Bolton Trails Mapping Guidelines

Issue 3. Draft 7

There are distinct activities that must be carried out in order.

- Creation of the base map online
- You might need to add couture lines. This can be a difficult business and only needed for areas that spread outside Bolton
- Production of the maps for access from the website
- Conversion of maps into master pages for inclusion in the hard copy guide book.
- Maps and QR codes for installation at kiosks
- Export of GPX, KML and KMZ files so that they can be downloaded from the website
- Self-Guided Tours: maps, QR codes and text

Introduction: Overview

The maps are all built on top of Open Street Maps or OSM. This document is not an introduction to OSM. If you want to learn more about OSM, then please look elsewhere – there is plenty of information available online. See https://www.openstreetmap.org. Note that all maps derived from OSM must have an appropriate attribution, because the content is copyrighted to the contributors. We use the following terminology:
“This map is based on OSM data © OpenStreetMap contributors. For more information see www.openstreetmap.org/copyright”

There are several software tools available for creating customized versions of a map of somewhere like Bolton. We have chosen a system called uMap which seems to satisfy all of our needs. This system offers a variety of map bases all of which have been created from the OSM base by volunteer contributors worldwide.

Layers can be added over the base. These layers can show local information on a customised version of a composite map. They do not affect the base layer. So, in the case of Bolton’s trails the layers represent distinct features of the town, such as paths, conservation lands, parking areas, ponds, rivers and streams, etc. The layers can have default values for various properties such as color, but individual items on a layer can have their own properties. Within a layer there can be lines, polygons and icons.

The result of this activity is a complete trail map of Bolton, plus the places where Bolton trails cross in to adjacent towns.

Having made a map of the whole town, a series of documents are made, one for each trail system or conservation area. This map can then be incorporated in to pages for use on the website, pages of the printed guide book, signs displayed in the field and finally the route of trails within a system can be exported to a .gpx, .kml or .kmz for import in to an online live map program such as Gurumaps, ViewRanger, Google Earth, Motion-GPS, etc. Smart phone users can then track their position in the field.

Section 1: Creating the Base Map Online

Tools

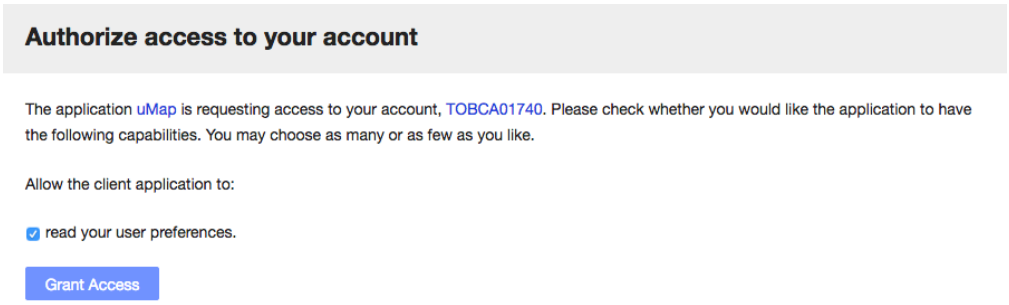
1. Choose a computer with lots of power, such as a gaming computer or a computer that's used for photo editing.
- The mapping software can be a heavy user of CPU and memory.
- Display updates can be slow. Sometimes clicking the refresh icon in the browser can help, but be careful because unsaved edits will be lost with this option.
- Also edits can rake some time to be processed by the uMap system - be patient.

2. Editor - http://umap.openstreetmap.fr/en/

Bolton Map Town Trail Map - TOBCA01740. If you are mapping for another town, you will need to make new maps.

3. Create your account if you don't have one or use the ConCom account if you have access to it. You will need to choose OSM as the provider by clicking on this logo:

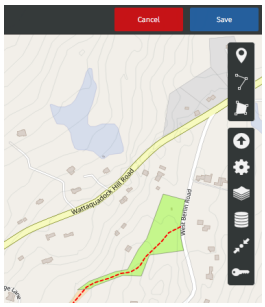
- Grant access to your account when asked.



- For Bolton mappers, if you use your own account, you will need to get permission to edit the map from the ConCom administrator or an established member of the Map team.
- Select the Bolton Town Trail Map.

4. In order to update the map you will need to click on the edit button in the top right hand corner of the window.

5. You will then see a list of options like this:



Roll over each option to learn its function. You will use all of the options. Familiarize yourself with them all.

6. On the tile layer the map base was originally "**OSM Humanitarian (OSM-Fr)**". Since October 2022 this has been changed to **"OSM OpenCycleMap"** This layer has been selected because it is clear and does not show some local incorrect details.

7. Each set of important features has a separate layer. Such as: Bridges, Stone walls, Parking, Boulders and Rocks, Private/no entry paths, etc. Take a look at the various layers. Note that some of these layers are almost never used. For instance, Parking, and no access, locations. They are there for documentation purposes only and are often inaccurate. Look carefully to see which layers are turned on by default when the map is first loaded.

8. The location map layer is used in the clickable map selection feature on the boltontrails.org/maps web page. See the information later in this document about how to create this tool.

   The contour lines layer was made specially and should never be changed. However, if a modification is needed then follow the instructions later in this document.

9. The trails for individual conservation areas shown in the online maps, the trail signs and the guide are in separate layers. For example, Fyfeshire has its own layer, as does Houghton Farm. Note that this applies to trails only, the Open Space layer represents the boundaries of the conservation lands for the whole town of Bolton. Each of the area-specific layers is prefixed by the map number as shown in the Bolton Trails Guide. You will also notice layers that identify segments. These layers cross reference to the trail segments used when the distances were measured using a wheel. There is a separate spreadsheet of these measurements.

   You can turn layers on or off, edit, delete, and set properties for the layers using the buttons next to the layer's name. You can also bring a particular area to the center of the screen by clicking on the magnifying glass button.

10. When you have initiated editing, you can identify each individual item on that layer by rolling over it. As you move the cursor around the display you will see a popup when you pass over an editable item, you start and stop editing an item by clicking on it. You will see a set of options:

For trails, you will see a box like this:  . For areas of land you will see a box like this: 

The selection of options is often determined by the nature of the item and what was done immediately before you made the selection.
Beware, sometimes it is hard to select an item because there are so many layers that the software will always choose the most obvious, in order to get around this issue, turn off layers, until you can select the item you need. You can also improve things by zooming in on the area.

The editor has a lockout mechanism, so that when two people are editing at the same time, only one person at a time can save changes. If you have edited the same item recently and update is not complete, you can lock yourself out because of the time it takes to execute the edits - beware of this; it can be very frustrating.

Map conventions and standards

The differentiation between what constitutes a primary trail and what constitutes a secondary trail has been confused in the past. In order to ensure consistency, the following rules have been used:
All trails are primary unless:

- The trail leads nowhere. I. E. a dead end
- The trail leads to private property
- The trail leads to an area where there is potential for risk and caution is needed.

The following conventions and standards are used on the map for the colors, opacity, weight, etc. of items shown. They are simply “what works”. There is no overall plan behind their selection and the values were chosen because they seemed reasonable when implemented. It could be that you find a better set of values - experimentation is always useful. The values are usually defined in the **shape properties** and **advanced properties** for a layer or an individual item:

1. Trails

Primary Trails
    Shape Properties:
        Color Red
        Opacity about 10%
        Weight about 10%
    Advanced properties:
        Dash array 4
Secondary Trails
    Shape Properties:
        Color DodgerBlue
        Opacity about 10%
        Weight about 10%
    Advanced properties:
        Dash array 4
Cross Town Trail North

Shape Properties:
Color Chocolate
Opacity about 10%
Weight about 10%
Advanced properties:
Dash array 4

Gas line route
Shape Properties:
Color Gold
Opacity about 10%
Weight about 20%
Advanced properties:
Dash array 8

Disused railway lines
Shape Properties:
Color Gray
Opacity about 60%
Weight about 20%
Advanced properties:
Dash array 6

2. Area standards

Conservation lands appear on the Open Space Lands Layer
Shape Properties
Color Black
Opacity about 20%
Fill Color Chartreuse
Fill opacity about 33%

APRs (Agricultural Preservation Restrictions) appear on the APR Land layer
Shape Properties
Color Black
Opacity about 20%
Fill Color Dark Green
Fill opacity about 33%

Private Land with easements, permission for access, licenses, etc. appear on the Private Property Layer
Shape Properties
Color Black
Opacity about 20%
Fill Color Orange
Fill opacity about 33%

Ponds appear on the water layer
Shape Properties
Color DimGrey
Opacity about 10%
Fill Color LightSkyBlue
Fill opacity about 10%

Swamps and other wet areas appear on the wetlands layer
Shape Properties
Color DarkBlue

Opacity about 5%
Fill Color CornflourBlue
Fill opacity about 20%

Streams. brooks and Ponds are on the Rivers and Streams layer
Shape Properties
Color DarkBlue
Opacity about 10%

Special consideration is needed for walls and contour lines.
If done without care walls, contours and trails can appear very bold.

Walls appear on the Rock Wall layer
Because of the way that uMap scales items, these parameters may need to be juggled in order to get a decent looking map at the end. The following values have been used with the Chrome browser, a0 paper size, 33% uMap zoom, 70% print zoom, splitting the town map into north and south sections. Having said that, the image can be sharpened up by playing with these numbers. Firefox does not offer a 33% option, but does offer 30% and 50%. The latter can give a sharper image on the final version. See later for more information on this, because for creation of online or printed maps it's useful to get away from a one-size fits all approach and customize for the particular map being created. The scaling varies map-by-map because of the differences in size and proportions of the properties.

Wall Shape Properties
Color Black
Opacity about 60%
Weight about 10%
Advanced Properties
Dash Array 5
Advanced Properties
Dash Array 7

Contour Lines
Require similar experimentation to Rock Walls. The zoom features of uMap mean that these lines can be too thick when zoomed in on some properties and too thin in other cases. The zooming obviously depends on the size of a property and how much space is available for the map. Larger properties are zoomed further out. The following parameters have been used successfully with the same settings and Chrome bowser described above.
Shape Properties
Color Dark BurlyWood
Opacity ~80%
Weight 0%
Advanced Properties
Dash Array undefined

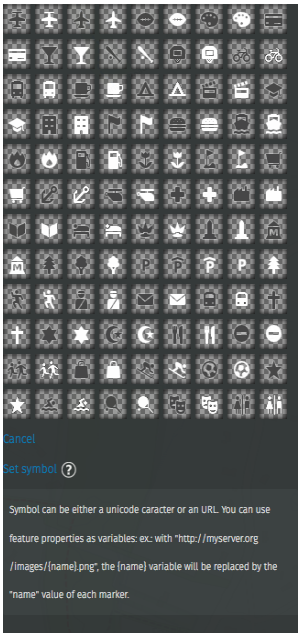
3. Features
Boulders and Rocks
Shape Properties:
Color Black
Opacity about 60%
Weight about 20%
Fill Color Black

Fill opacity about 25%
Advanced Properties
Dash Array 9

4. Icons and other annotations

Icons have been created especially for the Bolton Trails Committee. They must be selected from those available on the BoltonTrails.org website.

The page is https://boltontrails.org/icons



These icons must be used. Icons downloaded from the internet usually require an attribution or royalty fee so we have made our own. However, when appropriate feel free to use the icons provided by uMap

Usually these icons are not needed on the uMap base and are added when making the final map, but if necessary you can try them. Use the "Set Symbol" tool. To use the BoltonTrails icons you will need their urls and then you can access the files by using your browser.

Here are some examples. There are probably more shown on the website which is the definitive list.

Dams 

Shape Properties:
Icon shape Drop
Color DimGray
Opacity about 60%
Weight about 10%
Symbol http://boltontrails.org/wp-content/uploads/2019/09/DamC-png.png

Bridges 

Shape Properties:
Icon shape Default
Color SaddleBrown
Opacity about 60%
Weight about 40%
Symbol http://boltontrails.org/wp-content/uploads/2019/09/Bridge-png.png

Kiosks 

Shape Properties
Icon shape default
Color Saddlebrown
Opacity about 60%
Weight about 40%
Symbol http://boltontrails.org/wp-content/uploads/2019/09/Kiosk-png.png

Parking 

Shape Properties:

Icon shape Drop
Color DarkBlue
Opacity about 60%
Weight about 10%
Symbol http://boltontrails.org/wp-content/uploads/2019/09/Parking-png.png
https://boltontrails.org/wp-content/uploads/2021/06/No-PARKING.png

Private Trail/Dead End 

Shape Properties:

Icon shape Default
Color White
Opacity about 20%
Weight about 20%
http://boltontrails.org/wp-content/uploads/2019/09/RedX-png.png

Trail susceptible to flooding 

Shape Properties:

Icon shape Default
Color White
Opacity about 20%
Weight about 20%
Symbol http://boltontrails.org/wp-content/uploads/2019/09/Waves-New-png.png

Caution needed 

Shape Properties:

Icon shape Default
Color White
Opacity about 20%
Weight about 20%
http://boltontrails.org/wp-content/uploads/2019/12/Danger.png

Wooded Area 

Shape Properties:

Icon shape Default
Color White
Opacity about 20%
Weight about 20%
Symbol http://boltontrails.org/wp-content/uploads/2019/09/WoodsLg-png.png

Marsh or Swamp 

Shape Properties:

Icon shape Default
Color White
Opacity about 20%
Weight about 20%
Symbol http://boltontrails.org/wp-content/uploads/2019/09/WetlandsLg-png.png

Car top Boat launch area

Shape Properties:
Icon shape Default
Color White
Opacity about 20%
Weight about 20%
Symbol https://boltontrails.org/wp-content/uploads/2020/02/canoe2.png

Cell Tower

Shape Properties:
Icon shape Default
Color White
Opacity about 20%
Weight about 20%
Symbol https://boltontrails.org/wp-content/uploads/2020/03/Tower-5.png

Horse jump area

Shape Properties:
Icon shape Default
Color White
Opacity about 20%
Weight about 20%
Symbol https://boltontrails.org/wp-content/uploads/2020/02/Horse-Jump.png

You are here left to right. Used on maps at trail heads, in the field, etc
Symbol https://boltontrails.org/wp-content/uploads/2020/02/YAH-LR.png

You are here right to left. Used on maps at trail heads, in the field, etc.
Symbol https://boltontrails.org/wp-content/uploads/2020/02/YAH-RL.png

Section 2 Building a map for Access from the Website

Getting Started

The overall process consists of several steps. You will need a decent browser. The browser can have a significant effect on the appearance of the final map due to subtleties in the creation of pdf files and zooming of specific pages. The method described here has been tested using Firefox and Google Chrome, but feel free to experiment with others. Chrome has more scope for fine tuning and overall it has been found to be very successful, but essentially the process is the same in both cases. It's almost certainly possible to use Microsoft Edge and Apple Safari.

Make sure that you have tools to:

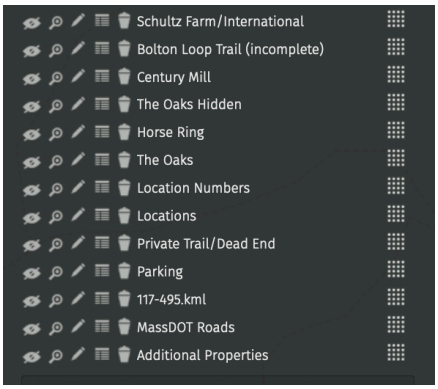
- Create a pdf file from a browser window. On the Mac this can be an issue where it's included in Chrome, it is an free, but limited add-on with Firefox, Safari does not seem support - there might be a Safari add on available from the app store.
- A pdf to png conversion program. Your Adobe Acrobat reader might include one, but the feature has a monthly fee and most home computer users would not want the expense, so purchase of a stand-alone third party app is often the best choice. Available from the app store. It might cost up to $20.00 for a decent one with no ads. Free ones are almost certainly available if you are unconcerned about privacy, etc.

Set up the base map with the required information

This can mean shutting off many layers. Most will be turned off by default, but it pays to check.

Not needed are layers that show:

- parking area icons
- Private trail or dead-end icons
- kiosk icons
- dams
- bridges
- anything on the "icons" Layer
- "Other Properties"
- "pdf bounding box"
- "other water"
- Any layer with "unmapped trails" or "hidden" in the name
- Any layer with "connections and proposals" in the name and any layer with "segment", "segmentation" plus somebody's name.
- Any layer with "self guided walks" in the name.
- Any layer about signs and bridges e.g. "8 Annie Moore Bridge/Kiosk/Large Sign Layer (Greg)"
- "work in progress" areas and other reference information (usually at the end) and probably off by default:



You must have these layers. Most will be on by default:

- Layers specific to the area you are interested in and surrounding areas.
- First Parish Land
- Space in Harvard
- Berlin Open Space
- 20’ Elev Contour Final
- Rock Walls
- Boulders and Rocks
- Water Layer
- Wetlands
- Rivers and Streams
- APR land
- Private Property
- Open Space lands
- Townline.kml
- Lancaster-Hudson and MCRT Railways
- Gas pipeline

Depending on your objective you might need:

- Locations and Location numbers
- Bolton Loop Trail (incomplete)

Some layers might only needed if you choose to use another map base than the “**OSM OpenCycleMap**” mentioned above. Examples are:

- 117-495.kml
- MassDOT roads

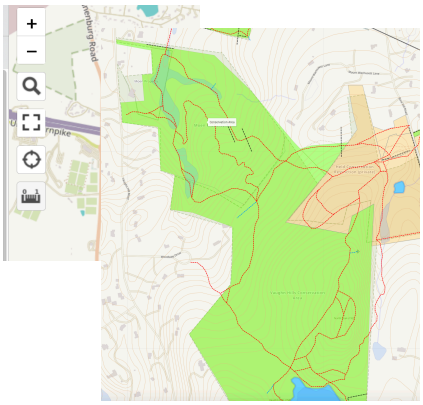
You now need an image of the base

This image will be imported in to the map document. The preferred format is .png, but jpeg or another image file type could also be used. The ideal way to do this is to create a custom file for the area that interests you. It will take some experimentation and juggling.

Create a base map file of the area that you need in one format.

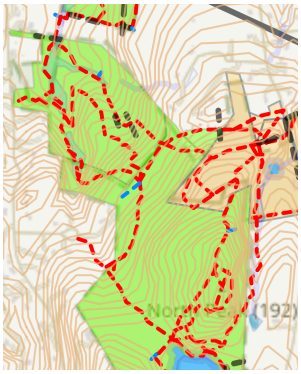
You can avoid this if you are able to use an existing .png file, but usually you are editing the maps because something has changed and therefore new png files will be needed. Also tweaking the display parameters in order to get a better image will result in new files.
You can make a png file of a specific area, part (say North, South, East or West, or a specific Conservation area) of the town or all of the area covered by Bolton's trail maps. The zoom features of uMap can distort presentation of features such as rocks, trails, contour lines and stone walls on the final map significantly. Careful adjustment of browser parameters is essential. The following guidelines have been successful on several examples of maps, but you may be able to tweak them more.
Instructions below are given for Firefox and Chrome. Firefox on an iMac was used to produce the base maps for the maps for the 2021 Trails Guide.

Firefox

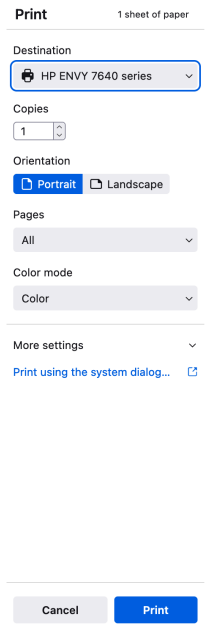


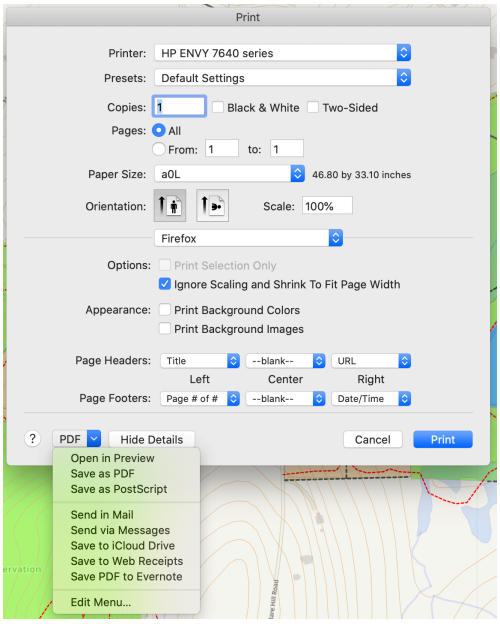
I. Go to the map page in your browser. http://u.osmfr.org/m/293934/
II. Find the area of town that interests you, then juggle with the +and- buttons in the top left hand corner to select a view that gives and acceptable looking map.

III. You will notice that the map program changes the granularity of lines, rocks, walls, etc. depending on the zoom level. the lower the zoom level, the coarser the granularity. Below is an example from Vaughn Hills.



IV. Next you need to get a decent sized section of the map displayed on the screen. You can do this in Firefox by using the browser's own built-in zoom. feature, accessed in the top right of the browser's tab.





V. Select "Print" then "Print using the system dialog".
VI. You will then see another set of choices.

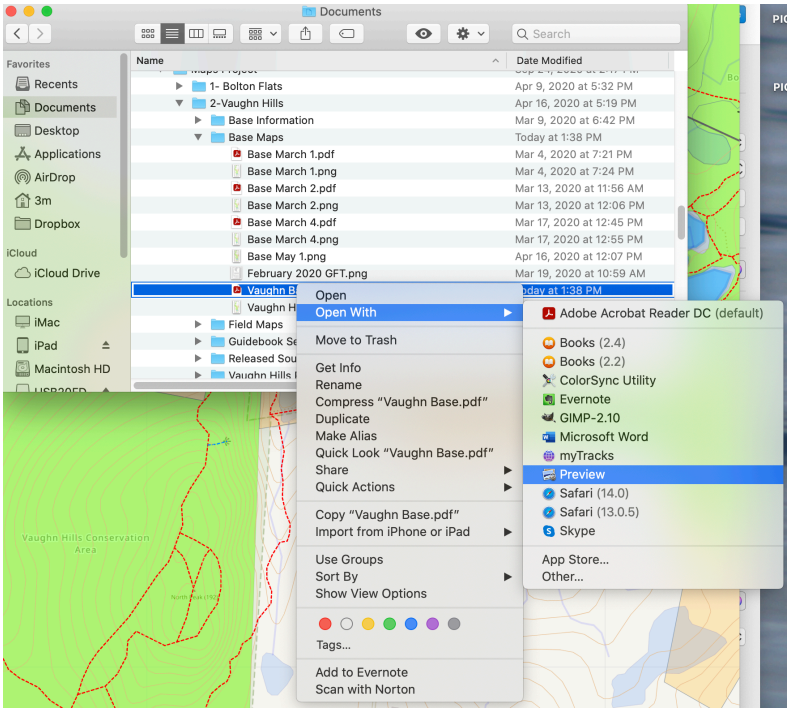
Select "Paper Size" and chose the largest possible. In this case "A0L". This was set up as a custom size using A0 landscape proportions. If you want to use A0, you will probably need to do this for yourself it is 46.8 by 33.1 inches.

In the bottom left hand corner, choose the "Save as PDF" option.

You will be asked for the directory and filename. for the subsequent pdf file. Choose the correct place and filename. These have been kept in an appropriate directory structure,

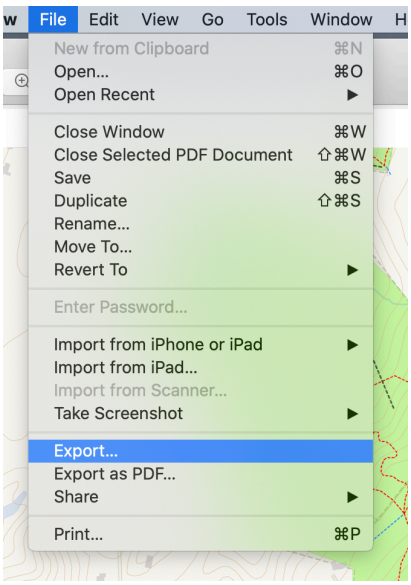
VI. Click on "Save".

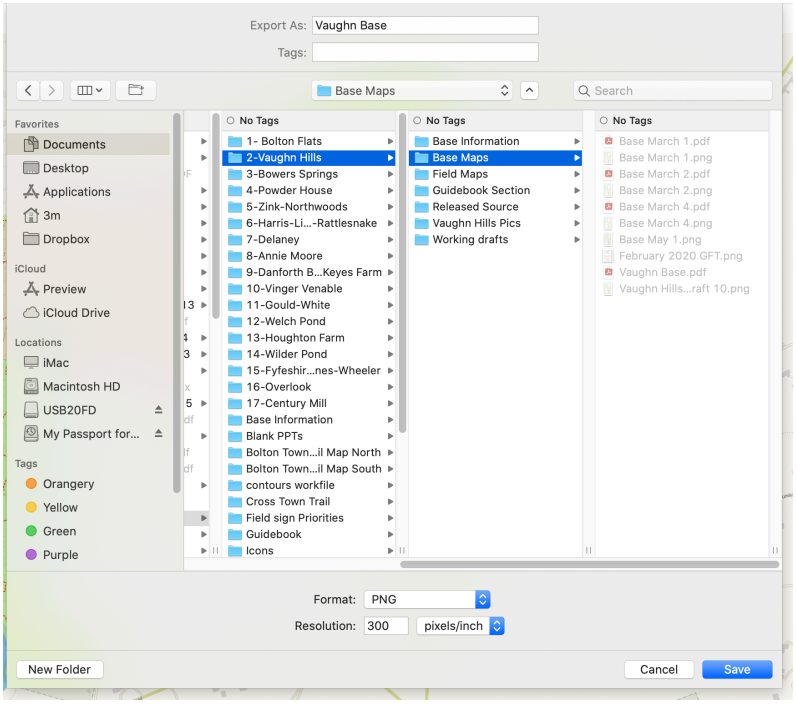
VII. Next you will need to make a .png of the map. On an Apple device, this is done using the "Preview" app. It is not always the default, so you might need to use the "Open with" option.



VIII. Select “PNG” format and click “Save”

IX. Having created the .png file, you should now crop the image to the size and shape of the map needed for the page in the online map. Many photo editing tools will allow you to do this. It can be done with Microsoft’s “Photos” or Paint 3D, or several free apps such as Photoscape. Of course full-function photo editing tools like Photoshop and GIMP can also be used.





Build your property maps and description.

This task requires Microsoft PowerPoint, Apple KeyNote or a similar tool such as OpenOffice Impress. Apple Keynote was used for the maps in the 2021 edition of the Trails Guide, but PowerPoint has been used successfully in the past. Currently (in 2022) .key files are the working standard, but they can be converted to .ppt or .pptx using Apple's software if that is the preferred choice. Beware though; the conversion is good, but not foolproof; some editing will be required.

Whatever application you select, must also have an "export to pdf" feature because pdf files are used on the website. It should also have a variable qualities of conversion. For the web site you need to be concerned about users download speed and data restrictions, especially with mobile deceives so medium quality is sufficient (the lowest quality is rarely good enough). but for the master file to be given to a printing contractor, you should choose the best quality option.

You will also need simple photo editing software for image cropping. Microsoft photos as included in Windows 10 is more than sufficient. You can use a third party application such as PhotoShop or GIMP. A free one such as PhotoScape is sufficient for this work.

Map page layout

In order to get the correct page size and limits, you should select one of the existing .key files for a map that has very similar proportions to the area that interests you and copy it then edit this file. This is much easier than trying to recreate this from scratch. In the online maps there are three pages per area - the map, some general information about the area and a page of rules and regulations.

Scale
This is one of the more complicated topics. uMap scales in discrete steps when zoomed in and out. There are some predefined scale images here:
http://boltontrails.org/map-examples-scale

These images can be used on the final map, but their size must be calibrated and adjusted to the actual scale used on the image. uMap has a tool that can be very helpful.

Click on the arrow on the list of options on the top left hand side of the uMap display:


You will get a list like this -

Click on the  button to measure a distance on the map and then set the size of the scale image accordingly.

For the online maps. you will need to create a customised legend. Don't use any more icons than necessary because space on the page is often limited. Here are some keys that were not shown earlier.

Legend Keys not shown in the icons list earlier.

Easements

Symbol http://boltontrails.org/wp-content/uploads/2019/09/Easement-3.png

Conservation Land

Symbol http://boltontrails.org/wp-content/uploads/2019/09/CR-legend.png

Agricultural Preservation Restriction

Symbol http://boltontrails.org/wp-content/uploads/2019/09/APR.png

Lake or Pond

Symbol http://boltontrails.org/wp-content/uploads/2019/09/Lake-Pond.png

Swamp or Wetlands

Symbol http://boltontrails.org/wp-content/uploads/2019/09/Swamp-or-Wetlands.png

Downloadable .GPS files
Recent online maps have a link to a downloadable .kmz file that can be used with one of the many mapping apps. .kmz is used because it is accepted by the security walls on most website hosting services. The icon is this:

Creation of these files is a byproduct of the mapping process. Use the “add link” feature with Keynote by right-clicking on the icon to connect to the file.

Section 4 Building the Pages for the Printed Guide

Work in progress

Printed pages:

The pages for the printed guide have a slightly different format, but again the best procedure is to copy and existing section and edit it to suit. For background information the details are listed here:

Use custom slide size of 540X864 pixels
Convert to pdf; Use highest quality available (“best” with Apple Pages)
Print to 8.5X 11. but choose custom scale of 70%

Guidelines for standardising trail appearance, necessary for printed pages - less so for the online maps:
If the scale is shown 500 ft, use 30% setting on Firefox
If the scale shows 1000 ft use 50% setting on Firefox

Size Guidelines for guidebook

Heading text 24 pt, position 35X10, 477X35. can be adjusted to fit with size if necessary)
Parking 14 pt
No entry 10 pt
cameras 22 pt X, 28 pt in text
Pennants 17 pt X, 13 pt in text
Text 12 pt
Area and mileage 12 pt, line 1 pt
Caution 20X27
QR code box size 126X154, position 77X692 (can be adjusted to fit with map shape & size if necessary)
QR code 109X109
Location map size 170X162, position 310X688 (can be adjusted to fit with map shape & size if necessary)
Compass 64X64

Slide Masters

Left hand pages: Title Slide Copy 3
Right hand pages: Title Slide Copy 1
Front Title slide
Inside front Title slide
Back Title slide
Inside back Title slide

Section 4 Useful Tools and Background Information

File Organization
The master copies of all the files are stored in Bolton Conservation Trust's Dropbox area: Bolton Cons Trust/Bolton Trails Committee/Trails Guide and Maps/Maps Project

This is an emulation of the structure used on the computer (an iMac) that was used to create the files which is as follows

The published maps are in the numbered directories, plus the location map

Clickable Map: Useful tool
https://www.image-map.net/

Contours (Courtesy of Rebecca Longvall):

TNM means https://viewer.nationalmap.gov/basic/
Visit TNM for data downloads and search for desired datasets for this particular project do the following:

1. Download 2 separate datasets: VECTOR_Hudson_MA_7_5_Min_GDB and VECTOR_Clinton_MA_7_5_Min_GDB
2. Save in a file location. In town hall this is saved on our N: drive under Bolton Custom, Conservation, Trail source data
3. Right click these files and extract all save again in the same location
4. Open ARCMAP desktop (functions may be different on ARC online)
5. Open catalog this will show you what data layers are displayed
6. Right click “layers” at the top of the catalog window
7. Locate the dataset open the gdb, open foundation, select elev_contour then click Add
8. Repeat for both datasets.

Once you have completed the above steps, To set the contour:

1. With the catalog window still open, right click on the evel_contour layer, select edit feature, select start edit
2. Right click the same evel_contour layer again, select attribute table, select the Contour Interval Column, right click the column and select field calculator
3. In the field calculator window ensure that the correct column (data) is selected. This will appear at the top of the text box on the bottom of this window. It should reach “Contour Interval =” above the text box.
4. In the text box type “20” then click ok. This will auto populate the contour interval column with the 20’ interval requirement that has been requested/and is the goal of this exercise.
5. Save edits by selecting this feature in the toolbar that should still be displayed.
6. Select stop edits (AFTER you have saved)
7. Right click each layer and save each as a layer file to a location that is accessible.

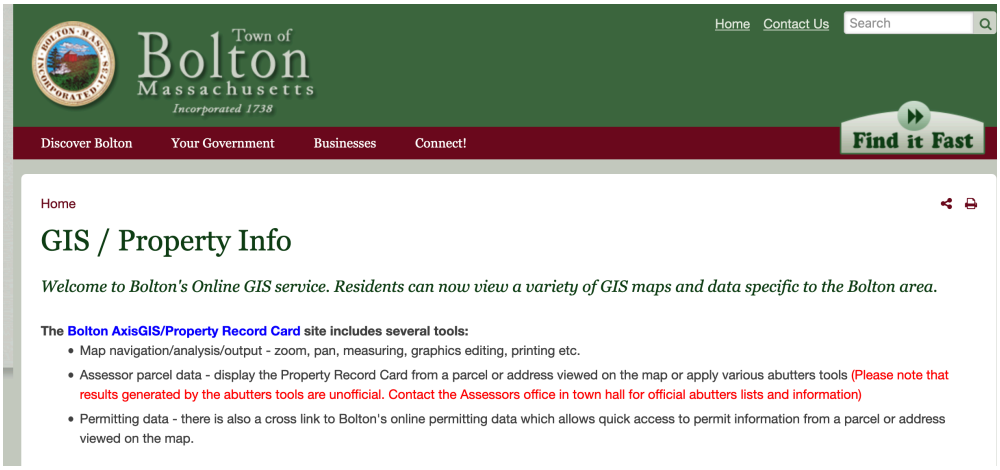
THEN if needing conversion to a kml:

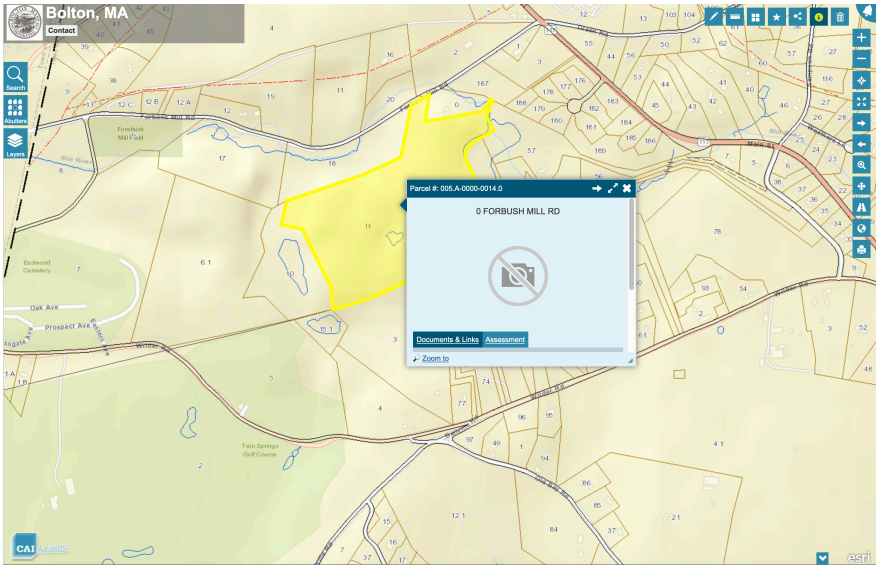
1. Select geoprocessing tools along the toolbar at the top of ArcMAP window
2. Select conversion tool
3. Select layer to kml tool
4. A new window shall pop up that allows you to select the layer and where to send the output again ensure these are accessible locations then activate conversion by selecting ok
5. Wait for the conversion to finalize then save your product and go locate the kml in the file to be imported to umap as necessary.

Section 6 Addition of Open Space and Private Lands

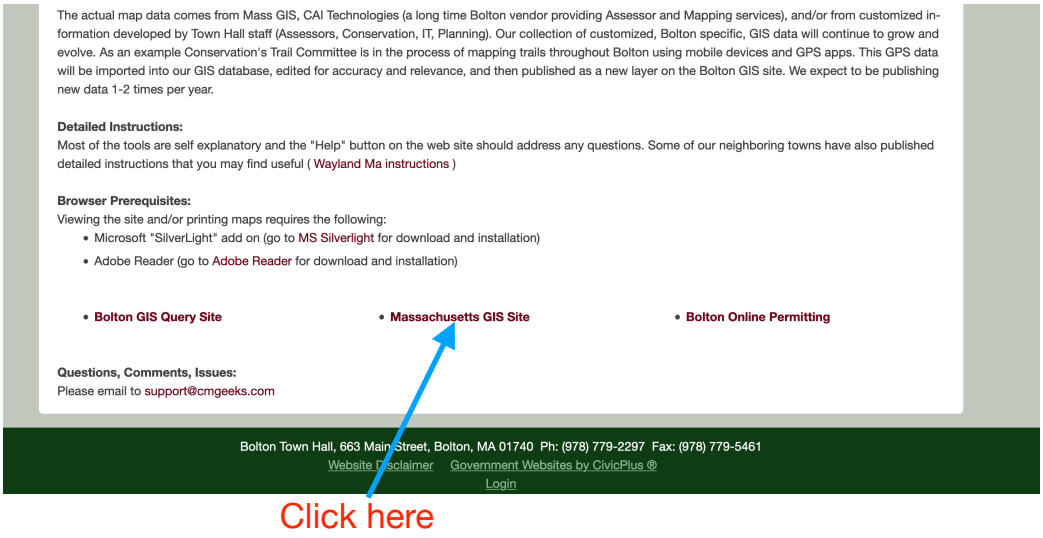
Occasionally, you will need to add to the Open Space Lands and Private Land layers. Here is an outline of the procedure:

1)Go to the GIS area on the town website and open the Town's GIS page.
https://www.townofbolton.com/home/pages/gis-property-info

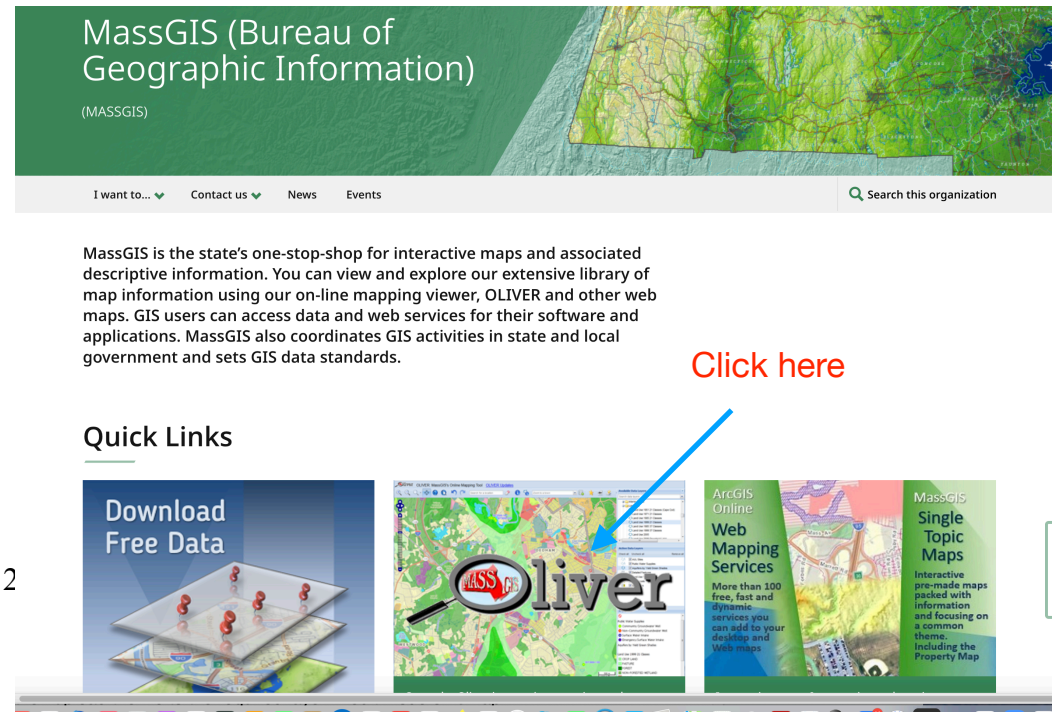


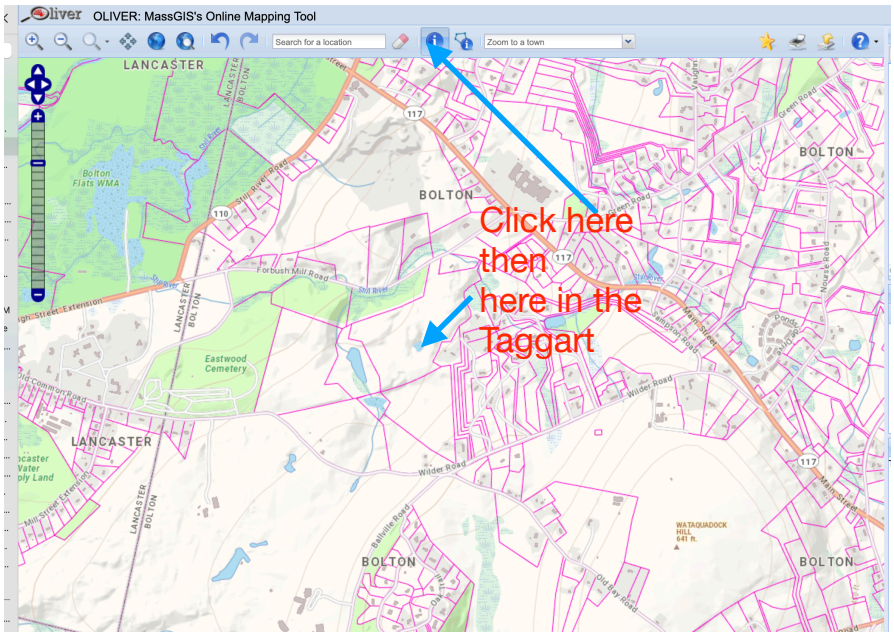


2) Allow access to your location and use the +- buttons to find the area that interests you E. G. the Taggart property

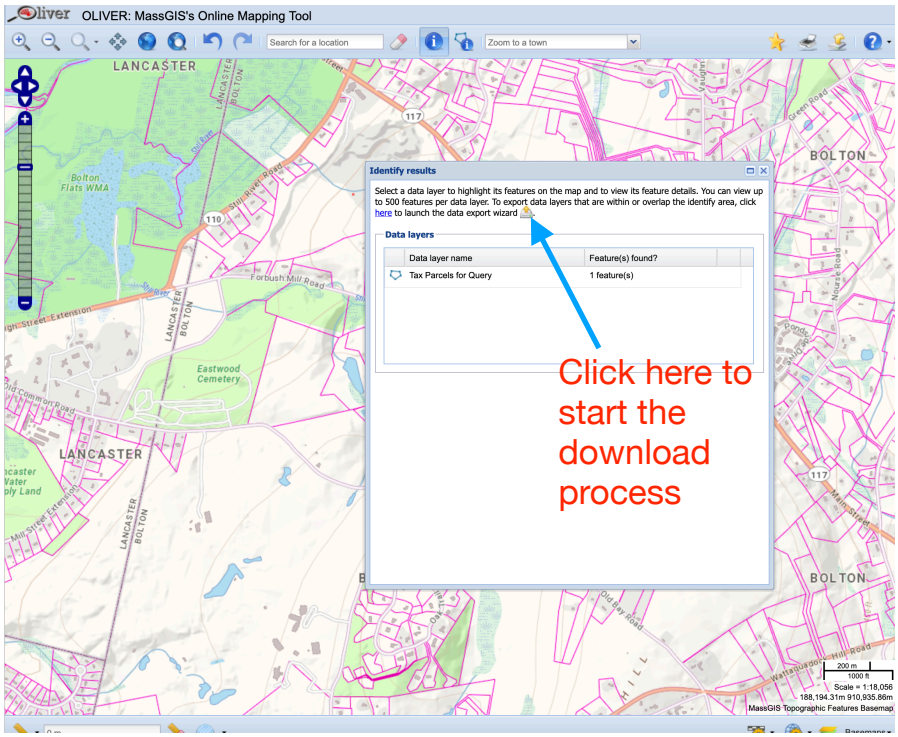


3) go back to the Previous page and click on “Massachusetts GIS Site” AND choose “Oliver”, then find Bolton and use the +- scale to find the required area.
4) use the selection button to pic the area (you might also get adjacent areas)

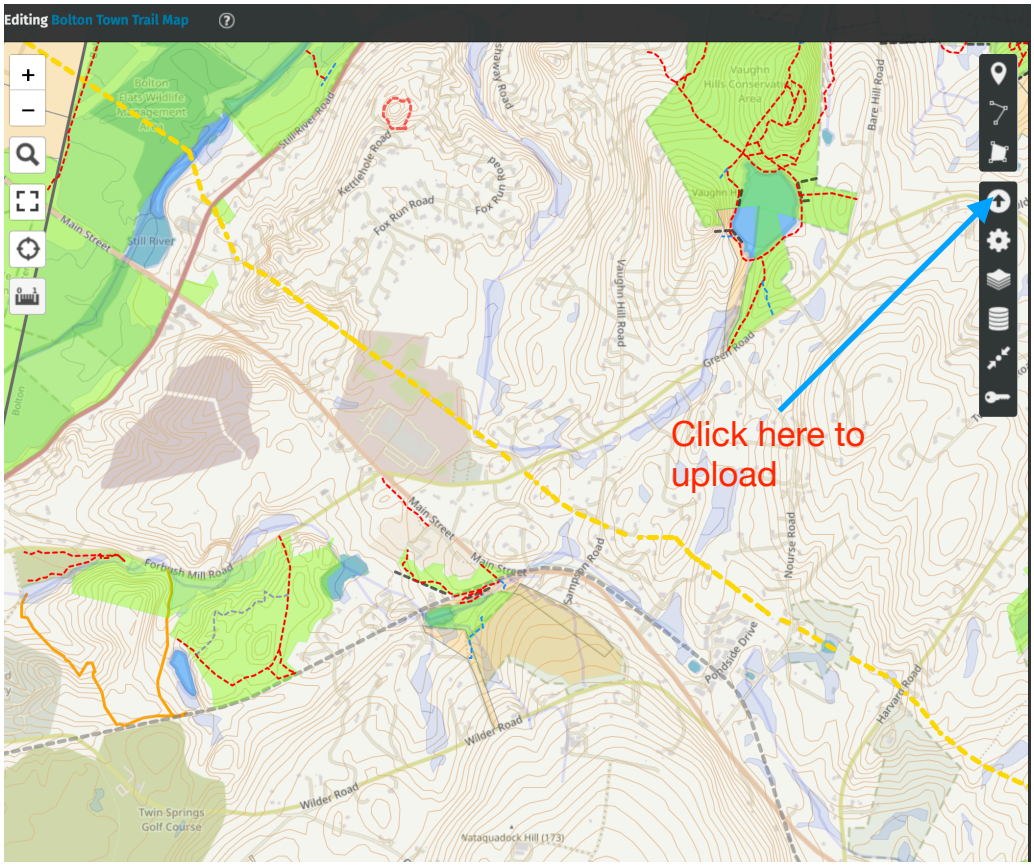




5) follow the instructions to download the area outline. Choose Google format.
6) save the file (zip), then unzip it to get a kml file.
7) You can then upload the file to the required layer in edit mode on uMap. Use the



"Open Space Lands" layer for land owned by the Town or Conservation Trust, use the "Private Property" layer for land where an individual or organization has granted an easement or licence.



8) remove extraneous stuff like markers, adjacent areas...
9) save it

Section 5 KMZ downloadable GPS files.

Work in Progress

Section 6 Trail Head maps

Work in Progress

Section 7 Self Guided Tours