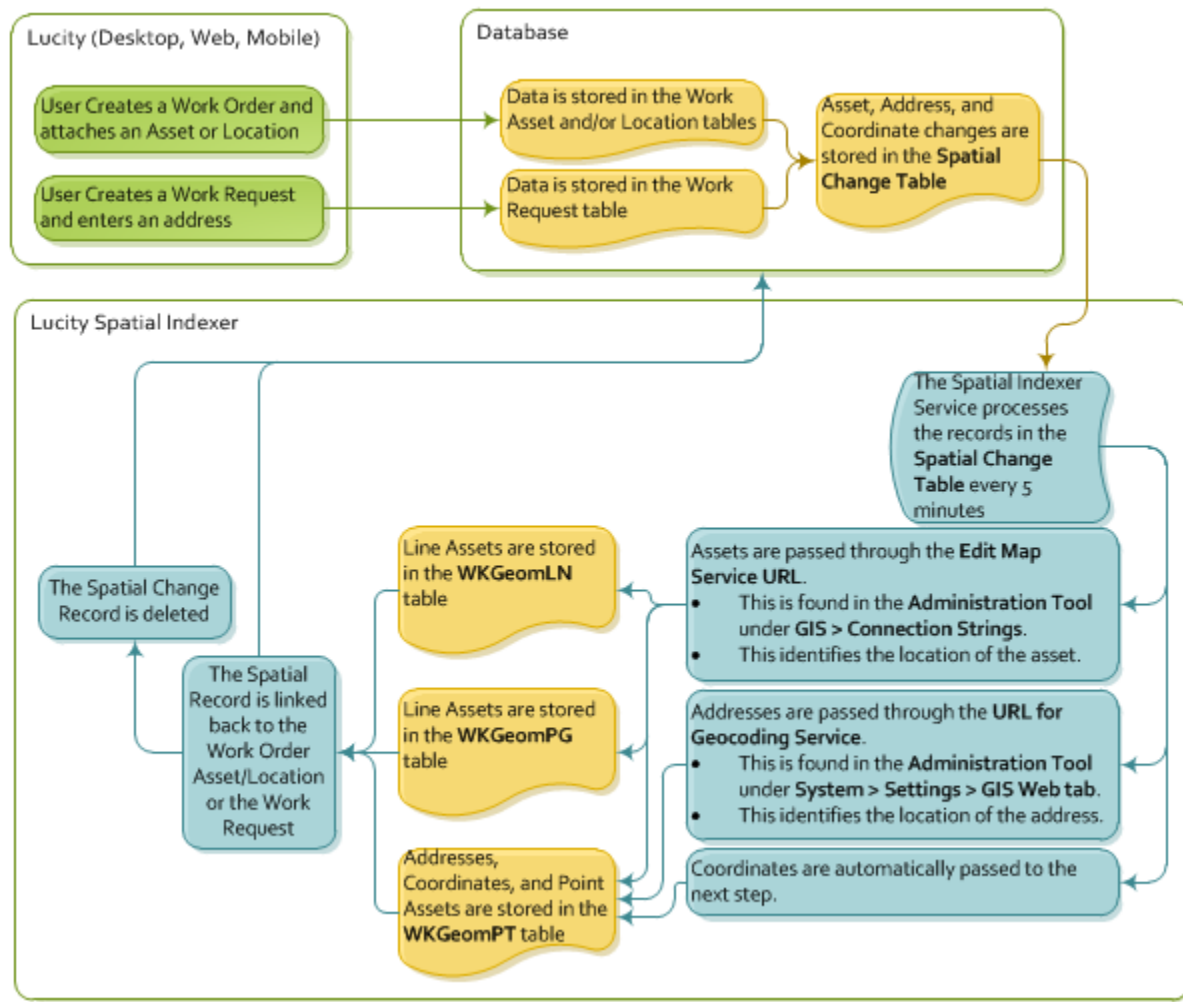
Url	Service is secure?	Proxy Url
https://tasks.arcgisonline.com/ArcGIS/rest/services/Geometry/GeometryServer	<input type="checkbox"/>	

Routing Service

Url	Service is secure?	Proxy Url
	<input type="checkbox"/>	

Default Vehicle Start Address for Work Routing:

## How it works



## Behind-the-scenes

The following Lucy tables and views are used with Lucy Spatial:

- **WKSPATIALCHANGE**
  - This table is updated automatically by the Lucy application with any change made to Work Requests and Work Orders that deal with location information.
  - The Lucy Spatial Updater service processes these records by obtaining their corresponding geometries
- **WKGEOMPT**- This table stores all point geometries populated by the Lucy Spatial Updater service retrieved when processing **WKSPATIALCHANGE**
- **WKGEOMLN**- This table stores all linear geometries populated by the Lucy Spatial Updater service retrieved when processing **WKSPATIALCHANGE**
- **WKGEOMPG**- This table stores all polygon geometries populated by the Lucy Spatial Updater service retrieved when processing **WKSPATIALCHANGE**

- GIS\_WKGEOMLNQR- View showing all linear Request locations
- GIS\_WKGEOMPGRQ- View showing all polygon Request locations
- GIS\_WKGEOMPTRQ- View showing point Request locations (asset only)
- GIS\_WKGEOMPTRQLOC- View showing point Request locations (address and x/y)
- GIS\_WKGEOMLNWO- View showing all linear Work Order locations
- GIS\_WKGEOMPGWO- View showing all polygon Work Order locations
- GIS\_WKGEOMPTWO- View showing point Work Order locations (asset only)
- GIS\_WKGEOMPTWOLOC- View showing point Work Order locations (address and x/y)

## Troubleshooting

Sometimes there may be records that fail to process. When a spatial change record cannot be processed it is kept in the Spatial Change table (Lucity.WKSPATIALCHANGE) and marked with an error code. These records are kept in the Spatial Change table for 30 days after they were initially processed. After 30 days they are deleted.

The error codes are found in the SPCH\_SU\_ERROR column:

- MissingData
  - Usually means that there was an issue with the data in WKSPATIALCHANGE like the moduleID is invalid; ParentRecID is invalid, invalid x/y data, etc.
- ServiceIssue
  - This occurs if there isn't a map service associated with the feature class or the feature class related to the asset type is not in the service
- NoGeometry
  - Returned if a record's geometry was found but was empty, if the indexer was unable to geocode an address, or if there was an issue with the REST call to retrieve the geometry.
- NoLucityRecord
  - Returned if the associated record no longer exists in Lucity

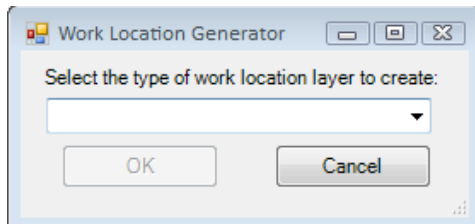
How to Process Records that have failed:

1. In the WKSPATIALCHANGE table find the record that failed
2. Review the error code for the record and resolve the problem
3. Delete the contents of the SPCH\_GUID and SPCH\_SU\_ERROR fields for the record
4. The next time the Lucity Spatial Updater service runs it will attempt to process the skipped record again.

## Generating Live Work Layers

After you setup the Lucy Spatial Updater and the service has begun processing work locations you are ready to display and interact with the results. The Lucy GIS extension in ArcMap provides some out-of-the-box tools to facilitate the generation of layers that can be used to show the work locations.

1. In ArcMap on the Lucy toolbar, click on the  button. The following pop-up will appear:

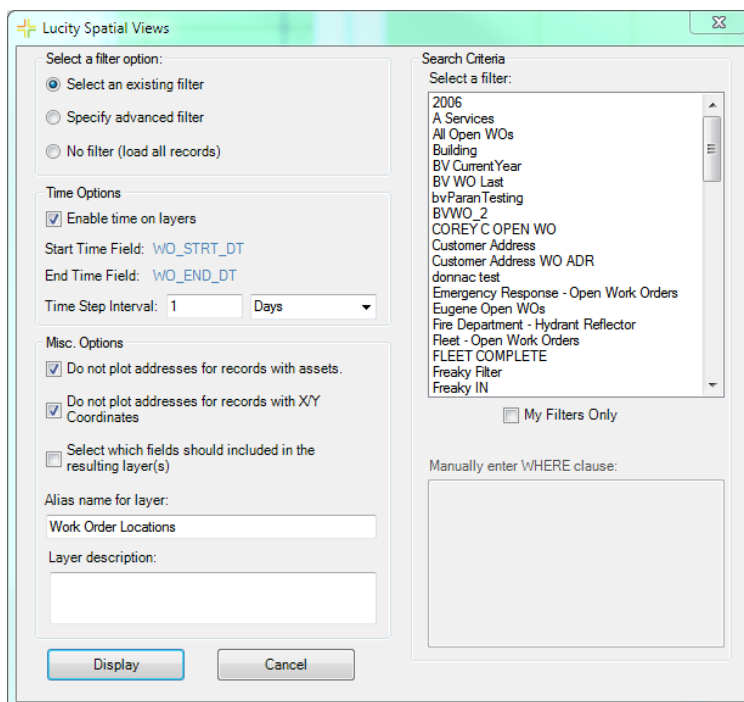


2. Select the type of work location you would like to create from the drop down list and Click OK.

### Available Views

<b>Requests</b>	This creates temporary static layers of work request locations based on Dates, Categories, Filters, and Spatial Filters.
<b>Requests (Live)</b>	This creates dynamic (live) views of work request data based on a filter.
<b>Work Orders</b>	This creates temporary static layers of work order locations based on Dates, Categories, Filters, and Spatial Filters.
<b>Work Orders (Live)</b>	This creates dynamic (live) views of work order data based on a filter.
<b>PM/Routine</b>	This creates temporary static layers of Master Projects based on a filter.
<b>Master Projects</b>	This creates temporary static layers of PM/Routine locations based on a Dates, Categories, Filters, and Spatial Filters.

3. The associated tool will appear allowing you to provide further details specific to the type of work.





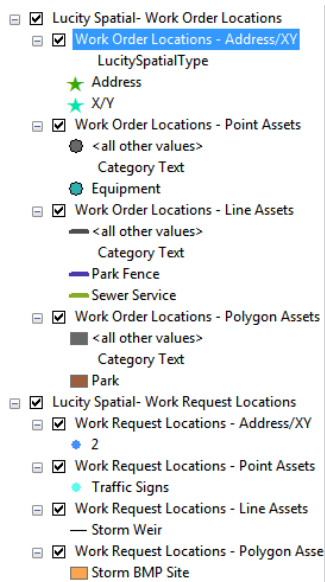
<b>Select a filter option</b>	Provides several ways for users to select a set of work requests to display.
<b>Select an existing filter</b>	Allows users to select a filter that was previously created and saved in the Requests module.
<b>Specify advanced filter</b>	Allows users to manually enter a filter using SQL.
<b>No filter (load all records)</b>	Displays all requests that have spatial information.
<b>Search Criteria</b>	These fields allow users to select or add a filter depending on their previous selection
<b>Select a Filter</b>	Displays all filters that were previously created and saved in the <b>Requests module</b> . Check the <b>My Filters Only</b> box to show only the filters created by the current user.
<b>Manually enter WHERE clause</b>	Type in a filter for the request module using SQL. Start with <b>WHERE....</b>
<b>Time Options</b>	These allow users to enable time functions within the layer. This allows users to use the ESRI Time functions within ArcMap.
<b>Enable Time on Layers</b>	This enables the time function for the request layers.
<b>Start Time Field</b>	These are the pre-configured fields that the time functions will use.
<b>End Time Field</b>	
<b>Time Step Interval</b>	Fill out the number of days/weeks/ months that the time functions should group the requests into. <b>Note:</b> This can be changed in the layer properties after the layer is created.
<b>Misc Options</b>	These allow users to control the results in several other ways.
<b>Do not plot addresses for requests with assets...</b>	This option causes the results to not plot the address of the work request if there is an associated asset. If this is turned off the work request will plot both.
<b>Do not plot addresses for work request locations with X/Y Coordinates</b>	This option causes the results to not plot the address of the request if there is an X/Y coordinate set. If this is turned off the request will plot both.
<b>Select which fields should be included in the resulting layer(s)</b>	The results produced by this tool will plot the location of different requests and will contain attribute information from the Request module in the Attribute table. Check this option to open another section of the tool to change which fields from the Request module show up in the Attribute table.
<b>Alias name for layer</b>	The name that will appear in the table of contents.
<b>Layer description</b>	The description that will appear in the layer's properties.

4. Fill out the form based upon the various settings and options that are available.

- a. Note: All request and work order fields are available for use in the resulting layer. To adjust which fields should be included in the results you will want to check the “Select which fields should be included in the resulting layer(s)”.

The screenshot shows the 'Lucity Spatial Views' dialog box. The 'Select a filter option' section has 'Select an existing filter' selected. The 'Time Options' section has 'Enable time on layers' checked, with 'Start Time Field' set to 'WO\_STRT\_DT' and 'End Time Field' set to 'WO\_END\_DT'. The 'Time Step Interval' is set to '1' Days. The 'Misc. Options' section has 'Do not plot addresses for records with assets.' and 'Do not plot addresses for records with X/Y Coordinates' checked. The 'Select which fields should be included in the resulting layer(s)' checkbox is checked and highlighted with a red box. The 'Search Criteria' section shows a list of filters, with '2006 A Services' selected. The 'Custom Field Options' section shows a list of fields, with 'Account # (WO\_ACCOUNT)' selected. The 'System Default Fields' section shows a list of default fields.

- Click Display once you are ready to generate the layers. Once the tool has completed processing, the resulting grouped layer will be added to the map.



Examining the resulting layers:

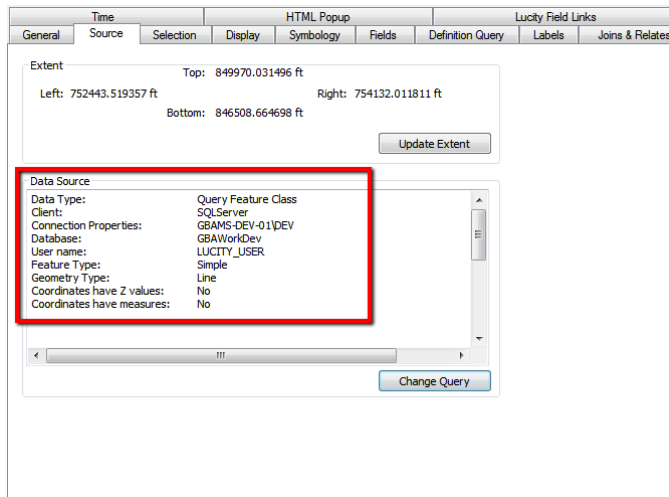
- The tool will generate 4 layers:
  - Point layer for address and x/y data
  - Point layer for asset data
  - Polyline layer for asset data
  - Polygon layer for asset data
- General- The resulting layer name and description is determined by the user specified settings that were defined on the Lucy Spatial Views form.

Alias name for layer:  
Work Order Locations

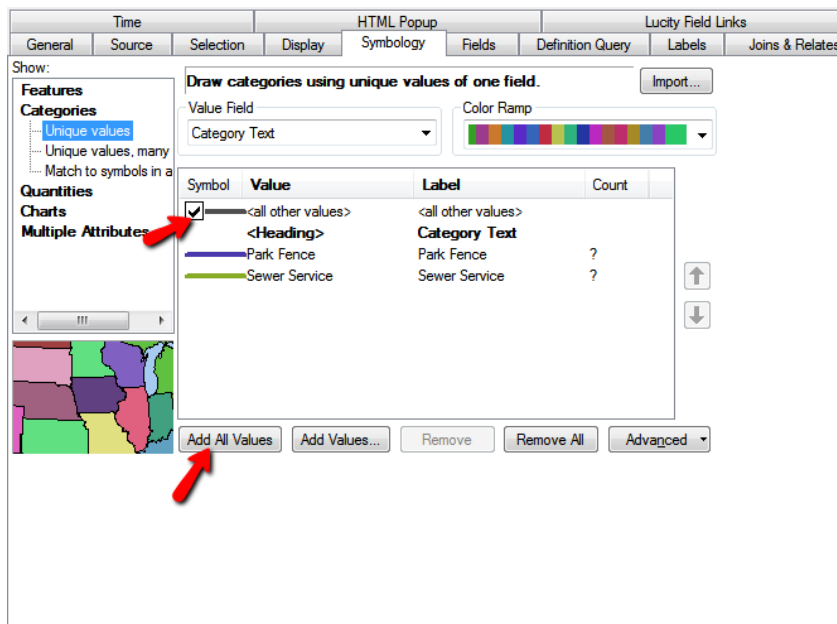
Layer description:  
All open WOs

- Note:** The Description will start with “LucySpatialWork:” or “LucySpatialRequest:”. You can modify the description, but the description **must** start with these key words. This is a requirement if these layers are to be used in the Lucy Web Map.

- Source- The source used for the work layers is the GBAWork database. The tool connects to the GBAWork database as Lucity\_User. You will need to know this information if you wish to publish the layer as a service later.



- Symbology- The default for the tool is to symbolize based upon the Work Category Text (RQ\_CAT\_TY, WO\_CAT\_TY). The symbology can be altered by going to the layer's symbology tab.



- Note: The symbology is not dynamic. In other words, if a new work order/request is created that as is assigned to a category that hasn't been used yet- it will not show in the layer. To account for this situation:
  - Adjust the symbology to include the "<All other values>". Even though you visually won't be able to tell what work category the work item has been assigned, at least it will be visible in the layer.
  - Occasionally you will want to update the symbology of the layer by using "Add All Values".

- Definition Query- A definition query was applied to the layer if the option to use an existing filter or an advanced filter was specified on the Lucy Spatial Views Form.

The screenshot shows the 'Definition Query' tab of the Lucy Spatial Views Form. The 'Definition Query' text area contains the query 'WO\_STAT\_CD < 950'. Below the text area are two buttons: 'Query Builder...' and 'Search Order...'.

- Time- If the option to enable time on the generated layer was set, then the Time tab on the resulting layer will have some additional settings that can be configured.

The screenshot shows the 'Time' tab of the Lucy Spatial Views Form. The 'Enable time on this layer' checkbox is checked. Under 'Time properties', the 'Layer Time' dropdown is set to 'Each feature has a start and end time field'. The 'Start Time Field' is 'Start Date' and the 'End Time Field' is 'End Date'. The 'Field Format' is '<Date/ Time>'. The 'Time Step Interval' is '1.00' and the unit is 'Days'. The 'Layer Time Extent' is set to 'To:'. The 'Calculate' button is visible. Under 'Advanced settings', the 'Time Zone' is '(UTC-06:00) Central Time (US & Canada)' and the 'Time Offset' is '0.00' and the unit is 'Years'. The 'Display data cumulatively' checkbox is unchecked.

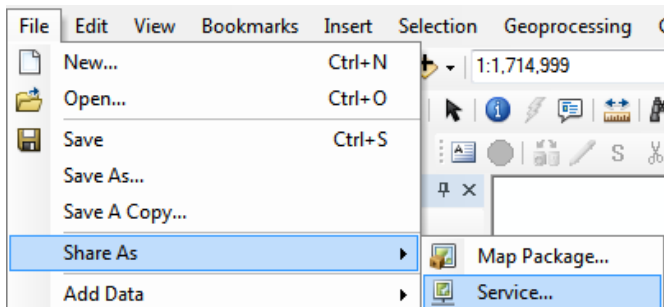
- Customizations to the layer settings (symbology, labelling, etc) can be saved and used as the default for future runs of the Lucy Spatial View tool. For more information on how to save these settings refer to the Lucy Symbology default tool:  
<http://help.lucity.com/webhelp/v140/gis/index.htm#25859.htm>
- The Lucy extension tries to handle all the situations needed with generating query layers; however, there may be some additional requirements needed based upon the underlying database platform. Refer to  
[http://resources.arcgis.com/en/help/main/10.2/index.html#/Preparing\\_to\\_use\\_query\\_layers/00s500000032000000/](http://resources.arcgis.com/en/help/main/10.2/index.html#/Preparing_to_use_query_layers/00s500000032000000/) for more information.

## Publishing Live Work Layers

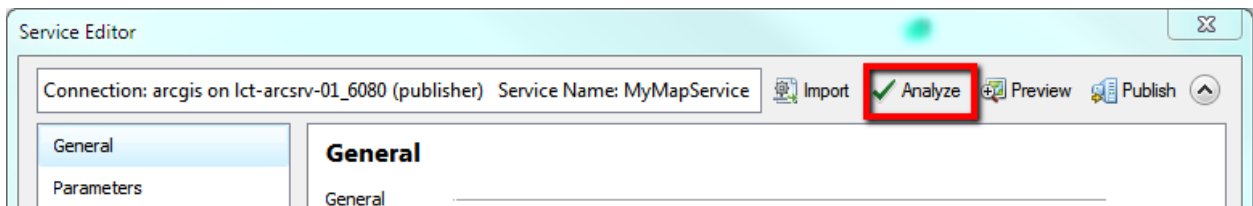
After you have created the live work layers, you can distribute access to those layers for users on the ArcGIS Desktop platform. If you wish to provide access to those layers in the Lucity web map, or any of the Lucity mobile applications then you will need to create a map service that contains these layers.

There is more than one way to publish a map service; the following is an example of how you can create the service from within an ArcMap document (.mxd).

- In ArcMap add the live work layers to the map and customize properties so the map is displaying the data as you like.
- In ArcMap, click File>>Share As>>Service.



- Before you publish the service, you will want to analyze.



- The following are some common warnings/errors found when publishing the Lucity Live Work Layers and how they can be resolved:

- Layer's data source is not registered with the server and data will be copied to the server

Severity	Status	Code	Description /
High	Unresolved	24011	Data source is not registered with the server and data will be copied to the server (8 items)
High	[Re-analyze]	24011	Layer's data source is not registered with the server and data will be copied to the server
High	Unresolved	24011	Layer's data source is not registered with the server and data will be copied to the server
High	Unresolved	24011	Layer's data source is not registered with the server
High	Unresolved	24011	Layer's data source is not registered with the server
High	Unresolved	24011	Layer's data source is not registered with the server
High	Unresolved	24011	Layer's data source is not registered with the server
High	Unresolved	24011	Layer's data source is not registered with the server
High	Unresolved	24011	Layer's data source is not registered with the server
Medium	Unresolved	10045	Map is being published with data copied to the server

status: Complete

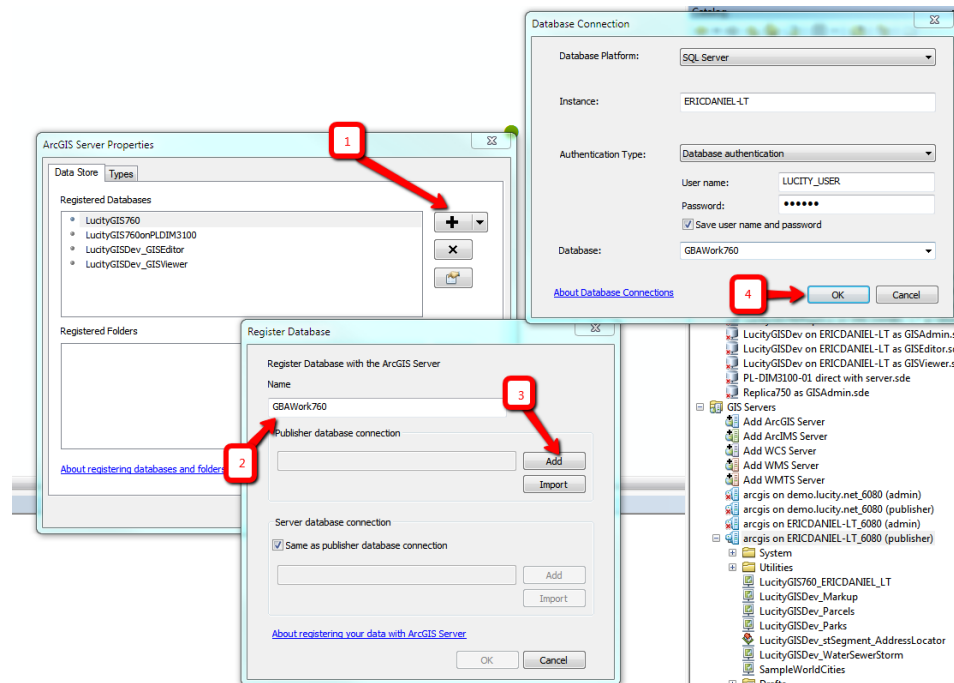
Lucity Process Log

**Register Data Source With Server**

- Show Data Store Registration Page
- Help
- Select Layer In Table Of Contents
- Mark As Exception
- Copy
- Select All

- This must be fixed; otherwise, the layer will not be refreshed with updates.
- To resolve, right-click on the error and select the Register Data Source With Server option.

- iii. If needed, you may need to manually create a db connection to GBAWork using Lucy\_User.



- Shape field is not visible

Severity	Status	Code	Description
High	Unresolved	10066	Map is not time enabled and all data in time enabled layers will draw by default
Medium	Unresolved	24048	Shape field is not visible (8 items)
Medium	Unresolved	24048	Shape field is not visible
Medium	Unresolved	24048	Shape field is not visible
Medium	Unresolved	24048	Shape field is not visible
Medium	Unresolved	24048	Shape field is not visible
Medium	Unresolved	24048	Shape field is not visible
Medium	Unresolved	24048	Shape field is not visible
Medium	Unresolved	24048	Shape field is not visible
Medium	Unresolved	24048	Shape field is not visible

**Make Shape field visible**

Remove Layer

Help

Select Layer In Table Of Contents

Mark As Exception

Copy

Select All

- i. This must be resolved before publishing
- ii. To resolve, right-click and select Make Shape Field Visible

- Once you resolved all the issues, you can publish the service. Once published, you can add this service to the Lucy web map or mobile applications.

The Lucy Live Work layers are essentially query layers. They are pointing to various spatial views in the Lucy database. These layers are 'live' meaning if a work location is added/updated/deleted this information automatically refreshed in the live work layer.

Notes: \_\_\_\_\_

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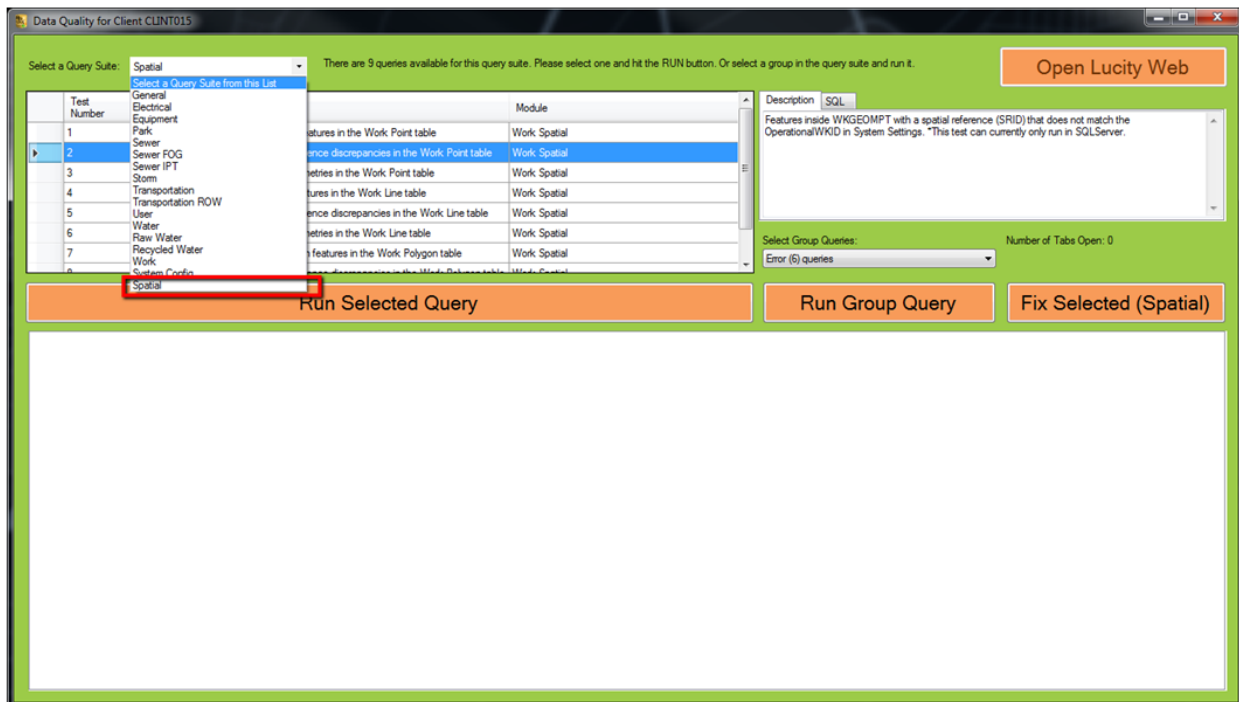
## Data Quality Tool

The Lucy Data Quality Services Tool (DQS) was modified in 2016r2 so there is now an option to run queries on the work spatial tables. In addition, there is an option to fix the issues found. Note: This functionality is currently only available for SQL Server database clients.

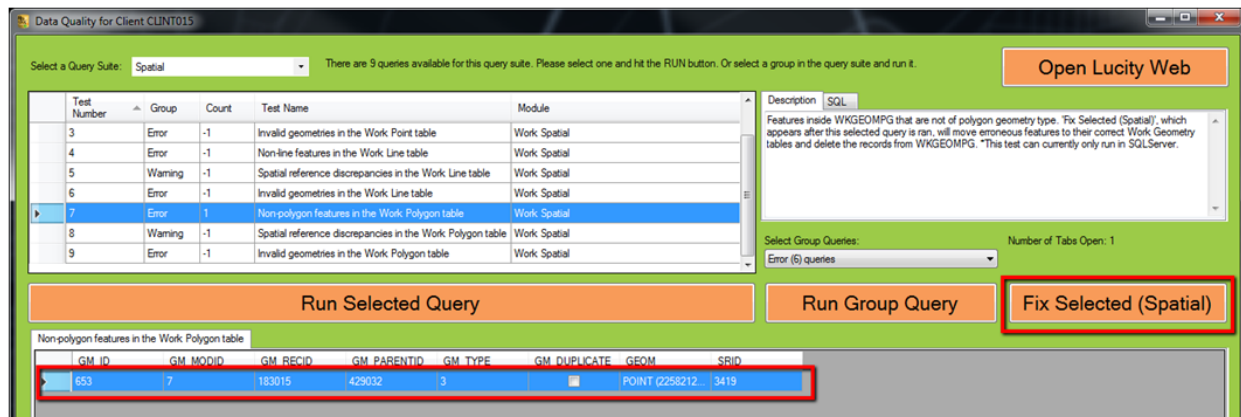
The DQS tool queries the Lucy spatial tables (WKGEOMPT, WKGEOMLN, WKGEOMPG) for the following data problems:

- Features of a different geometry type than what is supposed to be in the table (i.i. points in the polygon table).
  - This is marked as an error because this will cause problems with functionality.
- Features where the spatial reference does not match that of the Operational WKID as listed in Lucy system settings.
  - This is marked as a warning because this may impact certain functionality.
- Features that have invalid geometry (i.e. lines that intersect themselves, incomplete polygons, multiple vertices on top of each other, etc.).
  - This is marked as an error because this will cause problems with functionality.

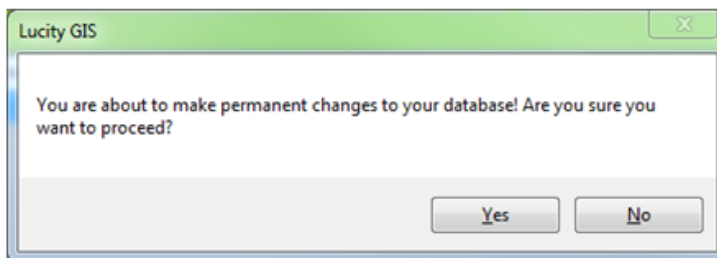
The queries are in a new query suite titled “Spatial” and work the same way as other queries in the program:



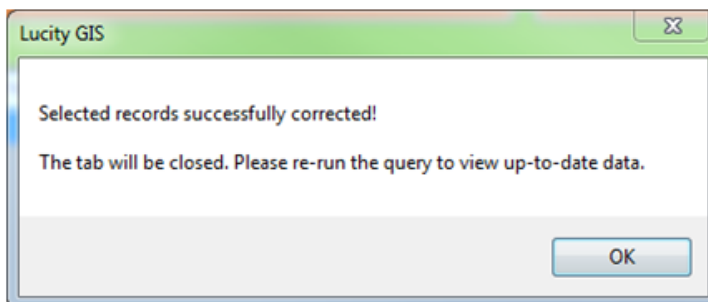
Once the query has been ran, if it is a query for incorrect geometry types, then a button appears to fix the selected records in the bottom grid:



1. When you click the Fix Selected (Spatial) button, the following prompt will appear confirming that the user wants to proceed to correct the data.



2. After clicking "Yes", the invalid geometry record is inserted into the correct geometry table and will be deleted from the current geometry table. After the fix is complete, a prompt similar to the following will appear informing the user of the results of the correction:



Notes: \_\_\_\_\_

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