
Instruction Package for Processing Data in ArcGIS Pro and ArcGIS Online

GeoConnect Prince Edward County: Strengthening Rural Connections through Mapping

GIS Collaborative Project 2409

Team HRS

Helen Plesko | GIS Applications Specialist | Sir Sandford Fleming College
Rahul Saravanabavan | GIS Applications Specialist | Sir Sandford Fleming College
Sharmila Wagle | GIS Cartographic Specialist | Sir Sandford Fleming College

Advisor

Paige Wearing | Faculty, School of Environmental & Resource Sciences | Sir Sandford Fleming College

Client

Anne VanVlack | Vital Signs Coordinator & Community Engagement | The County Foundation

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Sir Sandford Fleming College
School of Environmental & Natural Resource Sciences

Academic Statement

This instruction package is presented in partial fulfilment of the academic requirements for APST62, GIS Collaborative Project course, Fleming College.



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1 Introduction

This document is prepared in partial fulfillment of the academic requirements for APST62, GIS Collaborative Project course at Sir Sandford Fleming College. Its intended purpose is to allow staff at The County Foundation, as well as future students of the GIS Program at Fleming College, to easily replicate steps to create a database in ArcGIS Pro and manipulate data in ArcGIS Pro and ArcGIS Online. Note, some of the methodology requires an ArcGIS Pro license, ArcGIS Online Creator User account, or ArcGIS Community Analyst application.

2 Create a workspace

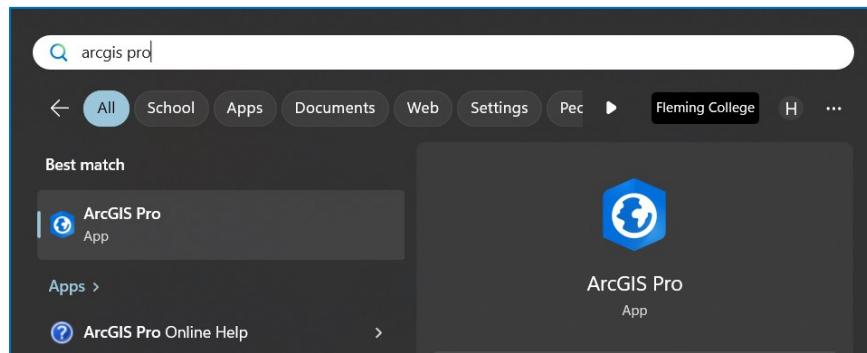
This section covers the required steps to create a workspace in ArcGIS Pro to house and work with the data.

2.1 Create a new ArcGIS Pro Project

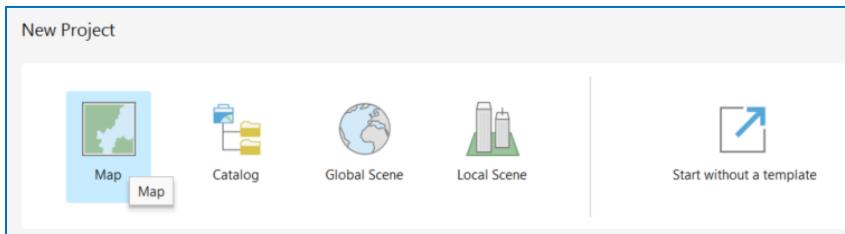
There are a few ways to create an **ArcGIS Pro Project**. Two of the more common methods is to either start with a map or start without a template. Starting with a map means the application will prompt you to save the project right away and open with a default basemap to get you started. On the other hand, starting without a template means the application won't prompt you to save the project and it won't open a map. This method is useful when viewing data from another database or when the project doesn't need to be saved. For more information on how to create a project, visit Esri's [Create a project](#) help page.

2.1.1 Starting with a map

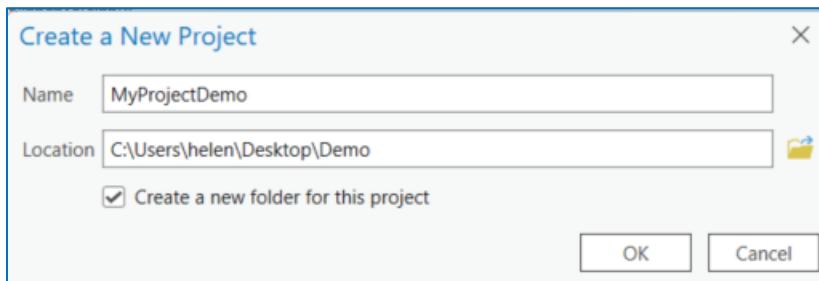
1. Create a **new empty folder** on your local device, where you intend to house the ArcGIS Pro project.
2. Open **ArcGIS Pro desktop application**. One way to do this is to search the app in the search bar of your local computer and click it.



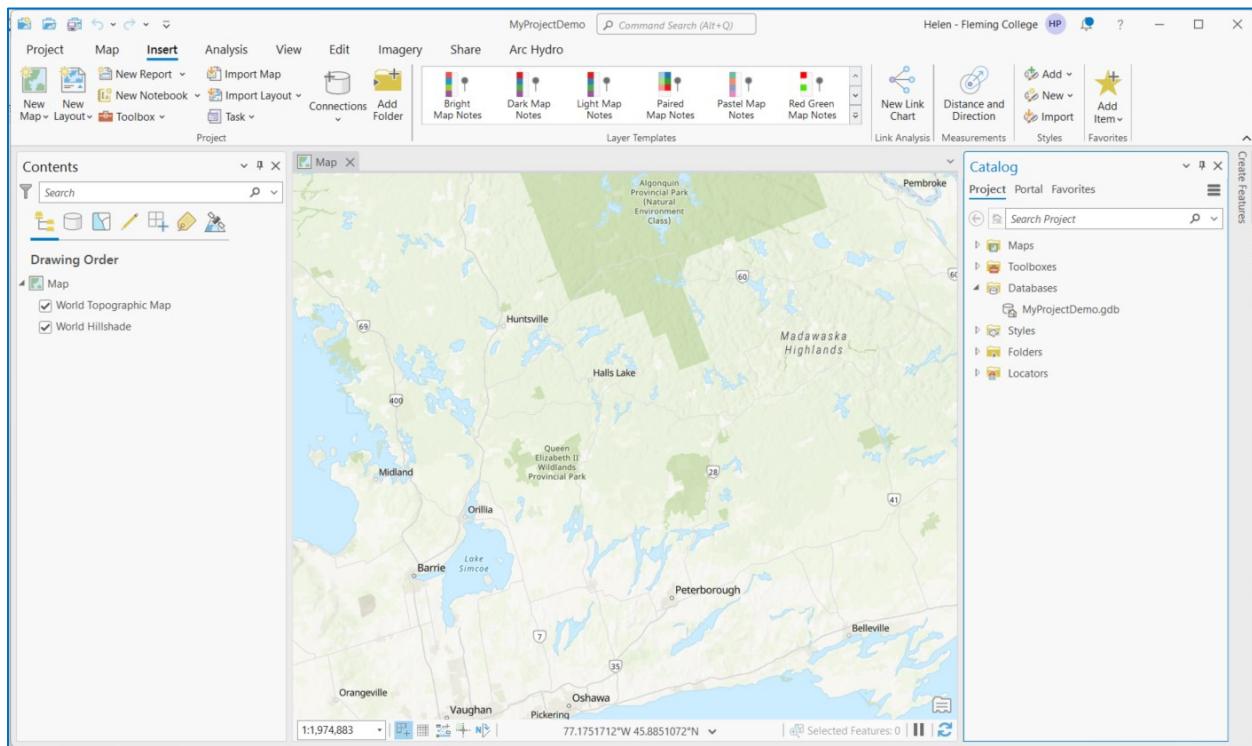
3. Under **New Project**, select **Map**.



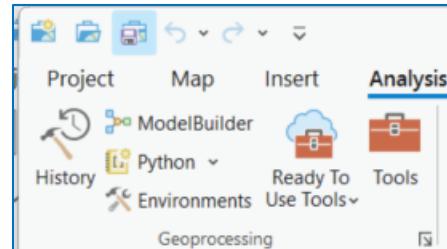
4. This will prompt you to create a new project. Name the project and then save it in the folder you created in step 1. Then click **OK**.



5. A new project will open. A default basemap has been added and the name of the file geodatabase in the **Catalog pane** under **Databases** has the same name as the project.

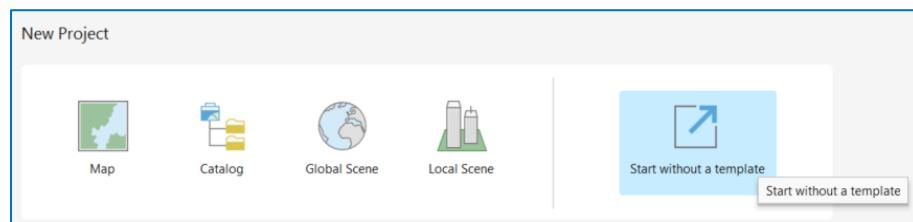


6. Remember to click the **Save** icon at the top left-hand corner to save any changes made to the project.

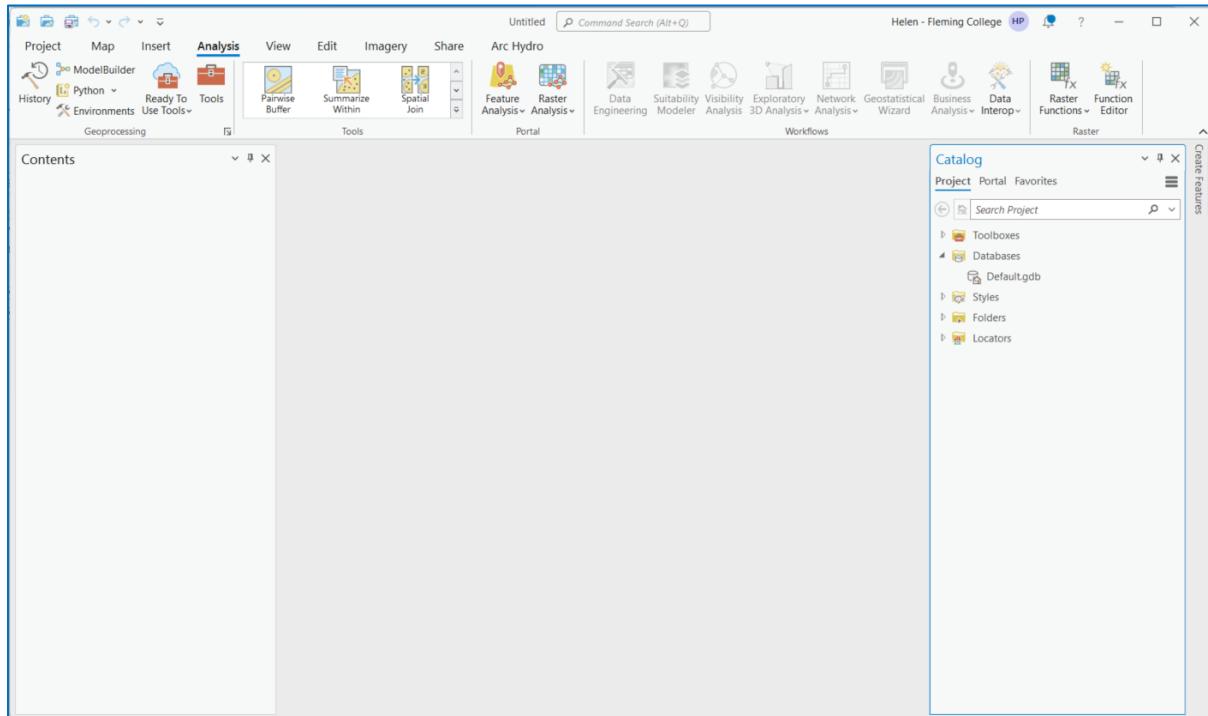


2.1.2 Starting without a template

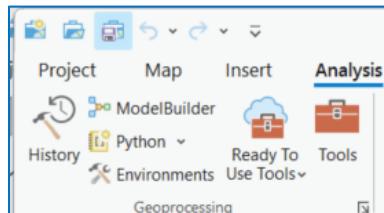
1. Open the **ArcGIS Pro desktop application**. Then select **Start without a template**.



2. A new project will open. No basemap is added and the name of the file geodatabase in the **Catalog pane** under **Databases** is named **Default.gdb**.



3. To save the project, click the **Save** icon in the top lefthand corner. You will be prompted to choose a destination to store the project folder.

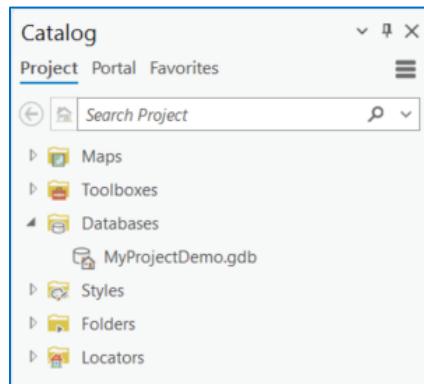


2.2 Create a file geodatabase

A **file geodatabase** is essentially a space to house a collection of files that can manage spatial and nonspatial data, including raster data, vector data, and tables. A file geodatabase can be created either manually or automatically in ArcGIS Pro. For more information on file geodatabases, visit Esri's [File geodatabase](#) help page.

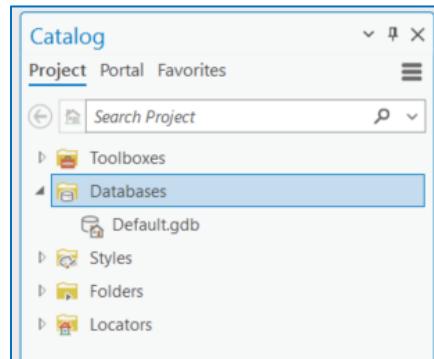
2.2.1 From starting with a map

If a new project was created by starting with a map, a file geodatabase will appear in the **Catalog pane** under **Databases**. It will have the same name as the project.



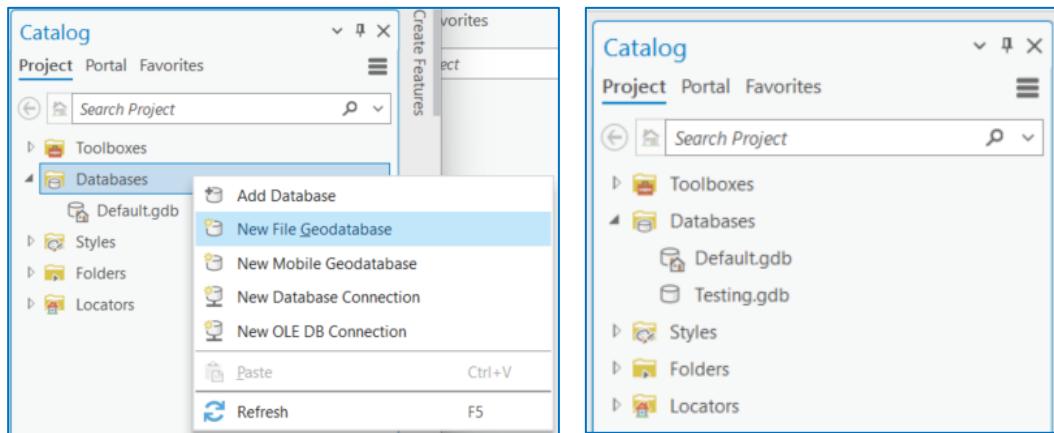
2.2.2 From starting without a template

If a new project was created **without a template**, a file geodatabase will appear in the Catalog pane under **Databases**. It will have the name of **Default.gdb**.



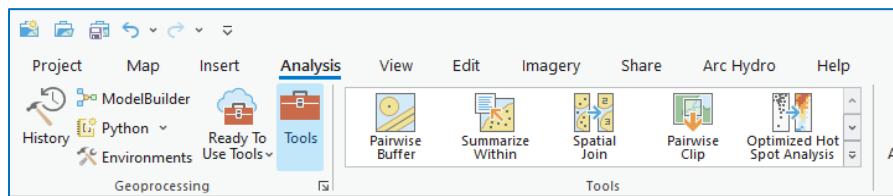
2.2.3 In the Catalog pane

Right click on **Databases** in the **Catalog pane** and select **New File Geodatabase**. You will be prompted to choose a destination to store the file geodatabase and name it. Click **Save**. The new file geodatabase will appear in your project.

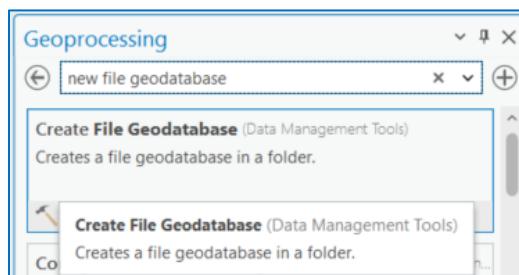


2.2.4 Create File Geodatabase tool

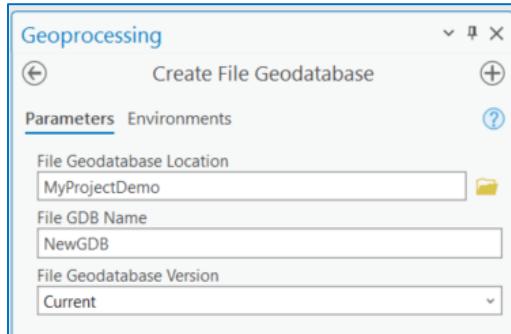
1. In the top ribbon of ArcGIS Pro, click **Tools**.



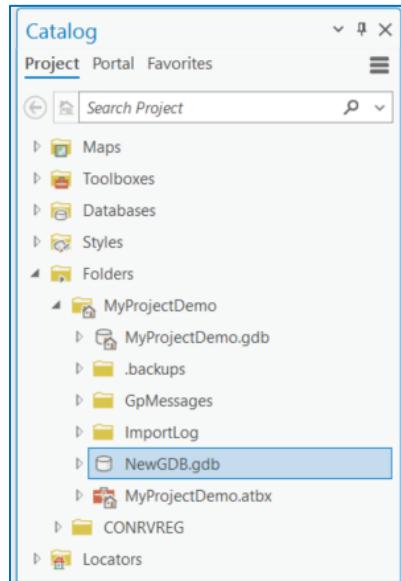
2. In the search bar of the **Geoprocessing window**, search “new file geodatabase” and then click the **Create File Geodatabase** data management tool.



3. For **File Geodatabase Location**, click the yellow folder and navigate to where you would like to save the geodatabase. In this case, the file geodatabase will be saved in the project folder. For **File GDB Name**, give the file geodatabase a name. Accept default for **File Geodatabase Version**. Click **Run**.



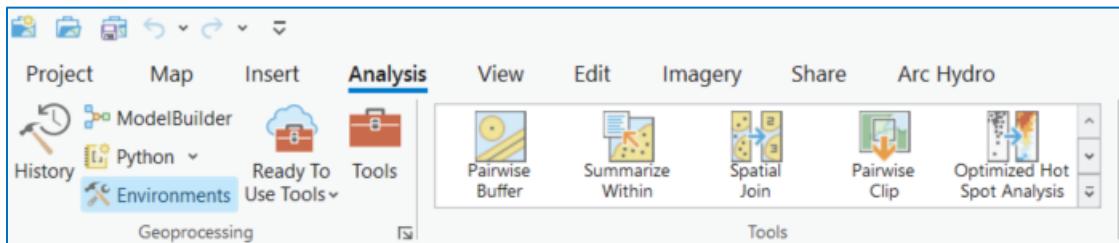
4. The file geodatabase will be created and in your project folder under **Folders** in the **Catalog Pane**.



2.3 Set the project environments

Setting the **project environments** sets the environments of all items being added to the geodatabase. This section goes over how to set the projection, processing extent, cell size, and mask of the project. For more information on environment settings, visit Esri's [Environment Settings \(Environments\)](#) help page.

To access the environment settings for a project, click the **Analysis** ribbon in ArcGIS Pro and then click **Environments**.



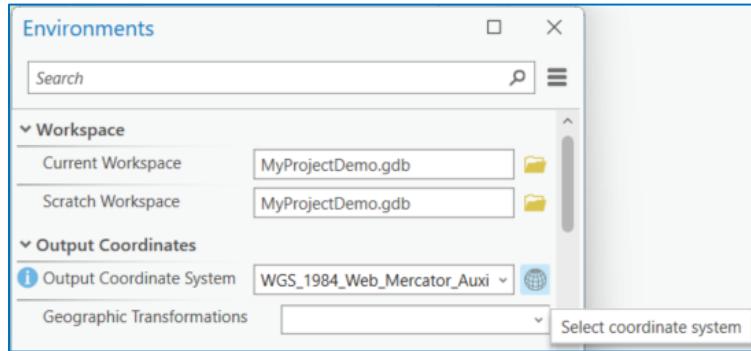
2.3.1 Set projection for layers to be used in static maps

When creating static maps in ArcGIS Pro, it is important to use the local projection of the study area to ensure there is minimal distortion. The projection depends on the purpose of the map and study area. A common one to use is Universal Transverse Mercator.

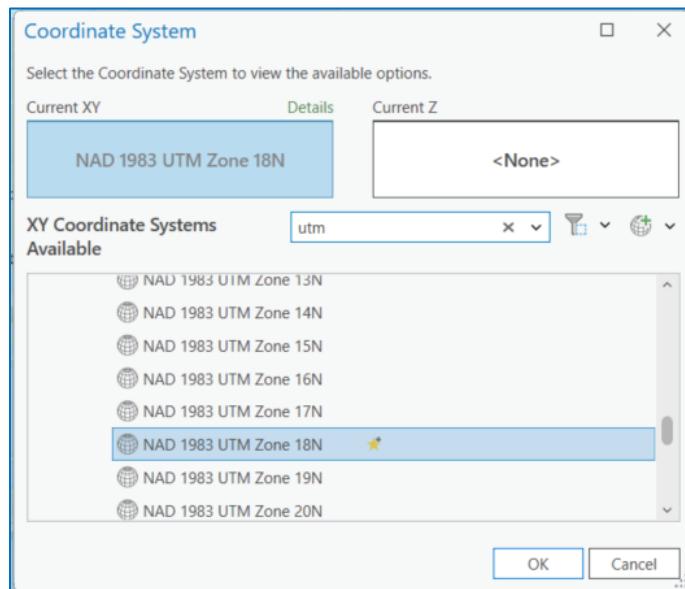
1. To find the **UTM Zone** of an area, visit the [MangoMap What UTM Zone am I in?](#) webpage and locate the study area on the map. Prince Edward County is situated in Zone 18N, so the projection to be used is **NAD 1983 UTM Zone 18N**.

A screenshot of the 'What UTM Zone am I in?' website. The map shows the southern part of Ontario, Canada, with a yellow vertical bar indicating UTM Zone 18. The town of Belleville is labeled. A callout box on the left side of the map displays the text 'UTM Zone: 18' and provides coordinates: Start Longitude: -78, Start Latitude: 0, Hemisphere: n, Central Meridian: -75. The website interface includes a top navigation bar with 'Maps' and 'Data' tabs, and a search bar at the top right.

2. In the **Environments** window, under **Output Coordinate System**, click the **globe** to select the coordinate system.



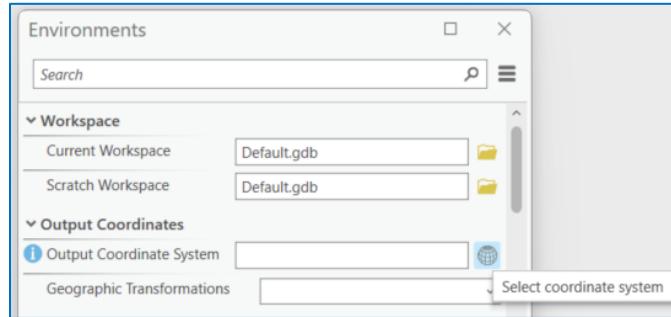
3. In the **Coordinate System** window, search “**UTM**” in the search bar, click **Projected Coordinate System**, click **UTM**, click **NAD 1983**, and find the projection with the appropriate zone for the study area. Click **OK**.



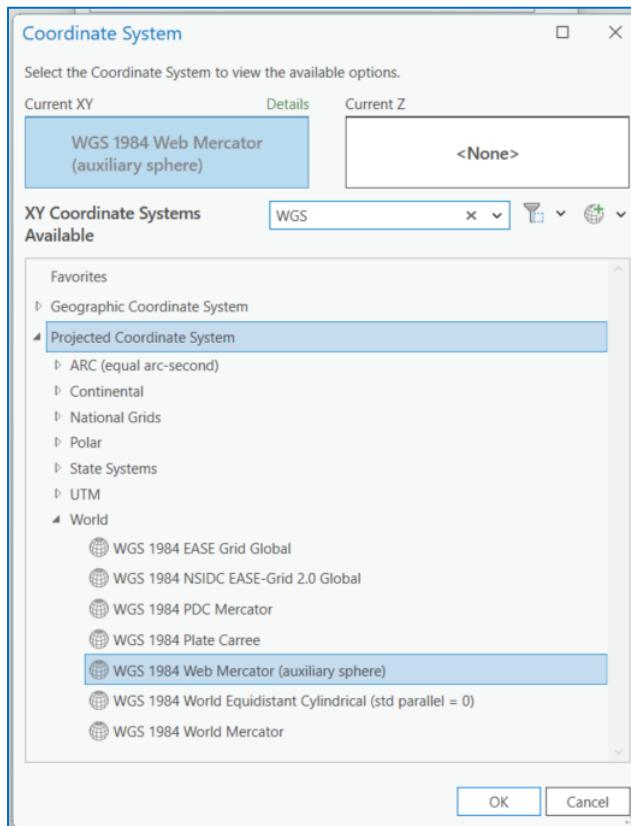
2.3.2 Set projection for layers to be used on the web

When using layers in web applications, it is best to use the projection of **WGS 1984 Web Mercator (auxiliary sphere)**, where WGS stands for World Geodetic System.

1. In the **Environments window**, under **Output Coordinate System**, click the **globe** to select the coordinate system.



2. In the **Coordinate System window**, search **WGS** in the search bar. Then expand the **Projected Coordinate System** list, expand the **World** list, and click **WGS 1984 Web Mercator (auxiliary sphere)**. Click **OK**.

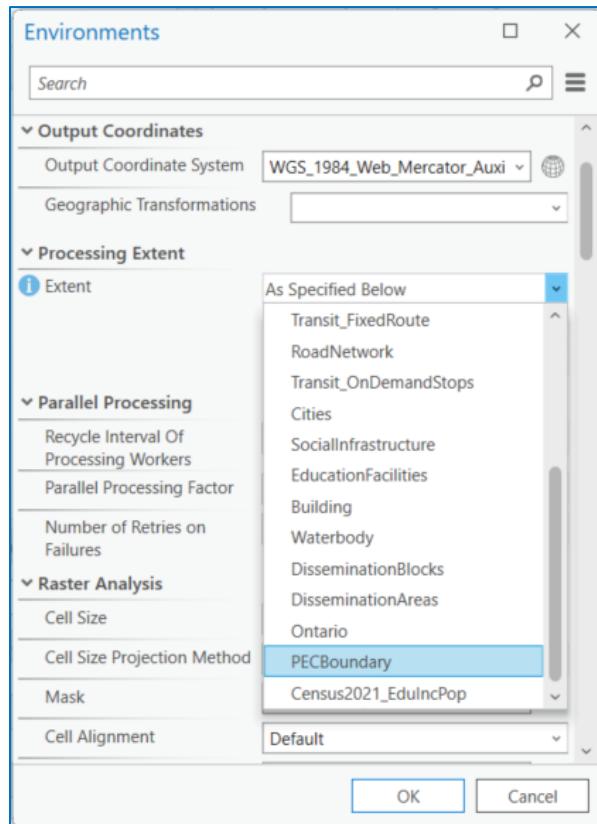


3. Now all features being imported or created to your file geodatabase will be defaulted to have this projection.

2.3.3 Set the processing extent

Setting the **processing extent** specifies the boundary within which features will be processed. It will be set for every tool that is run within the project. For more information, visit Esri's [Processing extent](#) help page.

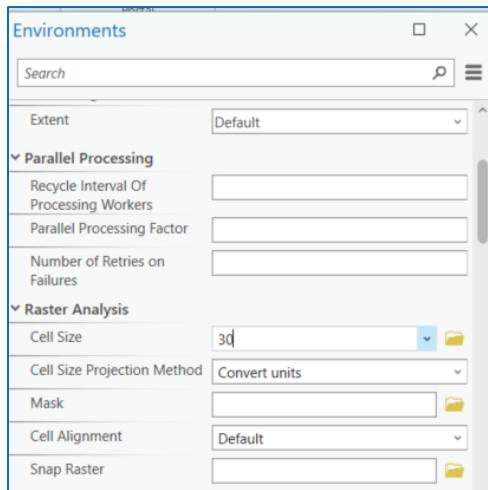
In the **Environments window**, you can choose a layer to use as the processing extent. Click the yellow folder to browse your directory for that layer or select it using the dropdown menu and then click **OK**. For this project, the Prince Edward County boundary was used as the processing extent.



2.3.4 Set the cell size

When working with raster data, it is important to set the **cell size** of the data. The cell size determines the resolution of raster datasets. For more information on setting the cell size, visit Esri's [Cell Size \(Environment setting\)](#) help page.

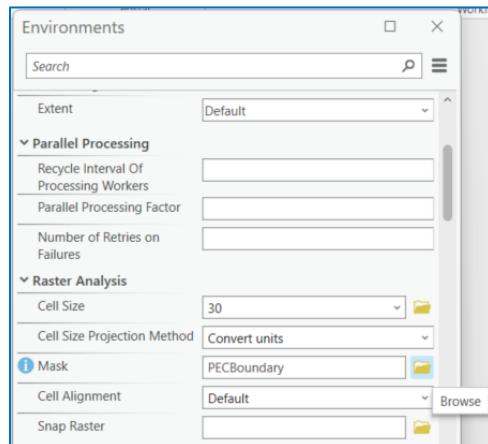
In the **Environments window**, you can choose whether you want to have the cell size set to **Maximum of Inputs**, **Minimum of Inputs**, or a **manual** input. For this project, cell size was manually set to **30**. Click **OK**.



2.3.5 Set the mask

When working with raster data, it is important to set the **mask** extent. The mask determines the boundary within which cells will be processed. Any cells of a raster within this mask will be affected by any tools run. For more information on setting the mask, visit Esri's [Mask \(Environment setting\)](#) help page.

In the **Environments window**, you can choose a layer to use as the extents of the mask. Click the yellow folder to browse your directory for that layer and then click **OK**. For this project, the Prince Edward County boundary was used as the mask.



3 Import data

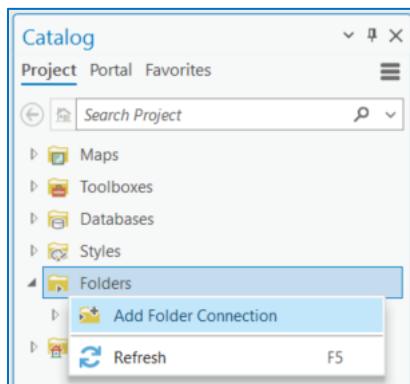
After configuring the workspace and setting the project environments, data can be imported to the geodatabase. This section covers the required steps to import data into the project from various sources and to save it within the file geodatabase.

3.1 From a downloaded zip file

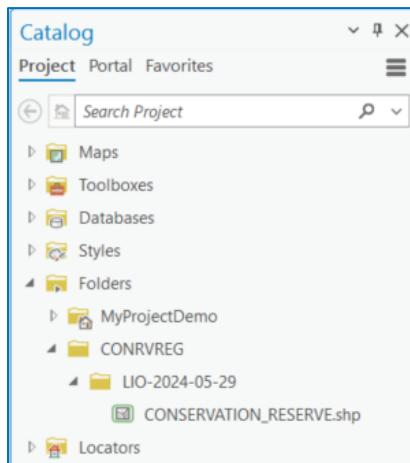
1. Navigate to the **source** of the data and **download** the appropriate file.
2. Download the **shapefile** or **geodatabase** containing the data.
3. Decide whether the data is going to be imported to ArcGIS Pro or ArcGIS Online.
4. If the data is going to be brought into **ArcGIS Pro**, extract it from the zipped folder. If the data is going to be brought into **ArcGIS Online**, keep the folder zipped.

3.1.1 Import to ArcGIS Pro file geodatabase

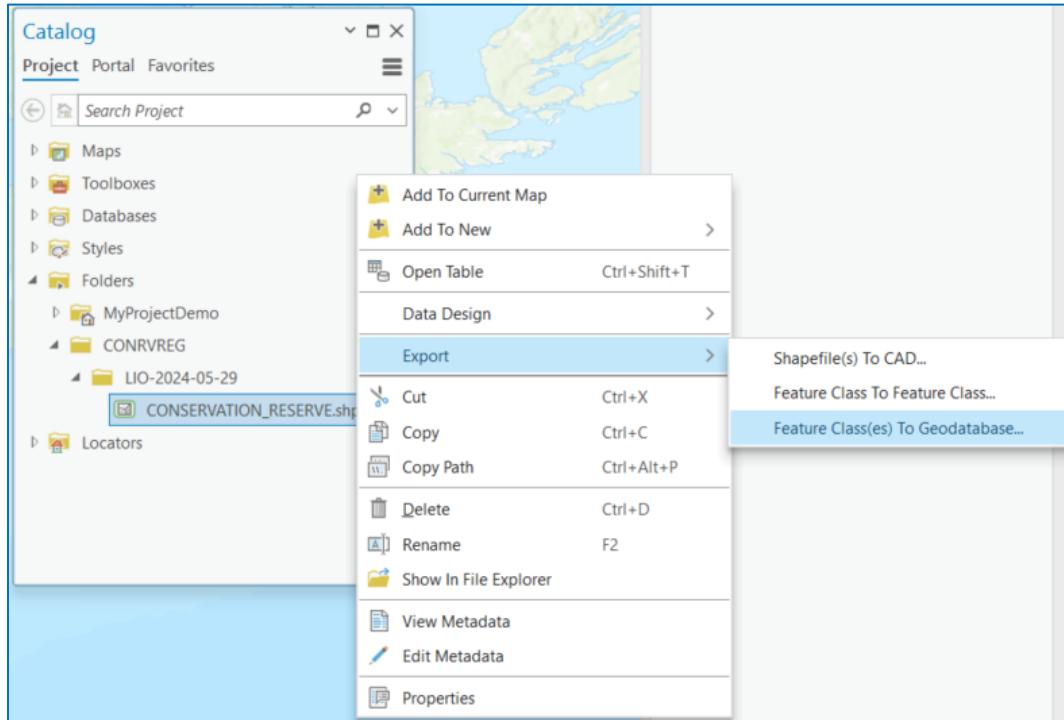
1. In the **Catalog pane** of ArcGIS Pro, right click on **Folders** and click **Add Folder Connection**.



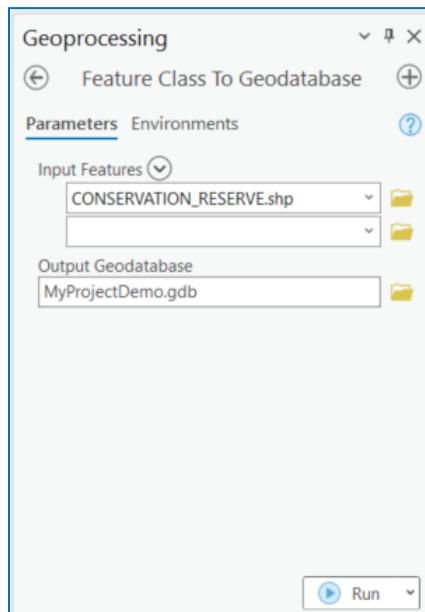
2. Navigate to the where the downloaded, extracted folder that contains your data is located and click **OK**. The folder will appear, and you will be able to expand it to see its contents.



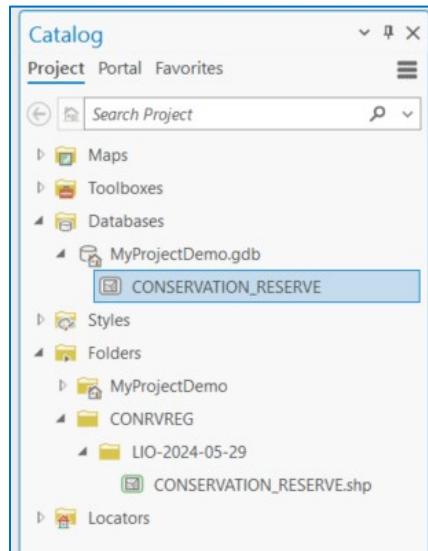
3. To import the shapefile to your file geodatabase, right click on it, hover over **Export**, and click **Feature Class(es) To Geodatabase...**



4. This will bring up a geoprocessing tool called **Feature Class To Geodatabase**. Ensure your **Input Features** is the correct feature you wish to import and ensure the **Output Geodatabase** is the geodatabase of interest. More than one shapefile can be added to the geodatabase at a time. Then click **Run**.

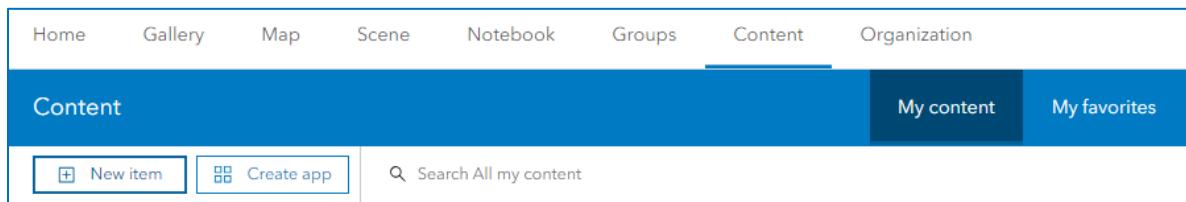


5. After the tool has successfully run, it will now appear in the project's geodatabase with the same environment settings as your project.

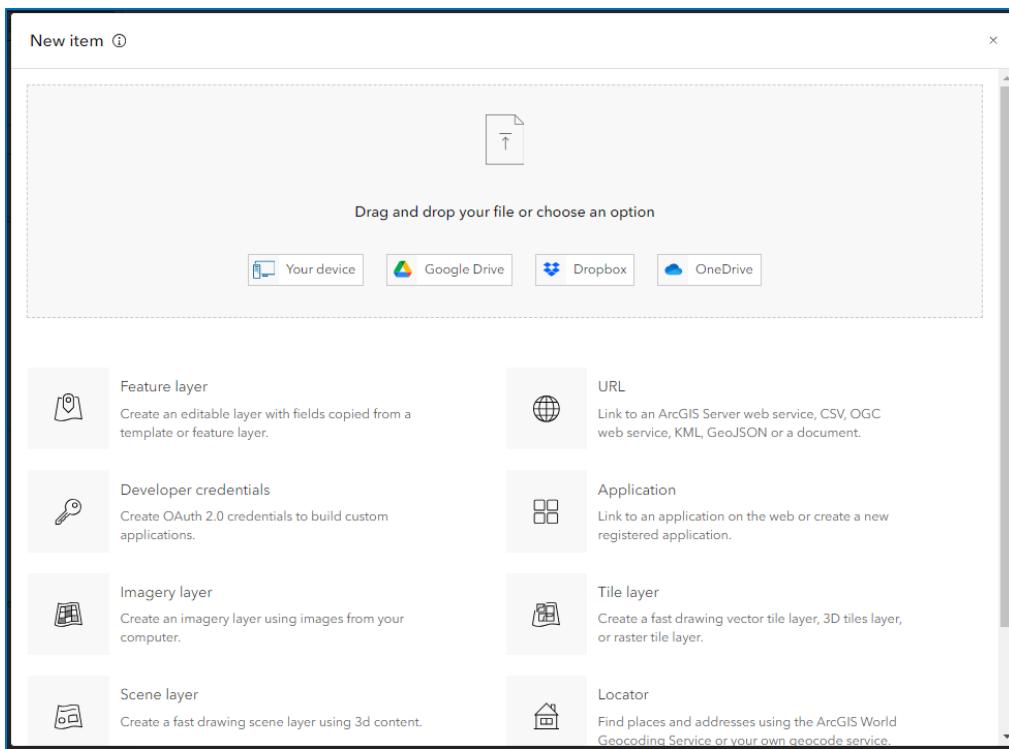


3.1.2 Import to ArcGIS Online

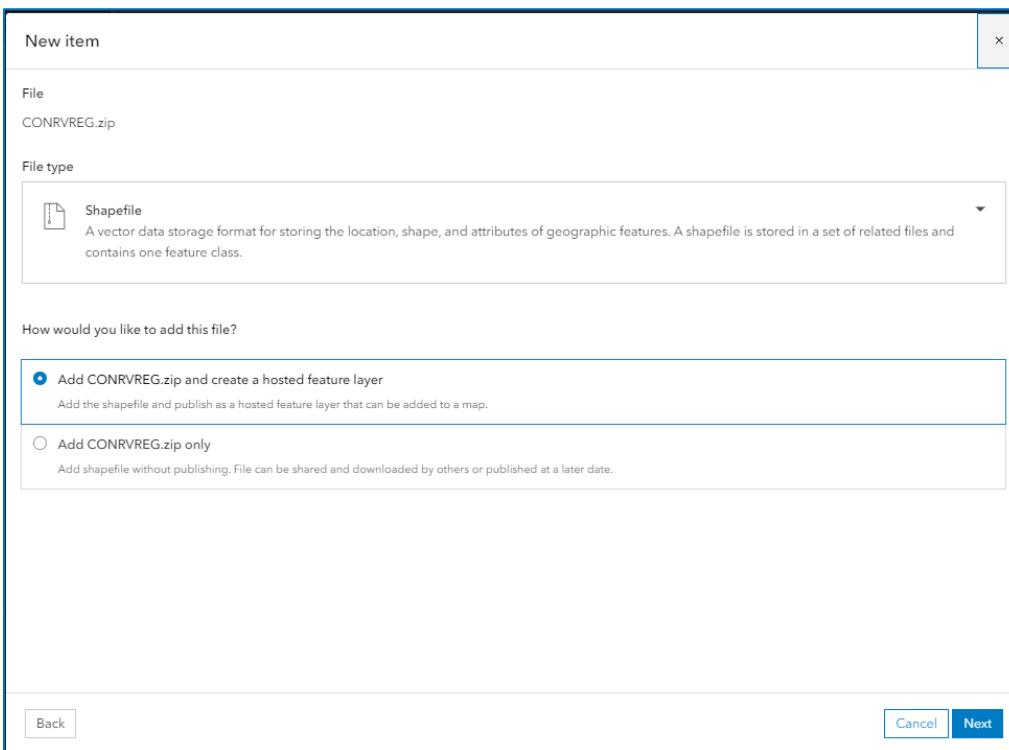
1. Navigate to the **ArcGIS Online homepage** and sign into your account.
2. In the navigation bar, click **Content** and then click **New item**.



3. The **New item** window will open. **Drag and drop** the zipped folder to this window.



3. ArcGIS Online will recognize that it is a **shapefile**. Accept defaults – be sure to add the folder AND create a hosted feature layer so that the data can be used in ArcGIS Online. Click **Next**.



4. Give the shapefile a title, save it in a folder, and optionally, add tags and a summary describing the file. Click **Save**.

NOTE: Larger shapefiles may take longer to upload. Wait patiently! ArcGIS Online will automatically refresh.

New item

File
CONRVREG.zip

Title
ConservationOntario

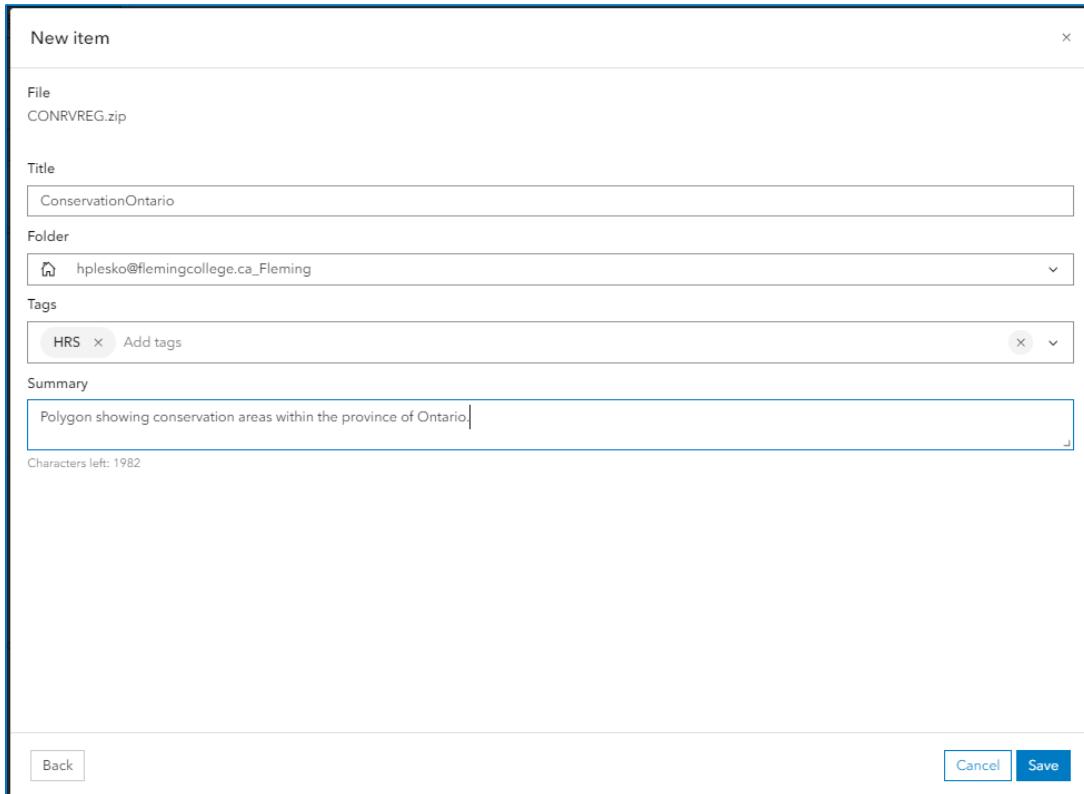
Folder
hplesko@flemingcollege.ca_Fleming

Tags
HRS

Summary
Polygon showing conservation areas within the province of Ontario

Characters left: 1982

Back Cancel Save



5. The page will automatically refresh and bring you to the **Overview** page of the item, where you can edit the summary, description, terms of use, title, tags, and credit. You can also bring the layer into **Map Viewer** from here to create a web map.

The screenshot shows the ArcGIS Online item overview page for a feature layer named 'ConservationOntario'. The main content area includes:

- Thumbnail:** A small map showing conservation areas within the province of Ontario.
- Description:** Polygon showing conservation areas within the province of Ontario.
- Details:** Feature layer (hosted) by [hblesko@flemingcollege.ca_Fleming](#). Item created: Jun 3, 2024. Item updated: Jun 3, 2024. View count: 0.
- Layers:** ConservationOntario Polygon layer.
- Terms of Use:** Add any special restrictions, disclaimers, terms and conditions, or limitations on using the item's content.

The right sidebar contains a vertical list of actions:

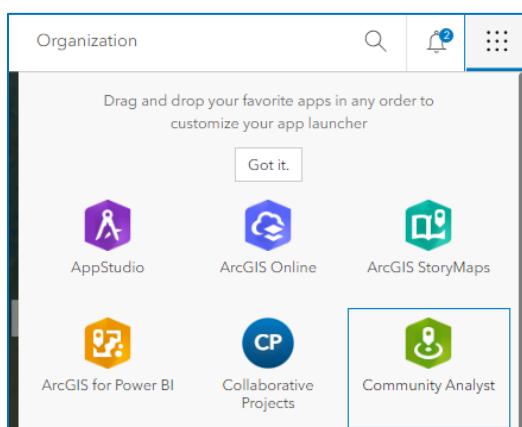
- Open in Map Viewer
- Open in Scene Viewer
- Open in ArcGIS Desktop
- Publish
- Create View Layer
- Export Data
- Update Data
- Share

Below the sidebar, there is an 'Item Information' section with a progress bar (Low to High), a note about top improvement (Add a longer summary), and a 'Details' section listing source, creation date, update date, schema, size, attachments, ID, and a star rating.

3.2 From ArcGIS Community Analyst

ArcGIS Community Analyst is an application that one can purchase in addition to an Esri Creator account. It supplies demographic data prepared by Environics Analytics and is an easy way to manipulate and view data. For more information about ArcGIS Community Analyst, visit Esri's [ArcGIS Community Analyst](#) overview page.

1. Navigate to the **ArcGIS Online homepage** and sign into your account.
2. Click the **waffle** in the top righthand corner and click **Community Analyst**.



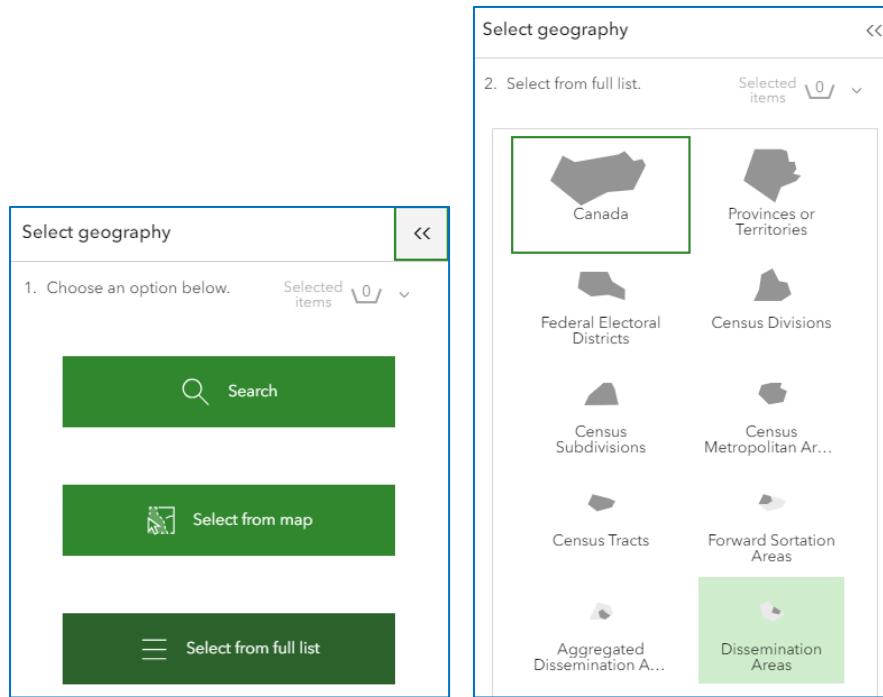
3. Create a new project and when using this application for the first time, be sure to select **Canada** as the country.

The screenshot shows a user interface for a geographic analysis tool. At the top, there is a navigation bar with a 'Canada' dropdown, a 'Help' link, a gear icon, and a user profile 'HP Helen'. Below the navigation is a search bar with the placeholder 'Enter country or region' and a magnifying glass icon. A horizontal menu bar displays letters from A to Z. To the left, there is a sidebar with icons for 'Show all' (a world map), 'Africa', 'Asia', 'Europe', 'North America', 'Oceania', and 'South America'. The main content area is titled 'C' and lists countries starting with 'C', each with a flag icon. The list includes Cabo Verde, Cambodia, Cameroon, Canada (highlighted in green), Cayman Is..., Central Afric..., Chad, Chile, China, Colombia, Congo, Re..., Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Rep..., Denmark, and Dominican...'. Below this, there is a 'New project' button and a 'Show all projects' link. On the right, there is a donut chart with a green segment labeled '25%' and the text 'of Population in United States Are Millennials (Born 1981 to 1998)'. A 'What's this?' link is also present.

4. Click **Define areas** to define the study area. This can be done by finding a location, selecting geography, or drawing a polygon. For this project, **Select geography** was chosen.

The screenshot shows the 'Define areas' section of the application. It features three main options: 'Find location' (with a description 'Enter an address, then add rings, drive time, or walk time around it.' and an icon of a location pin inside a circle), 'Select geography' (with a description 'Select a country, ZIP code or any of the available geographies for your analysis.' and an icon of a map outline), and 'Draw polygon' (with a description 'Draw a custom polygon around an area of your interest.' and an icon of a polygonal shape). Each option has a 'Learn more' link below it.

5. In the **Select geography window**, click **Select from full list** and then click **Dissemination areas**.



6. Select **Ontario** as the province from the dropdown menu, select the **Dissemination Area by Census Subdivision** from the next dropdown menu, and then search or find **Prince Edward County (CY)** from the third dropdown menu. Select all dissemination areas and select **No** to perform the suitability analysis based on dissemination areas but not the county as a whole. Then click **Finish**.

Select geography <<

3. Select from full list. Selected items 40 /

Ontario x

Select Dissemination Area by:

Census Subdivision

Prince Edward County, ON (CY) x

Dissemination Area

35130042, ON

35130043, ON

35130044, ON

35130045, ON

35130046, ON

35130047, ON

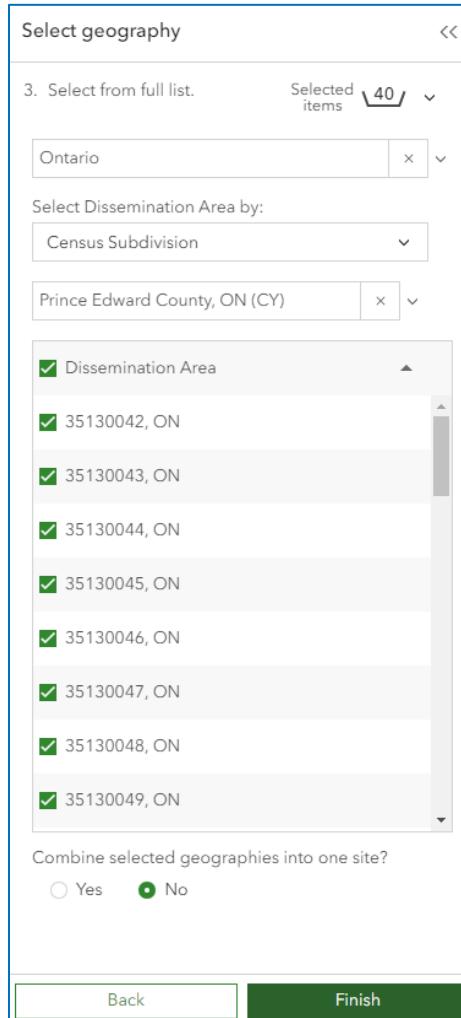
35130048, ON

35130049, ON

Combine selected geographies into one site?

Yes No

Back Finish



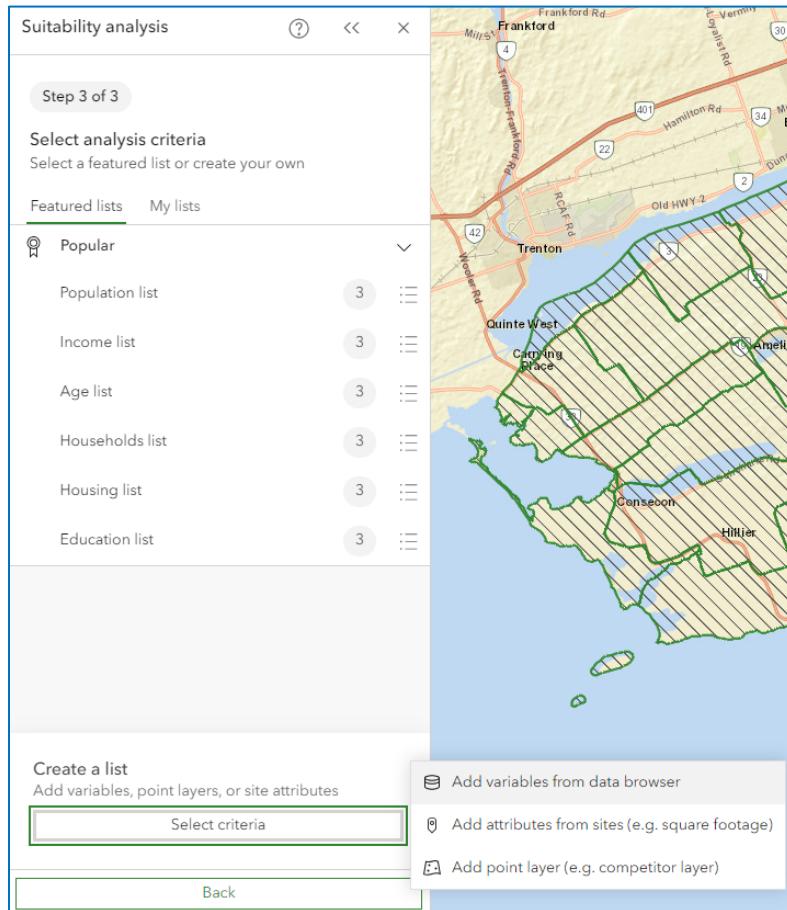
7. Click **Suitability analysis** either in the sidebar after clicking **Finish**, or from the **Run analysis** dropdown menu in the navigation bar at the top of the page.

The screenshot shows a 'Select geography' interface. On the left, a sidebar lists 'Your geography site(s) have been saved in the current project.' Below this, a list of actions includes 'Run reports', 'Run infographics', 'Suitability analysis' (which is highlighted in green), 'Comparison reports', and a large green 'I'm done' button. On the right, a map interface features three analysis tools: 'Define areas' (highlighted in green), 'Run analysis' (disabled), and 'Share results'. Under 'Run analysis', there are three sub-options: 'Suitability analysis' (highlighted in green), 'Void analysis', and 'Threshold areas'. Each sub-option has a brief description and a 'Learn more' link.

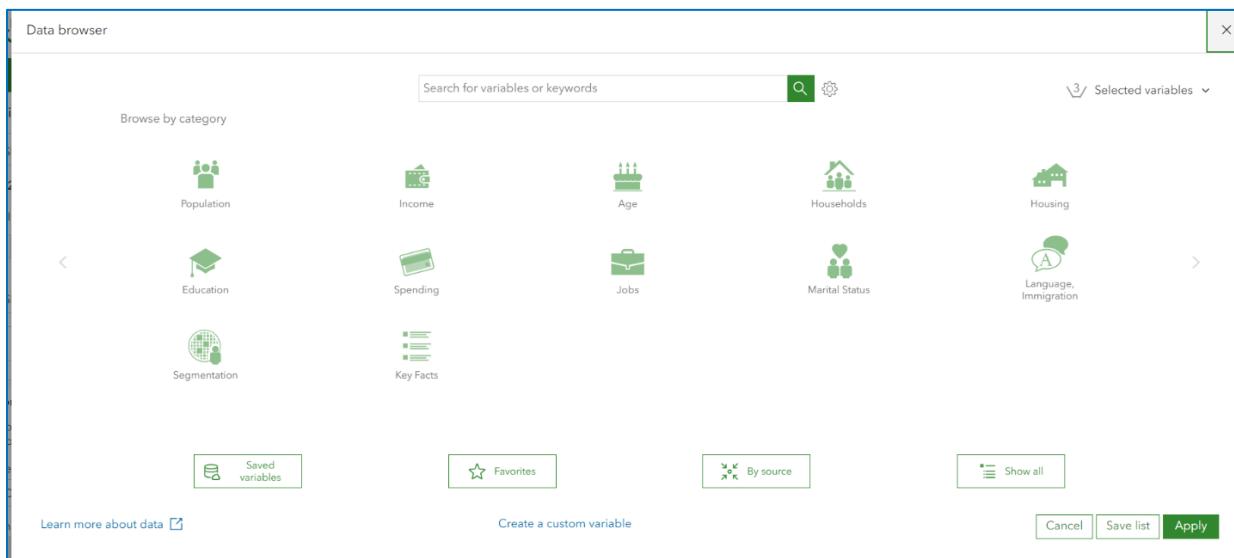
8. Since the dissemination areas are already selected, **Your sites** can be chosen in Step 1 of the analysis. Click **Next**. Ensure all 40 dissemination areas are selected for Step 2.

The screenshot shows the 'Suitability analysis' interface in 'Step 1 of 3'. It asks 'Select location type' and provides three options: 'Your sites' (selected), 'Features on the map', and 'Geographies'. Each option has a description and a radio button for selection. The 'Your sites' section also includes a note about selecting points, polygons, or geographies.

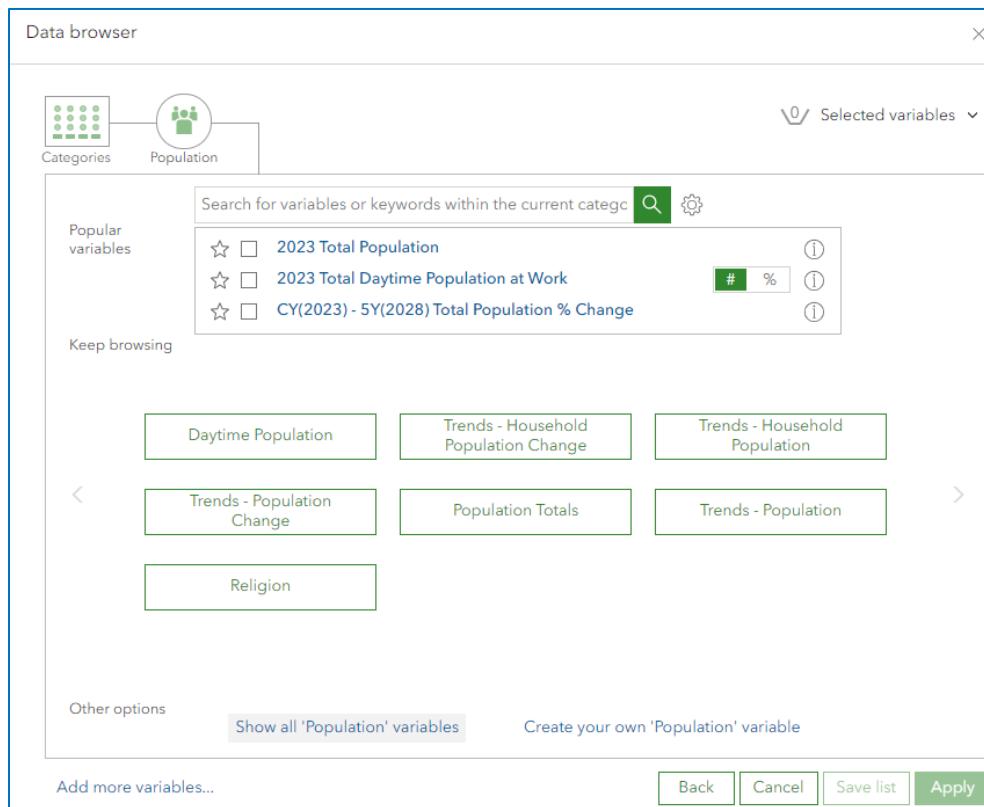
9. In Step 3, the criteria can be selected (maximum 20) for suitability analysis. For this project, data from Environics is of interest, so click **Select criteria**, then click **Add variables from data browser**.



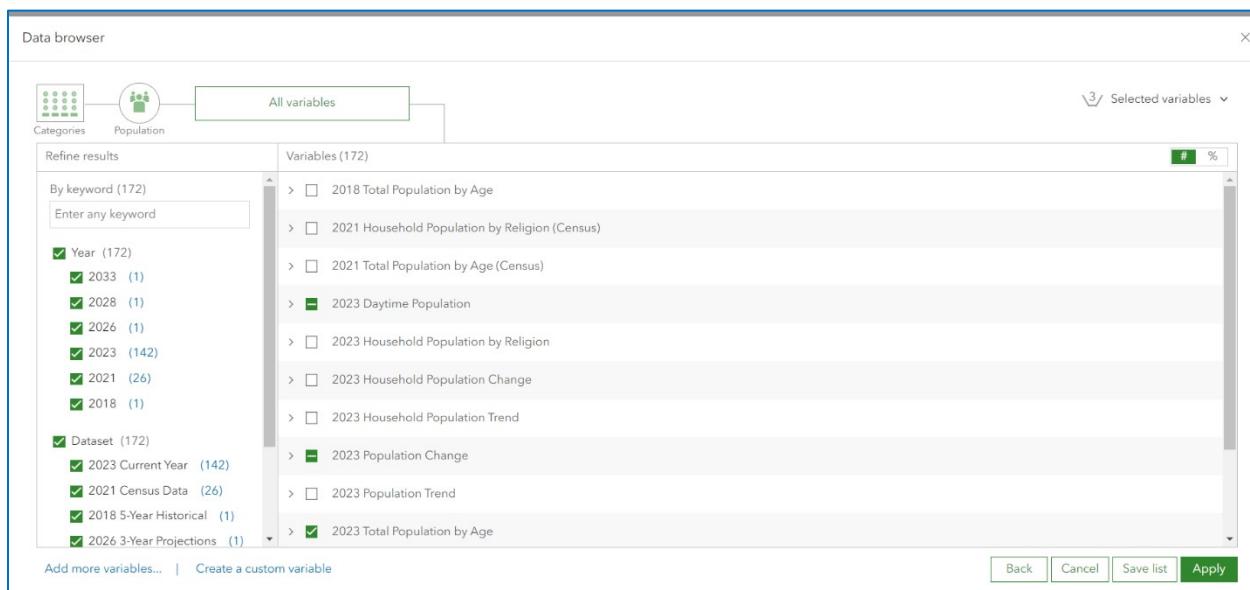
10. This will open a window of different themes of data. Click **Population** since that is the data of interest.



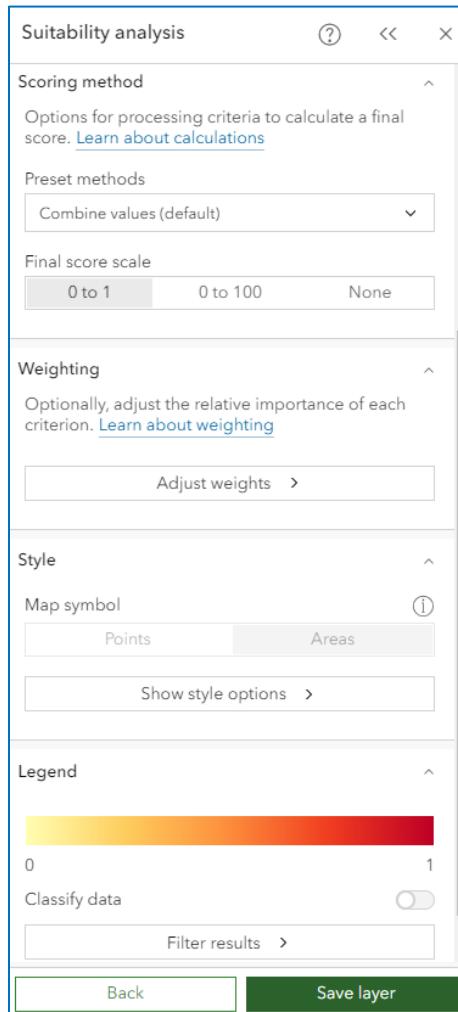
11. At the bottom of the **Data browser window**, click **Show all ‘Population’ variables**.



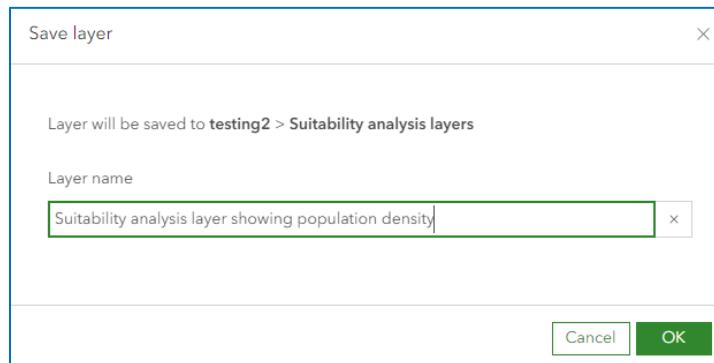
12. Select the required data from the list and then click **Apply**.



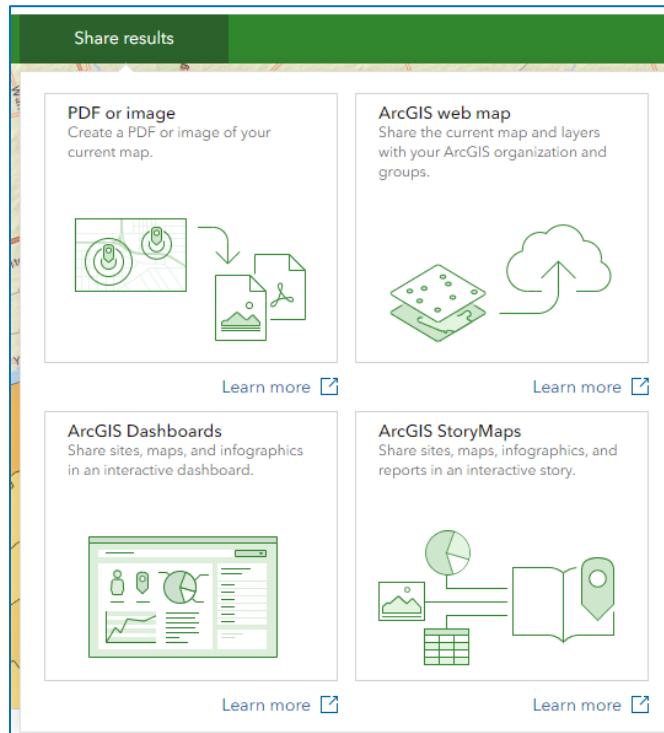
13. The map will show the final score of the suitability analysis. On the lefthand side, you will be able to adjust the variables, scoring method, weights, and symbology.



14. When the map is to your liking, click **Save layer** and name the layer. This name cannot be more than 60 characters. Then click **OK**.



15. This new feature layer will be saved in the project's feature storage in ArcGIS Online. The layers can then be saved in other formats or brought into web applications by clicking **Share results** in the top navigation bar.



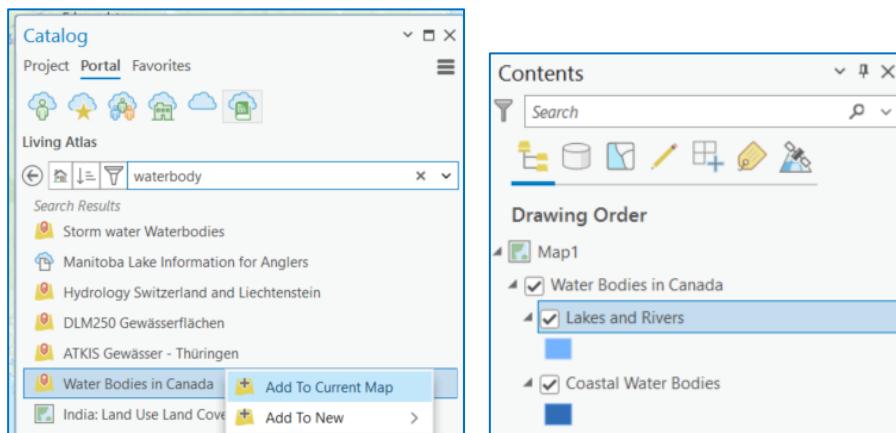
3.3 From Esri Living Atlas

3.3.1 Accessing the portal in ArcGIS Pro

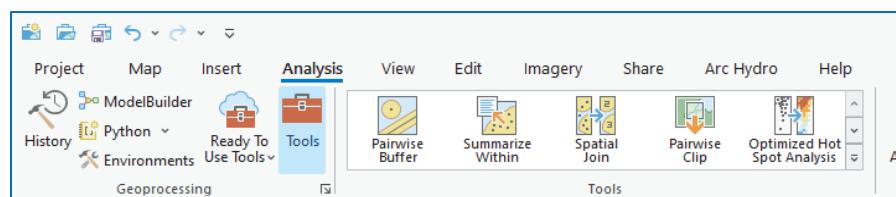
1. In the **Catalog pane** of the ArcGIS Pro project, click **Portal** then click the last icon, **Living Atlas**. Here you can search for public layers. Check the **Terms of Use** to ensure it can be used for your intention.



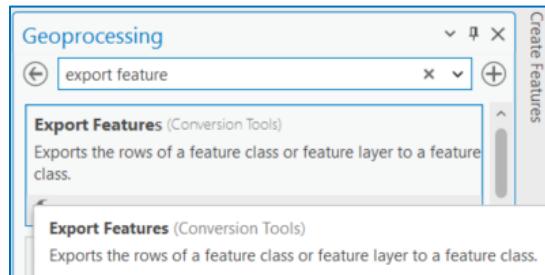
2. Right click on the layer and click **Add To Current Map** to view the layer then explore the layers on the map.



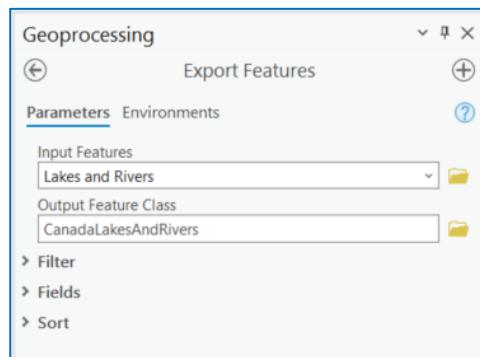
3. If there are layers of interest, in the top ribbon of ArcGIS Pro, click **Tools**.



4. In the search bar of the **Geoprocessing window**, search “**Export Features**” and then click the **Export Features** conversion tool.

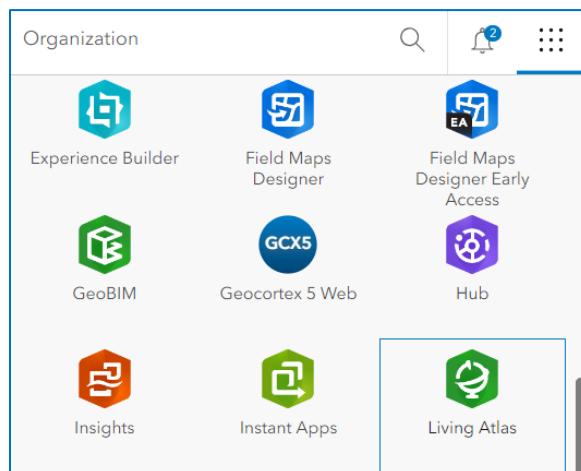


4. For **Input Features**, click and drag the feature to be exported. For **Output Feature Class**, navigate to the file geodatabase and name the feature class. Then click **Run**.

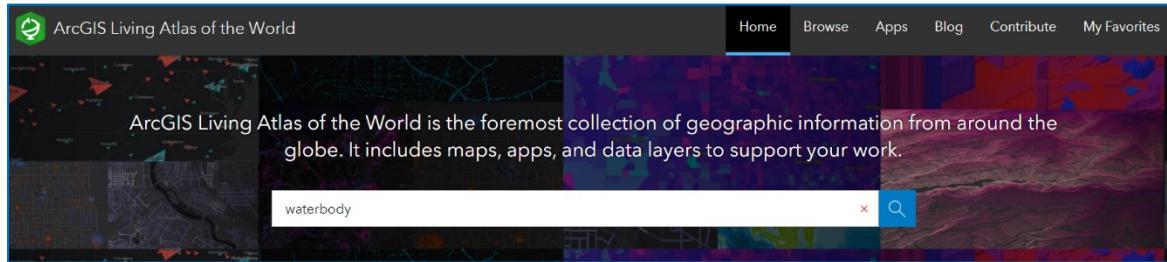


3.3.2 Accessing the portal in ArcGIS Online

1. Navigate to the **ArcGIS Online homepage** and sign in to your account.
2. Click the **waffle** in the top righthand corner and click **Living Atlas**.



3. Use the search bar to search the dataset of interest. Optionally, use the **Browse** tab to browse the hub.



4. Once the dataset has been located, hover over the **thumbnail** and click **View item details**.

A thumbnail view of a dataset titled "Water Bodies in Canada". The thumbnail shows a map of Canada with various water bodies highlighted in blue. A button labeled "View item details" is overlaid on the map. To the right of the thumbnail, the title "Water Bodies in Canada" is displayed, followed by a small icon and the text "Feature Service By EsriCanadaContent". Below this, a description reads: "Lakes, rivers, and coastal water body polygons compiled from Statistics Canada." At the bottom right of the thumbnail area are three small icons: a download arrow, a star, and an ellipsis.

5. From here, you can view the item details and description, view it in a web map, or bring it into ArcGIS Pro.

A detailed view of the "Water Bodies in Canada" dataset item page. The top navigation bar includes tabs for Overview, Data, and Visualization. The main content area starts with a description: "Lakes, rivers, and coastal water body polygons compiled from Statistics Canada." Below this is a thumbnail image of the dataset, a "Living Atlas" button, and an "Add to Favorites" button. The "Description" section explains that the files are for mapping inland and coastal waters, Great Lakes, and the St. Lawrence River. The "Additional Information" section lists two metadata links. The "Update Frequency" is noted as "Annually". On the right side, there's a "Details" panel with information like Source: Feature Service, Data updated: Feb 16, 2023, 2:13 p.m., Schema updated: Feb 18, 2023, 10:18 p.m., Size: 678.156 MB, Attachments size: 0 KB, and ID: 59d48eb2bbb83489fa612f5e53da767e1. Below the details are five small star icons.

4 Database design in ArcGIS Pro

This section summarizes the steps taken to design your database, which involves optimizing the fields, setting domains and subtypes, and creating feature datasets.

4.1 Optimize fields

Editing the fields is important as it allows the viewer or users of the data to understand what is being presented to them. To edit a field in ArcGIS Pro, right click on a feature class in the **Contents pane** and open its **Attribute Table**. Then right click on any field heading and click **Fields**. Here you will see the schema of the feature class, which includes the field names, types, domains, and more. Continue throughout this subsection to find ways to optimize the data for better storage and viewing. For additional information about defining fields, visit Esri's [Define fields in tables](#) help page.

4.1.1 Rename fields and set aliases

Field names must reflect the data that the column contains. The names must be unique within the same table, start with a letter, and be no more than 64 characters. Spaces are not allowed in a field name, but an underscore is and can be used in place of a space. Reserved words, symbols other than an underscore, superscripts, and subscripts are also all not allowed in a field name.

Field aliases is an alternative, more descriptive name for a field. Contrary to field names, field aliases can have spaces, up to 255 characters, symbols, superscripts, and subscripts.

For this project, an example field name is REG_NUM in the Conservation Area feature class. The alias for this field name is Regulation Number.

Field Name	Alias
OBJECTID	OBJECTID
Shape	Shape
OGF_ID	OGF_ID
SITE_ID	Site Identification
AREA_NAME	Name
TYPE	Type
STATUS	Status
REG_NUM	Regulation Number
REG_AREA	Regulation Area
CLASS	Class
OWNER	Owner
MGMT	Management
LOC	Location

4.1.2 Choosing an appropriate data type

Assigning a **data type** to a field determines what type of data is stored in that field. There are many different types of data types, including numbers, text, date, binary large objects, globally unique identifier, and raster. For this project, text, date, and number fields were used and will be described further. For more information about the other data types, visit Esri's [ArcGIS field data types](#) help page.

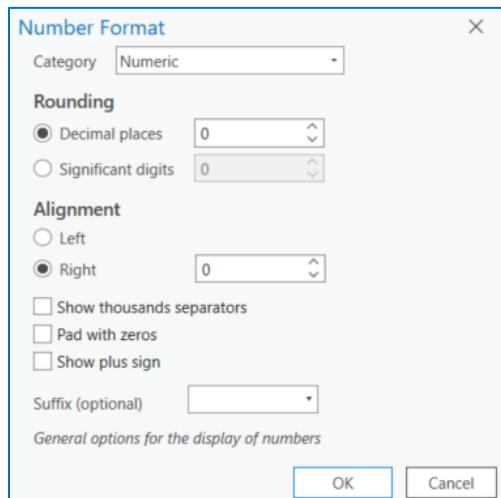
A **text data type** can store alphanumeric values, meaning characters that are either a letter or number. The default length for this data type is 255 characters, but this value can be changed.

A **date data type** can store the date and time within a shapefile and is typically in the format yyyy-mm-dd hh:mm:ss AM or PM. This field can be altered to show only the date, only the time, and also a timestamp offset. A use case for this data type is to record the date and time a feature was updated, as seen in the Social Infrastructure point data.

The **numeric data type** options to store numbers in a field include Short, Long, Float, and Double. A **short integer** includes values from -32,768 to 32,767 and it has the smallest storage size of 16-bit. A **long integer** is larger in size, 32-bit, but can hold values from -2,147,483,648 to 2,147,483,647. A **single-precision floating point number** is the same size as a long integer, 32-bit, but can hold values from approximately -3.4E38 to 1.2E38. Lastly, a **double-precision floating point number**, the largest of the four, 64-bit, can hold values from approximately -2.2E308 to 1.8E308.

4.1.3 Choosing an appropriate number format

When working with numeric data, the format could be edited to alter any incoming data. Where decimals were not needed and rounding isn't expected in the field, even if the data needs to be updated in the future, the value was set to 0.



4.1.4 Setting field length

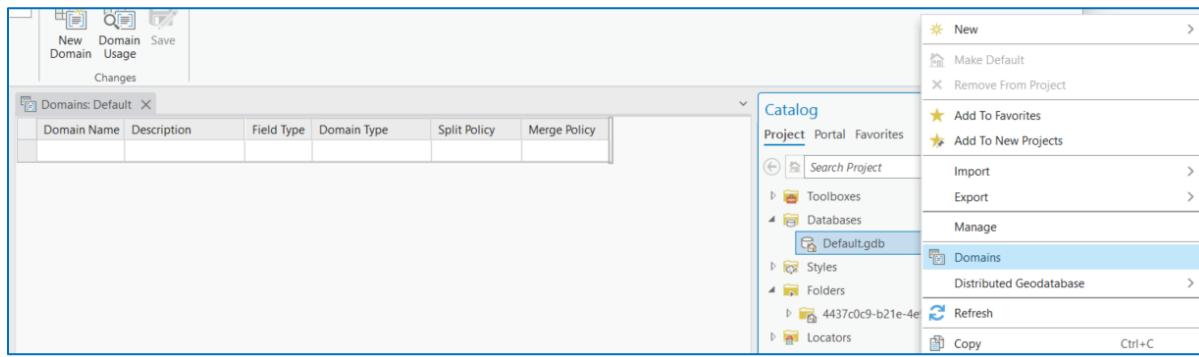
Field length becomes important when working with text data. The default length of a text field is 255 characters. One thing to note is that the length cannot be decreased after it is set, but it can be increased.

4.2 Create and set domains in ArcGIS Pro

Domains help with interpreting the data and automating data input. For more information about creating and managing domains, visit Esri's [Create and manage domains](#) help page.

4.2.1 Create a domain

1. Right click on the file geodatabase and click **Domains** to open the Domains editing window.



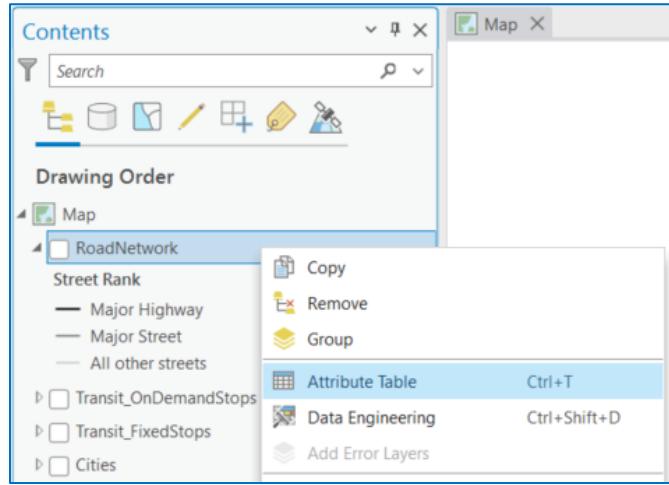
2. Click on a new row and type in the details for the new domain. The Field Type chosen here must be the same as the field type the domain will be applied to – this cannot be changed later. In this example, a **Coded Value Domain** will be created, but a **Range Domain** can also be created. For more information about these details, visit Esri's [Introduction to attribute domains](#) help page.

NOTE: If the new row doesn't appear, right click on a domain and click New Domain. A new row will appear.

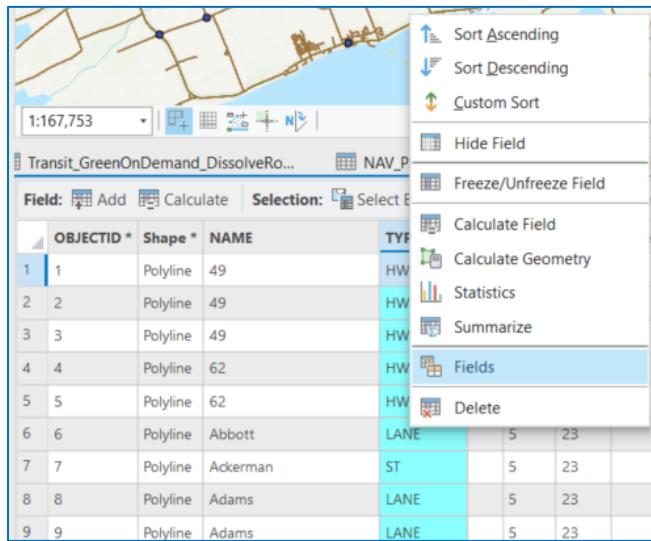
Domain Name	Description	Field Type	Domain Type	Split Policy	Merge Policy	Code	Description
PointCollectionMethod	The collection method for a point feature	Text	Coded Value Domain	Duplicate	Default	1	Trans-Canada Highway
Public Attractions and Landmark Structures FCode	The type of public attraction or landmark	Text	Coded Value Domain	Default	Default	2	National Highway System
SiteAddressLocation	A general description of the physical location represented by the site address point	Text	Coded Value Domain	Duplicate	Default	3	Major Highway
Street Class	The street class for the road network	Short	Coded Value Domain	Default	Default	4	Secondary Highway or Major Street
Street Rank	The street rank for the road network	Short	Coded Value Domain	Default	Default	5	All other streets
Transportation Facilities FCode	The type of transportation facility	Text	Coded Value Domain	Default	Default		

4.2.2 Apply domain to a field

1. Right click on the layer of interest in the **Contents pane** and click **Attribute Table** to open the layer's attribute table.



2. Right click one of the field headings, then click **Fields**.



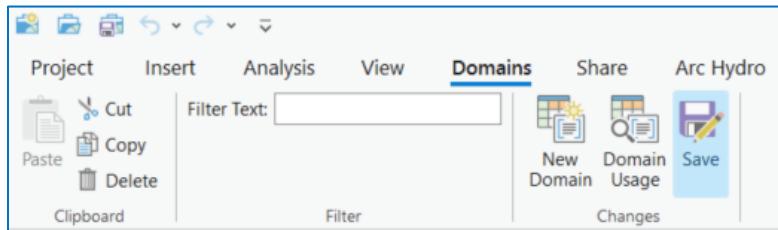
3. Under the **Domain** heading, use the dropdown menu to choose the appropriate domain.

NOTE: Only the domains with the same field type will appear here.

Visible	Read Only	Field Name	Alias	Data Type	Allow NULL	Highlight	Number Format	Domain	Default	Length
<input checked="" type="checkbox"/>	<input type="checkbox"/>	TYPE	Type	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>				6
<input checked="" type="checkbox"/>	<input type="checkbox"/>	DIR	Direction	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>				2
<input checked="" type="checkbox"/>	<input type="checkbox"/>	RANK	Street Rank	Short	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric	Street Rank		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	CLASS	Street Class	Short	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric	Street Class		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	SpeedLimit	Speed Limit	Short	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	DistanceKM	Distance (KM)	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	DrivingTime	Driving Time	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Shape_Length	Shape_Length	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			

Click here to add a new field.

4. Click **Save** in the top ribbon of ArcGIS Pro to save the changes.

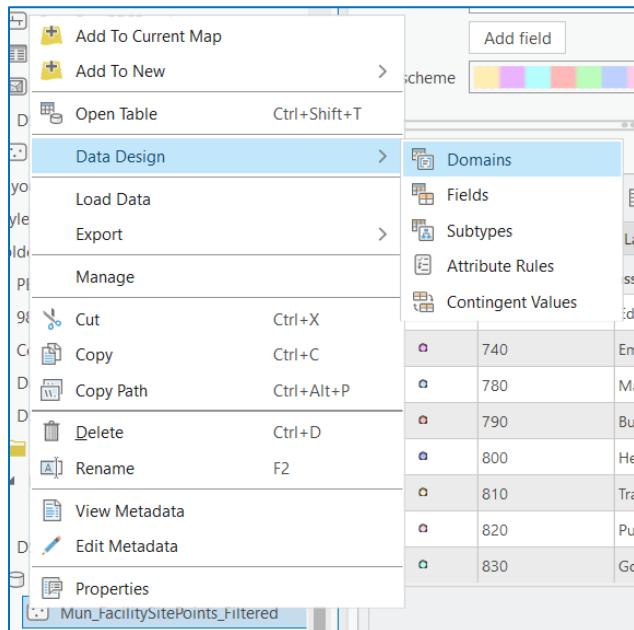


5. Head back to the layer's attribute table. The fields will be updated with the appropriate domain.

OBJECTID	Shape	Name	Type	Direction	Street Rank	Street Class
1	Polyline	49	HWY		Major Highway	Primary Highway
2	Polyline	49	HWY		Major Highway	Arterial
3	Polyline	49	HWY		Major Highway	Arterial
4	Polyline	62	HWY		Major Highway	Primary Highway
5	Polyline	62	HWY		Major Highway	Primary Highway
6	Polyline	Abbott	LANE		All other streets	Local
7	Polyline	Ackerman	ST		All other streets	Local
8	Polyline	Adams	LANE		All other streets	Local

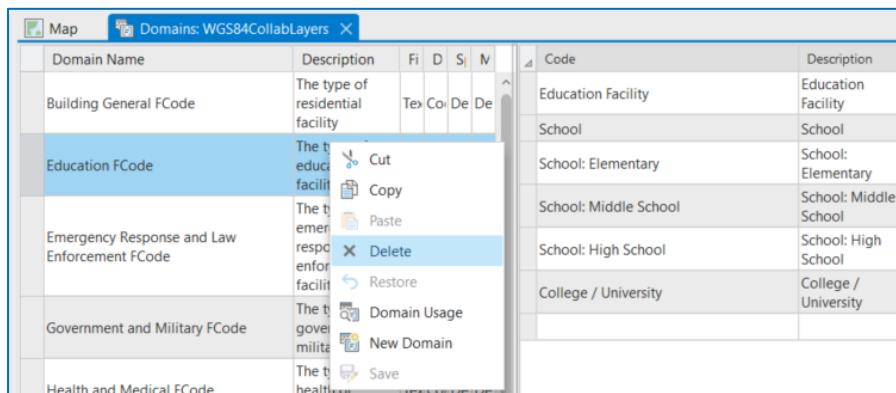
4.2.3 Delete a domain

1. Right click on the layer with the domain in the **Catalog or Contents pane**, hover over **Data Design**, and click **Domains**.

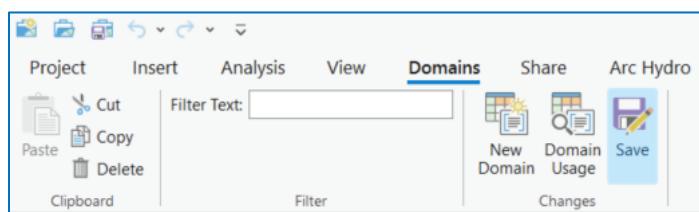


2. Right click on the domain to be deleted and click **Delete**.

NOTE: A domain cannot be deleted if it is being used alongside a subtype in the geodatabase.



3. Click **Save** in the top ribbon of ArcGIS Pro to save the changes.

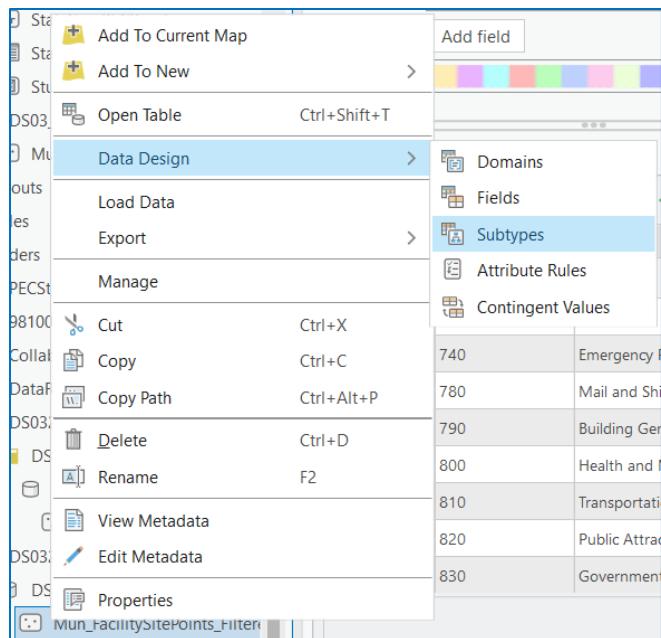


4.3 Create and set subtypes

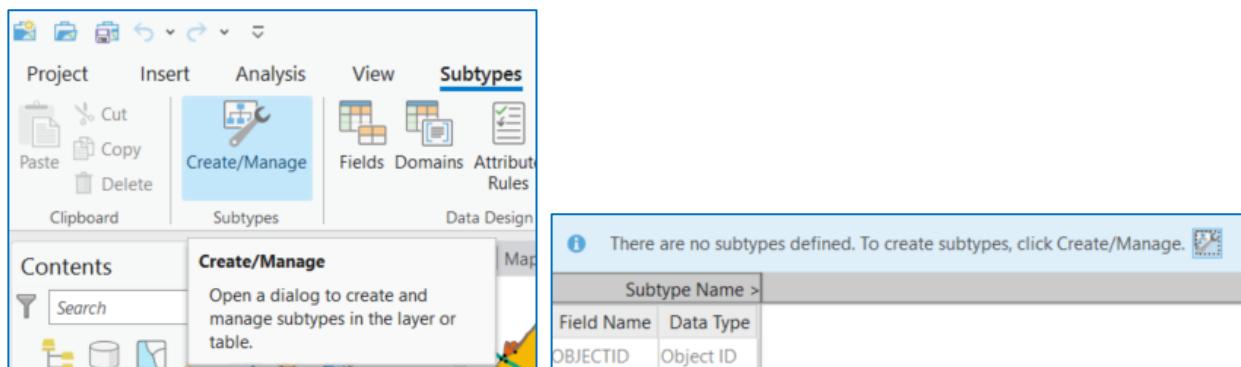
Like domains, **subtypes** help with interpreting the data and automating data input. When features need to be differentiated, but they share common attributes, subtypes can be used. For more information about creating and managing subtypes, visit Esri's [Create and manage subtypes](#) help page.

4.3.1 Create a subtype

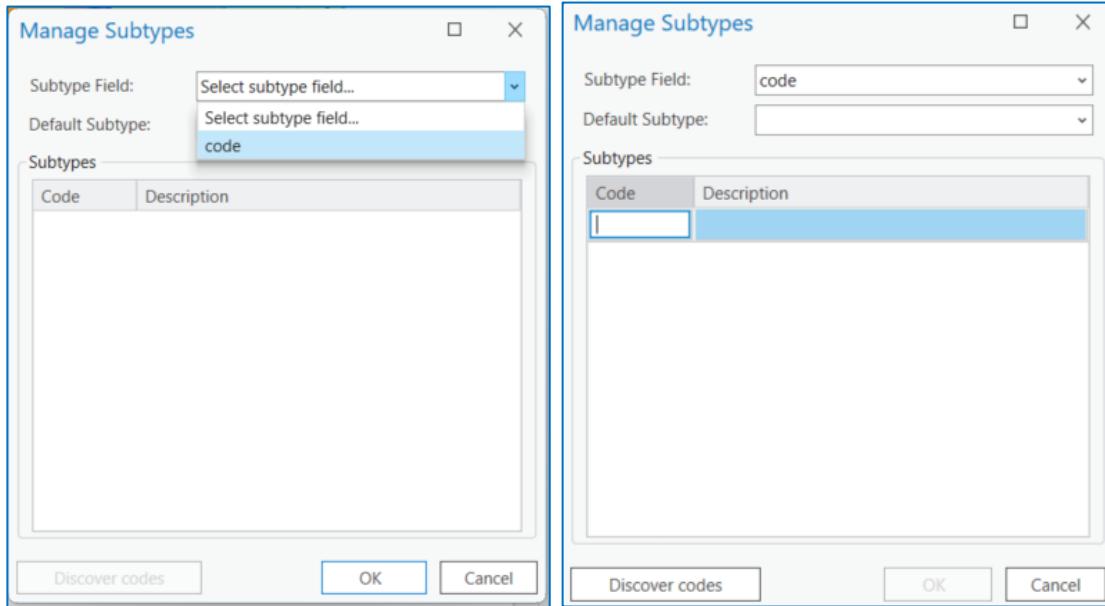
1. Add an **integer field** to the feature class that needs the subtype.
2. Right click the feature class that requires a subtype, hover over **Data Design**, and click **Subtypes**.



3. Click **Create/Manage** in the top ribbon of ArcGIS Pro. Alternatively, click the **small symbol** next to the blue message in the subtype window.



4. In the **Manage Subtypes** window, select the integer field as the **Subtype Field** and then either manually enter the code and description for each subtype, or click **Discover codes** for ArcGIS Pro to configure them for you.



5. An example result is in the social infrastructure data, where subtypes were set and domains that correspond to those subtypes are in place as well.

Subtype Name >		Education		
Field Name	Data Type	Domain	Default Value	Do
OBJECTID	Object ID			
Shape	Geometry			
NAME	Text			
OWNER	Text			
OWNTYPE	Text	OwnerType		Ow
*SUBTYPEFIELD	Long		730	
FEATURECODE	Text	Education FCode	Education Facility	Em
FULLADDR	Text			
MUNICIPALITY	Text		Education Facility	
STATE	Text		School	
CAPTUREMETH	Text	PointCollectionMethod	School: Elementary	
LOCATIONTYPE	Text	SiteAddressLocation	School: Middle School	
DESCRIPT	Text		School: High School	
FACAREA	Double		College / University	
LASTUPDATE	Date			

Manage Subtypes

Subtype Field: SUBTYPEFIELD

Default Subtype: Transportation Facilities

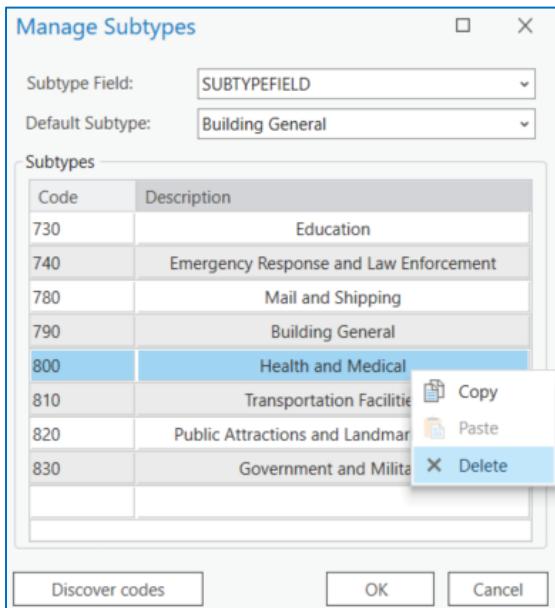
Subtypes

Code	Description
730	Education
740	Emergency Response and Law Enforcement
780	Mail and Shipping
790	Building General
800	Health and Medical
810	Transportation Facilities
820	Public Attractions and Landmark Buildings
830	Government and Military

Discover codes OK Cancel

4.3.2 Delete a subtype

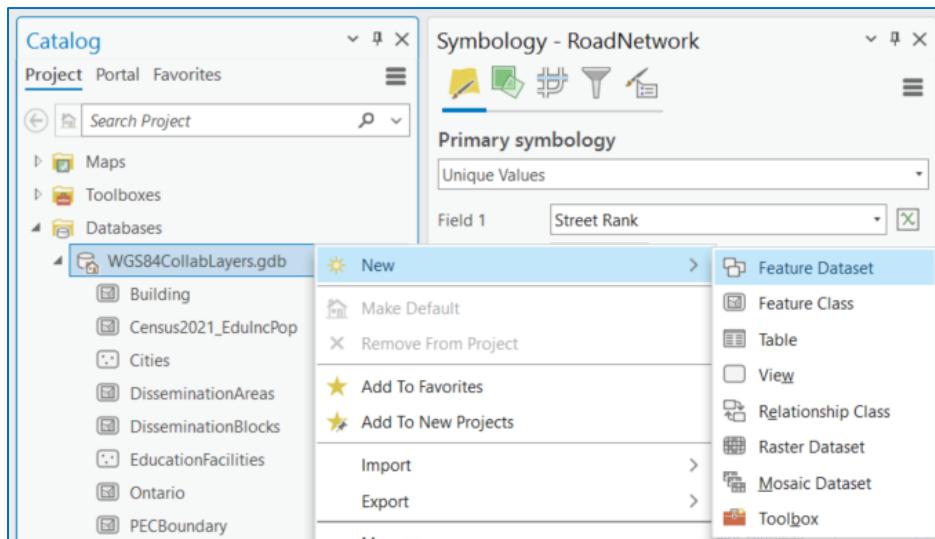
1. In the **Manage Subtypes window**, right click on a subtype and click **Delete**.



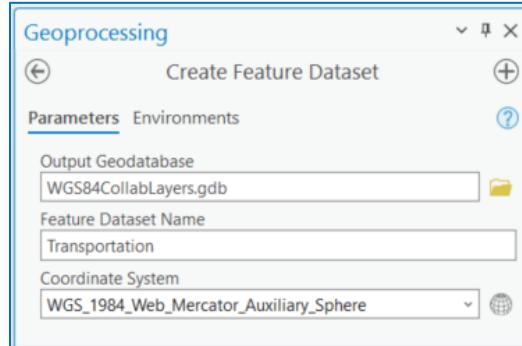
4.4 Create feature datasets

A **feature dataset** holds feature classes that are related to one another and share a coordinate system. Feature datasets are not to be viewed as “folders” within a file geodatabase, but rather to create a collection of the related feature classes for further analyses.

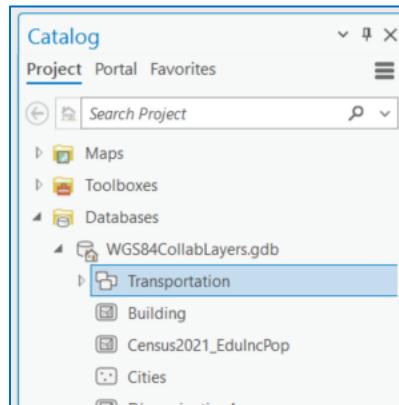
1. Right click on the geodatabase, hover over **New**, and click **Feature Dataset**.



2. In the **Geoprocessing window**, enter a **Feature Dataset Name**. For this project, a **Transportation** feature database is created to hold the layers related to transportation, including the road network and transit routes and stops. Next, check to make sure the default **Output Geodatabase** and **Coordinate System** both match those of your project. Click **Run**.



3. The feature dataset will appear in the geodatabase in the Catalog pane.



5 Manipulate the data

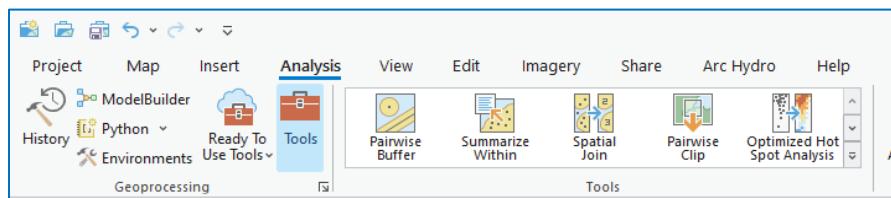
This section covers how to manipulate the data to create meaningful cartographic outputs.

5.1 Clip data

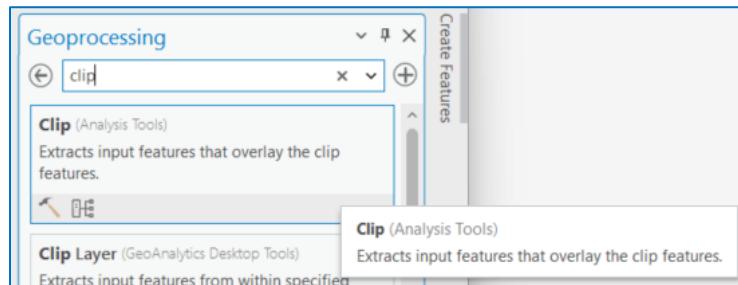
Clipping data is extremely useful for when you want to limit the study area and processing extents. This subsection covers how to clip data in ArcGIS Pro and ArcGIS Online. For more information about clipping data in ArcGIS Pro, visit Esri's [Clip \(Analysis\)](#) help page. For more information about clipping data in ArcGIS Online, visit Esri's [Clip a hosted feature layer to a specific polygon feature in ArcGIS Online Map Viewer Classic](#) how to page.

5.1.1 Clip tool in ArcGIS Pro

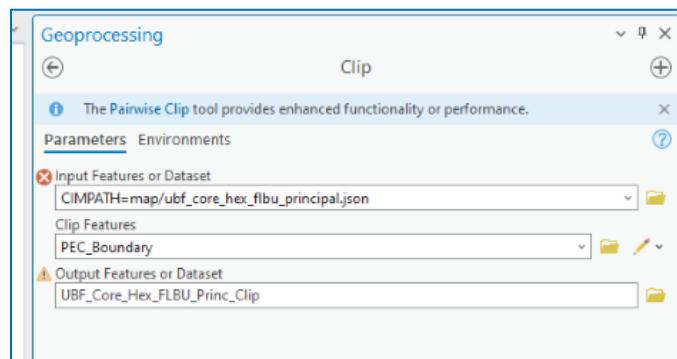
1. In the top ribbon of ArcGIS Pro, click **Tools**.



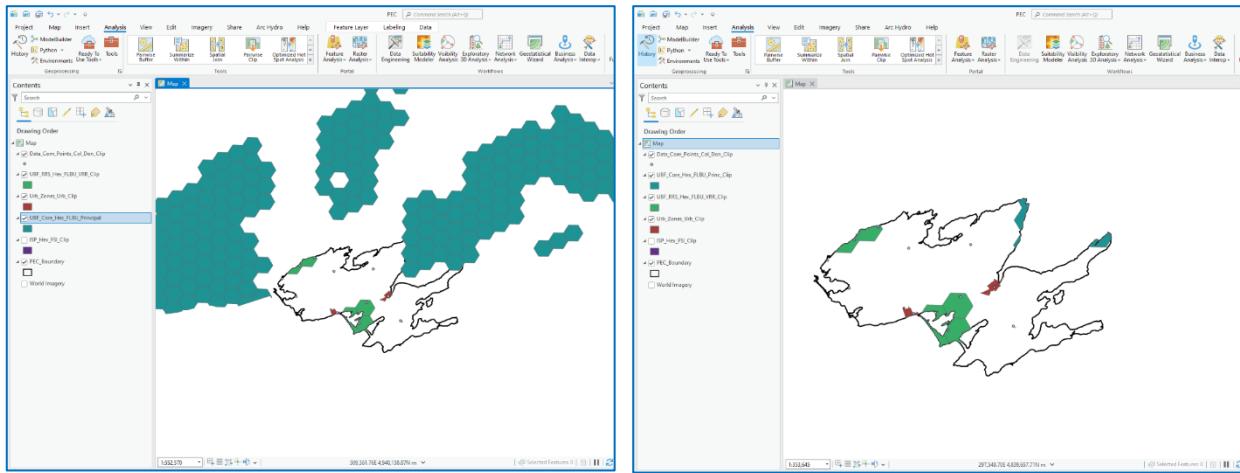
2. In the search bar of the Geoprocessing pane, search “clip” and select the Analysis Tool called **Clip**.



3. Choose the **Input Features or Dataset** either from the dropdown menu or by searching for it in another folder by clicking the yellow folder. Choose the **Clip Features** in a similar manner. Give the **Output Features or Dataset** an appropriate name. Check the **Environments** to ensure they are correct and click **Run**.

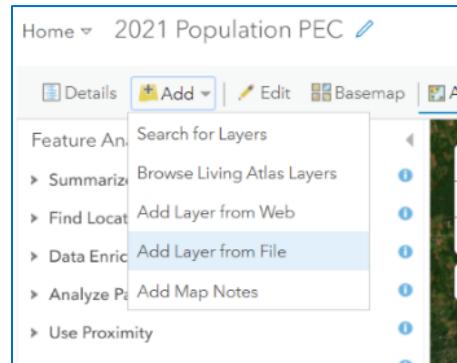


4. For this project, the broadband data is being clipped to the Prince Edward County boundary layer. The data within the boundary is the only data of interest in this case. See the before and after of running the Clip tool below.



5.1.2 Clip tool in ArcGIS Online

1. From the ArcGIS Online item page of the layer you wish to be clipped, open the layer in **Map Viewer Classic**.
2. Click **Add** and then **Add Layer from File**.



3. Click **Choose File** to locate the layer in your directory and then click **IMPORT LAYER**.

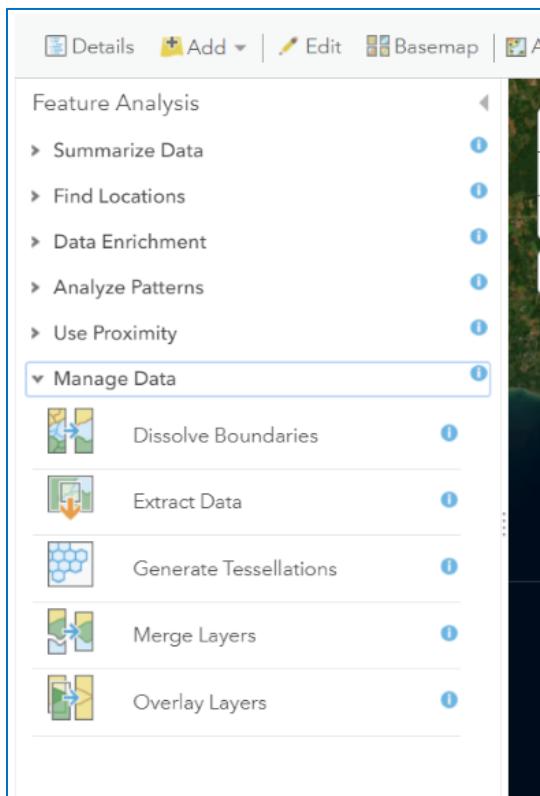
Add Layer from File

Locate the file you want to import.

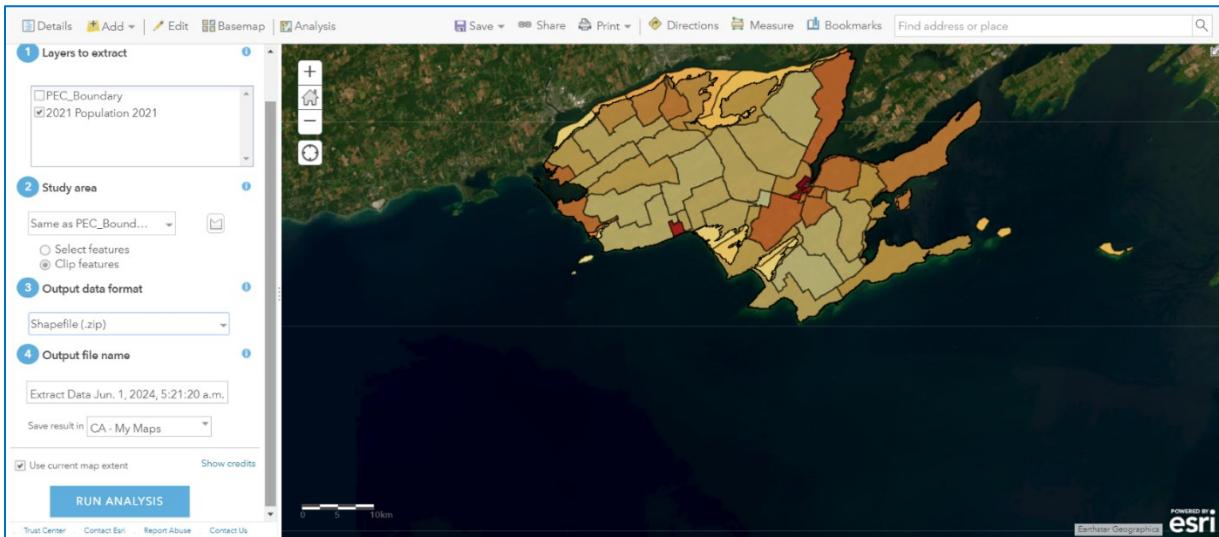
- Shapefile (ZIP archive containing all shapefile files)
- CSV or TXT files with optional address, place or coordinate locations (comma, semi-colon or tab delimited)
- GPX (GPS Exchange Format)
- GeoJSON (open standard format for simple geographical features)

File: No file chosen

3. Click **Extract Data** from the left toolbar.



4. Select the **Layer to extract**, ensure **Clip features** are selected, set the **Study area**, choose the **Output data format**, and name the **Output file name** accordingly. Then click **RUN ANALYSIS**.



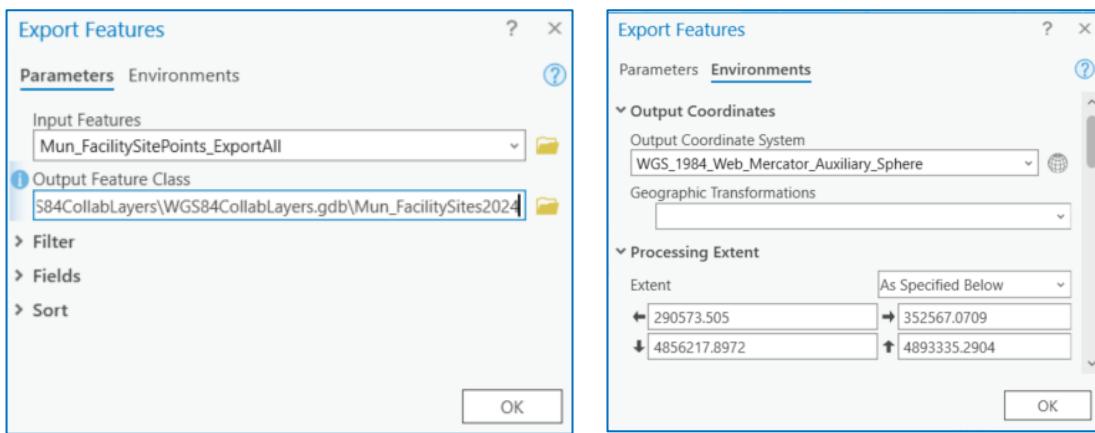
5. Save the web map with symbology and remove the unclipped layer from it.

5.2 Export Features

Exporting features allows you to take features of one class to create a new feature class with those selected features. To learn more about the exporting features tool in ArcGIS Pro, visit Esri's [Export Features \(Conversion\)](#) help page.

5.2.1 Export Features directly to file geodatabase

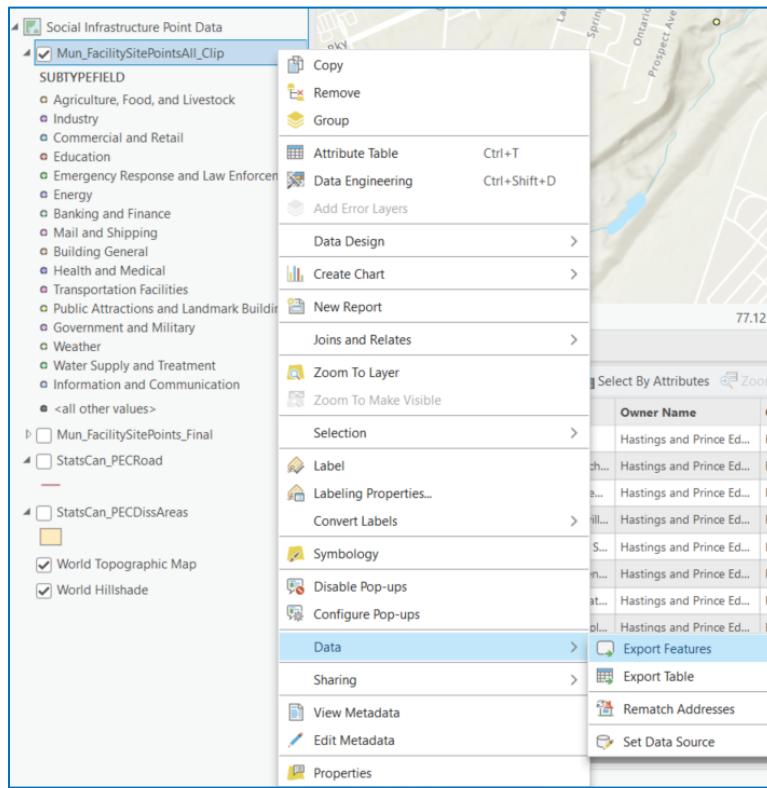
1. Right click on the feature class in the **Contents pane**, hover over **Data**, and click **Export Features**.
2. In Parameters, name the output feature class and ensure it is being saved in the correct geodatabase. In **Environments**, make sure that the output coordinate system and processing extents are correct. Then click **OK**.



3. Click **OK** and the new filtered feature class will appear in the Contents pane and in the file geodatabase. If it is not in the Contents pane, right click it in your file geodatabase and then click **Add to current map**.

5.2.2 Export Features based on selected attributes

1. Right click on the feature class in the **Contents pane**, hover over **Data**, and click **Export Features**.



2. Name the output file and make sure it is being saved to the file geodatabase.

3. Click **Filter** and use either the dropdown options (left) or SQL (right) to select the desired attributes. In this case, the data was being filtered based on requested subtypes from the client.

Left Dialog (Filter View):

Input Features: Mun_FacilitySitePointsAll_Clip
Output Feature Class: Mun_FacilitySitePoints_Requested_Clip

Filter:

Expression:

- Where: Subtype Field is not equal to 701 - Agriculture, Food, and Livestock
- Or: Subtype Field is not equal to 710 - Industry
- Or: Subtype Field is not equal to 720 - Commercial and Retail
- Or: Subtype Field is not equal to 760 - Banking and Finance
- Or: Subtype Field is not equal to 850 - Water Supply and Treatment

Right Dialog (SQL View):

Input Features: Mun_FacilitySitePointsAll_Clip
Output Feature Class: Mun_FacilitySitePoints_Requested_Clip

Filter:

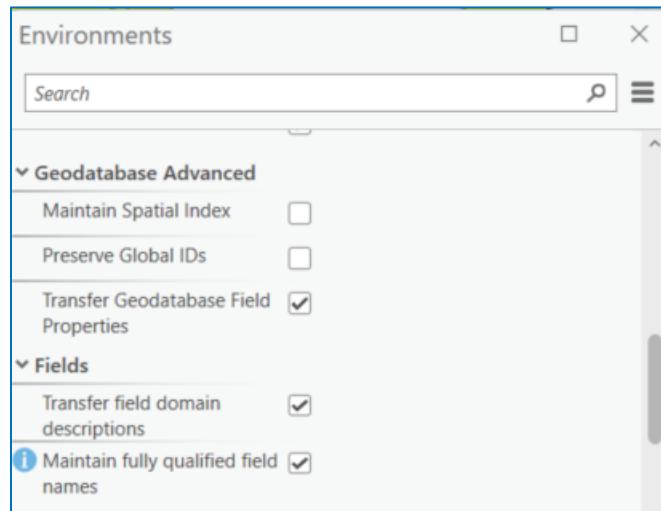
Expression:

```
SUBTYPEFIELD <> 701 Or SUBTYPEFIELD <> 710 Or SUBTYPEFIELD <> 720 Or SUBTYPEFIELD <> 760 Or SUBTYPEFIELD <> 850
```

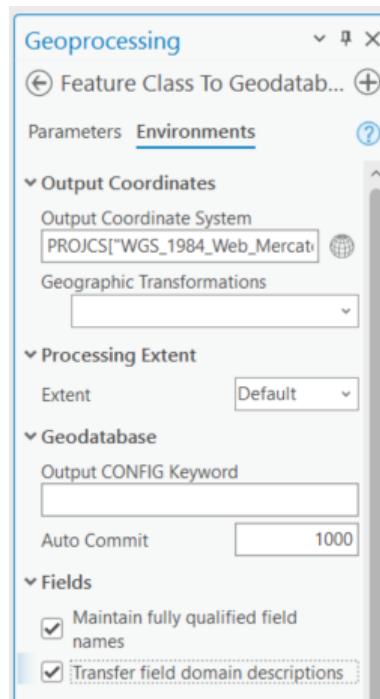
4. Click **OK** and the new filtered feature class will appear in the **Contents Pane** and in the file geodatabase. If it is not in the Contents Pane, right click it in your file geodatabase and then click **Add to current map**.

5.2.3 Export Features with domains and subtypes

There are two ways you can ensure the domains and subtypes are transferred when exporting features in ArcGIS Pro. One way is to ensure the **Environment settings** are set as so:



Another method is to select **Transfer field domain descriptions** in the **Feature Class To Geodatabase** tool.

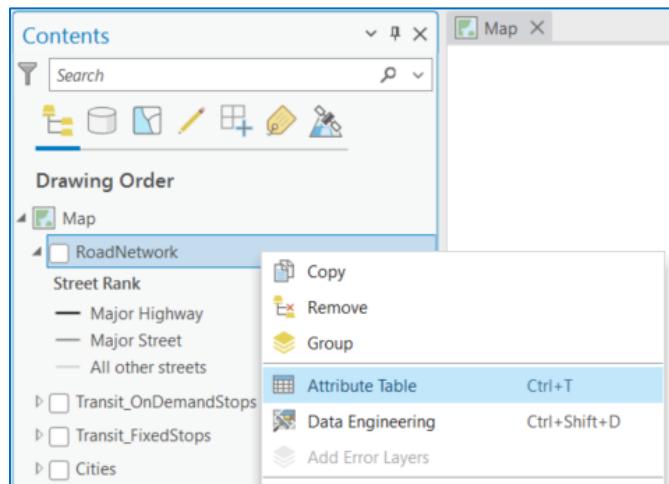


5.3 Add or edit data

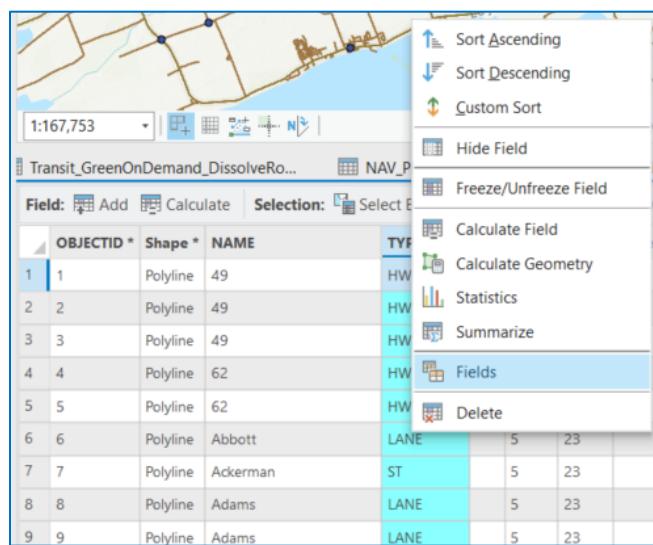
To populate a field, data can be typed in directly in the row of an attribute table. There are also some tools that can be used to automate this process.

5.3.1 Add a new field manually

1. Right-click on a layer in the **Contents pane** and click **Attribute Table**.



2. In the **Attribute Table**, right-click on any of the field headings and click **Fields** to bring up the field editing window.



3. At the bottom of the list of fields is the option to **Click here to add a new field**. From here, you can add a field manually.

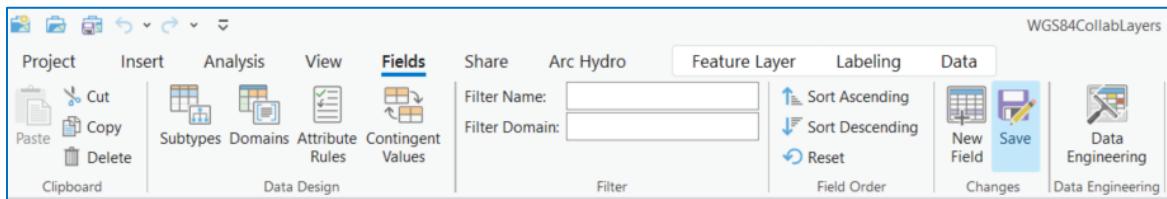
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Shape_Length	Shape_Length	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	DistanceKM	DistanceKM	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	DrivingTime	DrivingTime	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric		
Click here to add a new field.									

5.3.2 Calculate Geometry tool

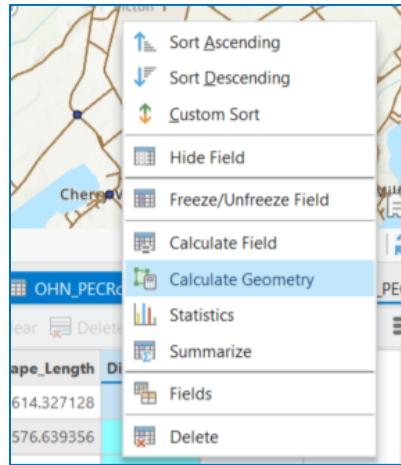
1. Add a new field that describes the data to be calculated. In this example, a new field is needed to store the distance in kilometers, so a new field called **DistanceKM** that stores **Double** data type and **Numeric** number format will be added.

Current Layer OHN_PECRoad_Dissolve (Digitizing)											
	<input checked="" type="checkbox"/> Visible	<input type="checkbox"/> Read Only	Field Name	Alias	Data Type	<input checked="" type="checkbox"/> Allow NULL	<input type="checkbox"/> Highlight	Number Format	Domain	Default	Length
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	OBJECTID	OBJECTID	Object ID	<input type="checkbox"/>	<input type="checkbox"/>	Numeric			
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shape	Shape	Geometry	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	NAME	NAME	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>				5
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TYPE	TYPE	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	DIR	DIR	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	RANK	RANK	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CLASS	CLASS	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	SpeedLimit	SpeedLimit	Short	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Shape_Length	Shape_Length	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	DistanceKM	DistanceKM	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	DrivingTime	DrivingTime	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric			
Click here to add a new field.											

2. Click save in the top ribbon of your project to save the added field.



3. Back in the **Attribute Table**, right click the new field and click **Calculate Geometry**.



4. Since this field will hold the shape length in kilometers, in the **Calculate Geometry window**, choose **Length** as the **Geometry Attribute Property** and then **Kilometers** as the **Length Unit**. Click **Apply**.

The screenshot shows the ArcGIS interface with the Calculate Geometry tool open. The Input Features dropdown is set to "OHN_PECRoad_DissolveRo...". The Field dropdown is set to "DistanceKM" and the Property dropdown is set to "Length". The Length Unit dropdown is set to "Kilometers". The Coordinate System dropdown is set to "NAD_1983_CSRS_UTM_Zone_18N". The OK button is visible at the bottom right of the dialog.

OBJECTID	Shape	NAME	TYPE	DIR	RANK	CLASS	SpeedLimit	Shape_Length	DistanceKM	DrivingTime
1	Polyline	49	HWY		3	12		614.327128	<Null>	<Null>
2	Polyline	49	HWY		3	21		50	576.639356	<Null>
3	Polyline	49	HWY		3	21		80	17600.873855	<Null>
4	Polyline	62	HWY		3	12		50	2697.816291	<Null>
5	Polyline	62	HWY		3	12		80	22218.129957	<Null>
6	Polyline	Abbott	LANE		5	23		0	87.15071	<Null>
7	Polyline	Ackerman	ST		5	23		50	413.075675	<Null>
8	Polyline	Adams	LANE		5	23		0	1017.616828	<Null>
9	Polyline	Adams	LANE		5	23		80	216.00901	<Null>
10	Polyline	Adolphus	LANE		5	23		80	161.066937	<Null>
11	Polyline	Agnes	ST		5	23		50	89.579174	<Null>
12	Polyline	Airport	LANE		5	23		80	1452.247955	<Null>

5. The table will be updated with the new values. Click **OK** to close the Calculate Geometry window.

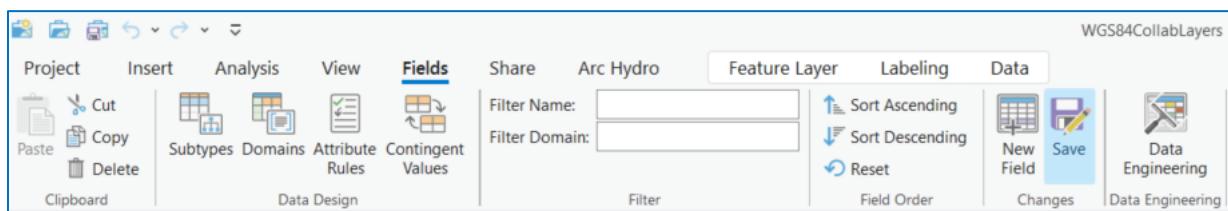
The screenshot shows the ArcGIS Pro Fields tool interface. The table contains 12 rows of data for roads, with columns including OBJECTID, Shape, NAME, TYPE, DIR, RANK, CLASS, SpeedLimit, Shape_Length, DistanceKM, and DrivingTime. The DrivingTime column shows values such as <Null>, 0.614327, 0.576639, etc. The Fields ribbon tab is selected, and the table is displayed in a grid format with various editing and selection tools at the bottom.

5.3.3 Calculate Field tool

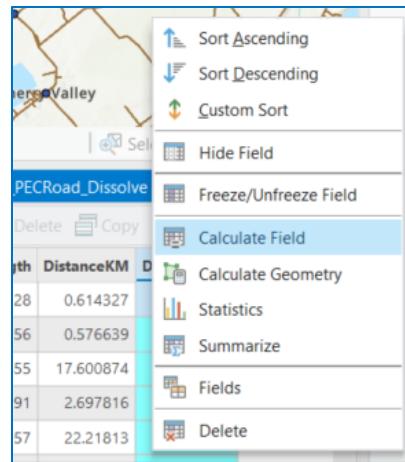
1. Add a new field that describes the data to be calculated. In this example, a new field is needed to store the driving time needed to travel the feature, so a new field called **DrivingTime** that stores **Double** data type and **Numeric** number format will be added.

The screenshot shows the ArcGIS Pro Fields dialog for the layer "OHN_PECRoad_Dissolve (Digitized)". A new field row has been added at the bottom of the list, labeled "Click here to add a new field.". The new field is named "DrivingTime", has a data type of "Double", and is set to "Numeric" format. Other fields listed include OBJECTID, Shape, NAME, TYPE, DIR, RANK, CLASS, SpeedLimit, Shape_Length, and DistanceKM.

2. Click **Save** in the top ribbon of your project to save the added layers.



3. Back in the **Attribute Table**, right click the new field and click **Calculate Field**.



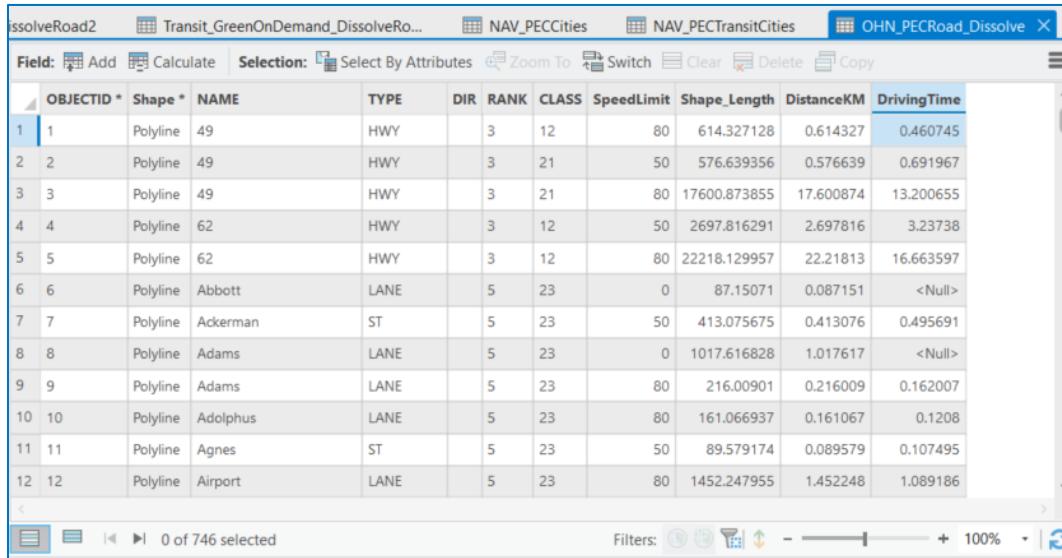
4. Since this field will hold the driving time per hour to travel the linear feature, in the **Calculate Field window**, enter the following statement.

(!DistanceKM! * 60) / !SpeedLimit!

This statement can also be completed by double clicking on field names and single clicking on operators.

A screenshot of the ArcGIS Calculate Field window. The input table is set to OHN_PECRoad_Dissolve. The field name is DrivingTime, and the expression type is Python 3. The expression being built is `(!DistanceKM! * 60) / !SpeedLimit!`. The Fields pane shows available fields: OBJECTID, Shape, NAME, TYPE, DIR, RANK, CLASS, SpeedLimit, Shape_Length, DistanceKM, and DrivingTime. The Helpers pane shows various Python methods like as_integer_ratio(), capitalize(), center(), conjugate(), count(), decode(), and denominator(). The expression builder shows the current state of the expression with operators (*, /, +, -, =) and values (DrivingTime =). The bottom right of the window has buttons for Enable Undo, Apply, and OK.

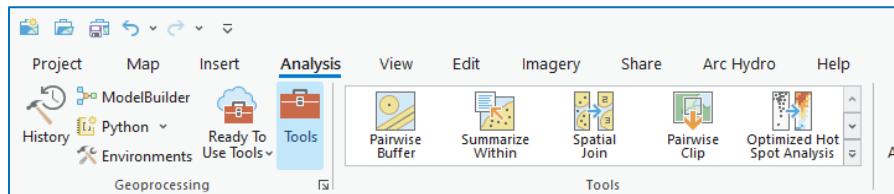
5. The field will be updated with the new values. Click **OK** to close the Calculate Field window.



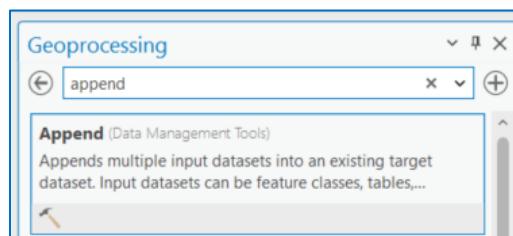
OBJECTID *	Shape *	NAME	TYPE	DIR	RANK	CLASS	SpeedLimit	Shape_Length	DistanceKM	DrivingTime
1	1	Polyline	49	HWY	3	12	80	614.327128	0.614327	0.460745
2	2	Polyline	49	HWY	3	21	50	576.639356	0.576639	0.691967
3	3	Polyline	49	HWY	3	21	80	17600.873855	17.600874	13.200655
4	4	Polyline	62	HWY	3	12	50	2697.816291	2.697816	3.23738
5	5	Polyline	62	HWY	3	12	80	22218.129957	22.21813	16.663597
6	6	Polyline	Abbott	LANE	5	23	0	87.15071	0.087151	<Null>
7	7	Polyline	Ackerman	ST	5	23	50	413.075675	0.413076	0.495691
8	8	Polyline	Adams	LANE	5	23	0	1017.616828	1.017617	<Null>
9	9	Polyline	Adams	LANE	5	23	80	216.00901	0.216009	0.162007
10	10	Polyline	Adolphus	LANE	5	23	80	161.066937	0.161067	0.1208
11	11	Polyline	Agnes	ST	5	23	50	89.579174	0.089579	0.107495
12	12	Polyline	Airport	LANE	5	23	80	1452.247955	1.452248	1.089186

5.3.4 Append tool

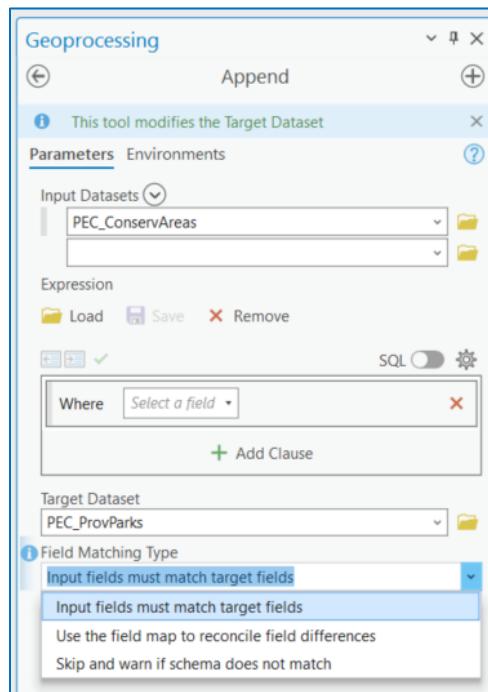
1. In the top ribbon of ArcGIS Pro, click **Tools**.



2. In the search bar of the Geoprocessing pane, search “Append” and select the Data Management Tool called **Append**.



3. For this project, the Conservation Areas in Prince Edward County need to be combined with the Provincial Park data, so they are in one feature class. So, the **Input Dataset** in this case is the Conservation Areas layer, and the **Target Dataset** is the Provincial Park layer. There are three types of **Field Matching Types** we can choose from, but for this project, the **input fields must match the target fields**. Click Run.



4. Open the attribute table of the target feature and the data is now appended.

OBJECTID	Shape	OGF_ID	Site Identification	Name	Type	Status
1	Polygon	107130857	P4484	Sandsbanks Provincial P...	Provincial Park	Regulated
2	Polygon	144444752	P4471	North Beach Provincial...	Provincial Park	Regulated
3	Polygon	963763	P4458	Lake on the Mountain...	Provincial Park	Regulated
4	Polygon	293693761	C4400	Monarch Point Conserv...	Conservation Reserve	Regulated

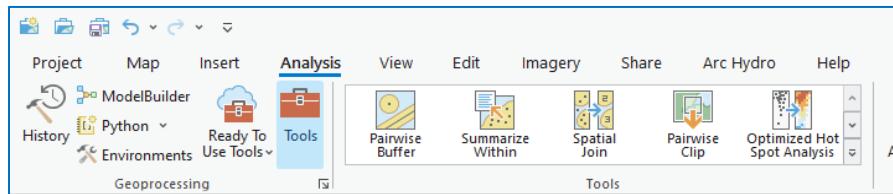
5.4 Simplify the data

When working with large datasets, the number of features can be overwhelming. There are tools that can be used within ArcGIS Pro that can help simplify their attribute tables and simplify their appearance.

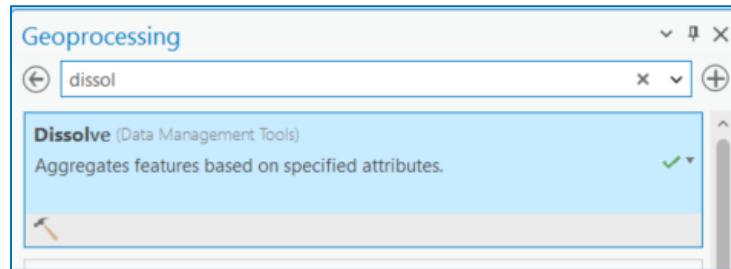
5.4.1 Dissolve tool

The **Dissolve tool** is particularly useful when it comes to larger datasets with similar data. For this project, the road network was dissolved. There were multiple features that had the same road name and were of the same speed limit. The suitability analysis layers were also dissolved by gridcode to simplify the attribute table and summarize area.

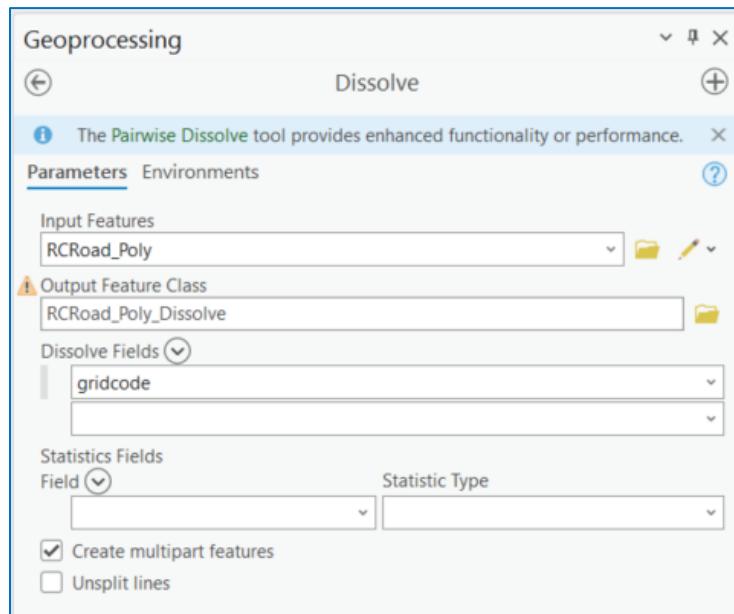
1. In the top ribbon of ArcGIS Pro, click **Tools**.



2. In the search bar of the Geoprocessing pane, search “**dissolve**” and select the Data Management Tool called **Dissolve**.



3. For **Input Features**, drag and drop the reclassified layer, select it from the dropdown menu, or select it from the yellow folder. Name the **Output Feature Class** something meaningful. Select **gridcode** as the **Dissolve Field**. Accept other defaults. Then click **Run**.



4. There were originally **1025 features**, and now there are only **two features**.

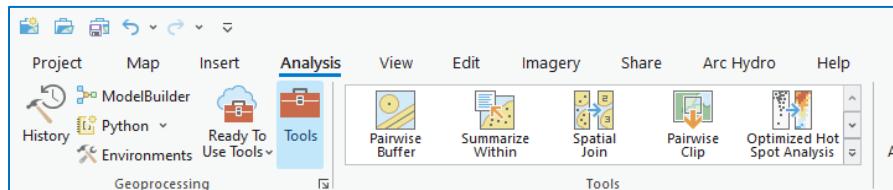
OBJECTID*	Shape*	Id	gridcode	Shape_Length	Shape_Area
1	Polygon	1	999	162.994172	1255.689
2	Polygon	2	1	377.393446	5227.134
3	Polygon	3	999	618.758261	18383.976296
4	Polygon	4	999	1009.837599	40805.516003
5	Polygon	5	999	8046.049858	517092.42905
6	Polygon	6	999	3244.422268	452113.199679
7	Polygon	7	999	3069.956295	584759.2126
8	Polygon	8	999	170.210368	1214.821714
9	Polygon	9	999	113.186926	616.206059
10	Polygon	10	999	113.186926	616.206059
11	Polygon	11	1	120	900
12	Polygon	12	1	120	900

OBJECTID*	Shape*	Suitability Code	Suitability Level	Shape Length	Shape Area	Area (KM2)	
1	Polygon		1	Highly Suitable	3066014.204283	77735125.707472	40.199335
2	Polygon		999	Unsuitable	3641650.013286	1977975443.508525	1022.80179

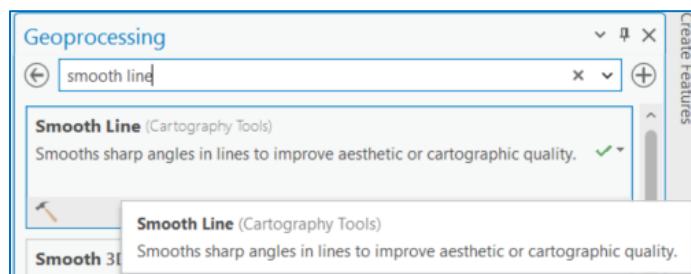
5.4.2 Smooth Line tool

The **Smooth Line tool** is particularly useful when it comes to linear datasets with jagged edges. For this project, the final least cost path was smoothed out. Since it was originally a raster and the layer will be examined on a large-scale map, it needed to be smoothed out to improve its appearance.

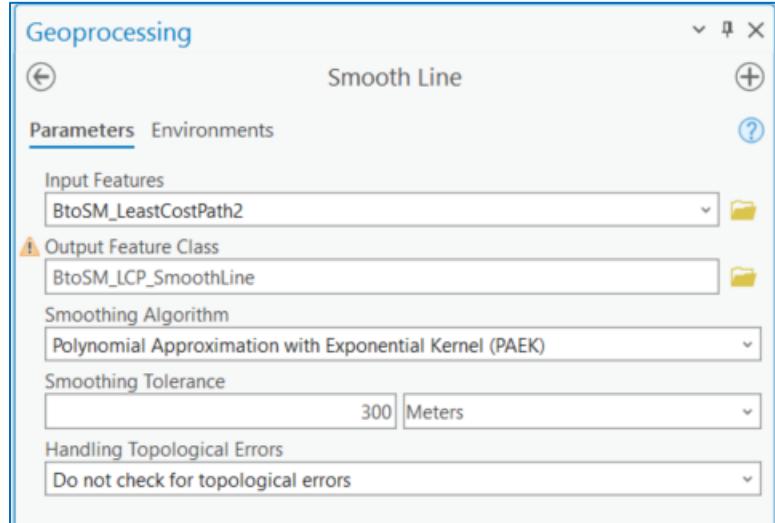
1. In the top ribbon of ArcGIS Pro, click **Tools**.



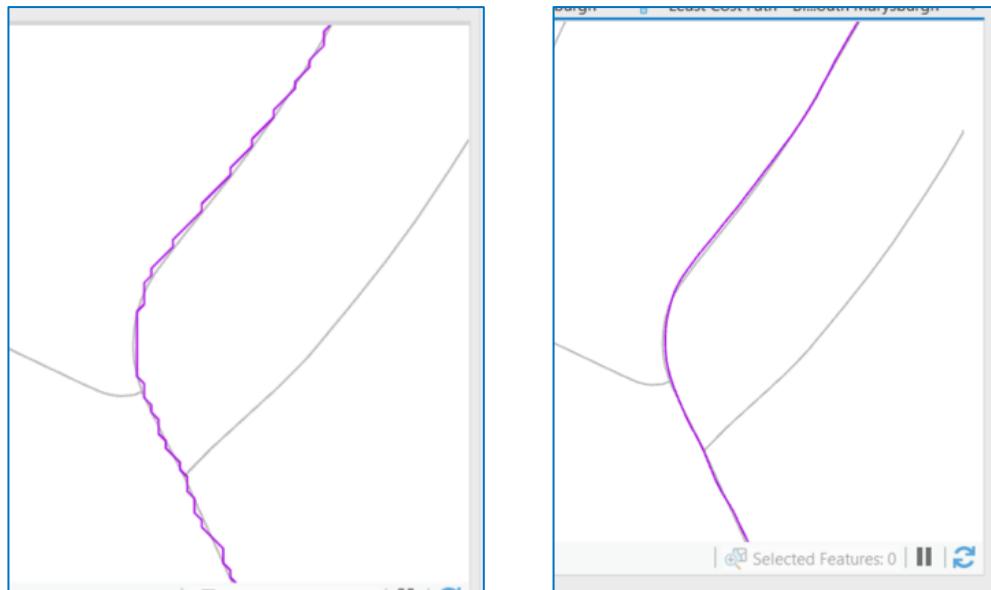
2. In the search bar of the Geoprocessing pane, search “smooth line” and select the Cartography Tool called **Smooth Line**.



3. For **Input Features**, drag and drop the **linear layer** that needs to be smoothed, select it from the dropdown menu, or select it in the folder. Give the **Output Feature Class** a meaningful name. Choose the **Polynomial Approximation with Exponential Kernel (PAEK)** as the **Smoothing Algorithm**. Set the **Smoothing Tolerance** to **300 Meters**. Select the option to **not check for topological errors**. Click **Run**.



4. Review the results of the line before (left) and after (right) the tool has been run. Rerun the tool with a different tolerance if necessary.

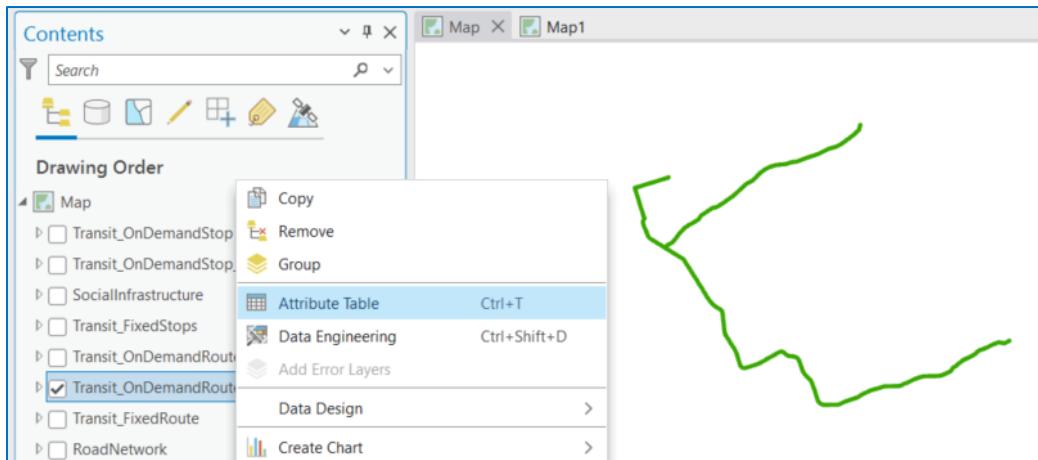


5.5 Summarize the data

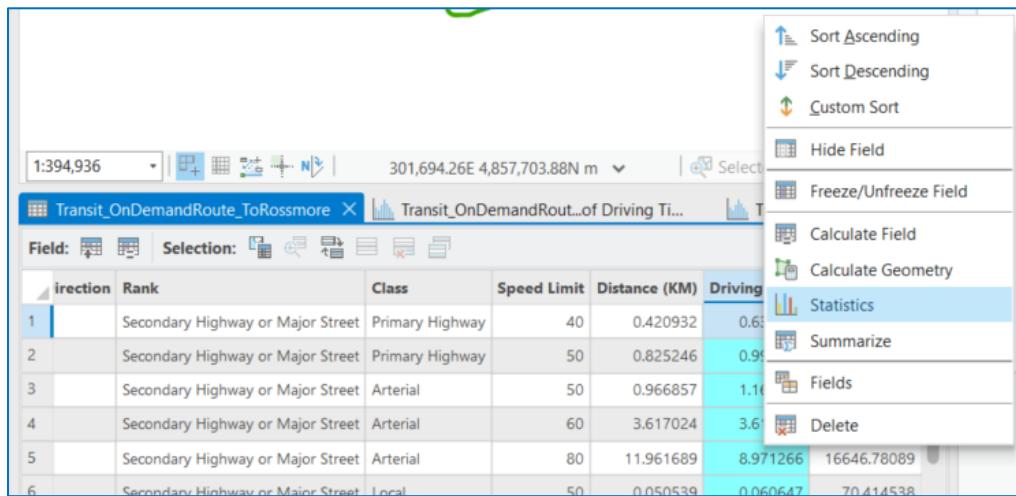
There are different ways one could summarize the data. This subsection details how to summarize statistics of a feature class.

5.5.1 Calculate statistics

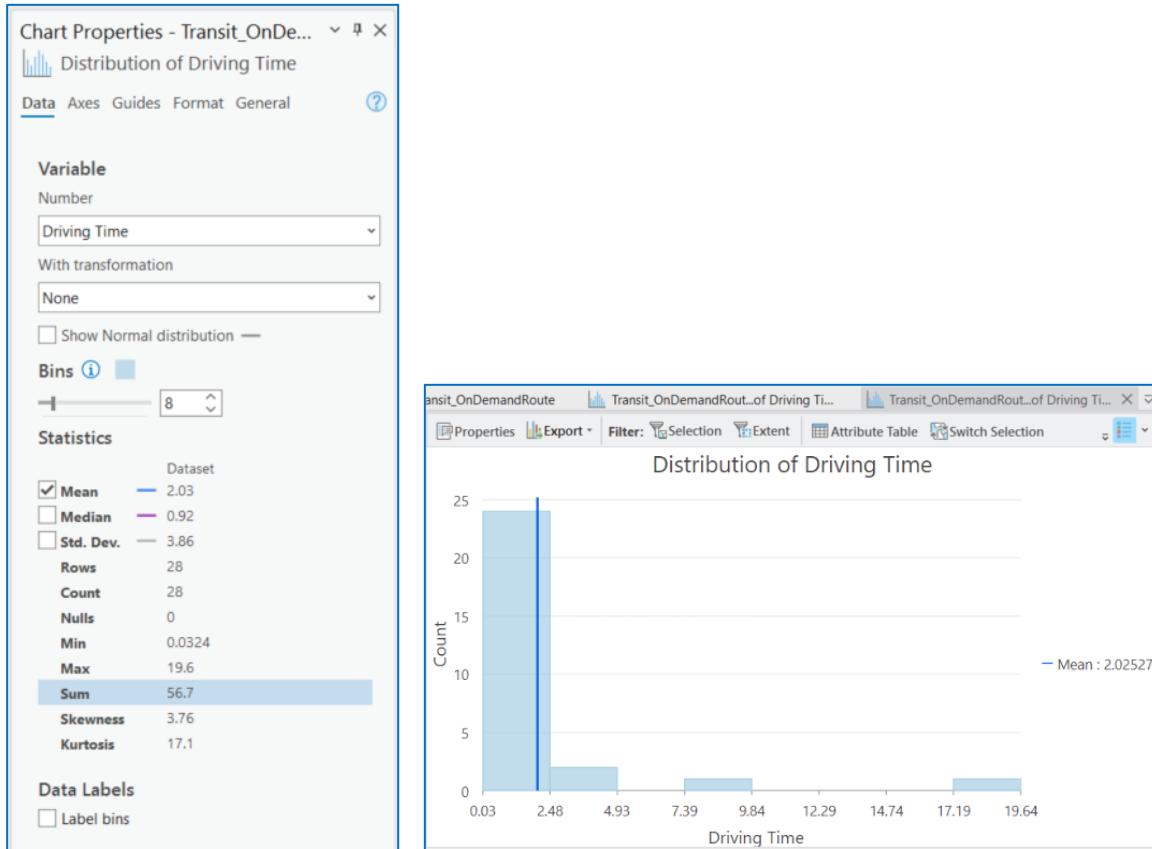
1. Right click on the layer in the **Contents pane** and click **Attribute Table** to open the layer's attribute table.



2. Right click on the field on which the statistics will be summarized and then click **Statistics**. For this project, the driving time of each transit route is of interest.



3. The **Chart Properties** pane will open, where the variables, bins, statistics, and data labels are shown. A **bar graph** will also appear showing the distribution of the data within the selected field. Since we are interested in total driving time, we will take a look at and record the **Sum** from the chart properties' statistics.



6 Create a feature class

This section outlines how to create a point and line feature class in ArcGIS Pro and ArcGIS Online. A technical term for this process is digitizing – where data from a static image or document is converted into a digital format.

6.1 Source the original data

This section involves steps on how the transit data was digitized from static maps. The first step is to source the original data to be digitized. Quinte Transit provided the on-demand and fixed transit routes found [here](#). The Corporation of the County of Prince Edward provided the on-demand and fixed transit routes found [here](#), as well as the summer route through Picton found [here](#). Google Maps can also be helpful throughout this process to confirm street names and bus stops.

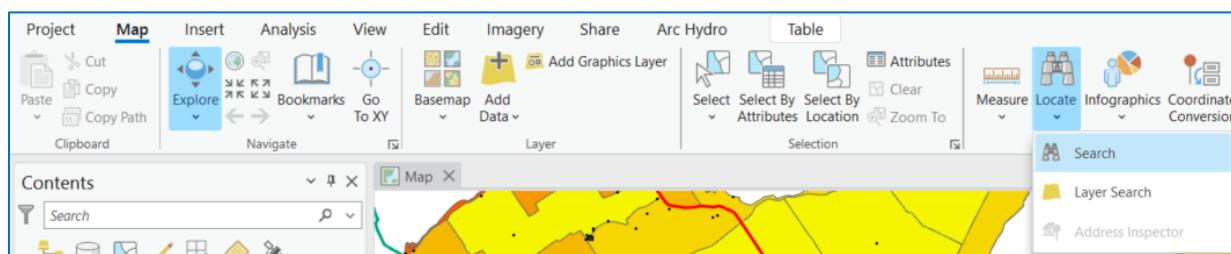
6.2 Create a new line feature class

Linear features were created for the project to represent the fixed, on-demand, and summer transit routes. They were created from an existing road network. The linear features that were digitized were missing from the road network, such as driveways.

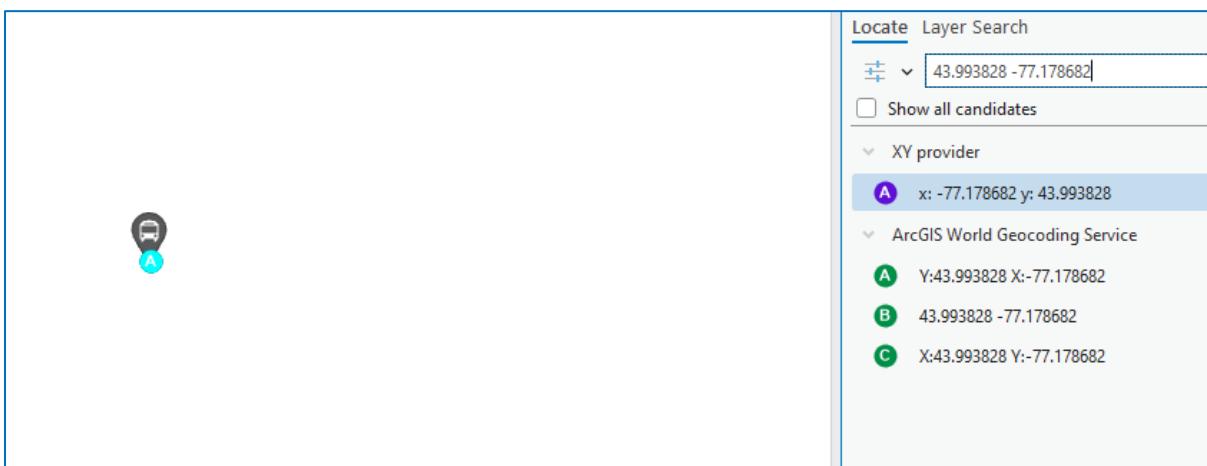
1. Ensure the Road Network layer is toggled on in the Contents pane, so it is visible on the map. Use the **Select tool** to select existing roads that make up the transit routes. Hold the **SHIFT key** to select multiple linear features.
2. Keeping the features selected, right click on the road network layer and select **Export Features** and follow the steps from an earlier chapter.

6.3 Create a new point feature class

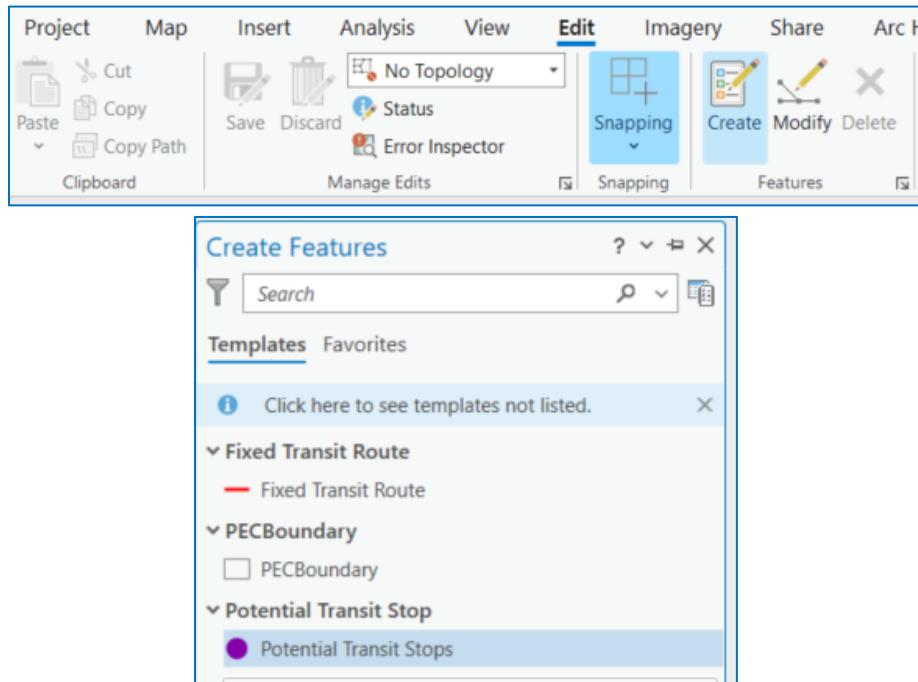
1. In the top ribbon of ArcGIS Pro, select the **Locate** tool.



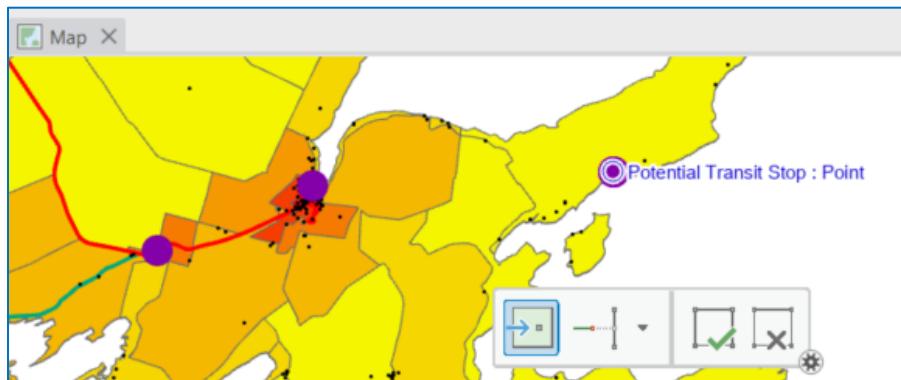
2. Using the locate tool, either insert the **latitudes** and **longitudes** of the points you would like to create or **search a location**.



3. In the top ribbon, click **Create** and select the **feature class** you would like to edit. For this project, all bus stops were digitized using this method.



4. Place the point on the map and then click the **box with the green checkmark**. The feature will appear in the attribute table. Click **Save** when complete.

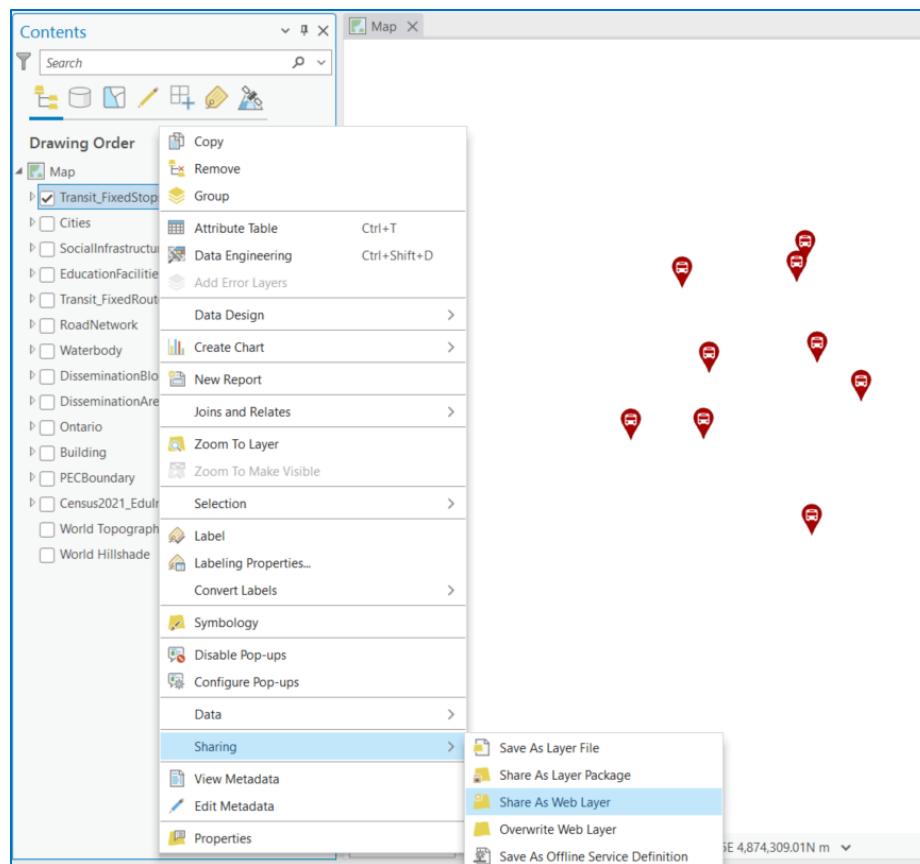


7 Share layer from ArcGIS Pro to ArcGIS Online

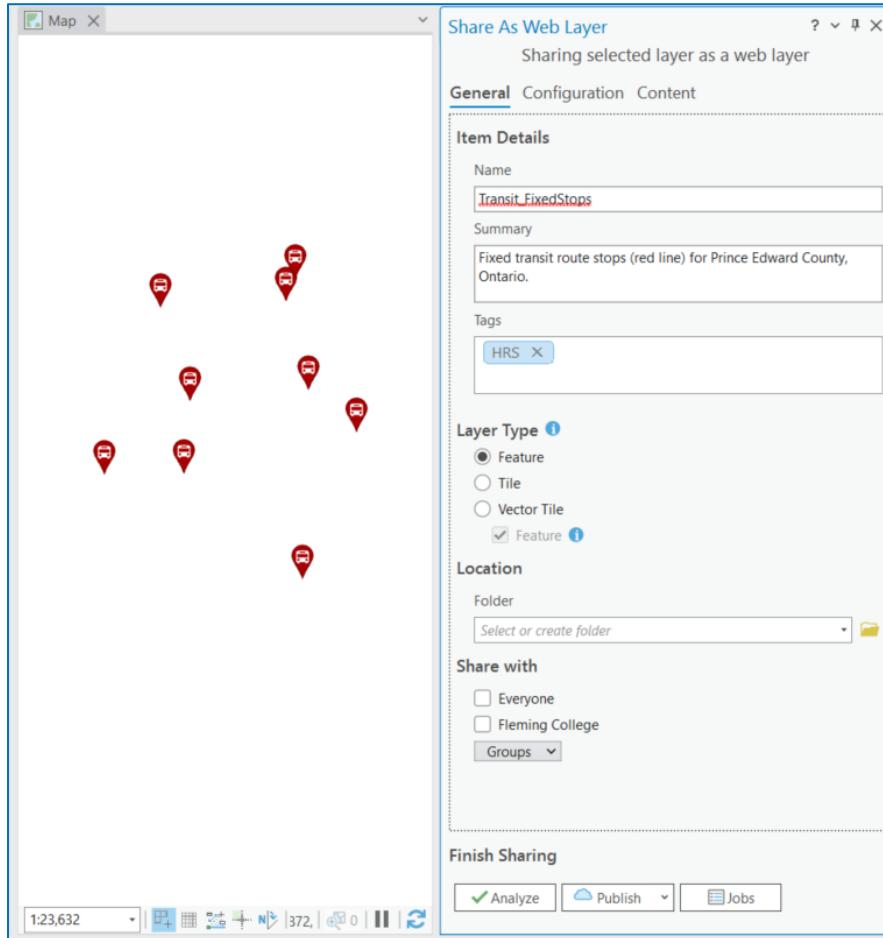
Sharing the layer from ArcGIS Pro to ArcGIS Online allows them to be used in web maps and applications. Layers can either be shared individually or as a group as a web layer to be used in ArcGIS Online, or as a group as a layer package to be downloaded by others and opened in ArcGIS Pro. When sharing multiple layers as one web layer, please note that they cannot be separated in ArcGIS Online.

7.1 Share as web layer

1. If sharing one layer, right click on the layer in the **Contents pane**, hover over **Sharing**, and click **Share As Web Layer**. If sharing multiple layers, hold **CTRL** on the keyboard and select the layers to be shared.

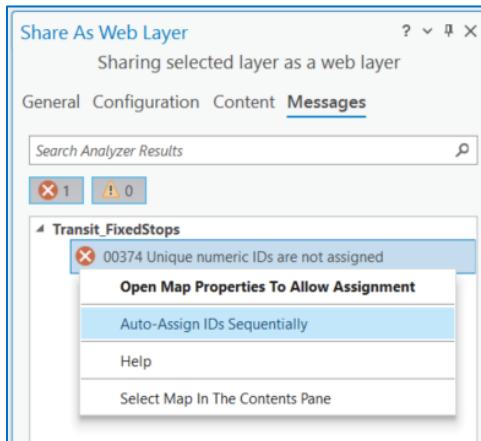


2. In the **Share As Web Layer** window under the **General tab**, add the **item details**, such as a Name and choose the **Layer Type**, if not already chosen. Optionally, add a summary and tags to describe the layer. If there is a folder or group in ArcGIS Online that you wish to share to, specify that here as well.



3. Under the **Configuration tab**, you will see the layers being shared. In the **Content tab**, you will see the hierarchy of the layers being shared.

4. Click **Analyze**. This will check for any errors that must be fixed or warnings that may need to be fixed. A common error that arises when sharing individual layers is **Error 00374**, which states that unique numeric IDs are not assigned. This error needs to be fixed so that it can be worked with on ArcGIS Online and used in web applications. To learn more about this error, visit Esri's [00374: Unique numeric IDs are not assigned](#) help page.



5. Once the errors are fixed, click **Analyze** again. Click **Publish** when all is clear and wait to receive the message saying it has been shared.

6. Once the layer(s) is shared, the hosted feature layer and its service definition will be available in the Contents section of your account, as well as any other groups or folders it has been shared.

NOTE: If sharing multiple layers as one web layer, there will still only be one hosted feature layer and one service definition shared.

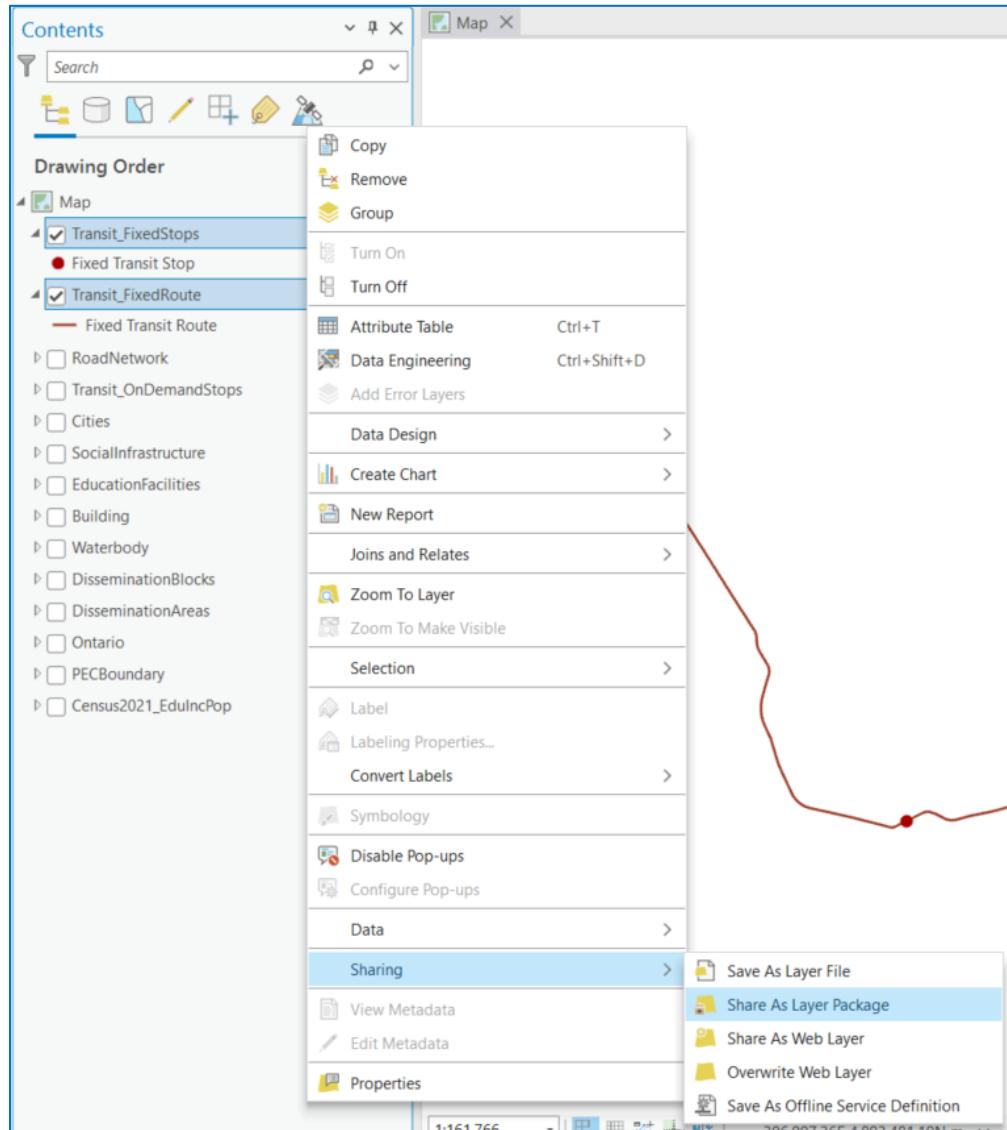
<input type="checkbox"/> Transit_FixedStops	Feature Layer (hosted)	Jun 3, 2024	+	Preview	...
<input type="checkbox"/> Transit_FixedStops	Service Definition	Jun 3, 2024		Preview	...

7. Click **Preview** to view a preview of the layer's details and click **View details**. This will open the item's page, where you can update the metadata and use it in other applications. The **Layers section** includes the layers that were shared. If sharing one layer, only one will appear. If multiple layers are shared, they will all appear, as shown below.

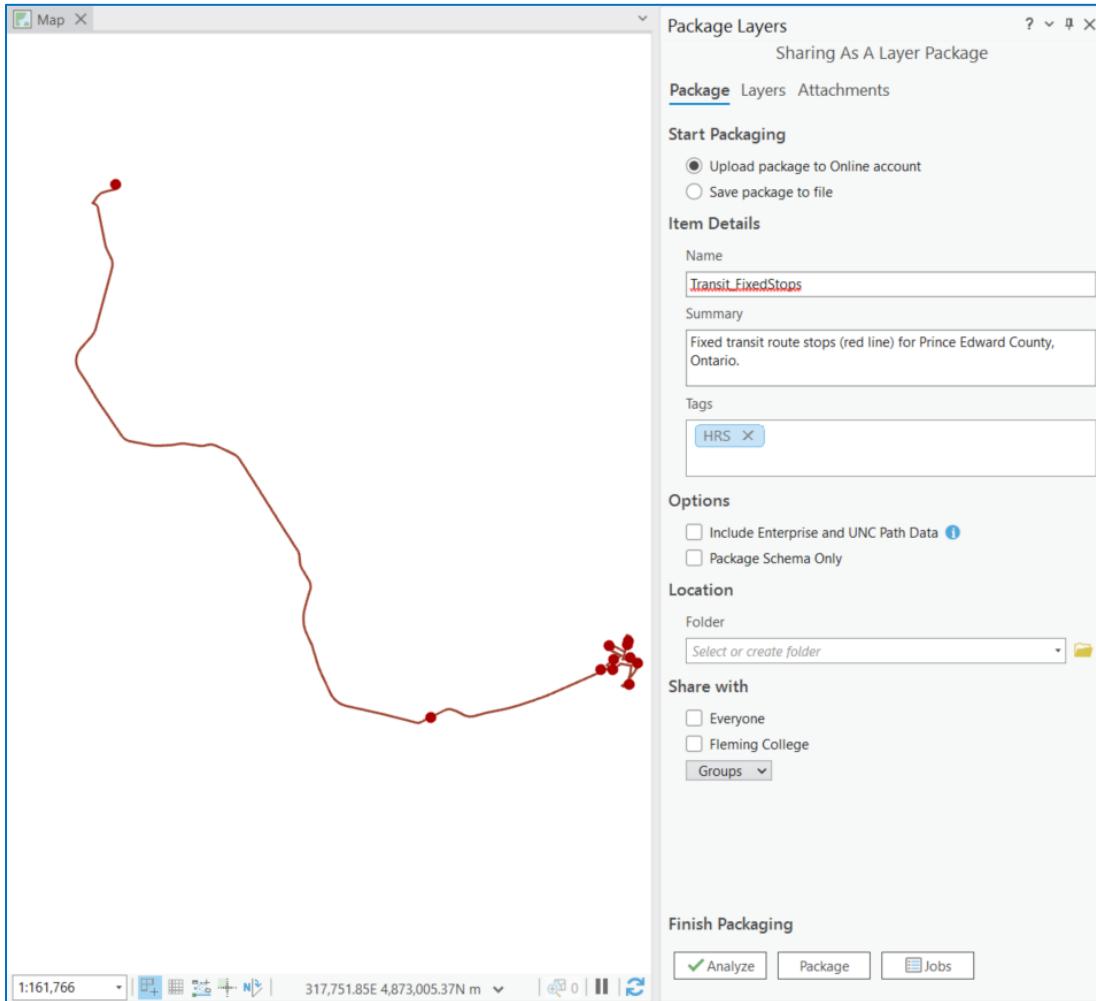
The screenshot shows the ArcGIS item details page for an item named "redtransitroute". The top navigation bar includes tabs for Overview, Data, Visualization, Usage, and Settings. The Data tab is selected. On the left, there is a thumbnail image of a red transit route, a summary section with a brief description, and a "Layers" section listing two layers: "Transit_FixedStops" (Point layer) and "Transit_FixedRoute" (Line layer). Below these are sections for "Description" and "Terms of Use". On the right, there is a sidebar with options like "Open in Map Viewer", "Edit", "Share", and "Metadata". A progress bar at the bottom indicates "Item Information" is 100% complete. A note says "Top Improvement: Add a summary".

7.2 Share as layer package

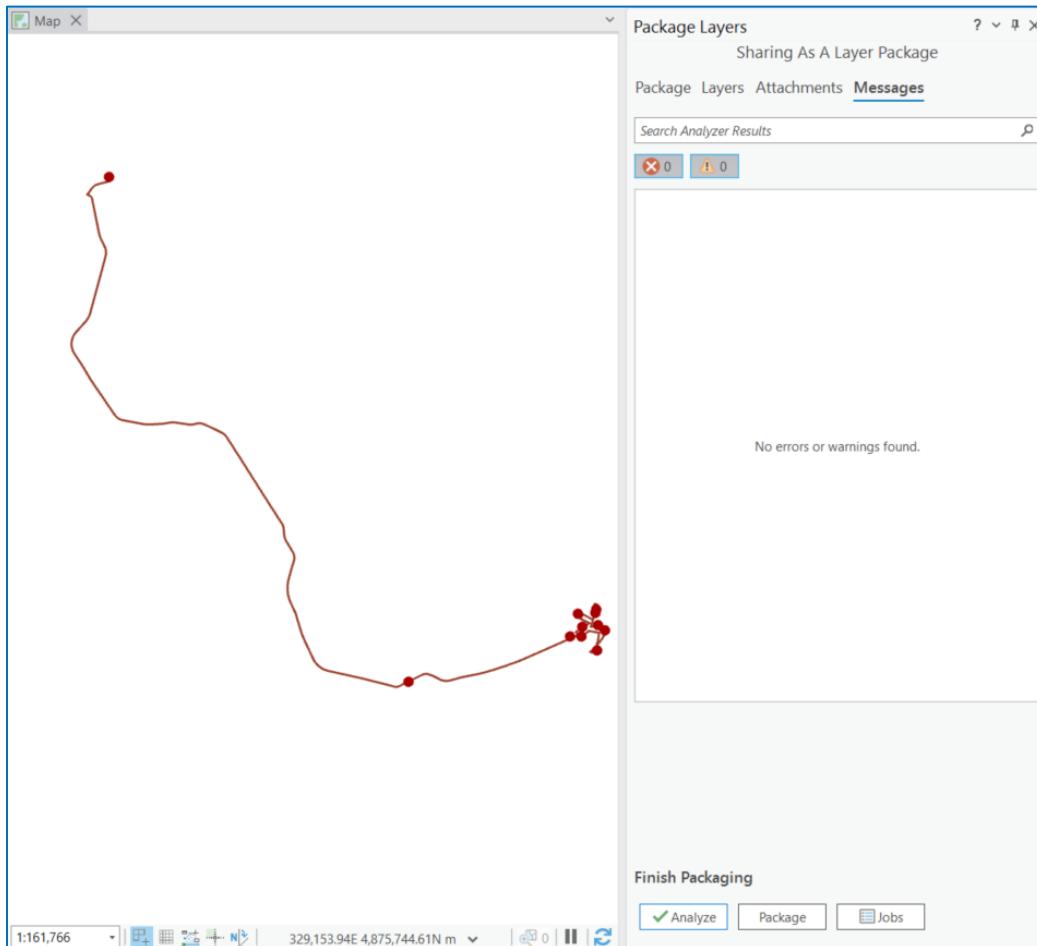
1. Highlight multiple layers in the **Contents pane** by holding **CTRL** and clicking the layers. Then right click them, hover over **Sharing**, and click **Share As Layer Package**.



2. In the **Sharing As A Layer Package** window under the **Package tab**, add the **item details**, such as a Name and choose how you would like to share the package, if not already chosen as **Upload package to Online account**. Optionally, add a summary and tags to describe the layer. If there is a folder or group in ArcGIS Online that you wish to share to, specify that here as well.



3. Click **Analyze**. This will check for any errors that must be fixed or warnings that may need to be fixed. Fix all errors and read the warnings (possibly fix them, too).

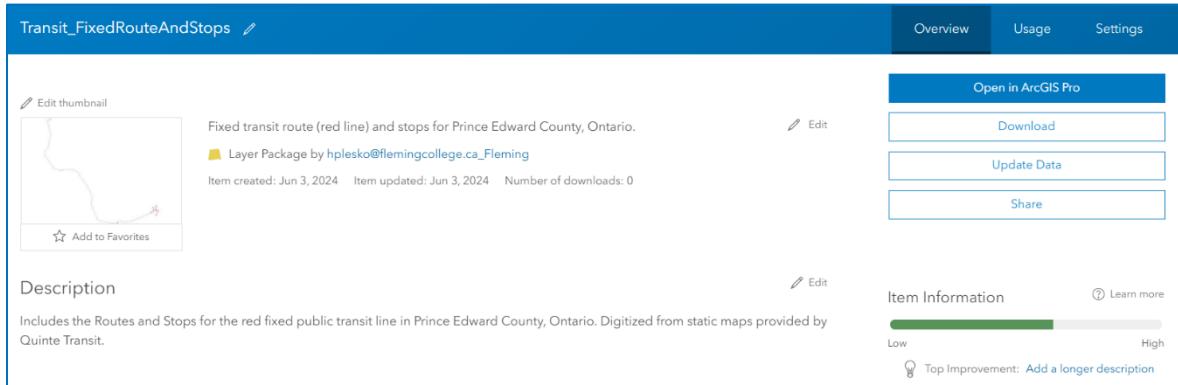


5. Click **Analyze** again. Once the errors are fixed, click **Package** and wait to receive the message saying it has been shared.

6. Once shared, the layer package will be available in the **Contents section** of your account, as well as any other groups or folders it has been shared.



7. Click **Preview** to view the layer package's preview and click View details. This will open the item's page, where you can update the metadata, open the package in ArcGIS Pro, share it, or download it.



8 Conclusion

Evidently, there are many ways to process and create data within ArcGIS Pro and ArcGIS Online's interface. The opportunities go beyond the tools explained throughout this instructional package. It is encouraged to further explore both platforms and their available tools to find one that best suits the purpose of the data.