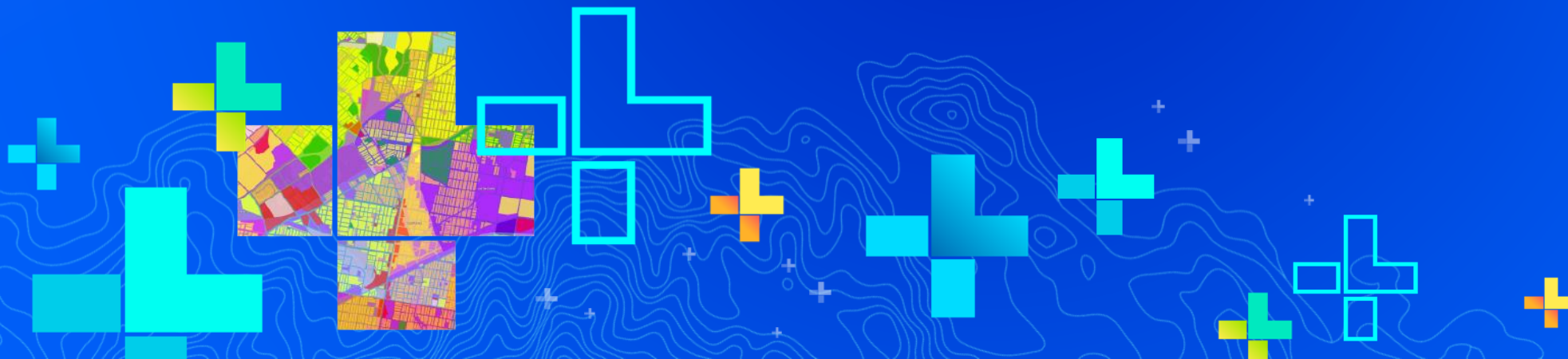




# ArcGIS Pro: Effective Use of Labels and Annotation

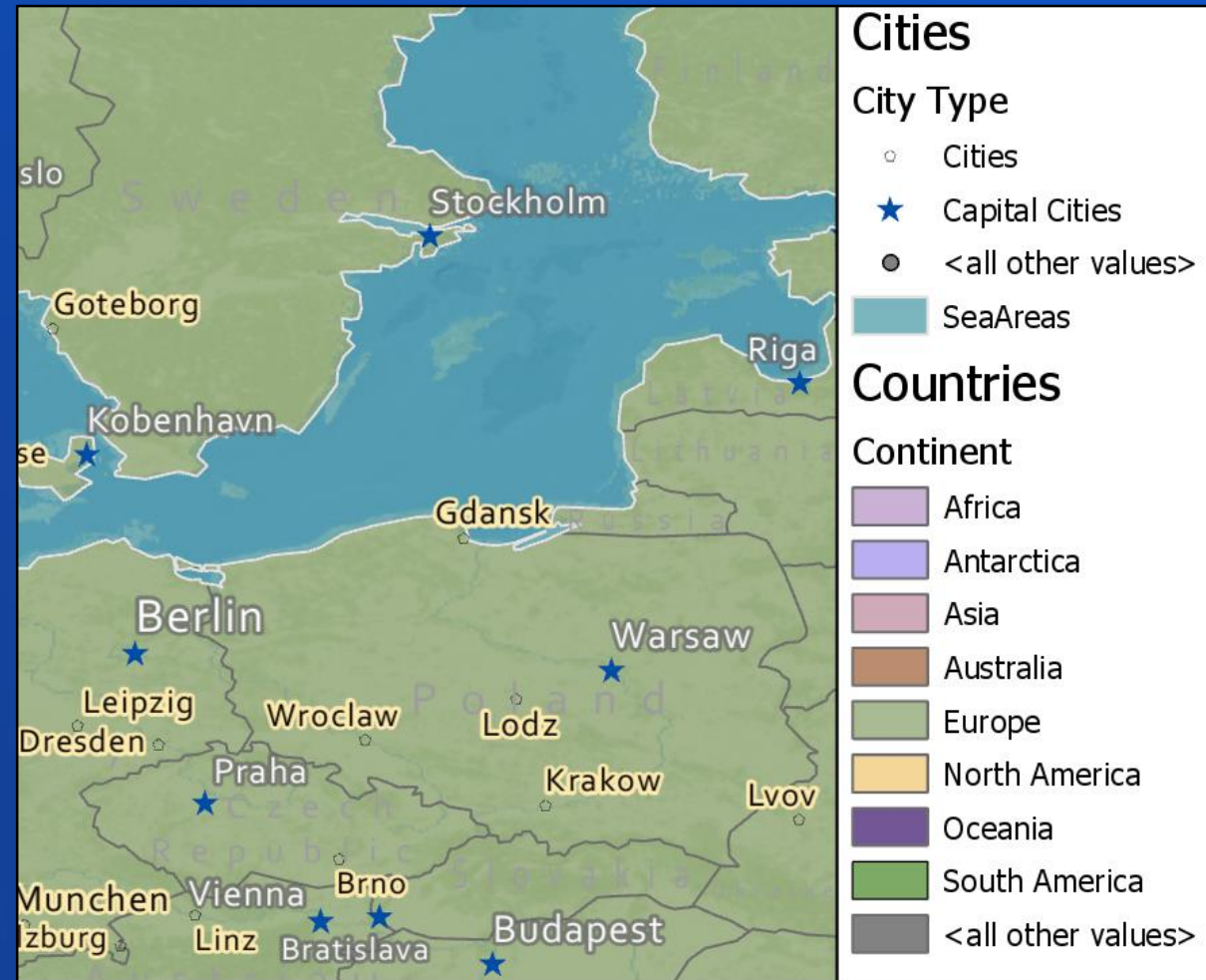
Ciara Rowland-Simms

SEE  
WHAT  
OTHERS  
CAN'T



# Text

- **Layout text**
  - Title
  - Legend
- **Map text**
  - Location specific
  - Labels and annotation

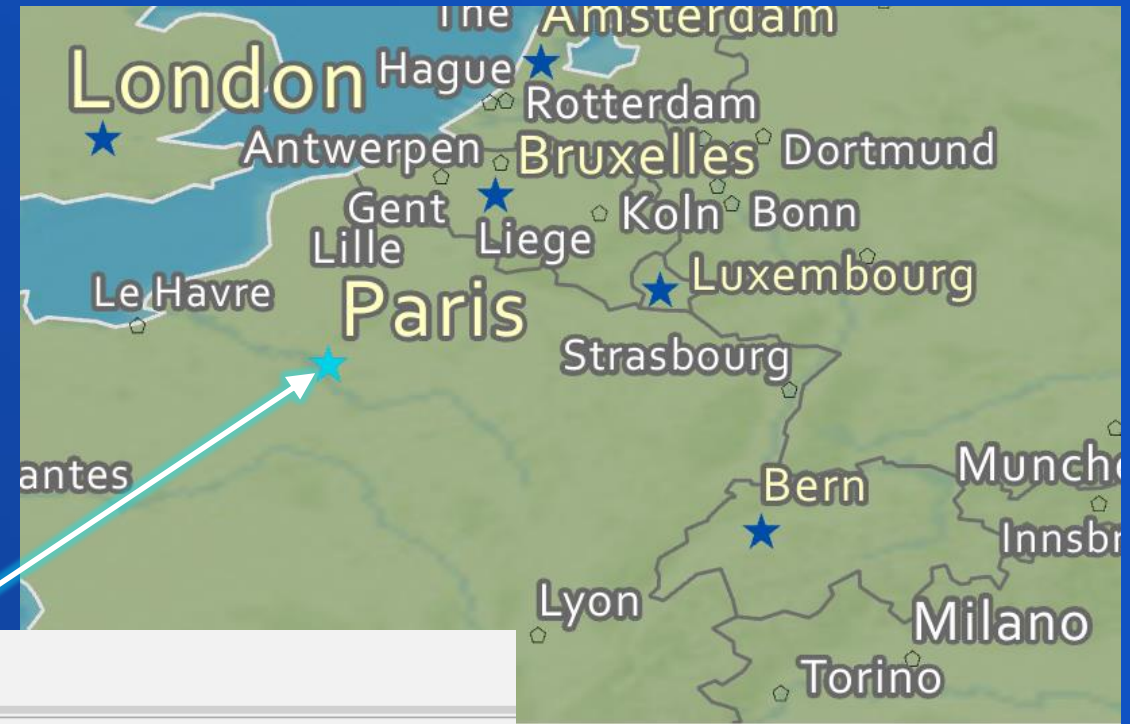


# Labeling



# Labeling

- Dynamic text placement
- Generated from feature attribute(s)
- Labels based on properties stored in layers



Cities						
Field:			Selection:			
Add Delete Calculate			Zoom To Switch Clear			
OBJECTID	Shape	NAME	COUNTRY	POPULATION	CAPITAL	
55	Point	Paris	France	9775000	Y	
56	Point	Volgograd	Russia	1360000	N	
57	Point	Strasbourg	France	400000	N	

# Label Class Properties

- **Class**

- Expression
- SQL Query
- Visibility range

- **Symbol**

- Font name, halo, callouts etc.
- Internationalization

- **Position**

- Relative position
- Strategies to place labels

Label Class

Cities - Capital Cities

Class | Symbol | Position

Language: Arcade

Fields: OBJECTID, NAME, COUNTRY, POPULATION

Functions: Abs(), Acos(), Asin(), Atan()

Insert Values

Expression

```
var pop = $feature.POPULATION
var maxPop = 23620000
var fontSize = 9 + (pop/maxPop)*15
"<FNT SIZE='" + fontSize + "'" +
$feature.NAME + "</FNT> "
```

☒ Insert fields with coded value description function

☒ Remove extra spaces

☐ Remove extra line breaks

[Learn more about label expressions](#)



# Label Class Properties

- **Class**

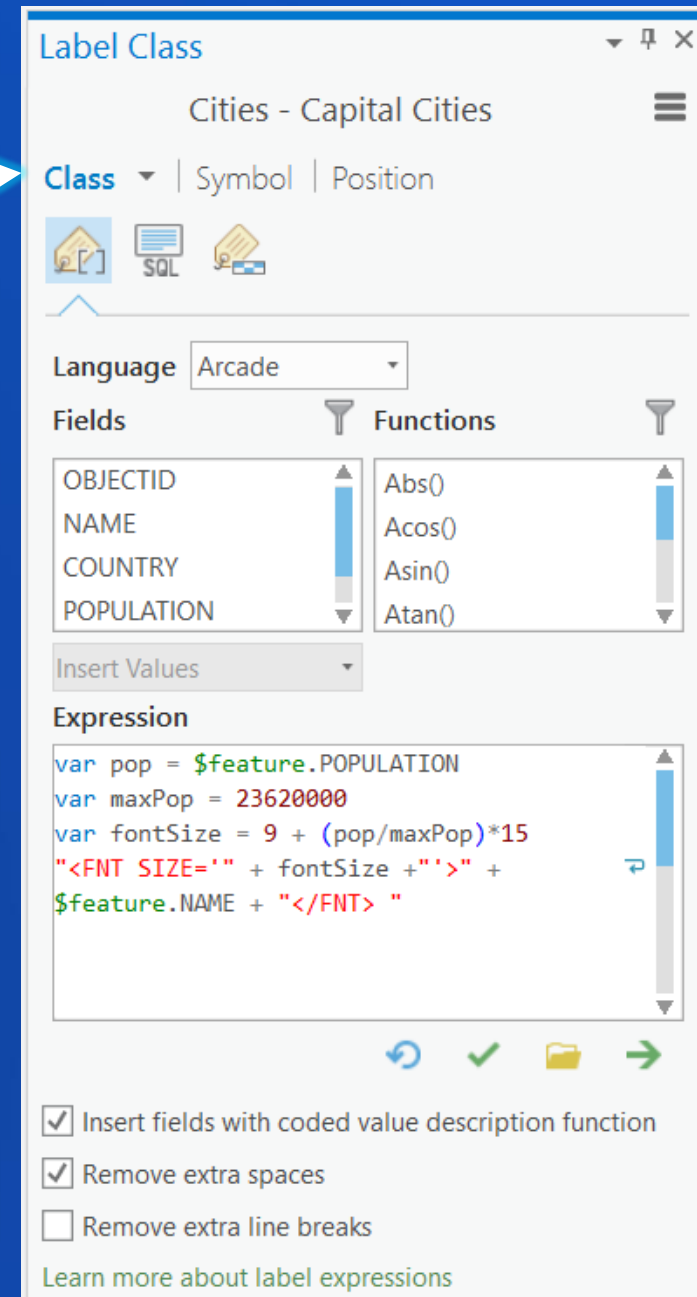
- Expression
- SQL Query
- Visibility range

- **Symbol**

- Font name, halo, callouts etc.
- Internationalization

- **Position**

- Relative position
- Strategies to place labels



Label Class

Cities - Capital Cities

Class | Symbol | Position

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var fontSize = 9 + (pop/maxPop)*15
"<FNT SIZE=" + fontSize + ">" +
$feature.NAME + "</FNT> "
```

☒ Insert fields with coded value description function

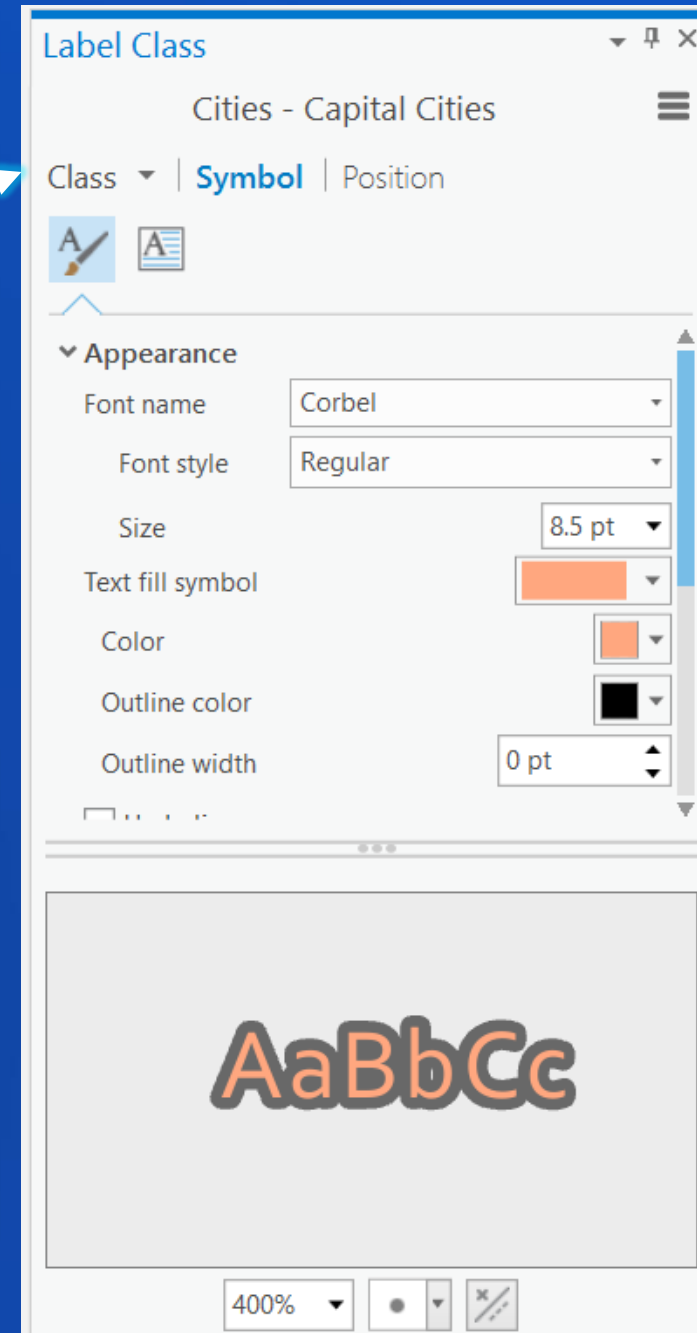
☒ Remove extra spaces

☐ Remove extra line breaks

[Learn more about label expressions](#)

# Label Class Properties

- **Class**
  - Expression
  - SQL Query
  - Visibility range
- **Symbol**
  - Font name, halo, callouts etc.
  - Internationalization
- **Position**
  - Relative position
  - Strategies to place labels



# Label Class Properties

- **Class**

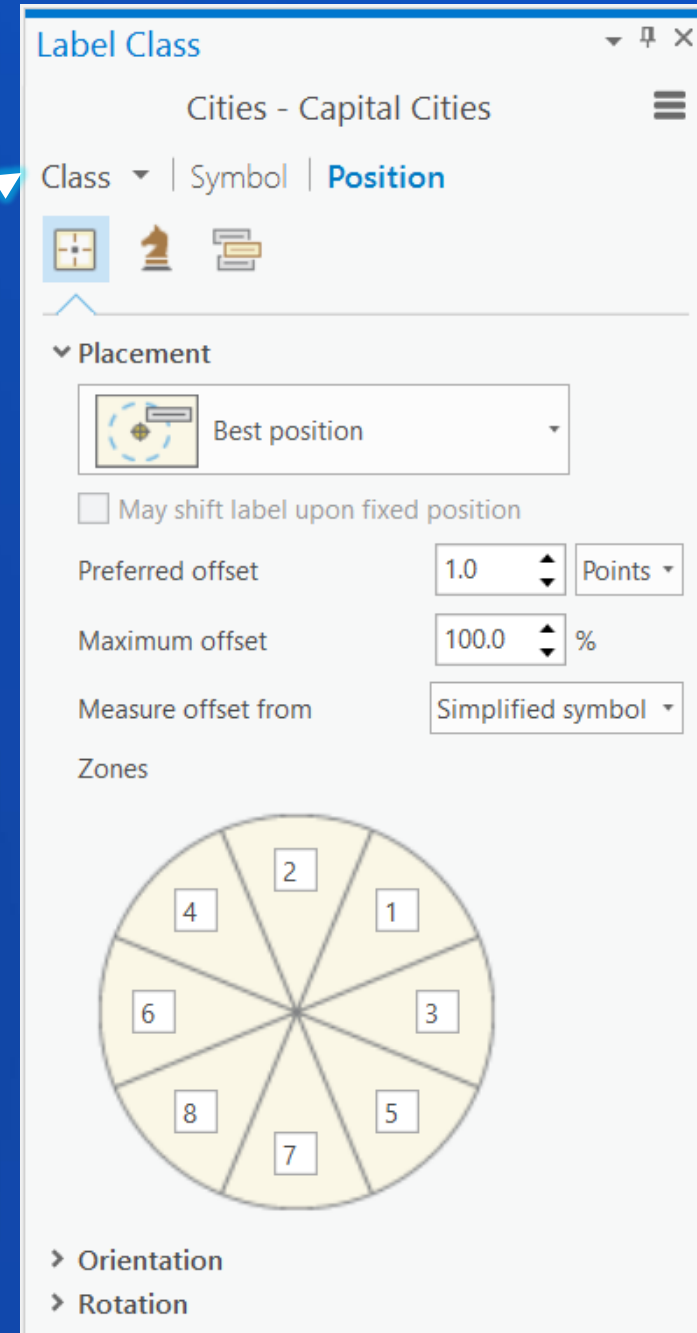
- Expression
- SQL Query
- Visibility range

- **Symbol**

- Font name, halo, callouts etc.
- Internationalization

- **Position**

- Relative position
- Strategies to place labels





# Labeling Demo



# Annotation





# Annotation Demo

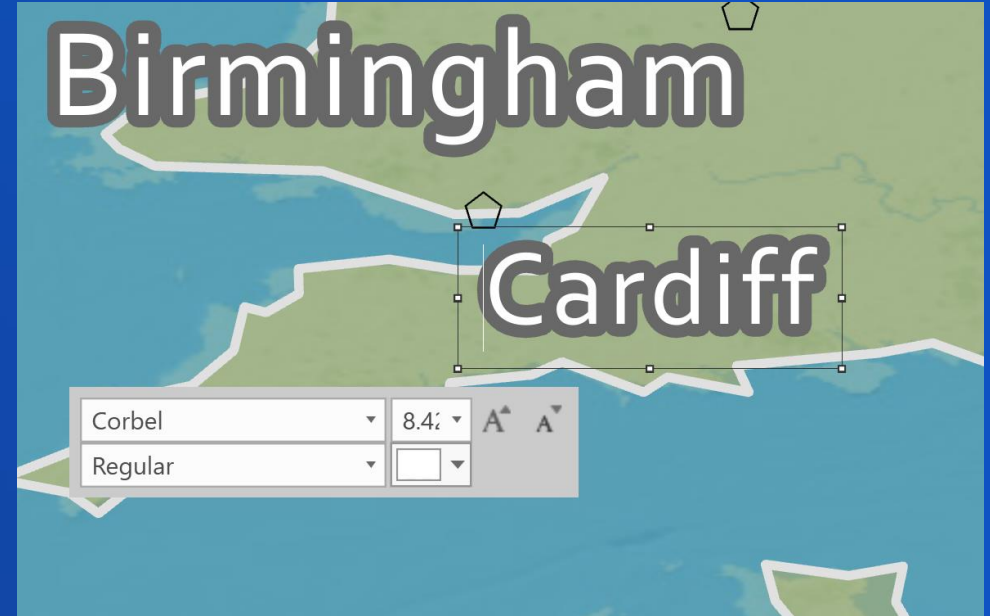
## Annotation – When should we use it?

- When you need to move individual pieces of text
- When you want to add text manually
- When you want text where there is no feature



# What is annotation?

- Static text
- Text can be edited
- Can be created through converting labels





# Unique properties of annotation

- Editing
- Storage
- Symbol collection

## Annotation Feature Class Properties

CitiesAnno

**Annotation** | Annotation Classes

▼ **Editing behavior**

☐ Text symbol required to be selected from the symbol table

▼ **Labeling**

Maplex Label Engine

Reference scale 1:20,000,000 ▼

Orientation of vertical labels 2° ▲▼

☐ Allow labels to overlap border

Abbreviation Dictionary Key Numbering Group

› **Symbol collection**



# Upgrading annotation

- ArcMap annotation is read-only
- Editable only if upgraded to new format
- Use 'Upgrade dataset' GP Tool



# Backwards compatibility

- **Upgraded annotation is NOT compatible with**
  - ArcMap
  - ArcGIS Pro prior to 2.0
- **Compatible from 2.0 onwards**



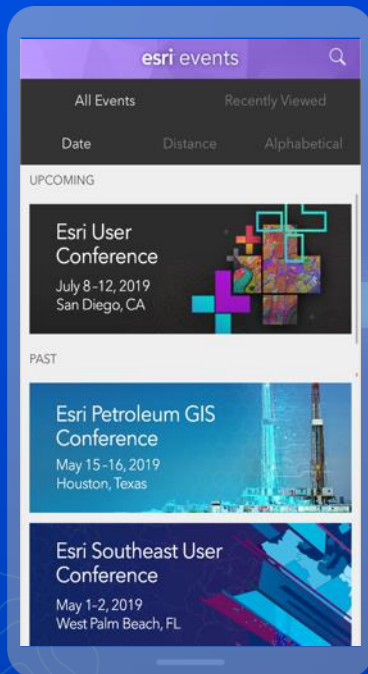
# Summary

- **Creation of labels**
  - Editing of labeling properties
  - Creation of label classes
- **Creation of annotation**
  - Converting labels to annotation
  - Editing
  - Sharing
  - Maintaining

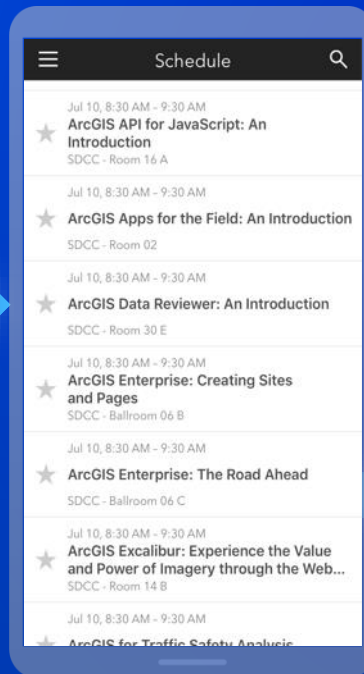
**These slides will be available on the UC proceedings page**

# Please Share Your Feedback in the App

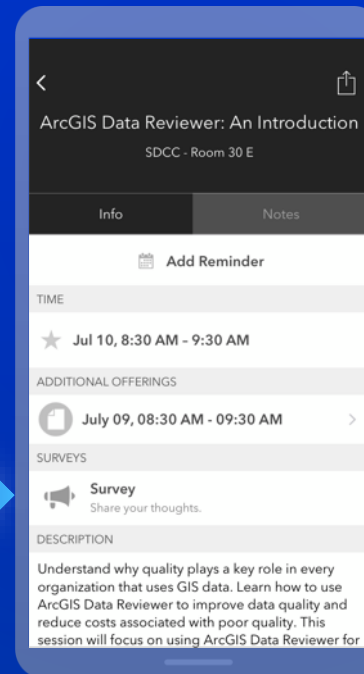
Download the Esri Events app and find your event



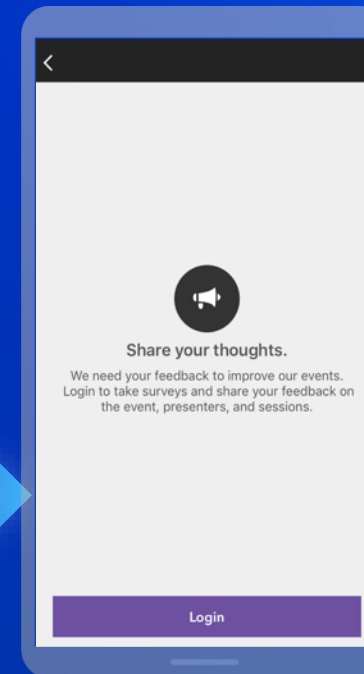
Select the session you attended



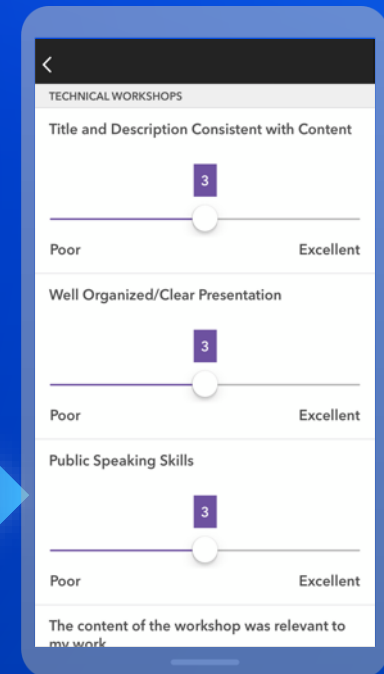
Scroll down to "Survey"



Log in to access the survey



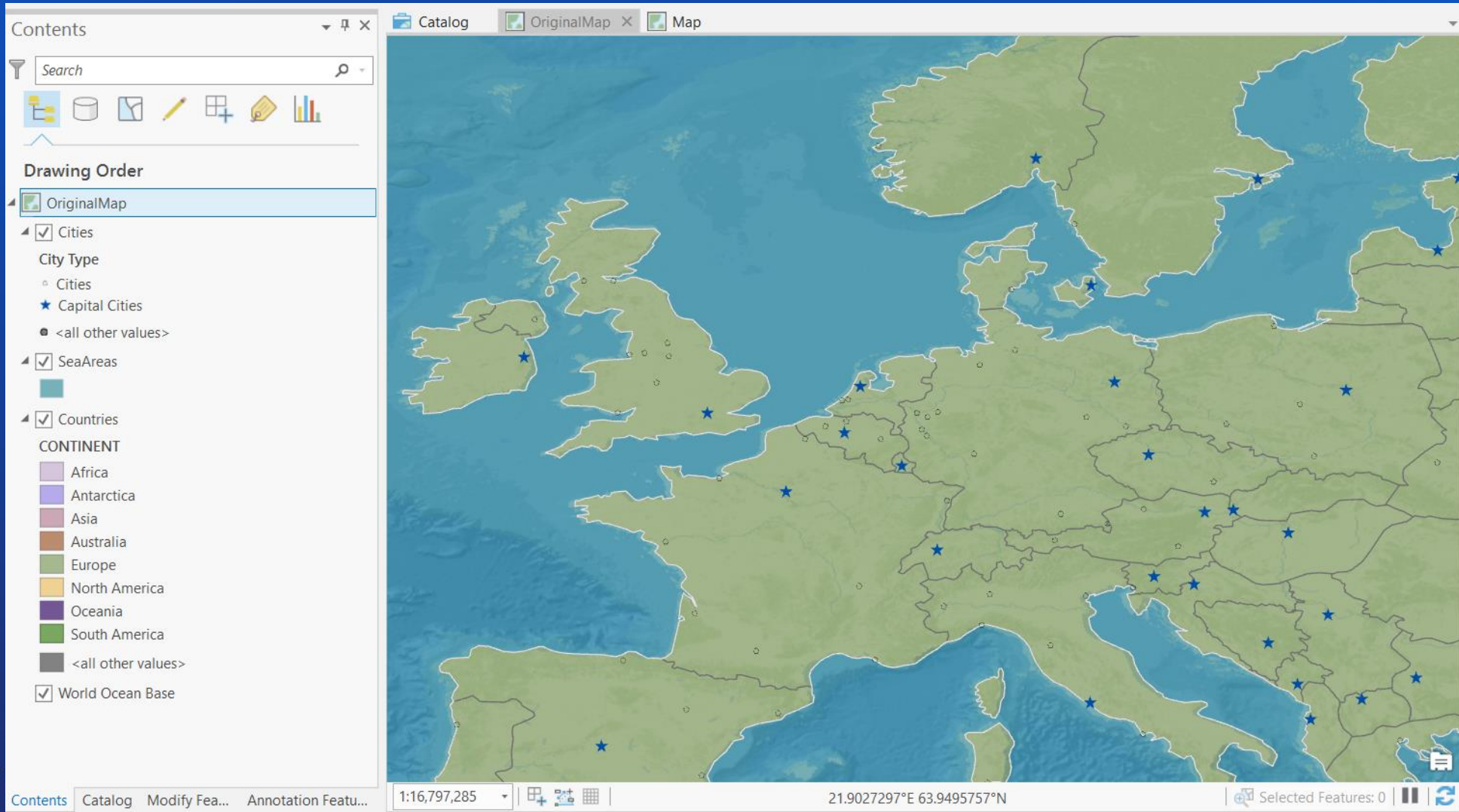
Complete the survey and select "Submit"



# Labeling Demo Images



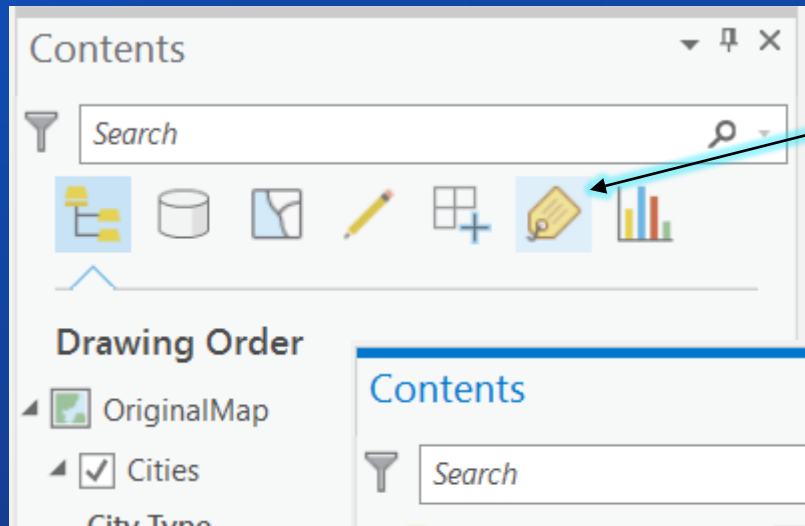
# Labeling demo – Label your layers



1. Starting with an unlabelled map of cities and capital cities

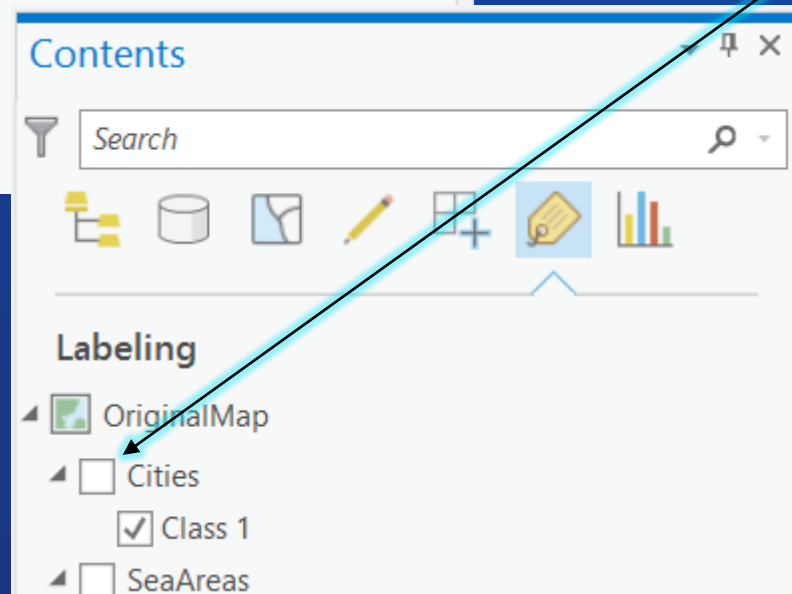


# Labeling demo – Label your layers



1. Switch to labelling view

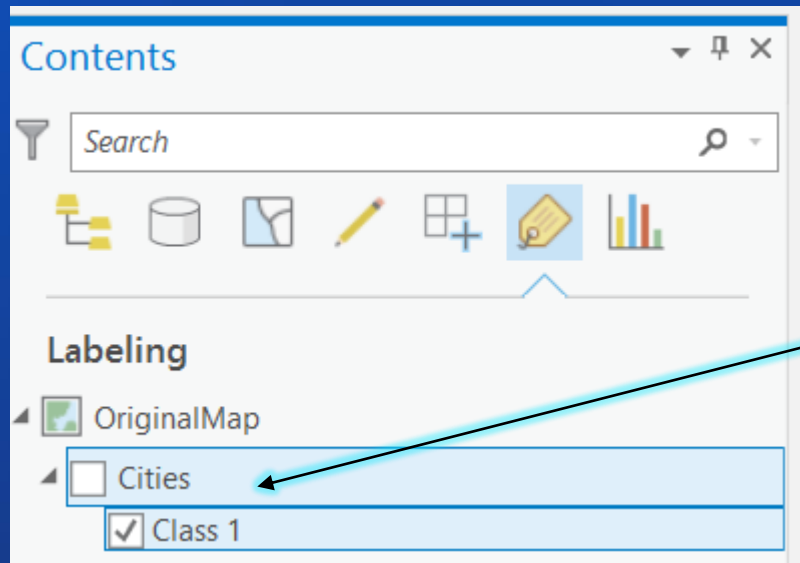
2. Toggle checkbox to label layer



3. Initially labels are set with default properties

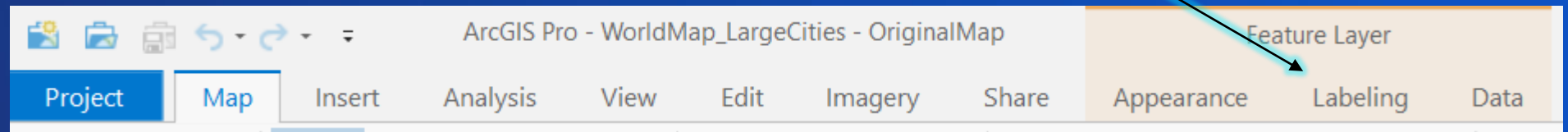


# Labeling demo – Activate labeling ribbon

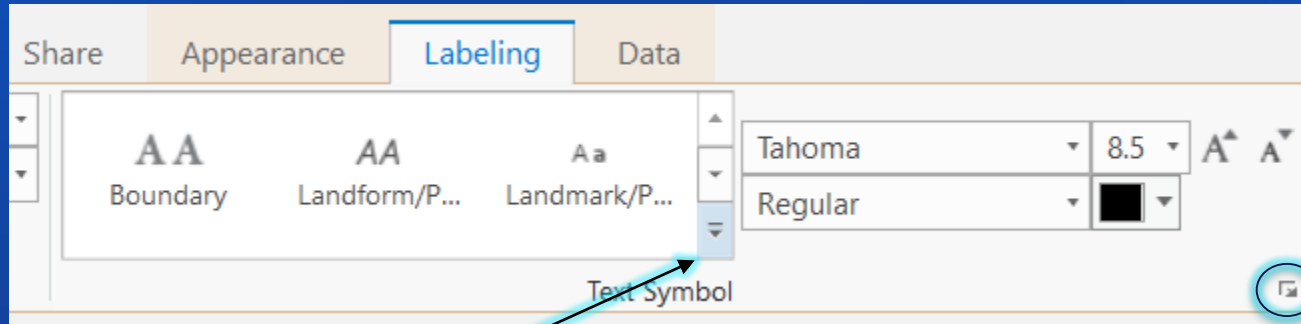


1. Select layer or label class in contents pane

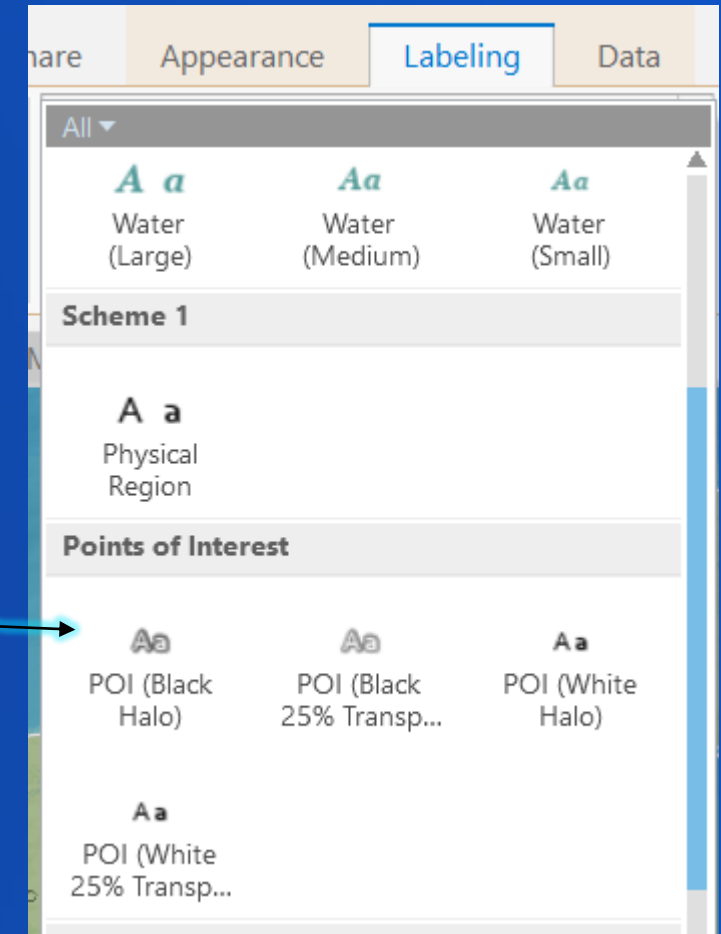
2. Select labeling from Feature Layer context ribbon



# Labeling demo – Modify text symbol



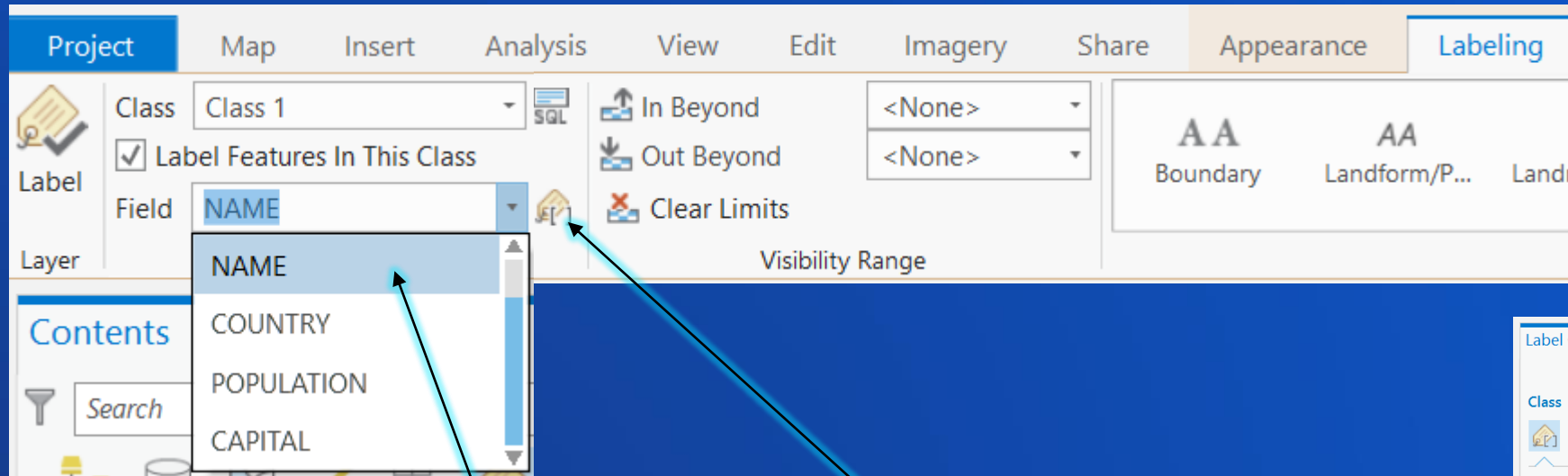
(3. Could also have launched the full symbol editor by clicking here)



1. Expand text symbol styles on ribbon for more options

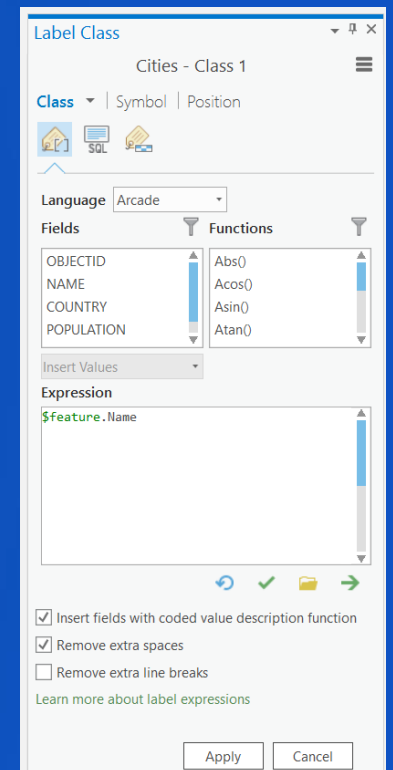
2. Select a text symbol from style gallery

# Labeling demo – Change label field



1. Select new field to label from

2. Launch the expression pane for more complex expression



# Labeling demo – Use tags in expression

## Expression

```
"<FNT SIZE = '12'>" + $feature.NAME +  
"</FNT>"
```

1. Tags can be used to modify some text symbol properties via the expression

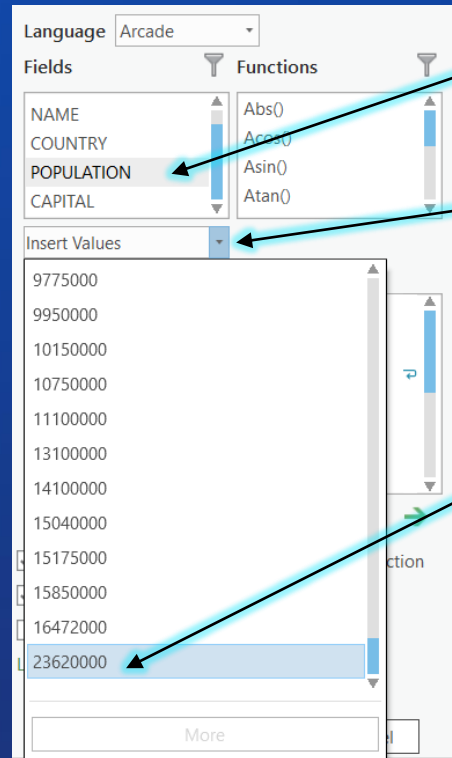
## Expression

```
var fontSize = 12  
"<FNT SIZE = '" + fontSize + "'>" +  
$feature.NAME + "</FNT>"
```

2. We can use a variable as the font size, allowing us to derive it from attributes

*Tags documentation: <http://pro.arcgis.com/en/pro-app/help/mapping/text/text-formatting-tags.htm>*

# Labeling demo – Use tags in expression



1. Double clicking a field inserts it to last cursor position in the expression

2. Single clicking a field activates the insert values drop down

3. Clicking a value from the dropdown inserts it into our expression

4. We can use the population field and max value to create an expression changing the font size based on the population of the city

## Expression

```
var pop = $feature.POPULATION
var maxPop = 23620000
var fontSize = 9 + (pop/maxPop)*15
"<FNT SIZE = '" + fontSize + "'" +
$feature.NAME + "</FNT>"
```



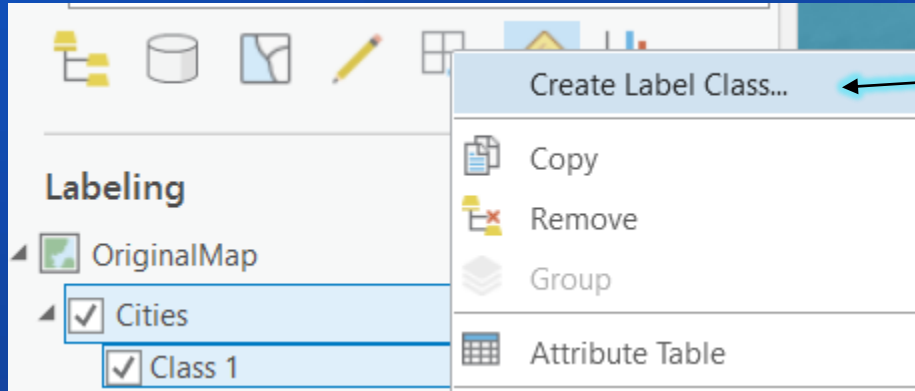
# Labeling demo – Use tags in expression

The screenshot displays the QGIS software interface. The main map window shows a map of Europe with city names labeled. The 'Contents' panel on the left shows the 'OriginalMap' layer with 'Cities' and 'Class 1' selected. The 'Label Class' panel on the right is open, showing the configuration for 'Cities - Class 1'. The 'Language' is set to 'Arcade'. The 'Fields' list includes NAME, COUNTRY, POPULATION, and CAPITAL. The 'Functions' list includes Abs(), Acos(), Asin(), and Atan(). The 'Expression' field contains the following code:

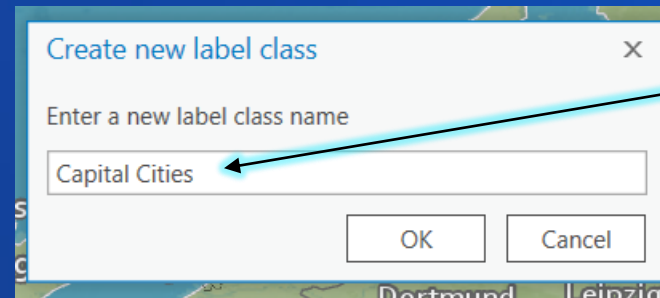
```
var pop = $feature.POPULATION
var maxPop = 23620000
var fontSize = 9 + (pop/maxPop)*15
"<FONT SIZE=" + fontSize + ">" +
$feature.NAME + "</FONT> "
```

Below the expression field, there are checkboxes for 'Insert fields with coded value description function' (checked), 'Remove extra spaces' (checked), and 'Remove extra line breaks' (unchecked). The 'Apply' and 'Cancel' buttons are at the bottom right of the panel.

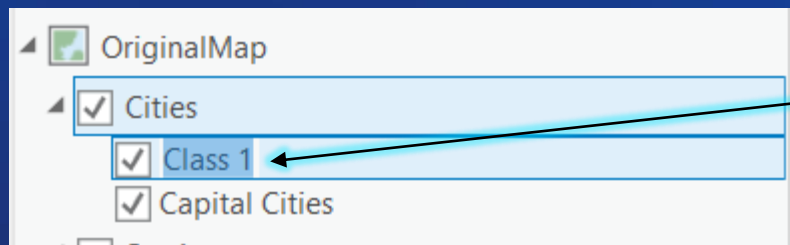
# Labeling demo – Creating new label class



1. On layer context menu, click 'Create label class'

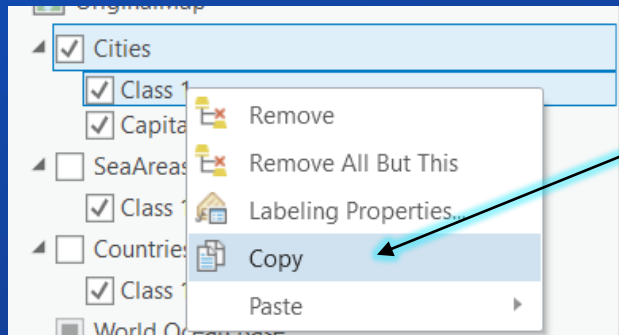


2. Give it a name



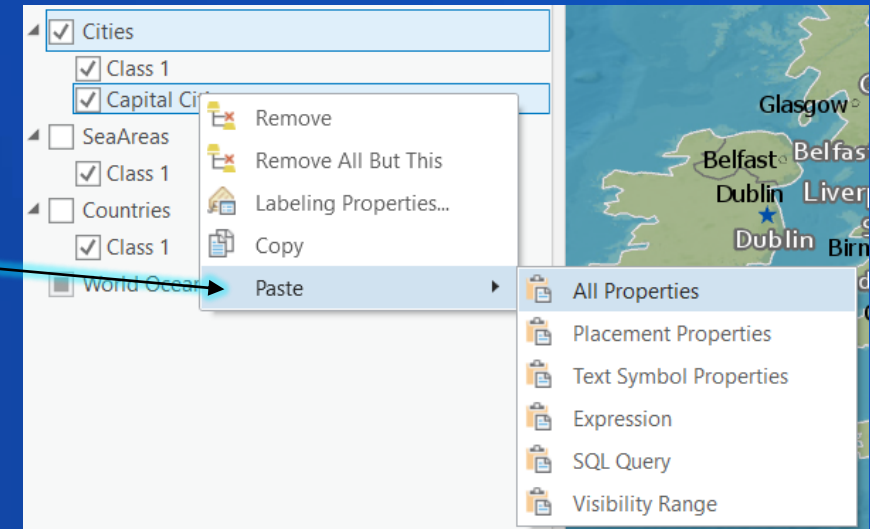
3. Slow click on the original label class name to rename it

# Labeling demo – Copy label class properties

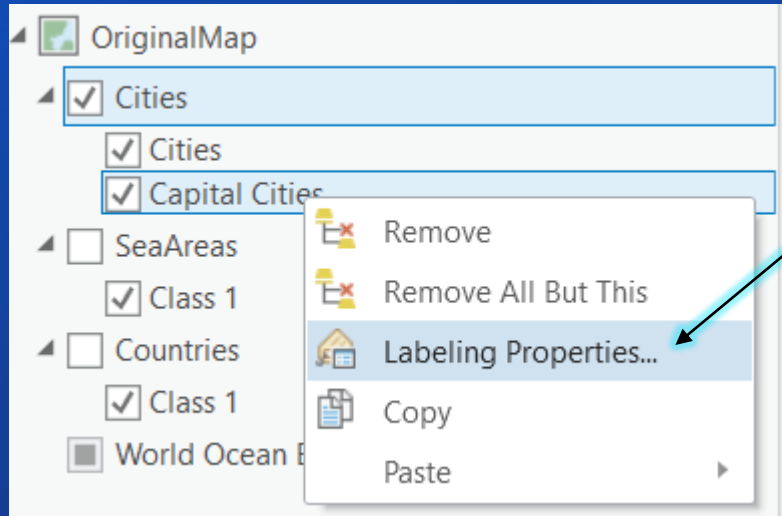


1. Right click original label class to copy the properties

2. Paste the desired properties into the new label class

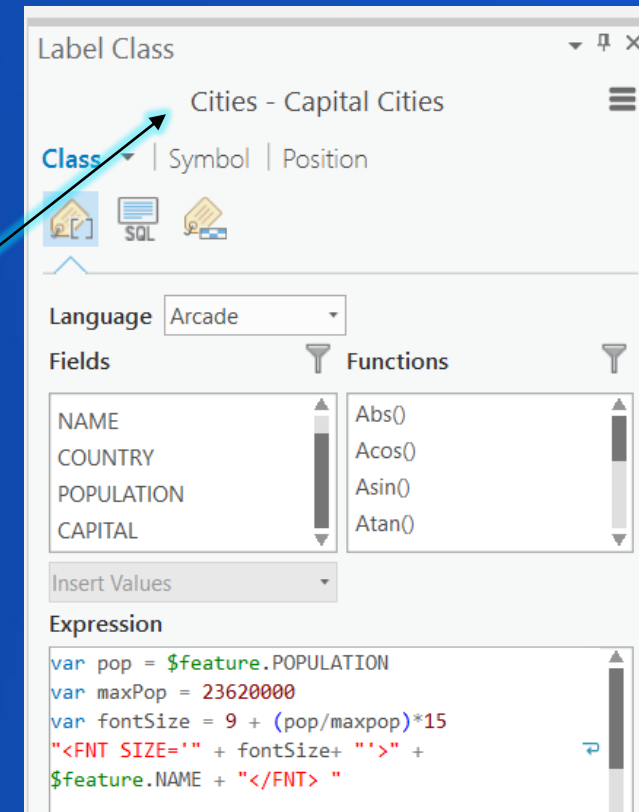


# Labeling demo – Labeling properties



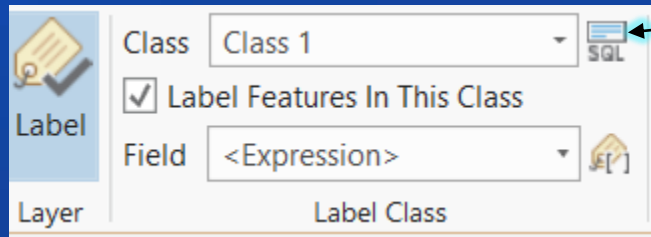
1. Labeling properties can now be modified independently for each label class. We can launch it off the context menu

2. Properties will be shown for the selected label class in the contents pane



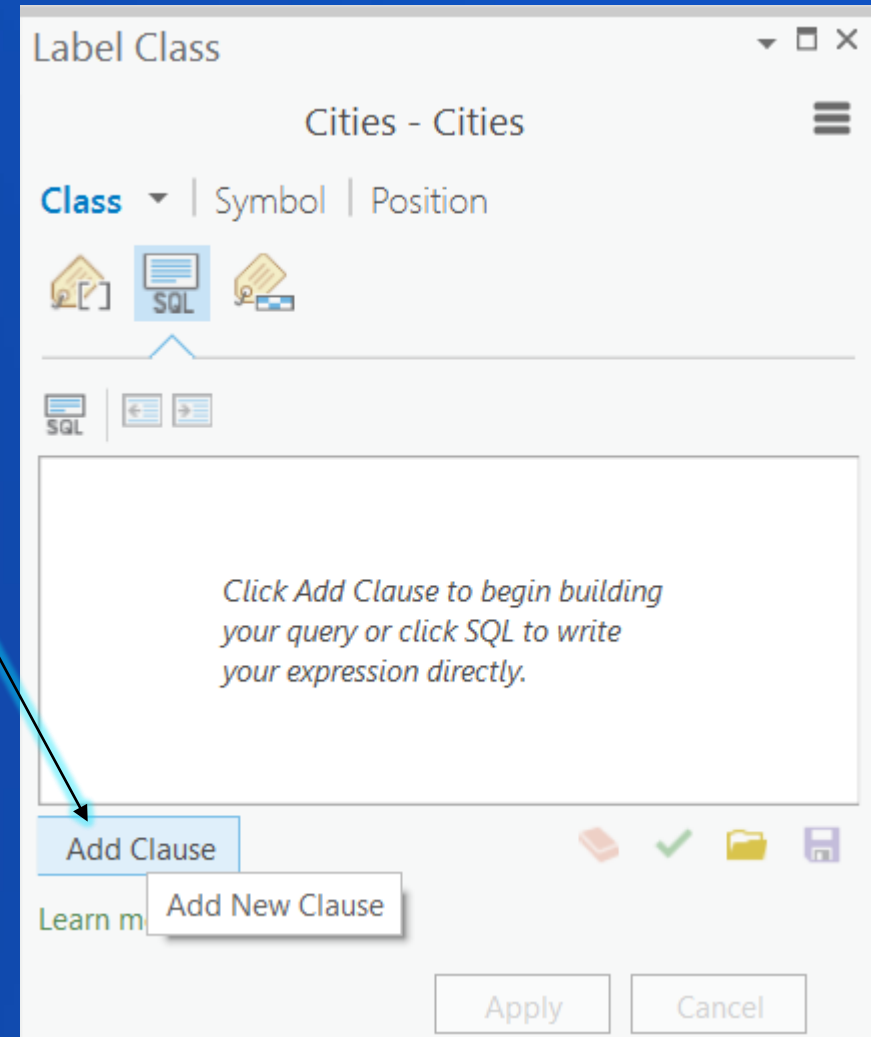
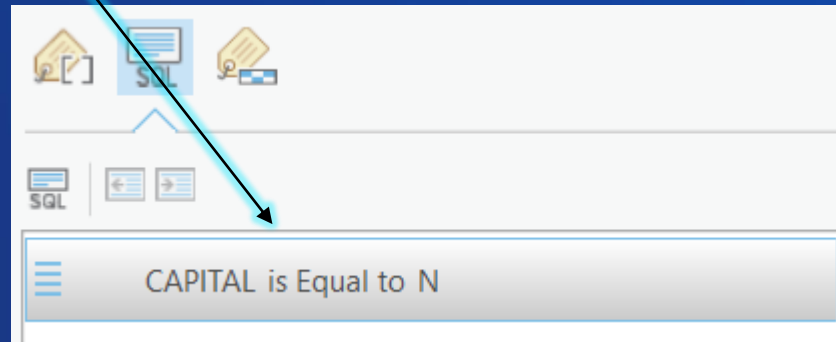
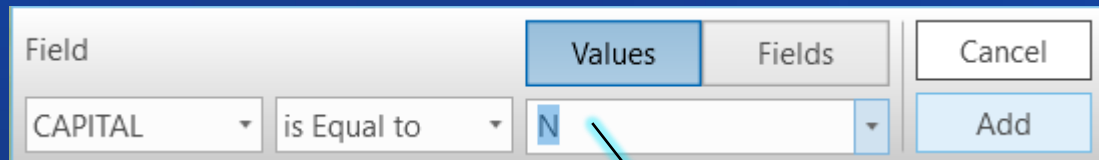
# Labeling demo – Add SQL Query

SQL Queries allow you to specify the subset of features which a label class will label



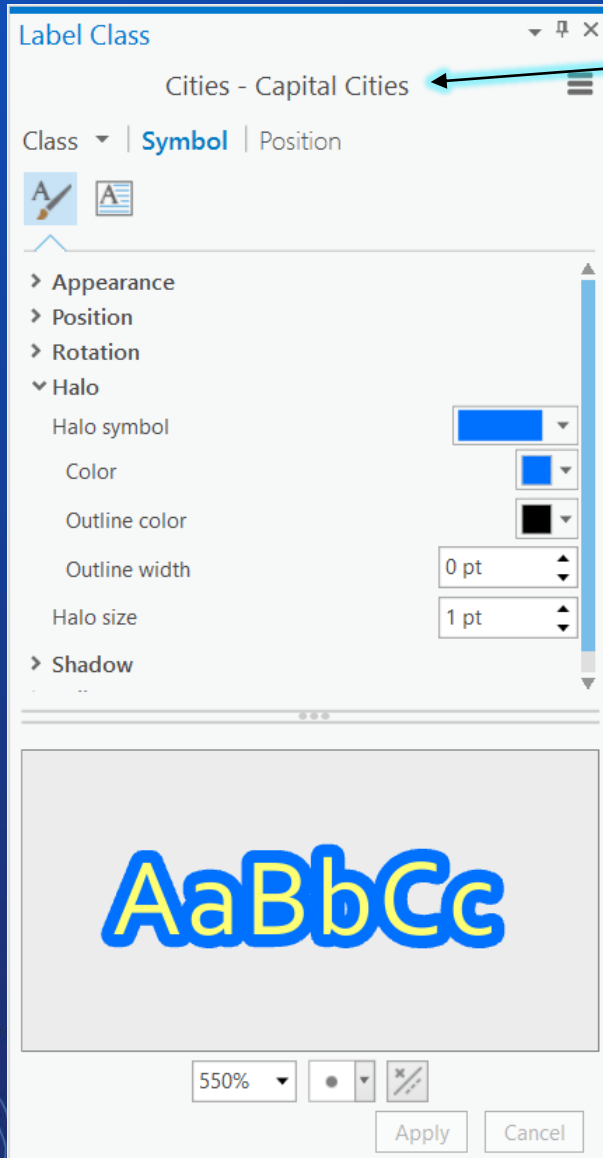
1. Clicking SQL on the labeling ribbon launches the SQL Query tab of the label class pane

2. From here we can add a new clause to specify which labels to use





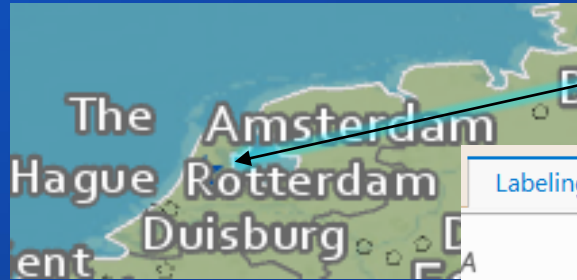
# Labeling demo – Modify new label class symbol



1. The 'Capital Cities' label class can now be modified independently of regular cities e.g. font and halo colour

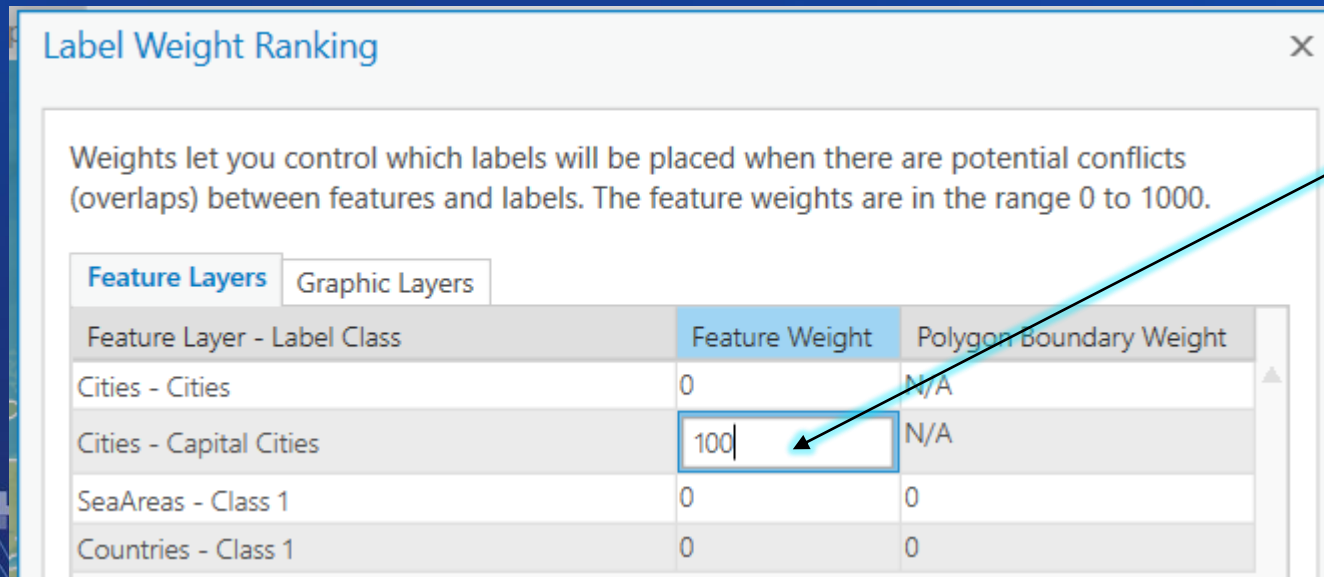
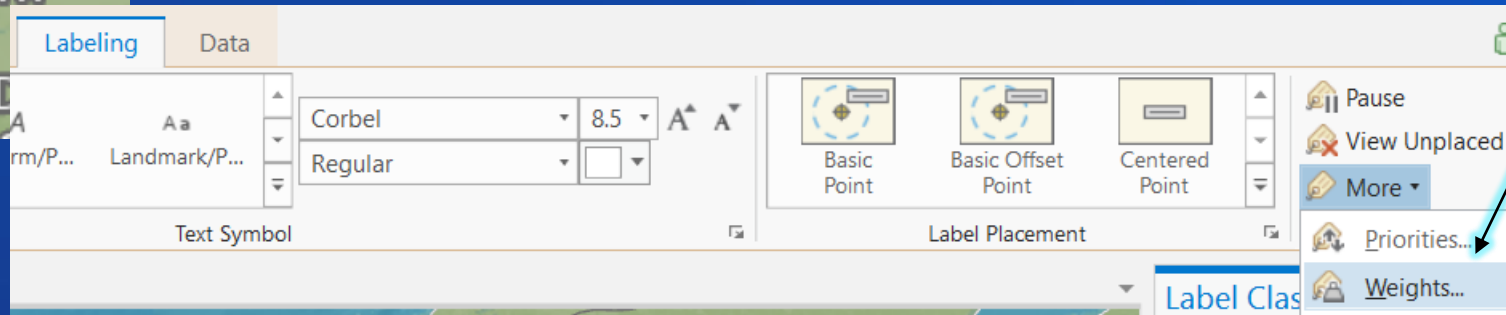


# Labeling demo – Add feature weight



1. To stop other labels overlapping our capital cities feature we need to add a feature weight

2. Launch the weights dialog from the ribbon



3. And add a capital cities feature weight

4. The capital city point features are no longer covered



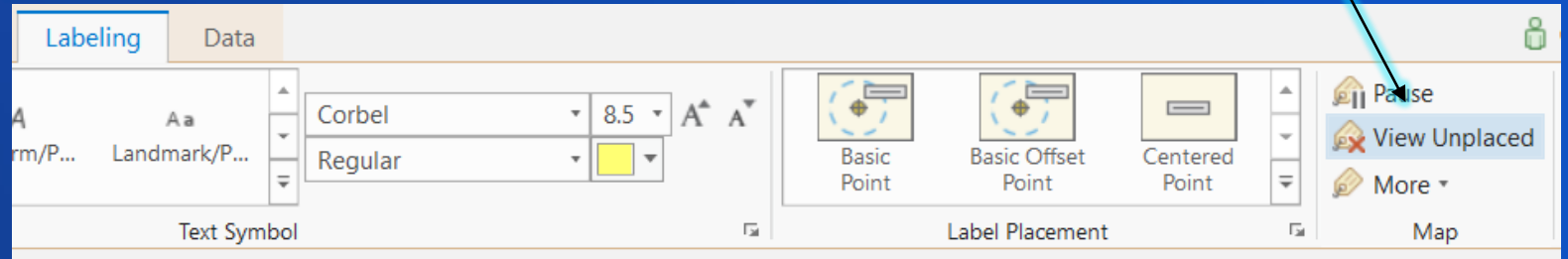


# Labeling demo – Unplaced labels



1. Not all labels will always be able to be placed if there is not enough room

2. We can view unplaced labels by selecting view unplaced on the ribbon



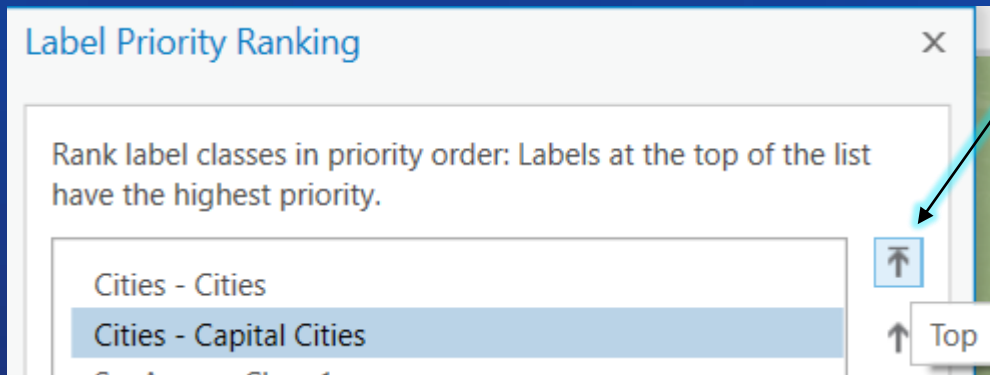
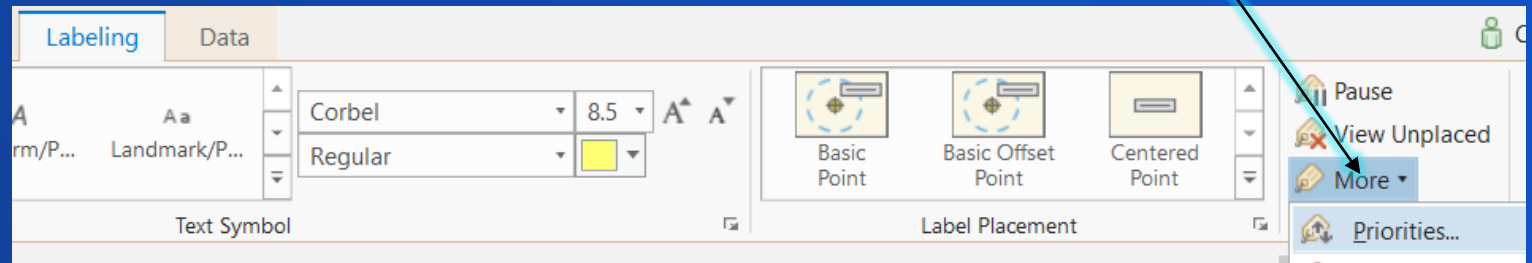
3. And now labels which have not been placed will show in red

# Labeling demo – Priorities



1. If we want the 'Capital Cities' labels to be placed over non capital cities, we can set them as higher priority

2. We launch the priorities dialog from the ribbon

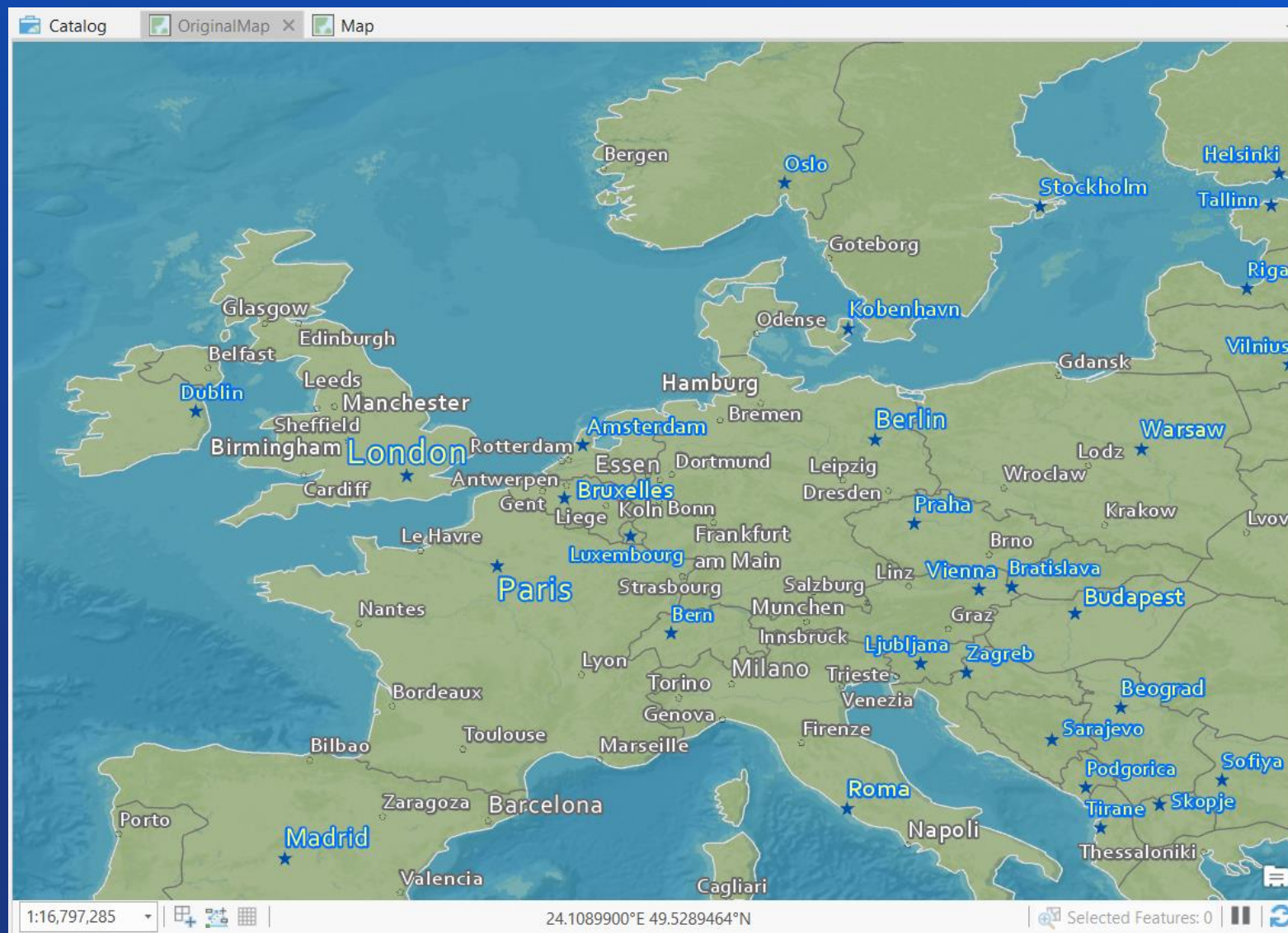


3. And by moving capital cities to the top

4. And the capital city labels will now be prioritised



# Labeling demo





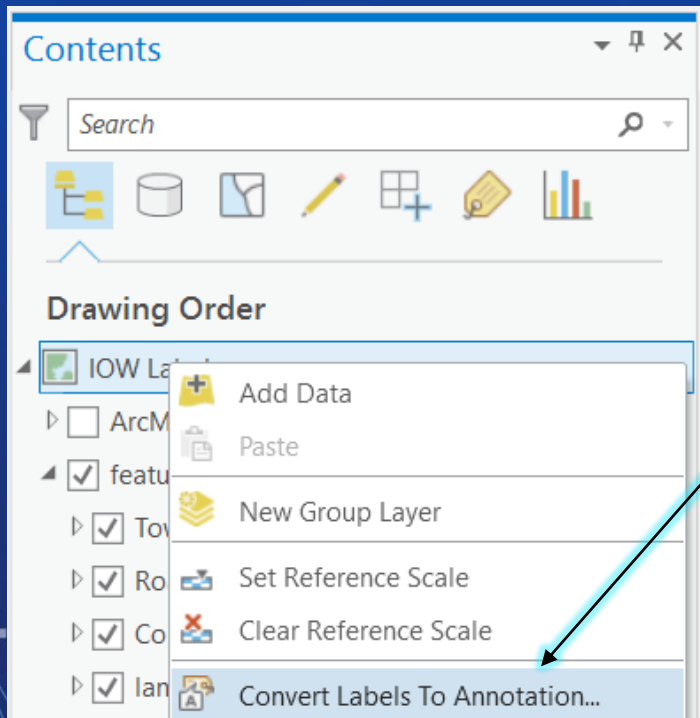
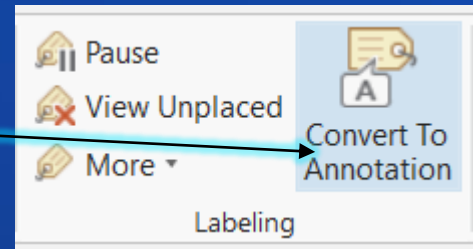
# Annotation Demo Images



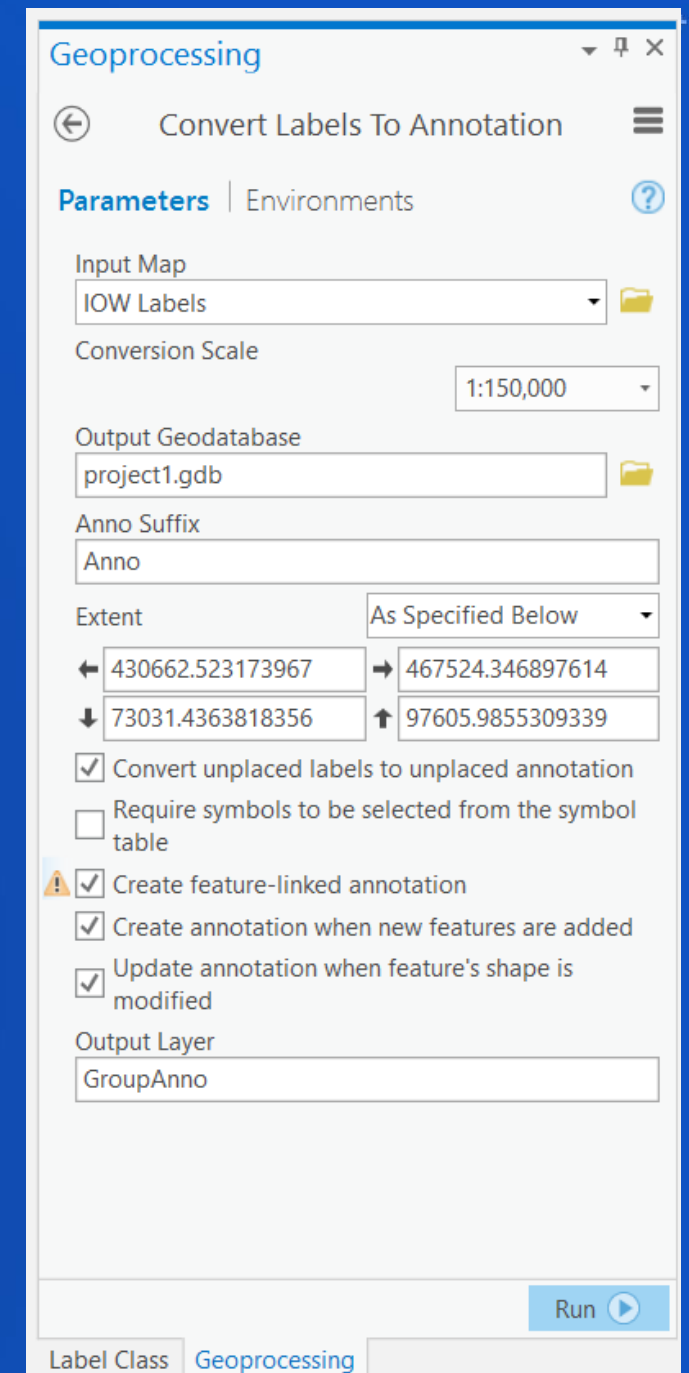
# Annotation demo – Convert labels to annotation

When you have labels set up, but need annotation, you can use 'Convert Labels to Annotation'

1. You can launch convert labels to annotation from the map ribbon



2. Or from the map context menu in the Contents pane



# Annotation demo – Convert labels to annotation

1. You set the Output Geodatabase to the database or feature dataset where you would like your annotation stored

2. The extent defaults to the map extent, but can be set to any reasonable values

3. Unplaced labels can be converted to unplaced annotation, and then placed manually later

4. Feature linked annotation can be created (advanced license required) in order to keep annotation linked to the underlying point line and polygon features

The screenshot shows the 'Convert Labels To Annotation' tool in the Geoprocessing pane. The interface includes a title bar, a back button, and tabs for 'Parameters' and 'Environments'. The 'Parameters' tab is active, showing the following settings:

- Input Map:** IOW Labels
- Conversion Scale:** 1:150,000
- Output Geodatabase:** project1.gdb
- Anno Suffix:** Anno
- Extent:** As Specified Below
  - Left: 430662.523173967
  - Right: 467524.346897614
  - Bottom: 73031.4363818356
  - Top: 97605.9855309339
- ☒ Convert unplaced labels to unplaced annotation
- ☐ Require symbols to be selected from the symbol table
- ☒ Create feature-linked annotation
- ☒ Create annotation when new features are added
- ☒ Update annotation when feature's shape is modified
- Output Layer:** GroupAnno

At the bottom right is a 'Run' button with a play icon. At the bottom left, there are tabs for 'Label Class' and 'Geoprocessing'.

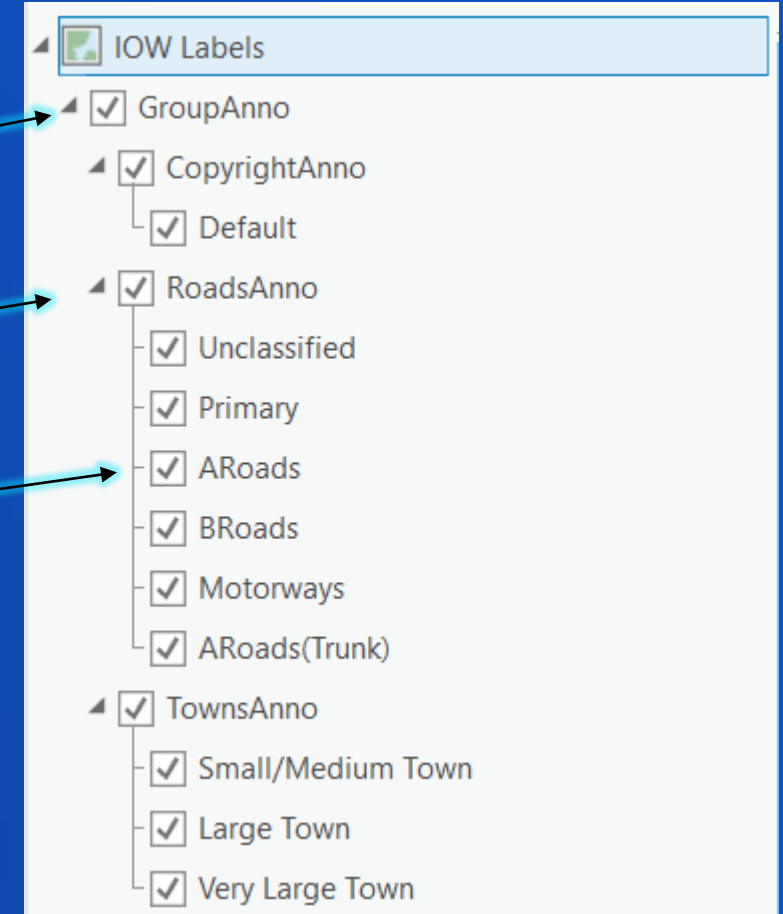
Four blue arrows point from the numbered text blocks on the left to specific fields in the tool:

- Arrow 1 points to the 'Output Geodatabase' field.
- Arrow 2 points to the 'Extent' section.
- Arrow 3 points to the 'Convert unplaced labels to unplaced annotation' checkbox.
- Arrow 4 points to the 'Create feature-linked annotation' checkbox.

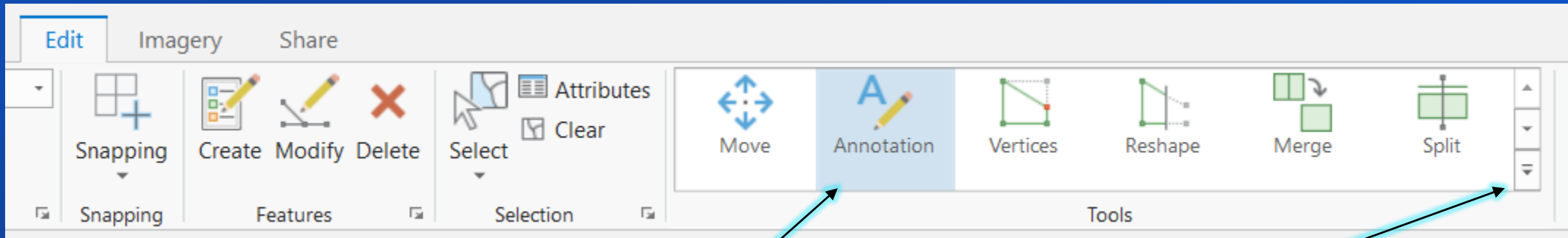


# Annotation demo – Annotation in contents pane

1. The resulting annotation feature classes are added to the map and added to a group layer
2. Labeling in map for these layers will be switched off. The text on the map is now annotation
3. The label classes in the layers become annotation classes in the annotation feature class (appearing as sublayers in the contents pane)



# Annotation demo – Annotation edit tool

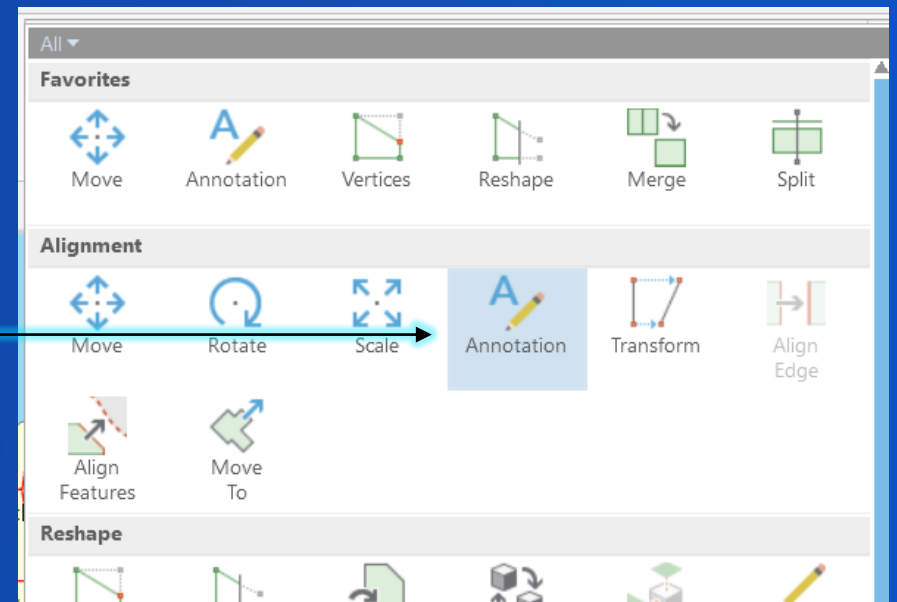


1. The edit annotation tool is found on the Edit pane under tools

2. If it is not in your favourites, click here to see full gallery

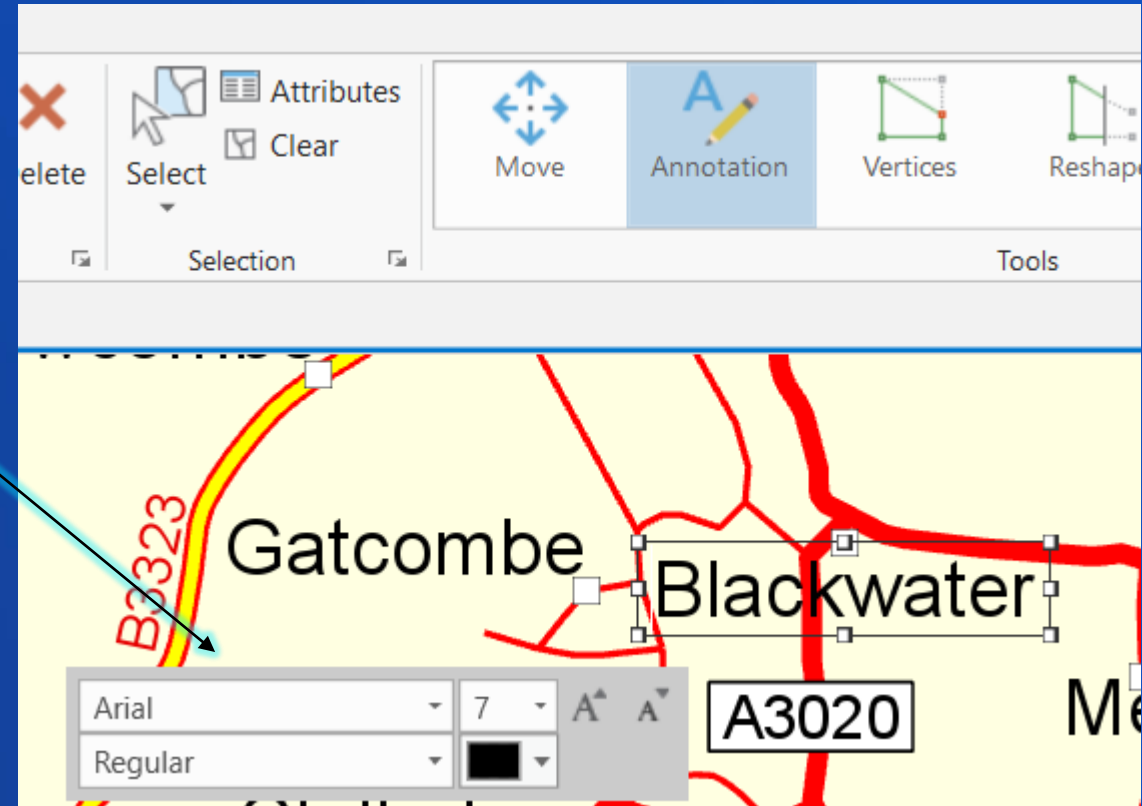
3. Where it can be found under alignment tools

(4. To add to favourites, right click and select add to favourites)



# Annotation demo – Annotation edit tool

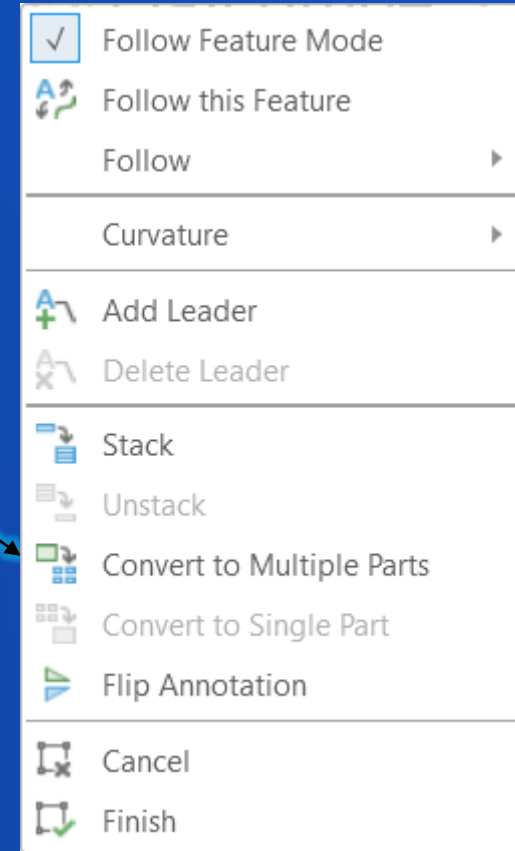
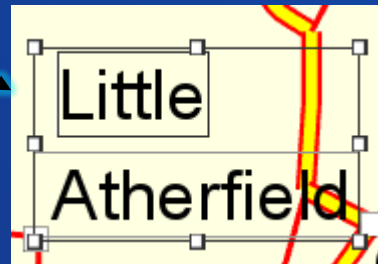
1. Selecting an annotation feature with the annotation tool active allows the text to be edited directly and brings up the editing tool bar



# Annotation demo – Annotation edit tool

1. Right clicking gives you access to a range of editing options

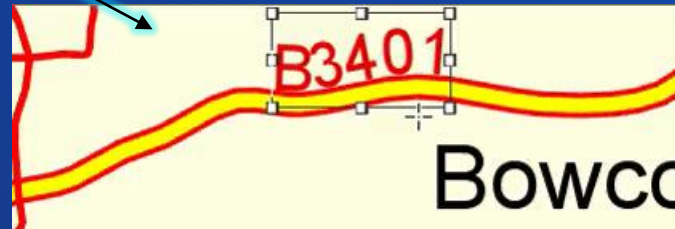
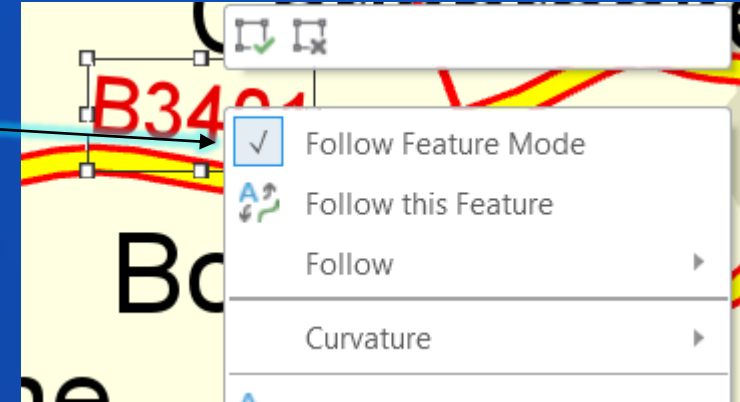
2. If annotation has multiple words you can convert it to multiple parts to edit them independently



# Annotation demo – Annotation edit tool

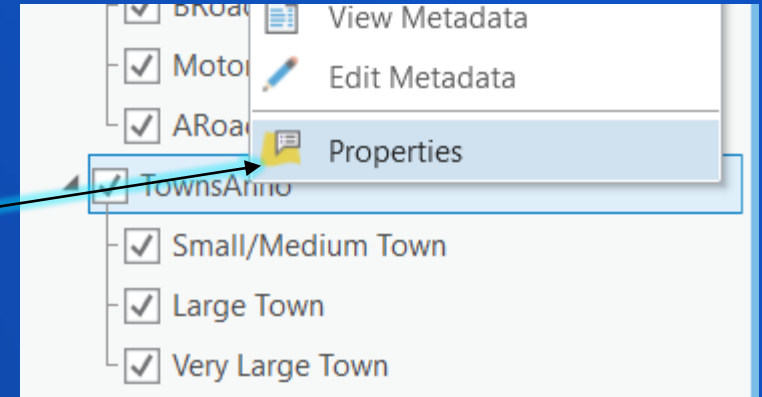
1. You can also activate follow feature mode

2. This allows annotation to be dragged along a feature (see gif)



# Annotation demo – Layer properties

1. You can view the layer properties by launching them from the context menu



Layer Properties: TownsAnno

**General**

Metadata

Source

Elevation

Selection

Display

Cache

Definition Query

Time

Range

Joins

Relates

Page Query

Name  
TownsAnno

Visibility range

Do not show layer when zoomed

In beyond (maximum scale)  
<None>

Out beyond (minimum scale)  
<None>

☐ Layer should be refreshed periodically  
1 Seconds

OK Cancel



# Annotation demo – Layer properties

1. The source tab shows you where the annotation is stored, as well as some of the properties it has stored in the geodatabase

2. Here you can see in particular:

- Whether it has been upgraded
- Its reference scale
- Whether it is feature-linked, and if so what feature class it is linked to

Layer Properties: TownsAnno

General  
Metadata  
**Source**  
Elevation  
Selection  
Display  
Cache  
Definition Query  
Time  
Range  
Joins  
Relates  
Page Query

> Spatial Reference  
> Domain, Resolution, and Tolerance  
▼ Annotation

Annotation has been upgraded to the current release	Yes
Reference scale	1:200,000
Text symbol required to be selected from the symbol table	No
Annotation is feature-linked	Yes
Related feature class name	Towns
Label engine	Maplex Label Engine
Annotation created with new features	Yes
Annotation updated when related feature's shape is modified	Yes

OK Cancel

# Annotation demo – Layer properties

1. If it is annotation created in ArcMap and imported into ArcGIS Pro, then this will say 'No' until it has been upgraded

Layer Properties: FeaturesAnno

General  
Metadata  
**Source**  
Elevation  
Selection  
Display  
Cache  
Definition Query  
Time  
Range  
Joins  
Relates  
Page Query

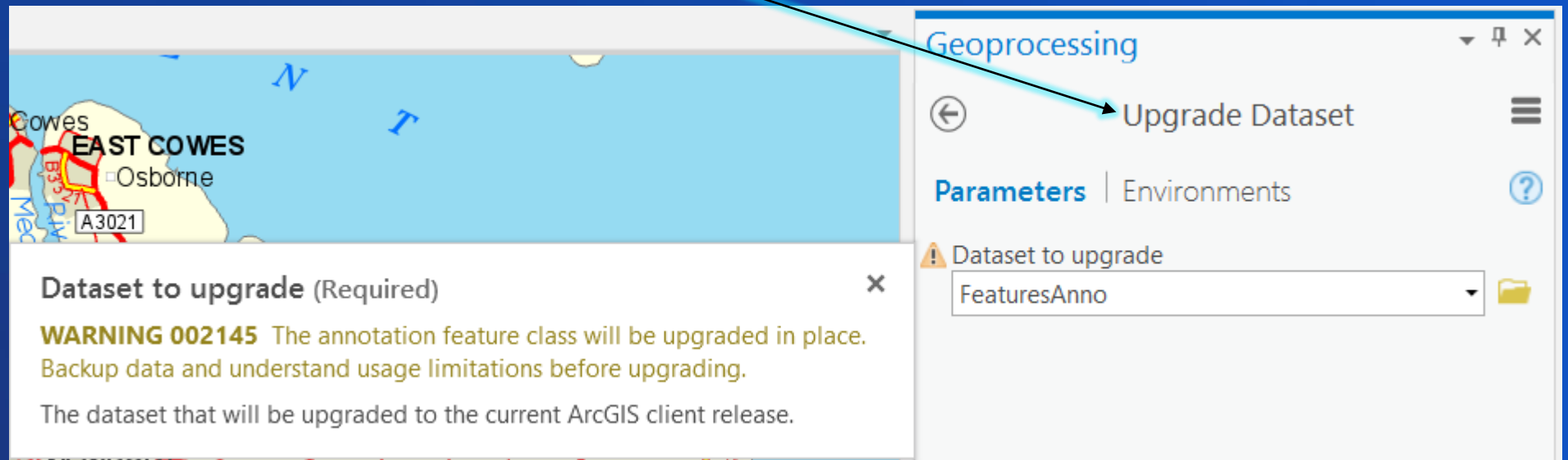
> Spatial Reference  
> Domain, Resolution, and Tolerance  
▼ Annotation

Annotation has been upgraded to the current release	No
Reference scale	1:200,000
Text symbol required to be selected from the symbol table	No
Annotation is feature-linked	Yes
Related feature class name	SpecialFeatures
Label engine	Maplex Label Engine
Annotation created with new features	Yes
Annotation updated when related feature's shape is modified	Yes

OK Cancel

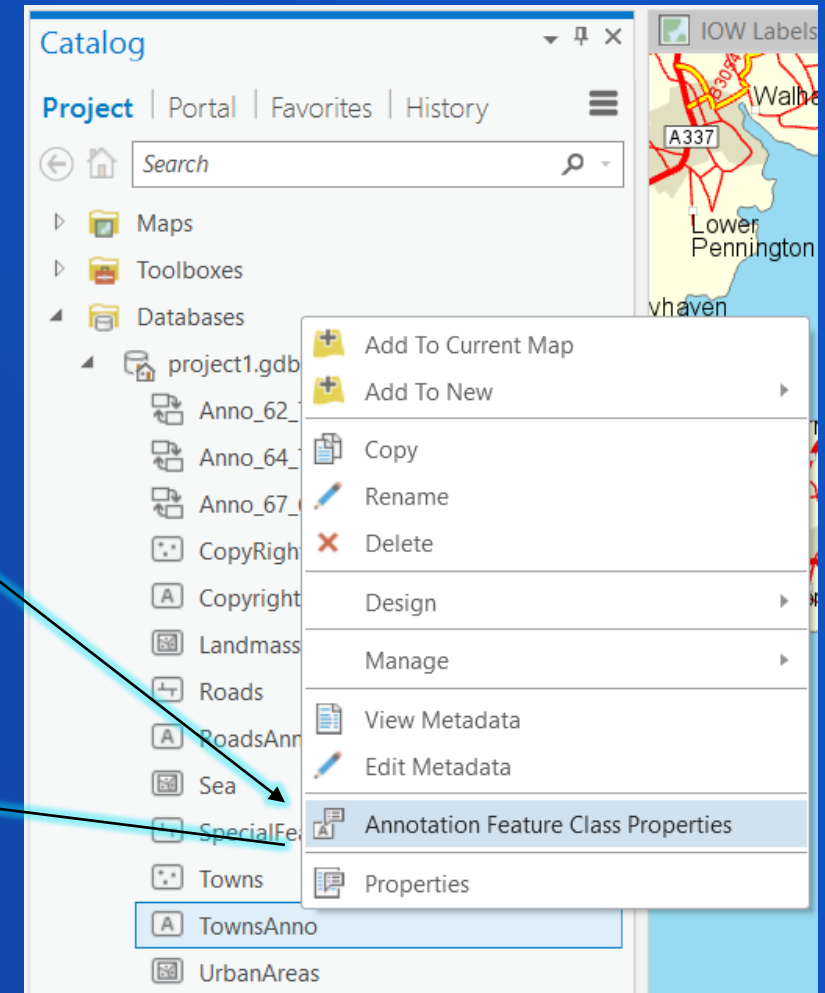
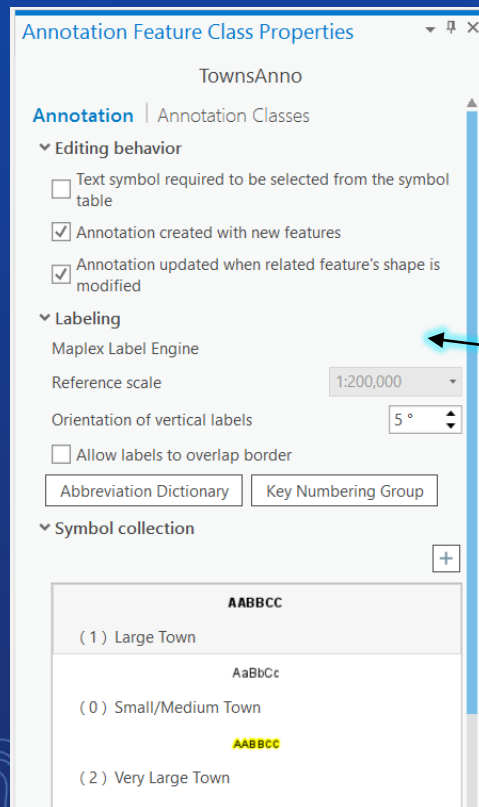
# Annotation demo – Upgrading ArcMap annotation

ArcMap annotation can be upgraded in place using the upgrade dataset geoprocessing tool



# Annotation demo – Feature class properties

Annotation feature class properties can be accessed via the Catalog pane



# Annotation demo – Feature class properties

The numbers in brackets next to symbols in the Symbol Collection correspond to the SymbolIDs in the attribute table

Symbol collection

AABBCC

( 1 ) Large Town

AaBbCc

( 0 ) Small/Medium Town

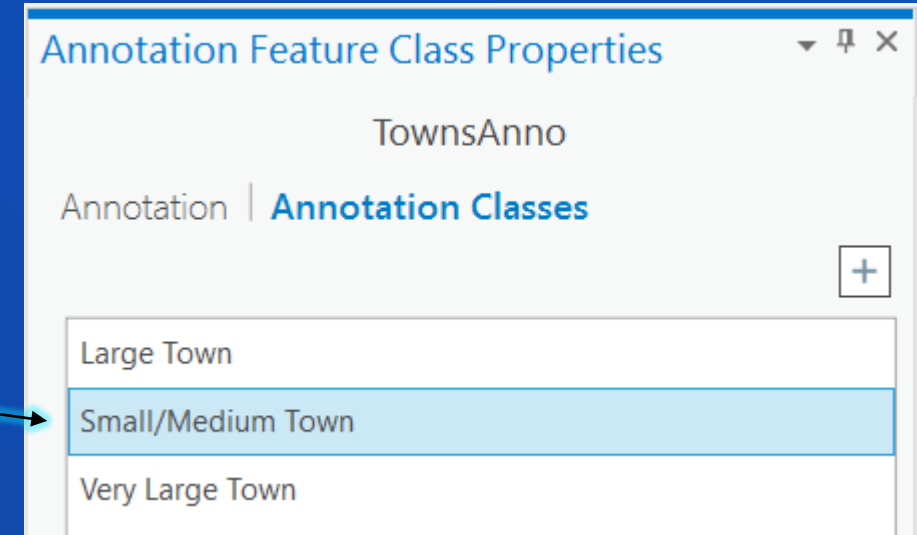
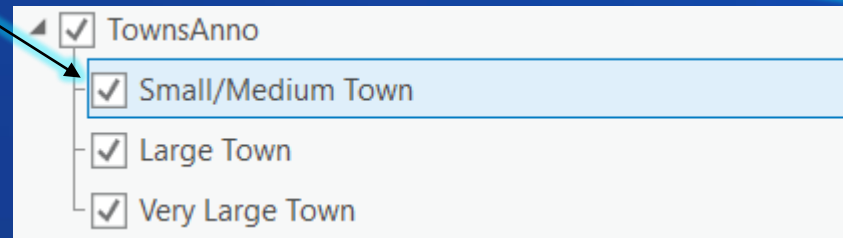
AABBCC

( 2 ) Very Large Town

TownAnno X										
Field: Add Delete Calculate			Selection: Zoom To Switch Clear Delete Copy							
OBJECTID	SHAPE	FeatureID	ZOrder	AnnotationClassID	Element	SymbolID	Status	TextString	FontName	
1	Polygon	749	<Null>	Small/Medium Town	Blob	0	Placed	Walhampton	Arial	
2	Polygon	753	<Null>	Small/Medium Town	Blob	0	Placed	Cowes	Arial	
3	Polygon	754	<Null>	Small/Medium Town	Blob	0	Placed	Gurnard	Arial	

# Annotation demo – Feature class properties

The annotation classes correspond to the AnnotationClassIDs in the attribute table and the sublayers in the contents pane



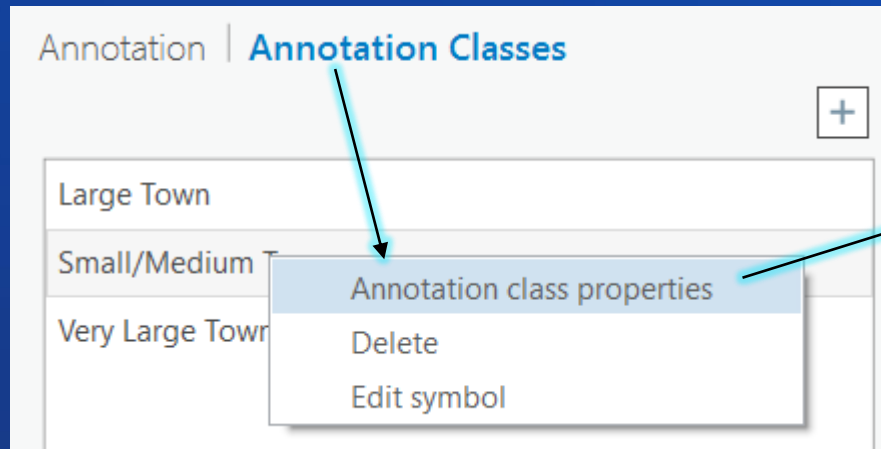
TownsAnno										
Field: Add Delete Calculate Selection: Zoom To Switch Clear Delete Copy										
OBJECTID	SHAPE	FeatureID	ZOrder	AnnotationClassID	Element	SymbolID	Status	TextString	FontName	
1	Polygon	749	<Null>	Small/Medium Town	Blob	0	Placed	Walhampton	Arial	
2	Polygon	753	<Null>	Small/Medium Town	Blob	0	Placed	Cowes	Arial	
3	Polygon	754	<Null>	Small/Medium Town	Blob	0	Placed	Gurnard	Arial	



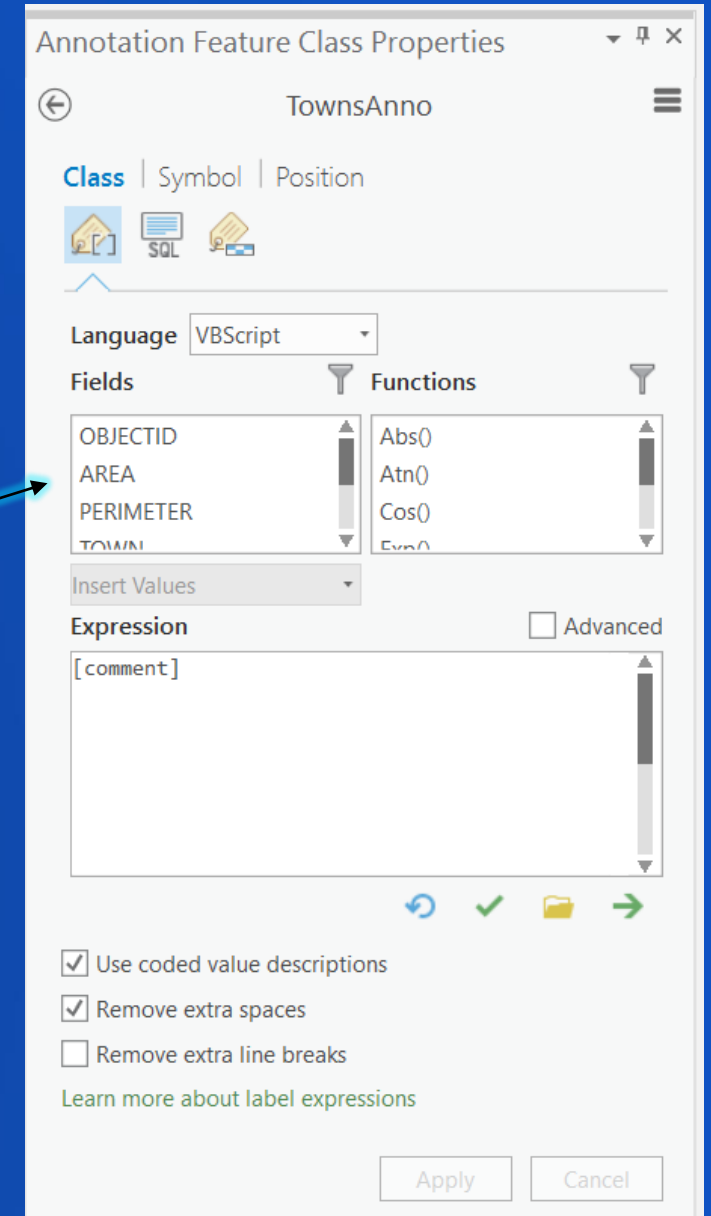
# Annotation demo – Feature class properties

The annotation classes can be modified.

These annotation classes contain all of the properties that your label class contained



(n.b. if annotation is standard annotation rather than feature-linked only the symbol and visibility range are included)

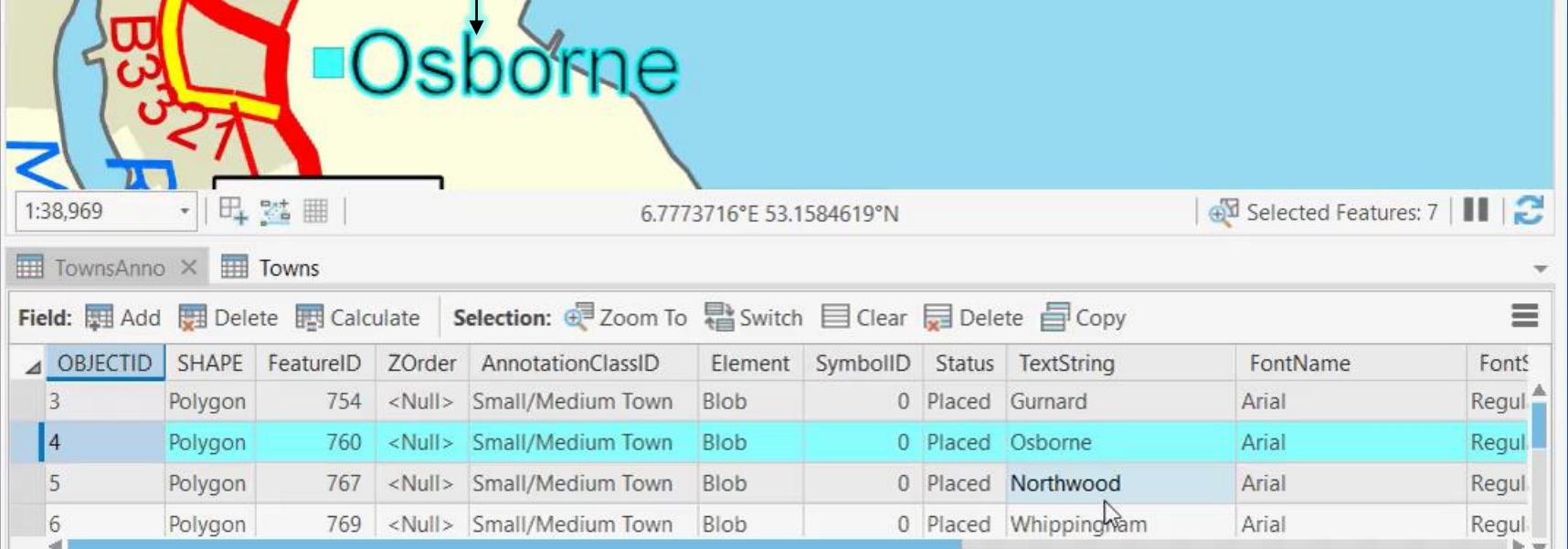


# Annotation demo – Attribute updates

Annotation attributes can be updated directly, and these attributes will update the draw

If the annotation is feature-linked, updates to the related point line or polygon feature class attributes will result in updates to the annotation.

1. Update TextString field directly in TownsAnno attribute table, see text on map update
2. Update the Towns 'Comment' field, see TownsAnno TextString field update and the text on the map update (see gif)

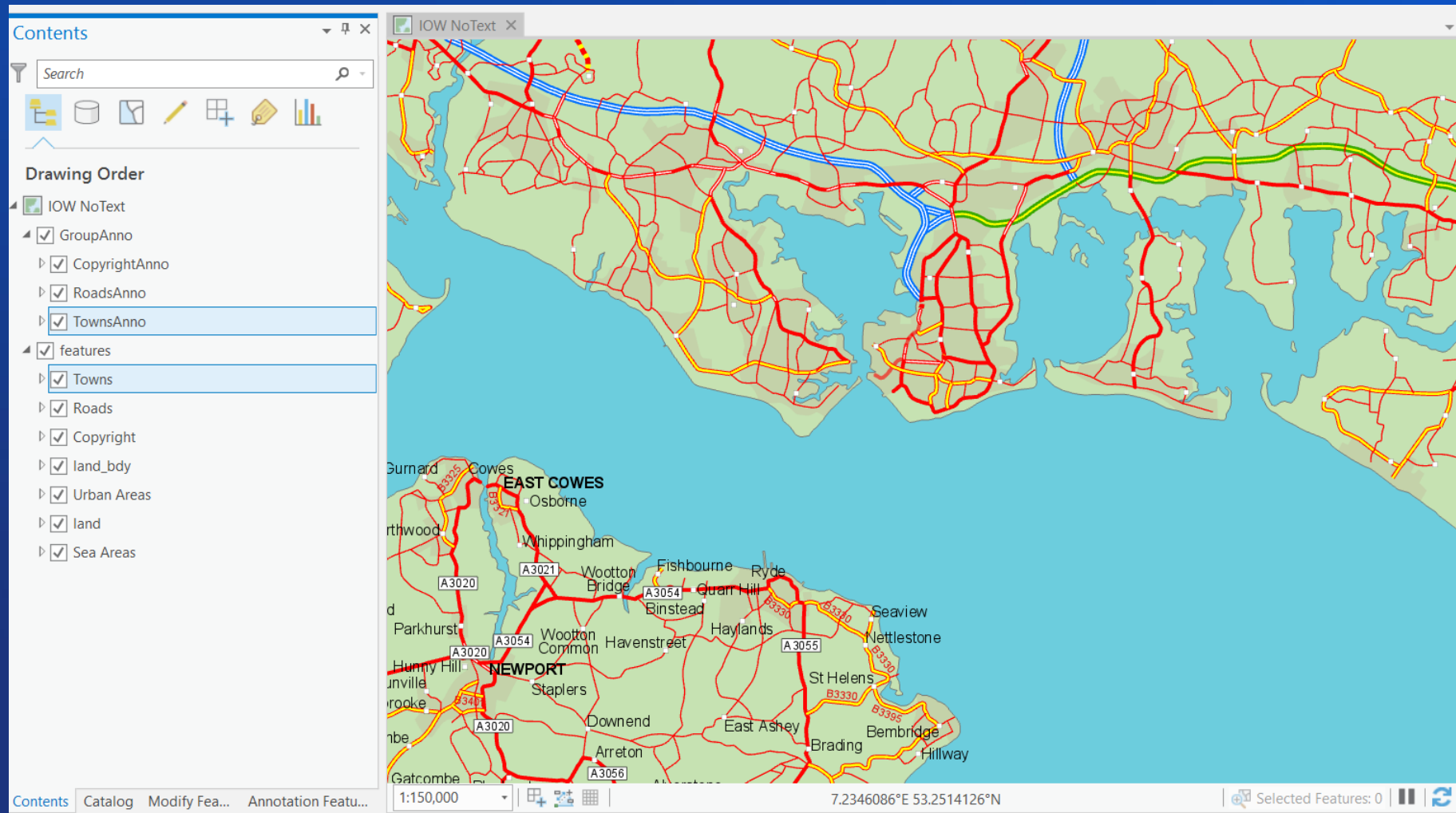


1:38,969 6.7773716°E 53.1584619°N Selected Features: 7

Field:	Add	Delete	Calculate	Selection:	Zoom To	Switch	Clear	Delete	Copy	
OBJECTID	SHAPE	FeatureID	ZOrder	AnnotationClassID	Element	SymbolID	Status	TextString	FontName	FontS
3	Polygon	754	<Null>	Small/Medium Town	Blob	0	Placed	Gurnard	Arial	Regul
4	Polygon	760	<Null>	Small/Medium Town	Blob	0	Placed	Osborne	Arial	Regul
5	Polygon	767	<Null>	Small/Medium Town	Blob	0	Placed	Northwood	Arial	Regul
6	Polygon	769	<Null>	Small/Medium Town	Blob	0	Placed	Whippingham	Arial	Regul

# Annotation demo – Annotate Selected Features

If we have feature's which don't have annotation, and a linked annotation feature class, we can use annotate selected features



# Annotation demo – Annotate Selected Features

## 1. Select the features to annotate

### Methods for selecting features:

#### Method 1

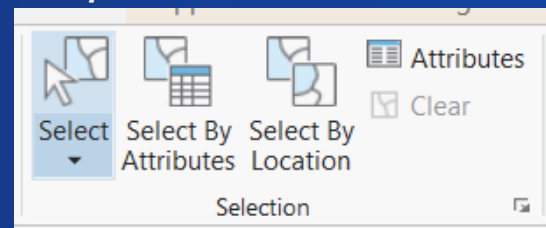
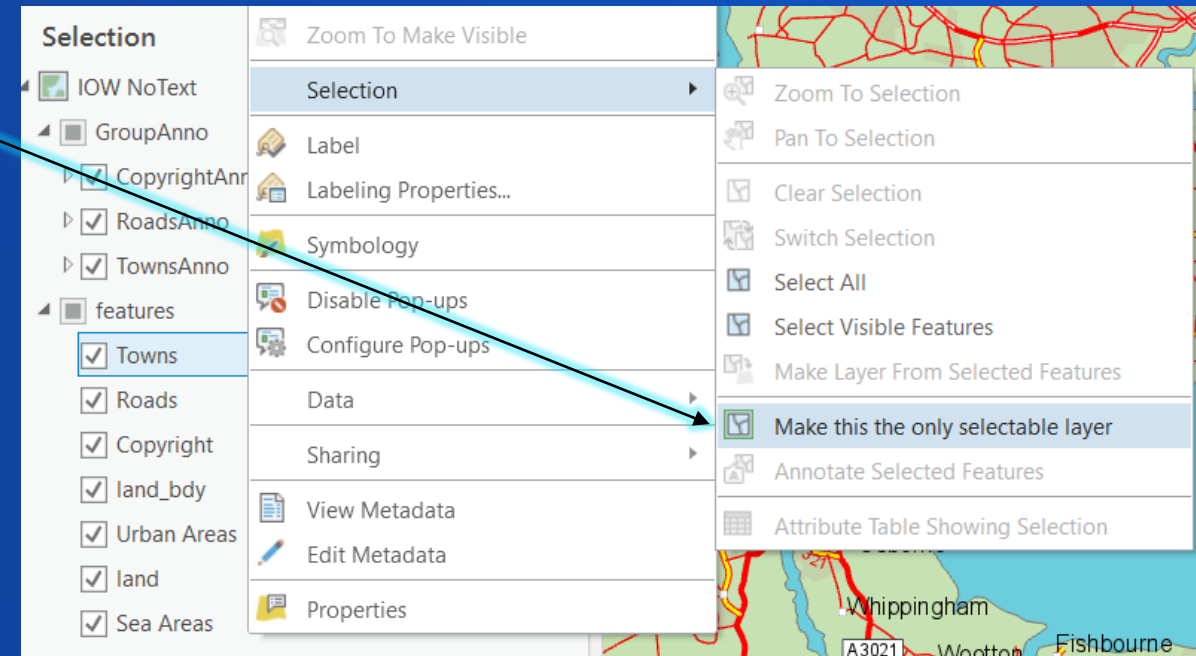
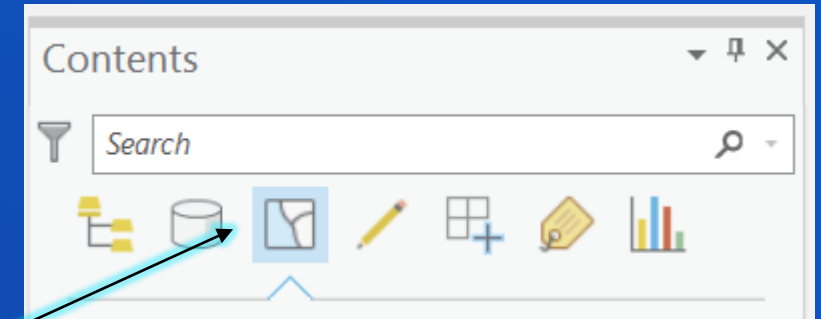
1. Go to select tool on ribbon and click features on map

#### Method 2

1. Go to list by selection Contents pane view
2. Right click linked feature class and under Selection, click make this the only selectable layer
3. Go to select tool on ribbon, and drag selection box over features to annotate

#### Method 3

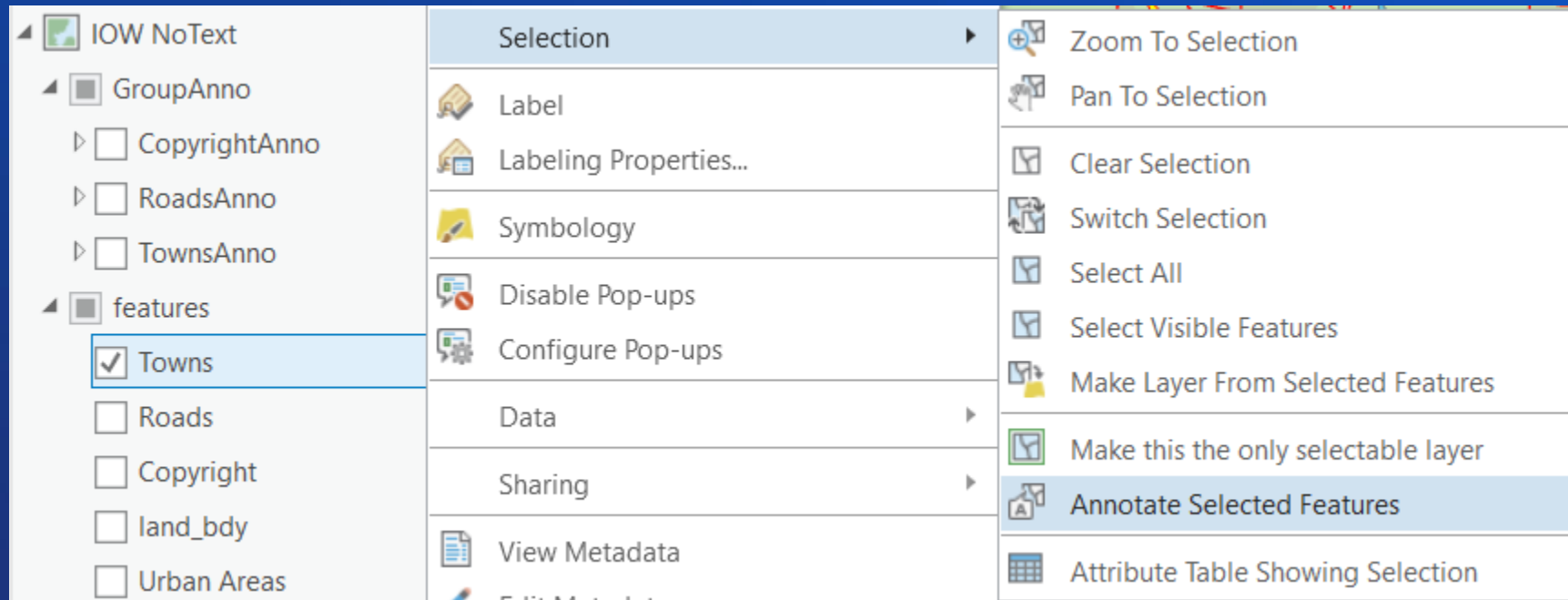
1. Click Select by attribute or select by location on ribbon and run tool with desired parameters



# Annotation demo – Annotate Selected Features

Once we have a selection...

1. Right click point/line/polygon feature layer in contents pane
2. Go to Selection → Annotate selected features





# Annotation demo – Annotate Selected Features

Run geoprocessing tool

See new annotation features added



Geoprocessing

← Annotate Selected Features

Parameters | Environments

Input Map  
IOW NoText

Input Features  
Towns

Annotation Layers (+) (-)  
Annotation Layer: TownsAnno

Sublayers

- ☒ Small/Medium Town
- ☒ Large Town
- ☒ Very Large Town

☐ Convert unplaced labels to unplaced annotation



# Bonus slides

Annotation doc links and information

# Annotation – Useful Links

## General

- **Annotation help:** <http://pro.arcgis.com/en/pro-app/help/data/annotation/annotation.htm>
- **Create annotation feature classes help:** <http://pro.arcgis.com/en/pro-app/help/data/annotation/creating-annotation-feature-classes.htm>
- **Annotation feature class properties help:** <http://pro.arcgis.com/en/pro-app/help/data/annotation/managing-annotation-feature-class-properties.htm>
- **Convert labels to annotation help:** <http://pro.arcgis.com/en/pro-app/help/mapping/text/converting-labels-to-annotation.htm>
- **Convert labels to annotation tool:** <http://pro.arcgis.com/en/pro-app/tool-reference/cartography/convert-labels-to-annotation.htm>
- **Symbol substitution:** <http://pro.arcgis.com/en/pro-app/help/mapping/text/display-geodatabase-annotation.htm>



# Annotation – Useful Links

## Upgrade

- **Upgrade Annotation help:** <http://pro.arcgis.com/en/pro-app/help/data/annotation/managing-annotation-feature-classes.htm#GUID-9035B765-7E33-47A7-854D-40E434FEB6BE>
- **Upgrade Annotation warning:** <http://pro.arcgis.com/en/pro-app/tool-reference/tool-errors-and-warnings/001001-010000/tool-errors-and-warnings-02126-02150-002145.htm>
- **Upgrade Dataset tool:** <http://pro.arcgis.com/en/pro-app/tool-reference/data-management/upgrade-dataset.htm>



# Annotation at ArcGIS Pro 2.2

## **Creation of annotation feature classes**

Converting labels to annotation

Creating empty annotation feature class

## **Creation of annotation features**

Indirectly → Feature-linked updates

Directly → Editing tool 'Create Features'

## **Editing of annotation features**

Indirectly → Feature-linked updates

Directly → Editing tools, attributes

## **Editing of annotation feature classes**

Annotation feature class properties edited from the catalog pane in ArcGIS Pro



# Types of Annotation

Standard vs Feature-linked

- Standard
  - Text with a geographical location
- Feature-linked
  - Associated with another feature class
  - Linked via a special relationship class



# Feature-linked annotation

## Composite Relationship

Text derived from field(s) in the feature class

Shape	ObjectID	StreetName	TownName
Polyline	27	Cowbridge Rd	Cardiff
Polyline	28	Westgate Rd	Cardiff

Base Feature Class

Shape	ObjectID	TextString	FeatureID
Polygon	1	Cowbridge Rd, Cardiff	27
Polygon	2	Westgate Rd, Cardiff	28

Annotation Feature Class

Cowbridge Rd, Cardiff

Westgate Rd, Cardiff



# Convert Labels to Annotation

Geoprocessing tool

- Output Geodatabase
- Extent
- Feature-linked or standard

Geoprocessing

Convert Labels To Annotation

Parameters | Environments

Input Map  
Isle of Wight Hampshire

Conversion Scale  
234096

\* Output Geodatabase

Anno Suffix  
Anno

Extent  
As Specified Below

441435.91271885 496536.193501016  
76873.5796369575 115473.506551802

☒ Convert unplaced labels to unplaced annotation  
☐ Require symbols to be selected from the symbol table  
☐ Create feature-linked annotation

Output Layer  
GroupAnno

# Feature-linked annotation

- Annotation updates with linked-feature
- Create annotation when new features are added
- Update annotation when feature's shape is modified

Geoprocessing

Convert Labels To Annotation

Parameters | Environments

Input Map  
Isle of Wight Hampshire

Conversion Scale  
234096

\* Output Geodatabase

Anno Suffix  
Anno

Extent  
As Specified Below

← 441435.91271885 → 496536.193501016  
↓ 76873.5796369575 ↑ 115473.506551802

☒ Convert unplaced labels to unplaced annotation  
☐ Require symbols to be selected from the symbol table  
☒ Create feature-linked annotation  
☒ Create annotation when new features are added  
☒ Update annotation when feature's shape is modified

Output Layer  
GroupAnno