



# Geographic Information System

## Digitalization

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# Outline

- Usage of Digitalization
- Digitalization Lab



# Usage of Digitalization

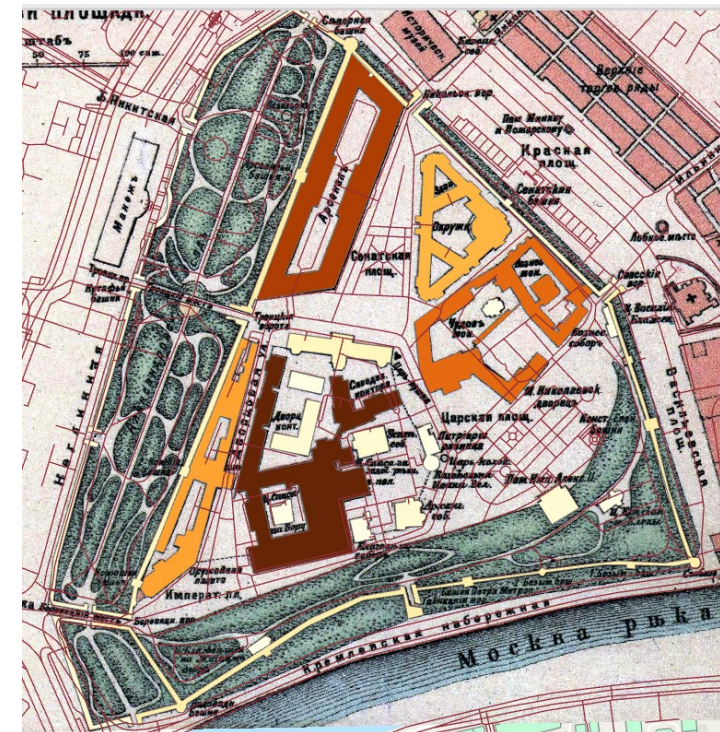
- In most cases, we have ESRI shapefile, Google KML or KMZ, GeoJSON, or any other geocoding file.
- However, we do not have some data that could be utilized for any kind of analysis; therefore, we have to digitalize a raster data (image) to a vector data (shapefile).
- This approach is widely adopted in both industrial and digital humanities, such as Ancient Taipei City Map.
- Two steps :: Georeferencing → Editing

# Digitalization Lab

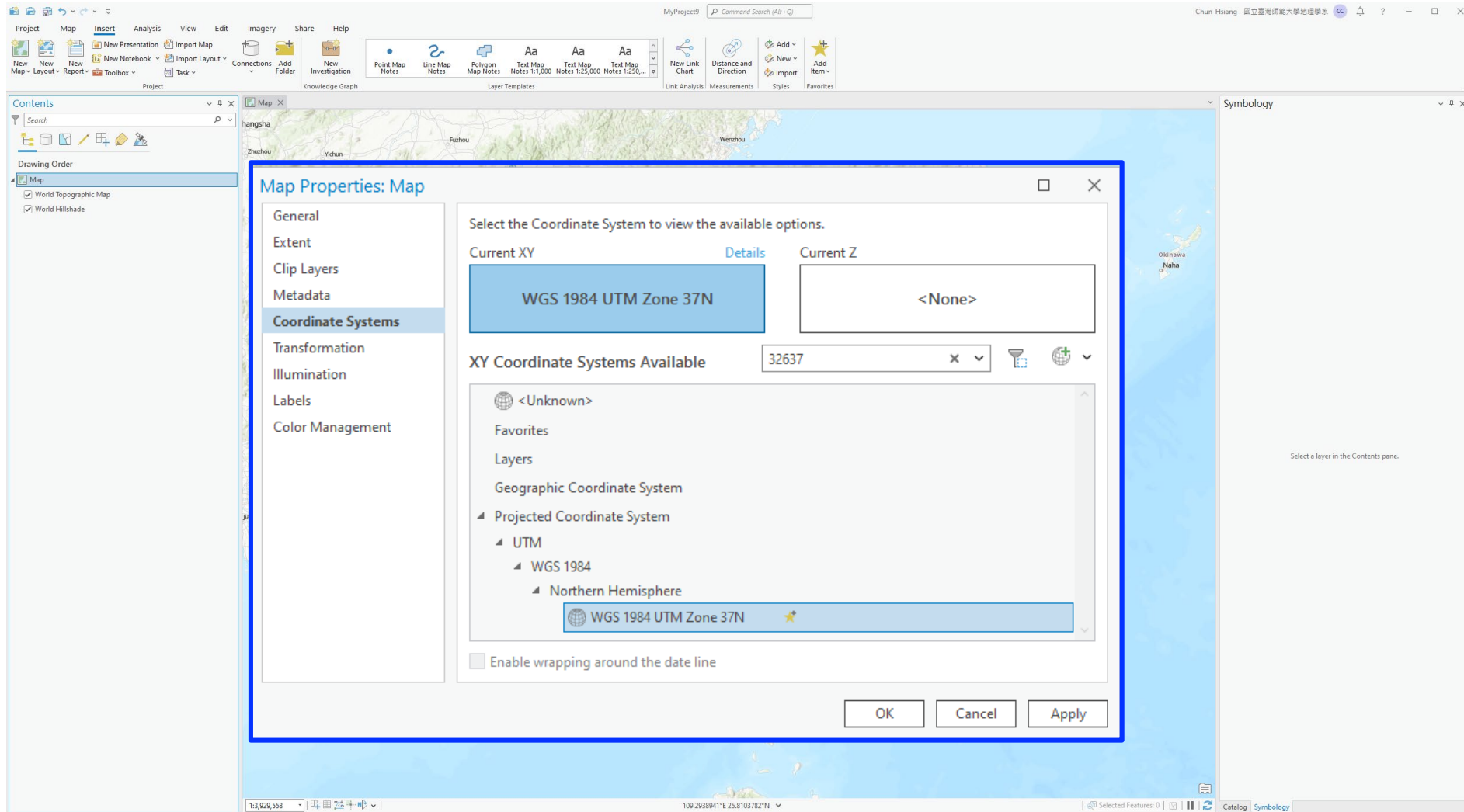
- Today, we have to digitalize an ancient map of Kremlin in Moscow, Russian Federation.
- Here is the link of dataset:  
<https://download.geofabrik.de/russia/central-fed-district.html>
- Two shapefiles will be used in this Lab:
  - gis\_osm\_roads\_free\_1.shp
  - gis\_osm\_buildings\_a\_free\_1.shp

# Digitalization Lab

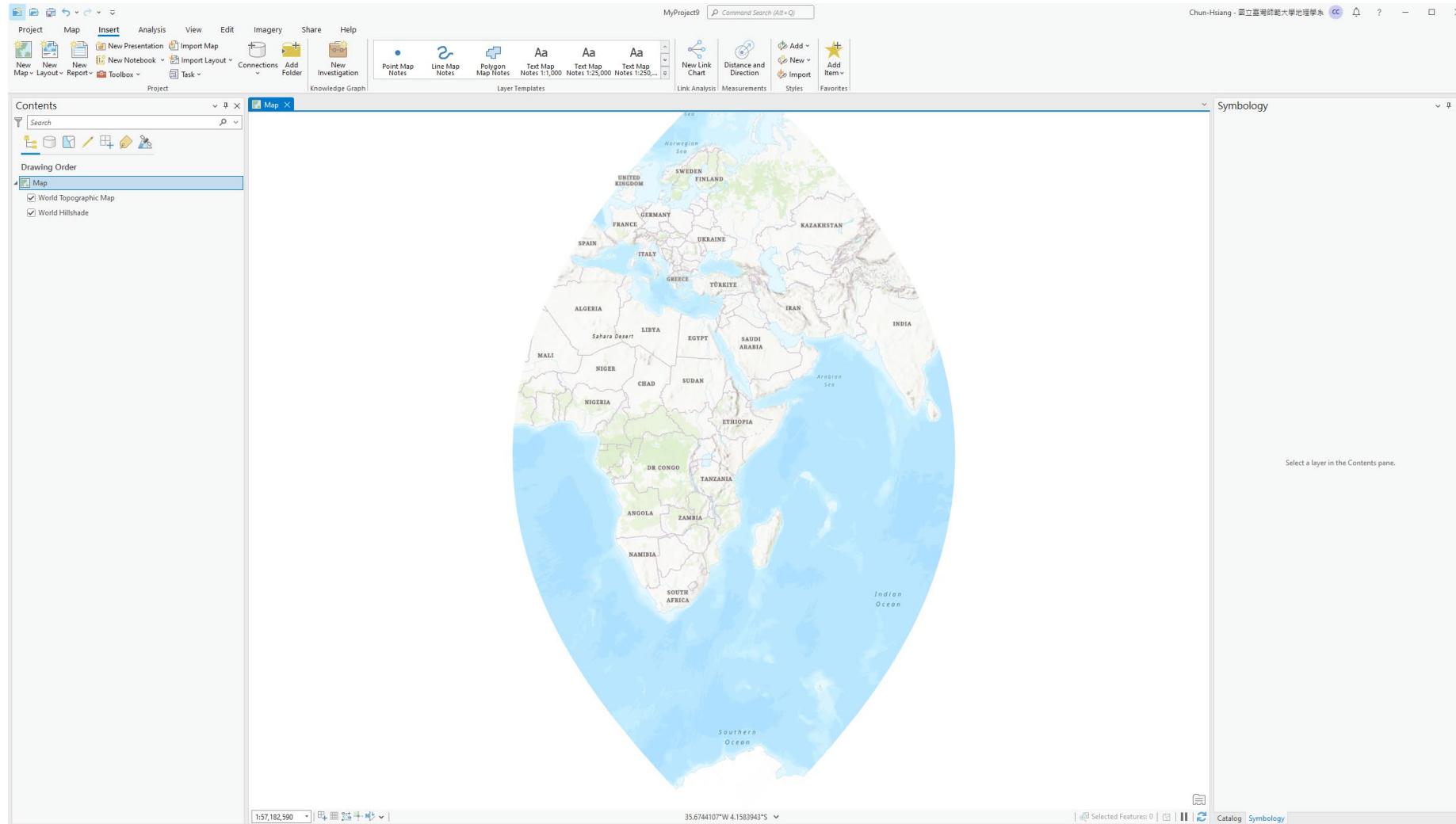
- 1) Set **PCS** for targeting area
- 2) **Create a Feature Class** (Shapefile)
- 3) **Georeferencing**
- 4) **Fit to Display**
- 5) **Add Control Points**
- 6) Show **Control Point Table** and **Save** it
- 7) **Edit :: Create** → start to digitalizing all Kremlin buildings
- 8) **Create a Feature Class** (Shapefile) for Erasing the overlapped areas
- 9) **Erase** the overlapped areas
- 10) **Create a Feature Class**(Shapefile) for adding the overlapped areas
- 11) **Union** the added areas
- 12) **Calculate Geometry** :: Perimeter and Area
- 13) **Symbology** with Area values



# PCS Settings for Moscow



# PCS Settings for Moscow



# OSM Datasets

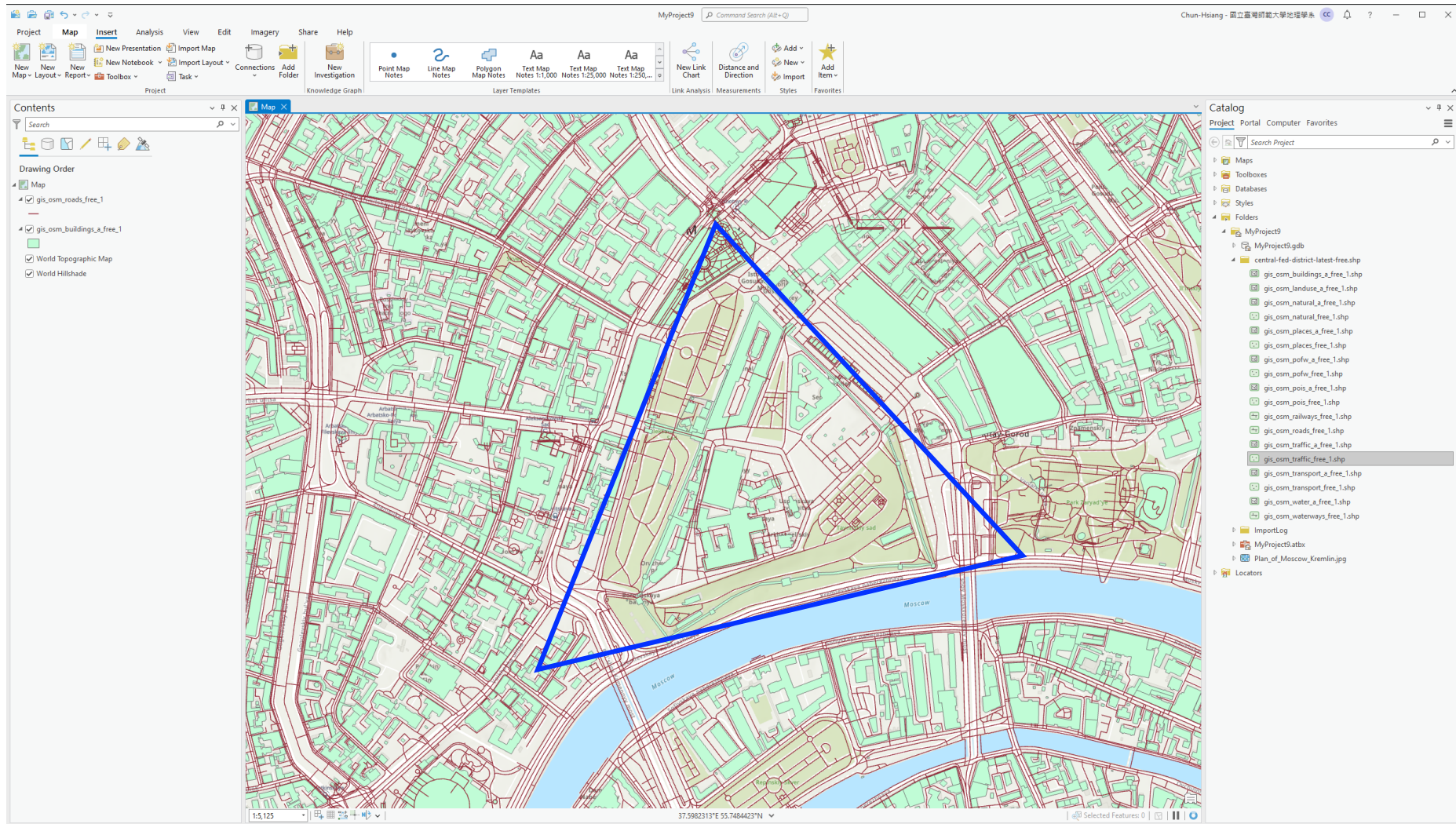
The screenshot displays the ArcGIS interface with a map of a city. The map shows a dense network of roads in red, buildings in green, and water bodies in blue. The interface includes a menu bar at the top, a toolbar with various tools, and a drawing order panel on the left. The drawing order panel lists the following layers from top to bottom:

- Map
- gis\_osm\_roads\_free\_1
- gis\_osm\_buildings\_a\_free\_1
- World Topographic Map
- World Hillshade

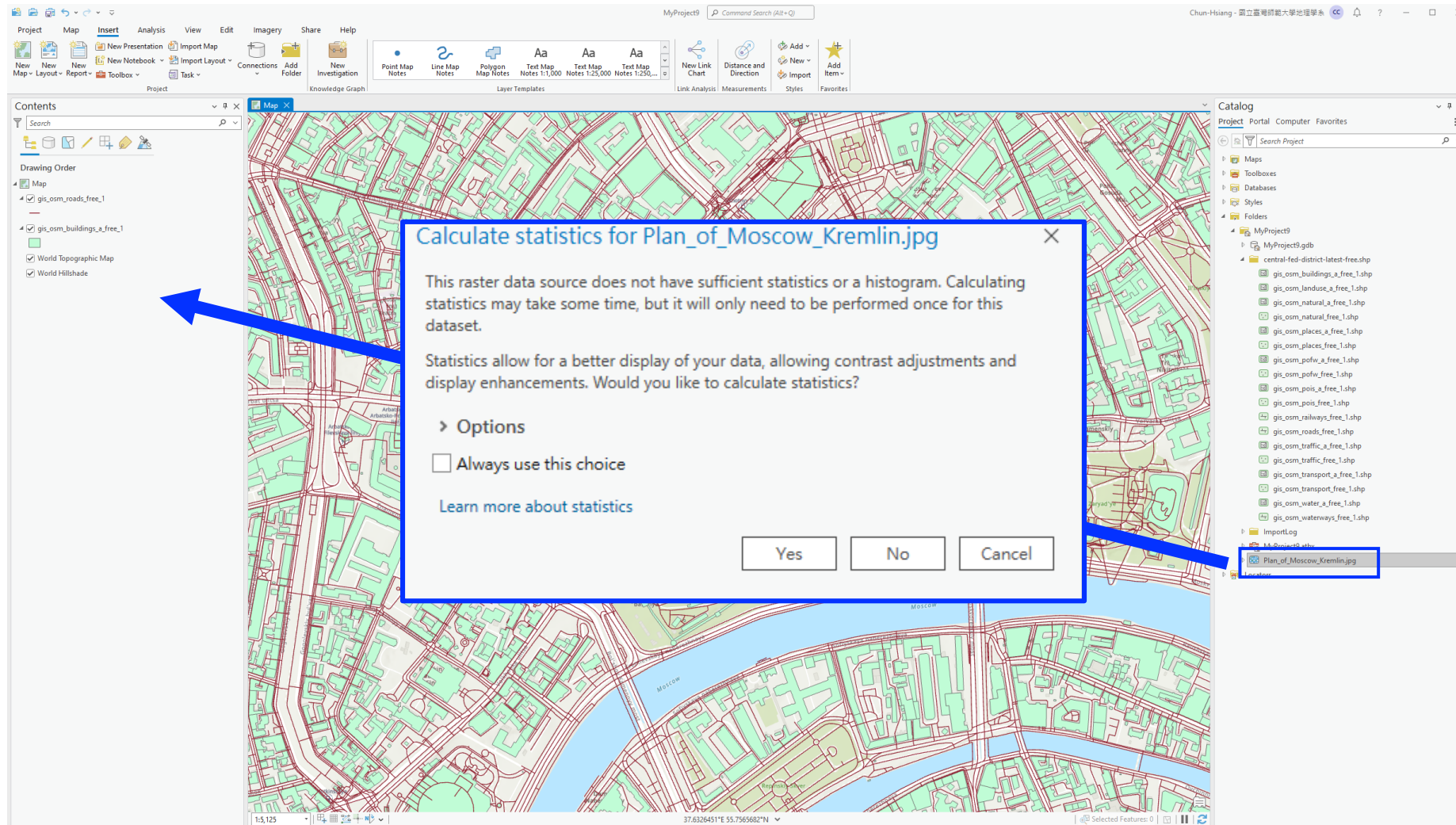
The right side of the interface shows a catalog panel with a search bar and a list of datasets. The datasets are organized into folders, including 'MyProject9' and 'central-fed-district-latest-free.shp'. The 'gis\_osm\_traffic\_free\_1.shp' dataset is currently selected.



# Zoom to Kremlin



# Load the Ancient Map



# Loaded the Ancient Map

The screenshot displays a GIS application window titled "MyProject9". The main map area shows a modern satellite-style map of Moscow with a red-outlined ancient map overlay. The map is overlaid on a green-tinted background. The interface includes a toolbar at the top with various tools like "New Map", "New Layout", "New Report", "New Presentation", "New Notebook", "Import Map", "Import Layout", "Task", "Connections", "Add Folder", "New Investigation", "Knowledge Graph", "Raster Layer", "Data", "Layer Templates", "Point Map Notes", "Line Map Notes", "Polygon Map Notes", "Text Map Notes", "New Link Chart", "Distance and Direction", "Add", "New", "Import", "Add Item", "Link Analysis", "Measurements", "Styles", and "Favorites".

On the left, a "Contents" panel is visible, showing a list of layers under the "Map" folder:

- gis\_osm\_roads\_free\_1
- gis\_osm\_buildings\_a\_free\_1
- Plan\_of\_Moscow\_Kremlin.jpg

Below the Contents panel, an RGB legend is shown:

- World Topographic Map
- World Hillshade

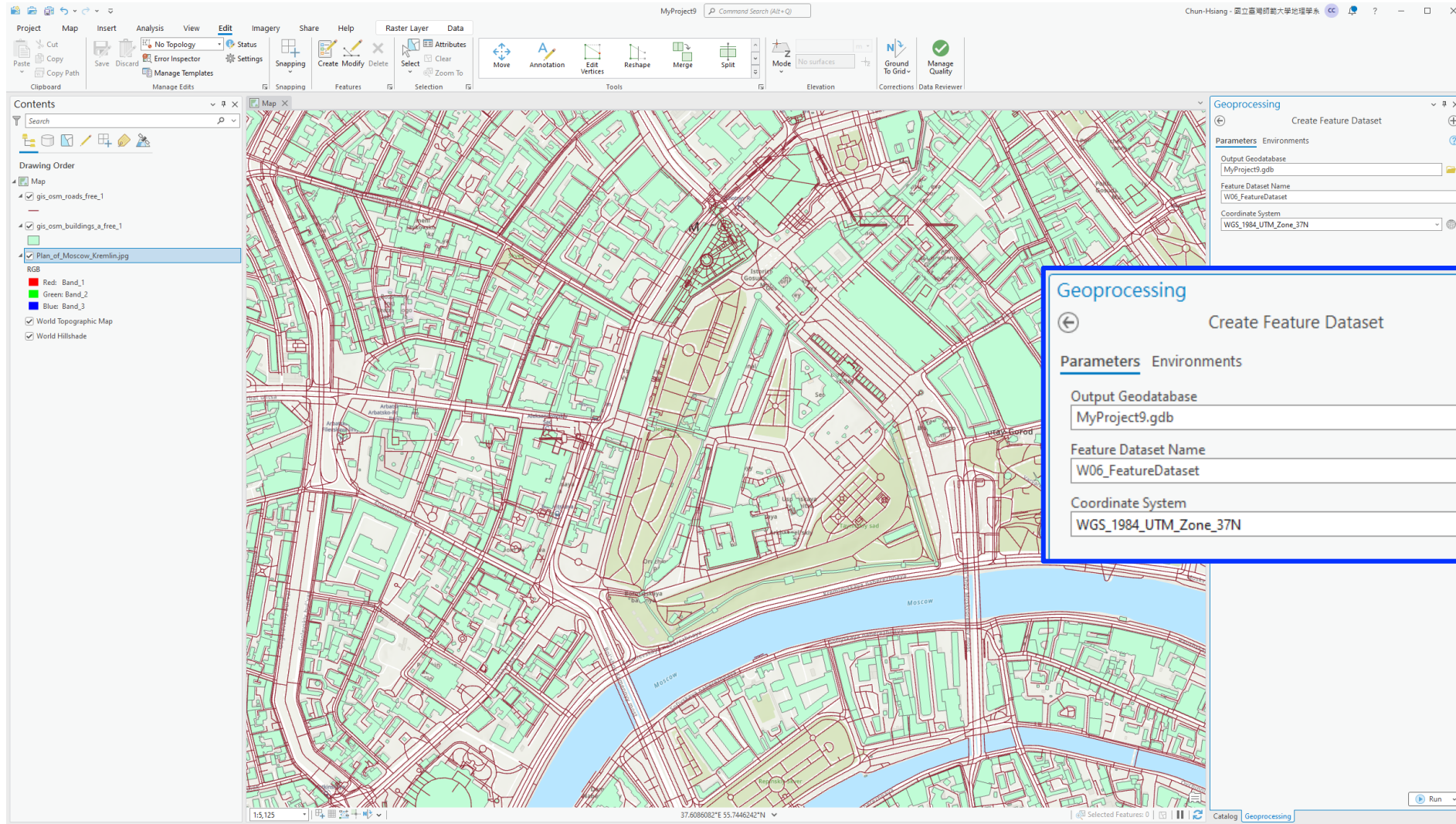
The legend also includes color-coded bands:

- Red: Band\_1
- Green: Band\_2
- Blue: Band\_3

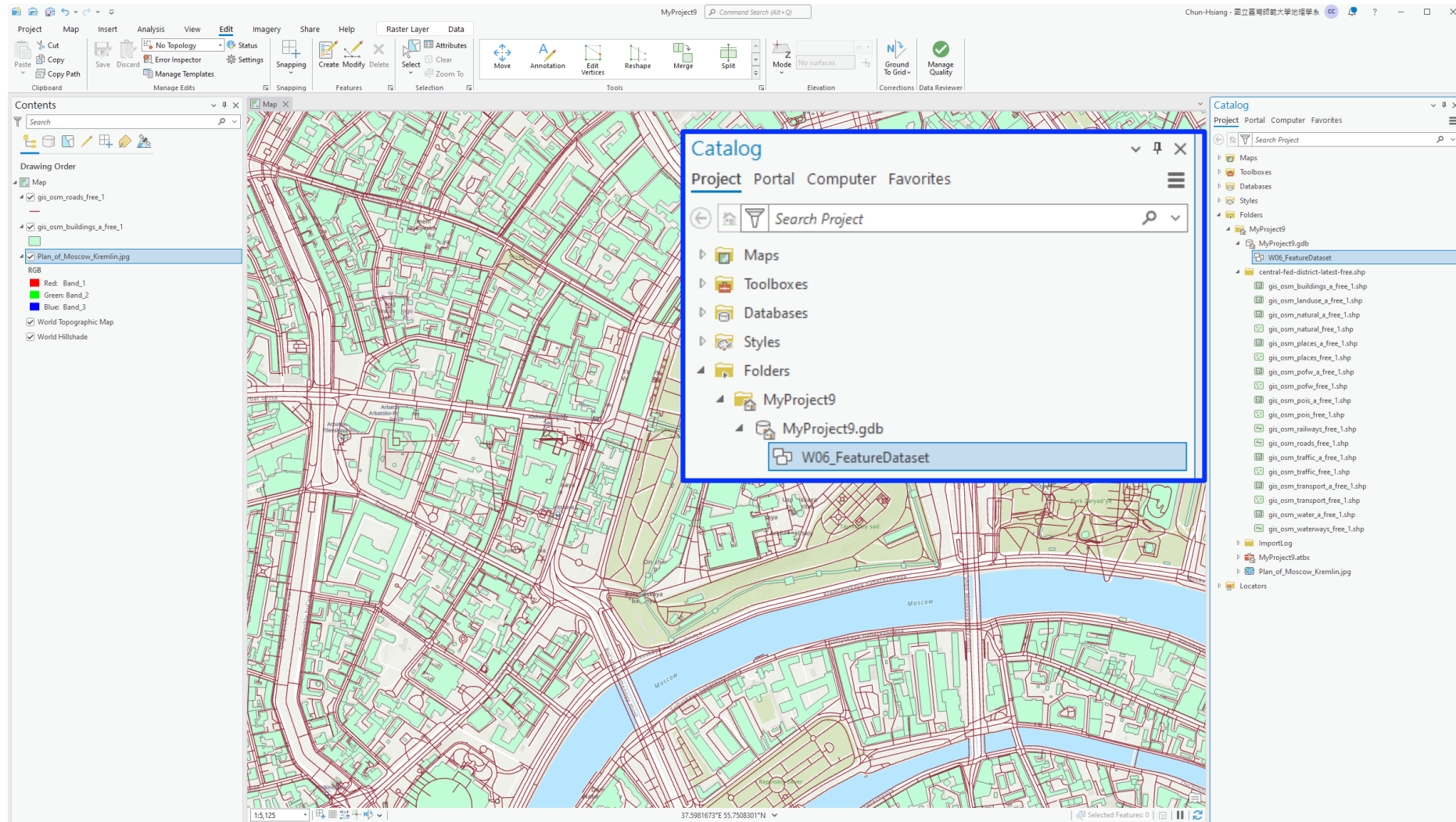
On the right, a "Catalog" panel shows a project structure with folders like "Maps", "Toolboxes", "Databases", "Styles", and "Folders". Under "MyProject9", there is a folder "MyProject9.gdb" containing a sub-folder "central-fed-district-latest-free.shp" with various GIS layers. The "Plan\_of\_Moscow\_Kremlin.jpg" file is highlighted in the Catalog.

A warning box titled "Unknown Coordinate System" is visible in the top right corner, stating: "Map data source is missing coordinate system information. Click here to view details."

# Create a Feature Dataset

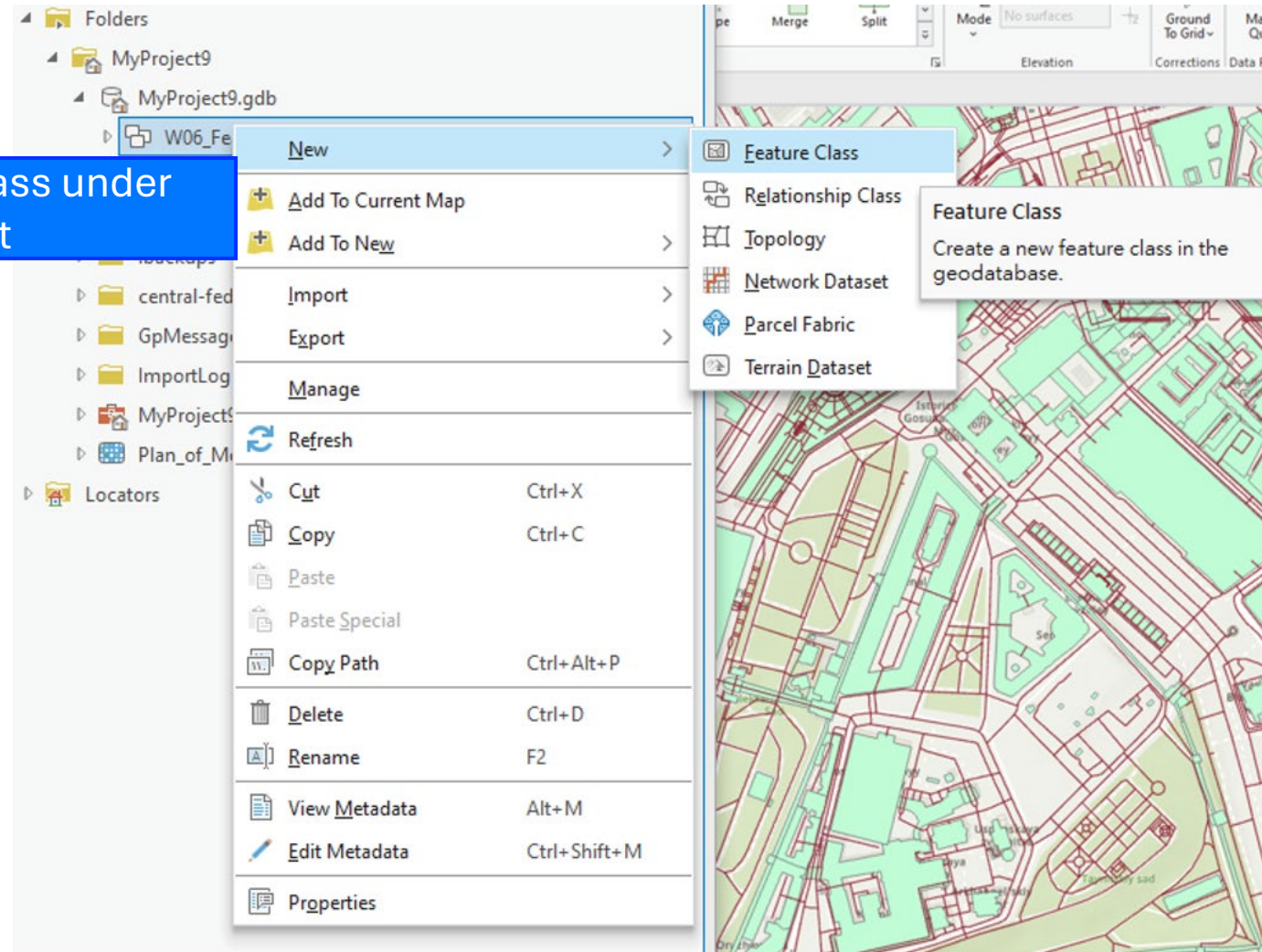


# Created a Feature Dataset

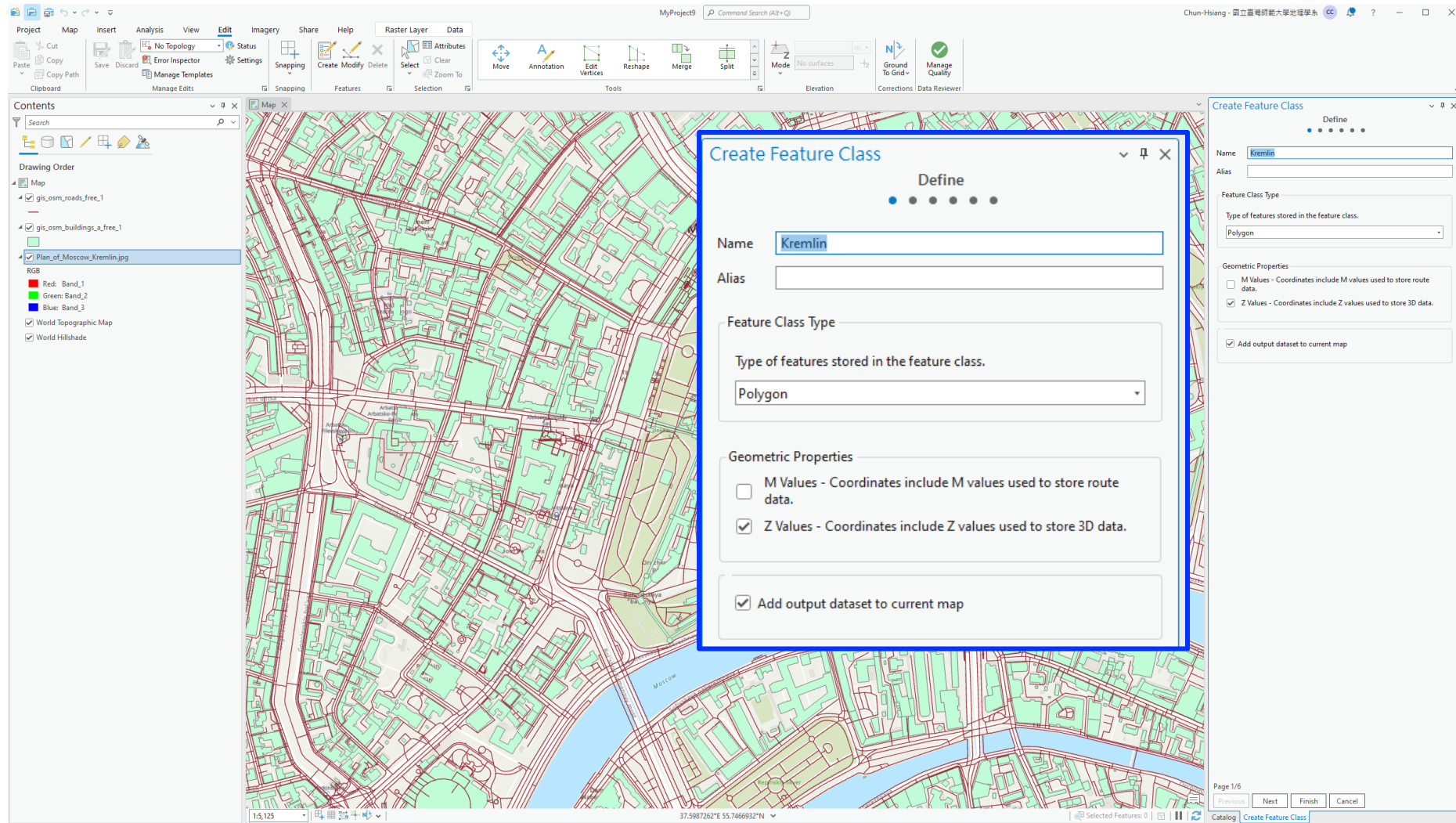


# Create a Feature Class for Digitalization

Create a feature class under the Feature Dataset



# Create a Feature Class for Digitalization



# Create a Feature Class for Digitalization

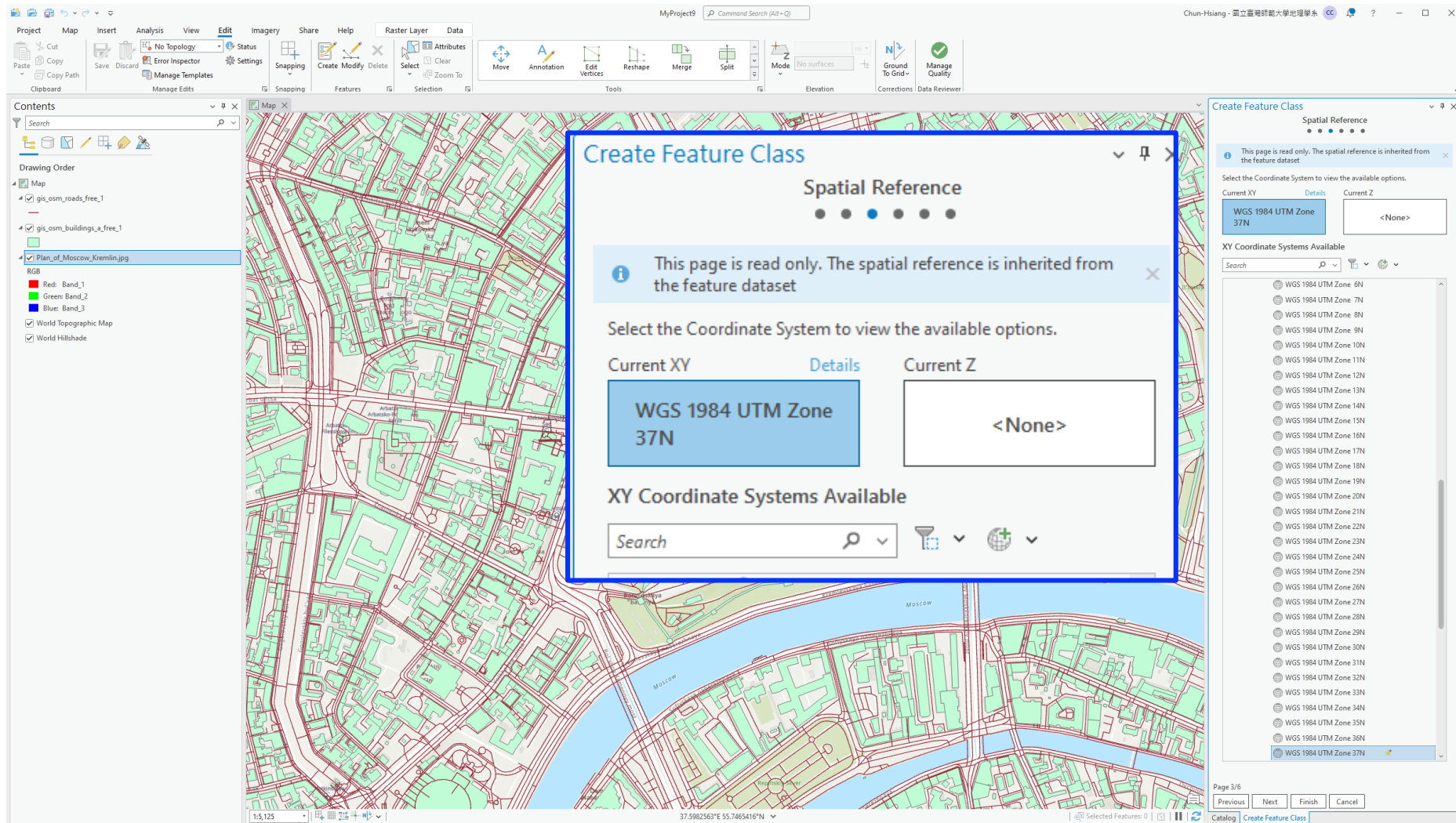
The screenshot shows the ArcGIS Desktop interface with a map of Moscow. A 'Create Feature Class' dialog box is open, displaying a table of fields to be created. The dialog box is highlighted with a blue border. The table lists the following fields:

Field Name	Data Type
OBJECTID	OBJECTID
SHAPE	SHAPE
Area	Double
Length	Double

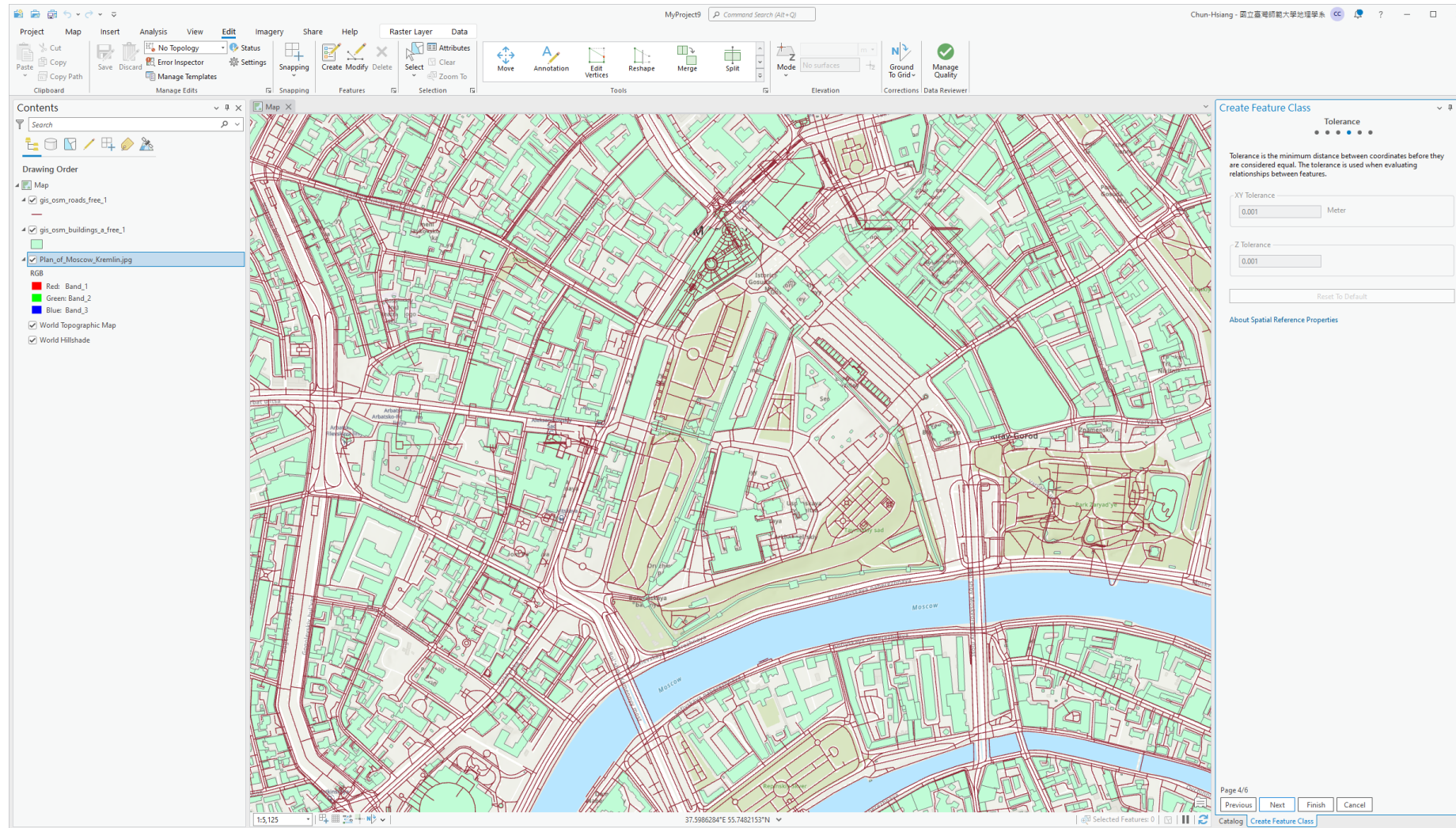
Below the table, there is a link that says 'Click here to add a new field'. The dialog box also includes 'Import' and 'Delete' buttons. The background map shows a street grid and buildings in Moscow, with the river labeled 'Moscow'.



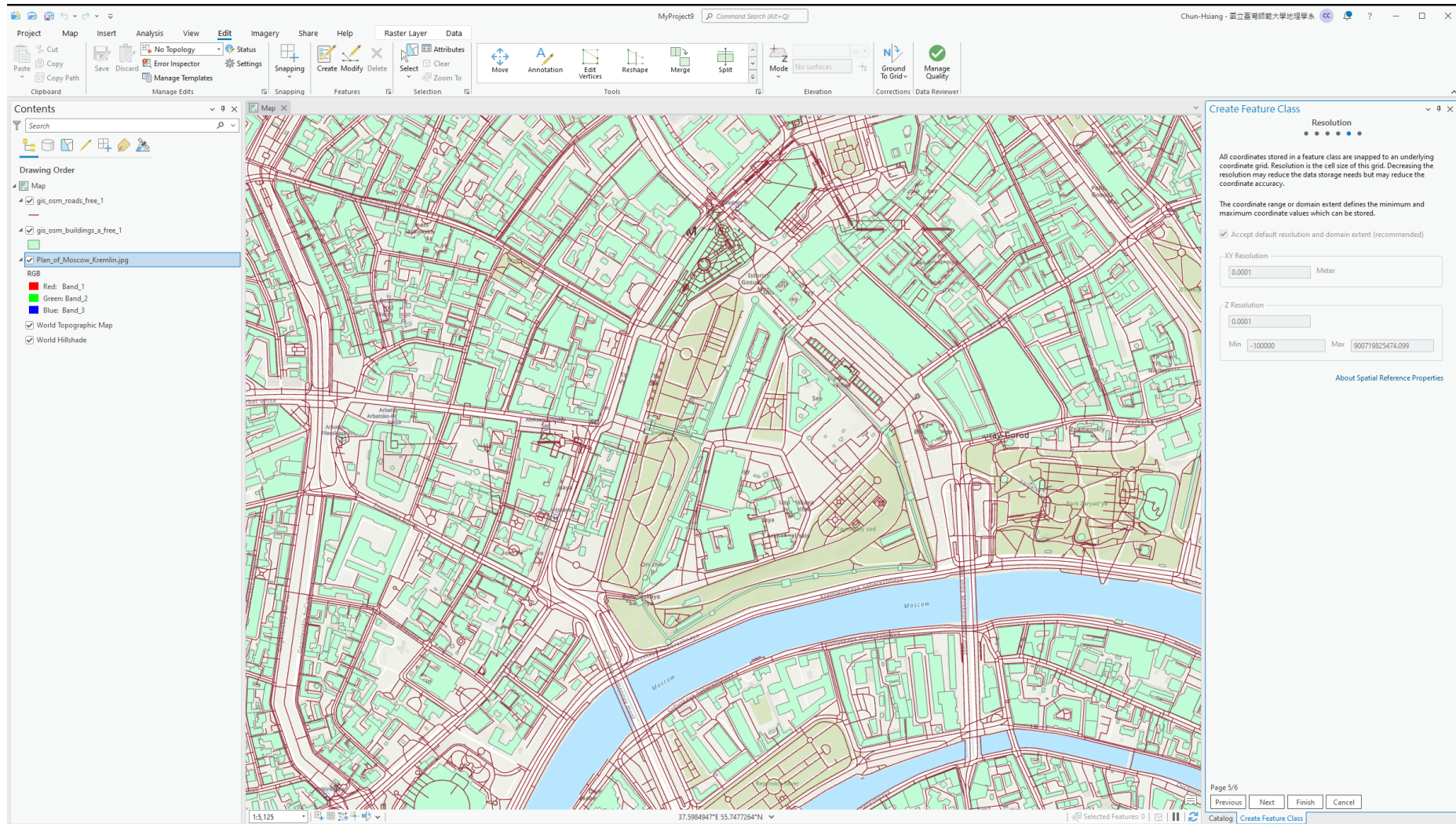
# Create a Feature Class for Digitalization



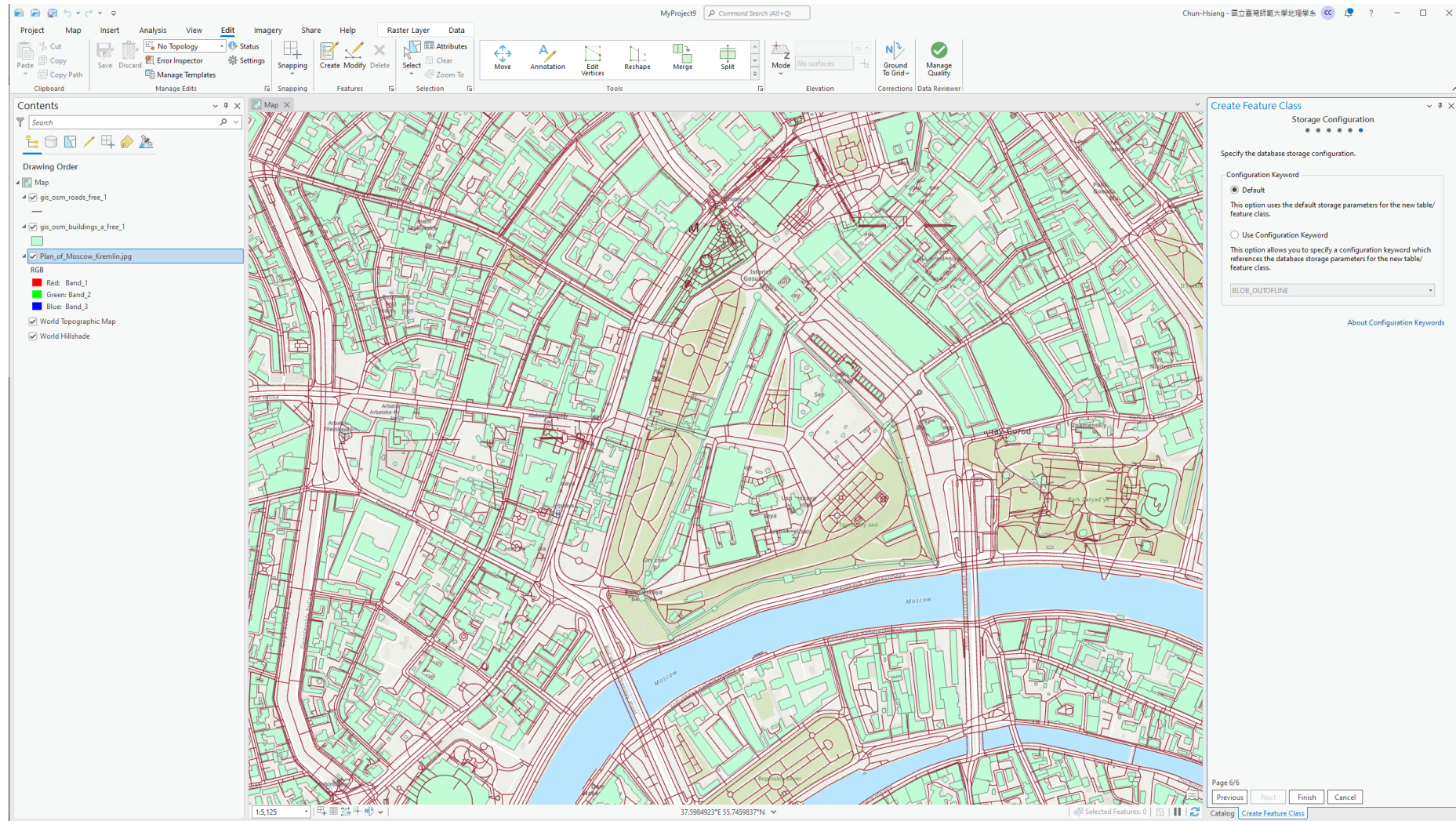
# Create a Feature Class for Digitalization



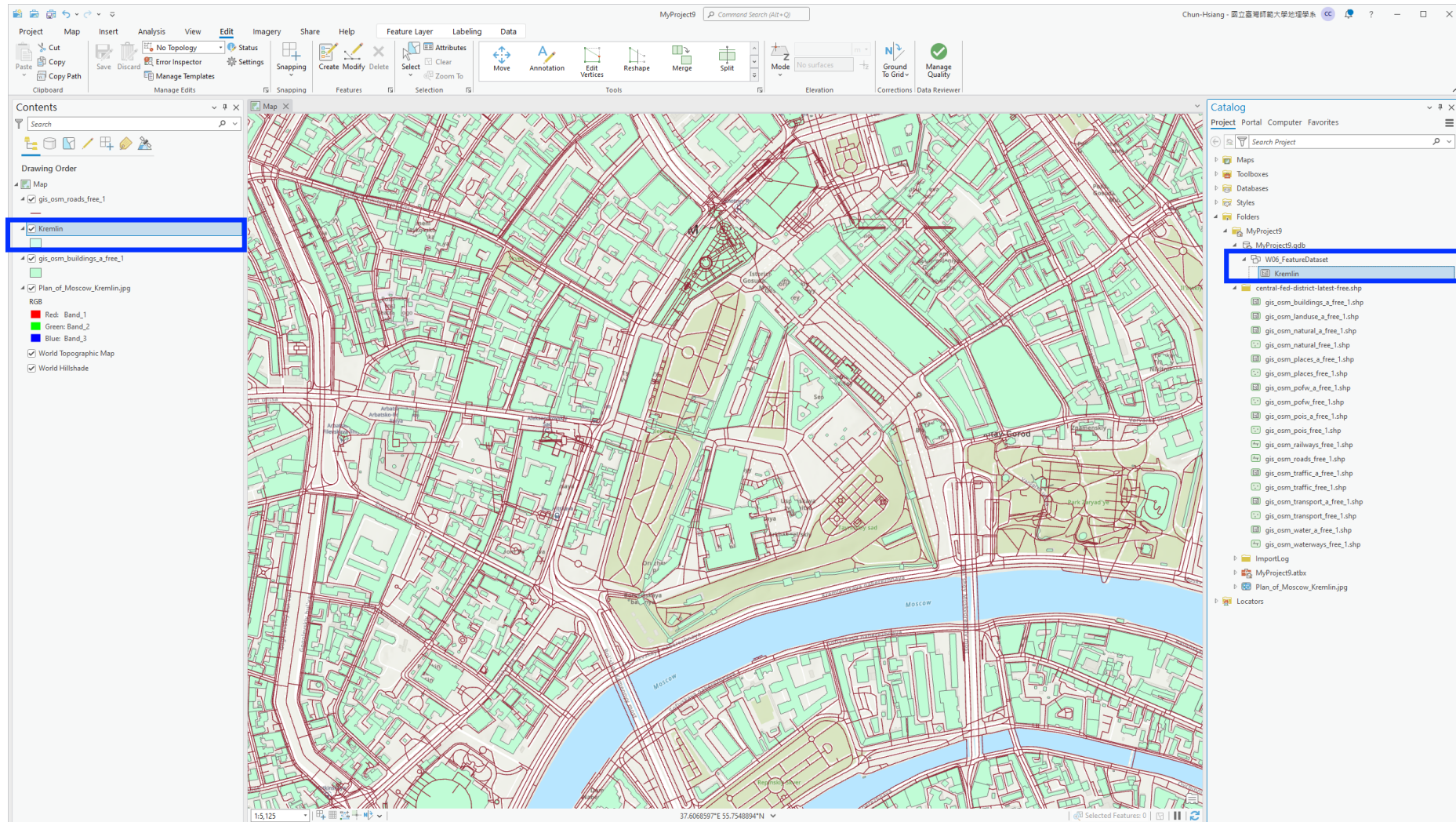
# Create a Feature Class for Digitalization



# Create a Feature Class for Digitalization



# Create a Feature Class for Digitalization





# The End

Thank you for your attention!

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