

Create Custom Map with *QGIS* Print Layout



EXERCISE



University
of Victoria | Libraries

Understand QGIS interface



*your interface may look different

Menu Bar

Toolbar

Layers Panel

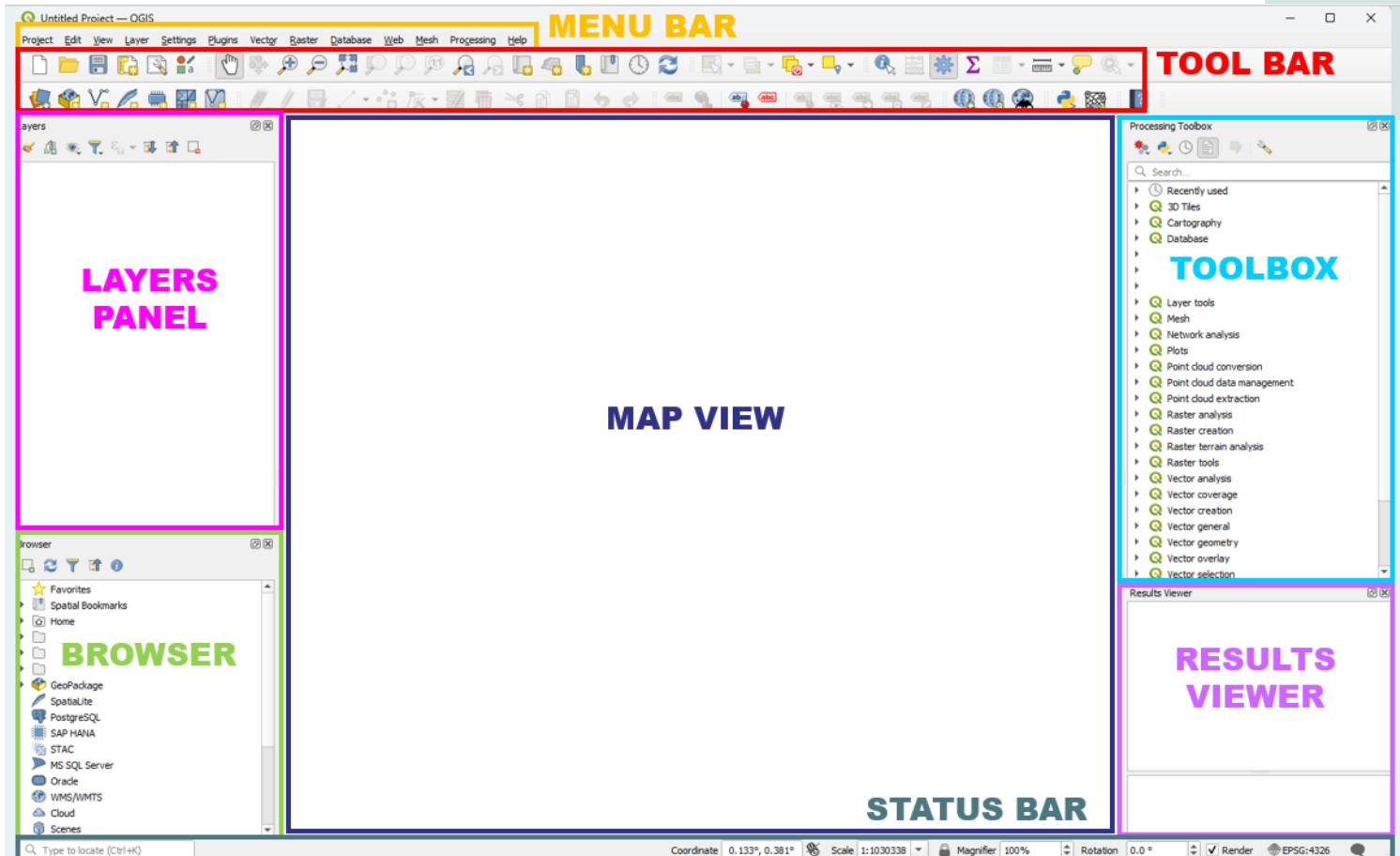
Browser

Map View

Status Bar

Toolbox

Results Viewer



Understand QGIS interface

Menu Bar: Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh HCMGIS Processing Help

Horizontal bar at top provides access to various functions and tools

(Project management, Edit, Plugins, Vector & Raster tools, etc.)



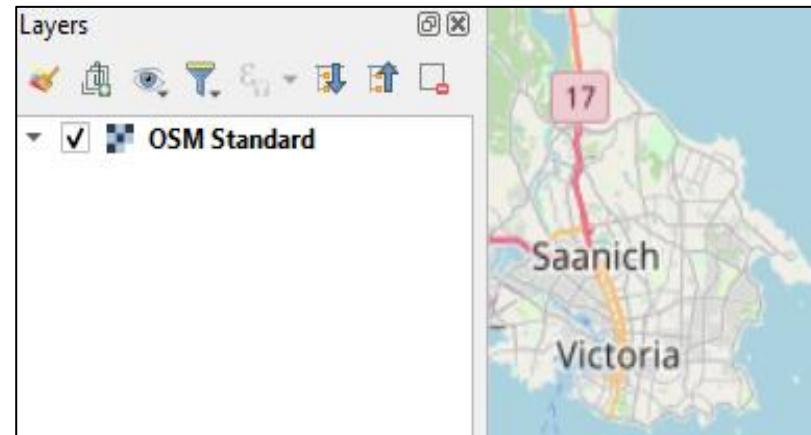
Contains icons for frequently used tools, such as Add Data, Pan, Zoom, Identify, etc.

Quick access to essential operations.

Layers Panel:

Displays all active **Layers** in the project.

Allows users to organize, manage visibility and access properties of layers

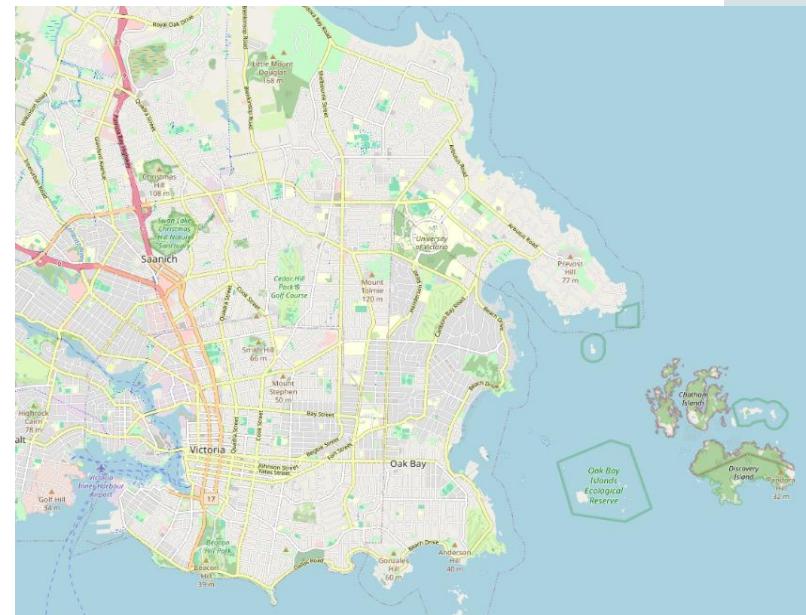


Understand QGIS interface

Map View:

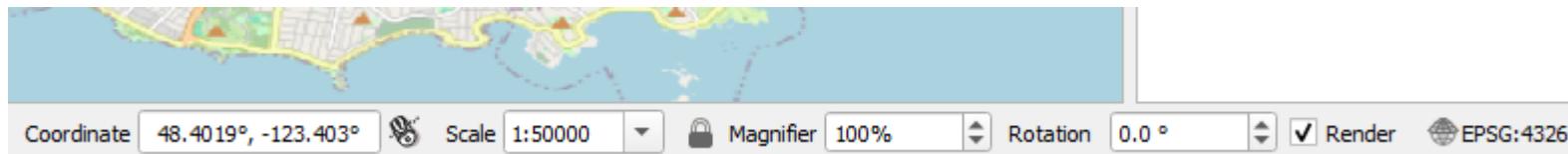
The central area where spatial data is displayed.

Users can interact with the map, visualize layers and analyze spatial relationships.



Status Bar:

Located at the bottom, it provides information about current project: coordinate display, scale and CRS settings.



Toolbar essentials

New project, open, and save



Add data

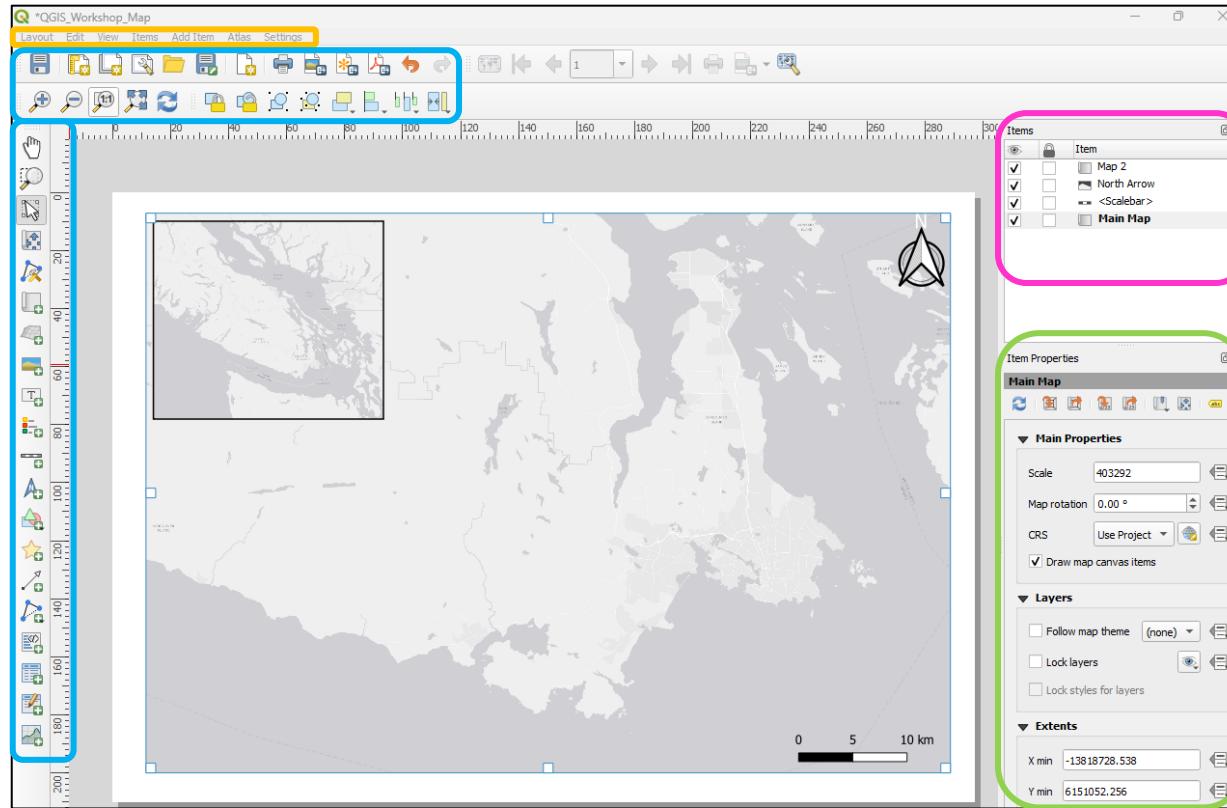
Print Layout interface

Menu Bar: Layout (save, templates, export, etc.), Add Item, Settings, etc.

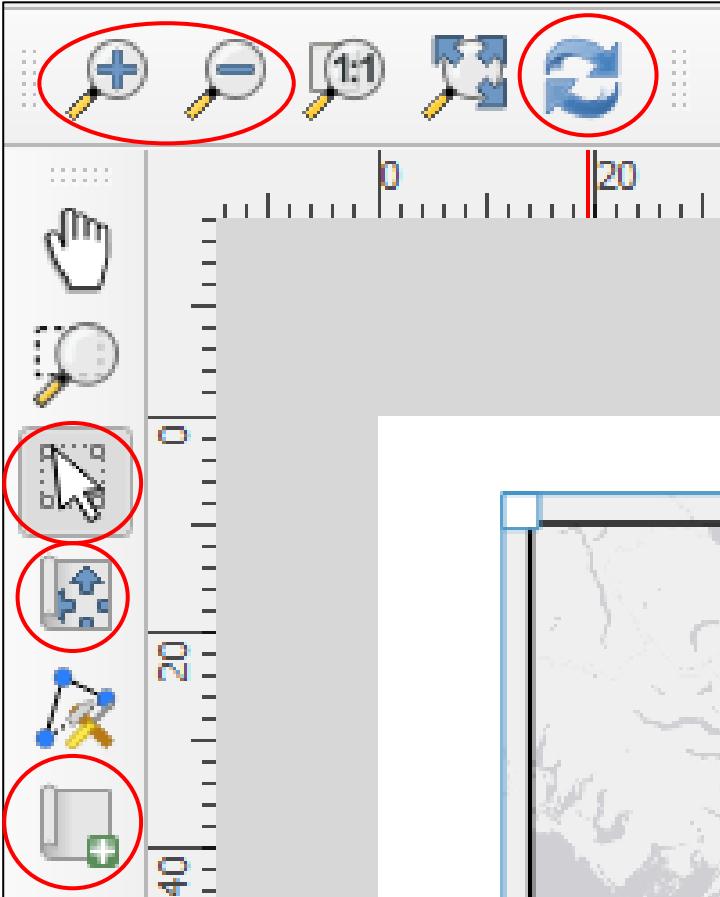
Toolbar(s): essential tools - save, open, export, zoom, add items, select/move item, etc.

Item Panel: list of items on the map – toggle view on and off, lock item, change item name, rearrange items

Item Properties: properties of selected item – many options for changing scales, fonts,, borders/frames, units, etc.



Print Layout interface: tools



Select/Move Item: move items in the print layout, opens the selected items' *Item Properties*



Move Item Content: move the map itself



Zoom: Not too useful as it Zooms in/out print layout (but not map(s)!)



Refresh: refresh print layout map to match main *QGIS* window



Add map: add map to print layout: click and drag to draw map on white sheet

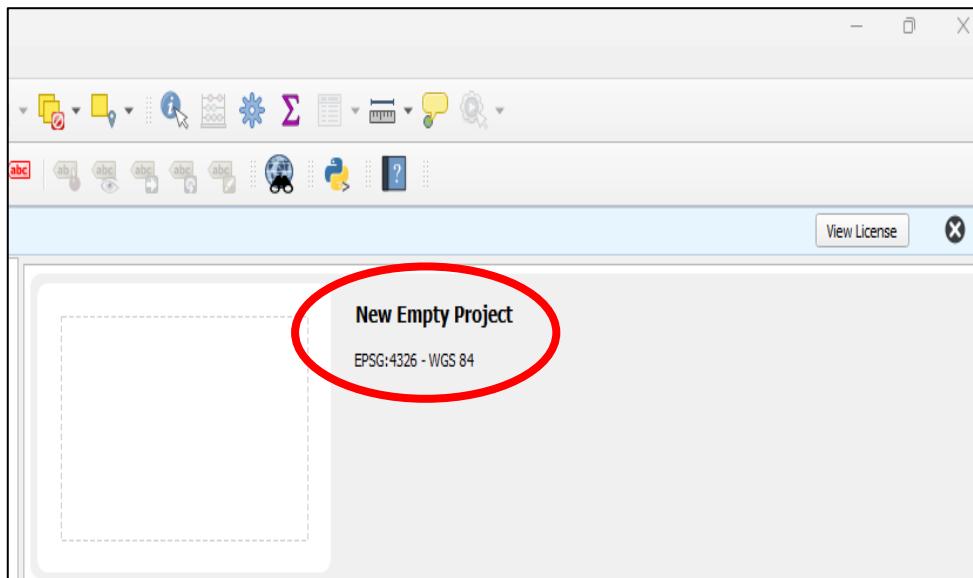
Start QGIS (if you haven't already)

Download workshop data

- Extract /unzip the .zip file
- Save it where you can find it...

Open QGIS (your version may be different)

- Double click on *New Empty Project*

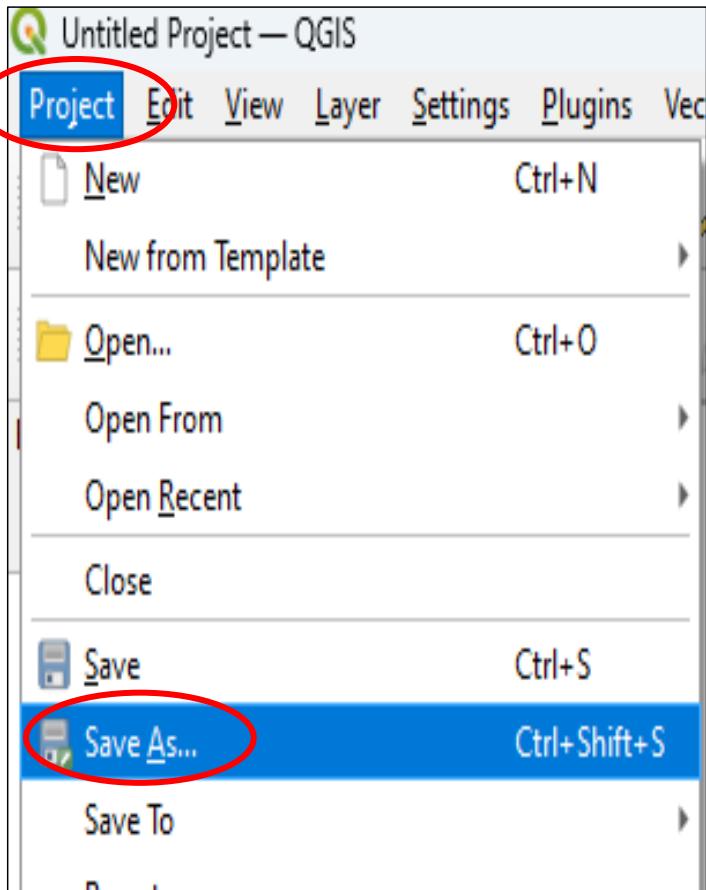


Note: New QGIS projects open with Geographic Coordinate System (GCS) **EPSG:4326**

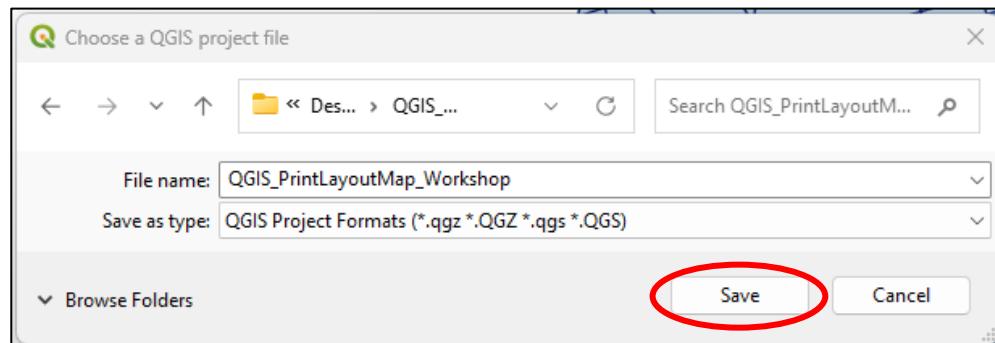
Activity #1



Save new project

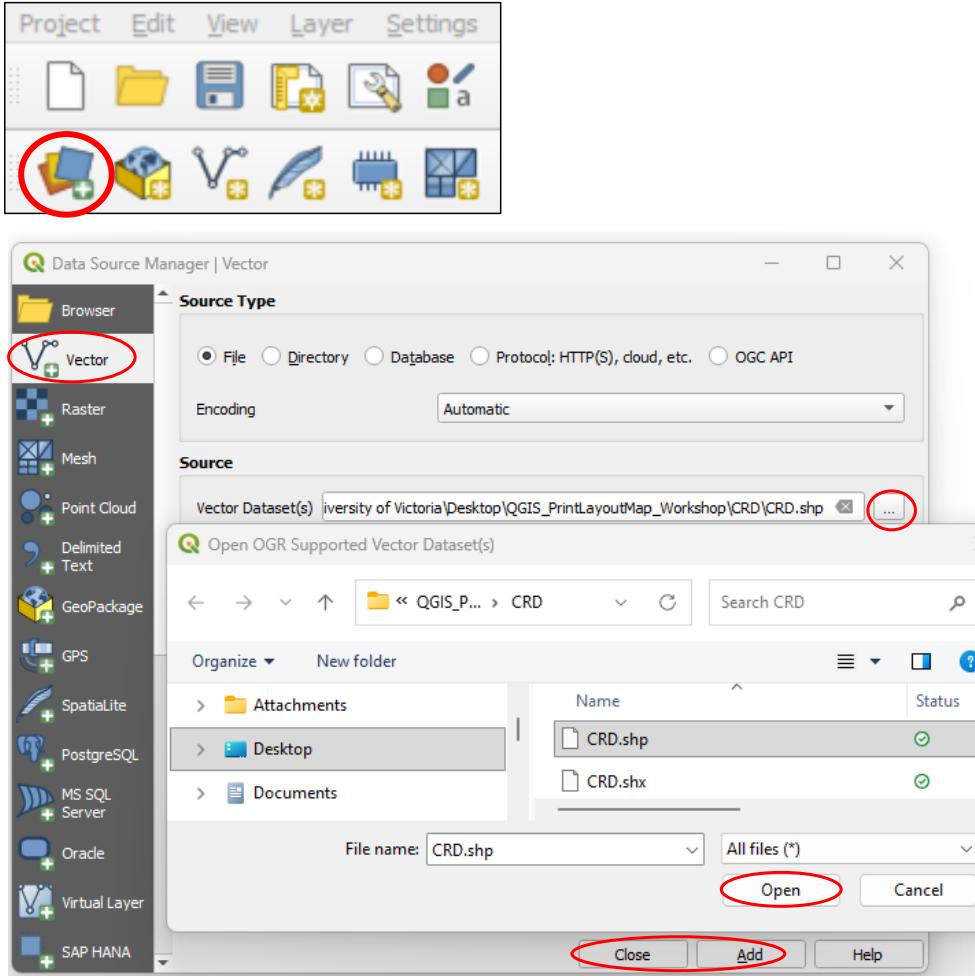


- In *QGIS* Menu Bar, select *Project* then *Save As*
- Name your project “**QGIS_PrintLayoutMap_Workshop**”
- Save your project as **.qgz** to where you can find it



Note: .qgz is the project file format for *QGIS*

Add CRD polygon shapefile



- Select *Open Data Source Manager* 

- Select the *Vector* tab

- Under the *Source* heading click the 

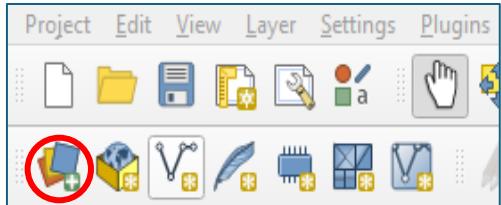
- Navigate to workshop data

- Select **CRD.shp**, Open

- **Add** and **Close**

Add TouristAttractions.csv

- Open *Data Source Manager*



- Select *Delimited Text*
- Navigate to workshop data
- Select and Open

TouristAttractions.csv

- Set X field as “Long”
and Y field as “Lat”
- **Add** (if a warning pops up, press OK)
then **Close**

The screenshot shows the 'Data Source Manager | Delimited Text' dialog. The 'Layer name' is set to 'TouristAttractions' and the 'Encoding' is 'UTF-8'. The 'File Format' section has 'CSV (comma separated values)' selected. In the 'Geometry Definition' section, 'Point coordinates' is selected, with 'X field' set to 'Long' and 'Y field' set to 'Lat'. A note 'Note: need EPSG 4326' is overlaid on the dialog. The 'Sample Data' table shows three rows of tourist attraction data:

Name	Lat	Long
abc Text (string)	1.2 Decimal (double)	1.2 Decimal (double)
1 Royal BC Museum	48.41991157	-123.3675242
2 Fisherman's Wharf	48.42278045	-123.3827426
3 Fairmont Empress	48.42199401	-123.3678634

Red numbers 3, 4, and 5 are overlaid on the dialog to indicate specific steps: 3 points to the 'File name' field; 4 points to the 'X field' and 'Y field' dropdowns; 5 points to the 'Add' button at the bottom right.

3

4

5

12

CHECK IN #1

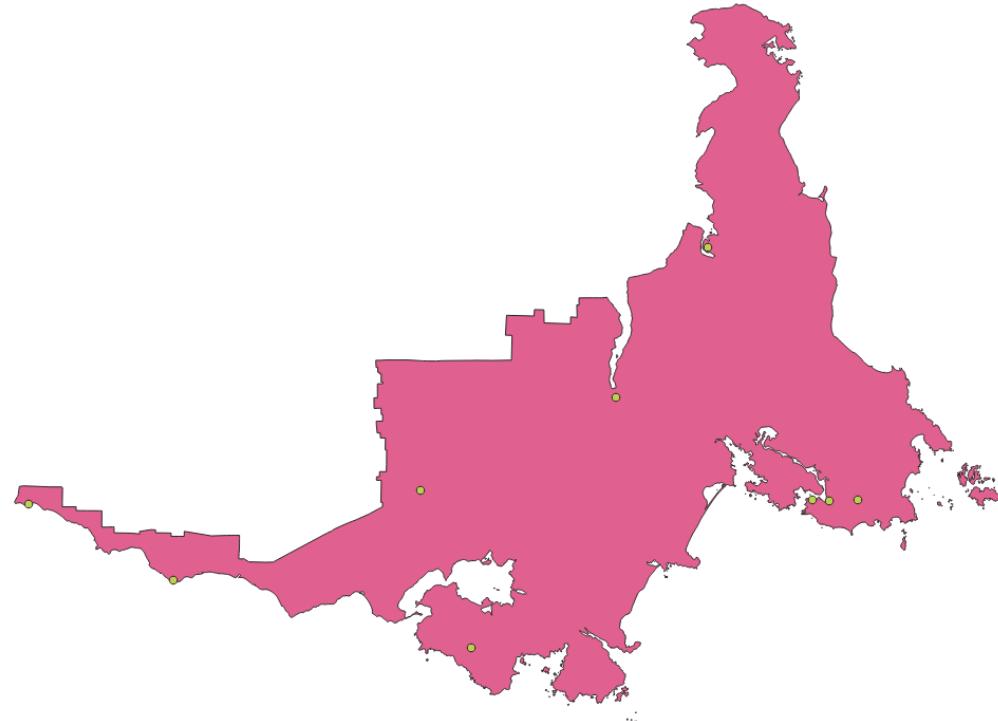
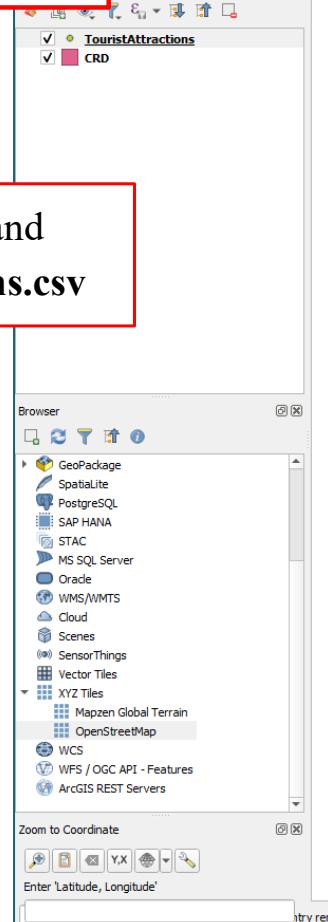
Save your work!

If you have questions, ask!

(next: add a basemap...)

- Added **CRD.shp** and **TouristAttractions.csv**

Note: your colours might be different



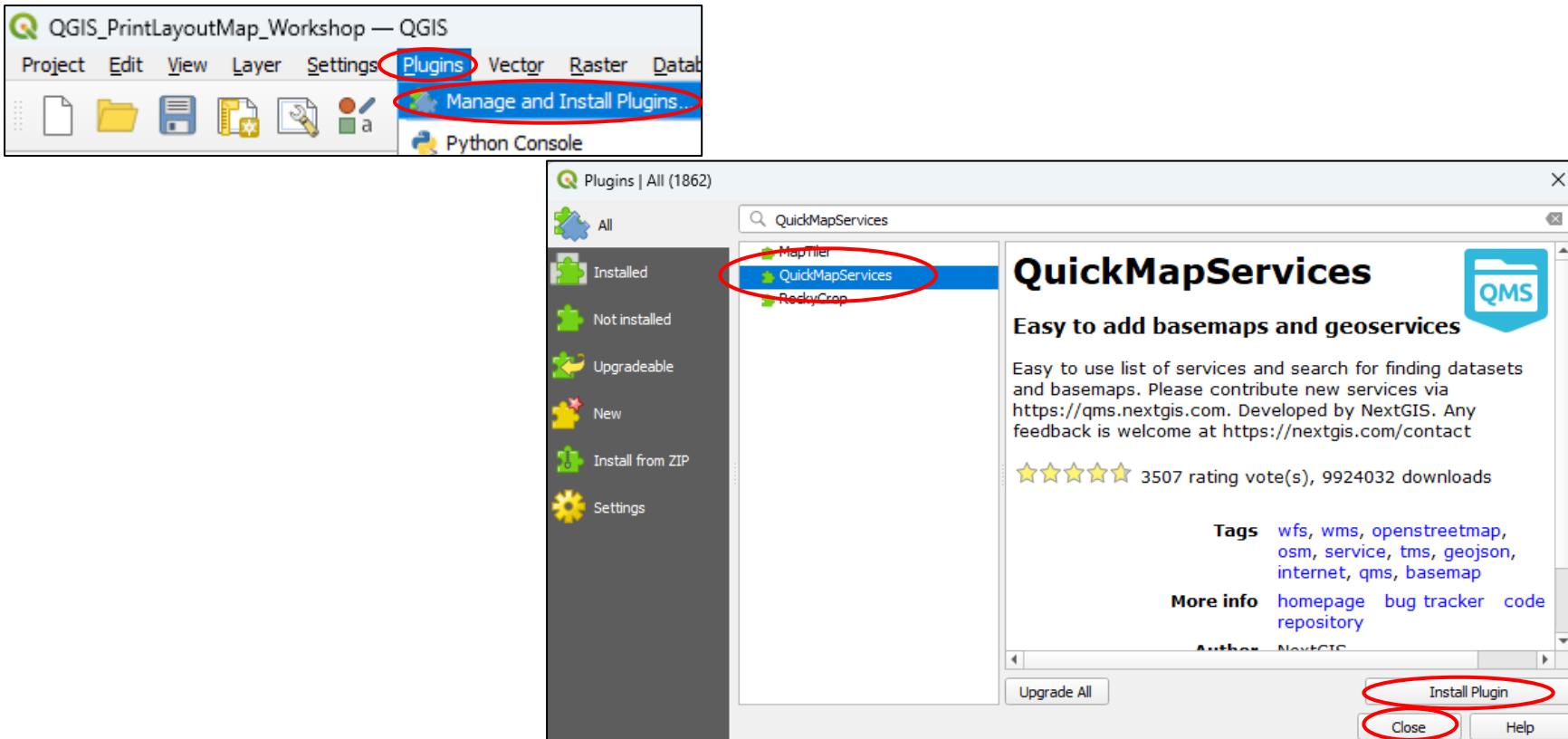
Activity #2



Add *QuickMapServices* plugin

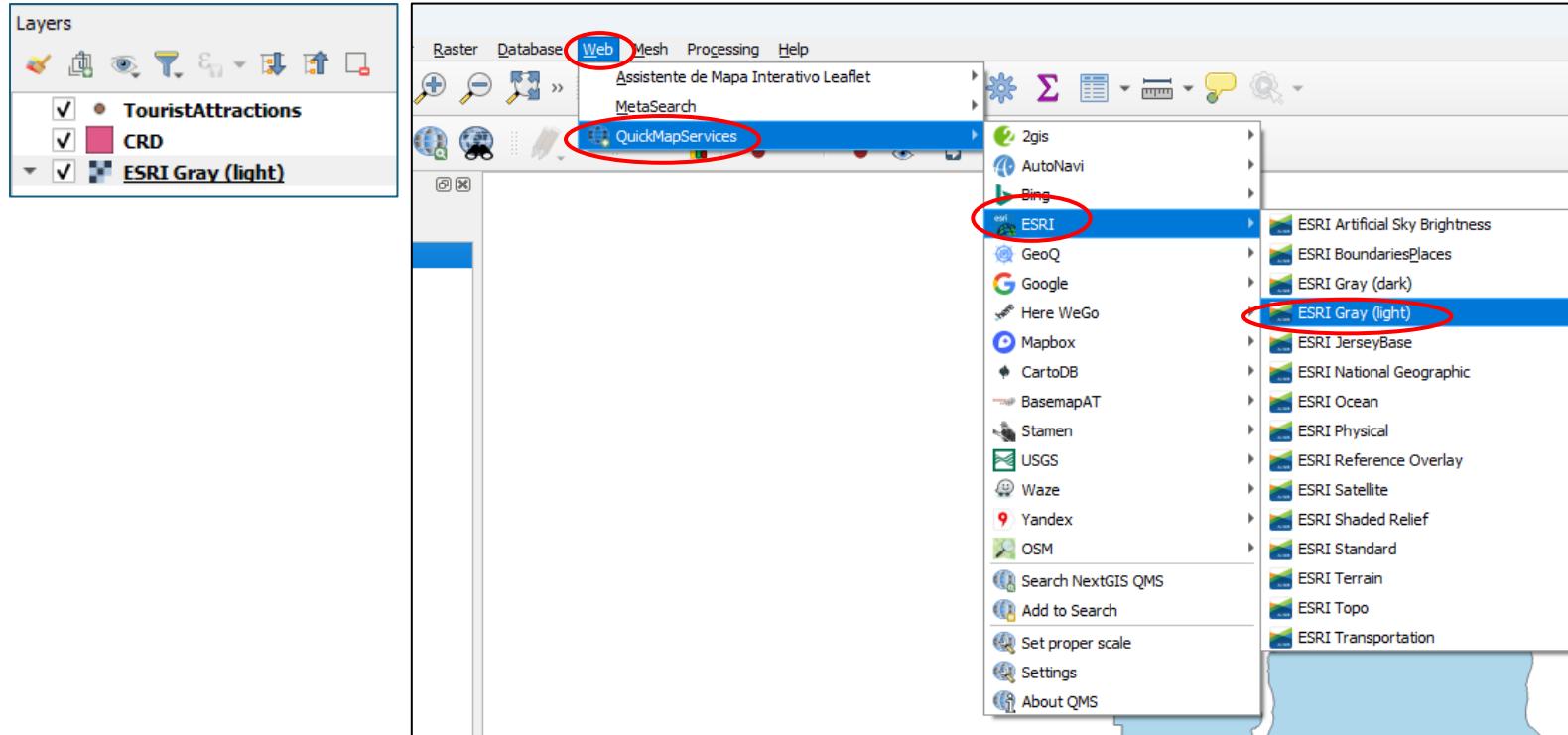
Add a basemap for location context; get many basemap options *QuickMapServices*

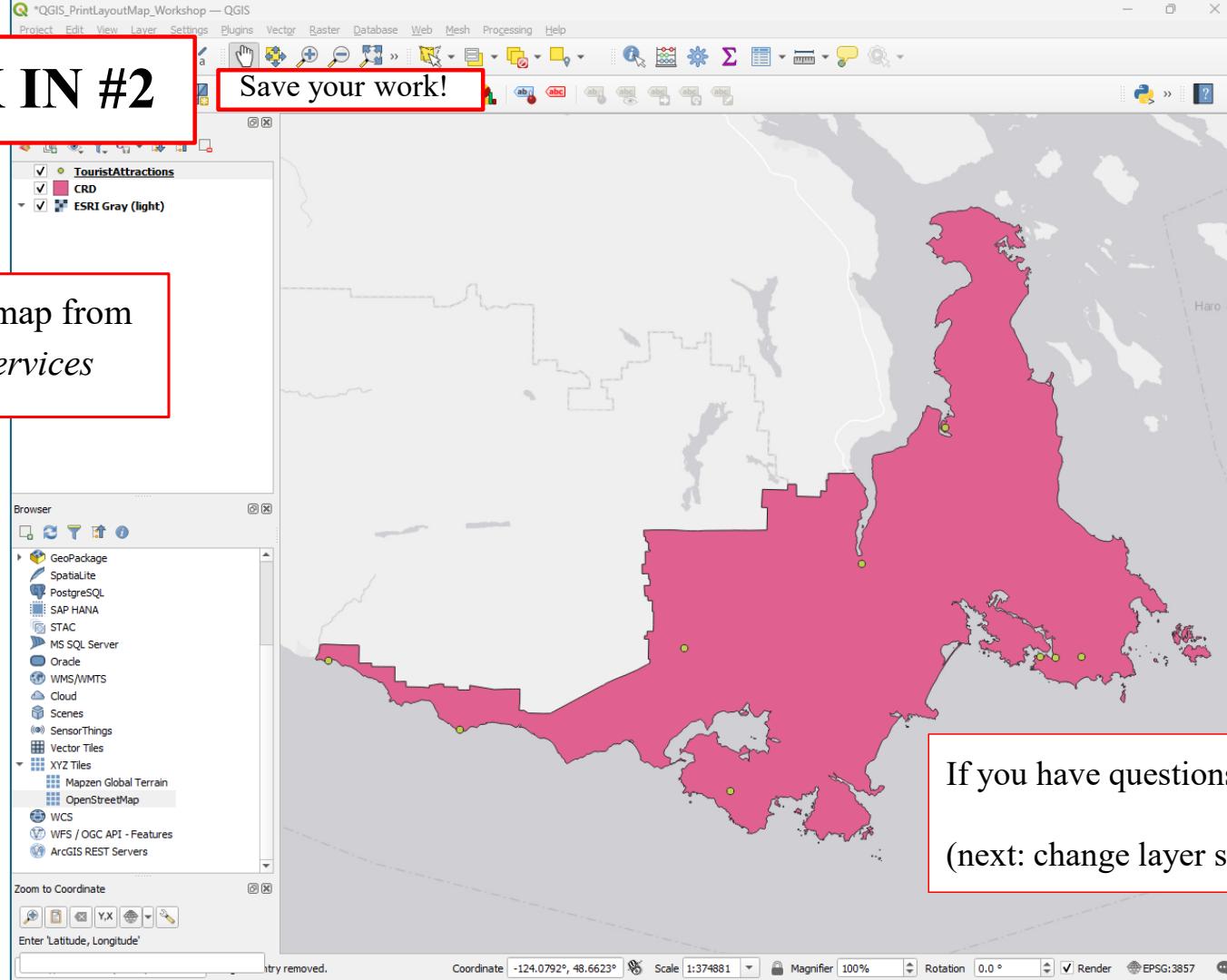
- In the *Menu* bar, select *Plugins*, then then *Manage and Install Plugin*
- Type “QuickMapServices”, select it, then *Install Plugin* and **close**



Add a basemap

- In the *Menu* bar, select *Web*, then *QuickMapServices*, then *ESRI*, then *ESRI Gray (light)*
 - If you do not see the many map options go to *Web*, then *QuickMapServices*, then *Settings*, and under *More Services*, select *Get contributed pack* and **ok**
- In **Layers**, make sure *ESRI Gray (light)* basemap is below **TouristAttractions** and **CRD**





CHECK IN #2

Save your work!

- Added basemap from *QuickMapServices*

If you have questions, **ask!**

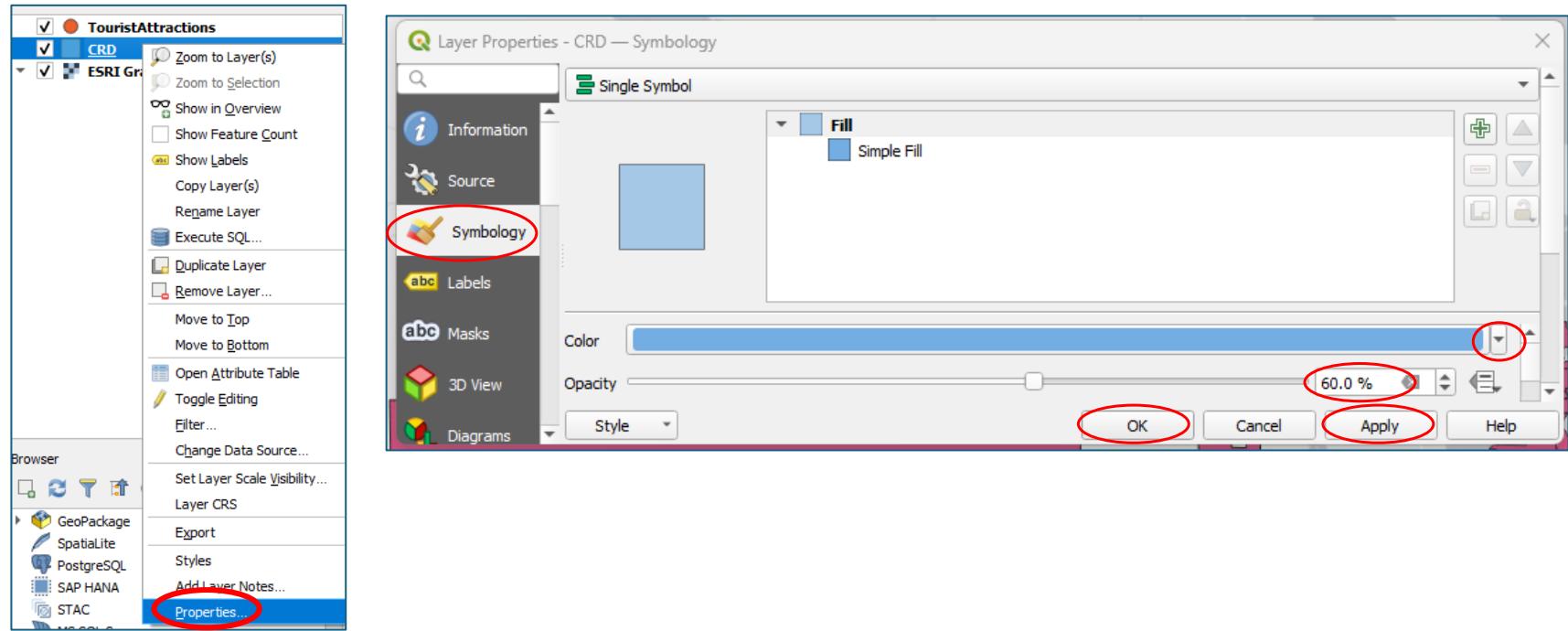
(next: change layer symbology...)

Activity #3



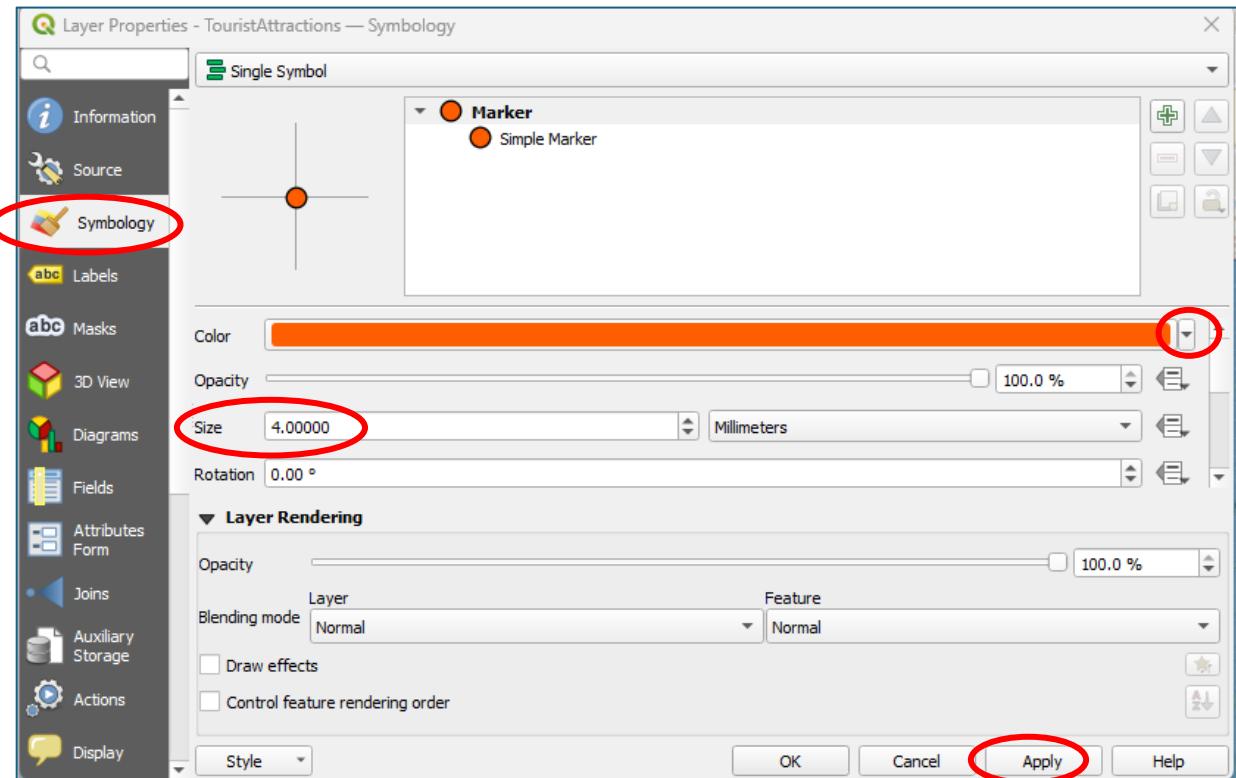
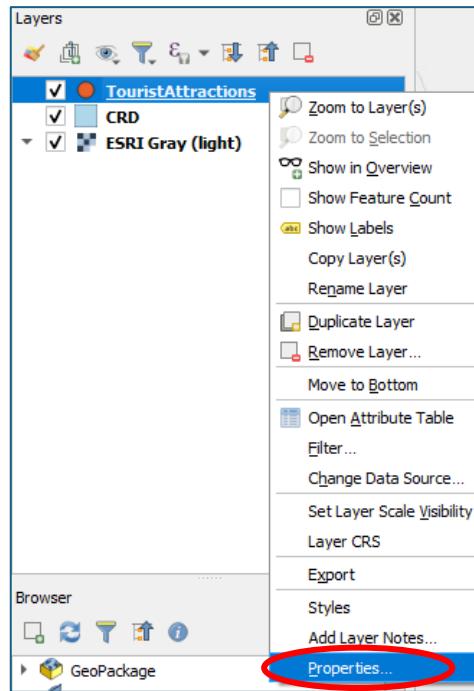
Change CRD.shp symbology

- In the *Layers* panel right click **CRD**
- Select *Properties* and then *Symbology*
- With *Colour* field, click the arrow and use colour palette to select colour of your choice
- Set *Opacity* to 60%
- **Apply** and **OK**



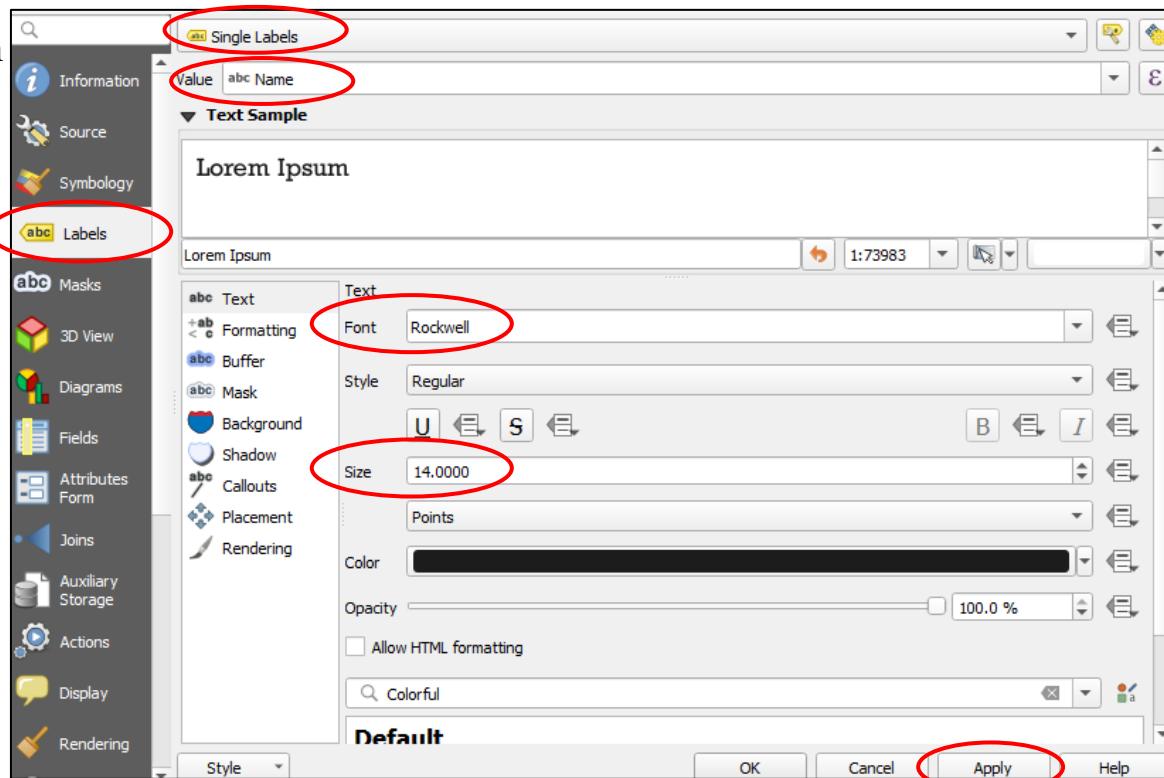
Change TouristAttractions.csv symbology

- In the *Layers* panel right click **TouristAttractions**
- Select *Properties* and then *Symbology*
- Change *Size* to 4.0
- Change *Colour* to a visible colour
- click **Apply** but not **OK** yet



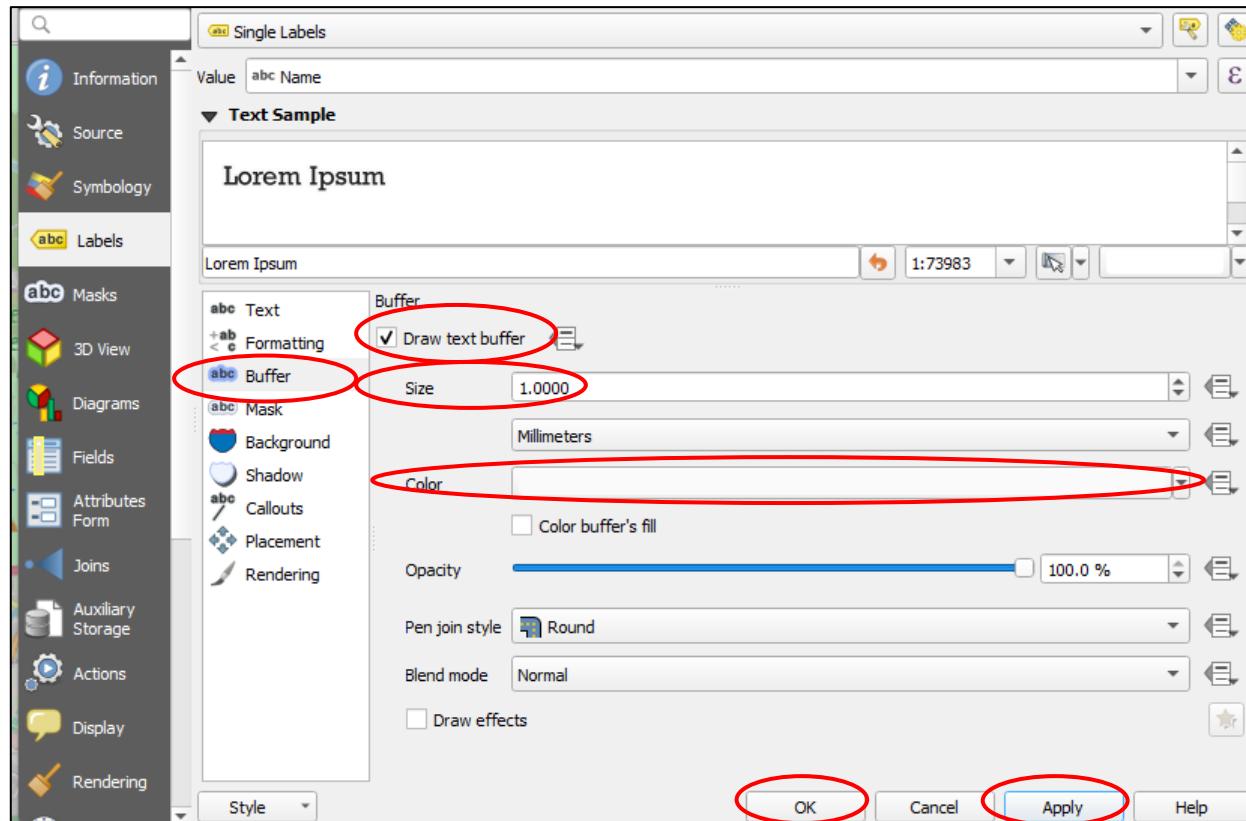
Label TouristAttractions.csv

- While still in *Properties*, select *Labels* tab
- Select “Single Labels” from the drop-down
- *Value* should be “Name”
- Change *Font* and *Size* if desired
- *Colour* should be black
- **Apply** but not **OK** yet



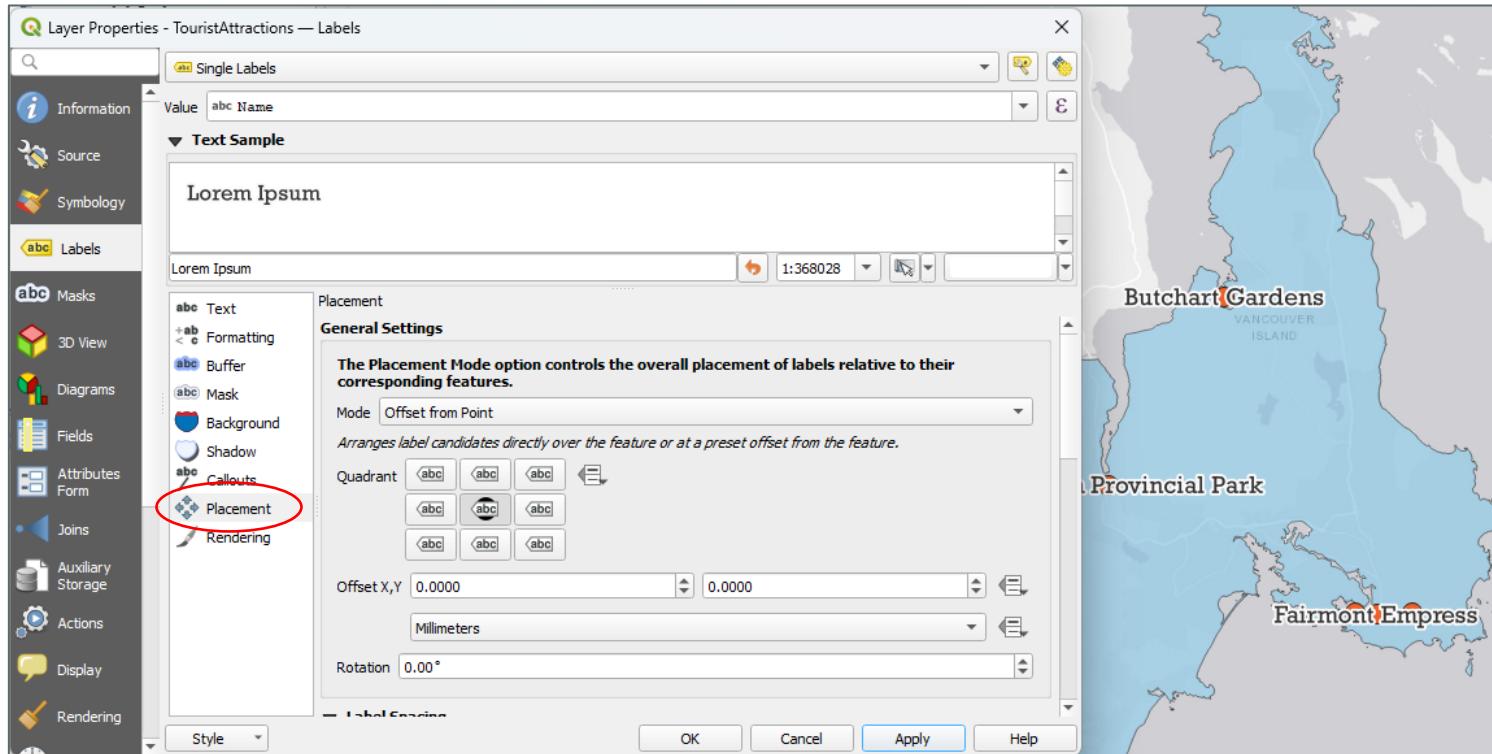
Buffer labels (for Locations.csv)

- While still in *Labels*, select “Buffer”
- Check “Draw text buffer” box
- *Size* 1.0 and *Colour* white
- **Apply** and **OK**



can also change *Placement* of Labels to be offset from points,
have Labels stacked instead of a long string, change location of labels...etc...

But won't today...



QGIS *QGIS_PrintLayoutMap_Workshop — QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help

CHECK IN #3

Save your work!

- Changed CRD and TouristAttractions symbology
- Added labels to TouristAttractions

Browser

- GeoPackage
- SpatialLite
- PostgreSQL
- STAC
- MS SQL Server
- Oracle
- WMS/WMTS
- Cloud
- Scenes
- SensorThings
- Vector Tiles
- Mapzen Global Terrain
- OpenStreetMap
- WCS
- WFS / OGC API - Features
- ArcGIS REST Servers

Zoom to Coordinate

Enter 'Latitude, Longitude'

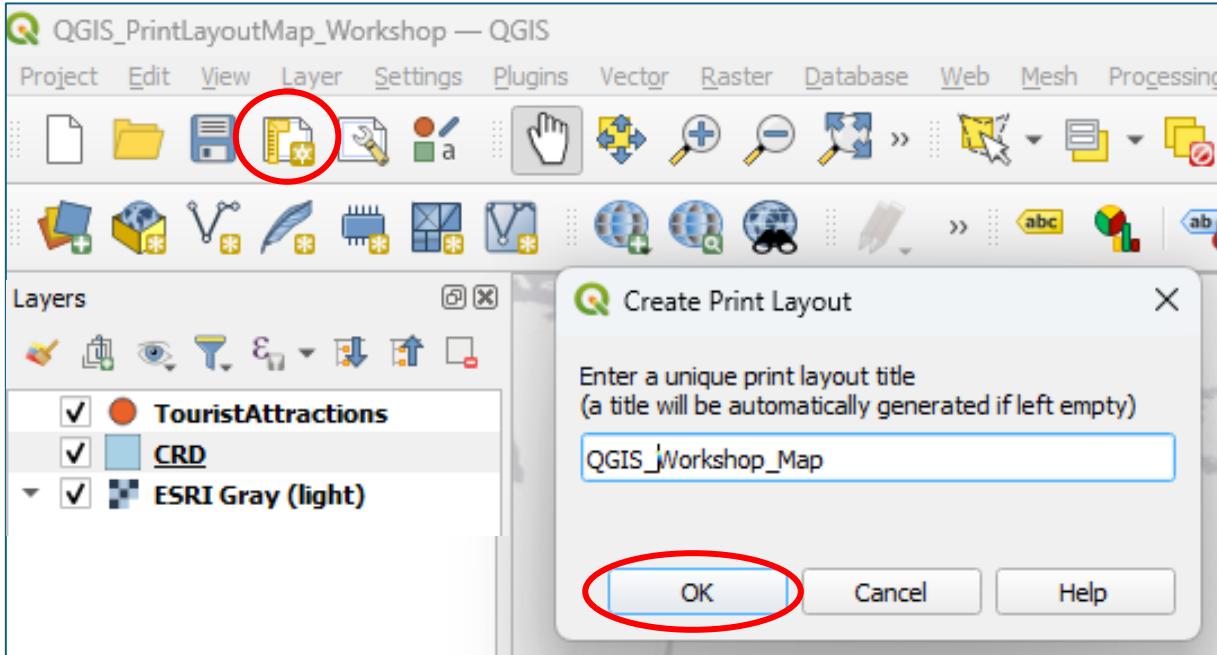
If you have questions, ask!

(next: create map for *Print Layout...*)

Activity #4

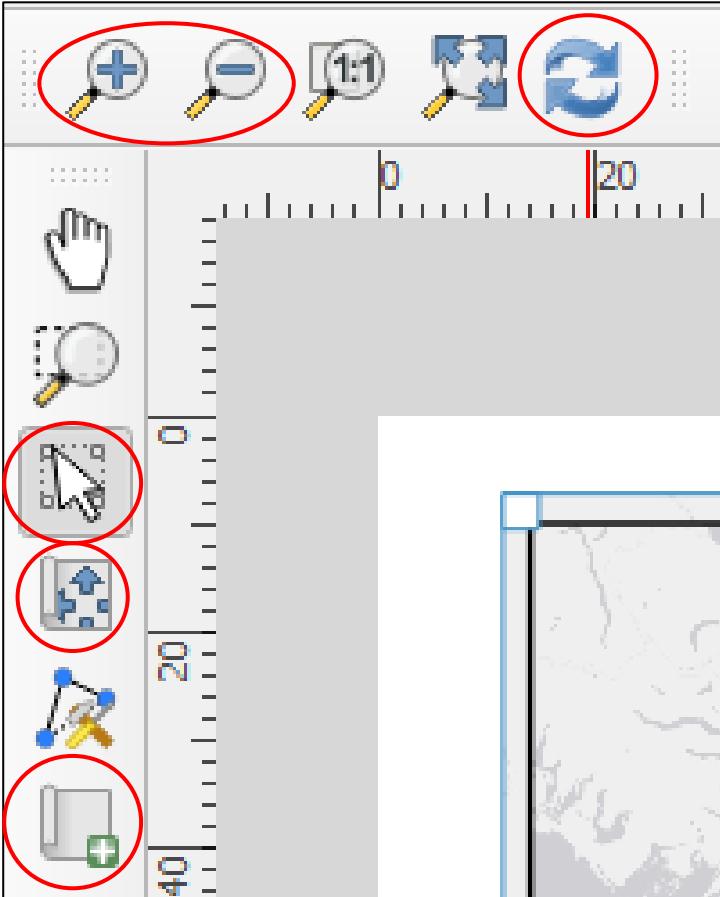


Generate new print layout



- In *QGIS* Menu Bar, select *New Print Layout* 
- Name your layout
“QGIS_Workshop_Map”
- **OK**

Print Layout interface: tools



Select/Move Item: move items in the print layout, opens the selected items' *Item Properties*



Move Item Content: move the map itself



Zoom: Not too useful as it Zooms in/out print layout (but not map(s)!)

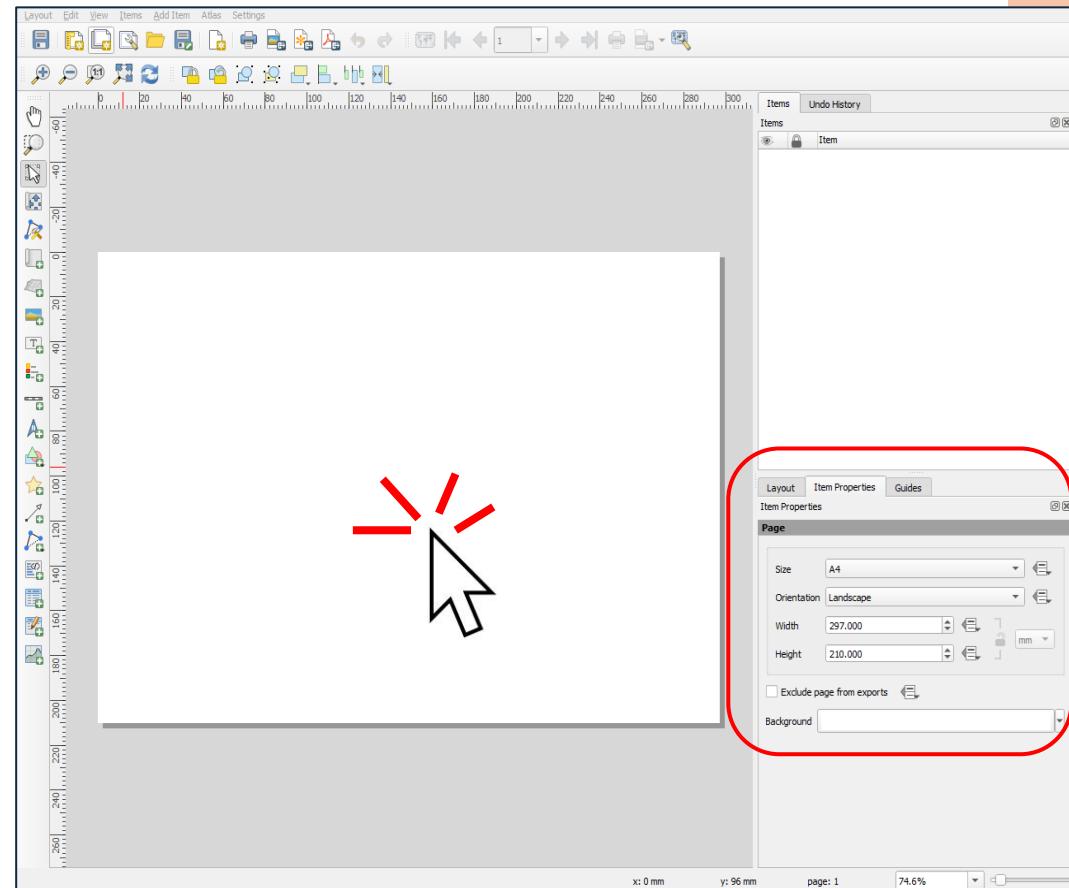


Refresh: refresh print layout map to match main *QGIS* window



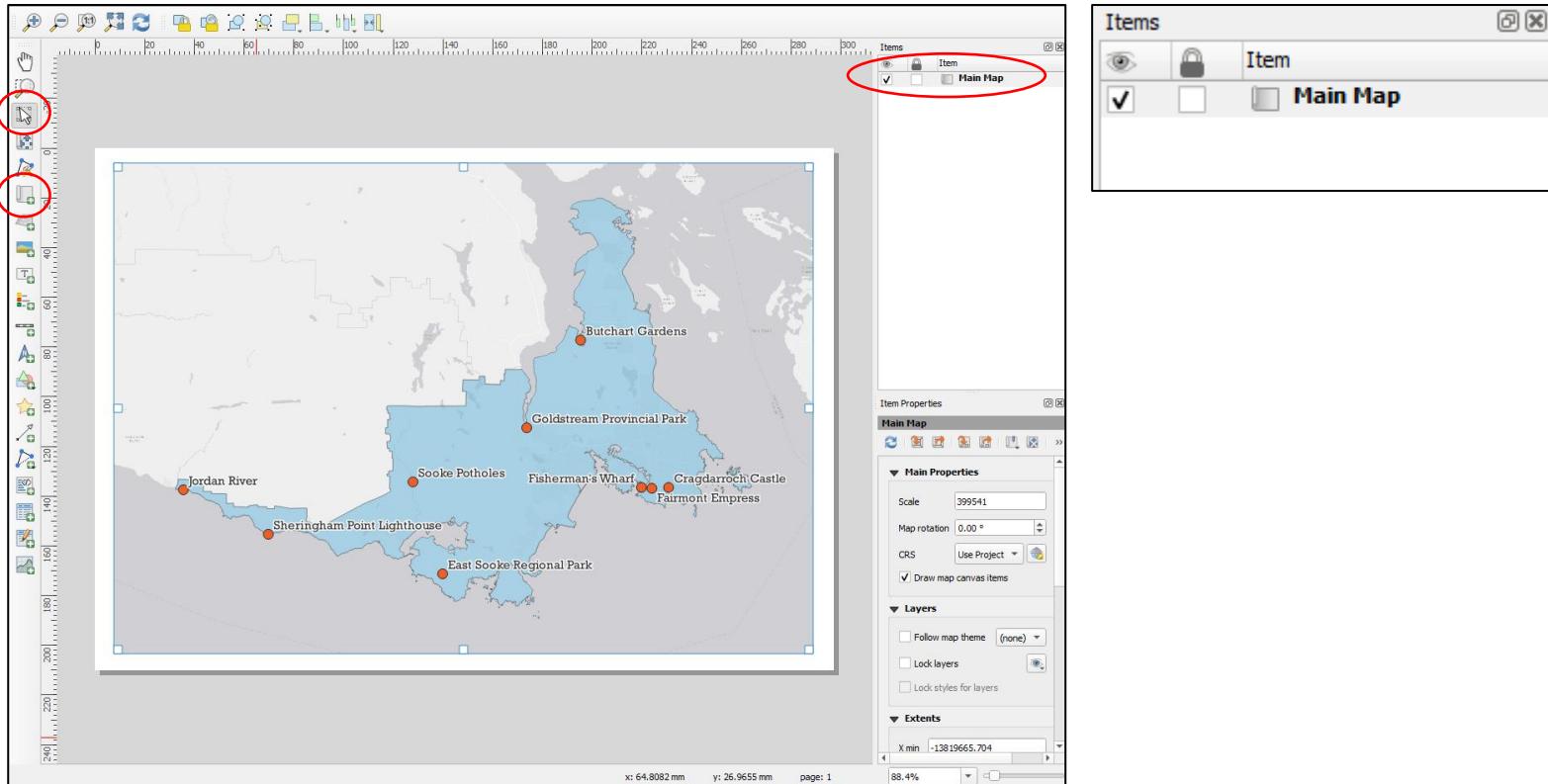
Add map: add map to print layout: click and drag to draw map on white sheet

- *Print Layout* will open in a new window
- Can go back and forth between main *QGIS* window and *Print Layout* window
- Can change page size, orientation, background, etc. by **clicking on white canvas** and viewing *Item Properties*
 - Leave as default: A4, Landscape, white background



Add Map

- In the *Toolbar*, select *Add Map*  and click and drag to draw the map over the print layout, leaving some space at the edges
- Under *Items*, double-click on **Map 1** text and rename to “**Main Map**”



Change Scale

- Under *Item Properties* and *Main Properties*, change *Scale* to 350000
- Can also zoom in and out of map view using *Move Item Content* in toolbar

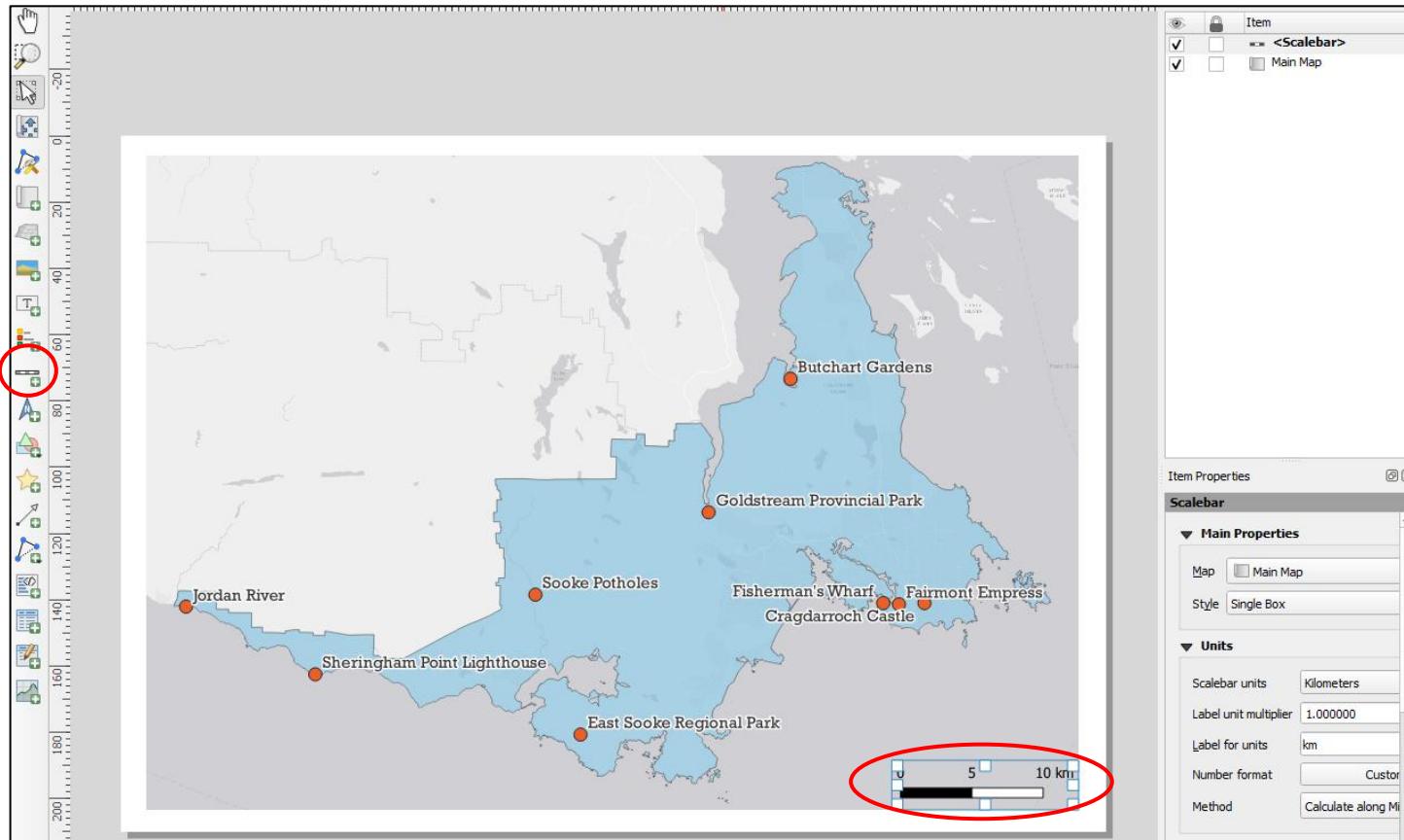


The screenshot displays the ArcGIS Pro application window. On the left is the map canvas showing a coastal area with various geographical features and labels like 'Jordan River', 'Sooke Potholes', 'Butchart Gardens', 'Goldstream Provincial Park', 'Fairmont Empress', 'Cragdarroch Castle', 'Fisherman's Wharf', 'Sheringham Point Lighthouse', and 'East Sooke Regional Park'. The map has a light blue background with darker blue areas representing water bodies. A legend on the far left shows various symbols for different data layers. The top ribbon menu has tabs for 'File', 'Edit', 'View', 'Analysis', 'Map', 'Tools', 'Data', 'Help', and 'ArcGIS'. The 'Map' tab is currently active. The right side of the interface contains several panels: 'Items' (with 'Main Map' selected), 'Item Properties' (showing 'Main Properties' with 'Scale' set to 350000), and 'Layers' (with checkboxes for 'Follow map theme', 'Lock layers', and 'Lock styles for layers'). The bottom status bar shows the coordinate 'x: -12.2969 mm', 'y: 32.9478 mm', 'page: 1', and a zoom level of '88.4%'.



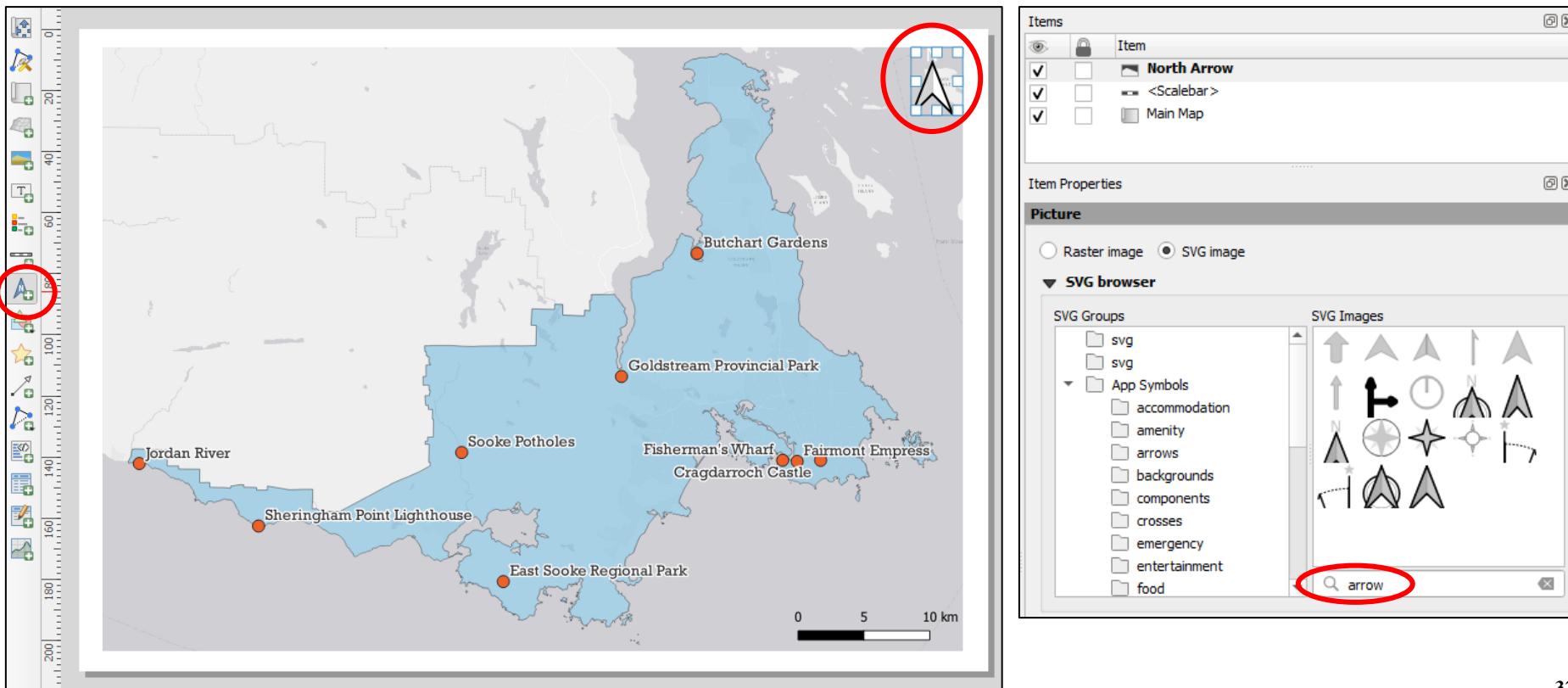
Add scale bar

- Select *Add Scale Bar* , click and draw in bottom right corner
- Could have many customizations - labels, margins, position of labels, colour, etc.



Add north arrow

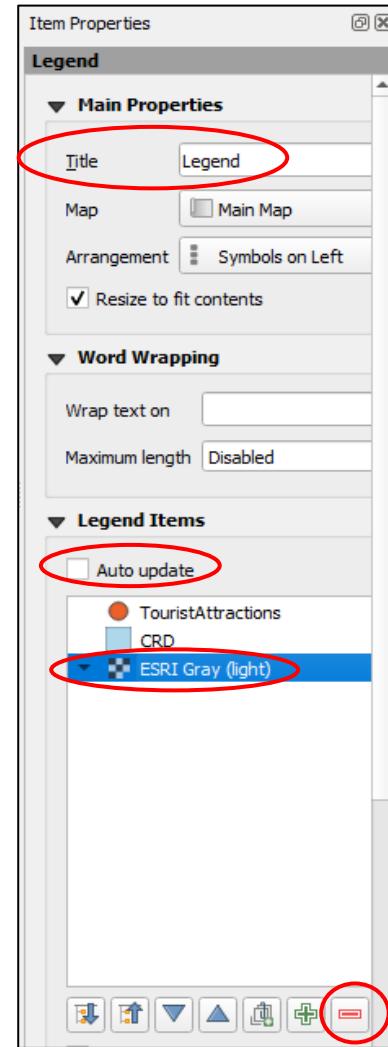
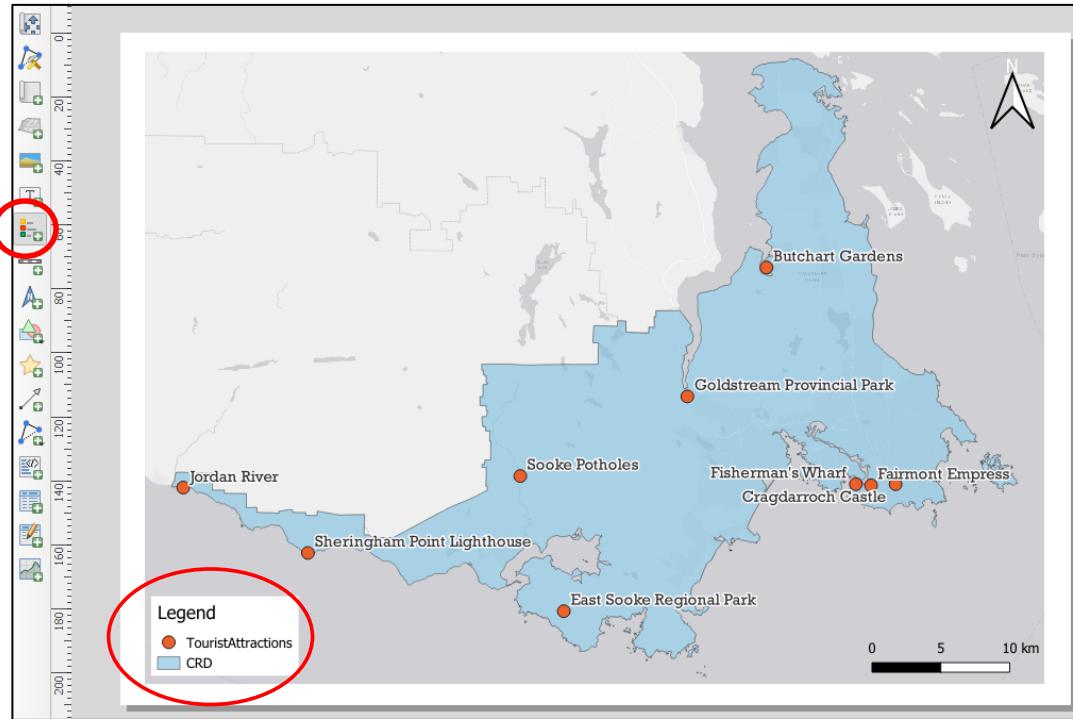
- Select *Add North Arrow*,  click and draw on upper right corner of **Main Map**
- In *Item Properties* under *SVG Images*, search “arrow”
- Can choose between many options; can also customize fill colour, stroke colour, etc.



The screenshot illustrates the process of adding a north arrow to a map. On the left, the main map view shows a coastal region with several landmarks labeled: Butchart Gardens, Goldstream Provincial Park, Sooke Potholes, Fisherman's Wharf, Fairmont Empress, Cragdarroch Castle, East Sooke Regional Park, Sheringham Point Lighthouse, and Jordan River. A red circle highlights the 'Add North Arrow' tool icon on the toolbar. Another red circle highlights the north arrow icon placed in the top right corner of the map. On the right, the 'Items' panel shows the 'North Arrow' item selected. The 'Item Properties' panel shows 'Picture' set to 'SVG image'. The 'SVG browser' panel displays a library of arrow icons, and a search bar at the bottom right is circled in red with the query 'arrow'.

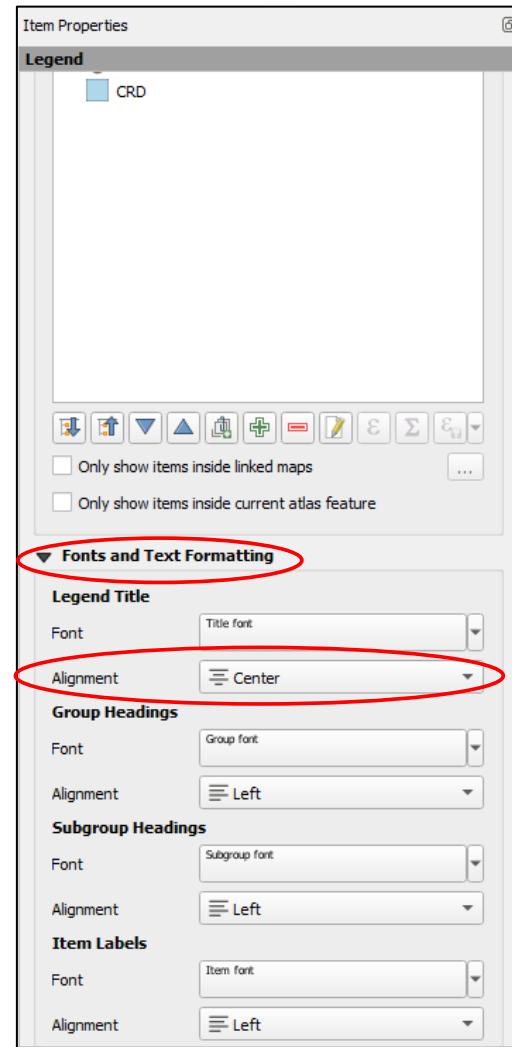
Add legend

- Select *Add Legend*,  click and draw in bottom left corner
- In *Item Properties*, under *Main Properties*, type “Legend” as *Title*
- Under *Legend Items*, uncheck “Auto update”
- Select **ESRI Gray (light)** and click the minus button to remove it from the legend



Change Legend alignment

- Under *Fonts and Text Formatting* and *Legend Title*, change *Alignment* to “Center”
- Many options to change fonts, size, alignments, etc.



Add Title

- Select *Add Label*  , draw text box in top middle
- In *Item Properties* replace default text with “Tourist Attractions of the CRD”
- Under *Appearance*, change *Horizontal alignment* to “Centre”
- Click *Font* box and can change font, size, colour, etc.



The 'Label Font' Item Properties dialog is open. It shows the following settings:

- Text**:
 - Font: Times New Roman
 - Style: Bold
 - Size: 35.0000
- Color**: A color swatch set to black.
- Opacity**: Set to 100.0 %.

The 'Label' Item Properties dialog is open. It shows the following settings under **Main Properties**:

- Tourist Attractions of the CRD

Under **Appearance**:

- Font: Times New Roman
- Horizontal margin: 0.00 mm
- Vertical margin: 0.00 mm
- Horizontal alignment: Center (circled in red)
- Vertical alignment: Top

CHECK IN #4

Save your work!

Added:

- Scale bar
- North arrow
- Legend
- Title

Tourist Attractions of the CRD



Congratulations!

Next: add overview inset map... if desired...

If not, skip to “Export Map”
(Activity #8, slide 55)

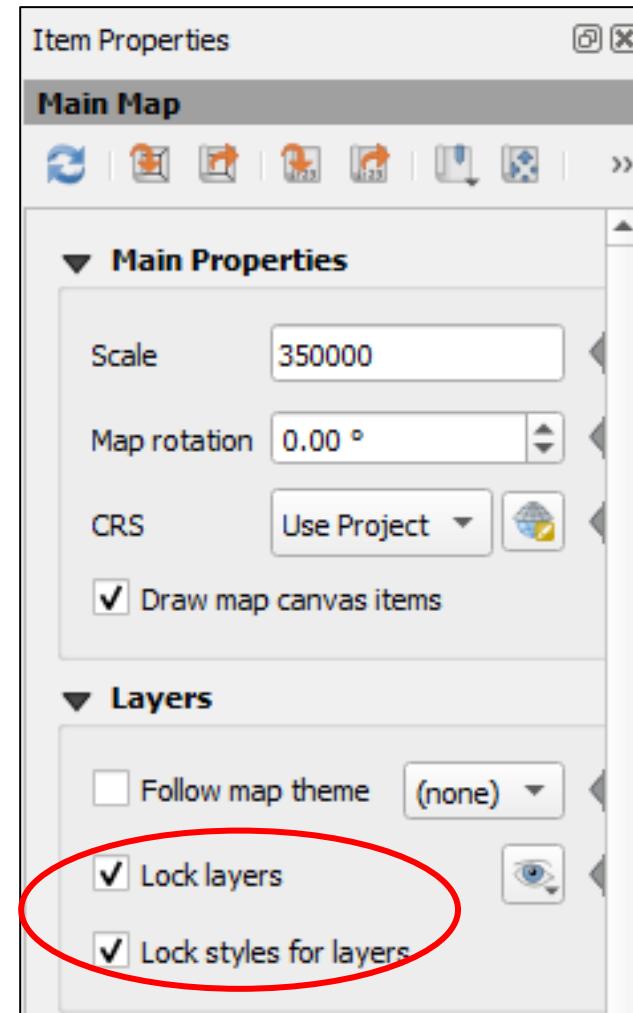


Activity #5



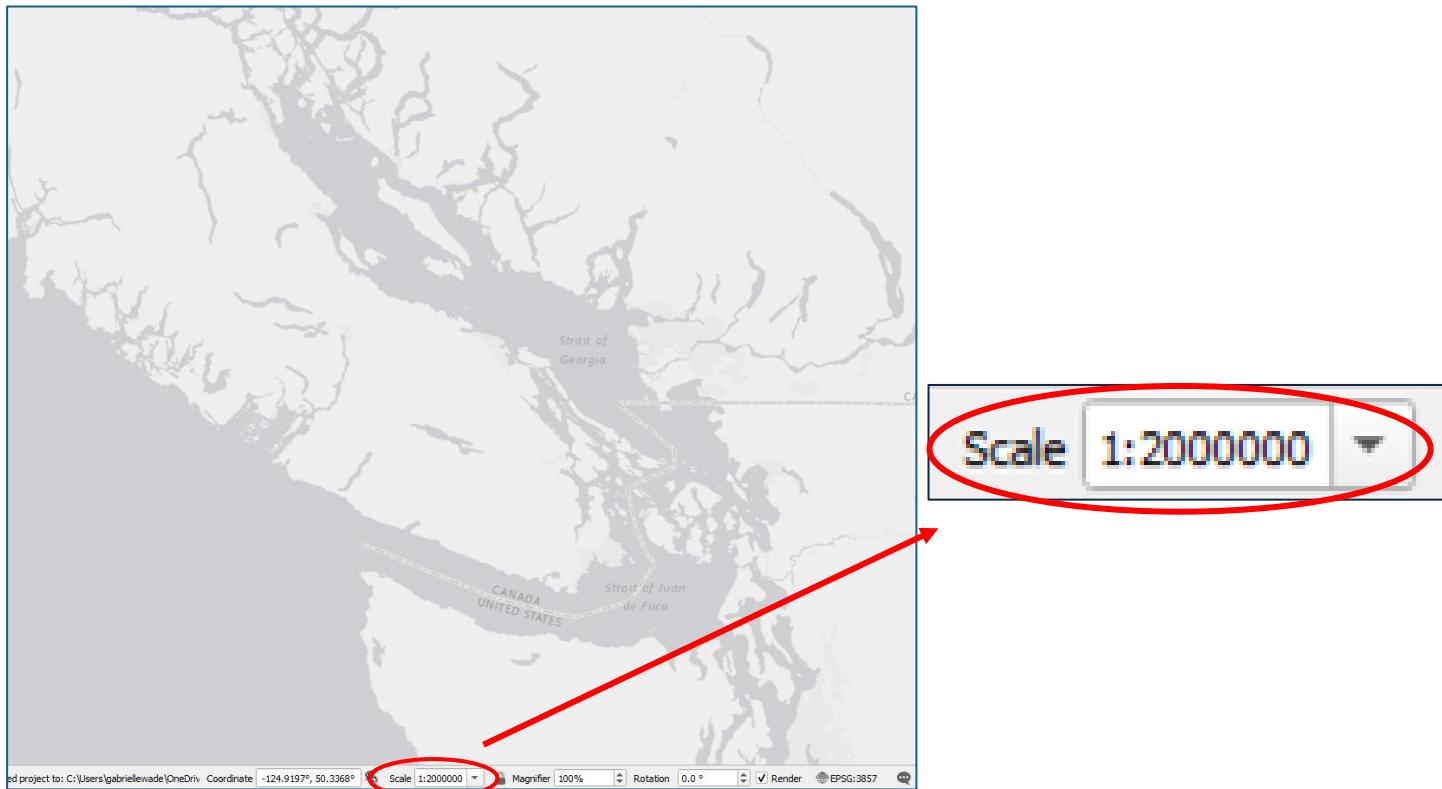
Lock map

- With **Main Map** selected , under *Item Properties* and *Layers*, check “Lock layers” and “Lock styles for layers”
 - This will prevent the map from being changed as we add overview inset map



Set map to overview layout

- Minimize *Print Layout* window & return to main *QGIS* window;
unchecked all layers except for **ESRI Gray (light)**
- In the *Status Bar*, change scale to 1:2,000,000

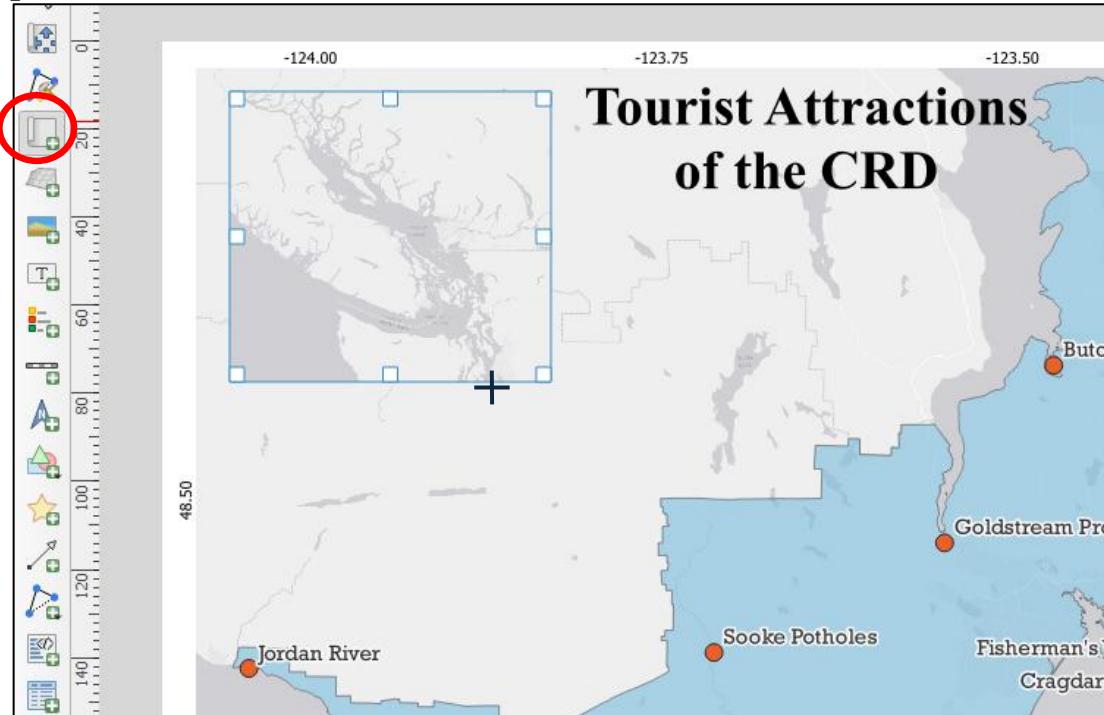


Set map to overview layout

- In the *Toolbar*, select *Add Map* and click and drag to draw square in top left corner of map

- This will be our **overview/inset map**:

Overview maps provide wider locational context to maps



View Item

- Under *Items*, double-click on **Map 2** text and rename to “**inset**”
- Under *Item Properties* change *Scale* to **5000000**
- Scroll down and check *Frame*; leave colour as black
change thickness to 0.5
- Use *Move Item Content*  to reposition map as below:



Items

		Item
<input type="checkbox"/>	<input type="checkbox"/>	inset
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tourist Attractions of th...
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Legend
<input checked="" type="checkbox"/>	<input type="checkbox"/>	North Arrow
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<Scalebar>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Main Map

Main Properties

Scale: 5000000

Map rotation: 0.00 °

CRS: Use Project CRS

Draw map canvas items

Rotation

Frame

Color: Black

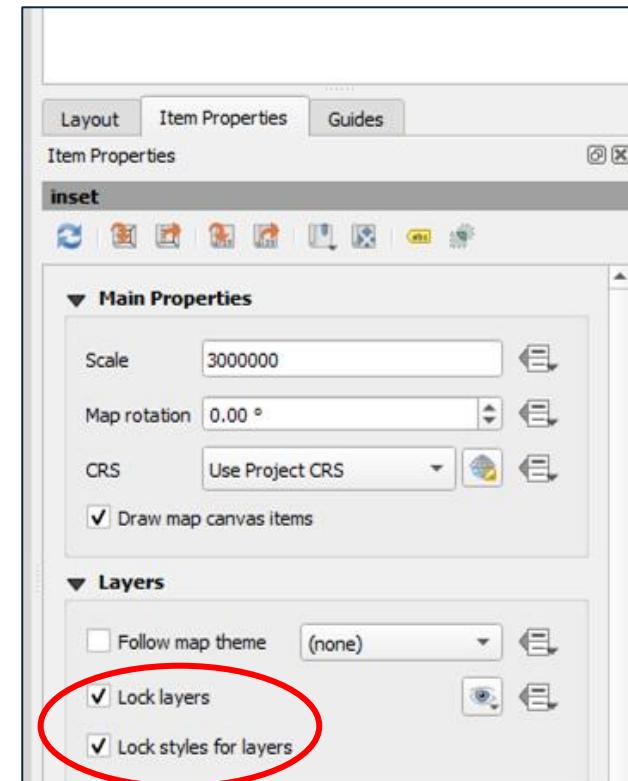
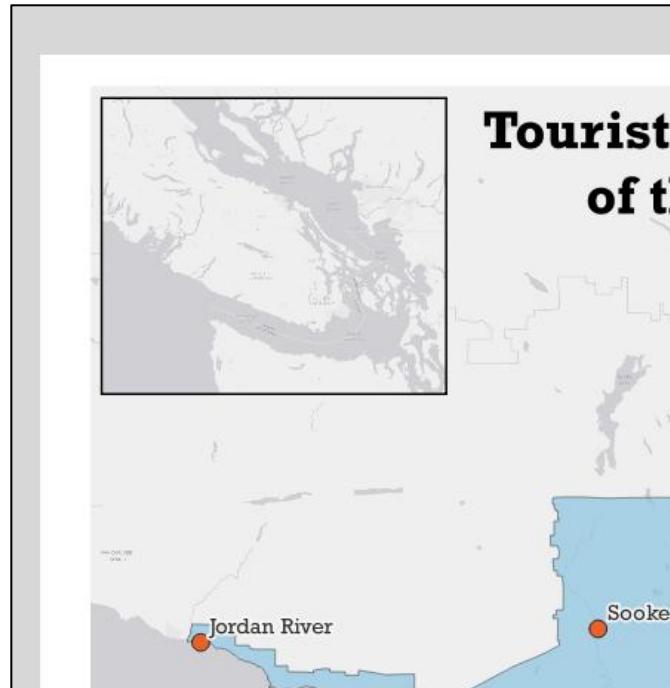
Thickness: 0.50 mm

Join style: Miter

Background

Lock layer

- Under *Item Properties* and *Layers*, check “Lock layers” and “Lock styles for layers”
 - This will prevent layer from being changed as we add to the print layout



CHECK IN #5

Save your work!

- Added overview inset map to print layout
- Added frame to map
- Locked map layer

If you have questions, ask!
(next: add a shape...)

Tourist Attractions of the CRD

Legend

- TouristAttractions
- CRD

Butchart Gardens

Goldstream Provincial Park

Cragdarroch Castle

Fairmont Empress

Fisherman's Wharf

Sooke Potholes

Sheringham Point Lighthouse

East Sooke Regional Park

Jordan River

0 5 10 km

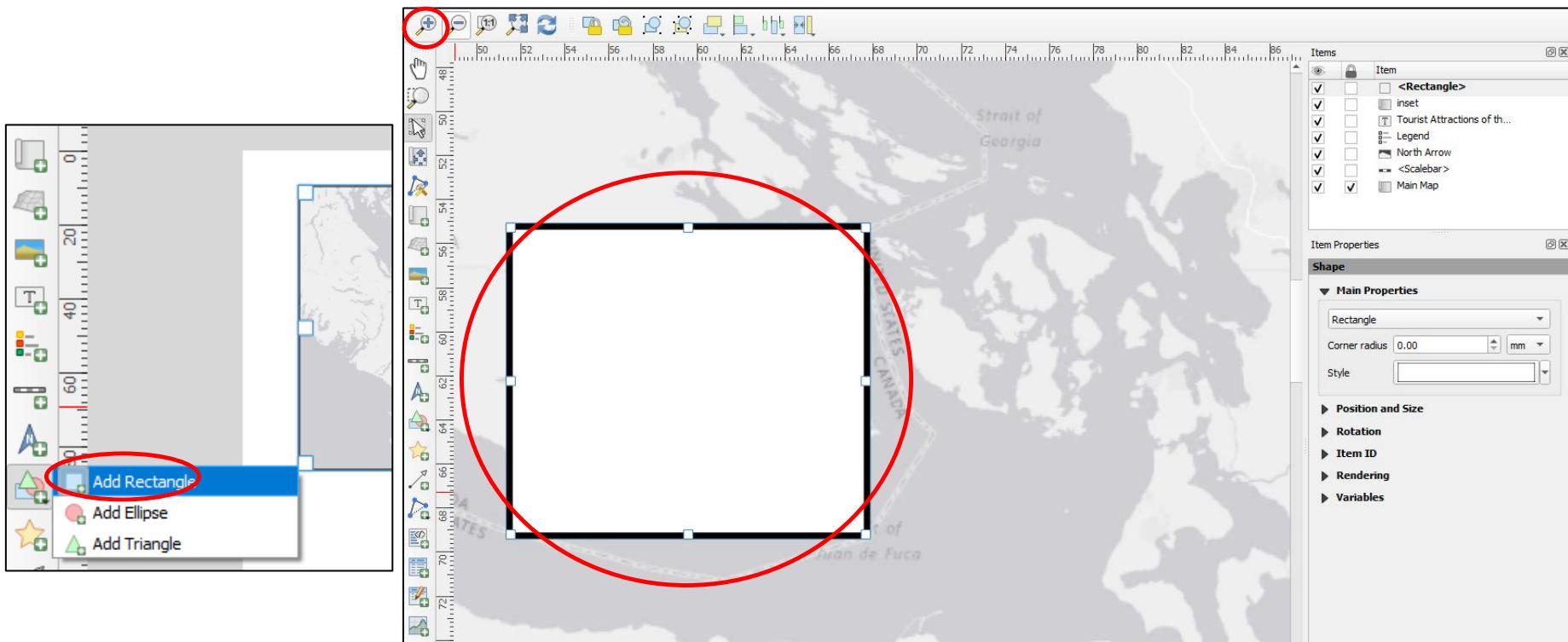
Activity #6



Add shape

Highlight on our inset map where study area is – draw a rectangle around the CRD

- Select *Add shape* tool and *Add Rectangle*
- Use *Zoom*  to zoom the layout
- Click and drag to draw rectangle around the study area



Change shape symbology

- Under *Shape*, click on *Style* tab
- Under *Fill*, scroll down through pre-made symbols and find “outline red”
 - Outline already comes with transparent fill.. Lots of options for colours, line thickness, etc.

The screenshot illustrates the steps to change the symbology of a shape in ArcGIS Pro:

- Left Panel (Item Properties):** Shows the "Shape" tab selected. Under "Main Properties", a "Style" dropdown is circled in red, indicating it needs to be selected to access the "Fill" settings.
- Middle Panel (Item Properties - Symbol Settings):** The "Fill" section shows a preview of a red-outlined rectangle. The "Color" swatch is set to red. A list of fill patterns is shown, with "outline red" circled in red at the bottom.
- Right Panel (Map View):** A map of British Columbia, Canada, is displayed. A specific area is highlighted with a red rectangle, demonstrating the result of applying the "outline red" symbology.

CHECK IN #6

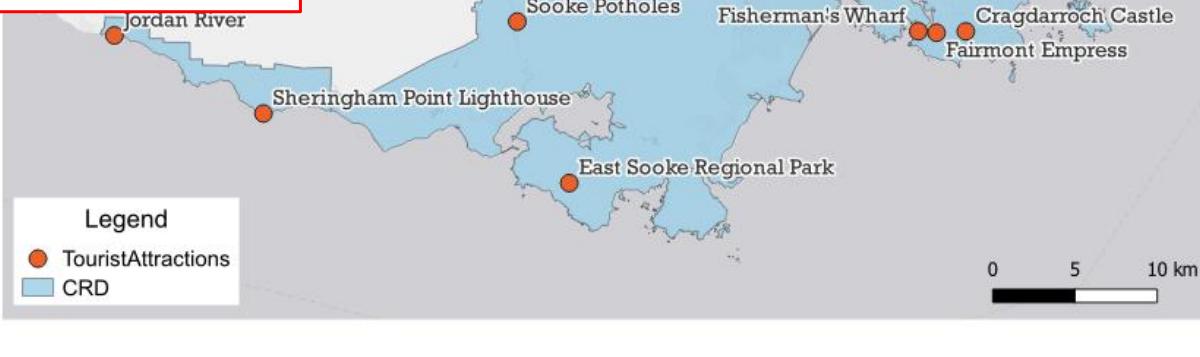
Save your work!



Tourist Attractions of the CRD



- Added shape on inset map to highlight study area
- Changed shape symbology



Item	Items
<input checked="" type="checkbox"/>	Tourist Attractions of the CRD
<input type="checkbox"/>	<Rectangle>
<input checked="" type="checkbox"/>	Map 2
<input checked="" type="checkbox"/>	Legend
<input type="checkbox"/>	North Arrow
<input type="checkbox"/>	<Scalebar>
<input checked="" type="checkbox"/>	Main Map

If you have questions, ask!

(next: add grid/coordinates...)

Item Properties

Congratulations!

Next: add grid coordinates
... if desired...

If not, skip to “Export Map”
(Activity #8, slide 55)

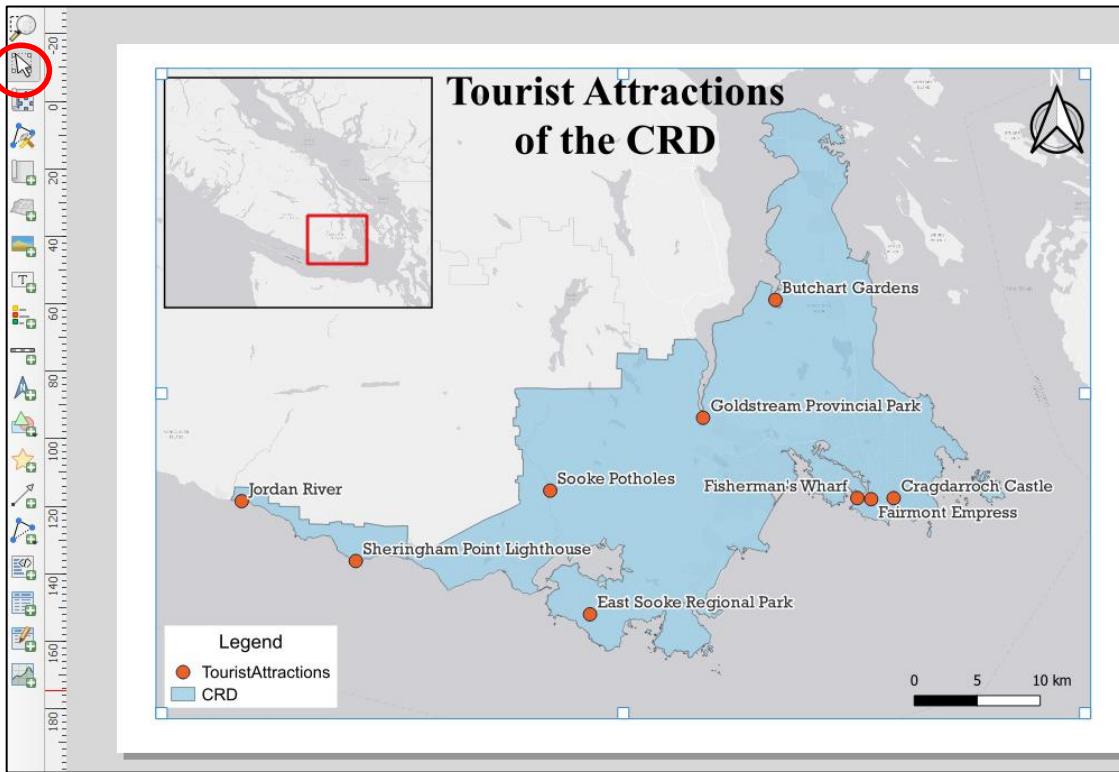


Activity #7



Add grid and coordinates

- With *Select tool*  , click main map to open its *Item Properties*
- Under *Item Properties*, scroll down and expand *Grids*
- Click plus button, then select **Grid 1** and *Modify Grid*



Item Properties

Main Map

Extents

X min	-13818728.538	
Y min	6150367.402	
X max	-13706970.189	
Y max	6229468.025	

Grids

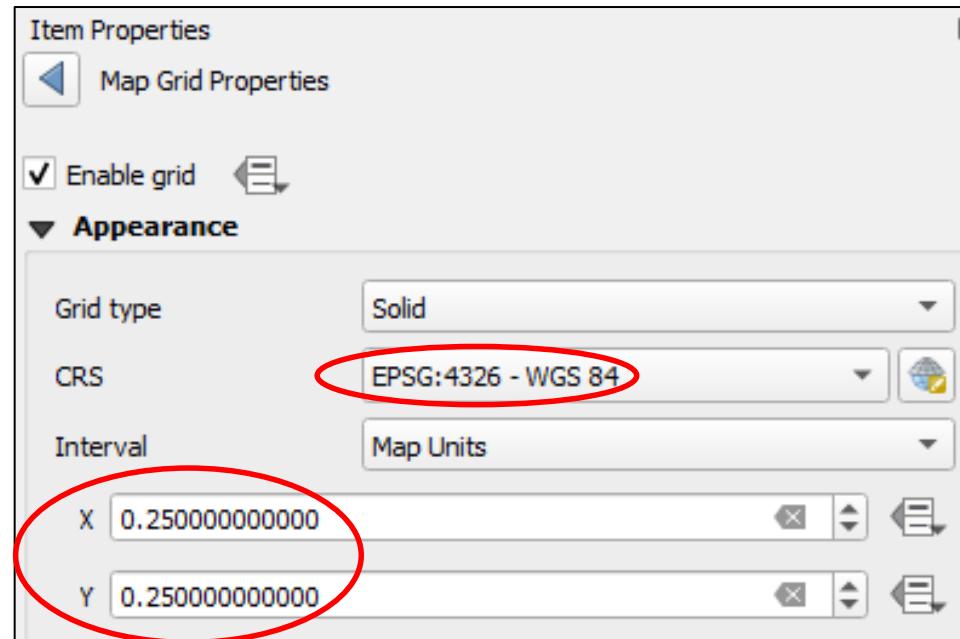
    

Grid 1

Modify Grid...

Add map grid

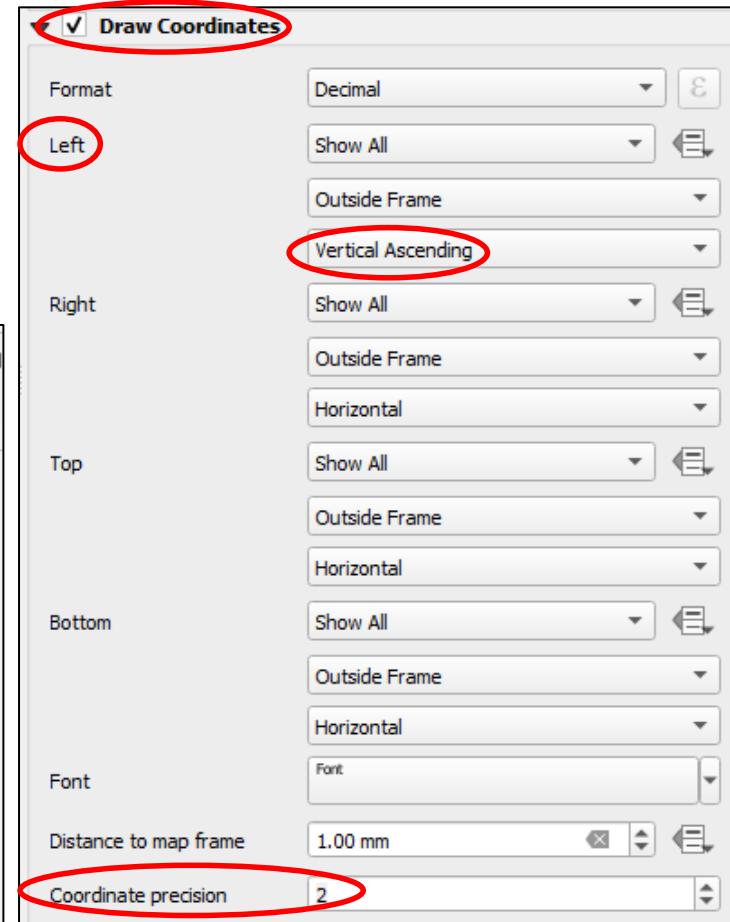
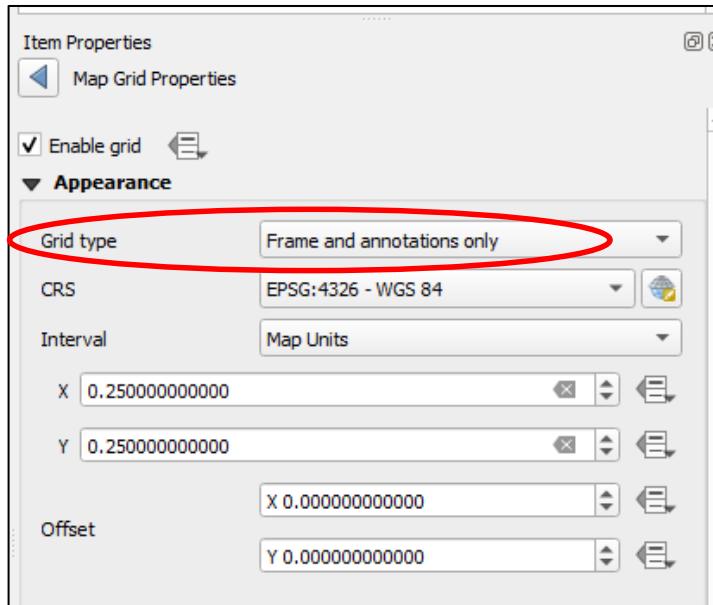
- For *CRS*, use drop-down to change to **EPSG: 4236 – WGS 84**
- For *Interval*, change X and Y to 0.25
 - this means that there will be a grid line for every 0.25 degrees of latitude/longitude



Add map coordinate annotations

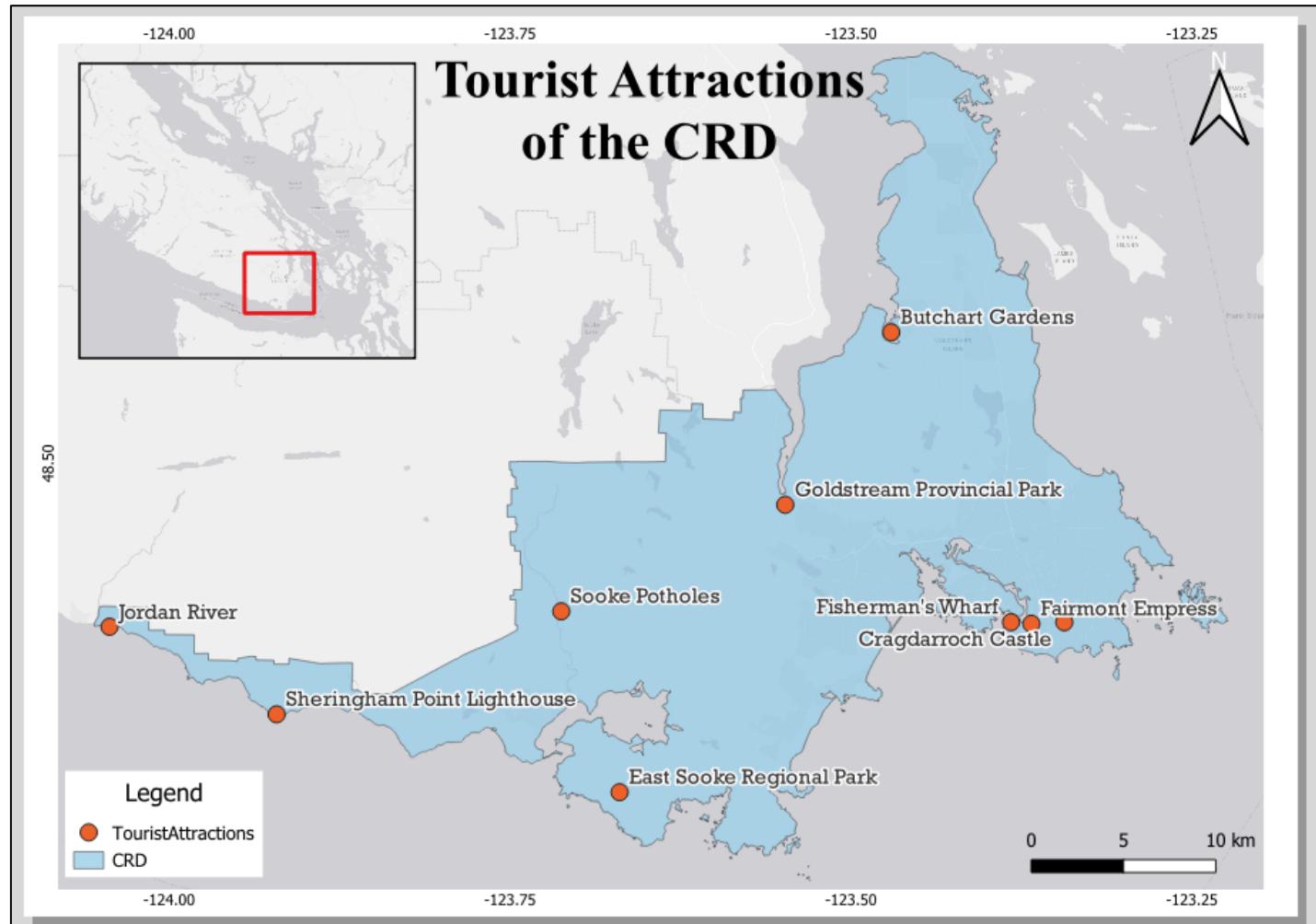
- Under *Appearance* and *Grid type*, use drop-down to change to “Frame and annotations only” – we don’t want the grid lines on our final map, but want the coordinates along the outside
- Scroll down and check *Draw Coordinates*
- For *Left*, change “Horizontal” drop-down to “Vertical Ascending”
- Change *Coordinate precision* to 2

lots of option to have coordinates only on some sides, with small tick, etc



Congratulations!

Next: export map

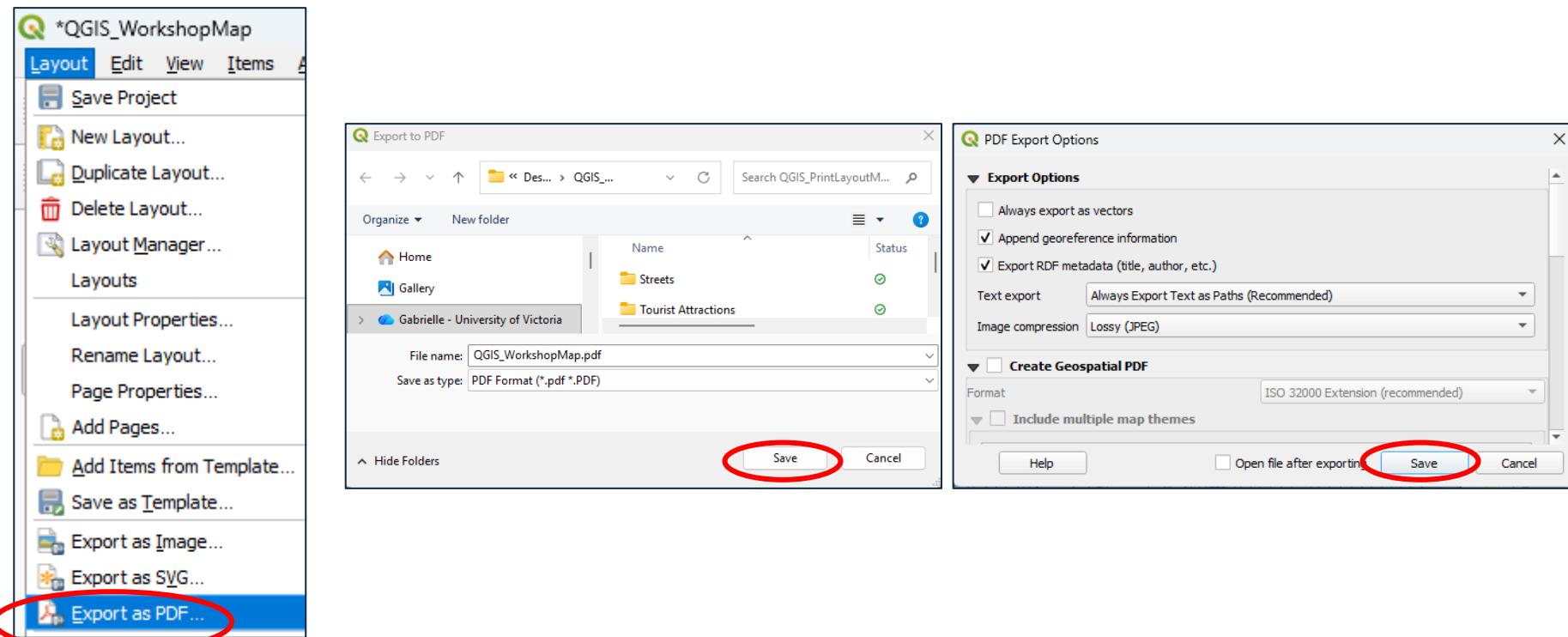


Activity #8



Export map

- Select *Layout* then *Export as PDF*
 - Can also *Export as image*... not today
- Save as “QGIS_WorkshopMap.pdf”
- Keep options as default, **Save**



Congratulations!

You can:

- Load polygon shapefile and locations csv
- Navigate and use main features of *Print Layout*
- Create and export custom map using *QGIS* map layout



Resources going forward:



QGIS – used in workshop today:

- QGIS Tutorials & Tips: <https://www.qgistutorials.com/>
- QGIS Training Manual: https://docs.qgis.org/3.40/en/docs/training_manual/index.html
- QGIS User Guide: https://docs.qgis.org/3.40/en/docs/user_manual/index.html

Find data:

- GeoSpatial Data Guide: <http://libguides.uvic.ca/geospatialdata>

Questions or problems:

- UVic Geospatial Librarian (danielbm@uvic.ca), YCW Geospatial Intern (gabriellewade@uvic.ca), or KULA Geospatial Assistant (jeronimo.elenes@gmail.com)

UVic full semester GIS courses in the Department of Geography:

- GEOG222 – Intro to Maps and GIS
- GEOG328 – GIS Analysis

GIS Skills and Mapping Micro-certificate (36 hours)

- <https://continuingstudies.uvic.ca/science-and-the-environment/programs/gis-skills-and-mapping>

