

ArcGIS Pro: Loading and Manipulating Data

Presented By: Cole White, GIS Analyst Map and Data Library





Download the workshop data:

https://uoft.me/ProDataDownload

Get these slides:

https://uoft.me/ProDataSlides

Please choose a lab computer with this sticker:

Agenda



Filtering Data

Geoprocessing

Working With Raster Data

Getting Help

But first, some troubleshooting

| University of Toronto | | |
|---|----------|--|
| All School Apps Documents | Web More | ArcGIS [®] Pro |
| Best match | | New Project |
| ArcGIS Pro App | | Image: Resources Map Image: Resources Image: Resou |
| Search school and web | | Recent Projects |
| A arcgis pro - See school and web results | > | LoadingAndManipulatingDataDeleteMe C:\temp\ArcGiS Pro\LoadingAndManipulatingDataDeleteMe.aprx |
| 𝒫 arcgis pro download | > _ | JSONtoFeatureClass U\\STAFF\ColeWhite\working\JSONtoFeatureClass\JSONtoFeatureClass.aprx |
| 𝒫 arcgis pro login | > | ArcGIS Pro Introduction C:\Users\whiteco7\Downloads\IntroToPro\ArcGIS Pro Introduction.aprx |
| | > - | Ighap_processing U\\STAFF\ColeWhite\working\\ghap_processing.lghap_processing.aprx |
| Websites | | |





Introduction The Map and Data Library

- Access data collections
- Workshops and training
- One-on-one consults
- Appointment-only until summer 2025 (?)

https://mdl.library.utoronto.ca/ mdl@library.utoronto.ca <u>416-978-5589</u> 11am - 5pm, Monday - Friday

Map and Data Library Tutorials and Workshops

https://mdl.library.utoronto.ca/support/tutorials https://mdl.library.utoronto.ca/support/workshops-and-training

| COLLECTIONS - | TECHNOLOGY - | SUPPORT - | ABOUT - | MY ACCOUNT | UTL | Q SEARCH MDL |
|---|--------------|---|--|---|---------------------|--------------------------|
| Search Tutorials | | MDL Tutorials | | | | |
| Search by title or key word | | Displaying 1 - 14 of 14 Tute | orial Results | | | |
| Spatial Analysis | • | An Introduction | to Mapping and Sp | atial Analysis with C | QGIS | |
| All Tools | | Learn the basics of GIS modules. • Module 1. Getting | with open source softwar started | e, QGIS (https://qgis.org). T | his tutorial/worksh | op is made up of three |
| All Data Formats | • | Module 2. Making | a map using layouts | | | |
| Sort by | | Module 3. Manipu | lating geospatial dataset | 5 | | |
| Date Created Newest Search Tutorials Reset | • | Download the datasets location: https://maps.li Note that while the exa operations can be comp | used for this workshop a brary.utoronto.ca/worksh mples shown in this tutor pleted using the linux or n | t this hops/QGIS/2022/QGIS.zip ial were captured using the nac OS version of QGIS. | windows version o | of QGIS, all modules and |
| | | Technique: Mapping, Spa Date Created: 2022-11-01 | tial Analysis Tools: QGIS | | | |
| | | ArcGIS Pro: Infor | mation, Tutorials, a | and Workshops | | |
| | | ArrGIS Pro is a deskton | GIS software developed b | w Esri and is intended to re | eolace ArcMan | |



Finding Data Map and Data Library collection: https://mdl.library.utoronto.ca/

TECHNOLOGY . lidar Geospatial data

Geospatial data

Toronto Lidar 2015

Toronto Lidar Data - 2008

York Lidar Data 2019



Scholars Geoportal

https://geo2.scholarsportal.info/

Scholars GeoPortal Data Place or address parks Anywhere ~ 🔾 Downloadable content only Back To Browse Park Sports Field Region Found 96 results showing results 1 to 10 Add - 1/7 Details Sort by: Producer: DMTI Spatial Inc. Relevance Date published: 2015-04-01 (publication), 2021-09-15 (revision) Type of data layer: Vector Refine: Topics Park Sports Field Point Add - 0/7 Details Environment and conservation (16) Producer: DMTI Spatial Inc. Census and Date published: 2015-04-01 (publication), 2021-09-15 administrative (revision) Type of data layer: Vector boundaries (12) Imagery, base maps, and land cover (10) Federal Protected Area

Add Details

Land use and planning

Cultural, society, and

Inland water resources

Transportation networks

Biologic and ecologic (3)

Locations and geodetic networks (2)

Agriculture and farming

Facilities and structures

demographic (5)

185

(4)

(4)

(1)

(1)

Utility and

communication

networks (3)

Keywords

Producer: Ontario Ministry of Natural Resources Date published: 2008-07-09 (creation), 2008-07-09 (revision) Type of data layer: Vector

Municipal Park

Producer: Ontario Ministry of Natural Resources Date published: 2000-01-01 (creation), 2000-01-01

(revision) Type of data layer: Vector

Canadian Heritage River System

Add Details

Producer: Ontario Ministry of Natural Resources Date published: 1986-01-02 (creation), 2004-01-05 (revision)



Planet.com

Access instructions:

https://mdl.library.utoronto.ca/collections/data-portal/planetcom





Open data



City of Toronto Open Data

The City of Toronto's Open Data Portal is an open source delivery tool to bring people and data together. Whether you're an app developer, an engaged citizen, or a student trying to learn more about how the city works, the Open Data Portal contains a wealth of datasets for you to explore. We update regularly with new datasets, and welcome your requests.

Recently Added Datasets

| Topographic Mapping – Building Ou | tlin |
|-----------------------------------|------|
| City of Toronto Free Public WiFi | |
| HousingTO Action Plan | |
| Toronto Signature Sites | |
| | |

Public Engagement Review Survey

| and the | | |
|---------------------------------------|--|--|
| INARS | | ****** |
| | - | and the second second |
| and a state | 11818 8234 Alexan 481.00 | |
| U.B.W | 0.000/0022.000 0.12/0022/0022.00 0.02/0020.01 | |
| fal | | |
| tai | | 140.00.00 |
| CON PURC | ALC: NO. OF STREET | The second |
| NW NO. | Construction of the | and the second second |
| än | Construction of the owner | and subscript |
| | - 27 | |
| | Contract of Contract of Contract | ALL PROPERTY AND A DESCRIPTION OF A DESC |
| AND DESCRIPTION OF | The second | Ter sati Birterige Bedt. |
| A A A A A | The state of the s | Contract of the second |
| 1943 <u>1</u> | and the second se | to came anno con alla |
| 11 10 10 100 | | |
| | - 91 L | |
| ardina | | CONSISTENCE OF THE OWNER |
| | | |
| 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | 1.14 |
| | and a second | 1997 (P) |

| es | 52 days ago |
|----|--------------|
| | 2 months ago |
| | 2 months ago |
| | 3 months ago |
| | 4 months ago |
| | |

ArcGIS Online and Living Atlas



What's new

Explore items recently added to ArcGIS Living Atlas of the World, learn about GIS events, and discover ways to use content.





t six depth ranges at a spatial resolution of 250 r rate these multidimensional soil







World Imagery Wayback Export The World Imagery Wayback app in ArcGIS Living Atlas is now delivering packages, tile packages, that is. The new Wayback Export capability is designed to support exporting small volumes of imagery base map tiles for offline use in ArcGIS applications and other applications built with an ArcGIS Maps SDK for

Updates coming to ACS layers The U.S. Census Bureau's American Community Survey (ACS) layers in ArcGIS Living Atlas include over 100 layers covering a wide range of topics on population, income, education, health insurance, language, race and ethnicity, and more. Learn about

he next Census ACS five-year estimates release,

Environment layers retiring in December 2023 Every December, layers from Esri's content catalog

layers have been in mature support, marked as

n which layers are retiring in 2023 and

are retired and will no longer be available. Retired deprecated, and not actively maintained for at least

Creating a New Project

 Launch Pro from the Windows Start Menu





| ity of | Toronto | D | | |
|---------------|-----------|--------------------|-----|------|
| hool: | Apps | Documents | Web | More |
| | | | | |
| GIS Pr | o | | | |
| ol and | web | | | |
| pro - | See schoo | ol and web results | > | |
| pro d | ownload | 1 | > | |
| pro Ic | ogin | | > | |
| progr | am | | > | - |
| | | | | |

𝒫 arcgis pro

 From the intro screen, create a new project using the Map template.

| 🕑 ArcGIS | Pro | | |
|-------------------------------|---------------------|---------|--------------|
| | New Project | | |
| Home Learning Resources | Map | Catalog | Global Scene |
| | Recent Projects Fin | d | 6 |
| | | | |



- Give your new project a name.
- Choose a location on your filesystem to save the project.
- Check the box to create a new folder for the project.
- Click **OK**.



| t | × |
|---------------------------------|----|
| nd Manipulating Data | |
| mp\ArcGIS Pro | |
| a folder for this local project | |
| OK Canc | el |

- A new project containing a map view will open.
- The map will be empty except for a default
 basemap.
- Make sure you're signed in with your U of T credentials.



Working with Vector Data: Add a data layer from a shapefile

Shapefile (.shp) - a very common GIS vector file format.

- Other GIS-compatible vector formats:
 - .dwg, .dxf CAD drawings (survey plans often use this format)
 - .kml, .kmz Google Earth file
 - .geojson GeoJSON (often used in web mapping)



Add a data layer from a shapefile



From the Map tab, click the Add Data button.

Add a data layer from a shapefile

- Navigate to the location where you've saved the sample data.
- Select Neighbourhoods -4326.shp and click OK.





Add a data layer from a shapefile



• The layer will be added to your map view. • **Note**: This dataset was acquired from the City's open data portal website: https://open.toronto.ca/dataset/neighbourhoods/



| - University | of Toronto 💿 🏚 | | a × |
|---------------------|--|-------------------------------|------------------------------|
| oordinate onversion | Rause Rai Lock | nvert Downlo. - IS Offline | ad D |
| | Catalog Project Portal Compu Catalog Project Portal Compu Catalog Cata | uter Favorites | ~ [#] × ≡ ρ √ |

 Right-click the Neighbourhoods layer and select **Properties** from the contextual menu. (Or, double-click the layer name.)



| 5 - 2 | ~ | | | |
|------------------------|-------|----------|-------------------------------|---------------|
| Мар | Inse | ŧ | <u>R</u> emove | . 1 |
| | - | \$ | <u>G</u> roup | ١ |
| у | Explo | | <u>Attribute Table</u> Ctrl+T | , e |
| y Path | ~ | | Data Engineering Ctrl+Shift+D | A |
| u , , , | | ۲ | Add Error <u>L</u> ayers | رہ |
| | | | Da <u>t</u> a Design | > |
| 8 | E | h | Create C <u>h</u> art | > |
| rdor | | 1 | <u>N</u> ew Report | 1 |
| ruer | | | Joins and Relates | > |
| ourhoods | - 432 | | <u>Z</u> oom To Layer | |
| | | R | Zoom To Make <u>V</u> isible | |
| Topograph Hillshade | ic Ma | | Selection | <u> </u> |
| | | ø | La <u>b</u> el | |
| | | æ | Labeling Pr <u>o</u> perties | |
| | | | <u>C</u> onvert Labels | <u>> {</u> |
| | | | Symbology | |
| | | F | D <u>i</u> sable Pop-ups | |
| | | R | Configure Pop-ups | _]] |
| | | | <u>D</u> ata | > |
| | | | <u>S</u> haring | > |
| | | | View <u>M</u> etadata | |
| | | 1 | Edit Metadata | |
| | | R | <u>P</u> roperties | |
| | | | | |

- Click on the **Source** tab.
- Take a look at the information in the Spatial Reference section.
- Note that this layer uses the WGS 1984 geographic coordinate system.
- Click OK.

| Properties: Neight | ourhoods - 4326 |
|--------------------|---------------------|
| ral data | ✓ Data Source |
| ce | Data Type |
| tion | Shapefile |
| ion | Geometry Type |
| iy 🛛 | Coordinates have 2 |
| 3 | Coordinates have |
| tion Query | > Extent |
| 2 | ✓ Spatial Reference |
| es | Geographic Coord |
| | WKID |
| 25 | Authority |
| Query | Angular Unit |
| | Prime Meridian |
| | Datum |
| | Spheroid |
| | Semimajor Axis |
| | Semiminor Axis |
| | Inverse Flattening |
| | |

Laye

Gene

Met

Sour

Eleva

Selec

Displ

Cach

Defin

Time

Rang

Index

Joins

Relat

Page

| | | | | | × |
|----------|------|---|----------------|-------|----|
| | | Ĩ | Set Data Sou | urce | î |
| | Shap | pefile Feature Class | | P | |
| | U:\S | TAFF\ColeWhite\workshops\ProLoadingAndMan | ipulatingData\ | v | |
| | Poly | gon | | | |
| value | No | | | | |
| 1 value | No | | | | |
| | | | | | |
| | | | | | 11 |
| nate Sys | stem | WGS 1984 | | B | |
| | | 4326 | | | |
| | | EPSG | | | |
| | | Degree (0.0174532925199433) | | | |
| | | Greenwich (0.0) | | | |
| | | D WGS 1984 | | | |
| | | WGS 1984 | | | |
| | | 6378137.0 | | | |
| | | 6356752.314245179 | | | 4 |
| | | 298.257223563 | | | |
| | | ОК | Cancel | Apply | |

From the Insert tab on the Pro Ribbon, click New Map.





• A new, blank map will be added to your project.



- Click the Add Data button.
- Navigate to and open
 NeighbourhoodsUTM
 Zone17.shp



| IM Zone 17N Type Geometry HeighbourhoodsUTMZone17.shp Shapefile Polygon JTMZone17.shp Default OK Cancel | | | | × |
|---|-----------------------------|------------------------------|-------------------|----------|
| me Type Geometry NeighbourhoodsUTMZone17.shp Shapefile Polygon | 「M Zone 17N ・ ご | $\downarrow = $ Search Neigh | bourhoods - UTM . | <u> </u> |
| me Type Geometry NeighbourhoodsUTMZone17.shp Shapefile Polygon | | | | E |
| NeighbourhoodsUTMZone17.shp Shapefile Polygon | me | Туре | Geometry | |
| JTMZone17.shp Default • OK Cancel | NeighbourhoodsUTMZone17.shp | Shapefile | Polygon | |
| JTMZone17.shp Default • OK Cancel | | | | |
| JTMZone17.shp Default • OK Cancel | | | | |
| JTMZone17.shp Default • OK Cancel | | | | |
| JTMZone17.shp Default • OK Cancel | | | | |
| JTMZone17.shp Default • OK Cancel | | | | |
| JTMZone17.shp Default • OK Cancel | | | | |
| JTMZone17.shp Default • OK Cancel | | | | |
| JTMZone17.shp Default • OK Cancel | | - | | 3 |
| OK Cancel | ITM7ope17 shp | Default | | |
| OK Cancel | | Delault | | |
| | | | OK Can | cel |
| | | | | |



• A second version of the Neighbourhoods layer will be added to your new map.

Open the Properties pane for this version of the Neighbourhoods layer.

- Note the Spatial Reference details.
- Click **OK**.

| Laver Pro | perties: Neigh | bourhood | sUTMZone17 |
|-----------|----------------|----------|------------|
| | | | |

| General | ✓ Spatial R |
|------------------|-------------|
| Metadata | Projected |
| Source | Projectio |
| Elevation | wikip |
| Selection | WKID |
| Display | Previous |
| Cache | Authority |
| Definition Query | Linear U |
| Time | False Eas |
| Range | False No |
| Indexes | Central N |
| loins | Scale Fac |
| Relates | Latitude |
| Page Query | Geograp |
| | WKID |
| | Previous |
| | Authority |
| | Angular |
| | Prime M |
| | Datum |
| | Spheroid |
| | Semimaj |
| | Semimin |

| Projected Coordinate System | ٨ | IAD 1983 | |
|------------------------------|---|-------------|--|
| Projection | Т | ransverse | |
| WKID | | 958 | |
| | 4 | 150 | |
| Authority | E | PSG | |
| Linear Unit | N | Aeters (1.0 | |
| False Easting | 5 | 00000.0 | |
| False Northing | 0 | .0 | |
| Central Meridian | - | -81.0 | |
| Scale Factor | 0 | .9996 | |
| Latitude Of Origin | | .0 | |
| Geographic Coordinate Syster | m | NAD 198 | |
| WKID | | 4617 | |
| Previous WKID | | 4140 | |
| Authority | | EPSG | |
| Angular Unit | | Degree (| |
| Prime Meridian | | Greenwig | |
| Datum | | D North | |
| Spheroid | | GRS 198 | |
| Semimajor Axis | | 6378137 | |
| | | 6356752 | |
| Semiminor Axis | | 429419F | |

> Domain, Resolution, and Tolerance

| | | × |
|---------------------|-----|------|
| | | ~ |
| CSRS UTM Zone 17N | B | |
| Mercator | | - |
| | | |
| | | |
| | | |
|) | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| 3 (CSRS) | ð | |
| | | |
| | | |
| | | |
| 0.0174532925199433) | | |
| h (0.0) | | |
| American 1983 CSRS | | |
|) | | |
| 0 | | |
| 314140356 | | |
| 22101 | | |
| | | ÷ |
| | | |
| OK Cancel | App | ly - |
| | | |

- Right-click the Map1 tab.
- Select New Vertical Tab Group.



- Compare the two map views side by side
- Note that the shape of the neighbourhoods layer is quite different between the two maps.
- This is due to two different spatial reference systems being used.



WGS84 Geographic Coordinate System Universal Transverse Mercator (UTM) Zone 17N Projection

 Zoom out to view the entire world on each map view.



WGS84 Geographic Coordinate System

Universal Transverse Mercator (UTM) Zone 17N Projection

World Geodetic System 1984 (WGS84)

- Scope: Worldwide
- **Units**: Degrees (latitude and longitude)



NAD83 CSRS UTM Zone 17

Scope: Centered on -81 degrees longitude

- Allows Southern Ontario to be mapped quite accurately on a flat surface
- Units: Metres

More information: <u>https://gisgeography.com/map-projections/</u>

BIH-Defined CTP (1984.0)



Figure 1.1 WGS 84 Reference Frame







- To maintain spatial consistency and accuracy, as well as avoid potential data issues, it's best for all layers within a map to use the same spatial reference.
- Data can be reprojected using ArcGIS Pro's geoprocessing tools if necessary.
- Close the Map1 tab. We will continue working with the WGS84 map.





Add data from Living Atlas or ArcGIS Online

- Living Atlas is a curated selection of authoritative spatial datasets provided by Esri via the ArcGIS Online platform.
- Living Atlas content can be added to ArcGIS Pro maps as Web Services (more info about those later).



https://livingatlas.arcgis.com/

- Click the Add Data Button.
- Select the Living Atlas tab.



- Type **iNaturalist** in the search box and press Enter.
- Select the

 iNaturalist
 Observations
 Feature Layer and
 Click OK.



| | | | C | x נ |
|---------------------------|---------------|--|----------|------------|
| sults for 'inaturalist' 🗸 | - - [] | $= \left \overline{\nabla} \right $ inaturalist | | × • |
| | | | | E |
| | | Туре | Date Cre | ated |
| ralist Observations | Q () | Feature Layer | 7/8/2024 | 2:21:00 PM |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | > |
| Find more items | | | | |
| ns | | Default | | • |
| | | | OK (| Cancel |
| | | | | curreer |
| | | | | |

- This dataset contains crowdsourced wildlife observations.
- When zoomed out, the individual observations are
 aggregated into bins denoting the number of observations per area.



- Zoom in to display individual observation points.
- Note that the points

 have been
 symbolized by
 category (taxonomic class)



Visit the Living Atlas website to browse other available datasets:

https://livingatlas.arcgis.com/en/home/



What's new



Explore items recently added to ArcGIS Living Atlas of the World, learn about GIS events, and discover ways to use content



Map coastal property loss using ArcGIS Online and ArcGIS Living Atlas

se steps to create your own coastal prop or less) using ArcGIS Online and ArcGIS Living Atla



FCC Broadband Data Collection The December 2023 FCC Broadband Data



New Esri Environment Basemap The beta release of the new Environment Basemap is



Sentinel-1 Explorer: Observing Earth in a different light
Add data from a spreadsheet

- One of the most common ways of importing data into GIS is by using **spreadsheets** (.csv, .xlsx, etc.)
- Spreadsheets can be transformed into spatial layers if they contain geographic information.
- Spreadsheet data can also be joined to spatial layers via a **key field**.

| Π.Δ. | R | | F | 6 | цан I | г в Г в |) SK | 1 346 1 | M | - N | | (p) | 0 | R | T | I SHC II | w x | 1 | 7 | | |
|----------|-----------|----------------------------------|-----------|-------------|-------------|-------------------|---------------|---------------|------|-----|-------------|---------|-------------|------------------|----------|----------|------------------|--------|---------------|-----------------|----------|
| id | BranchCod | PhysicalBra BranchNan Address Po | ostalCode | Website 1 | Telephone | SquareFoo PublicP | arki KidsStop | LeadingRea Cl | LC D | NH | TeenCounc Y | outhHub | AdultLitera | Workstatic Servi | Tier Lat | Long NBI | No NBHDNam TPLNI | WardNo | WardName | PresentSiteYear | <u> </u> |
| | 1 AB | 1 Albion 1515 Albio M | 19V 1B2 | https://www | 416-394-5: | 29000 | 59 | 1 1 | 1 | 1 | 1 | 1 | 1 | 38 DL | 43.73983 | -79.5841 | 2 Mount Oliv | 1 | 1 Etobicoke I | 2017 | |
| | 2 ACD | 1 Albert Cam 496 Birchm N | 11K 1N8 | https://www | 416-396-81 | 28957 | 45 | 0 1 | 1 | 1 | 1 | 1 | 0 | 36 DL | 43.70802 | -79.2693 | 120 Clairlea-Bir | 1 | 20 Scarboroug | 1971 | |
| | 3 AD | 1 Alderwood 2 Orianna [N | 18W 4Y1 | https://www | 416-394-5: | 7341 shared | | 0 0 | 0 | 0 | 0 | 0 | 0 | 7 NL | 43.60194 | -79.5473 | 20 Alderwood | 0 | 3 Etobicoke-I | 1999 | |
| (| 4 AG | 1 Agincourt 155 Bonis / N | 11T 3W6 | https://www | 416-396-8 | 27000 | 86 | 0 1 | 1 | 1 | 0 | 1 | 0 | 42 DL | 43.78517 | -79.2934 | 118 Tam O'Sha | 0 | 22 Scarboroug | 1991 | |
| <u> </u> | 5 AH | 1 Armour He 2140 Aven N | 15M 4M7 | https://www | 416-395-54 | 2988 shared | | 0 0 | 0 | 0 | 0 | 0 | 0 | 5 NL | 43.73934 | -79.4219 | 39 Bedford Pa | 0 | 8 Eglinton-La | 1982 | |
| | 6 AL | 0 Answerline | | https://www | 416-397-5 | | | | | | | | | RR | | | | | | | |
| | 7 AN | 1 Annette Sti 145 Anneti N | 16P 1P3 | https://www | 416-393-7(| 7806 | 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 11 NL | 43.66336 | -79.4663 | 90 Junction Ar | 0 | 4 Parkdale-H | 1908 | |
| | 8 AP | 1 Amesbury 1565 Lawre N | 16L 1A8 | https://www | 416-395-54 | 6320 | 22 | 0 0 | 0 | 0 | 0 | 0 | 0 | 6 NL | 43.70646 | -79.4857 | 30 Brookhave | 1 | 5 York South | 1967 | |
| 1 | 9 BB | 1 Brookbank 210 Brookl N | 13A 2T8 | https://www | 416-395-5- | 7933 | 20 | 0 0 | 0 | 0 | 0 | 0 | 0 | 9 NL | 43.75951 | -79.3259 | 150 Fenside-Pa | 0 | 16 Don Valley | 1968 | |
| 1 | 0 BC | 1 Black Creek North York N | 13L 1B2 | https://www | 416-395-54 | 5782 shared | | 0 0 | 0 | 0 | 0 | 0 | 0 | 7 NL | 43.72122 | -79.5105 | 26 Downsview | 1 | 7 Humber Riv | 2002 | |
| 1 | 1 BD | 1 Bendale 1515 Danfe N | 1J 1H5 | https://www | 416-396-8 | 8500 | 30 | 0 0 | 0 | 0 | 0 | 0 | 0 | 9 NL | 43.75106 | -79.2441 | 157 Bendale So | 1 | 21 Scarboroug | 1961 | |
| 1 | 2 BE | 1 Beaches 2161 Quee N | 14L 1J1 | https://www | 416-393-7 | 8000 | 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 12 NL | 43.67013 | -79.2985 | 63 The Beache | 0 | 19 Beaches-Ea | 1914 | |
| 1 | 3 BF | 1 Barbara Frt 20 Covingt N | 16A 3C1 | https://www | 416-395-54 | 29417 | 6 | 0 1 | 1 | 0 | 1 | 1 | 1 | 30 DL | 43.72075 | -79.4322 | 32 Englemoun | 0 | 8 Eglinton-La | 1992 | |
| 1 | 4 BKONE | 0 Bookmobile One | | https://www | w.tpl.ca/bc | | | | | | | | | NL | | | | | | | |
| 1 | 5 BKTWO | 0 Bookmobile Two | | https://www | w.tpl.ca/bc | | | | | | | | | NL | | | | | | | |



Add data from a spreadsheet: **XY** coordinates

- In Windows Explorer, navigate to the sample data folder.
- Open tpl-branch-general-information-2023.csv in Excel or other spreadsheet software.
- Each row in the spreadsheet contains information about one public library location. Note the Lat and Long columns.
- Exit Excel.

| A | В | C D | E | F | G | н | <u> </u> | ų d | К | L N | 1 N | | 0 | P | Q | R | \$ | Т | U | W | X | Y | Z | AA |
|----|-----------|-----------------------|--------------|------------|------------|--------------|------------------|------------------------|---------|----------------|-----|---|--------------|---------|-------------|------------------|---------|----------|----------|------------------|--------|--------|---------------|----------------|
| | BranchCod | d PhysicalBraBranchNa | n Address | PostalCode | Website | Telephone | SquareFoo Public | cPark <mark>i</mark> K | idsStop | LeadingRea CLC | DIH | 1 | TeenCounc Yo | outhHub | AdultLitera | Workstatic Servi | ic Tier | Lat | Long NBH | No NBHDNam | TPLNIA | WardNo | WardName | PresentSiteYea |
| 1 | AB | 1 Albion | 1515 Albi | o M9V 1B2 | https://ww | 416-394-5: | 29000 | 59 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 38 DL | | 43.73983 | -79.5841 | 2 Mount Oliv | 1 | | 1 Etobicoke f | 2017 |
| 2 | ACD | 1 Albert Car | m 496 Birch | m M1K 1N8 | https://ww | A 416-396-81 | 28957 | 45 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 36 DL | | 43.70802 | -79.2693 | 120 Clairlea-Bir | 1 | 2 | 0 Scarboroug | 1971 |
| 3 | AD | 1 Alderwoo | d 2 Orianna | [M8W 4Y1 | https://ww | w 416-394-5: | 7341 share | d | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 NL | | 43.60194 | -79.5473 | 20 Alderwood | C |) | 3 Etobicoke-I | 1999 |
| 4 | AG | 1 Agincourt | 155 Bonis | M1T 3W6 | https://ww | A 416-396-8! | 27000 | 86 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 42 DL | | 43.78517 | -79.2934 | 118 Tam O'Shai | C | 2 | 2 Scarboroug | 1991 |
| 5 | AH | 1 Armour H | le 2140 Ave | n M5M 4M7 | https://ww | 416-395-54 | 2988 share | d | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 NL | | 43.73934 | -79.4219 | 39 Bedford Pa | C | 1 | 8 Eglinton-La | 1982 |
| 6 | AL | 0 Answerlin | ie | | https://ww | 416-397-5 | | | | | | | | | | RR | | | | | | | | |
| 7 | AN | 1 Annette S | ti 145 Anne | ti M6P 1P3 | https://ww | 416-393-71 | 7806 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 NL | | 43.66336 | -79.4663 | 90 Junction Ar | C |) | 4 Parkdale-H | 1908 |
| 8 | AP | 1 Amesbury | 1565 Law | reM6L 1A8 | https://ww | 416-395-54 | 6320 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 NL | | 43.70646 | -79.4857 | 30 Brookhave | 1 | | 5 York South | 1967 |
| 9 | BB | 1 Brookban | k 210 Broo | ki M3A 2T8 | https://ww | 416-395-5· | 7933 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 NL | | 43.75951 | -79.3259 | 150 Fenside-Pa | C | 1 | 6 Don Valley | 1968 |
| 10 | BC | 1 Black Cree | k North Yo | k M3L 1B2 | https://ww | 416-395-54 | 5782 share | d | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 NL | | 43.72122 | -79.5105 | 26 Downsview | 1 | | 7 Humber Riv | 2002 |
| 11 | BD | 1 Bendale | 1515 Dan | fcM1J 1H5 | https://ww | 416-396-8 | 8500 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 NL | | 43.75106 | -79.2441 | 157 Bendale So | 1 | 2 | 1 Scarboroug | 1961 |
| 12 | BE | 1 Beaches | 2161 Que | e M4L 1J1 | https://ww | 416-393-7 | 8000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 NL | | 43.67013 | -79.2985 | 63 The Beache | C | 1 | 9 Beaches-Ea | 1914 |
| 13 | BF | 1 Barbara F | rt 20 Coving | gt M6A 3C1 | https://ww | 416-395-54 | 29417 | 6 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 30 DL | | 43.72075 | -79.4322 | 32 Englemoun | C | • | 8 Eglinton-La | 1992 |
| 14 | BKONE | 0 Bookmob | ile One | | https://ww | ww.tpl.ca/bc | | | | | | | | | | NL | | | | | | | | |
| 15 | BKTWO | 0 Bookmob | ile Two | | https://ww | ww.tpl.ca/bc | | | | | | | | | | NL | | | | | | | | |



• From Pro's Analysis tab, click Tools.



- The Geoprocessing pane will open.
- In the search bar, start typing 'xy table to point'.
- Click the first search result to open the tool.



 Click the folder icon next to the Input Table input box.

 Navigate to the CSV file. Select the file and click OK.



- Select Long from the X Field dropdown and Lat for the Y Field dropdown (if these don't automatically populate).
- Click Run.

| Geoprocessing | ~ † × |
|--|----------|
| XY Table To Point | \oplus |
| Parameters Environments | 0 |
| Input Table tpl-branch-general-information-2023.csv | ✓ |
| Output Feature Class tplbranchgeneralinformation2023_XYTableToPoint | |
| X Field Long | ~ 读 |
| Y Field Lat | ~ 췋 |
| Z Field | ~ 读 |
| Coordinate System | |
| GCS_WGS_1984 | |
| | |
| Catalog Geoprocessing | Run Y |

 A new layer showing library locations has been added to the map.



Add data from a spreadsheet: Geocoding

- Review the Street furniture-Bicycle parking data -4326.csv file from the sample data in Excel.
- Note that this dataset contains no lat/long information; however, it does include columns with street address information.

| | A | В | с | D | E | F | G | н | 3 | J | к | L | м | N | 0 |
|---------------|-----|----------|----------|-----------|-------------|-----------|------|-------------|-----------|--------|------|-------------|-----------|-------------|--------------|
| 1 | _id | OBJECTID | ID | ADDRESSN | ADDRESSST | FRONTING | SIDE | FROMSTRE | DIRECTION | SITEID | WARD | BIA | ASSETTYPE | STATUS | SDE_STATE_ID |
| 2 | 1 | 5 | BP-0583 | 4841-4881 | Yonge St | None | None | Harlandale | None | None | 18 | Willowdale | Ring | Existing | |
| 3 | 2 | 34 | BP-0350: | 8 | Kensington | None | None | Kensington | None | None | 11 | Kensington | Ring | Existing | |
| 4 | 3 | 41 | BP-11900 | 8 | Assiniboine | None | None | Nelson Rd | None | None | 7 | None | Rack | Existing | |
| 5 | 4 | 60 | BP-1551 | 46 | Wellesley S | None | None | Wellesley S | None | None | 13 | None | Ring | Temporarily | Removed |
| 6 | 5 | 171 | BP-1533: | 911 | Davenport | None | None | Davenport | None | None | 12 | None | None | Existing | |
| 7 | 6 | 175 | BP-0891 | 20 | Lombard S | None | None | Lombard S | None | None | 13 | Old Town T | None | Existing | |
| 8 | 7 | 202 | BP-1480 | 359 | King St E | None | None | Derby St | None | None | 13 | Old Town T | Ring | Existing | |
| 9 | 8 | 249 | BP-1338 | 145 | Queens Qu | None | None | York St | None | None | 10 | The Water | None | Existing | |
| 10 | 9 | 251 | BP-12074 | 1960 | Queen St E | None | None | Kenilworth | None | None | 19 | The Beach | Ring | Existing | |
| 11 | 10 | 276 | BP-1596 | 87 | Avenue Rd | Avenue Rd | East | Elgin Ave | North | None | 11 | None | Ring | Existing | |
| 12 | 11 | 299 | BP-0520 | 522 | University | None | None | Elm St | None | None | 11 | None | Ring | Existing | |
| 13 | 12 | 341 | BP-0393 | 50 | Blue Jays W | None | None | Mercer St | None | None | 10 | Toronto Do | Ring | Temporarily | Removed |
| 14 | 13 | 356 | BP-05924 | 1313 | Bloor St W | None | None | St Helens A | None | None | 9 | Bloordale \ | Ring | Temporarily | Removed |
| 15 | 14 | 417 | BP-0804 | 145 | Queens Qu | None | None | York St | None | None | 10 | The Water | None | Existing | |
| 16 | 15 | 418 | BP-0776 | 162 | Mc Caul St | None | None | Mc Caul St | None | None | 11 | None | Ring | Existing | |
| Person | | 100 | | 1015 | ol o | •• | •• | •• | | •• | | 01 111 | •• | E 1 11 | |

- Open the
 Geoprocessing
 pane by clicking the
 Tools button
 (Analysis tab)
- Search for and open the Geocode
 Addresses tool



- Provide the Input Table
 parameter by clicking the
 folder icon and navigating to
 the bicycle parking csv file.
- For the Input Address
 Locator parameter, select
 ArcGIS World Geocoding
 Service from the dropdown.

| eoprocessing | | ~ 4 × |
|--|----------------|-------------|
| -) Geocode | Addresses | \oplus |
| | | |
| This tool may consume ArcGI. Click to estimate credits. | S credits. | |
| arameters Environments | | 2 |
| Input Table | | |
| Street furniture-Bicycle parking d | ata - 4326.csv | |
| Input Address Locator | | |
| ArcGIS World Geocoding Service | | × 🗁 |
| Input Address Fields | Single Field | ~ |
| Field Name | Alias Name | |
| Single Line Input | <none></none> | <u> </u> |
| Output Feature Class | | |
| Streetfurnitur_GeocodeAddres | | 🗁 🛡 🛛 |
| Country | Se | elect All 🤣 |
| 🗌 Afghanistan | | |
| 🗌 Albania | | |
| 🗌 Algeria | | |
| 🗌 American Samoa | | |
| 🗌 Andorra | | |
| 🗌 Angola | | ~ |
| | | 🕟 Run 👻 |
| talog Geoprocessing | | |
| | | |

- Select Multiple Field for the Input Address Fields
 parameter.
- Referring to the names of the spreadsheet columns, provide values for the Address or
 Place, Address2, and
 Neighborhood parameters.



| essing | | ~ 4 × |
|--|-------------------|------------------|
| Geocode | e Addresses | \oplus |
| tool may consume ArcGI to estimate credits. | S credits. | |
| rs Environments | | ? |
| dress Locator | | ^ |
| Vorld Geocoding Service | | - |
| dress Fields | Multiple Field | ~ |
| ne | Alias Name | |
| or Place | ADDRESSNUMBERTEXT | ~ |
| | ADDRESSSTREET | ~ |
| | <none></none> | ~ |
| hood | BIA | ~ |
| | <none></none> | × |
| | <none></none> | ~ |
| | <none></none> | * |
| | <none></none> | 2 * 2 |
| | <none></none> | * |
| | <none></none> | - |
| | | |

- Check Canada for the Country.
- Leave the Preferred Location Type as Address location.
- Select Address for the Category.
- Click Run.

| Geoprocessing | | ~ 4 × | |
|--|-----------------------------------|---------|--|
| | Goocodo Addroccos | | |
| e | Geocode Addresses | Ð | |
| This tool may conclusion Click to estimate | nsume ArcGIS credits. credits. | | |
| Parameters Environ | ments | ? | |
| Burunai | | ^ | |
| Cabo Verde | | | |
| 🗌 Cambodia | | | |
| Cameroon | | | |
| 🖌 Canada | | | |
| Cayman Islands | | | |
| 🗌 Central African Re | epublic | ~ | |
| Preferred Location Ty | pe | | |
| Address location | | ~ | |
| Category | | | |
| 🛛 🗹 Address | | | |
| ▶ 🗌 Postal | | | |
| ▷ 🗌 Coordinate Sy | ystem | - U | |
| ▷ □ Populated Pla | ice | - U | |
| ▶ 🗍 POI | | - U | |
| | | IJ | |
| Optional paramete | rs | ~ | |
| | | 💽 Run 👻 | |
| Catalog Geoprocessin | g | | |

 Result: the software will attempt to look up locations for each address provided.



- Review the **socialhousing.csv** file in the sample data folder.
- This dataset details social housing unit density exist per Toronto neighbourhood. Neighbourhoods are identified by a unique ID number.
- It also lists how many of these units are geared-to-income (RGI).



| A | в | C | С |
|----------|-------|------|---|
| bourhood | Units | RGI | |
| | 950 | 411 | |
| | 1288 | 1181 | |
| | 372 | 180 | |
| | 308 | 299 | |
| | 358 | 358 | |
| | 553 | 401 | |
| | 762 | 511 | |
| | 688 | 390 | |
| | 200 | 198 | |
| | 1240 | 1178 | |
| | 129 | 80 | |
| | 879 | 779 | |
| | 1010 | 753 | |
| | 106 | 73 | |
| - | 77 | 39 | |
| | 133 | 114 | |
| | 223 | 160 | |

- Add the socialhousing.csv file to the map.
- Use the Add Data button, or simply drag and drop the file from Windows Explorer into the map view.





- Recall that the Neighbourhoods layer also contains an ID for each neighbourhood in its attribute table.
- We can join the housing data to the neighbourhood polygons by matching these IDs.

| | socialhousing.csv | × | | ~ | | Neig | hbourh | oods - 4 | 326 × | | | | | | |
|----|-------------------|---------|---------|--------------|-----|------|--------|----------------|-------------|------------------------|-------------|---------------------|-------------------|---------------------------|----|
| 璽 | 周 🔓 🖓 | | | | Fie | ld: | Add 🔝 | Eg Calo | culate S | election: ⁶ | 🔓 Select By | Attributes 🛛 💭 Zoor | n Te 📲 Switch 🔲 C | lear 🙀 Delete 📑 Copy | |
| | Neighbourhood | Units | RGI | ^ | | FID | Shape | _id1 | A IEA_ID2 | AREA_AT3 | PARENT_4 | AREA_SH5 | AREA_LO6 | AREA_NA7 | A |
| 1 | 1 | 950 | 411 | | 1 | 0 | Polygo | 1 | 2502366 | 26022881 | 0 | 174 | 174 | South Eglinton-Davisville | S |
| 2 | 2 | 1288 | 1181 | | 2 | 1 | Polygo | 2 | 2502365 | 26022880 | 0 | 173 | 173 | North Toronto | N |
| 3 | 3 | 372 | 180 | | 3 | 2 | Polygo | 3 | 2502364 | 26022879 | 0 | 172 | 172 | Dovercourt Village | D |
| 4 | 4 | 308 | 299 | | 4 | 3 | Polygo | 4 | 2502363 | 26022878 | 0 | 171 | 171 | Junction-Wallace Emer | J |
| 5 | 5 | 358 | 358 | | 5 | 4 | Polygo | 5 | 2502362 | 26022877 | 0 | 170 | 170 | Yonge-Bay Corridor | Y |
| 6 | 6 | 553 | 401 | | 6 | 5 | Polygo | 6 | 2502361 | 26022876 | 0 | 169 | 169 | Bay-Cloverhill | Bi |
| 7 | 7 | 762 | 511 | | 7 | 6 | Polygo | 7 | 502360 | 26022875 | 0 | 156 | 156 | Bendale-Glen Andrew | B |
| 8 | 8 | 688 | 390 | | 8 | 7 | Polygo | 8 | 2502359 | 26022874 | 0 | 155 | 155 | Downsview | D |
| 9 | 13 | 200 | 198 | | 9 | 8 | Polygo | 9 | 2502358 | 26022873 | 0 | 154 | 154 | Oakdale-Beverley Heig | 0 |
| 10 | 14 | 1240 | 1178 | | 10 | 9 | Polygo | 10 | 2502357 | 26022872 | 0 | 153 | 153 | Avondale | A |
| ii | 16 | 129 | 80 | * | 11 | 10 | Polvao | 11 | 2502356 | 26022871 | 0 | 152 | 152 | East Willowdale | E |
| | |) of 12 | 7 selec | ted Filters: | | | ∎ ∢ | ⊳ 0 o | f 158 selec | ted. | | | | | |

- Right-click the Neighbourhoods layer in the Contents pane.
- Choose Joins and Relates -> Add Join



| - Ex.4 2 | | | |
|----------------------|--------------|---------------|---------------------------------|
| | Ctrl+C | | |
| perties | Ctrl+Shift+V | | |
| | | | - Bas |
| | | | Kirby Road |
| Table | Ctrl+T | | Richm |
| neering | Ctrl+Shift+D | | Vaughan |
| Layers | | | I STAR |
| | | 2 | |
| gn | | 2 | |
| art | | > | 1 DT |
| ort | | | D D |
| Relates | | > | Add Join |
| Layer | | | Isa Kentove Join |
| Make <u>V</u> isible | | | Remove All Joins |
| | | > | Add Spatial Join |
| | | | Add Relate |
| Pr <u>o</u> perties | | | Remove Relate |
| abels | | > | 🚆 Remove A <u>l</u> l Relates 🦉 |
| iy | | | |
| | | | Tat |
| Popula | | | XY. |
| rop-ups | | | |
| | | > / | |
| | | ×- | |

Specify the following:

- Input Table: Neighbourhoods -4326
- Input Field: _id1
- Join Table: socialhousing.csv
- Join Field: Neighbourhood

Click OK.

| Add Join | ? | × |
|----------------------------|----|----------|
| Input Table | | |
| Neighbourhoods - 4326 | | ~ |
| 🛕 Input Field | | |
| _id1 | ~ | |
| Join Table | | |
| socialhousing.csv | ~ | |
| Join Field | ĥ | |
| Neighbourhood | ~ | <u>₩</u> |
| 🕦 🗹 Keep all input records | | |
| Index join fields | | |
| Join Operation | | |
| dite. | | ~ |
| Validate Join | | |
| | | |
| | ОК | |

- Open the Neighbourhoods layer's attribute table.
- Scroll to the far right.
- Data from the csv has successfully been joined to the polygon layer.



Neighbourh

III Neighbo

Field:

2 0 (173)

3 illage (1

4 ace Eme

5 prridor

7 Andrew

9 rley Hei

n-Davisv

| Selection: 🎦 🐖 | 2 🗆 💭 🚍 | | | | 1 | = |
|-----------------------|-----------|----------|---------------|---------------|---------------|---|
| CLASSIF9 | CLASSIF10 | OBJECTI1 | Neighbourhood | Units | RGI | - |
| Not an NIA or Emergin | NA | 1782473 | 1 | 950 | 411 | U |
| Not an NIA or Emergin | NA | 1782475 | 2 | 1288 | 1181 | |
| Not an NIA or Emergin | NA | 1782476 | 3 | 372 | 180 | |
| Not an NIA or Emergin | NA | 1782478 | 4 | 308 | 299 | |
| Not an NIA or Emergin | NA | 1782480 | 5 | 358 | 358 | |
| Not an NIA or Emergin | NA | 1782481 | 6 | 553 | 401 | |
| Not an NIA or Emergin | NA | 1782483 | 7 | 762 | 511 | |
| Neighbourhood Impro | NIA | 1782484 | 8 | 688 | 390 | |
| Neighbourhood Impro | NIA | 1782486 | <null></null> | <null></null> | <null></null> | |

Joined data!

Export the layer to save a permanently-joined version of the data

- Right-click the layer name in the Contents pane
- From the menu, choose Data ->
 Export Features



| * * | <i>;</i> | |
|------------|--|--|
| Inse | rt Analysis <mark>View</mark> Edit Ima | igery Share Help Feature Lay |
| | 📲 🔚 🔚 Catalog Pane 🕮 Geo | pprocessing 🚦 Workflow Manager 👻 📲 Cre |
| Link | Link Reset Catalog View 🖻 Pyti | hon Window 😪 Aviation 👻 🔸 İm |
| Views ~ | Cursors Panes ~ 🖃 Contents 📺 Task | ts ™a Indoors ❤ |
| đ | Copy Ctrl+C | |
| | | Richvale Langstaff |
| Ē. | <u>R</u> emove | Commerce Valley |
| \$ | <u>G</u> roup | Uplands Thornhill Thornhea |
| | Attribute Table Ctrl+T | German Mili |
| 8 | Data Engineering Ctrl+Shift+D | Grandview |
| e 🌸 | Add Error Layers | W SUBJECTION IN |
| | Data Design > | |
| ir İdli | Create Chart > | |
| v 🚗 | New Report | 15 pt |
| | Leine and Dalates | TAT |
| - | | I FEX |
| h 🙉 | Zoom To Layer | A D Y |
| . TUX | Zoom To Make <u>V</u> isible | |
| | Selection > | THAT |
| v 🚸 | La <u>b</u> el | TT Stores |
| ß | Labeling Properties | ATAL SE |
| | <u>C</u> onvert Labels > | FILLE |
| 1 | Symbology | THEFT |
| 5 | Disable Pop-ups | KALI |
| 礘 | Configure Pop-ups | 1 the second the |
| | <u>D</u> ata > | Export Features |
| | <u>S</u> haring > | Export Table |
| | View <u>M</u> etadata | <u>R</u> ematch Addresses |
| 1 | <u>E</u> dit Metadata | Split Address Review |
| | Properties | 🕞 Set <u>D</u> ata Source |
| | | 2 |

 The output layer will be saved in the project geodatabase by default.



| ort Features | ? | × |
|-----------------------------------|----|---|
| meters Environments | | ? |
| ut Features | | |
| eighbourhoods - 4326 | * | |
| tput Feature Class | | |
| ighbourhoods_socialhousing_joined | | 2 |
| er | | |
| lds | | |
| rt | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | OK | |
| | | |

Web services allow data to be shared from the internet.

To add a web service layer to Pro:

- Visit <u>https://open.toronto.ca/dataset/</u> web-map-services/
- Expand the Download Data section
- Click the Visit Page button next to the **Orthorectified Aerial Imagery - Most** current year item

Aerial LiDAR - Hillshade

A hillshade is a hypothetical illumination of a surface by determining illumination values for each cell in a raster. It is calculated by setting a position for a hypothetical light source and calculating the illumination values of each cell in relation to neighboring cells. It can be used to greatly enhance the visualization of a surface for analysis or graphical display, especially when using transparency. The City of Toronto publishes hillshades in both bare earth (no aboveground features included), and full-feature. Bare Earth Full Feature

Not available for this dataset DATA FEATURES DATA OUALITY DOWNLOAD DATA File Orthorectified Aerial Imagery - 2022 Orthorectified Aerial Imagery - 2021 Orthorectified Aerial Imagery - 2020 Orthorectified Aerial Imagery - 2018

DATA PREVIEW

E 140% ☆ Q Search



• Copy the URL (Ctrl + C)

https://gis.toronto.ca/arcgis/rest/ services/basemap/cot_ortho/MapServer

| ← → C @ D A https://g |
|--|
| ArcGIS REST Services Directory |
| <u>Home</u> > <u>services</u> > <u>basemap</u> > <u>cot_or</u> |
| JSON SOAP WMS WMTS |
| basemap/cot_ortho (Map |
| View In: ArcGIS JavaScript ArcGIS |
| View Footprint In: ArcGIS Online |
| Service Description: City of Toronto |
| Map Name: Layers |
| Legend |
| All Layers and Tables |
| Layers: |
| • <u>City of Toronto Imagery</u> (0) |
| Description: |
| Copyright Text: City of Toronto |
| Spatial Reference: 102100 (3857) |
| |

gis.toronto.ca/arcgis/rest/services/basemap/cot_ortho/MapServer

rtho (MapServer)

pServer)

IS Online Map Viewer ArcGIS Earth ArcMap ArcGIS Explorer

Map Viewer

o Orthophoto Current Year

- In Pro, click the Add Data button (Map tab)
- Select From Path...



- Paste in the web service URL.
- Click Add.

Add Data From Path

catalog path.

Path

Service type

paths



• Result:



Symbology in ArcGIS Pro

- Symbology involves the use of symbols to represent geographic features (and their attributes) on the map
- Effective symbology makes it easier for viewers to understand complex information.

Symbology in ArcGIS Pro

Access Pro's symbology options:

- Right-click on the neighbourhoods_social housing_joined layer in the Contents Pane
- Select Symbology from the pop-up menu
- The **Symbology Pane** will appear.



Symbology in ArcGIS Pro Types of Symbology: Single Symbol

Single Symbol: All features in a layer are represented with the same symbol. Ideal for displaying features of the same type.

- The Neighbourhoods layer has this symbology style by default.
- To customize the symbology, click the symbol swatch on the Symbology pane.

| Symbology - Neighbourhoods - 4326 | ~ # X |
|-----------------------------------|-------|
| | ≣∣ |
| Primary symbology | |
| Single Symbol | • |
| Symbol - | |
| Label | |
| Description | |
| | |
| | |
| | |

Symbology in ArcGIS Pro Types of Symbology: Single Symbol

• Choose **Black Outline** from the Gallery.

| Symbology © | - Neighbo | ourhoods - Format Po | - <mark>4326</mark> olygon Syn | nbol | ` | ⁄ [‡] × ≡ |
|----------------|------------|--|-----------------------------------|------------|-----------|-----------------------|
| Gallery Prop | oerties | | | | | |
| Type here to : | search | | | ې |) ∽ All s | tyles 🔹 |
| Symbols found | : 157 | | | | | <u></u> |
| ✓ ArcGIS 2D | 8 | | | | | î |
| Black | E ack O | r - - - - - - - - - - | Airport | Airpor | Buildin | |
| Cemetery | Commercial | Black Outline (Style: ArcGIS 2D Category: Comr Tags: black | 2 pts) non tation | Governm | Healt | |
| Industrial | Land | Landmar | Park | Recreation | Wat | |



- Click the Back button to return to the main symbology options for the Neighbourhoods layer
- Choose Unique
 Values from the
 Primary symbology
 dropdown

| Symbology - Neighbourhoods - 4326 | | | | | ~ 4 | |
|-----------------------------------|------------|-------------------------------|-----------|------------|---------------|-----------|
| Gallery Prop | erties | | | | | |
| Type here to s | search | | | ر | > ~ | All style |
| Symbols found | : 157 | | | | | ø |
| ✓ ArcGIS 2D | | | | | | |
| Black | Black O | r – ¬ I I L _ J Dash | Airport | Airpor | Buildin |) |
| Cemetery | Commercial | Cultural | Education | Governm | Healt. | |
| Industrial | Land | Landmar | Park | Recreation | Wat | |

| Symbology - Neighbourhoods - 4326 | ~ # × | | | |
|---|-------|--|--|--|
| | ≡ | | | |
| Primary symbology | | | | |
| Single Symbol | | | | |
| Symbolize your layer using one symbol | | | | |
| Single Symbol Draw using single symbol. | | | | |
| Symbolize your layer by category | | | | |
| Unique Values Draw categories using unique values of one or multiple fields. | | | | |
| | _ | | | |
| Graduated Colors Draw quantities using graduated colors. | | | | |
| Bivariate Colors Draw quantities using bivariate colors. | | | | |
| Unclassed Colors Draw quantities using an unclassed color gradient. | | | | |
| Graduated Symbols Draw quantities using graduated symbols. | | | | |
| Proportional Symbols Draw quantities using proportional symbols. | | | | |
| Dot Density Draw quantities using dot density. | | | | |
| Charts | ~ | | | |

Choose CLASSIF9 from the Field 1 dropdown menu.

Note: This field is not very well-named, but a review of the attribute table shows that it specifies each neighbourhood's Emerging Area or NIA status.

| III Neighbourhoods - 4326 $	imes$ | | | | | | |
|--|--|--|--|--|--|--|
| Field: 🖽 Add 🖽 Calculate Selection: 🏪 Select By Attributes 🧔 Zoom To 📇 S | | | | | | |
| × ⁸ | CLASSIF9 | | | | | |
| 67 Area (90) | Not an NIA or Emerging Neighbourhood | | | | | |
| 68 (121) | Neighbourhood Improvement Area | | | | | |
| 69 Jirchmount (1 | Not an NIA or Emerging Neighbourhood | | | | | |
| 70 Maryvale (119) | Not an NIA or Emerging Neighbourhood | | | | | |
| 71 anter-Sullivan | Not an NIA or Emerging Neighbourhood | | | | | |
| 72 16) | Emerging Neighbourhood | | | | | |
| 73 ennis (115) | Neighbourhood Improvement Area | | | | | |
| 74 n-l- n-1-4 /4 | Name of State of Proceedings State between the set | | | | | |

| Symbology - Neighbourhoods - 4326 $\sim \mp \times$ | | | | | | |
|---|---|---|-------------|--|--|--|
| Primary symb | ology | | | | | |
| Unique Values | | | | | | |
| Field 1 | _id1 | • | \boxtimes | | | |
| Color scheme | _id1 AREA_ID2 AREA_AT3 PARENT_4 | | 读 | | | |
| Classes Scal | AREA_SH5 AREA_LO6 AREA_NA7 | | More ~ | | | |
| Symbol | CLASSIF9 | | | | | |
| | OBJECTI11 Alias: CLASSIF9 Type: String Units RGI | | | | | |
| | | | | | | |

 Each polygon is now styled to reflect the attribute value in the CLASSIF9 field.



 Various colour schemes can be selected from the **Color scheme** dropdown.



Customize individual symbols:

 Click the swatch next to the Emerging Neighbourhood category.



| 🔲 📑 + ↑ ↓ 🥃 More ~ | | | | | | |
|-------------------------------|--|--|--|--|--|--|
| | | | | | | |
| | | | | | | |
| ng Neighbourhood | | | | | | |
| ourhood Improvement Area | | | | | | |
| NIA or Emerging Neighbourhood | | | | | | |
| | | | | | | |
| er values> | | | | | | |
| | | | | | | |
| | | | | | | |

Customize individual symbols:

• Click Properties.



| burhoods - 4326 $\sim \mp \times$ on Symbol - Emerging Neighbourhood \equiv | | | | | | |
|--|-----------|------------|---------|--------|--|--|
| | | ې | ⊃ | yles 🔹 | | |
| | | | Ś | ≥ ₹ | | |
| | | | | î | | |
| Dash | Airport | Airpor | Buildin | | | |
| Cultural | Education | Governm | Healt | | | |
| Landmar | Park | Recreation | Wat | | | |
Symbology in ArcGIS Pro Types of Symbology: Unique Values

Customize individual symbols:

 Adjust the Fill Color, Outline Color, and **Outline Width** settings.



Symbology in ArcGIS Pro Types of Symbology: Graduated Symbols

- Return to the primary symbology view and select
 Graduated Symbols.
- Choose RGI for the field.



| ibology - neighbourhoods_socialhousing_joined 🛛 🗸 🖣 🗙 | | | | | | |
|---|--------------------------------|-------------|--|--|--|--|
| L 🔊 🛱 | ት 🍸 🍊 | ≡ | | | | |
| ary symbo | ology | | | | | |
| luated Symb | pols | · | | | | |
| | RGI | | | | | |
| nalization | <none></none> | | | | | |
| od | Natural Breaks (Jenks) | • | | | | |
| es | 5 | × | | | | |
| num size | 4 pt 🗘 Maximum size | 18 pt 🗘 | | | | |
| late | Background | | | | | |
|)raw gradua | ted symbols above all layers 🕕 | | | | | |
| | 800 | | | | | |
| sses Histo | gram | | | | | |
| | | 🔲 큧 More 🛩 | | | | |
| mbol | Upper value 🔶 | Label | | | | |
| • | ≤ 247 | 0 - 247 | | | | |
| • | ≤ 611 | 248 - 611 | | | | |
| • | ≤ 1145 | 612 - 1145 | | | | |
| • | ≤ 1926 | 1146 - 1926 | | | | |
| | ≤ 2926 | 1927 - 2926 | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| og Symbo | logy | | | | | |
| - Carried | | | | | | |
| | | | | | | |

Symbology in ArcGIS Pro Types of Symbology: Graduated Symbols

• Click the symbol to change the template



Cla

Sy

Cata

| nbology - neighbourhoods_socialhousing_joined 🛛 🗸 🖣 🗙 | | | | | | |
|---|--------------------------------|-------------|--------|--|--|--|
| | | | | | | |
| nary symbo | ology | | | | | |
| luated Symb | pols | | • | | | |
| | RGI | | | | | |
| nalization | <none></none> | | • | | | |
| nod | Natural Breaks (Jenks) | | • | | | |
| es | 5 | | * | | | |
| mum size | 4 pt 🗘 Maximum size | 18 pt 🗘 | | | | |
| olate | Background | | | | | |
|)raw gradua | ted symbols above all layers 🕕 | | | | | |
| sses Histo | gram | | More 🗸 | | | |
| mbol | Upper value - | Label | | | | |
| • | ≤ 247 | 0 - 247 | | | | |
| • | ≤ 611 | 248 - 611 | | | | |
| • | ≤ 1145 | 612 - 1145 | | | | |
| • | ≤ 1926 | 1146 - 1926 | | | | |
| | ≤ 2926 | 1927 - 2926 | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| og Symbo | logy | | | | | |
| | | | | | | |

Symbology in ArcGIS Pro Types of Symbology: Graduated Symbols

 Choose a symbol from the Gallery.



Symbology in ArcGIS Pro Types of Symbology: Graduated Symbols

- Adjust Minimum and Maximum symbol sizes.
- Result: Attribute information is visualized by symbol size.



| Middlefield Sceelar Ave 1 | Symbology | - neighbourhoods_socialh サマイム | iousing_joined | ~ * × | | | |
|------------------------------------|---------------------|----------------------------------|----------------|-------------|--|--|--|
| Milliken East | Primary symb | ology | | | | | |
| | Graduated Symbols + | | | | | | |
| the take | Field | RGI | - | \boxtimes | | | |
| | Normalization | <none></none> | | | | | |
| A CH | Method | Natural Breaks (Jenks) | * | | | | |
| | Classes | 5 | | | | | |
| Scarboroug' | Minimum size | 20 pt 🗘 Maximum size | 60 pt 🗘 | | | | |
| | Template | a Background | | | | | |
| | 🗹 Draw gradu | ated symbols above all layers 🕦 | | | | | |
| section Alle t | Classes Hist | ogram | | | | | |
| X/X | | | | More 🗸 | | | |
| | Symbol | Upper value | Label | | | | |
| aton ad | ٢ | ≤ 247 | 0 - 247 | î | | | |
| | ٢ | ≤ 611 | 248 - 611 | | | | |
| | | ≤ 1145 | 612 - 1145 | | | | |
| | | ≤ 1926 | 1146 - 1926 | | | | |
| 白 | | | | ~ | | | |
| 🚳 Selected Features: 0 🔟 🚺 🥰 | Catalog Symb | ology | | | | | |

Symbology in ArcGIS Pro Types of Symbology: Graduated Colours

- Return to the primary symbology view and select **Graduated Colors**.
- Choose RGI for the field.
- Choose a colour ramp.
- The map symbology now communicates information re: the quantity of rent geared to income housing per neighbourhood.



| Symbology - Neighbourhoods - 4326 🛛 🛛 👻 🔻 🗙 | | | | | | | | |
|---|----------------------------|--------------------|--------|--|--|--|--|--|
| <u>></u> + + + + + + + + + + + + + + + + + + + | | | | | | | | |
| Primary symb | Primary symbology | | | | | | | |
| Graduated Colo | rs | | ÷ | | | | | |
| Field | RGI | | • 🖂 | | | | | |
| Normalization | <none></none> | | ÷ | | | | | |
| Method | Natural Breaks (Jenks) | | | | | | | |
| Classes | 5 | | | | | | | |
| Color scheme | | | - ÷ | | | | | |
| Symbol | Upper value ≤ 247 | - Label 0 - 247 | | | | | | |
| | | | More ~ | | | | | |
| Symbol | Upper value | Label | | | | | | |
| | <u><u><u>s</u></u> 247</u> | 0 - 247 | | | | | | |
| | ≤ 611 | 248 - 611 | | | | | | |
| | ≤ 1145 | 612 - 1145 | | | | | | |
| | ≤ 1926 | 1146 - 1926 | | | | | | |
| | ≤ 2926 | 1927 - 2926 | | | | | | |
| | | | | | | | | |

- Open the Attribute
 Table of the libraries
 layer:
 - Right-click the
 layer name and
 select Show
 Attribute Table,
 or select the layer
 name and press
 Ctrl + t.
- Note that some records have <**Null**> for their address

| Ħ | tplbranchger | neralinfo | _XY1 | ableToPoint 🗙 | | | | | | ~ |
|-----|--------------|-----------|------|---------------------|-----------------|-------------------|------------------------|---------------|---------------------------|------|
| Fie | ld: 💷 Add | 🛄 Calcul | ate | Selection: 🛅 Select | By Attributes 🧃 | Zoom To 🛛 🗟 Switc | h 🔲 Clear 💭 Delete 🚽 | Сору | | ≡ |
| | OBJECTID * | Shape * | _id | BranchCode | PhysicalBranch | BranchName | Address | PostalCode | Website | Te ^ |
| 1 | 1 | Point | 1 | АВ | 1 | Albion | 1515 Albion Road, Tor | M9V 1B2 | https://www.tpl.ca/albion | 41 |
| 2 | 2 | Point | 2 | ACD | 1 | Albert Campbell | 496 Birchmount Road, | M1K 1N8 | https://www.tpl.ca/albert | 41 |
| 3 | 3 | Point | 3 | AD | 1 | Alderwood | 2 Orianna Drive, Toron | M8W 4Y1 | https://www.tpl.ca/alderv | 41 |
| 4 | 4 | Point | 4 | AG | 1 | Agincourt | 155 Bonis Avenue, Tor | M1T 3W6 | https://www.tpl.ca/agincc | 41 |
| 5 | 5 | Point | 5 | АН | 1 | Armour Heights | 2140 Avenue Road, To | M5M 4M7 | https://www.tpl.ca/armou | 41 |
| 6 | 6 | Point | 6 | AL | 0 | Answerline | <null></null> | <null></null> | https://www.tpl.ca/contac | 41 |
| 7 | 7 | Point | 7 | AN | 1 | Annette Street | 145 Apporto Street Tar | M60 102 | https://www.tpl.ca/annett | 41 |
| 8 | 8 | Point | 8 | AP | 1 | Amesbury Park | 1565 Lawrence Avenue | M6L 1A8 | https://www.tpl.ca/amest | 41 |
| 9 | 9 | Point | 9 | BB | 1 | Brookbanks | 210 Brookbanks Drive, | M3A 2T8 | https://www.tpl.ca/brook | 41 |
| 10 | 10 | Point | 10 | BC | 1 | Black Creek | North York Sheridan M | M3L 1B2 | https://www.tpl.ca/blackc | 41 |
| 11 | 11 | Point | 11 | BD | 1 | Bendale | 1515 Danforth Road, T | M1J 1H5 | https://www.tpl.ca/benda | 41 |
| 12 | 12 | Point | 12 | BE | 1 | Beaches | 2161 Queen Street Eas | M4L 1J1 | https://www.tpl.ca/beach | 41 |
| 13 | 13 | Point | 13 | BF | 1 | Barbara Frum | 20 Covington Road. To | M6A 2C1 | https://www.tpl.ca/barba | 41 |
| 14 | 14 | Point | 14 | BKONE | 0 | Bookmobile One | <null></null> | <null></null> | https://www.tpl.ca/bookn | 1> |
| 15 | 15 | Point | 15 | вктюо | 0 | Bookmobile Two | <null></null> | <null></null> | https://www.tpl.ca/bookn | 1> |
| 16 | 16 | Point | 16 | BL | Í | Bloor/Gladstone | 1101 Bloor Street West | M6H 1M7 | https://www.tpl.ca/bloor | 41 |
| 17 | 17 | Point | 17 | BR | 1 | Brentwood | 36 Brentwood Road N | M8X 2B5 | https://www.tpl.ca/brentv | 41 |
| 18 | 18 | Point | 18 | BRW | 1 | Bridlewood | Bridlewood Mall, 157A | M1W 258 | https://www.tpl.ca/bridle | 41 ~ |
| < (| | | | | | | | | | |
| | | ▶ 0 of ' | 112 | selected | | | Filters: 🚇 | 📨 🌆 🎄 🗉 — | + 100% - | 12 |

- These records also lack latitude and longitude information, and are not displayed anywhere on the map
- Let's filter out these layers to exclude them from further analysis

| Ŧ | III tplbranchgeneralinfoXYTableToPoint X | | | | | | | | | | |
|----------|---|---------------|-------------|---------------|---------------|---------------|------------------------|---------------|---------------|-----------------------|-----------------|
| Fiel | Field: 🖽 Add 🖽 Calculate Selection: 🏝 Select By Attributes 🚭 Zoom To 😤 Switch 🖃 Clear 💭 Delete 🚍 Copy 🚍 | | | | | | | | | | |
| | cyProgram | Workstations | ServiceTier | Lat | Long | NBHDNo | NBHDName | TPLNIA | WardNo | WardName | PresentSiteYear |
| 1 | 1 | 38 | DL | 43.739826 | -79.584096 | 2 | Mount Olive-Silverston | <u>i</u> | 1 | Etobicoke North | 2017 |
| 2 | 0 | 36 | DL | 43.708019 | -79.269252 | 120 | Clairlea-Birchmount | 1 | 20 | Scarborough Southwest | 1971 |
| З | Ö | 7 | NL | 43.601944 | -79.547252 | 20 | Alderwood | 0 | 3 | Etobicoke-Lakeshore | 1999 |
| 4 | 0 | 42 | DL | 43.785167 | -79.29343 | 118 | Tam O'Shanter-Sullivan | 0 | 22 | Scarborough-Agincourt | 1991 |
| 5 | 0 | 5 | NL | 43.739337 | -79.421889 | 39 | Bedford Park-Nortown | 0 | 8 | Eglinton-Lawrence | 1982 |
| 6 | <null></null> | <null></null> | RR | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> |
| 7 | 0 | 11 | NL | 43.663359 | -79.466348 | 90 | Junction Area | 0 | 4 | Parkdale-High Park | 1908 |
| 8 | 0 | 6 | NL | 43.706456 | -79.485726 | 30 | Brookhaven-Amesbury | 1 | 5 | York South-Weston | 1967 |
| 9 | 0 | 9 | NL | 43.759507 | -79.325904 | 150 | Fenside-Parkwoods | 0 | 16 | Don Valley East | 1968 |
| 10 | 0 | 7 | NL | 43.721219 | -79.510467 | 26 | Downsview-Roding-CFB | 1 | 7 | Humber River-Black Cr | 2002 |
| 11 | 0 | 9 | NL | 43.751063 | -79.244052 | 157 | Bendale South | 1 | 21 | Scarborough Centre | 1961 |
| 12 | 0 | 12 | NL | 43.67013 | -79.298526 | 63 | The Beaches | 0 | 19 | Beaches-East York | 1914 |
| 13 | 1 | 30 | DL | 43 720752 | -79 432215 | 32 | Englemount-Lawrence | 0 | 8 | Eglinton-Lawrence | 1992 |
| 14 | <null></null> | <null></null> | NL | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> |
| 15 | <null></null> | <null></null> | NL | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> | <null></null> |
| 16 | 0 | 36 | DL | 43.659878 | -79.434022 | 83 | Dufferin Grove | 0 | 9 | Davenport | 1913 |
| 17 | 0 | 33 | DL | 43.647448 | -79.514259 | 15 | Kingsway South | 0 | 3 | Etobicoke-Lakeshore | 1955 |
| 18 | Ö | 7 | NL | 43.797144 | -79.31777 | 147 | L'Amoreaux West | 0 | 22 | Scarborough-Agincourt | 1992 🗸 |
| <u> </u> | | | | | | | | | | | > |
| | | ▶ 0 of 112 | selected | | | | Filt | ers: 🔘 🛛 | II 🖉 | | + 100% - 2 |

- Open the layer's
 Properties and select
 the Definition Query
 tab.
- Definition queries

 allow you to display
 only the subset of
 data that meets the
 conditions you set.
- Click New Definition
 Query.

| Layer Properties: tplbranchgeneralinformation2023_XYTableToPoint | | × |
|---|---------|---|
| General Metadata Source Elevation Selection Display Cache Definition Query Time Range Indexes Joins Relates Page Query Page Query | | |
| | Li tokk | |

Create the query:
 Where Lat is not
 null And Long is not
 null

- Click Apply.
- Click OK.

| /er Properties: tplł | oranchgeneralinformation2023_XYTableToPoint | |
|----------------------|---|------------------------------------|
| eneral | Definition Queries | + New definition query > 🕸 |
| 1etadata | | |
| ource | 🕑 Query 1 | |
| levation | | SQL 🔿 |
| election | | |
| isplay | Where Lat T is not null | × |
| ache | And * Long * is not null * | × |
| efinition Query | | |
| ime | + Add Clause | |
| ange | | |
| ndexes | | Apply Cancel |
| bins | | |
| elates | | |
| age Query | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | 1 Queries | Active definition query: Query 1 周 |
| | | |
| | | OK Cancel Apply |
| | | |

 Only the records that are associated with a physical location remain

| Field: 🖽 Add 🕮 Calculate Selection: 🏪 Select By A | | Selection: 🛅 S | elect By Attributes 🛛 🗯 | butes 🧬 Zoom To 📲 Switch 🔲 Clear 👼 Delete 🚽 Copy | | | | | | |
|---|-----------|----------------|-------------------------|--|----------------|-----------------|-------------------------|------------|-----------------------------|----|
| _ 01 | BJECTID * | Shape * | _id | BranchCode | PhysicalBranch | BranchName | Address | PostalCode | Website | Te |
| 1 1 | | Point | 1 | АВ | 1 | Albion | 1515 Albion Road, Tor | M9V 1B2 | https://www.tpl.ca/albion | 41 |
| 22 | | Point | 2 | ACD | 1 | Albert Campbell | 496 Birchmount Road, | M1K 1N8 | https://www.tpl.ca/albert | 41 |
| 3 3 | | Point | 3 | AD | 1 | Alderwood | 2 Orianna Drive, Toron | M8W 4Y1 | https://www.tpl.ca/alderv | 41 |
| 4 4 | | Point | 4 | AG | 1 | Agincourt | 155 Bonis Avenue, Tor | M1T 3W6 | https://www.tpl.ca/agincc | 41 |
| 5 5 | | Point | 5 | АН | 1 | Armour Heights | 2140 Avenue Road, To | M5M 4M7 | https://www.tpl.ca/armou | 41 |
| 67 | | Point | 7 | AN | 1 | Annette Street | 145 Annette Street, Tor | M6P 1P3 | https://www.tpl.ca/annett | 41 |
| 7 8 | | Point | 8 | AP | 1 | Amesbury Park | 1565 Lawrence Avenue | M6L 1A8 | https://www.tpl.ca/amest | 41 |
| 39 | | Point | 9 | вв | 1 | Brookbanks | 210 Brookbanks Drive, | МЗА 2Т8 | https://www.tpl.ca/brook | 41 |
| 9 10 |) | Point | 10 | вс | 1 | Black Creek | North York Sheridan M | M3L 1B2 | https://www.tpl.ca/blackc | 41 |
| 10 11 | L. | Point | 11 | BD | 1 | Bendale | 1515 Danforth Road, T | M1J 1H5 | https://www.tpl.ca/benda | 41 |
| 11 12 | E. | Point | 12 | BE | 1 | Beaches | 2161 Queen Street Eas | M4L 1J1 | https://www.tpl.ca/beach | 41 |
| 12 13 | Ì | Point | 13 | BF | 1 | Barbara Frum | 20 Covington Road, To | M6A 3C1 | https://www.tpl.ca/barba | 41 |
| 13 16 | ; | Point | 16 | BL | 1 | Bloor/Gladstone | 1101 Bloor Street West | M6H 1M7 | https://www.tpl.ca/bloorg | 41 |
| 14 17 | • | Point | 17 | BR | 1 | Brentwood | 36 Brentwood Road N | M8X 2B5 | https://www.tpl.ca/brentv | 41 |
| 15 18 | 1 | Point | 18 | BRW | 1 | Bridlewood | Bridlewood Mall, 157A | M1W 258 | https://www.tpl.ca/bridle | 41 |
| 16 19 | ſ | Point | 19 | BUR | 1 | Burrows Hall | 1081 Progress Avenue, | M18 5Z6 | https://www.tpl.ca/burrov | 41 |
| 17 20 |) | Point | 20 | сс | 1 | Cliffcrest | 3017 Kingston Road, T | M1M 1P1 | https://www.tpl.ca/cliffcre | 41 |
| 18 21 | E I | Point | 21 | CE | 1 | Centennial | 578 Finch Avenue West | M2R 1N7 | https://www.tpl.ca/center | 41 |
| 9 22 | | Point | 22 | CED | 1 | Cedarbrae | 545 Markham Road, T | M1H 2A1 | https://www.tpl.ca/cedarl | 41 |
| | | | | | | ate | •••••• •••••• | | the as a distribution | ļ |

Geoprocessing

- Geoprocessing tools allow users to transform spatial layers and related data
- Typically accept input layer(s) along with other parameters, and output a new layer.
- ArcGIS Pro includes hundreds of geoprocessing tools

- From the Analysis Tab/ Geoprocessing group, click the **Tools** button.
- The Geoprocessing Pane will appear.



| Geoprocessing | ~ † × |
|---|-------|
| € 🛠 Find Tools P | • 🕀 |
| Favorites Toolboxes Portal | |
| ✓ Suggestions 9 | |
| 📕 XY Table To Point (Data Management Tools) | |
| Select Layer By Attribute (Data Management Tools) | |
| Sectors (Conversion Tools) | |
| K Copy Features (Data Management: Tools) | |
| ✓ Project Favorites | |
| Calculate Field (Data Management Tools) | |
| Y Pairwise Buffer (Analysis Tools) | |
| Near (Analysis Tools) | |
| Y Pairwise Dissolve (Analysis Tools) | |
| Spatial Join (Analysis Tools) | |
| Y Pairwise Intersect (Analysis Tools) | |
| > Recent | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

• Search for **Buffer** and click the first result.



| processing | ~ # × |
|------------|-------|
| ∻ buffer | × |

Buffer (Analysis Tools)

Creates buffer polygons around input features to a specified distance.

Buffer 3D (3D Analyst Tools)

Creates a 3D buffer around points or lines to produce spherical or cylindrical multipatch features.

Pairwise Buffer (Analysis Tools)

Creates buffer polygons around input features to a specified distance using a parallel processing approach.

Graphic Buffer (Analysis Tools)

Creates buffer polygons around input features to a specified distance. A number of cartographic shapes are available for buffer ends (caps) and corners (joins) when...

1 DE

Multiple Ring Buffer (Analysis Tools)

Creates multiple buffers at specified distances around the input features. These buffers can be merged and dissolved using the buffer distance values to crea...

Create Buffers (GeoAnalytics Desktop Tools)

Creates buffers around input features to a specified distance.



Enrich Layer (Business Analyst Tools)

Enriches data by adding demographic and landscape facts about the people and places that surround or are inside data locations.

Catalog Geoprocessing Symbology

Parameters:

- Input Features: Libraries
- Distance: **1 kilometre**
- Click Run.

| oprocessing | ~ # × |
|--------------------------------------|--|
| В | uffer 🕀 |
| | |
| The Pairwise Buffer tool provides en | hanced functionality or performance. X |
| ameters | ۳ ۵ |
| put Features | |
| olbranchgeneralinformation2023_XYTal | oleToPoint 🚽 🖬 🖊 🗸 |
| utput Feature Class | |
| olbranchgeneralinfor_Buffer | |
| stance [value or field] | Linear Unit 🔹 👻 |
| | Kilometers ~ |
| ethod | |
| lanar | ~ |
| ssolve Type | |
| o Dissolve | <u>e</u> |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | 💽 Run 👻 |
| log Geoprocessing Symbology | |
| | |
| | |

Result:



| ×. | Geoprocessing | ф × |
|--------------|---|----------|
| | E Buffer | \oplus |
| | The Dalpuics Buffer tool provider enhanced functionality or performance | × |
| 4 | Become terre Control provides enhanced functionality of performance. | |
| The | Parameters Environments | w w |
| 0 | Input Features | |
|). | tplbranchgeneralinformation2023_XYTableToPoint ~ 🗁 🦻 | /~ |
| 1 | 🛕 Output Feature Class | |
| 2 | tplbranchgeneralinfor_Buffer | 1 |
| m | Distance Ivalue or Fold | 1 |
| L | Intervence (value or neid) | |
| Lagrene | Kiometers | |
| • | Method | |
| A | Planar | <u> </u> |
| tice | Dissolve Type | |
| \checkmark | No Dissolve | |
| 1ª | | |
| | | |
| 1.a | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | Due Due | |
| | Kur | |
| - | Buffer completed with warnings. | × |
| Ħ | View Details Open History Suggestions | |
| 11 12 | Catalog Geoprocessing Symbology | |
| | | |

Raster data

- Geographic information expressed as a grid of pixels (also called 'cells').
- Each pixel represents a specific value, such as elevation, temperature, or land cover class.
- Common file formats:
 - TIFF/GeoTIFF Very common in desktop publishing and GIS
 - Esri Grid Proprietary ArcGIS format
 - NetCDF Multidimensional raster data

- Add the dm_620483.tif
 file from the workshop
 data to the map
- Double click on the layer name in the
 Contents pane to view the layer's properties.



 Note the number of columns and rows, number of bands, cell size, and spatial reference.

| General | | |
|----------------------|-----------------|------|
| Metadata | ✓ Data Source | |
| Source | Data Type | Ra |
| Elevation | Location | U: |
| Display | Name | dn |
| Cache | Vertical Units | M |
| Time | | |
| Processing Templates | * Raster Inform | nat |
| Joins | Columns | |
| Relates | Rows | |
| | Number of B | and |
| | Cell Size X | |
| | Cell Size Y | |
| | Uncompress | ed S |
| | Format | |
| | Source Type | |
| | Pixel Type | |
| | Pixel Depth | |
| | NoData Valu | e |
| | Colormap | |
| | Pyramids | |
| | Compression | |
| | Mensuration | Cap |
| | ✓ Band Metad | ata |
| | ∽ Band_1 | |
| | Source Ban | d In |
| | > Statistics | |
| | > Extent | |

| | | | | × | i. |
|------------|---|--------------|------|----------|----|
| | ſ | Set Data Sou | irce | <u>^</u> | |
| laster | ال ایر | | B | | |
| J:\STAFF\C | oleWhite\workshops\ProLoadingAndManipulatingData\data | | | | |
| lm_620483 | 3.tif | | | | |
| /leter | | | | | |
| tion | | | | | |
| | 4401 | | B | | |
| | 4401 | | | | |
| ds | 1 | | 1 | | |
| | 5 | | | | |
| | 5 | | - 2 | | |
| Size | 73.89 MB | | | | |
| | TIFF | | | | |
| | Generic | | | | |
| | floating point | | | | |
| | 32 Bit | | | | |
| | -3.4028231e+38 | | | | |
| | absent | | | | |
| | levels: 3, resampling: Nearest Neighbor | | | | |
| | None | | | | |
| pabilities | Basic | | | | |
| a | | | | | l |
| ndex 1 | | | B | | |
| | | | | ~ | |
| | ОК | Cancel | App) | | |
| | | | | | |

 The Explore tool can be used to query pixel (elevation) values



• From the Edit tab/Selection group, choose the **Select** tool.

| Project | Мар | Insert | Analysis | View | Edit | Imagery | Share |
|------------|----------|-----------|---------------|------------|--------|---------|----------|
| ■ 書 % c | iut | Rì | 📝 🔤 No To | pology | 🔹 🐶 St | tatus | |
| Paste 🛱 C | ору | Save Disc | ard 🔣 Error I | nspector | 췋 Se | ettings | Snapping |
| - 🔤 C | opy Path | | 📑 Manag | ge Templat | es | | * |
| Clipbo | ard | | Manag | e Edits | | य | Snapping |
| | | | | | | | |



 Click within the map view to select one of the neighbourhood polygons.



From the
 Geoprocessing pane,
 open the Extract by
 Mask tool.

| Geoprocessing ~ 4 × | |
|---|--|
| | |
| Extract by Mask (Spatial Analyst Tools) Extracts the cells of a raster that correspond to the areas defined by a mask. | |
| <u>^</u> | |
| Entrant by Dector also in the Life Solid | |
| Extracts the cells of a raster based on a rectangle by specifying the rectangle's extent. | |
| ^ | |
| Clin Pactor /Data / Jose and Taxia | |
| Clip Raster (Data Management Tools) | |
| service layer. | |
| | |
| Extract by Polygon (Spatial Analyst Tools) | |
| Extracts the cells of a raster based on a polygon by specifying the polygon's vertices. | |
| | |
| Extract by Attributes (Spatial Analyst Tools) | |
| Extracts the cells of a raster based on a logical query. | |
| 5 | |
| Clip (Analysis Tools) | |
| Extracts input features that overlay the clip features. | |
| | |
| Extract by Circle (Spatial Analyst Tools) | |
| Extracts the cells of a raster based on a circle by specifying the circle's center and radius. | |
| × | |
| 24 Items 🔠 🗄 🗄 | |
| atalog Geoprocessing Symbology | |

Input Parameters:

- Input raster: DEM
- Input raster or feature mask data: The neighbourhoods layer
- Note that the tool honours the layer selection
- Click Run.

| oproces | sing | ~ å × |
|--------------|-----------------------------|----------|
| | Extract by Mask | \oplus |
| ameters | Environments | ? |
| put raster | | |
| im_620483 | 3.tif | - 🗁 |
| put raster | or feature mask data | |
| leighbourh | oods_socialhousing_joined ~ | 🖻 / · |
| 🚺 Use t | he selected records: 1 | |
| utput raste | er | |
| xtract_dm_ | _61 | |
| traction A | rea | |
| nside | | ~ |
| nalysis Exte | ent | |
| L 1/2 / | - 😁 阔・ ・ク | |
| ✓ X and Y | Extent | |
| Тор | 4851002.5 | |
| Left | 618997.5 | |
| Right | 641002.5 | |
| Bottom [| 4828997.5 | |
| ← Extent C | Coordinate System | ~ |
| NAD 198 | 3 UTM Zone 17N | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | Run Y |
| log Geor | processing Symbology | |
| | | |

Result:



Getting Help

- From the **Help** tab in Pro, choose **Help -> Online Help**
- A website will be launched where you can access detailed documentation for the latest version of Pro.



| | | | 🗉 🏠 Q Se | arch | | |
|---|---|--------------------------------------|--|---|---|-------------|
| Stories ~ Abo | out ~ | | | | Q | ● 2 |
| | Overview | Extensions | Features 👻 | Resources | Free Trial | Pricing |
| grate from ArcMap | | | 1. | | 21 m | |
| arch ArcGIS Pro help | | Q | | | | |
| | | | | | | |
| O NEIP versions ↓ Help arcl tial application for creat ize, analyze, compile, ar | hive ing and workin nd share your d | g with spatial dat ata. | ta on your desktop. | In this to Create p Map and Perform It geoproc Manage | ppic rojects I visualize your c analysis and essing and edit your di | lata ata |
| ects | | | | Use task Share yo | s to streamline y ur wor <mark>k</mark> | our work |
| our GIS work into project er representations of sp | cts. A project ca | n contain maps, atial data. A pro | scenes, layouts, ject also contains | Access le | earning resource | 25 |
| ources such as system f | folders, databas | es, toolboxes, se | ervers, styles, and | | | |

Getting Help

- Visit <u>https://</u> <u>www.esri.com/</u> <u>training/</u> and log in with your UTORid.
- The Course Catalog contains many helpful, beginnerfriendly tutorials.

| esri | Products ~ | Industries ~ | Support & Servic | es v |
|--|--|----------------------------|---------------------|---|
| 🗎 🛛 Esri A | cademy | | | |
| Course | Catalog Cour | ses by Schedule | Courses by Location | New and |
| | | | | |
| | | | | Ex |
| | | | | |
| | | | | |
| | | | Search Course | es |
| | | | Search Tips | |
| - | | lie f | | |
| P P | Ę | | | |
| Getting Star | ted ArcGI | S Products Da | ata Management | Mappin |
| | | | | |
| | | | | |
| | wing All 🜲 | PRODUCTS V | iewing All 💠 🖂 | Maintenan |
| FORMATS Vie | | | | |
| FORMATS Vie | | | | |
| FORMATS Vie Viewing Res | sults: 500 | | | |
| FORMATS Vie Viewing Res | sults: 500 | | No. | LEARNING |
| FORMATS Vie Viewing Res INSTRUCTOR- Using Arc Intelligen | sults: 500 LED GIS AllSourc | e for <mark>Geospat</mark> | ial | LEARNING Esri Arc 2025 |
| FORMATS Vie Viewing Res INSTRUCTOR- Using Arc Intelligen | sults: 500 LED GIS AllSourc ce Analysis | e for Geospat | ial | LEARNING Esri Arc 2025 Added I |



Getting Help

 Contact the Map and **Data Library**



Next Steps

- Layout creation
- Analysis
- Working with raster data
- Automation
- Artificial Intelligence/Machine Learning



Resources: Finding Spatial Data

MDL Geospatial Data Collection https://mdl.library.utoronto.ca/collections/geospatial-data

Scholars GeoPortal https://geo.scholarsportal.info

Natural Earth Data https://www.naturalearthdata.com/

Open Street Map https://www.openstreetmap.org

City of Toronto Open Data https://open.toronto.ca/

Ontario GeoHub https://geohub.lio.gov.on.ca/

Toronto and Region Conservation Authority Open Data https://data.trca.ca/

GIS at NASA https://www.earthdata.nasa.gov/learn/gis

ArcGIS Hub https://hub.arcgis.com/search Living Atlas https://livingatlas.arcgis.com/en/home/

USGS EarthExplorer https://earthexplorer.usgs.gov/

Thank you!