

# **Assisting local governments towards disaster risk reduction**

*Training on participatory mapping and  
use of decision support tools*

## **OSM Training Materials 2013**

*Release 0.1*



October 3, 2013

This document is under CC0 1.0 Universal (CC0 1.0) Public Domain Dedication

# Contents

|  |    |
|--|----|
| About this document . . . . .  | 2  |
| About the project . . . . .  | 2  |
| Background . . . . .   | 2  |
| Project Objectives . . . . .   | 3  |
| About ESSC . . . . .   | 3  |
| Integration with the institutional work program on risk resilience . . . . . | 3  |
| Introduction . . . . .   | 4  |
| Getting started on OpenStreetMap.org . . . . .                               | 6  |
| Visit the OpenStreetMap Website . . . . .                                    | 6  |
| Navigate the Map . . . . .   | 6  |
| Save an Image of the Map . . . . .   | 8  |
| Create an OpenStreetMap Account . . . . .                                    | 8  |
| Adding Your First Points . . . . .   | 10 |
| Summary . . . . .  | 11 |
| Getting Started Editing: JOSM . . . . .                                      | 12 |
| Download JOSM . . . . .  | 12 |
| Install JOSM . . . . .   | 12 |
| Change JOSM Settings . . . . .   | 13 |
| Change Language . . . . .  | 16 |
| Learn Basic Drawing with JOSM . . . . .                                      | 16 |
| Basic Operations . . . . .   | 17 |
| Points, Lines, and Shapes . . . . .  | 17 |
| Changing Objects . . . . .   | 19 |
| Drawing . . . . .  | 19 |
| Add Presets . . . . .  | 20 |
| Draw Your Own Map . . . . .  | 20 |
| JOSM Plugins and Preferences . . . . .                                       | 21 |
| Mirrored Download . . . . .  | 21 |
| Direct Upload . . . . .  | 22 |
| edit gpx . . . . .   | 23 |
| Print . . . . .  | 27 |
| Summary . . . . .  | 27 |
| Appendix . . . . .   | 27 |
| DirectUpload Details . . . . .   | 27 |
| Uploading GPS Traces Online . . . . .  | 30 |
| Going Out for a Fieldwork . . . . .  | 31 |
| Surveying with a GPS . . . . .   | 32 |
| What is a GPS? . . . . .   | 32 |
| Turn on the GPS . . . . .  | 32 |
| Navigate the GPS . . . . .   | 35 |
| Tracks and Waypoints . . . . .   | 36 |
| Save Your Location . . . . .   | 36 |

|  |     |
|--|-----|
| Turn on the Track Log . . . . .  | 40  |
| Copy Waypoints and Tracks to the Computer . . . . .                            | 40  |
| Summary . . . . .  | 44  |
| Surveying with Field Papers . . . . .  | 45  |
| Overview of Field Papers . . . . .   | 45  |
| How does Field Papers work? . . . . .  | 47  |
| Create and Print . . . . .   | 47  |
| Map with Field Papers . . . . .  | 53  |
| Scan and Upload . . . . .  | 53  |
| Open in JOSM . . . . .   | 56  |
| Repeat! . . . . .  | 59  |
| Summary . . . . .  | 59  |
| Data Processing using OSM . . . . .  | 60  |
| Editing with JOSM . . . . .  | 61  |
| A Tour of JOSM . . . . .   | 61  |
| Download OSM Data . . . . .  | 62  |
| JOSM Layers . . . . .  | 64  |
| Edit . . . . .   | 65  |
| Tags . . . . .   | 66  |
| Upload Changes . . . . .   | 67  |
| See your changes on the map . . . . .  | 71  |
| Saving OSM files . . . . .   | 71  |
| Summary . . . . .  | 71  |
| Using Aerial Imagery . . . . .   | 72  |
| Offsets with existing data in OSM . . . . .                                    | 73  |
| Offsets with no existing data in OSM . . . . .                                 | 78  |
| Summary . . . . .  | 80  |
| For Proper and Excellent Editing on OSM . . . . .                              | 81  |
| Editing in Detail . . . . .  | 82  |
| Introduction . . . . .   | 82  |
| JOSM Editing Tools . . . . .   | 82  |
| Relations . . . . .  | 91  |
| Editing Techniques: The Dos and Do Nots . . . . .                              | 94  |
| Summary . . . . .  | 100 |
| Appendix . . . . .   | 100 |
| Dealing with Conflicts . . . . .   | 110 |
| Introduction . . . . .   | 110 |
| Conflicts . . . . .  | 110 |
| Conflict Resolution . . . . .  | 112 |
| Ways to Avoid Conflicts . . . . .  | 115 |
| Summary . . . . .  | 115 |
| Appendix. More Specific Conflicts . . . . .                                    | 115 |
| Resolving differences in the node list of two versions of a way . . . . .      | 116 |
| The standard workflow . . . . .  | 116 |
| A simple workflow: Keep the node list from your local object version . . . . . | 119 |
| Support for comparing node lists . . . . .                                     | 122 |
| Quality Assurance . . . . .  | 124 |
| Introduction . . . . .   | 124 |
| The Validation Tool . . . . .  | 125 |
| Summary . . . . .  | 129 |
| Tasking Manager . . . . .  | 130 |
| Summary . . . . .  | 132 |
| GPS Essentials . . . . .   | 136 |
| Installation of GPS Essentials . . . . .                                       | 136 |

|  |     |
|--|-----|
| Configure GPS Essentials to Work Offline . . . . .             | 136 |
| GPS feature on Android phone . . . . .                         | 137 |
| Acquiring Satellites . . . . .                                 | 138 |
| Creating Tracks . . . . .                                      | 139 |
| Creating Waypoints . . . . .                                   | 141 |
| Geotagging Photos . . . . .                                    | 149 |
| Saved Photos . . . . .   | 149 |
| Exporting/Saving Waypoints . . . . .                           | 149 |
| Exporting/Saving Tracks . . . . .                              | 151 |
| CC0 1.0 Universal (CC0 1.0) Public Domain Dedication . . . . . | 154 |
| Statement of Purpose . . . . .                                 | 154 |

## About this document

This document is a supplementary material for the “Assisting local governments towards disaster risk reduction: Training on participatory mapping and use of decision support tools” of the Environmental Science for Social Change in partnership with the Department of Interior and Local Government (DILG) supported by the World Bank-East Asia Pacific and Global Facility for Disaster Reduction and Recovery (WB-GFDRR).

This material is based on the online training guide developed by the Humanitariam OSM Team available at: <http://learnosm.org>

## About the project

The Institute of Environmental Science for Social Change <http://essc.org.ph> is a Jesuit research organization in the Philippines that promotes environmental sustainability and social justice through the integration of scientific methodologies and social processes. It is implementing an initial six-month work activity that will contribute to the initiative of the Department of Interior and Local Government in assisting the country’s most vulnerable local governments gain more resilience to the harsh effect of disasters.

The Institute will take the lead in providing training on participatory mapping to selected local governments in flood-prone areas by using OpenStreetMap tools for effective community engagement and data collection and maintenance.

Volunteers from OpenStreetMap-Philippines will be joining the Institute as co-trainors. This opportunity also assists OpenStreetMap gain broader visibility.

The Institute will also customize InaSAFE, a free software that produces realistic natural hazard impact scenarios, for use in the Philippine context, specifically catering to the needs and realities of the initial set of selected local governments. InaSAFE stands for Indonesia Scenario Assessment For Emergencies, and is used across the country for better planning, preparedness and response activities, formulation of contingency plans, and community-based disaster risk management.

## Background

The Philippines is ranked third out of 173 countries in terms of vulnerability to disaster risks and natural hazards (World Risk Index 2011, United Nations University-Institute for Environment and Human Security). Given this high-risk status, greater initiatives on local disaster risk reduction and management and comprehensive place-specific hazard assessments are critical and urgent.

A major element in effectively minimizing risks during extreme weather events at the local level is the capacity of local governments to effectively respond to the various phases of disaster events (pre-, during, and post-).

Contributing to this is the use of decision support tools that enables the use of data from responsible national agencies and from local updated information.

It is in this context that the Institute was invited to partner with the World Bank’s East Asia Pacific Disaster Risk Management portfolio and the Department of Interior and Local Government to implement a six-month project on Participatory mapping and LGU decision support tools for disaster risk reduction.

The East Asia Pacific Disaster Risk Management portfolio of the World Bank is rapidly expanding in the area of highly technical disaster and climate risk assessments with core components related to building resilience through better decision making, especially for infrastructure investments. East Asia Pacific has several cutting-edge programs including Building Urban Resilience with the InaSAFE risk information decision tool. EAP works in close partnership with the Global Facility for Disaster Reduction and Recovery on the Open Data for Resilience Initiative, which aims to reduce the impact of disasters by empowering decision-makers with better information and the tools to support their decisions.

## **Project Objectives**

The project will provide training on participatory mapping and InaSAFE support to the Philippine government in disaster risk reduction activities, specifically through these strategies:

- Supporting the growth of the OpenStreetMap community that has competence in leveraging participatory mapping methods with OpenStreetMap tools and Web-based map platforms and is a proven effective approach to community engagement and in obtaining data.
- Supporting the customization of InaSAFE that will leverage the InaSAFE initiative with the decision support tool component of the project, having been developed and implemented in Indonesia so far. The Department of Interior and Local Government identified InaSAFE's potential in assisting local governments design their contingency and land use plans.

## **About ESSC**

The Institute of Environmental Science for Social Change <http://essc.org.ph/> is a Jesuit research organization in the Philippines that promotes environmental sustainability and social justice through the integration of scientific methodologies and social processes.

### **Integration with the institutional work program on risk resilience**

This effort is a critical contribution to the institutional work program of the Environmental Science for Social Change on risk resilience that is undertaken in collaboration with partners who seek ways to reduce the risks of weather events when these trigger geomorphologic hazards such as floods, landslides, and drought.

The work requires an active engagement with local communities, national and local government, faith-based organizations, educators, professionals, media, academe, and other civil society organizations so that we contribute to the development of emerging structures that assist “centres of living and learning” across Asia Pacific and sustain engagements in disaster risk reduction.

There are three major elements in the Institute’s approach to the risk resilience work program:

- Learning, to improve understanding of natural hazards and related risks through scientific analysis and disaster risk assessment
- Creating, to develop capacity for risk reduction through social preparedness
- Accompanying, to build a regional network of partners and collaborators who contribute to dialogue and exchange on disaster risk reduction and management

As the Institute envisions a trusting and empowering society working for sustainable resource management, ecological services, and human security, there is a critical need to develop environmental mechanisms with communities and local governments in the Philippines to promote appropriate resource management and implementation. Such a goal requires harnessing the Institute’s full complement of its competence and capacities in resource mapping, geomatics, landscape and watershed analysis, social analysis, and communications, thus ensuring that we are of service to those in need.

More information about ESSC: <http://www.essc.org.ph>

### **License of this document**

This document is under CC0 1.0 Universal (CC0 1.0) Public Domain Dedication

You can copy, modify, distribute and perform the work, even for commercial purposes, all without asking permission.

A copy of the license is included at the end of this document.

## Introduction

Information is powerful. With good information and the right understanding, individuals and communities are better able to improve their lives and make good decisions about the future. There are many people and organizations who make decisions that affect our lives. Good information allows these NGOs, governments and citizens to make better decisions, and hopefully make our lives better. Maps can be a good way to convey information.

Maps are visual symbols of our world. They can often demonstrate an idea better than words. This in turn can also help answer important questions. Where is the closest school or hospital? Who has the least access to these facilities? Where is poverty the most problematic? Questions like these can often best be expressed with maps, and maps can help find solutions to these questions.

As an exercise, get a pen and paper and draw a map of your town or village. What are the most important things to include on the map? What is the most important information? Spend a few minutes making your map, and when you're finished, think about why the information you included is important, and who it might be important to.



Figure 1: A village in Indonesia

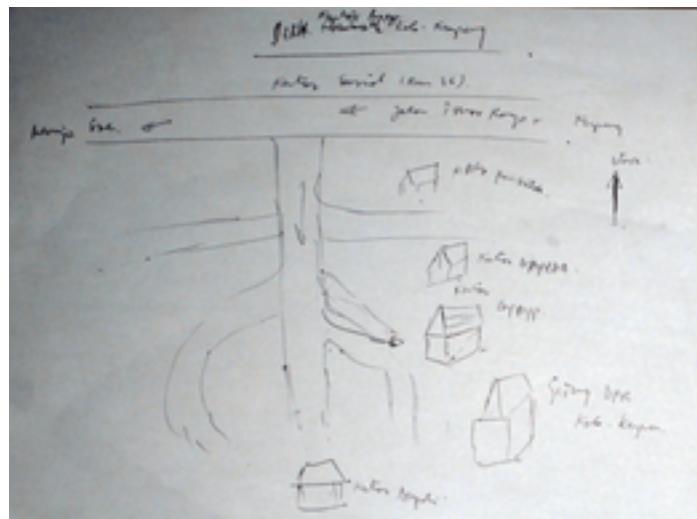


Figure 2: Example of a hand-drawn map

If your town is like most, you may have drawn some lines to represent roads, possibly a river or stream. Perhaps you added important buildings such as schools and offices, fields, or boundaries. Whatever you

drew, you probably used symbols – a line to symbolize a road, a square to symbolize a building, and so on. Your map is a representation of what is on the ground.



Figure 3: Examples of symbols

Your map is informative. You might use a map like this to explain to someone where different places are, where problems are in your community, or merely to help someone find their way around. The uses of your map is limited though. There is only one copy of the map and the way you drew it may make sense to you, but perhaps not to someone else who would have drawn their own map in a different way. Because your map is merely on paper, it is difficult to get that information to others. This is why making your map on a computer, in such a way that anyone can access it, can be much more valuable.

OpenStreetMap is a tool for creating and sharing map information. Anyone can contribute to OSM, and thousands of people add to the project every day. Users draw maps on computers, rather than paper, but as we will see in this guide, drawing a map on a computer is not all that different from drawing on paper. We still draw lines to represent roads, fields, and anything else, and we still represent schools and hospitals with symbols. The important thing is that OSM maps are saved on the internet, and anyone can access them at any time, totally free.

We hope that you will find OpenStreetMap useful and interesting in your work. By following this guide, you should be able to quickly start making digital maps and adding to OSM.

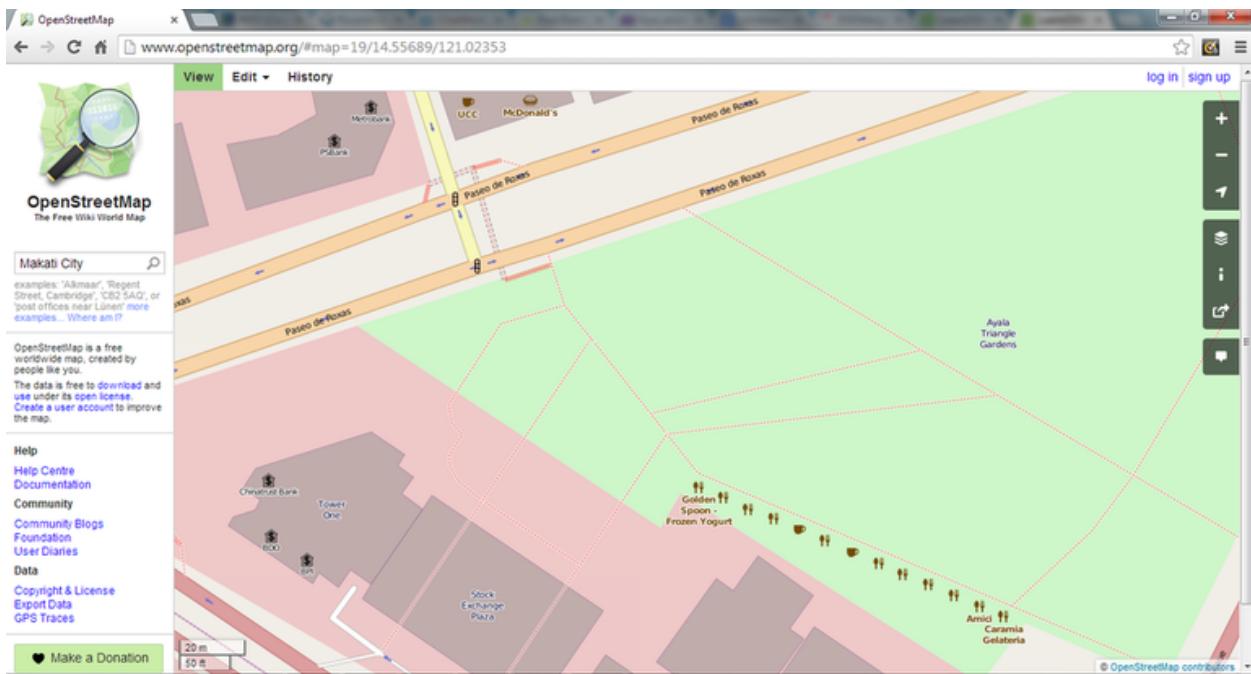


Figure 4: Digital maps with OpenStreetMap

## Getting started on OpenStreetMap.org

In this chapter we will learn step by step how to navigate the OpenStreetMap website, view and print maps, and sign up for a user account. After you have your own username and password, you will be able to add your first points to the map.

### Visit the OpenStreetMap Website

- Be sure that your computer is on and you are connected to the internet.
- To visit the OpenStreetMap website, you need to open your web browser. Start your browser – Firefox, Chrome, Opera, or Internet Explorer.
- In the address bar at the top of the window, enter the following text: [www.openstreetmap.org](http://www.openstreetmap.org)
- When the page has finished loading, you should see something like this:

### Navigate the Map

- The main thing you should see is the map. Move the map by clicking on it with your left mouse button, holding the button down, and dragging your mouse around (see figure below).
- If you have a mouse with a scroll-wheel, zoom in and out on the map by turning the wheel. If you don't have a scroll-wheel, use the + and - buttons on in the upper left corner of the map. (see figure below)
- To search for a place, left-click in the box labelled "Search" on the left side of the page (see figure above). Type in the name of your town or village and press Enter. A window should appear to the left of the map with the results of your search. Click on the location that looks like the one you want. The map will automatically move to the location you chose.

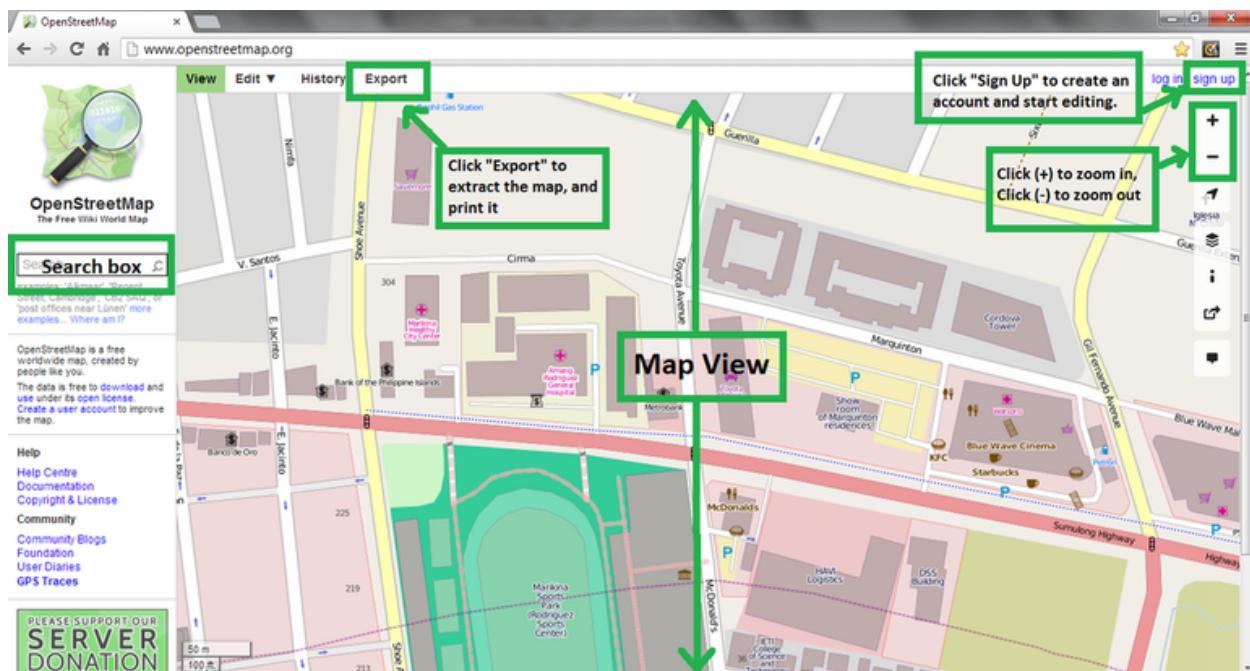


Figure 5: OpenStreetMap website with some main functions listed

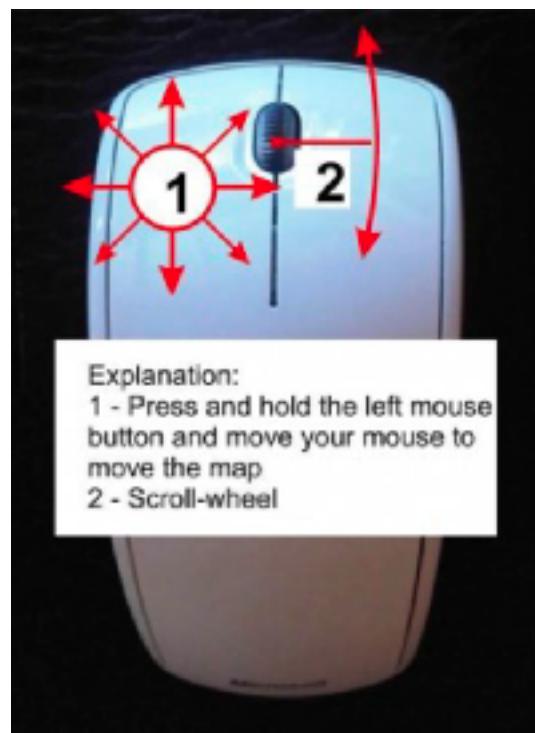


Figure 6: Mouse navigation

## Save an Image of the Map

If you want to save an image from OpenStreetMap that you can easily print, follow these instructions.

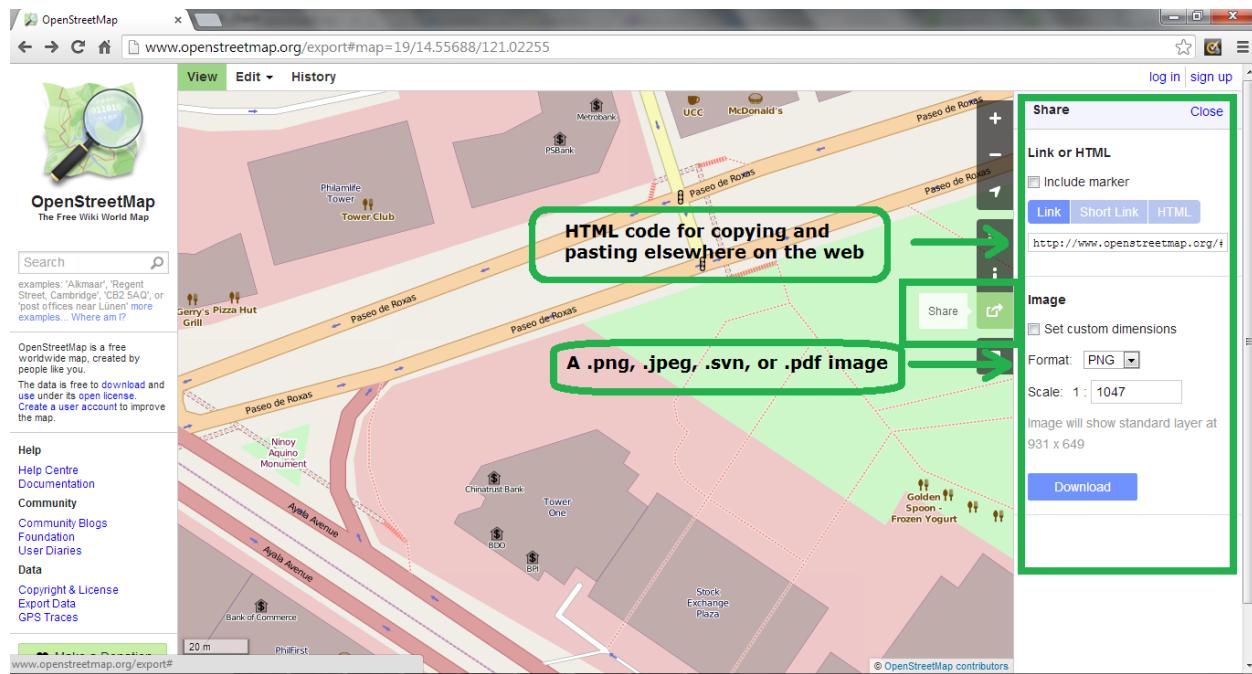


Figure 7: Exporting a map

1. On the right side of the map, click on the button labeled “Share”. A new panel will appear next to the map.
2. In the “Share” sidebar, it allows you to get HTML or export the images of the maps.
3. Click “Download” at the bottom of the new window to export the image. A download will start. Save it to your computer.
4. Open the file that you downloaded. If you would like to print the map, you can select “Print” from the File menu, after connected your computer to a printer.

## Create an OpenStreetMap Account

Now that you have seen what the main website looks like, you can register for a username and password and make your first additions to the map.

1. Go back to the OpenStreetMap website. Click “sign up” in the top right corner of the page. You should see a new page that looks like this:
2. There are five boxes on this page that you need to fill in to register an account with OSM. Enter your email address in the first two boxes. You should enter the same email address in both boxes. Later, you will need to open your email to confirm your account with OpenStreetMap.
3. In the third box, enter the username that you would like to have. You will not be able to choose a username that someone else has chosen before, so it should be creative. If you try to enter something simple, like your first name, it is likely that someone has already claimed that name.
4. Enter a new password in the fourth and fifth boxes. You should enter the same password in both boxes. It does not need to be the same as the password for your email.

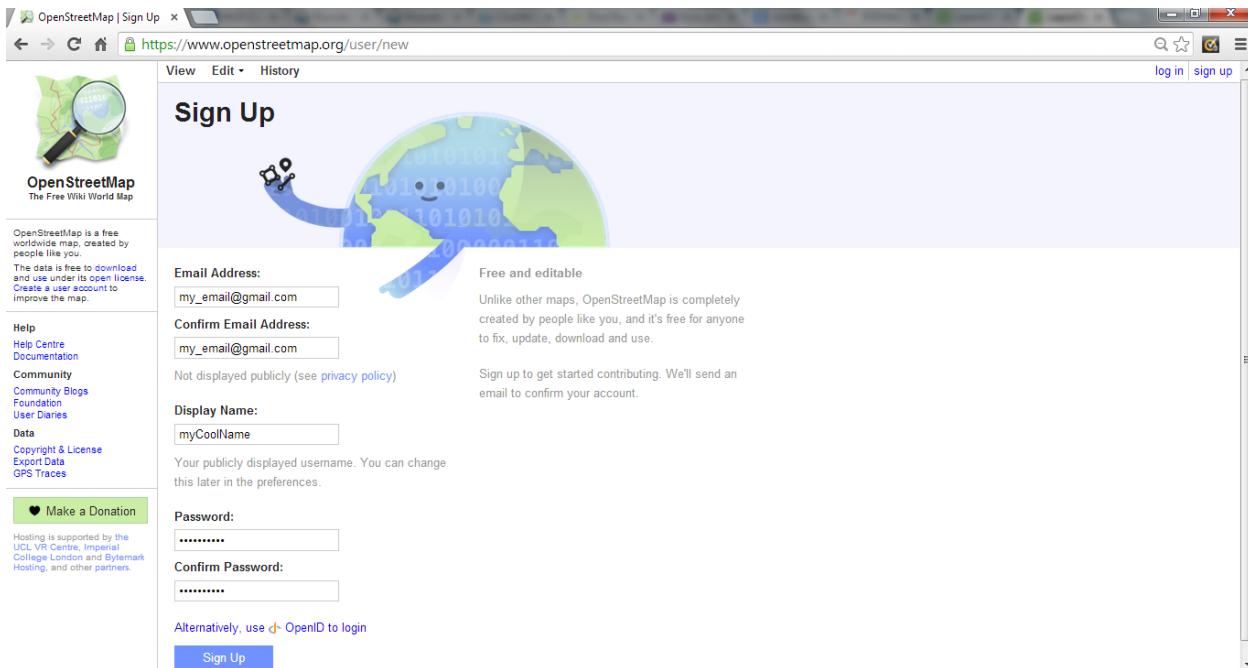


Figure 8: Registering an OpenStreetMap account

5. You will want to remember your user name and your password so that you can login later. You may want to write down your OSM username and password.
6. After you have completed all the boxes, click “Continue” at the bottom of the page.
7. If there are any problems, an error message may pop up. Check to make sure that your email is the same in the first two boxes, and your password is the same in the bottom two boxes. If the third box is highlighted red, it means that someone else has already chosen your username, and you should try a different name.
8. Open a separate window or tab in your internet browser, and navigate to your email. Common email sites are [mail.yahoo.com](http://mail.yahoo.com) and [www.gmail.com](http://www.gmail.com).
9. Enter your email address and your email password to open your email. Note that this is not the same as your OpenStreetMap username and password.
10. If everything was successful with your registration, you should see an email from OpenStreetMap in your inbox. Open the email. It should look like the image below. Click on the link that is identified below:

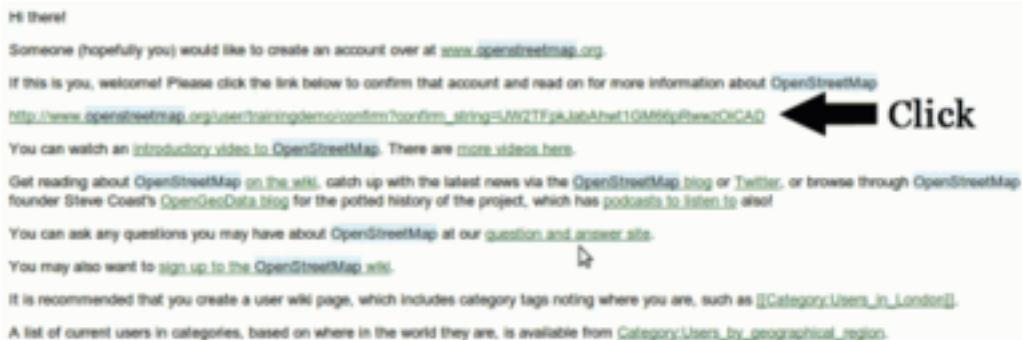


Figure 9: Confirming your OpenStreetMap account

- A new tab or window will open. If everything went well, you should have an OSM account! On the OpenStreetMap page, click “log in” in the top right corner. Enter your OpenStreetMap username and password and press Enter. You should now be logged in. You should see your username in the upper right corner of the page.

## Adding Your First Points

Now that you are logged in with your username on the OpenStreetMap website, you can use the ID editor to add your first point to the map.

- Move the map to a place that you know very well, such as your town or village.
- Zoom in to a place where you would like to add a point to the map.
- Just above the map on the left, there is a tab marked “Edit” with a small triangle besides it. Click the small triangle. You should see a menu drop down.
- Click “Edit with ID (in-browser editor)”.

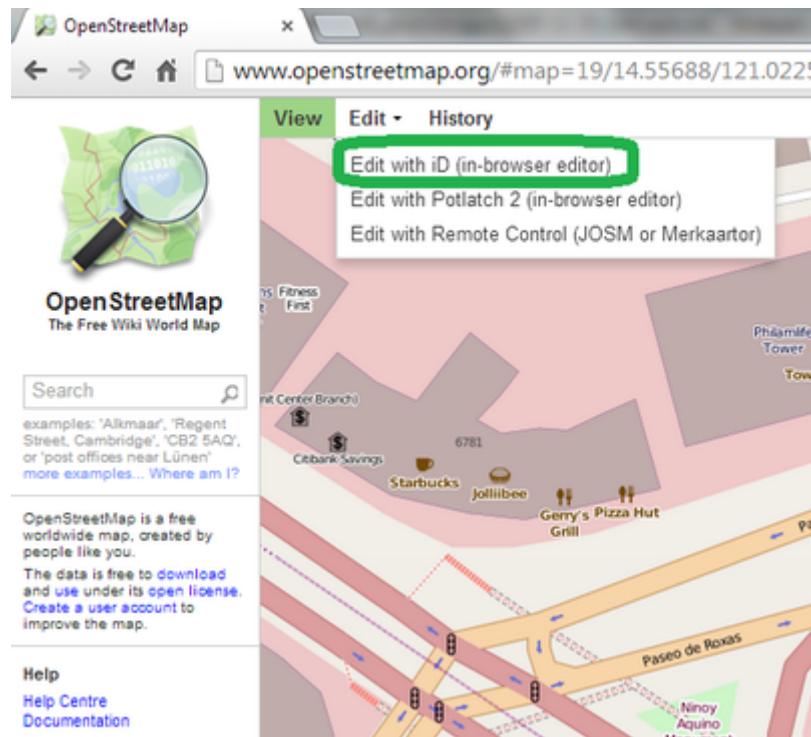


Figure 10: editid

- The online editor for OpenStreetMap should open. If a window pops up, press “OK”.
- You can add a point to the map by clicking on an icon on the left, and dragging it to its location on the map. After you add the point and are satisfied that it is correct, click “Save” in the upper right corner.
  - NOTE: If you are not sure about the accuracy of the point(s) you add, don’t click “Save”! Play around with the ID editor, but don’t save your changes.

## **Summary**

Congratulations! If all went well you now have an OpenStreetMap username and password, you know how to navigate the OSM website, and you have your first understanding of how to add points to the map.

In the next chapter, we will install a desktop editor for OpenStreetMap, called JOSM, and learn how to draw maps and add places with symbols to the map.

## Getting Started Editing: JOSM

In this chapter we will learn step by step how to download and install JOSM, the Java OpenStreetMap editor. We will change some of the settings in JOSM to make it easier to use. Then we will open a sample map and learn some of the basic operations of the software. Remember in chapter 1 when we asked you to draw a map of your town or village? We will conclude this chapter by drawing your map again, this time digitally. After this you should have a good understanding of how to draw maps in JOSM.

### Download JOSM

- If you have a copy of JOSM on a CD or usb flash drive, you can skip to section 2, Install JOSM.
- If you don't have JOSM already, or want the newest version, open your web browser - this may be Firefox, Chrome, Opera, or Internet Explorer.
- In the address bar at the top of the window, enter the following text and press Enter: [josm.openstreetmap.de](http://josm.openstreetmap.de)
- You can also find this website by searching for "JOSM"
- The website should look something like this:

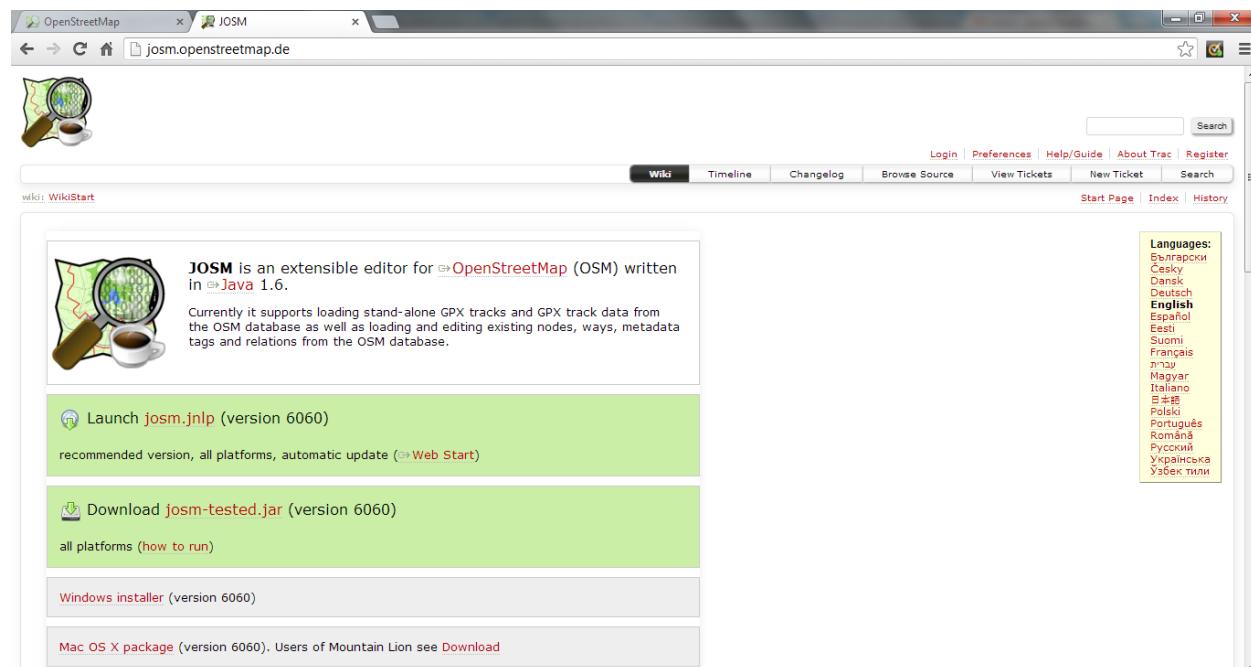


Figure 11: Download JOSM

- If you have Windows installed on your computer, click "Windows JOSM Installer" to download JOSM. If you have a different operating system, click on the link for your system. Your download should begin. In this chapter we will assume that you are using Windows, but the instructions are similar for other operating systems.

### Install JOSM

- You may have problems installing JOSM if Java is not already installed on your computer. If you have problems in this section, try downloading and installing Java. You can download it here:

<http://www.java.com/en/download/>

- Find the JOSM install file on your computer. Double-click it to begin setup.
- Click ‘OK’, ‘Next’, ‘I Agree’, and ‘Install’. When the installation is complete, click ‘Finish’ to launch JOSM for the first time. Later, when you want to start JOSM, you can do so by clicking on the Start Menu in the lower left corner of your computer, and clicking the program JOSM.
- You may see a window pop up that asks if you want to update the software. You don’t need to update it since it is new. Press the button that says “Cancel.” If you don’t ever want to see this message again, check the box at the bottom before pressing “Cancel.”
- When JOSM starts, it will look something like this:



Figure 12: JOSM Startup

## Change JOSM Settings

Before we begin using JOSM, it’s a good idea to change some of the settings so that is will be easier to use. To change the settings, click “Edit” on the top menu, and then click “Preferences.”

### Add Bing Imagery

- We want to be able to use satellite imagery when we are making our maps, so let’s add that from the Preferences window. On the left side of the Preferences window there are different icons for different settings. Click on the icon that says “WMS TMS”. You may need to click on the down arrow to find it:
- Click on “Bing Sat”. Then Click “Activate”.
- You should now see “Bing Sat” in the list below the Activate button.

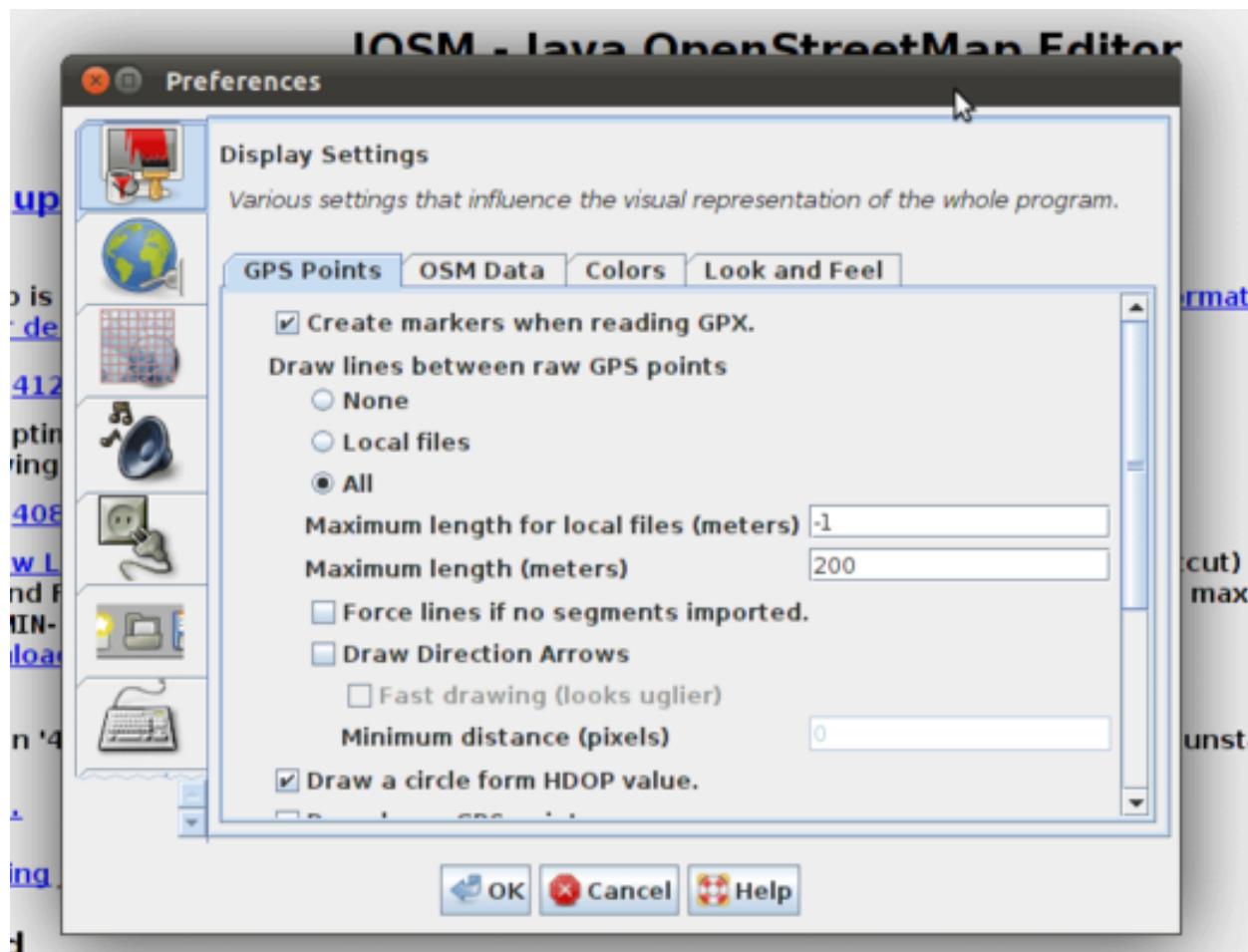


Figure 13: Changing Preferences



Figure 14: WMS TMS



Figure 15: Click Arrow Down

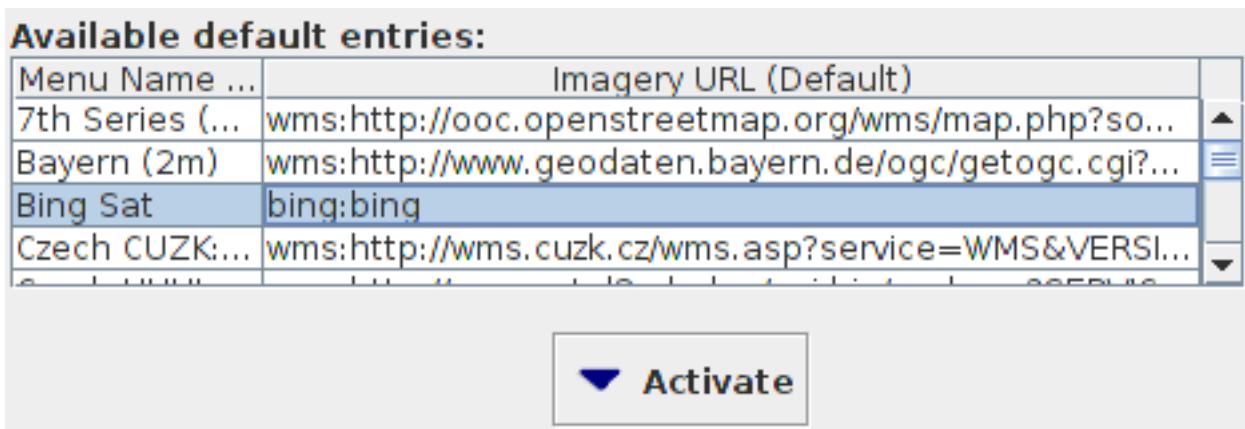


Figure 16: Activating Bing Sat

### Add Presets

- If you have been given a file that should be added to the presets menu, you can add it now. For example, a presets file might be named something like buildings.xml.
- You should still have the Preferences window open. If you don't, click Edit -> Preferences to open the window.
- On the left side, click the icon that looks like a grid.



Figure 17: Adding Presets

- Click the tab at the top that reads “Tagging Presets”.
- In the upper right, press the + button.
- Next to the second box on the right, click the button that looks like a folder. Navigate to the presets file you want to add, for example, buildings.xml.
- Click OK

### Add Field Papers Plugin

- Later in this guide we will learn about a tool called Field Papers, which will allow us to print out a map of an area, draw on it and take notes, and then load it into JOSM in the background. Then we can add our drawings and our notes into OpenStreetMap. Now we will add the Field Papers plugin to JOSM.
- You should still have the Preferences window open. If you don't, click Edit -> Preferences to open the window.
- On the left side, click the icon that looks like a plug.
- Click the button that says “Download list”. The list will download from the internet, and when it is finished you will see a list of ’optional plugins appear in the window.



Figure 18: Plug

- In the search box at the top, type “field”. This will show only items in the list that have “field” in the title.

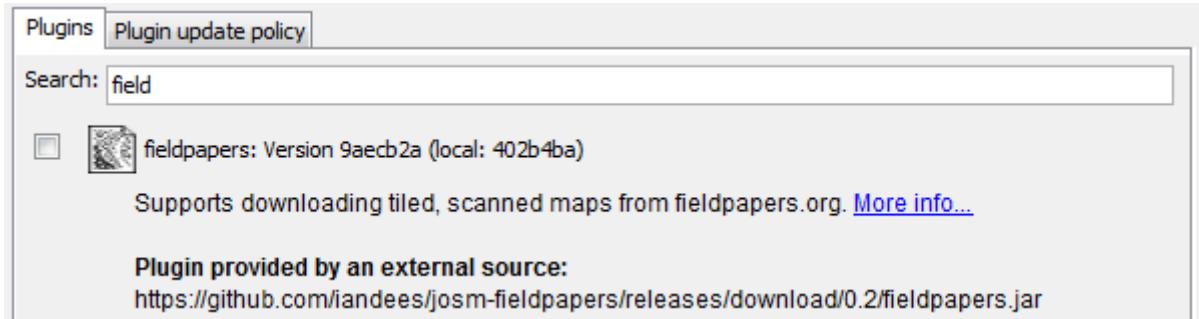


Figure 19: Searching fieldpaper

- Click the checkbox next to the fieldpapers plugin, and press OK at the bottom of the window.
- Field Papers will now be downloaded and installed. Do not click “Cancel”.

## Change Language

- JOSM has been translated into many languages. If it has been translated into your language, you can change it in the Preferences.
  - If you don't have the Preferences window open, click Edit -> Preferences.
  - On the left side, click the icon that looks like a paint can and paint brush.
  - At the top of the window, click the tab that says “Look and Feel”.
  - Choose your language in the dropdown box next to the word “Language”.
  - Click OK.
- You need to restart JOSM to save your settings. Click “File” in the upper left corner, and Click “Exit” at the bottom of the menu.
- Start JOSM again by going to the Windows Start Menu in the bottom left corner. Find JOSM and click on it to start.

## Learn Basic Drawing with JOSM

- Now let's open up a sample OSM file which we will use to learn the basic ways to draw maps with JOSM. Note that this map is not real, in that it is not a real map of a real place, so we will not save it on OpenStreetMap.
- If you were given a set of files by your instructor, you should already have the file we will open, named sample.osm.

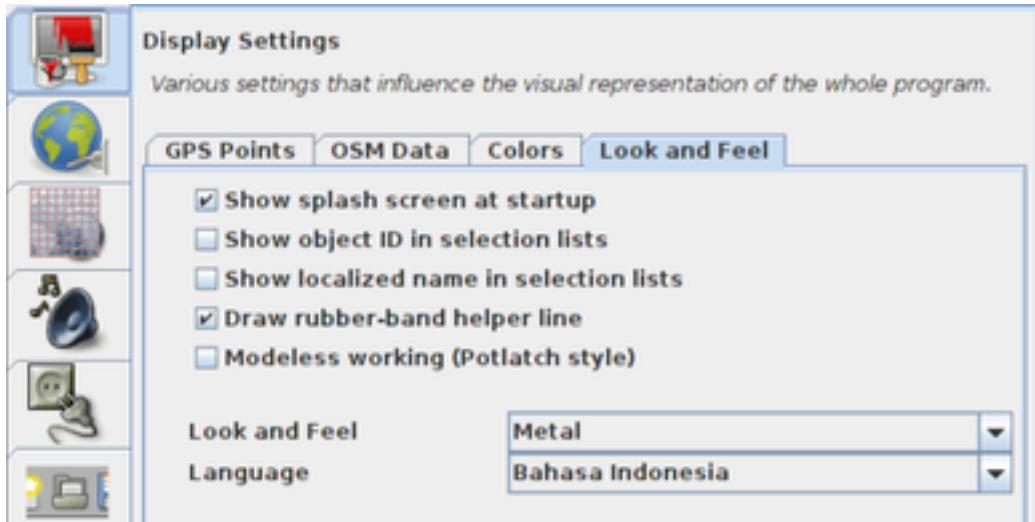


Figure 20: Language Translation

- If you don't have the file sample.osm on your computer, you can download it here: [sample.osm](#)
- Now let's open the sample map file in JOSM. Open JOSM. Click the "Open" button in the upper left.



Figure 21: Open Map

- Find the file sample.osm. Click on it, and then click "Open".
- You should now see a sample map, similar to this:

## Basic Operations

- To move the map left or right, up or down, hold your right mouse button down, and move your mouse.
- There are several ways to zoom in and out of the map. If you have a mouse, you can use your scroll wheel to zoom in and out. If you are using a laptop and don't have a mouse, you can zoom in and out using the scale bar in the upper left of the map window. Drag the bar left and right by holding your left mouse down and moving the bar left or right with your mouse.
- Look at the sample map. There are a few different types of objects here. There is a river, a forest, some buildings, several roads, and a couple of shops. To select an object, click on it with your left mouse button.

## Points, Lines, and Shapes

- As you click different objects on the sample map, notice that there are three different types of objects on the map. There are points, lines, and shapes.
- Points are a single location, represented by symbols. On this sample map, there are two points, a clothing shop and a market. The clothing shop is represented by a shirt symbol, and the market is represented by a shopping cart.

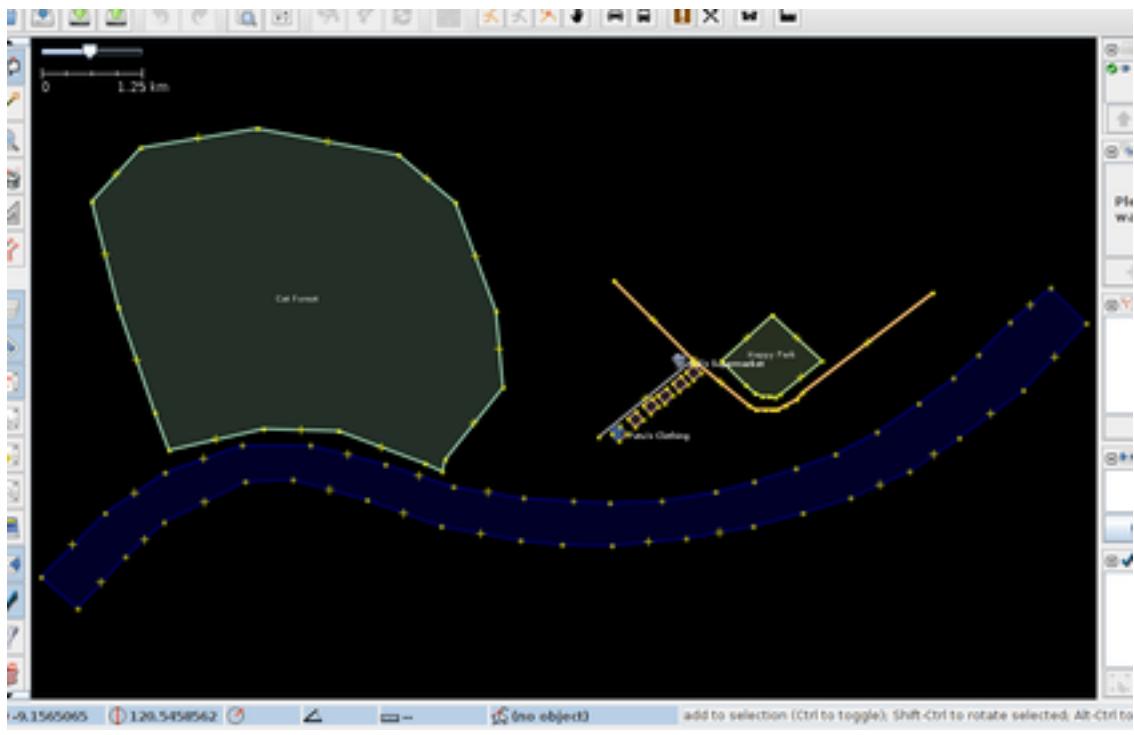


Figure 22: Loading Map

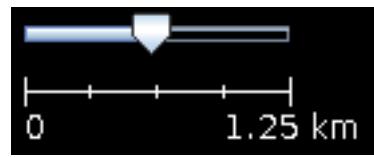


Figure 23: Zoom Map

- There are several lines on the map as well, which represent roads. If you look closely you will see that within the lines, there are points as well. These points don't have any symbols or other information associated with them, but they help to define where the line is located.
- Lastly, there are numerous shapes on the sample map, representing different places - a forest, a river, and buildings. A shape generally represents an area, like a field or a building. A shape is exactly like a line - the only difference is that its line begins at the same point where it ends.
- You may notice that when you select an object, a list appears to the right of the map in a window called "Properties". These are known as tags. Tags are information that is tied to a point, line or shape that describes what it is. We'll learn more about tags in Chapter 7, Advanced Editing. For now all you need to know is that this information helps describe whether our object is a forest, a river, a building, or something else.
- Think about drawing a map by hand, and how you are also drawing points, lines, and shapes. What other places are best represented by points? Lines? Shapes?

## Changing Objects

- Select the forest on the left side of the map. Be sure to click on the line around the forest, not one of the points on the line. Now hold your left mouse button down and drag your mouse. You should be able to move the forest to a new location on the map.
- Click on one of the points on the line around the forest. Hold your left mouse button down and drag your mouse. You should be able to move the point. This is how you can change the shape of an object, or move a point.

## Drawing

- On the left side of a JOSM is a column of buttons. Many of these buttons open new windows on the right side that provide more information about the map. The most important buttons, however, are at the top of these column. These buttons change what you can do with your mouse.
- The top four buttons in this column are the most important. They allow you to:
  1. Select
  2. Draw
  3. Zoom in
  4. Delete
- Until now, you have been using the Select tool, which looks like this:



Figure 24: Select Tool

- Before you draw, you need to make sure that nothing is selected. Click in the black space on the map, where it is empty, to make sure nothing is selected.
- Click on the second button, the Draw tool.
- Find an empty area on the map, and double-click with your mouse. This will draw a single point.



Figure 25: Draw Tool

- To draw a line, single-click with your mouse. Move your mouse and click again. Continue until you are happy with your line. To end the line, double-click your mouse.
- Draw a shape the same way that you draw a line, but finish the shape by double-clicking on the point where you started the line.

## Add Presets

- Now we know how to draw points, lines and shapes, but we still haven't defined what they represent. We want to be able to say that our points are shops, schools, or something else, and whether our shapes are fields, buildings, or something else.
- Click on the Select tool, in the column of buttons on the left.



Figure 26: Select Tool

- Select one of the objects that you drew with the Draw tool. On the top menu, click "Presets". Move your mouse through the sub-menu to the type of location you would like to define.
- When you click on a preset, a form will pop up asking you for more information. You do not have to fill in every field, but you may wish to add some of the important fields, such as the name of the object.
- When you are finished entering the information, click "Apply Preset". If everything went well, your point, line, or shape should change colors or show a symbol. This is because you have defined what it is.

## Draw Your Own Map

- Now let's draw a map in order to practice the techniques you have learned. You may wish to redraw the map that you drew on paper in Chapter 1.
- Drag the map away from the sample map. Hold the right mouse button and drag your mouse, until you have a nice empty area to draw on.
- Use the Draw tool to create points, lines, and shapes. Describe what your objects are by selecting from the Presets menu.
- When you are finished, you should have your own map, similar to the sample map that we opened in sample.osm.

**Summary** Excellent! If all went well you have learned how to setup JOSM on your computer, and the basic tools for drawing maps. In the next two chapters, you will learn how to use GPS and Field Papers to map your town or village. In Chapter 6, we will return to JOSM and using the information we collected, we will add objects to OpenStreetMap.

## JOSM Plugins and Preferences

As you become more advanced in your editing techniques, you may start wondering how you can find additional JOSM features to improve your mapping skills. JOSM allows you to install numerous plugins, which are extra tools that allow you to complete specific tasks in the software. You have already installed several plugins if you have been following these tutorials. In the preceding chapter, you installed a plugin that allows you to use Field Papers. There are many different plugins available in JOSM and we will cover some of the most useful ones in this chapter.



Figure 27: plug

Any time you want to install a new plugin, go to Edit → Preferences and click on the “Plugins” tab. If you don’t see a list of available plugins, click “Download List.” You can install any plugin by checking the box next to it and clicking OK down at the bottom. When you install a new plugin, you will need to restart JOSM. By now you must be tired of restarting JOSM every time you change the settings. Luckily, our first plugin is made to restart JOSM for you!

Recommended Plug-ins:

- [Mirrored Download](#) (allows you to download more OSM data)]
- [Direct Upload](#) (allow you to upload GPS tracks)]
- [Editgpx](#) (allows you to edit GPX files)]
- [Print](#)

We also recommend downloading these plug-ins, which are covered in other chapters:

- [Field Papers](#)
- [Buildings\\_tool](#)
- [Utilsplugin2](#)

### Mirrored Download

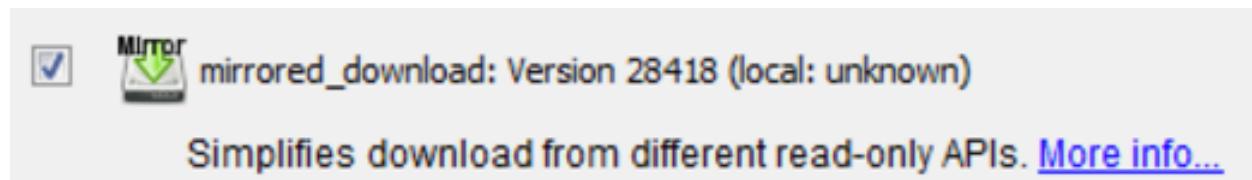


Figure 28: Mirrored Download

**Mirrored Download** will make downloading OSM data for editing faster. Instead of getting the data from the central OSM server, it allows us to get it from a “mirror,” which is an exact replica of the data but in a location that is faster to access it.

Once the plugin is installed (and you have restarted JOSM), you will see another new entry on the File Menu, “Download from OSM mirror...”

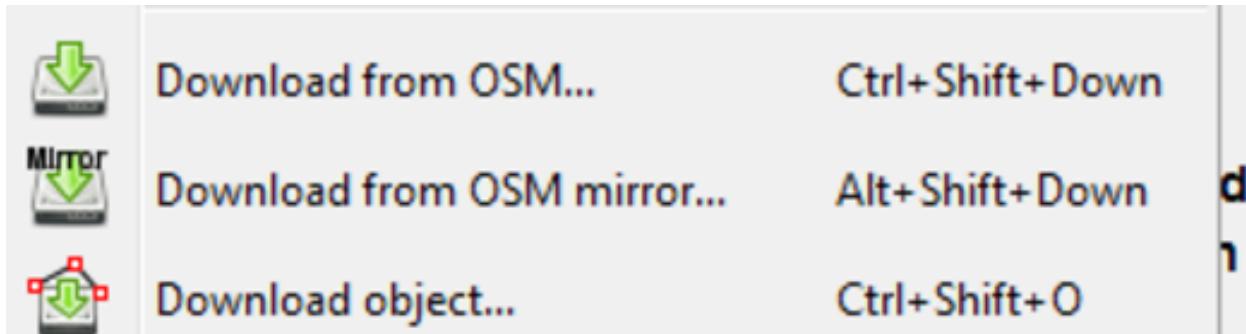


Figure 29: Downloading OSM Mirror

Downloading data is exactly the same process you learned before, but it can be much faster!

## Direct Upload

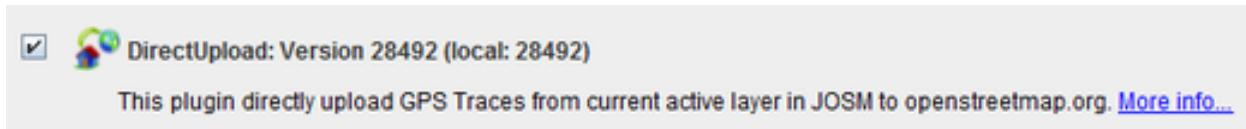


Figure 30: Direct Upload

**DirectUpload** uploads GPX tracks directly to OSM through JOSM (more information is available in the [Appendix](#)). Once the plug-in is installed (and you have restarted JOSM), you will see anew “Upload traces” item under the “Tools” Menu.



Figure 31: Upload Traces

When you click on the “Upload Traces” button this window will pop up:

Put keywords (seperated by commas without spaces) that relate to your GPS trace in the <<Tags (comma delimited)>> box. For example, <<Country,region,city,neighborhood,road name>>. Next, provide a description of your tags. A drop-down list will allow you to reuse former tags and descriptions. Lastly, choose what type of visibility you would like your track to have. There are four levels from private to identifiable (all explained below in the [Appendix]{site.baseurl}/learnosm/en/).

Click on Upload Trace. If you are not connected to your OSM account, you will have to do it now.

Once successfully uploaded, the Text area will display an “OK” status and the “Upload Trace” button will not be clickable. More information about this plug-in and GPS uploads is available in the [Appendix](#).

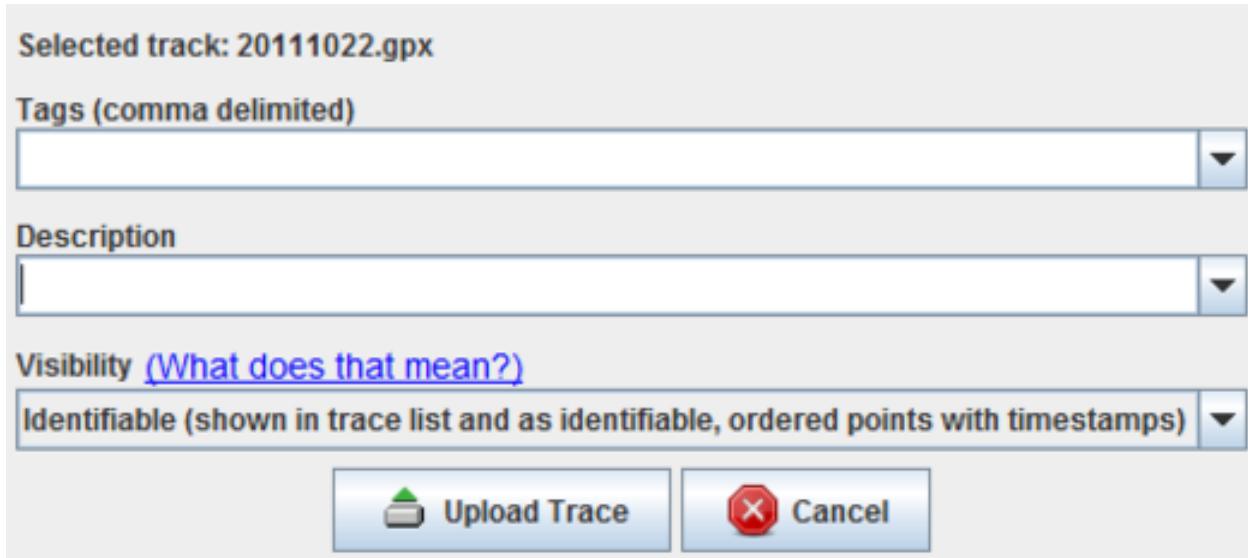


Figure 32: Window for Upload Traces

### **edit gpx**



**EditGpx** allows you to prepare recorded GPX tracks before uploading them to OSM. Often tracks have parts that you would like to remove. Therefore, this plug-in delete points of tracks in a speedy manner and creates anonymity for timestamps of a track.

Once the plug-in is installed (and you have restarted JOSM), you will see this new tool in the tool bar on the left.



Figure 33: New Tool

1. Open a GPX file in JOSM
2. Press the new button

in the left menu bar and the GPX data will be imported to a new EditGpx layer. Every node of the track will be highlighted in yellow.

3. Now mark the points (by clicking) or areas (by drawing a rectangle on their extent) that you would like to delete. The yellow highlighting should disappear.



Figure 34: Open a GPX file in JOSM



Figure 35: New Button

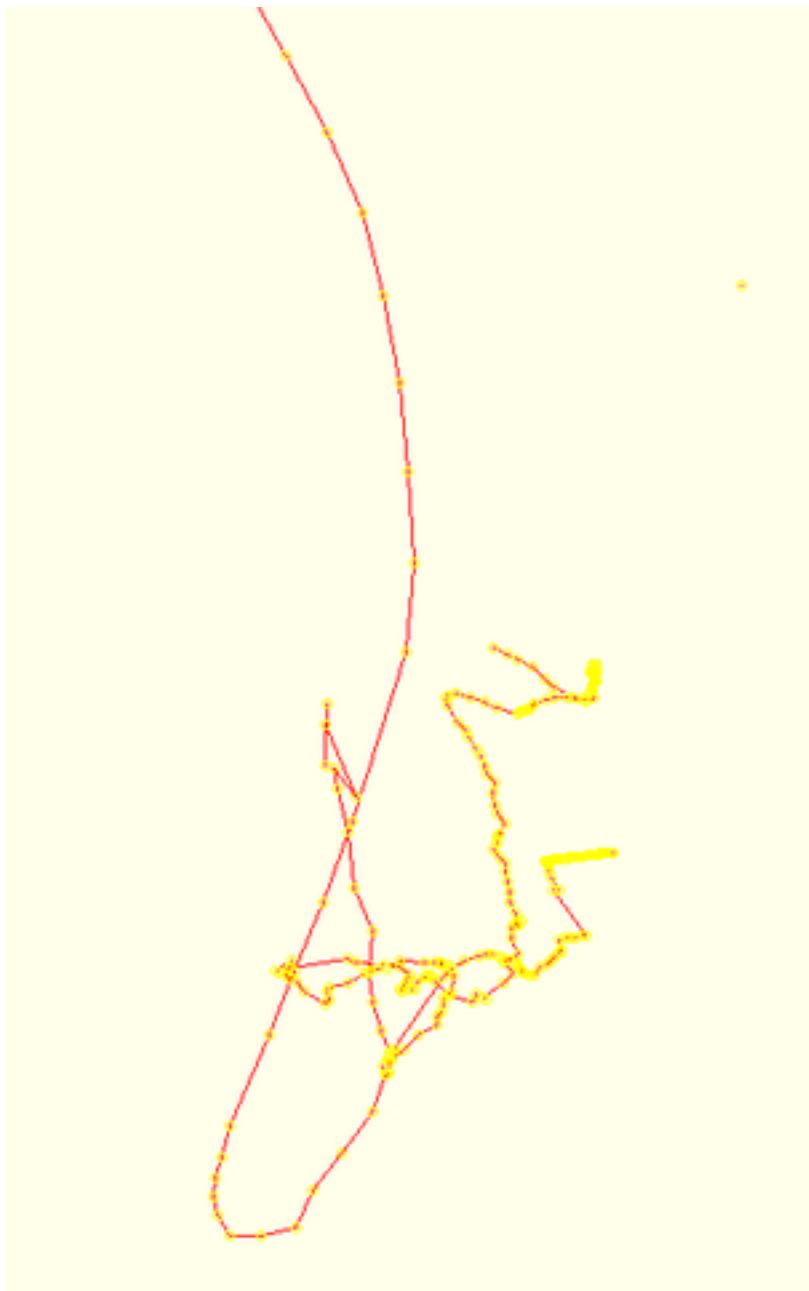


Figure 36: EditGpx Layer

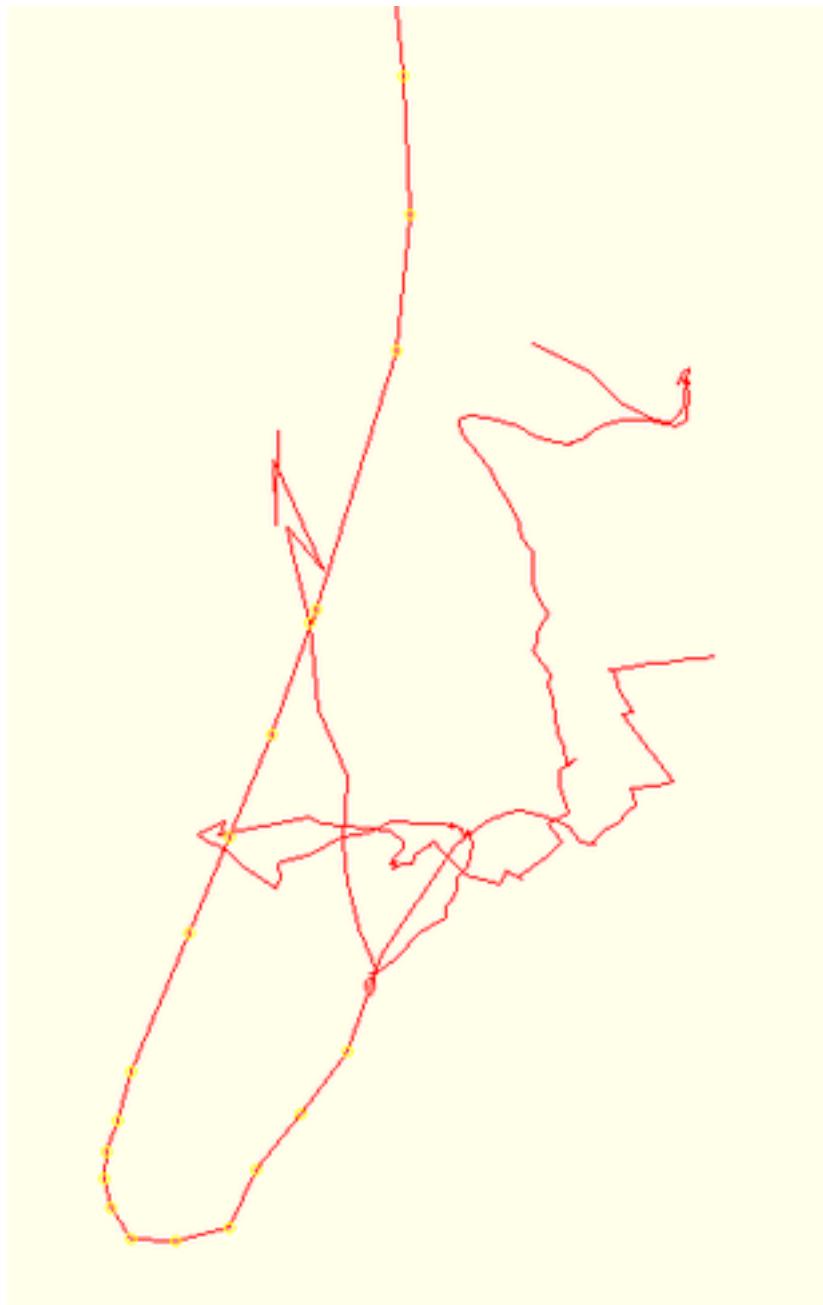


Figure 37: Removed yellow highlight

4. Right click on the layer name and choose <<Convert to GPX layer>> in the <<Context>> menu.
5. Now you can save the normal GPX layer as a file or upload the data to OSM (eg by using the plugin <http://josm.openstreetmap.de/wiki/Plugins>).

## Print



Figure 38: Print Plugin

If you want a quick and easy way to print a map while you are editing in JOSM, install the **print plugin**. Although you won't be able to do anything stylistic with your printout, this is a good way for a quick and easy print. Once the plugin is installed, a new item will be available on the File menu called "Print..."



Figure 39: Print...

Clicking this will open the Print Dialog, which looks like this:

Here you can change your printer settings. If you don't see anything on the page, check the box next to "Map Preview" on the right. Zoom in or out on the map by changing the number in the "Scale" box. Increase the resolution by changing the number next to "ppi". When you have finished editing the settings, click "Print."

## Summary

These are some useful plugins that are available for JOSM. Feel free to continue exploring the many other plugins. As you have already seen, the Preferences menu has a short description of each plugin, and you can open a web page with more information by clicking on the "More info..." link next to each.

Good luck!

## Appendix

### DirectUpload Details

Adding your GPS tracks and waypoints to the OSM Server is useful for many reasons. *\_(If you do not want your GPX points to be seen by anyone else you do not have to read this section. You can simply display your GPX files from JOSM, and therefore store them locally)\_* First of all, GPS tracks are the most useful way of collecting and georeferencing objects in OSM. (See Chapter 8: Using Aerial Imagery) GPS units

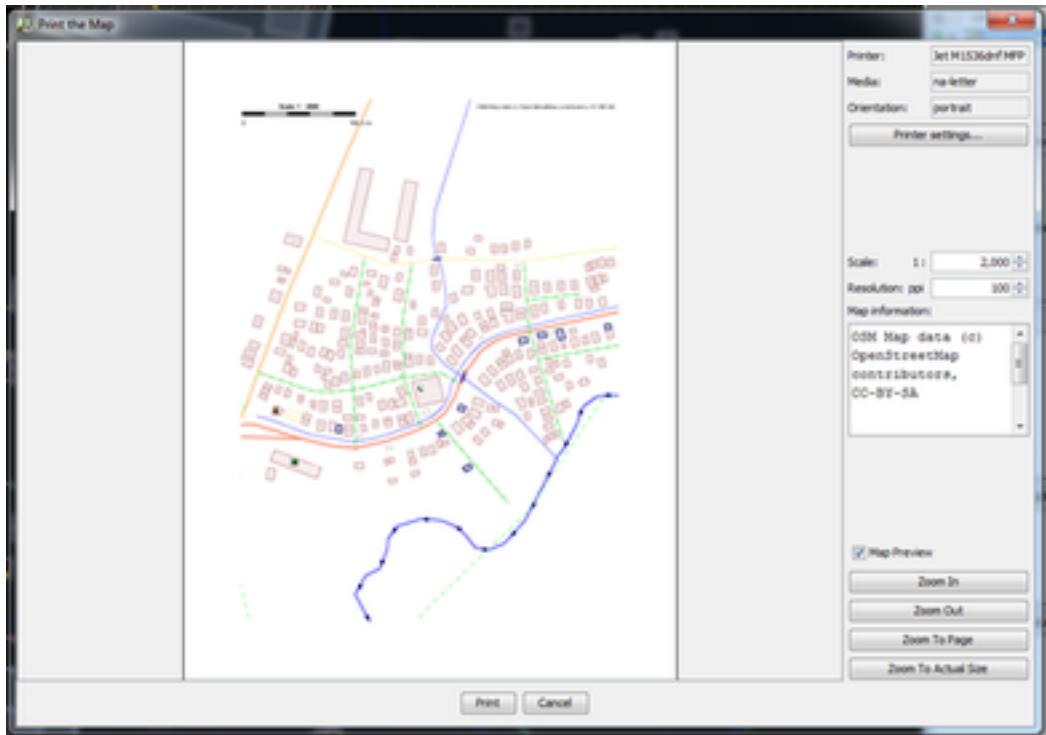


Figure 40: Print Dialog

[More info...](#)

Figure 41: More Info



Figure 42: Direct Upload Details

have greater accuracy than satellite imagery and therefore are a useful tool for checking how offset imagery may be. Using many GPS tracks (the greater the number of tracks the greater the ability to determine geolocation accuracy) allows you to determine if background imagery may be misaligned.

Uploading tracks to the server permits greater sharing of information. It allows people who do not have access to the field, simply because they do not live in that area or they do not have access to a GPS devices, to help with digitizing. There are two ways to upload your traces: 1) JOSM Plugin or 2) on the main OSM website.

Note: GPS waypoints cannot be uploaded to the OSM database directly. However, they can be converted to tracks and then be uploaded temporarily, for example, so they can be displayed as background objects in Potlatch.

After you have opened your GPX file in JOSM and clicked Go to <<Tools>> and click <<Upload traces>>. Describe the GPX file, write some tags, and visibility. For visibility, you can choose whether private, trackable, public or identifiable.

1. **Identifiable:** Your trace will be shown publicly in Your GPS\*\*traces and in the public GPS traces list. Other users can download the raw trace and connect it with your username. Timestamps of the tracks points will also be available through the public GPS API.
2. **Public:** Your trace will be shown publicly in Your GPS\*\*traces and in the public GPS traces list. Other users are still able to download the raw trace from the public trace list and any timestamps contained within. However, data shown in the API does not reference your trace page, nor are the timestamps available, though the points are chronically ordered.
3. **Trackable:** The trace will **not** show up in any public listings, but the trackpoints will still be available through the public GPS API **with timestamps**. Other users will be able to download the trackpoints but these will not be associated with you.
4. **Private:** The trace will **not** show up in any public listings. Trackpoints will be available in timeline order through the public GPS API **without timestamps**.

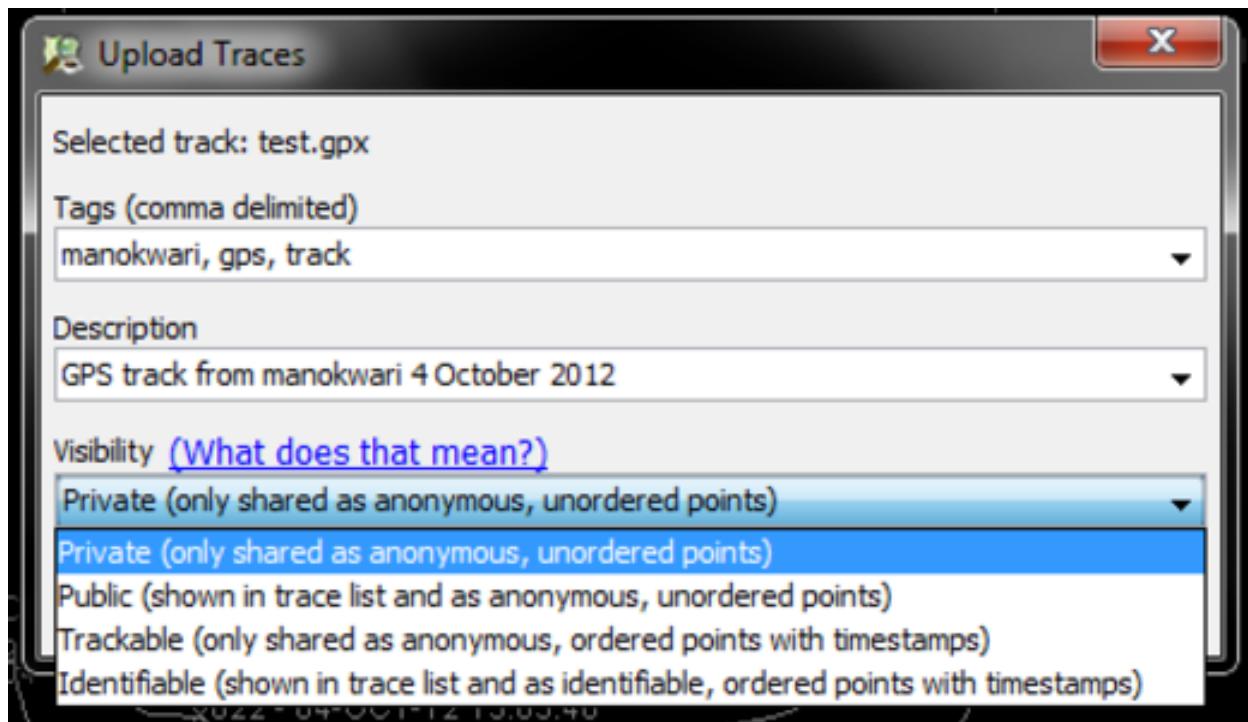


Figure 43: GPS API without timestamps

## Uploading GPS Traces Online

1. Go to <http://www.openstreetmap.org/> and log in.
2. Select <<GPS Traces>> found on the left banner.

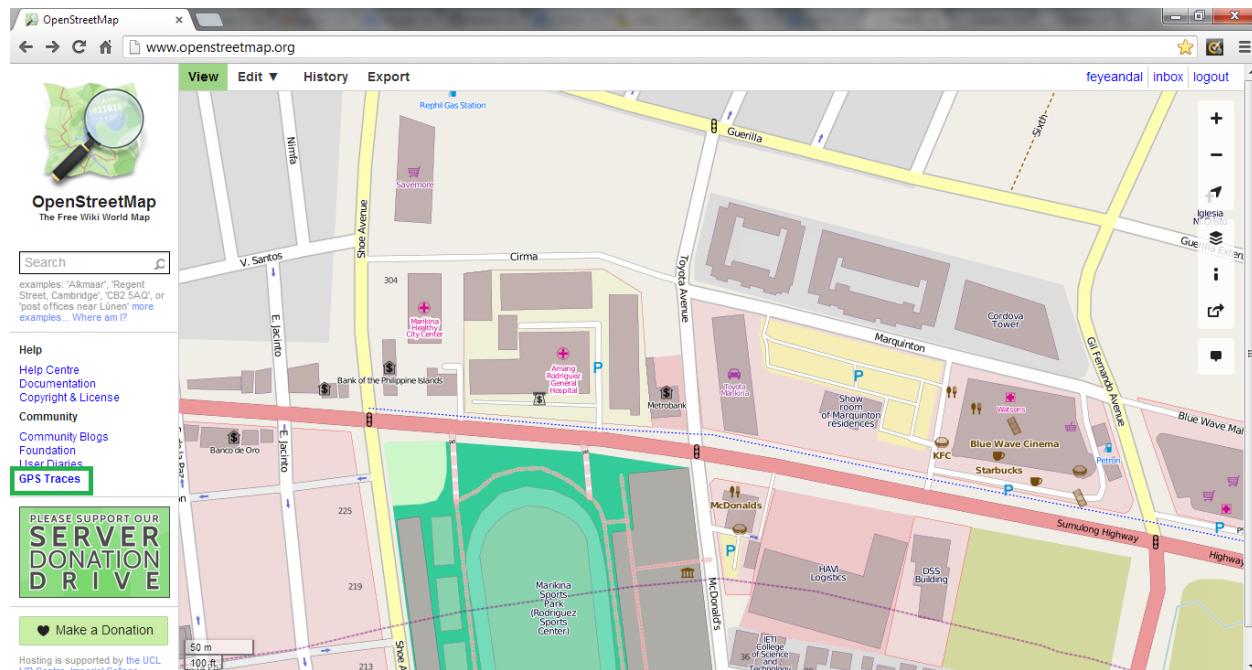


Figure 44: GPS Traces

3. Select **upload a trace**. Here, you can also **See just your traces** to review previous GPS tracks.
4. Find your file in <<Choose File>>. Label it in the Description box, give it some Tags, and chose what type of Visibility it will have. If you have many .gpx files you can compress them into a zip archive and upload it. It will be treated as one large gpx file and only one entry on the trace list will be created.

## Upload GPS Trace

Upload GPX File:  MappingParty.gpx

Description: Jakarta CBD

Tags: Critical\_Infrastructure, Schools, Hospitals, Government\_Buildings (comma delimited)

Visibility:

Figure 45: Epload GPS

5. Click *Upload*.

The file will be uploaded to the OSM server, where it will join the queue of files waiting to be inserted into the database.

## **Going Out for a Fieldwork**

Welcome to the second phase of the Beginner's guide. This part requires data collection by doing fieldwork around your area. You will learn the basics of GPS and how to use them. With the use of fieldpapers,we will be able to draw on it and add notes, and upload your edited fieldpapers back into JOSM.

## Surveying with a GPS

In this chapter we will see what a GPS does and how it works. You will learn how to operate a GPS, and how to use it to create maps. In this chapter we will explain how to operate the Garmin eTrex Vista HCx, a common GPS used for mapping. There are many other models of GPS which do the same thing, so if you are working with a different one, don't worry – the principles remain the same.

### What is a GPS?

A GPS is like a mobile phone, except that instead of receiving radio signals from telephone companies, it receives signals from satellites that are going around the Earth. By receiving these signals from the satellites, a GPS is able to calculate your exact location on the planet. It records this location in coordinates, which are two long numbers. One number tells you how far East or West you are – this is called longitude. The second number tells you how far North or South you are – this is called latitude. Every place on Earth has unique geographic coordinates.

For example: -8.639298 Latitude, 116.311607 Longitude is a location in Lombok, Indonesia.



Figure 46: Google Earth software, showing coordinates of Lombok, Indonesia

### Turn on the GPS

Before you turn on your GPS, go outside where you have a clear view of the sky. Because the GPS determines your location by receiving signals from satellites, it won't work indoors.

On the right side of your GPS, press and hold the Power button. The GPS will start, and it will show you the Satellites page. You should see something like the image below. Your GPS is looking for satellite signals. When it has connected to three or more satellites, it will have your location.



Figure 47: Garmin eTrex Vista HCx



Figure 48: GPS determined location

Once your location is determined, the Satellite screen will disappear and you will see the main menu.



Figure 49: GPS main menu

## Navigate the GPS

- The GPS has different screens and menus that allow you to do different things. To switch between screens, press the button marked “X”, just above the power button on the right side of the device. This button also serves to go back. If you press something by mistake and would like to cancel or go back, press the “X” button.
- By pressing the X button, you should be able to flip through different screens that will look something like this:
- If you return to the Satellites page, you can see that you are connected to three or more satellites. In the upper left corner are your coordinates, your latitude and longitude.

To add OSM to your GPS, download the latest data from <http://labs.geofabrik.de/haiti/latest.garmin-gmapsupp.zip>. Unzip “latest.garmin-gmapsupp.zip” and save the “gmapsupp.img” file into a temporary folder. After turning on and connecting your GPS to your computer, create a “Garmin”

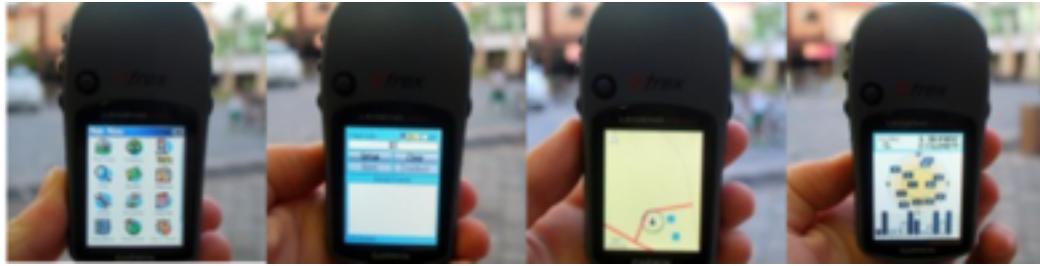


Figure 50: GPS all

folder at the root of the USB drive that appeared when you plugged in the GPS. Copy the gmap-suppl.img to the “Garmin” folder. Lastly, restart the GPS and the OSM map extracts should be added to your device.

Flip to the Map page, and you can see a map of where you are. If you have added OSM maps to your GPS, you may see roads and places. Otherwise, the map may look quite blank. Zoom in and out by pressing the up and down arrow buttons on the left side of the GPS.

## Tracks and Waypoints

Your GPS records two kinds of information that are useful for creating maps or saving the coordinates of a place. First, it allows you to save your location in the memory of the GPS. When you save a location, the coordinates will be saved with a name. For example, your first saved point will be named 001, the second 002, and so on.

If your GPS does not start at 001 and you would like to clear the previous points, go to the “Find” icon in the main menu. Hit “waypoints” and then the submenu button on the right side to display the Waypoint submenu. Scroll down to “Delete” click “all symbols” and “Yes”.

When you save a point, you can write down the number on a piece of paper, along with a note about what it is, any any attribute or indicators you would like to know. Saved locations on your GPS are called waypoints.

Second, your GPS can save what are called tracks. While a waypoint only saves a single location, a track will save a series of locations wherever you move. For example, the track will record your location every one second, or every one meter, and the result will be a series of dots that show the path of where you have been. Tracks are useful for mapping objects that are represented by lines or shapes, such as the course of a road, or the shape of a field.

## Save Your Location

- To save your current location as a waypoint, click the “X” button until you reach the Main Menu. Using the joystick, move it so that “Mark” is highlighted on the screen. Push the joystick button down to open the “Save Waypoint” page.

If you are using multiple GPS devices it is important to ensure that all the devices are set to the same format. To check this go to the “Main Menu” and find “Set up Menu”. Click on “Units” and make sure the Position Format is set to decimal degrees (hhdd.dddd°), the Map Datum to WGS 84 (which is a calculated standard coordinate frame, or spheroidal reference surface, for the Earth), and the distance speed, elevation and depth are set to meters.

- You can see on this page some information about the waypoint that you are saving. First is the name. If this is your first waypoint, it probably reads “001”. This is the number you should record on paper



Figure 51: GPS path



Figure 52: save location 1



Figure 53: save location 2

along with the information you want to collect with this object. Next you will see the time and date when the point is recorded. Below that are the coordinates, followed by the altitude.

- Use the joystick to move to the “OK” button at the bottom of the screen. Press the joystick button down to save this point. Be sure to write down the number of the point, along with what the place is and any other information you want to record about the place in your notebook.
- Press the “X” button to go to the map page. You should now see your point on the map.

## Turn on the Track Log

- Now that we have learned how to save points, let’s learn how to turn the track log on and off. When the track log is turned on, it will automatically record your path. It’s good practice to turn on the log when you begin mapping, and turn it off when you are finished. You will then be able to look at the track on a computer and see the path that you mapped. If you would like to map the course of a road, it is a good idea to save a waypoint at the beginning and end of the road, writing in your notebook the name and type of the road, and any other important information about the road.
- To turn on the track log, click the “X” button until you reach the page that says Track Log.
- If you would like to empty the track log to delete earlier recordings, use the joystick to select “Clear”, and press the joystick down. The bar at the top should read “0%”.
- To turn on the log, move the joystick to highlight “On”, and press the joystick down. The track log is now recording your path.
- Under the “Set up” option, you also can set time or distance intervals to track. Time intervals instruct your GPS to record your location at given intervals. If you have a memory card in your GPS, it is good practice to set this to 1 second, meaning that every second your location will be added to the track log. This may be useful when detailed surveys are needed.
- Press the “X” button to go to the map page. As you move you will see your track shown as a series of dots.

## Copy Waypoints and Tracks to the Computer

### Attach GPS to the Computer

- When you are finished mapping with the GPS you will want to copy the points and tracks to your computer so that you can open them in JOSM. First, turn off the track log on your GPS, by going to the track page and selecting “Off”.
- Attach the GPS to your computer with the cable. One end should plug into your computer’s USB port, and the other goes into the back of the GPS, beneath the rubber flap at the top. The GPS should be turned on to copy the points and tracks.

### Install GPS Drivers

- You may need to install GPS drivers on your computer. If you have a copy of USBDrivers\_23.exe on your computer, double-click it and install.
- If you don’t have this file, you can download it. Open your internet browser and go to: <http://www8.garmin.com/support>
- Click “Download” to get the installation file. Locate it on your computer, and double-click to install.



Figure 54: turn on track

## Get the GPSBabel Setup Program

- GPSBabel is a program that allows us to copy data from the GPS. If you have a copy of GPSBabel on a CD or usb flash drive, you can skip to the next section.
- If you don't have GPSbabel already, open your web browser and go to [www.gpsbabel.org](http://www.gpsbabel.org)
- Click "Downloads" at the top of the page.
- Scroll down the page. If your computer uses Windows, you want to download the installation file for Windows. Click "GPSBabel-1.4.2-Setup.exe". The file will be downloaded to your computer.

## Install GPSBabel

- Locate the GPSBabel setup file on your computer. Double-click it to install.
- Click "Next".
- Click "I accept" and "Next".
- Continue clicking "Next" until the program installs.
- When the program has finished installing, click "Finish" to start GPSBabel.

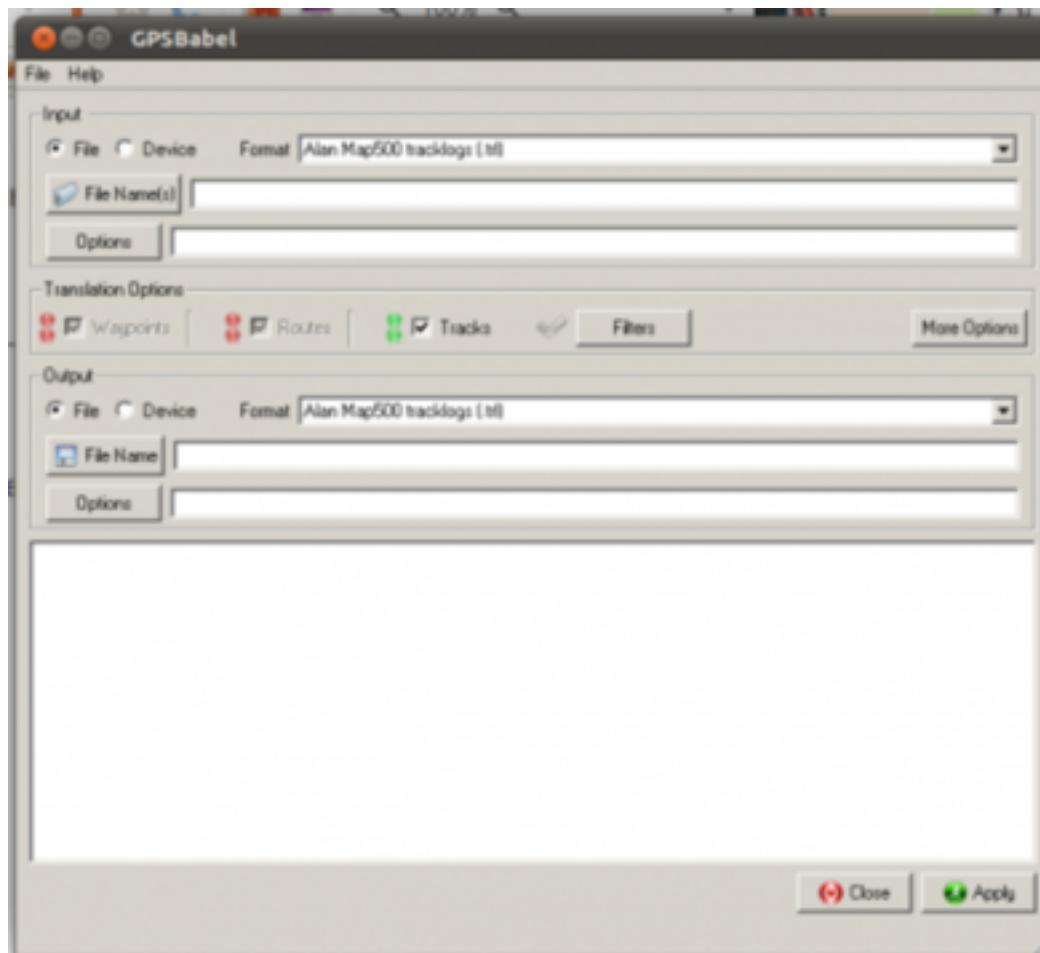


Figure 55: GPSBabel Interface

## Copy Tracks and Waypoints

- Click in the circle next to the word “Device” at the top of the window.
- In the dropdown menu labelled “Format”, select “Garmin serial/USB protocol”
- Go down to the middle of the window, under Output. In the dropdown menu labelled “Format”, select “GPX XML”:

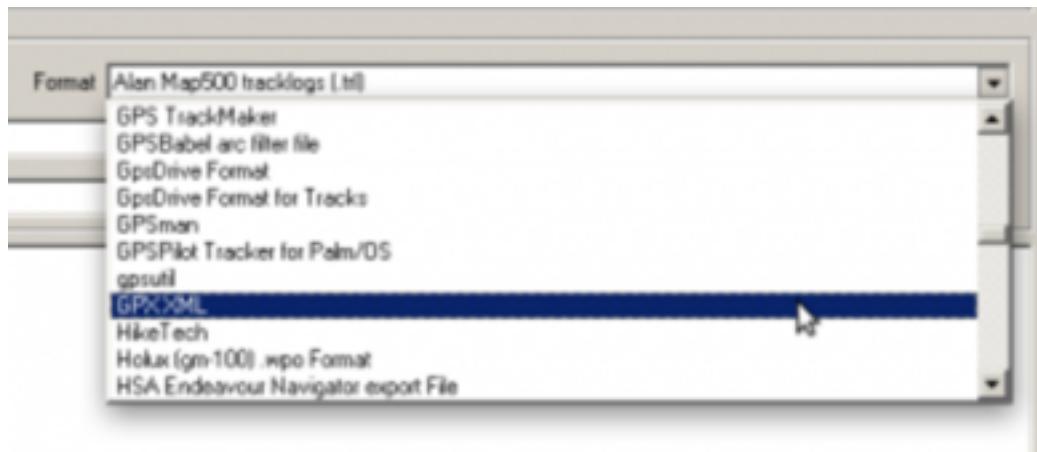
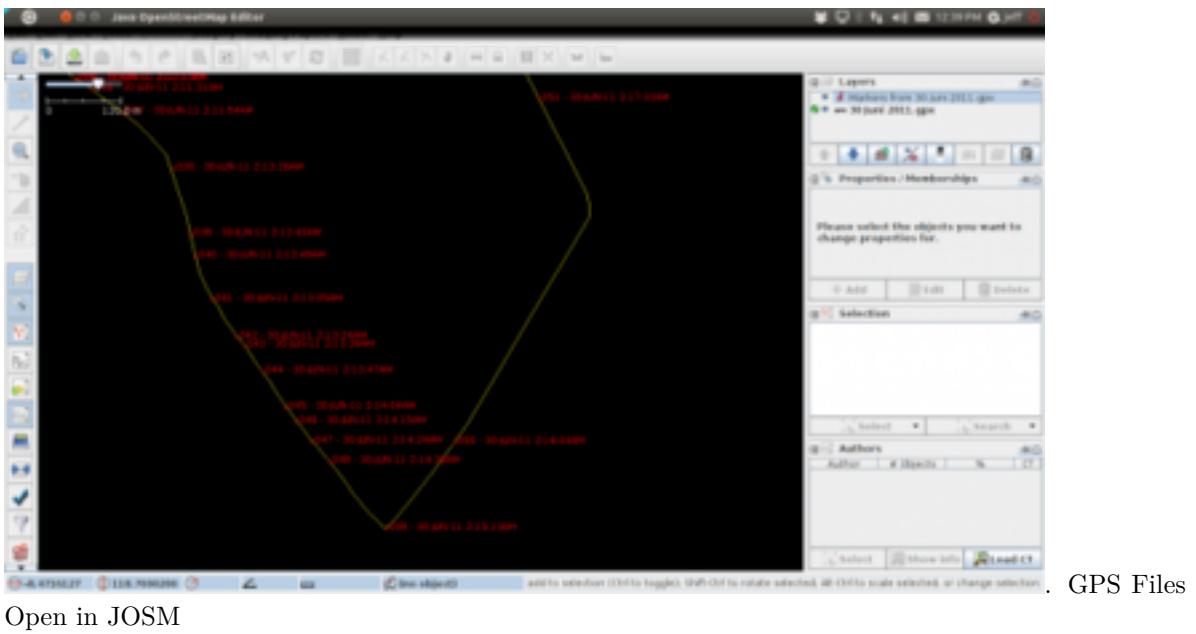


Figure 56: Choose GPX XML

- Click “File Name” and type a name for your saved file. It should be something that describes the data, such as the date and the location. For example, *jakarta-07-07-2011*
- Make sure your GPS is connected to the computer and turned on.
- Click “Apply” in the bottom right corner of the window.
- If all goes well you should see a bar move across the screen, indicating that the data is being retrieved from the GPS. When it is finished, your points and track will be saved in the file that you selected.

## Open in JOSM

- Now open JOSM. On the top menu, click “File” and then click “Open...”
- Find and select the file that you created with GPSBabel. Click “Open”.
- You should now see your points and tracks loaded into JOSM.



GPS Files

[Open in JOSM](#)

## Summary

Congratulations! You should now have an understanding of how to use the GPS. If you haven't already, practice saving points of some important locations. In this chapter you learned how to open your points and tracks in JOSM. In Chapter 6, we will use this information to add new places to OpenStreetMap. In the next chapter, we will learn about Field Papers, which is another way of collecting information for OpenStreetMap. With Field Papers, all you need is paper and a pen, and you can collect the coordinates of places just like with a GPS.

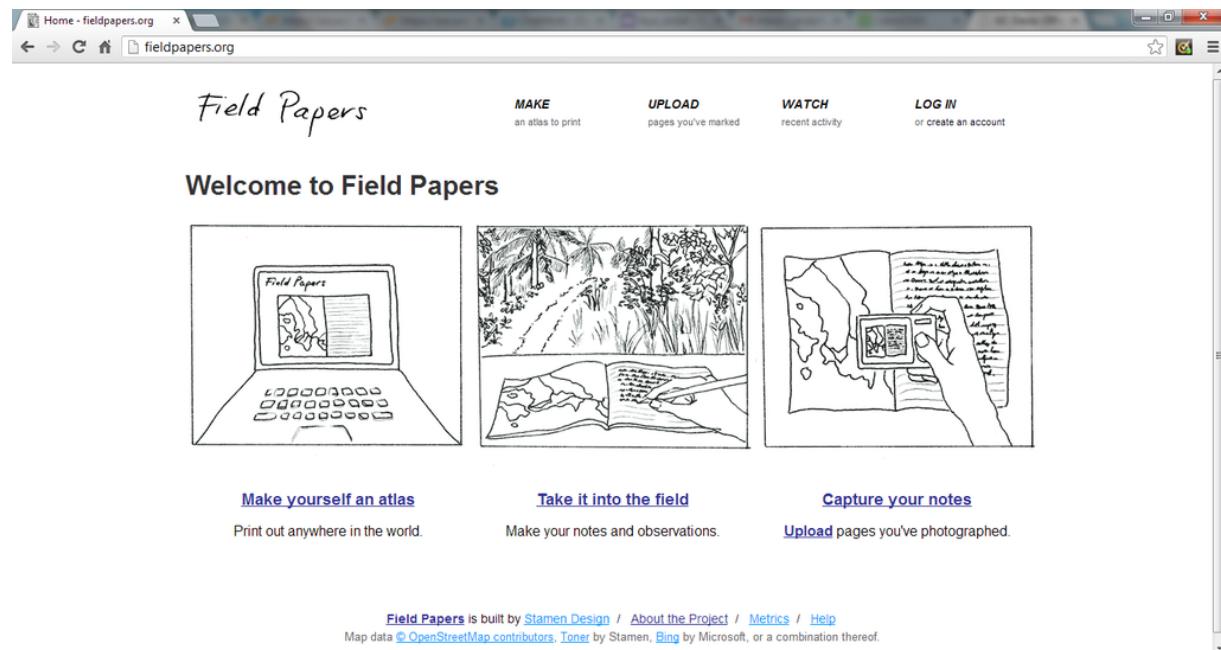
# Surveying with Field Papers

In this chapter we will see how we can record the coordinates of places without a GPS. We will use a tool called <http://fieldpapers.org/>, which allow you to print a map of an area, draw on it and add notes, and load the paper back into JOSM, where you can add your locations to OpenStreetMap.

## Overview of Field Papers

Before we go into detail about Field Papers, let's look at an overview of how the process works:

1. Locate the area you want to map on the Field Papers website. Print out a map of this area. You can choose to print the current map of the area on OpenStreetMap, or you can choose to print aerial imagery, if it is available in your area.

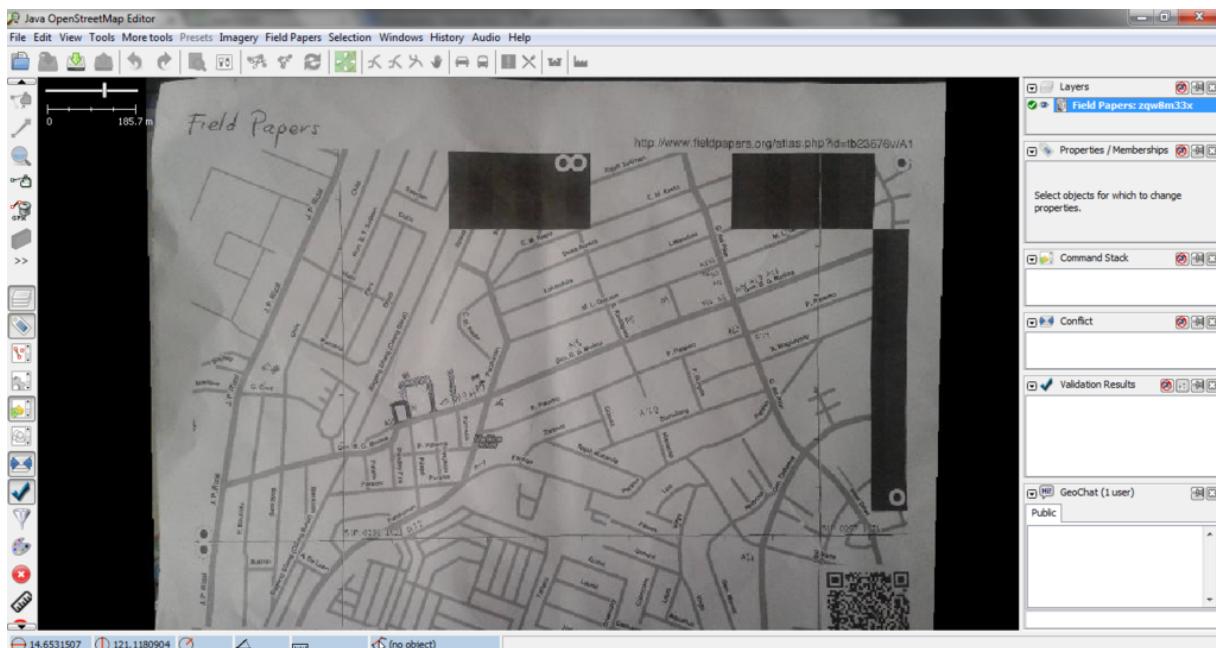


walking paper

2. Use your printed map to survey the area. Add more places by drawing them on the map. Draw lines for roads, shapes for buildings, and so forth. Write notes about each location directly on the map, or write numbers on the map that relate to numbers in your notebook, where you can write more detailed information about each object.



3. Scan your paper into the computer. If you don't have a scanner, you can take a photograph of the paper, if your camera is able to take high quality pictures. Upload the image to the Field Papers website: <http://fieldpapers.org/upload.php>
4. In JOSM, load the Field Papers. Use the objects you draw as a reference to add them digitally into OpenStreetMap.



fieldpaper josm

## How does Field Papers work?

If you follow the Field Papers process described above, you will be collecting accurate geographic coordinates of places with nothing more than paper. How is this possible?

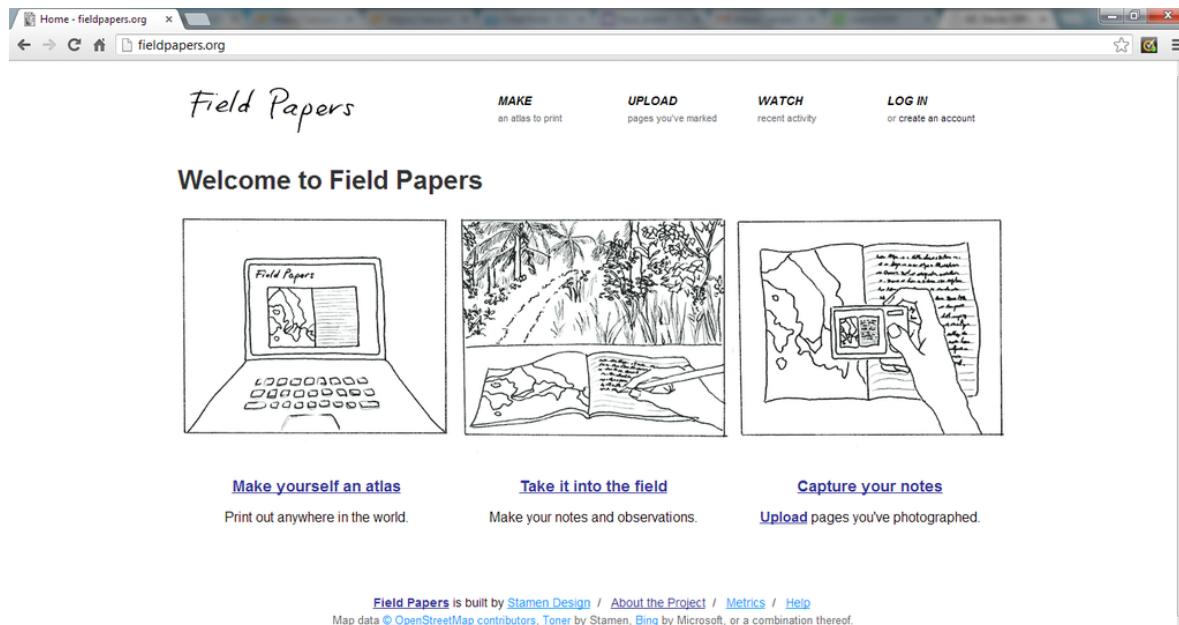
**! [paper QR code] []**

When you print a Field Papers, the paper comes with a square barcode on the bottom of the page. This bar code allows Field Papers to determine the exact location of the map that you are using to survey. Later, when you load the paper back into JOSM, all the objects that you drew will be shown in their actual locations, or at least quite close, which is good enough for us.

Now let's learn how to create and use Field Papers.

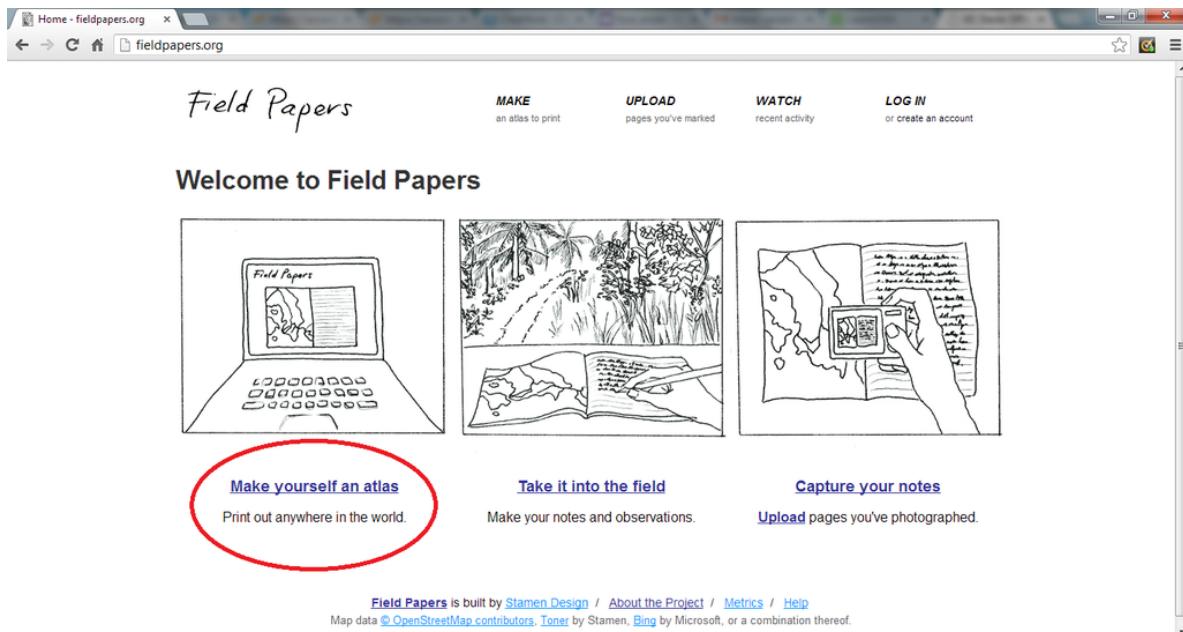
## Create and Print

- Open your web browser – this may be Firefox, Chrome, Opera, or Internet Explorer.
- In the address bar at the top of the window, enter the following text and press Enter: [fieldpapers.org](http://fieldpapers.org)
- The website should look something like this:



walking paper

- Click **Make yourself an Atlas** to select the area you want to print out.



make atlas

It will direct to the page:

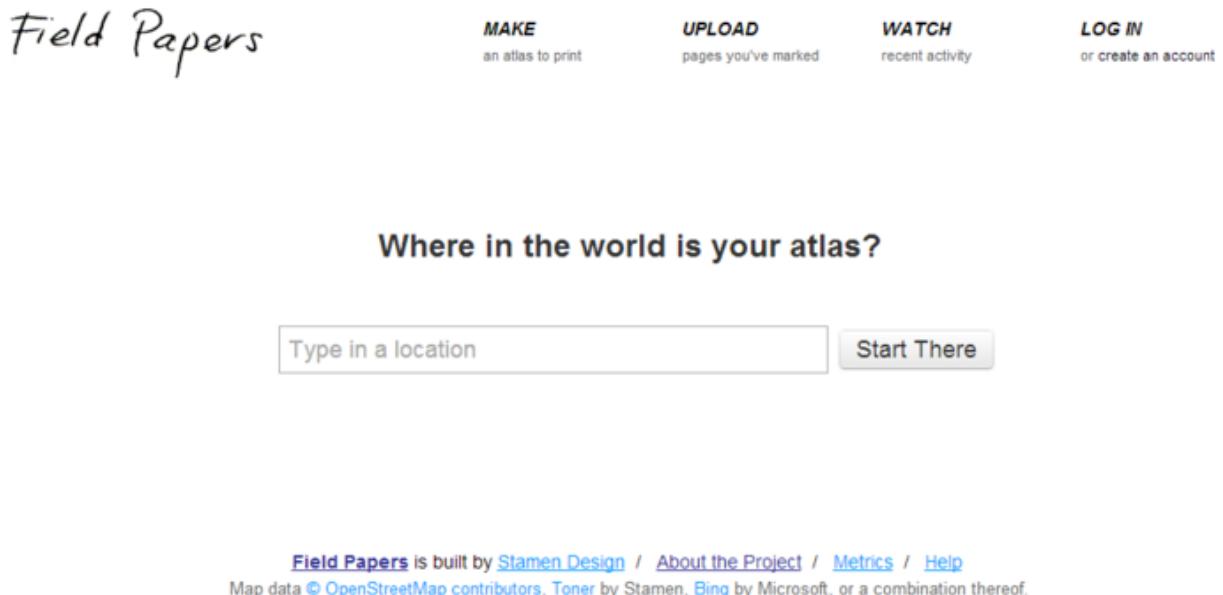
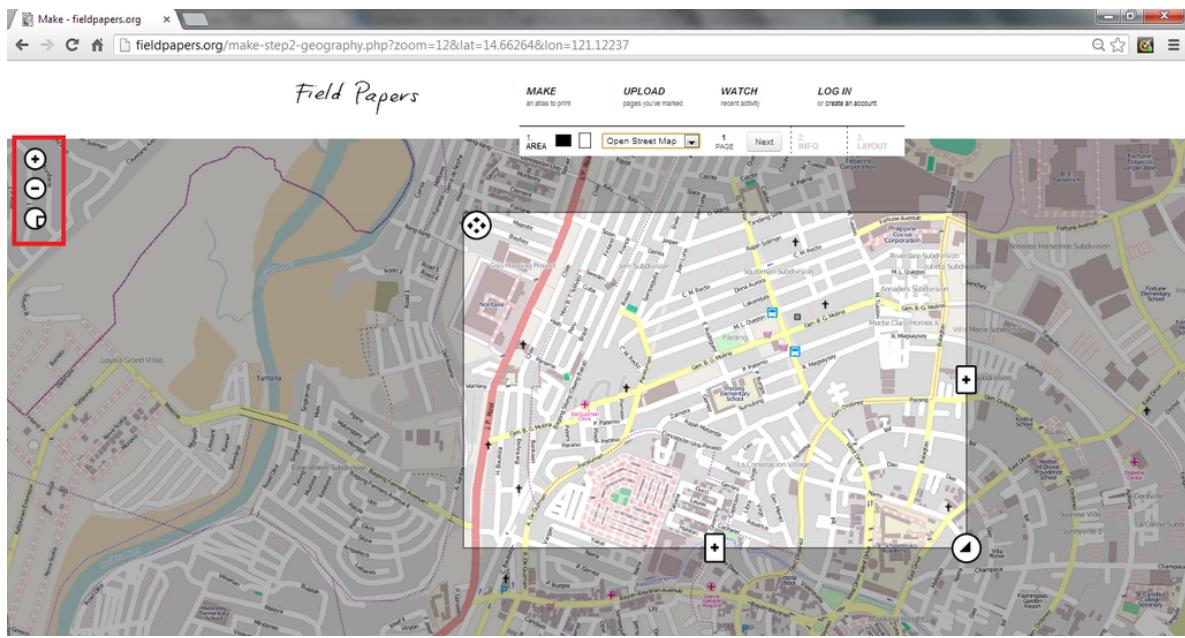


Figure 57: atlas

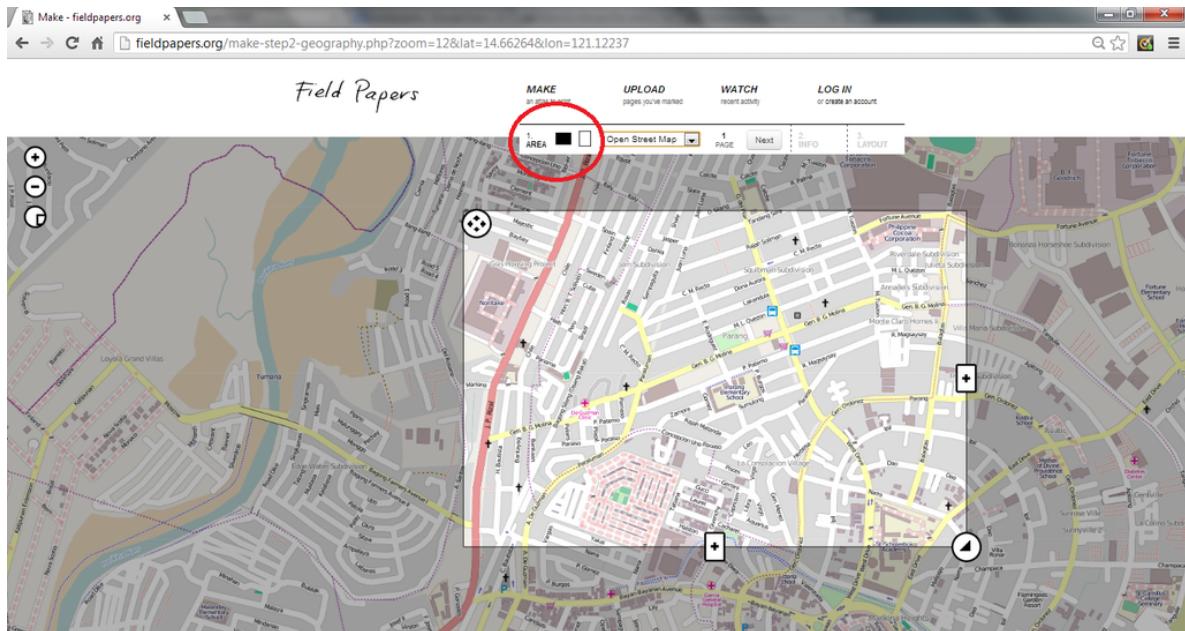
Type the name of the area in the space provided. Then click “Start there”.

- The map that you see shows the area that you would like to print on paper. You can move the map the same way you move the map on the OpenStreetMap website, using your left mouse button to drag the map East or West, and your scroll wheel to zoom in and out of the map. Left-clicking on the + and – buttons in the upper left corner will also zoom in and out.



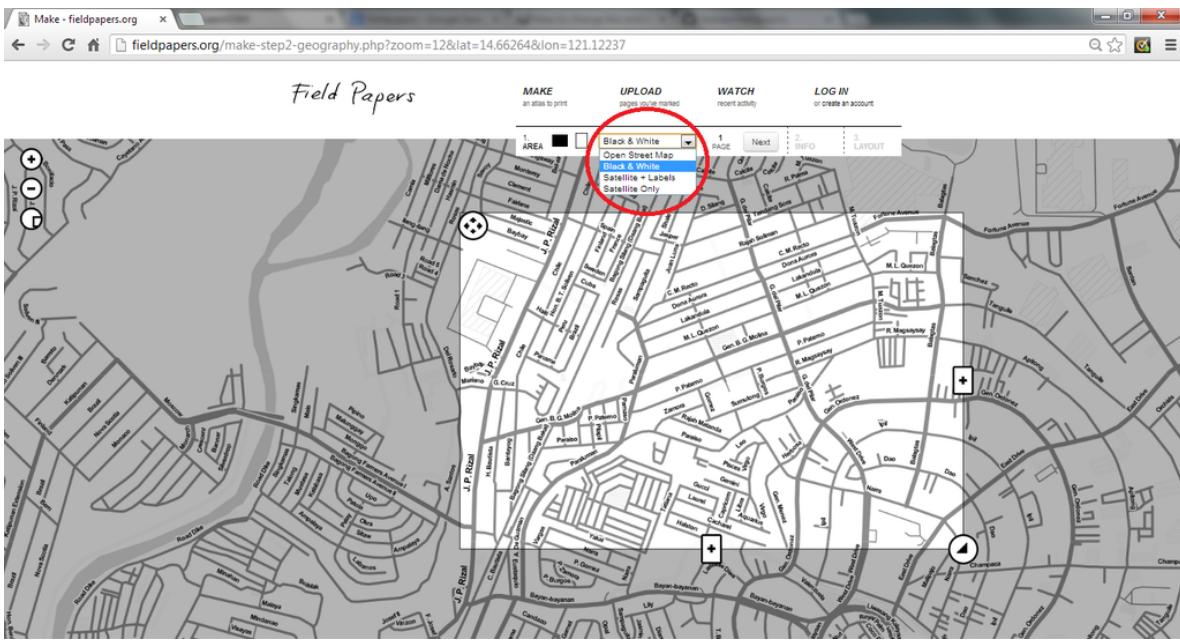
Zoom In/Out

- Just above the map are some additional options. The first option is to select the size of the tile you want to use for printing the fieldpaper.



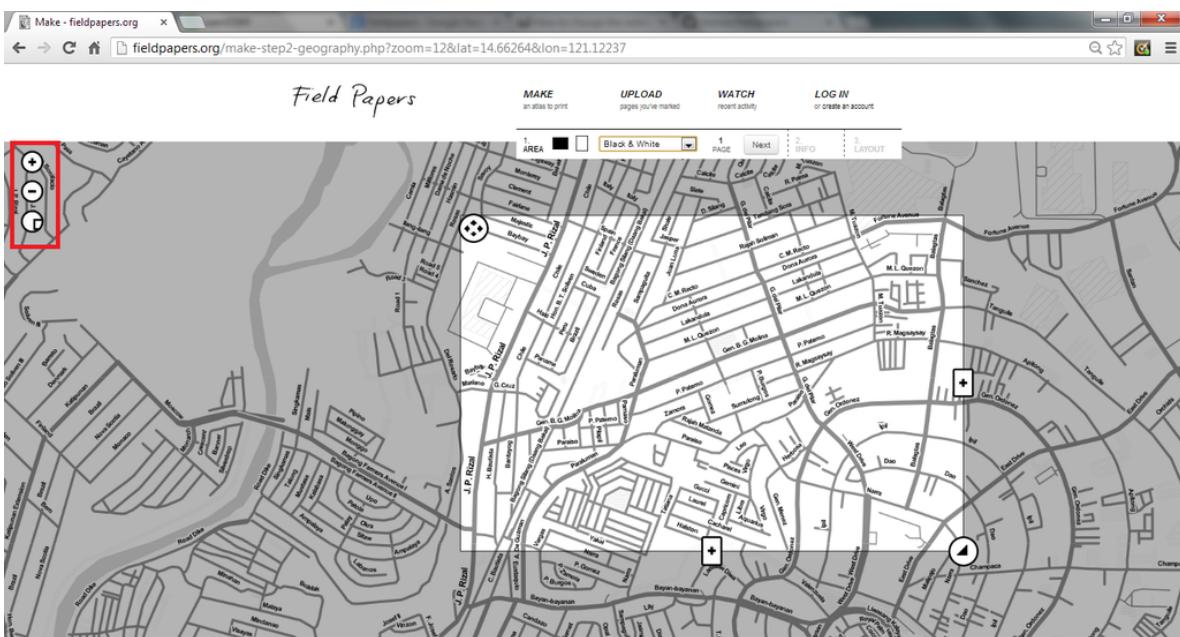
Choose Tile

- The next option lets you select the kind of data you want to use for your fieldpaper. Here you can select from different options that will change how the map looks. For now, you may select Black and White.



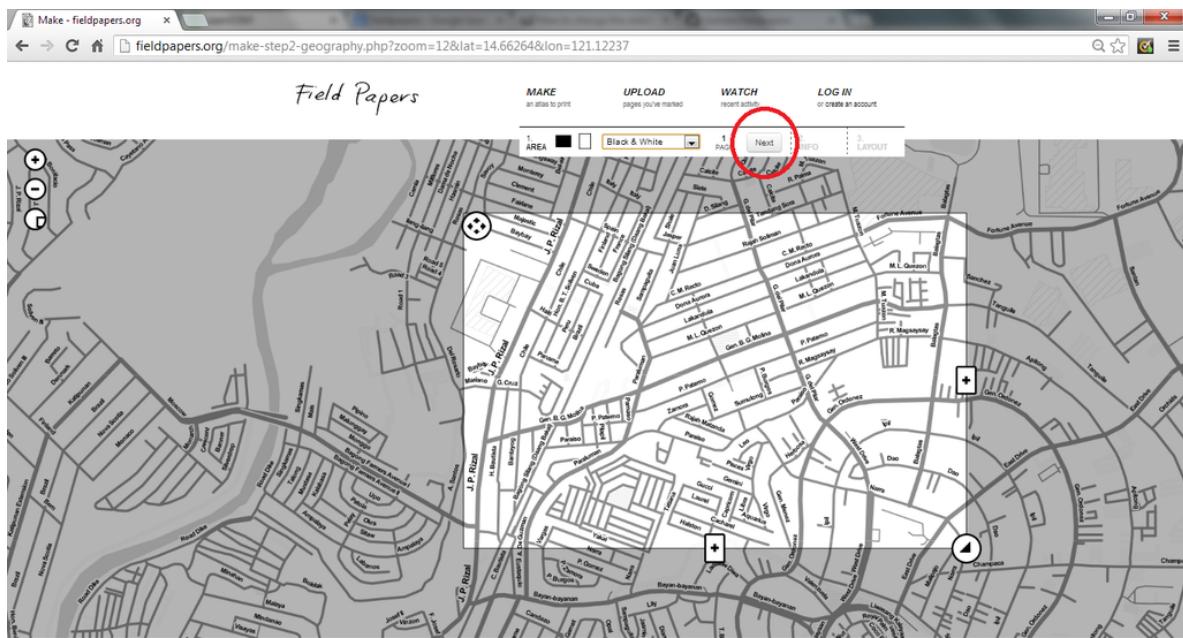
Black and White

- Make sure that the map shows the area that you want to map. Even after you search for your location, you may want to move the map around to choose the right area. When you zoom in and out of the map, you are changing what are called “zoom levels”, which is simply a way of saying how close you are zoomed in. When you are zoomed as far away as possible and you can see the whole Earth, you are at zoom level 0. When you zoom in as far as you can go you are at zoom level 18. The current zoom level is shown just above the map. Usually zoom level 15, 16, or 17 is good for making Field Papers.



Zoom

- Let’s make the print now! If you have found the area you are interested in mapping and have selected the options that make your paper look good, you are ready. Click the button labelled “Next”, beside dropdown box.



Label next

- After that, you will name your map and add optional text to each page.

*Field Papers*

**MAKE**  
an atlas to print

**UPLOAD**  
pages you've marked

**WATCH**  
recent activity

**LOG IN**  
or create an account

---

1. AREA    2. **INFO**    3. LAYOUT

### Name/Description

Give Your Atlas a Name

Add optional text to each page?

Text you enter will show up next to each map in the atlas

Make this atlas private.  
(That means it's only accessible to you, if you're logged in, or by direct URL.)

**Next**

Figure 58: name

- The next option lets you select a layout. It comes with three options. You may add a UTM grid overlay to each map if you want to.

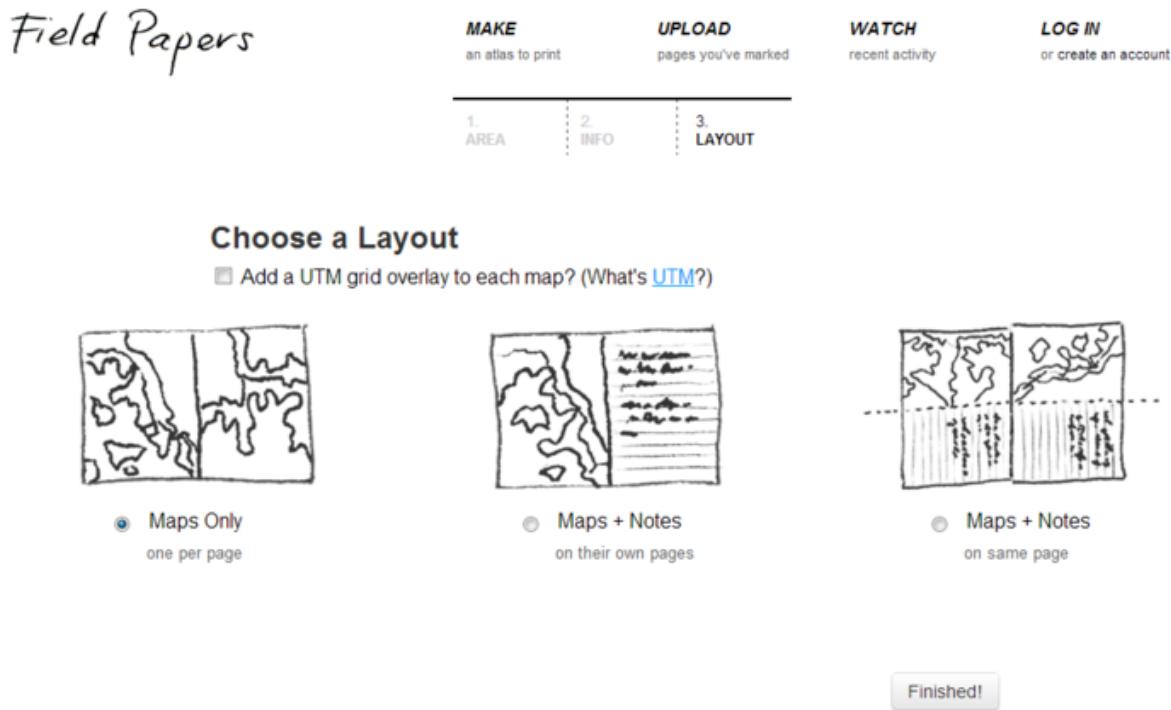


Figure 59: layout

- You will see a new page which says that your print is being processed. When it is finished, you will see your print on this page. It usually take anywhere from a few minutes up to twenty minutes for a print to be completed.

Preparing your atlas... (10% complete)



This may take a while, generally a few minutes.

You don't need to keep this window open; you can [bookmark this page](#) and come back later.

Figure 60: paper prepare print

- When your print is ready, click “Download map PDF for print”. The Field Paper should begin downloading.



[Download PDF](#)

- When the download is finish, open the PDF file. Connect your computer to a printer and print the page. If everything goes well, you should now have your map printed on paper.

## Map with Field Papers

- Take your Field Paper outside, and use it as a guide to walk and identify new places that are not on the map.
- Draw lines for roads, shapes for buildings, and so forth. Write notes about each location directly on the map, or write numbers on the map that relate to numbers in your notebook, where you can write more detailed information about each object.
- When you are satisfied with your additions on the paper map, then you can add them digitally into OpenStreetMap.

## Scan and Upload

- Field Papers are very useful for mapping with nothing more than paper, but they are not 100% magic. We will still need to add our paper into JOSM, add our information digitally, and save our changes on OpenStreetMap.
- The first step is to scan your Field Papers into your computer. You can do this by attaching a scanner to your computer, scanning the paper, and saving it as an image file. If you don't have a scanner, you can take a photography of the paper, but you should be careful to take a very good photo. Make sure that the paper is flat and your camera is directly in front of it. Be sure to include the barcode in the image, as Field Papers will not work without it. Here is an example of a scanned/photographed image:
- Once you have your field paper scanned and saved on the computer, open your web browser and return to [fieldpapers.org](http://fieldpapers.org), just as before.
- Click on the “Upload” tab.
- Click “Choose File” and navigate to the file where you scanned/photographed your Field Papers.



Figure 61: paper example 2

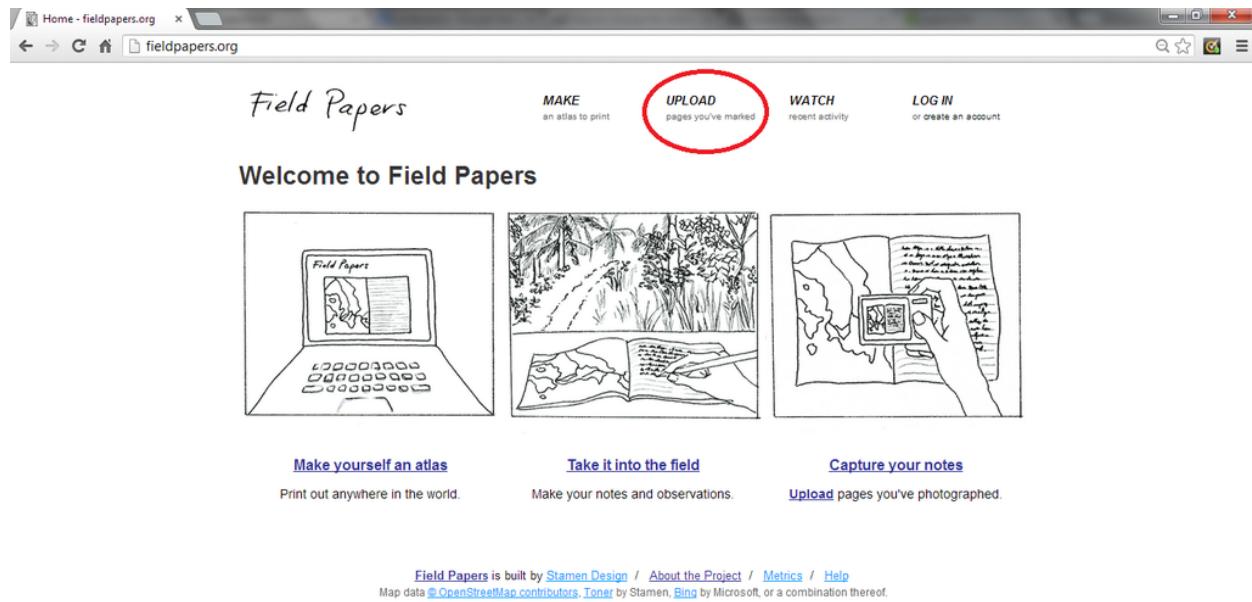


Figure 62: upload

## Upload

Choose an atlas page to upload. We'll work out where it goes (using the QR code).

fieldpaperprtsc.png

### Rules

- Make sure the scan/photo/image is at least 200dpi.
- Make sure you're uploading a JPG, PNG, TIF, or GIF. (PDFs won't work.)
- Don't upload things that aren't Field Papers maps, please.

Figure 63: paper upload 1

- Click “Upload”
- It may take a few minutes for your paper to upload, depending on the speed of your internet connection. When the upload finishes, you will see something like this:

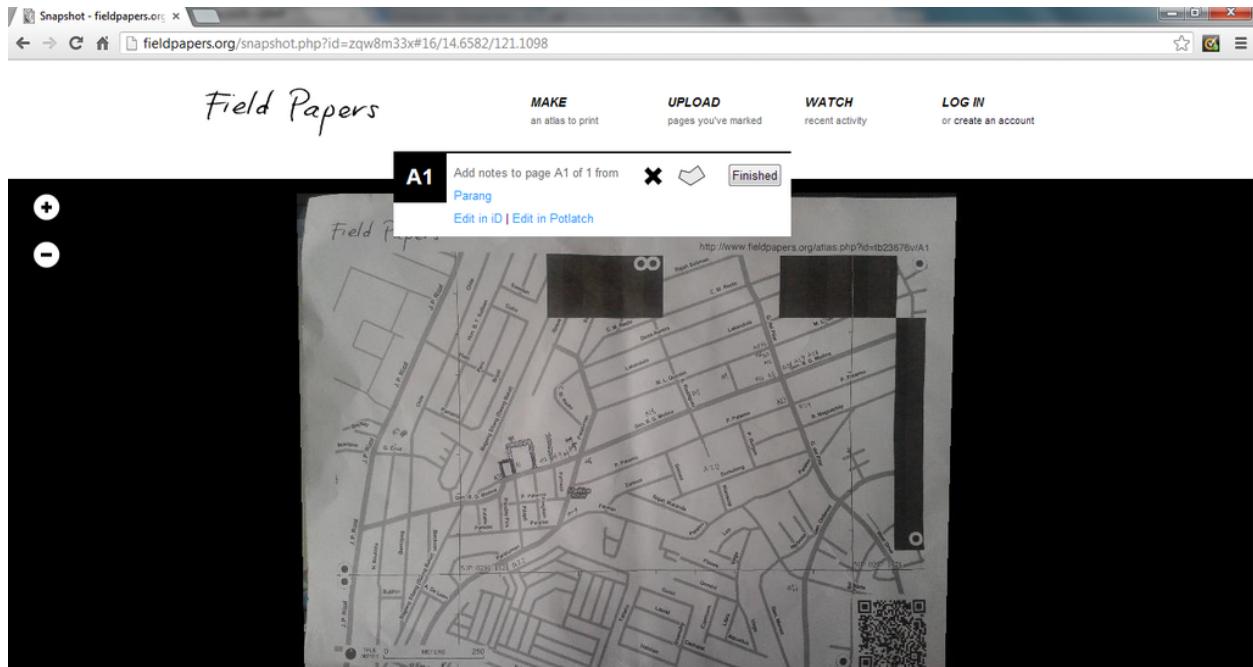


Figure 64: paper upload 2

## Open in JOSM

- When your scan has finished processing, you can load it into JOSM and use it to add your information to OpenStreetMap. Return to the Field Papers website, by typing [fieldpapers.org](http://fieldpapers.org) in your web browser, just as before.
- Click “Watch” tab then click “Snapshots” tab.
- Find your paper from the list, and click on it. You should see something like this:
- To load the paper into JOSM, we need to copy the snapshot ID of the Field Papers you have scanned. In the URL bar at the top of your internet browser, select the text and press CTRL+C on your keyboard to copy. The text should look similar to this: <http://fieldpapers.org/snapshot.php?id=zqw8m33x#16/14.6582/121.1098>
- Now open JOSM. In the previous section, we installed the Field Papers plugin, which allows us to see our scan. If you don’t have Field Papers installed, go back to Chapter 3.3 for instructions on how to install.
- On the top menu of JOSM, Click “Field Papers”. Then click “Scanned Map...”
- Press CTRL+V on your keyboard to paste the text that you copied from the Field Papers website.
- Click OK.
- If all went well, you should see your Field Paper load into JOSM. In the next chapter, we will see how to add the places that you mapped into OpenStreetMap.

You can also use your scanned Field Papers in other OSM online editors such as iD or Potlatch2 by clicking the “Edit in iD” or “Edit in Potlatch” links in the scanned Field Papers page.

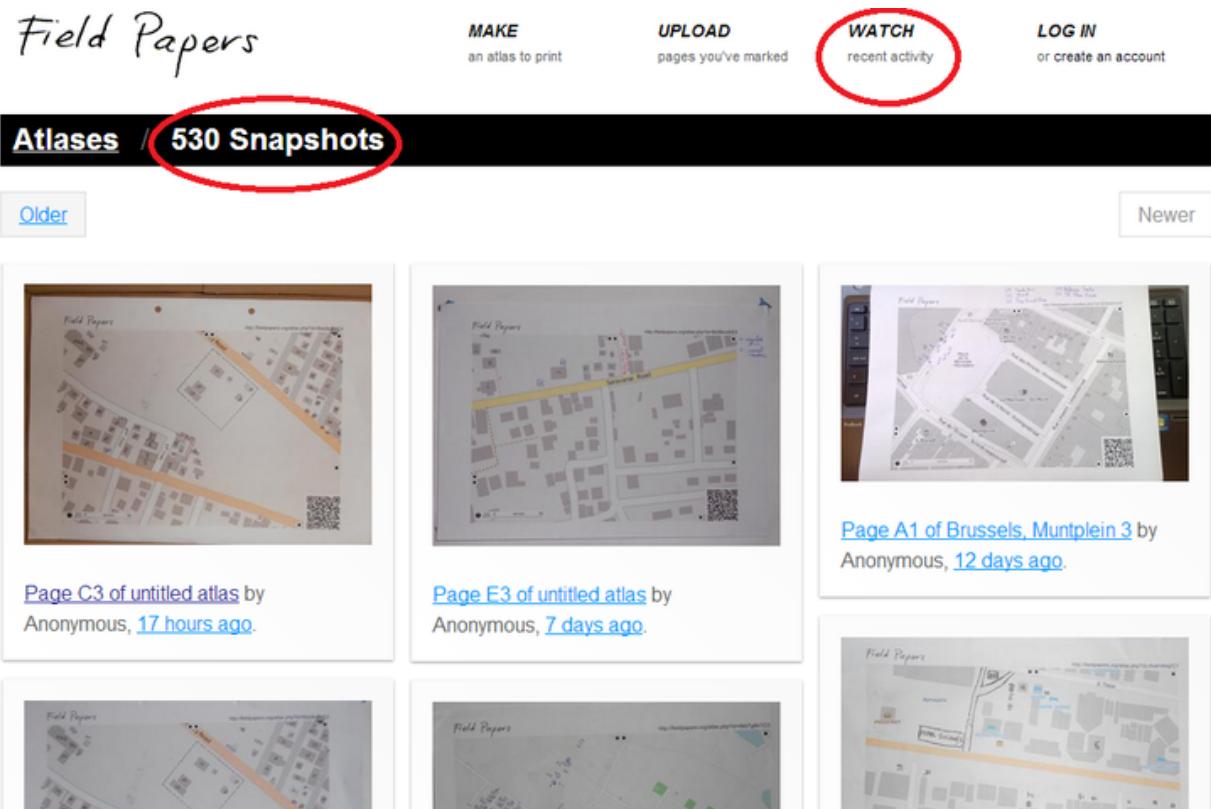


Figure 65: paper scanned

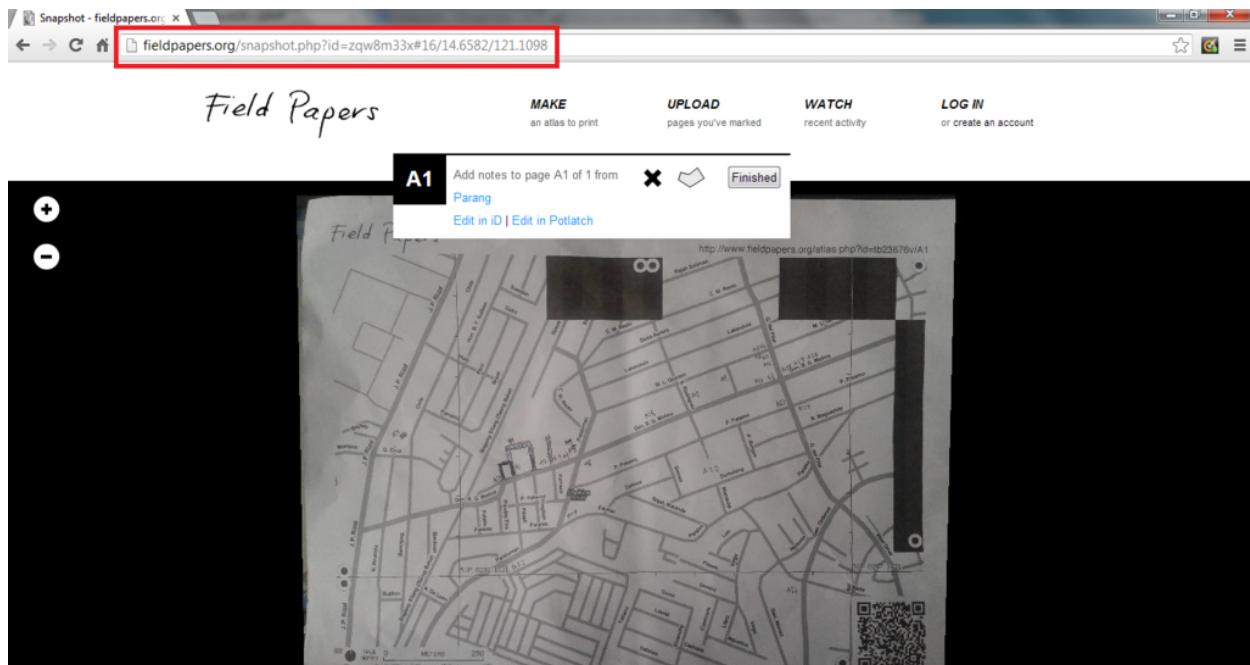


Figure 66: fieldpaperid

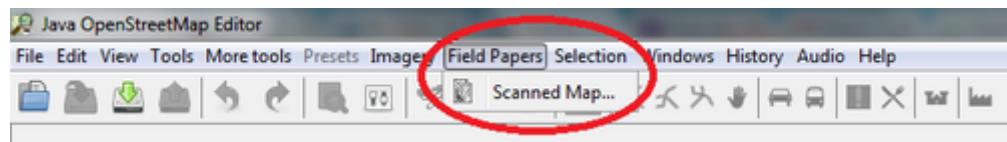


Figure 67: scannedmap

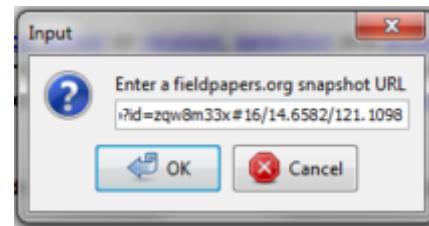


Figure 68: fsnapshot

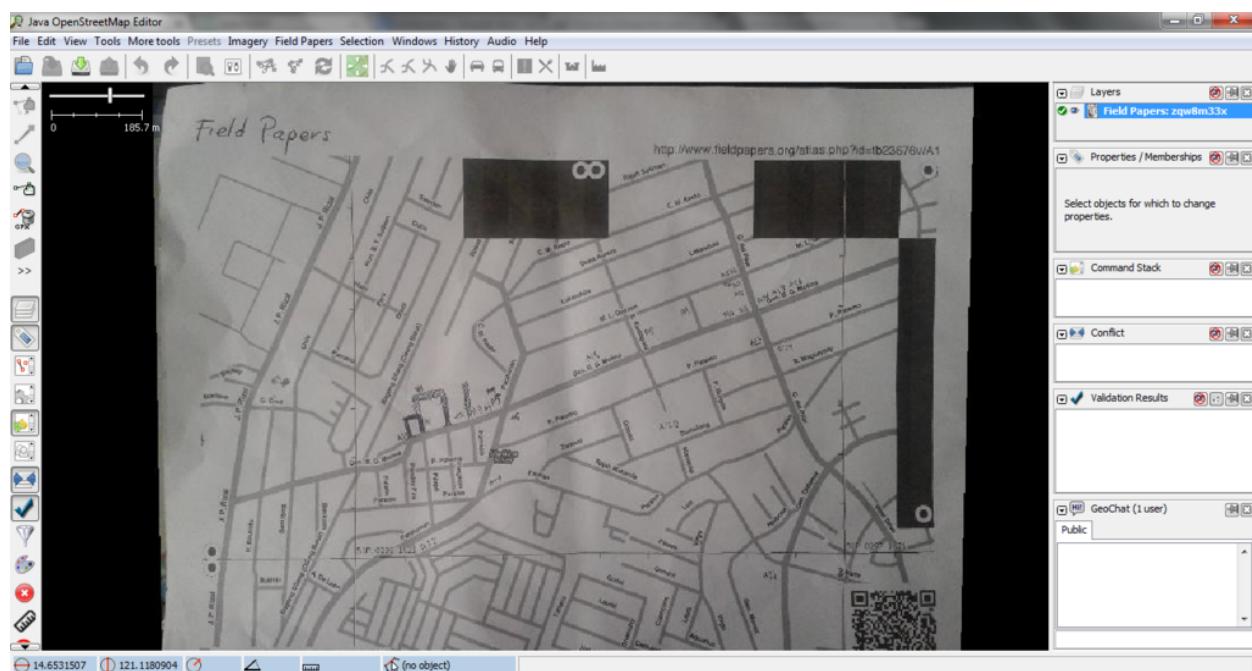


Figure 69: fieldpaperjosm

```
! [editinidorpot] []
! [paper in id] []
```

## Repeat!

- After you add your changes to OSM, they will finally be saved on the map. Then the next time you want to improve the map, you can print out a new Field Papers which will include the changes that you made. As this process is repeated, the map will get better and better, the more you map!

## Summary

Congratulations! In this chapter you learned the process of using Field Papers and how they work. You learned how to print, map, and scan a Field Paper. In the next chapter, we will learn how to add the places that we mapped into OpenStreetMap, and you will have learned the complete process of editing the map.

## **Data Processing using OSM**

Welcome to the 3rd phase of Beginner's Guide using OSM. Now that you have done fieldwork, we will now edit on JOSM the data that you collected during the fieldwork. For a better guide and visualization of the area when editing on JOSM, this material will help you how to load and use aerial imagery on JOSM.

## Editing with JOSM

In Chapter 3 you installed JOSM and began drawing your first points, lines, and shapes. You added presets to these objects in order to attach information about them. By the end, you were able to draw your own map in JOSM.

Drawing maps in Chapter 3 was an exercise to learn JOSM and learn how to draw places on the map. But our maps were not accurate, because we had not yet included location. In the past two chapters we have examined two tools, GPS and Field Papers, which allow us to collect actual locations of places (Generally, GPS receivers determine your location within +/- 10 meters, so they may not be completely accurate, especially if you only take one waypoint). These locations are represented by coordinates.

Drawing a *real* map, that is, a map where all the points, lines, and shapes are in their proper location, is no different than drawing the maps we drew in chapter - But now, we will use our GPS points and tracks, and our Field Papers, to draw similar maps at their correct locations on the planet.

In this chapter we will learn how to edit the map on OpenStreetMap and add our improvements. We'll learn the basic cycle of mapping on OSM:

### Download the current map data from OSM

- [Tour of JOSM](#)
- [Download OSM Data](#)
- [JOSM Layers](#)

### Edit it using GPS, Field Papers, and notes as a guide

- [Edit](#)
- [Tags](#)

### Save changes to OpenStreetMap

- [Upload Changes](#)
- [See Your Changes on the Map](#)
- [Saving OSM files](#)

By the end of this chapter, we will be able to see our additions on the OSM map.

## A Tour of JOSM

1. First, to start JOSM click on the Start Menu in the lower left corner of your computer, and find the program JOSM.
2. Then, load your gpx file and your Field Paper in JOSM. You don't need to open both, but you can if you want. Refer to the previous two chapters if you don't remember how to open these in JOSM.
3. A quick tour of JOSM's features: JOSM has many different features. The main window in JOSM you are already familiar with- this is the map window, and it is where most of the action takes place. Here you view, edit, and add to the OpenStreetMap data.
4. To the right of the map window are a series of panels, which each do something different. Typically when you first install JOSM several panels are shown by default, such as Layers, Properties, and Selection. When you select a point, line, or shape in the map window, it will be shown in the Selection panel. Information about the object will be shown in the Properties panel, and the username of the author of that object will be shown in the Authors panel.

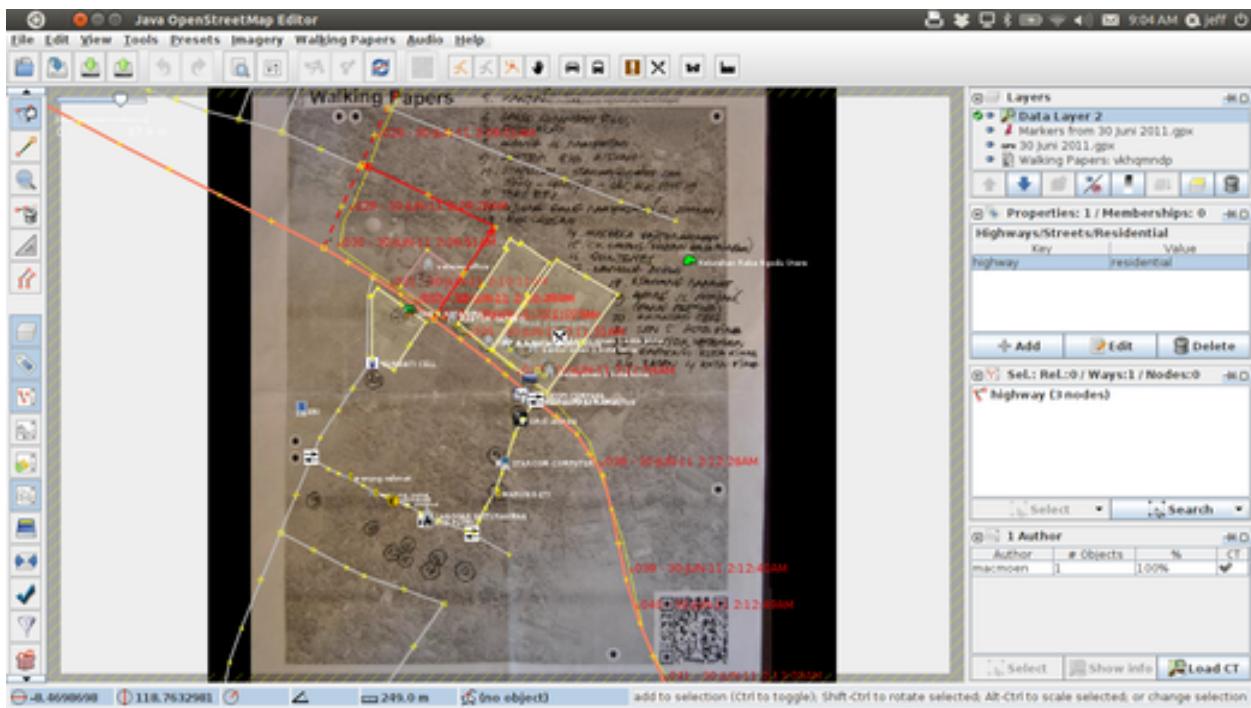


Figure 70: Authors Panel

5. On the left side of JOSM, there are several toolbars, which consist of many buttons. At the top of this bar are different buttons which change what you can do with your mouse. You are already familiar with the first two, the Select tool and the Draw tool. The other tools make it easier to zoom in, delete an object, draw a shape, or create a line that is parallel to another line.
6. Below these tools are many more buttons. These buttons control what you see on the right side of JOSM. Using these buttons you can open and close the boxes on the right, such as properties, selection, and author.

## Download OSM Data

- Remember the cycle of editing OpenStreetMap described in the introduction of this chapter? **Download,edit,save**. Before we can edit the map, we must download the existing OSM data in our area.
- When you open your gpx track or Field Paper, the map window will show what you have opened, and will automatically move to the correct coordinates. After you open your files, look in the bottom left corner of JOSM. You can see the latitude and longitude (coordinates) of your mouse cursor.
- Because our map window is already showing the area that we want to edit, it is easy to download the OpenStreetMap data for this area. Click on “File” in the top left corner of JOSM and click “Download from OSM”. This will open up the download window. You can access this window more simply by clicking on the download button, shown here:
- When the download window opens, you should see a map with a pink box drawn on it. If you don’t see the map, click on the tab marked “Slippy map”.
- The pink box represents the area of the map that we would like to download for editing. Unless you have moved the map window since you opened your GPS file or Field Papers, the box should be drawn around the correct area. However if you would like to download a larger area, you can draw a new

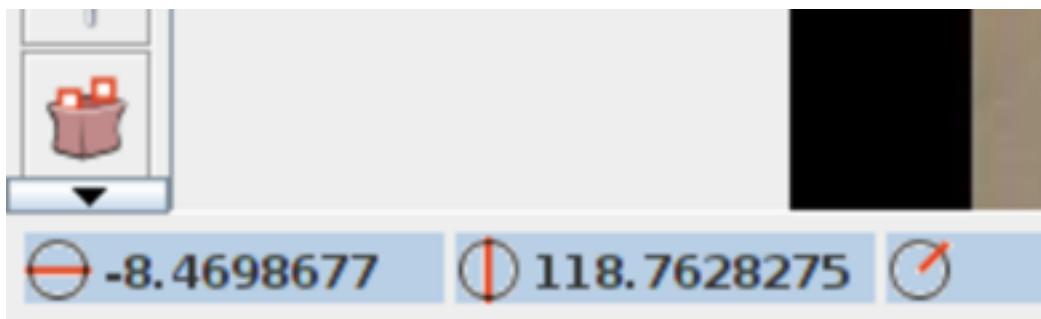


Figure 71: Coordinates



Figure 72: Download Button

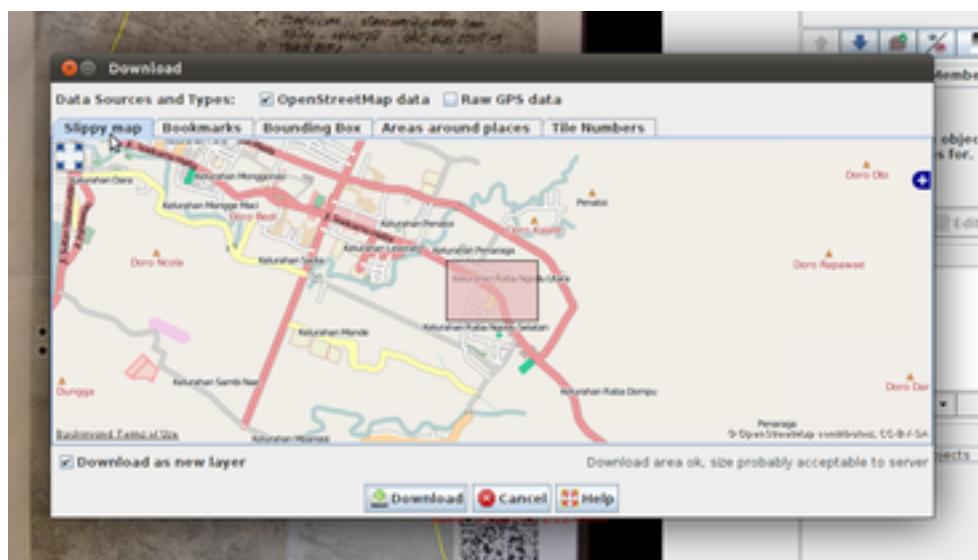


Figure 73: Slippy Map

box. To draw a new box, click on the map, hold your left mouse button down, and drag your mouse to create a box. Release the mouse button to finish drawing the box.

- When you are satisfied with the size and location of the box, click “Download” at the bottom of the window. JOSM will get the data for this area from OpenStreetMap and open it in your map window for editing.

## JOSM Layers

1. Open your GPS file and downloaded data from OpenStreetMap, if you haven't already. You may notice that when you open a file, or add Field Papers, or download from OpenStreetMap, another item is added to the Layers panel on the right side of JOSM. Your Layers panel may look something like this:

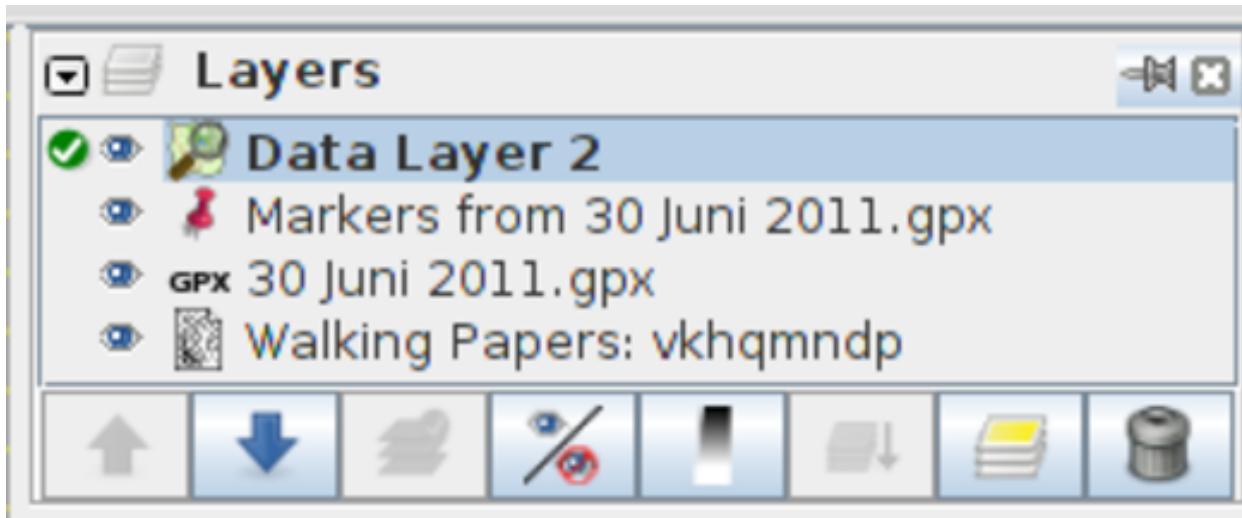


Figure 74: JOSM Layer

2. Each item in this list represents a different source of data that you have open in your map window. In the example above, “Data Layer 2” is the OpenStreetMap data that we want to edit. “Markers” are the waypoints from the GPS, and “30 Juni 201-gpx” is the track from the GPS. Finally, “Field Papers” is the layer created when I added my Field Paper into JOSM. You can add the Bing imagery layer, which shows satellite imagery, by clicking “Imagery” on the top menu of JOSM and selecting “Bing Sat.”
3. To hide one of these layers, select one of them with your mouse and click the Show/Hide button that looks like this:



Figure 75: Show/Hide Button

4. You should see the layer that you selected disappear in the map window. Click Show/Hide again, and it will reappear.
5. You can close a layer by selecting it and using the delete button:



Figure 76: Delete button

6. Lastly, it's important to know that you can only edit the layer that is considered *active* by JOSM. If you are unable to edit the map in your map window, it's probably because you don't have the correct layer set as active. Most layers, such as GPS points, Field Papers, and satellite imagery, can't be edited. The only layers that can be edited are data from OpenStreetMap, which are usually called "Data Layer 1".
7. To make a layer active, select it in the Layers panel, and click on the Activate button:

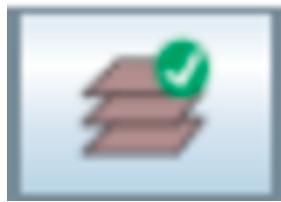


Figure 77: Activate button

## Edit

- The next step is to edit the map and add new items. This is not always easy at first, but with practice you will get better and better.
- If you want to move a point, line, or shape, use the **select tool**. Click on an object and drag it where it should be. This can be used to correct the location of items that have been put in the wrong place.



Figure 78: Select Tool

- Use the **draw tool** to draw new points, lines, and shapes. Describe these objects by selecting from the Presets menu, as you did in [Chapter 3](#).
- Remember that your GPS points and your Field Papers don't automatically go into OpenStreetMap. You need to add them to the OSM map *digitally*, using the draw tool. But your points, tracks, and Field Papers can be seen in the background as a guide.

- Let's assume that you saved a waypoint on your GPS named 030, and you wrote in your notebook that 030 is a school. To add this point into OpenStreetMap, you should select the draw tool, and double-click on top of point 030 in your map window. This will create a point. Then go to the Presets menu, and find the preset for school. Enter the name of the school and click "Apply Preset". Do the same to add lines and shapes.

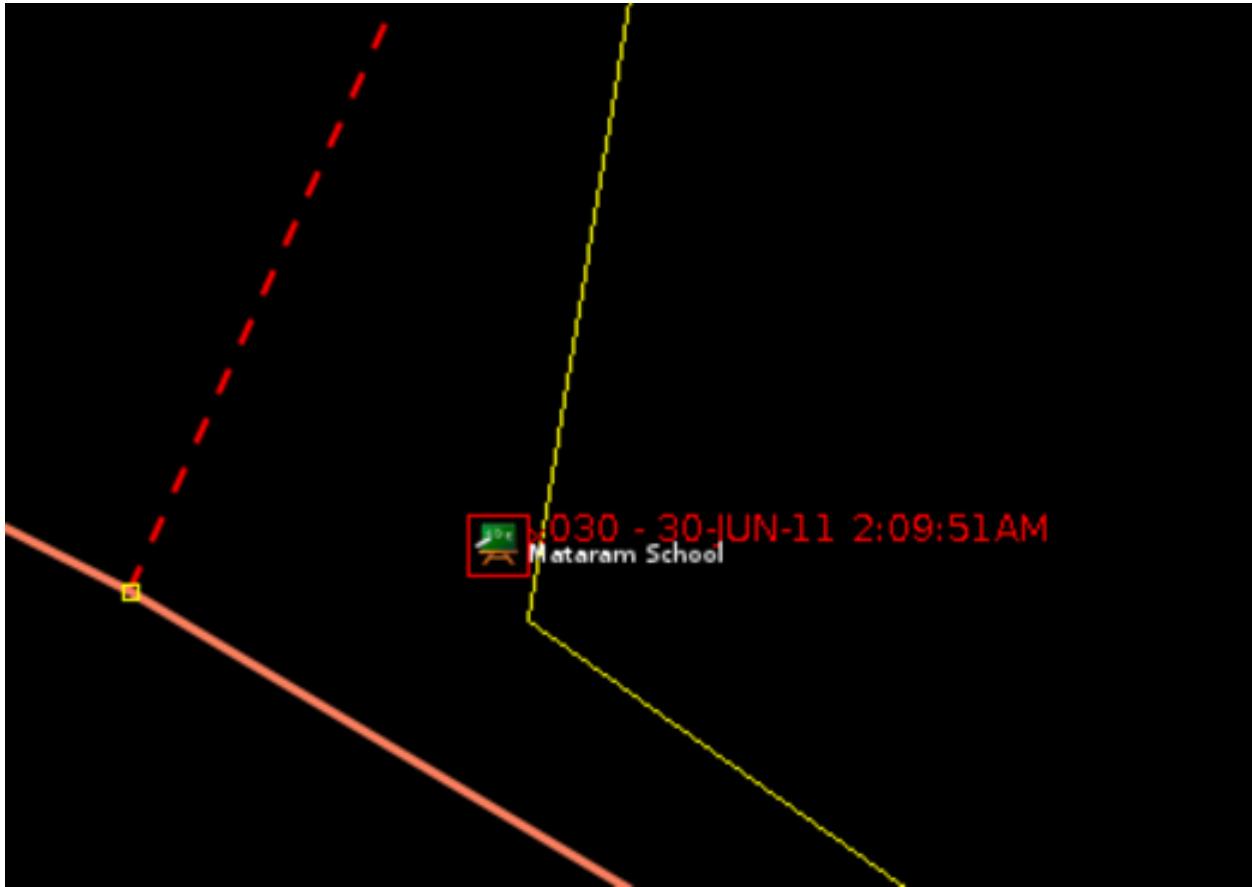


Figure 79: Apply Preset

## Tags

- When you draw a point, line, or shape, it has a location, but no information about what it is. In other words, we know **where** it is, but not **what** it is. Before now, we have been using items from the Presets menu to define **what** it is. The way OpenStreetMap knows **what** an object is is by using **tags**.
- A tag is like a label that you can put on something. For example, if I draw a square, it's only a square. But then I add multiple tags to it that describe what it is: this square is a building, the name of the building is "Menara Thamrin", the building is 16 levels high
- You can add as many tags as you want to an object. Tags are saved as pairs of text, called the **keys** and the **values**. In OpenStreetMap, the tags written above would in fact be: `building = yes, name = Menara Thamrin, building:levels = 16`
- If you select an object in JOSM, you can see all the tags that are attached to it in the Properties panel on the right.

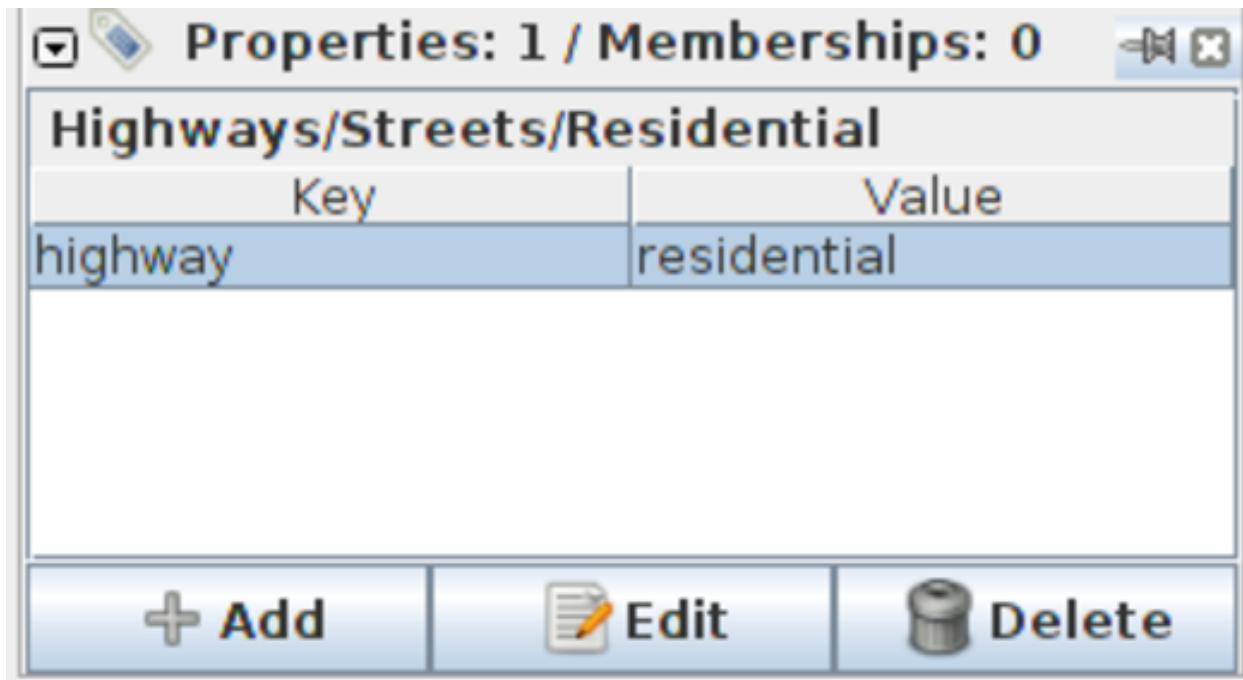


Figure 80: Tags

### Editing Tags

- You can add, edit, and delete these tags from this panel. The tags are traditionally in English however, so it is often better to use the Presets menu. When you add or change tags, such as primary highway versus footpath, the style will change according to the tag.
- To edit an existing object:
- Select it.
- Then you can edit the tags in one of two ways: (1) You can use the Presets menu to open up a form and edit the information, or (2) you can edit the tags directly in the Properties window on the right.

### Common Mistake: Tagging nodes when you want to tag lines or polygons

- When you are adding tags to a node, you select the node and then add your tags (or use the presets menu). When you want to add tags to a line or polygon, it is important that you select the line, and NOT the nodes that make up the line.
- A common mistake is to use the JOSM select tool to draw a box around an object, which causes everything, both the line **and** the nodes to be selected, and when you add tags they are applied to the nodes as well. Be sure to **only** select lines when you want to add tags to them.
- More information about tags and presets can be found in Intermediate Guide Chapter 4: XML and JOSM Presets.

### Upload Changes

1. After you have made a couple of changes to improve the map, let's save those changes to OpenStreetMap. To save the changes, we need to be connected to the internet, because we are in fact uploading the changes

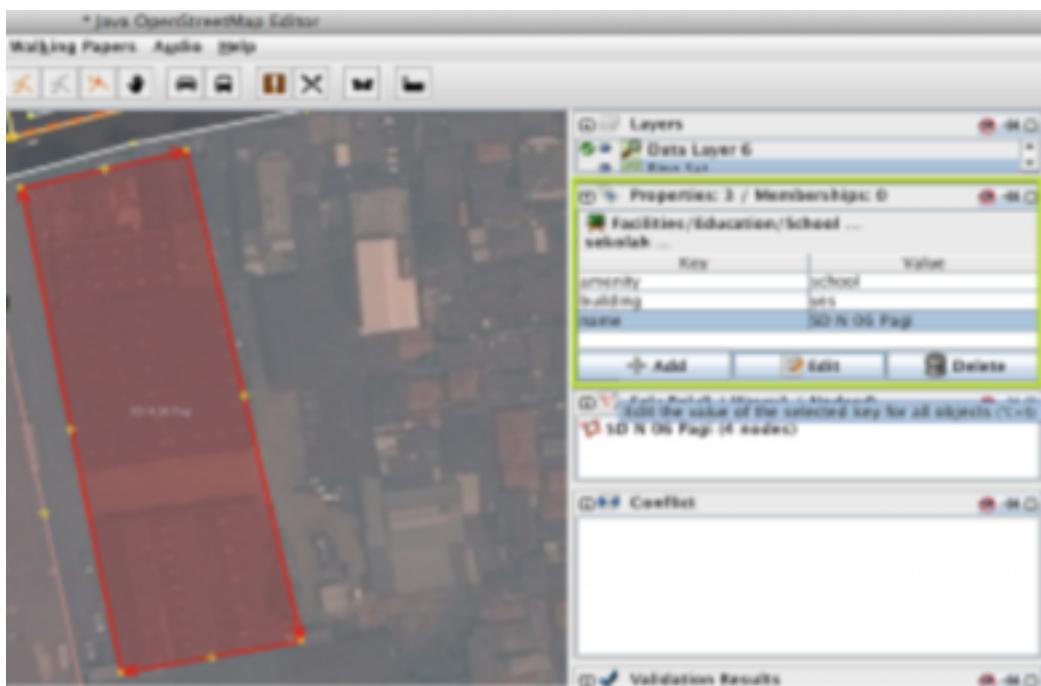


Figure 81: Properties Window

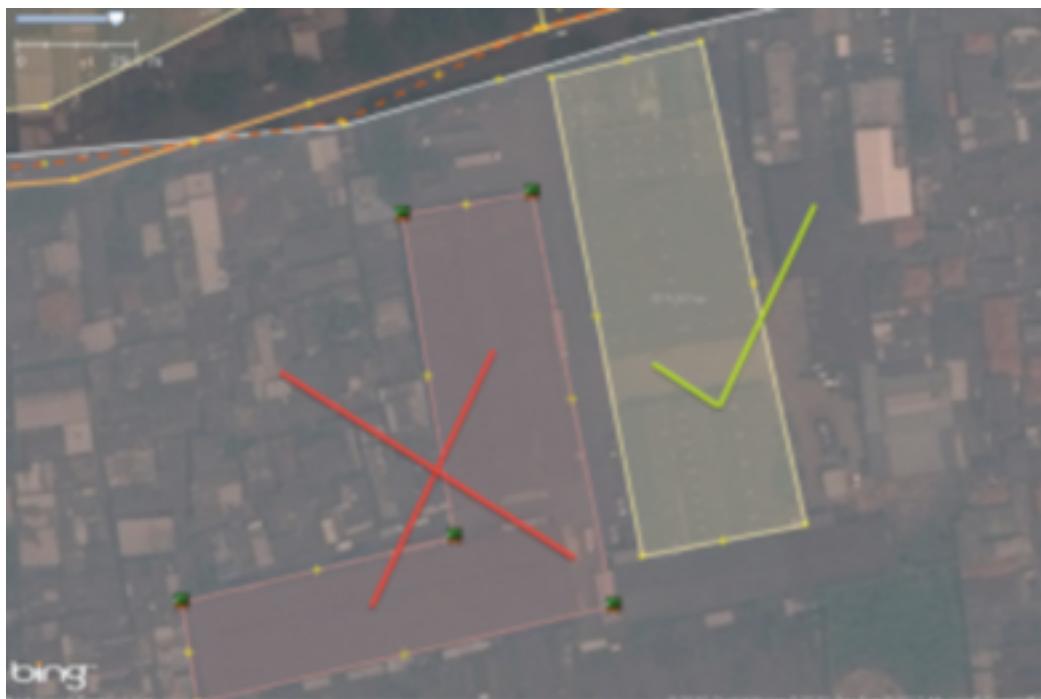


Figure 82: Common Mistake

to OpenStreetMap.

2. Click “File” on the top menu, and then click “Upload Data”. This will open up the upload window. You can access this window more simply by clicking on the upload button, shown here:



Figure 83: Upload

3. The window that appears shows a list of the objects that you are adding and the objects you are modifying or deleting. In the box at the bottom you are asked to provide a comment about the changes that you are making. Type in here a description of your edits.

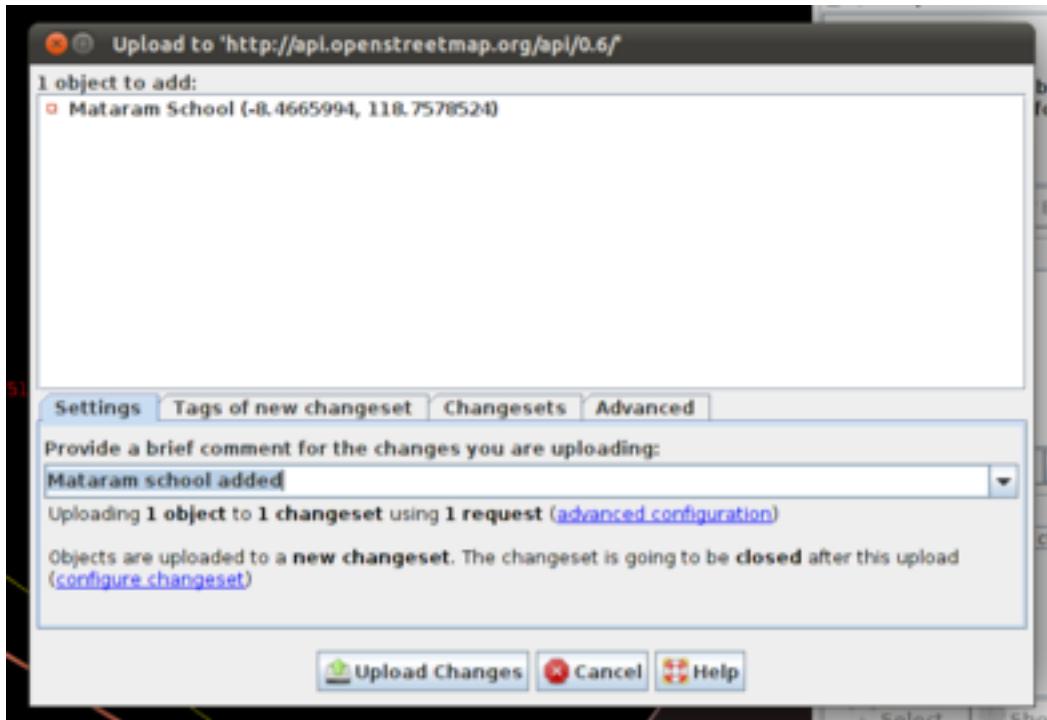


Figure 84: Describe Edits

4. Click “Upload Changes”.
5. If this is your first time saving changes to OpenStreetMap, you will be asked for the username and password that you created in Chapter
  - Enter them in the window that appears. If you check the box in this window, your username and password will be saved and you won’t need to enter them again in the future. Click “Authenticate”.
6. You will need to wait a few seconds for your changes to be uploaded, and then you are done! You have made your first edits to OpenStreetMap. You may continue editing to add all your points if you wish.



Figure 85: Authenticate

Always be sure to upload your changes before you close JOSM.

## See your changes on the map

- Open your internet browser and go to <http://openstreetmap.org/>
- Move the map to the area that you edited.
- You should see your changes now appearing on the map! If you don't, try pressing CTRL+R to refresh the web page. Sometimes the map doesn't update properly and needs to be reloaded.
- What if you don't see your changes? Don't worry - it may take a few minutes for the changes to be shown on the map. Also, check your additions in JOSM to make sure that you added them correctly. A good general rule is, if your point has an icon in JOSM, then it should be seen on the main map at the OpenStreetMap website.

## Saving OSM files

- Sometimes after you download some OSM data, you may wish to save it so that you can edit it offline, and then upload it later when you have internet access again.
- To save an OSM file, make sure that it is the active layer in the Layers panel. Click "File" on the top menu, and click "Save". Choose a location for the file and give it a name. You can also save by clicking this button:



Figure 86: Save Button

- You can now close JOSM and your data will be saved. When you want to open the file again, simply open JOSM, go to the "File" menu, and click "Open..."

## Summary

Now that you've seen how to add to OpenStreetMap, what's next? Remember that OSM maps get better and better over time. Every time you make improvements to the map, those changes remain and the data gets better and better. And just as you can improve other people's work, so they can improve your work too.

In the final chapter we will step away from JOSM, and look at some interesting projects that use OpenStreetMap data, and learn how you can continue learning about OSM.

## Using Aerial Imagery

Tracing over imagery is both an easy and powerful way to contribute to OSM. Especially when resolution is high and skies are clear, digitizing from satellite imagery can provide the skeleton of OSM maps. This is useful because it makes ground-truthing, or gathering attribute data, easier for people in the field.

Nonetheless, tracing from imagery requires some precautions so that objects are not placed in the wrong location. There are two important aspects that must be considered when tracing from imagery:

- **Resolution:** The resolution refers to the detail of imagery or the number of pixels from which the image is comprised. A pixel is the smallest unit of an image. The smaller the area of the pixel the better the resolution. With smaller pixels you are able to distinguish between objects on earth better, as evidenced by the figure below. On the left is an image with low resolution, and fewer pixels per image. It is hard to distinguish the puzzle piece because a majority of the image is considered part of the puzzle piece. On the other hand, the image on the right with high resolution has smaller pixel units and therefore enables the puzzle piece to be much more distinguishable. In OSM, you are most likely to be able to use high resolution imagery. Satellite civil imagery offers resolution under “1 meter”, which means each pixel of the imagery represents a one meter squared. That is pretty good!

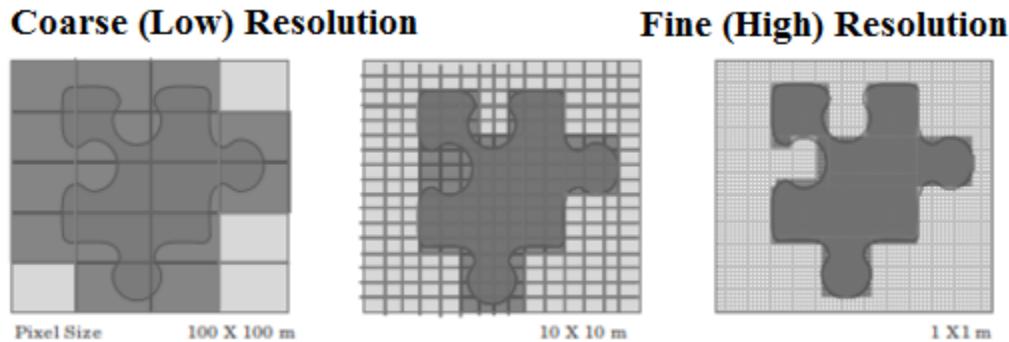


Figure 87: puzzle

- **Georeference:** Georeference is a term for how closely the imagery's pixels match the actual locations on the ground. This matching is a relatively complex process, and the greater the terrain variation and relief, the harder it is to achieve a good georeference. Satellites are hundreds of kilometers from the surface of the earth and when they take flat pictures to represent the curved earth there is bound to be some distortion and offset. The fact that some of the images are taken at an angle to the surface of the earth complicates this process, especially when looking at buildings. The existence of offsets is shown slightly when you move between two images covering the same area, e.g. when you zoom in and the former displayed layer replaces another one with better resolution. Can you see shifts in the objects displayed in the imagery?

To get an idea of why the offset occurs imagine taking a picture of a statue with a wide-angle lens and printing it. Now try to deform and stretch it so that it matches the actual shape of the statue. This is what occurs when georeferencing imagery.

Satellites are being built with progressively greater imagery precision and therefore extremely accurate resolution (the unit is often in centimeters). On the other hand, the georeference provided by satellites is still off. The amount of mismatch is still described in units of meters. A 5-10 m georeference mismatch is considered good.

In summary, when you are trying to map an area accurately based on satellite imagery, keep in mind that high resolution is not the only aspect that permits good location. Almost all objects in the image are offset from the ground location.

There are ways that you can minimize the imprecision of the imagery offset. You will be exposed to two main scenarios and methods for overcoming imagery offset:

1. you want to trace over imagery in an area that has already been mapped in OSM
2. you want to trace over an imagery in an area where there is no existing data in OSM

## Offsets with existing data in OSM

Sometimes after downloading OSM data, adding the imagery, and zooming into the best resolution, you realize that the existing OSM data, especially roads, does not correctly overlay the imagery objects.



Figure 88: existing data

Many OSM beginners believe that the roads have been traced incorrectly and thus move the roads to what appear to be the better location. Moving the road may be completely **WRONG!** There is a possibility instead that the imagery is poorly aligned in comparison to the reality in the field.

A way to check or prove that the imagery is offset is through using GPS tracks. To do so, add **existing GPS tracks** (yours or other people's– more information on how to do this can be found in [AddingGPSData to OSMserver](#)) to the area you are tracing. Click on

then tick <> near the top in the <> window. After downloading, an additional layer <> will appear.

In this example, with the GPS tracks (in red) added you can see that the existing objects (here: the roads) are positioned correctly. The imagery is actually not correctly georeferenced, and has an offset in comparison with the reality. It has to be adjusted.



Figure 89: download



Figure 90: downloaded GPX

Do not be confused that the tracks appear like a sequence of lines and not one solid line. Most GPS devices have a 2-5 m accuracy, which is sufficient for roads because you do not drive or walk in the middle of the road. Try to imagine an average GPS trace somewhere in the middle of the existing lines.

To offset imagery, right-click the imagery layer or menu <>, open <>, or use the imagery adjust button in left toolbar.



Figure 91: adjust button

Then drag the imagery so that it is correctly overlaid by the tracks. Click on another tool when it is over. Note that for some projects people will save offset information to the wiki or other sources so that people working together on areas can share common values. You can also give the offset a “Bookmark name” if you need to use it again in the future. This offset is saved in a new “Imagery offset” menu available from the imagery drop-down.

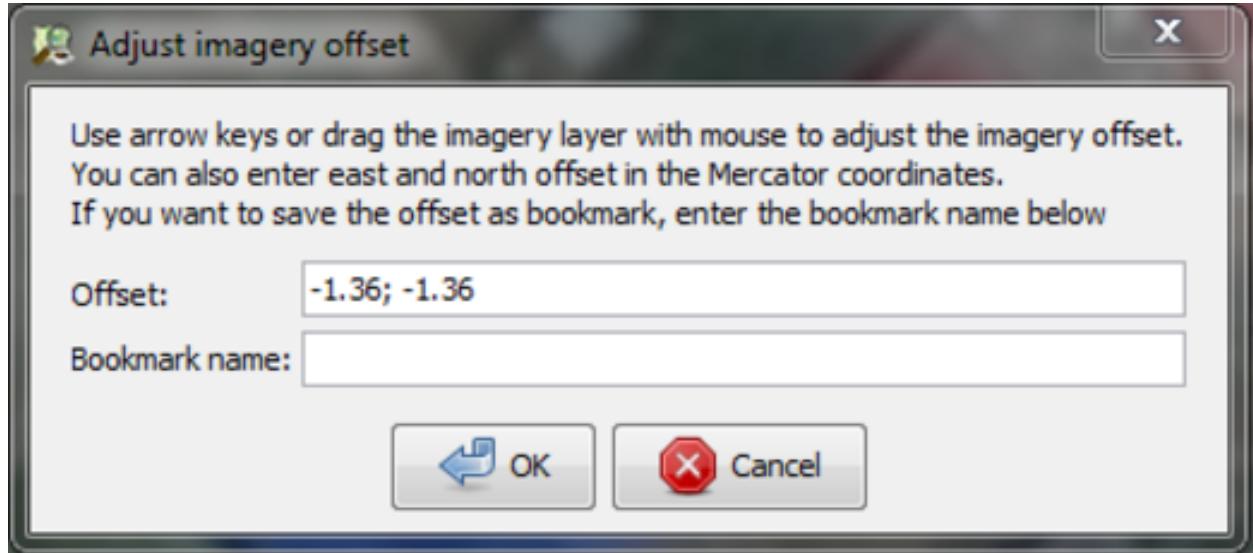


Figure 92: adjust window

Now that the imagery is adjusted you can trace over it. While mapping you can hide the layer <> if it interferes with your work.

One last thing to remember: the offset might not be the same over the full extent of the imagery! This is especially true in regions with a marked relief. So when the imagery seems to be offset again, repeat the whole process.



Figure 93: downloaded GPX



Figure 94: adding to existing data

## Offsets with no existing data in OSM

It may happen that you are the first one to OSM map an area, e.g. in remote rural areas or in developing countries. Therefore, neither existing OSM data nor GPS tracks can be downloaded.



Figure 95: no data

How can you deal with this since you do not have any reference to control the offset of the imagery? There are two ways around this:

1. Go into the field: If you or others have the possibility to use a GPS in the area, take waypoints on significant infrastructure or objects that are visible on the imagery and/or make tracks of the roads, then add them in JOSM.
2. Use existing data: If you cannot go into the field then another option is to gather other **Open Database License data (ODbl)**. If you can it is best to check the imagery with another image that is correctly aligned. If you are offsetting an image based on another one, using transparency is the easiest way. To do this, simply click the gradient line and change the opacity of the layer.

Usually administration imagery has poor resolution, over ten meters of resolution, and so might be worse than the previous image.

If you have access to vector data, roads, lakes, rivers and buildings are your best options for determining how offset your imagery is. Try to stay away from boundary lines because those are not reliable for figuring out if imagery is misaligned.

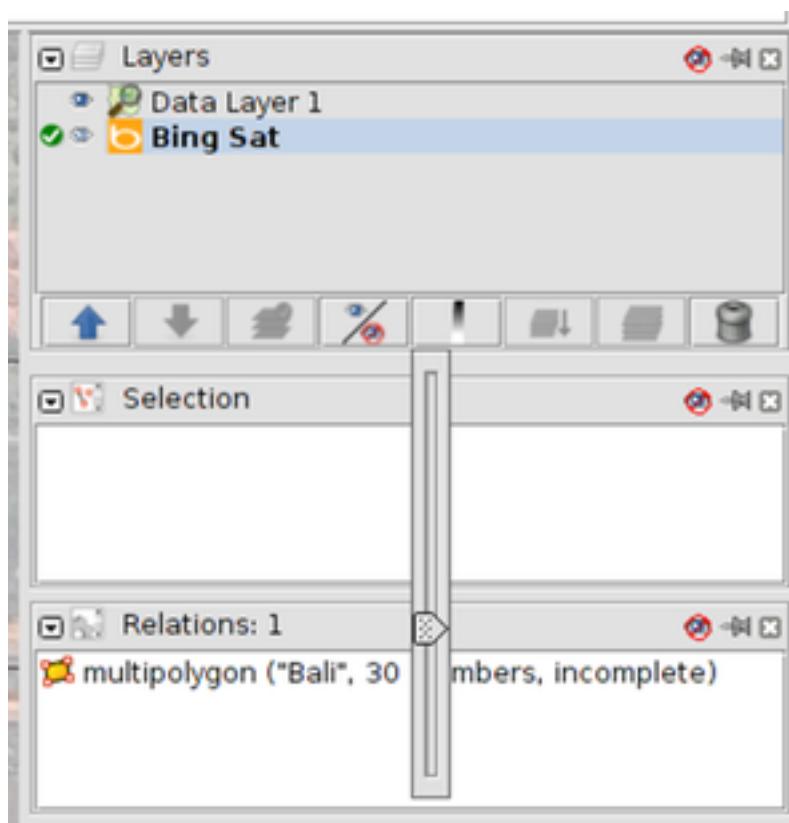


Figure 96: change opacity

## **Summary**

Tracing imagery is a technique that makes mapping in OSM faster and more efficient. However, it must be done with precision and care. There are times when you are digitizing an area and the imagery itself may be off. Whether it be through poor resolution or poorly georeferenced imagery, there are ways you can deal with inaccurate imagery. They mainly involve referencing imagery with GPS traces and tracks.

## **For Proper and Excellent Editing on OSM**

Welcome to the last phase of the Beginner's Guide of using OSM. This guide dives more into the details of editing and validating. We look at shortcuts and ways to contribute to the OSM community, such as through wiki sites or the tasking manager. Understanding these elements are useful for developing better and more effective additions to OSM. Hopefully, by the end of this guide you will be able to develop the skills and tools needed to correct and strengthen the quality of data in OSM.

# Editing in Detail

## Introduction

In this chapter, we will describe relations, JOSM editing tools, and editing techniques in greater detail.

While this chapter is not extremely advanced, it is more difficult than the previous chapters. If you don't feel like you fully understand the lessons leading up to this, you may wish to practice a little bit more before continuing.

Topics covered in this chapter:

- Editing Tools: Tools, The Building Plugin, & shortcuts
- Relations: Description & how to edit and tag them
- Editing Techniques: The Dos and Do Nots

## JOSM Editing Tools

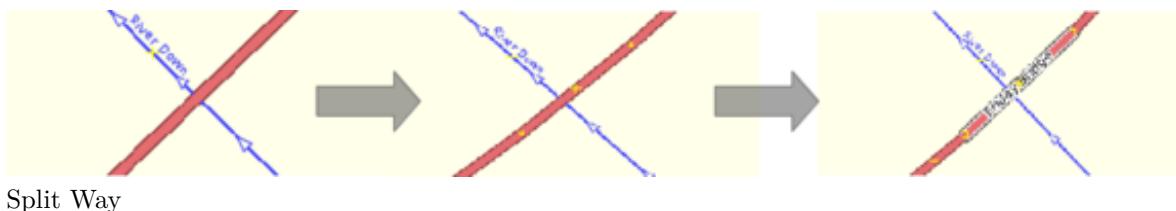
There are a few ways you can access more editing tools in JOSM. We will look more at the default tools, some plugins and then keyboard editing shortcuts.

### Drawing tools

JOSM has some additional tools to make it easier to draw lines and shapes. These tools are found in the “Tools” menu at the top of JOSM.

In order to apply the functions in this menu, you must first select a point, line or shape in the map window. Some of the most useful functions are described here:

- **Split Way:** This allows you to divide a line into two separate lines. This is useful if you want to add different attributes to different parts of a road, such as a bridge. To use this function, select a point in the middle of the line that you want to split, Select Split Way from the Tools menu, and your line should be split in two.



- **Combine Way:** This does the opposite of *Split Way*. To combine two lines into a single line, they must share a single point. To use this function, select both lines that you want to combine. You can select more than one object by holding the SHIFT key on your keyboard and clicking on each line. When you have selected both lines, select *Combine Way* from the Tools menu.

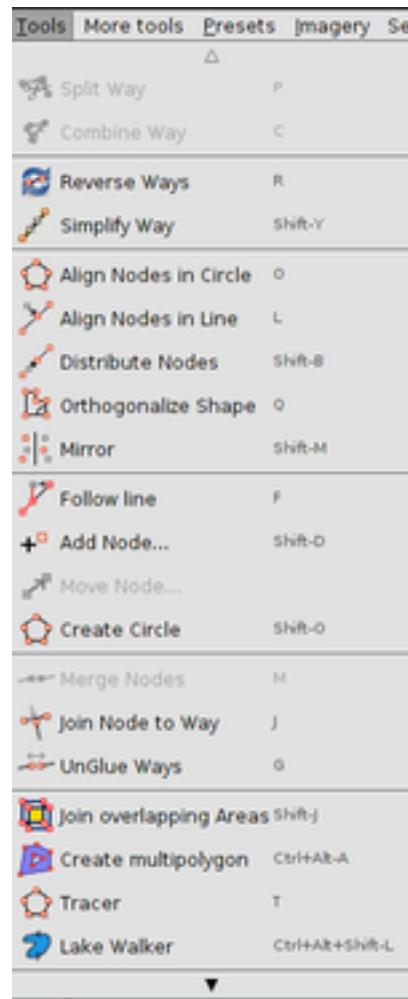
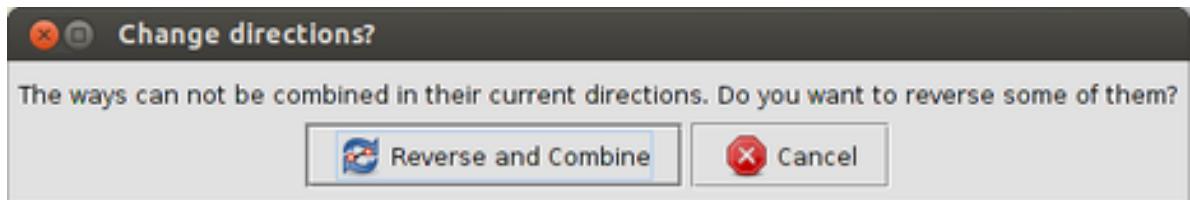


Figure 97: Tools



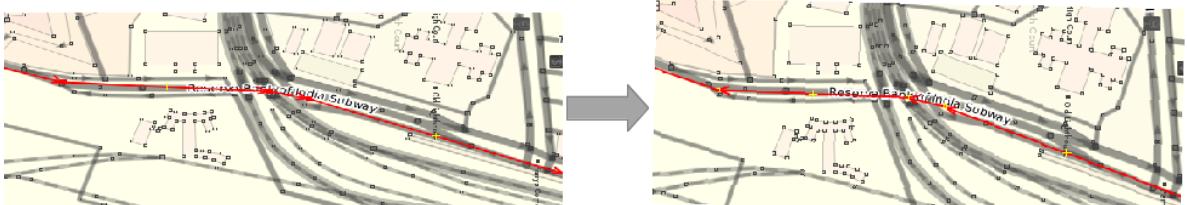
Combine Way

If you are combining roads that have different directions, you might get this warning:



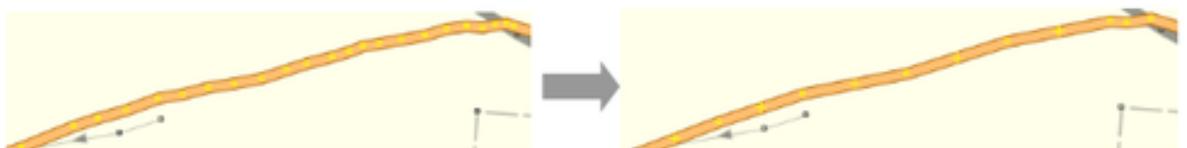
Combine Roads If the roads are connected and go in the same direction, then choose <<Reverse and Continue>>.

- **Reverse Way:** This will change the direction of the line. If the line incorrectly represents a river or a road that is one way, you may want to change its direction. Unless someone has intentionally created a way to be one way you do not usually have to worry about altering the direction because ways in OSM default to both ways.



Reverses Way

- **Simplify Way:** If your line has too many points in it and you'd like to make it simpler, this will remove some of the points from a line.



Simplify Way

- **Create Circle OR Align Nodes in Circle:** If you are trying to make a circular shape, draw the circle as best you can and then select three nodes and the function. It will help arrange your points in a circle.
- **Align Nodes in Line:** This function will align a series of points into a straight line. With long lines it is best to select sections of the line to straighten. Be careful as this does have the tendency to shift the line a little.
- **Orthogonalize Shape:** This function is very useful for drawing regular shapes such as buildings. After you draw an area, this function will reshape it to have square corners. This feature is most useful

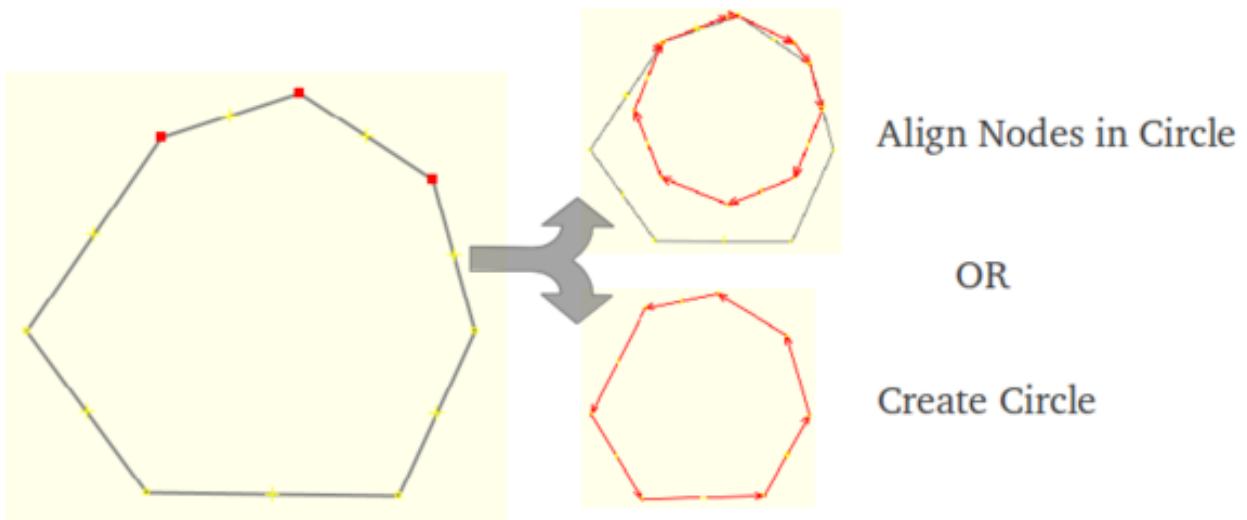


Figure 98: Create Circle

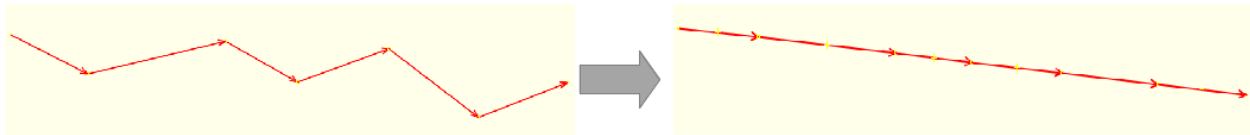
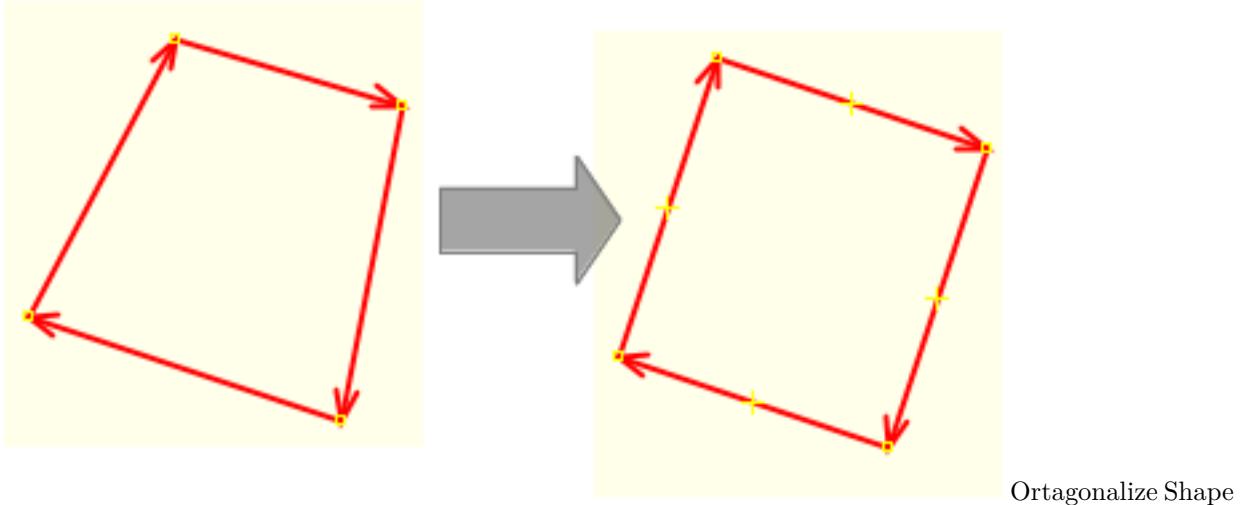
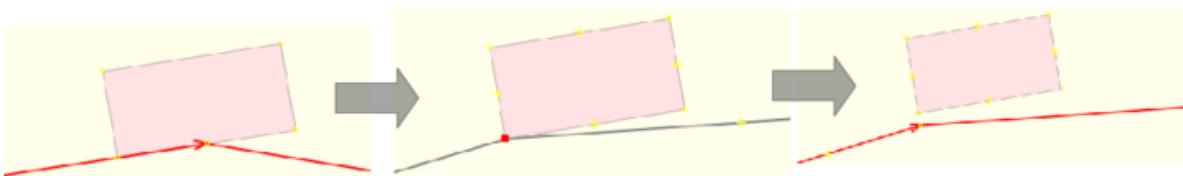


Figure 99: Align Node in Line

for other regularly shaped features, such as tennis courts, or landuse areas. (Using the Building Plugin, which will be explained below, might be easier).



- **Unglue way:** This tool allows you to detach nodes that are connected.



Unique way

The line and node will not actually appear separate as the last screen shot implies.

## Plugins



Figure 100: Plugin

**Building Plug-in:** This plug-in is by far one of the most useful tools for editing (digitizing). This tool allows you to create shapes with 90 degree corners with just three clicks. First, you trace the edge of your building and then you drag out the line to make it a polygon.



Figure 101: Trace edge



Figure 102: Making polygon

You can also create more complicated buildings by using the merge option. Create your building outline, select all of the polygons (press SHIFT to highlight them all) and then hit SHIFT + J to merge the objects.

Furthermore, you can alter the default settings (size and tagging) under \*<<Edit>> and then at the bottom “Set building size”.



Figure 103:

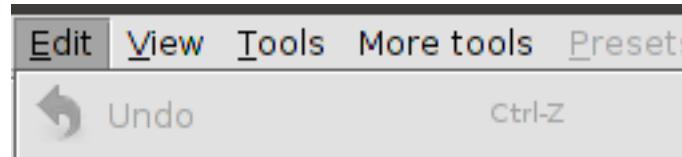


Figure 104: Size and Tagging

If you are dealing with similar sized buildings, you can change the building to a certain dimension, such as 5 x 6 meters (the unit is meters). Even more, if you are mapping similar infrastructure, such as townhouses in the same area, then you can edit the tags to be all the same under the <<Advanced>> tab.

**Utilsplugin2 (More Tools):** This add-on has a few features that may be useful for editing.

Once you have restarted JOSM you will get a tab called <<More Tools>>:

| More tools                        | Presets          | Imagery | Selection | Windows |   |
|-----------------------------------|------------------|---------|-----------|---------|---|
| UnGlue Relation                   | Alt+Shift-G      |         |           |         | Duplicates the nodes, ways and relations that comprise the selected relation.                 |
| Add nodes at Intersections        | Shift-I          |         |           |         | Adds missing nodes at intersections of two or more selected ways.                             |
| Split Object                      | Alt-X            |         |           |         | Splits an object at selected nodes. Must select two split nodes or one split way.             |
| Replace Geometry                  | Ctrl+Shift-G     |         |           |         | Replaces node or way with another way. Useful if you want to keep history.                    |
| Copy tags from previous selection | Shift-R          |         |           |         | Pastes tags from previous selected objects.   |
| Add Source Tag                    | Ctrl+Alt-S       |         |           |         | Adds remembered source tags.  |
| Paste Relations                   | Ctrl+Alt-V       |         |           |         | Paste relation memberships from objects in buffer onto selected objects                       |
| Align Way Nodes                   | Shift-L          |         |           |         | Align nodes in a way  |
| Split adjacent ways               | Ctrl+Alt+Shift-P |         |           |         | Split adjacent ways on T-intersections  |
| Extract node                      | Alt-J            |         |           |         | Extracts node when a single node is selected.   |
| Symmetry                          | Alt+Shift-S      |         |           |         | Duplicates selected nodes and ways (need mirror object) like a mirror.                        |
| Open custom URL                   | Shift-H          |         |           |         | Opens specified URL browser   |
| Lat Lon tool                      | Ctrl+Shift-L     |         |           |         | Creates objects from lat-long coordinates. Simply enter in the coordinates to create objects. |
| Select custom URL                 | Shift-C          |         |           |         | Allows you to insert a URL to your tags.  |
| Circle arc                        |                  |         |           |         | Simplifies drawing of circle arcs. Good for curvy roads.                                      |

utilsplugin2

These tools have proved to be the most useful:

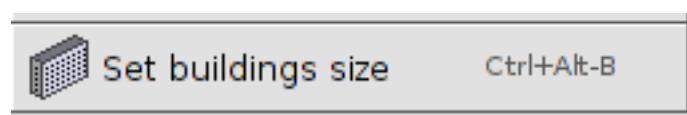


Figure 105: Set building size

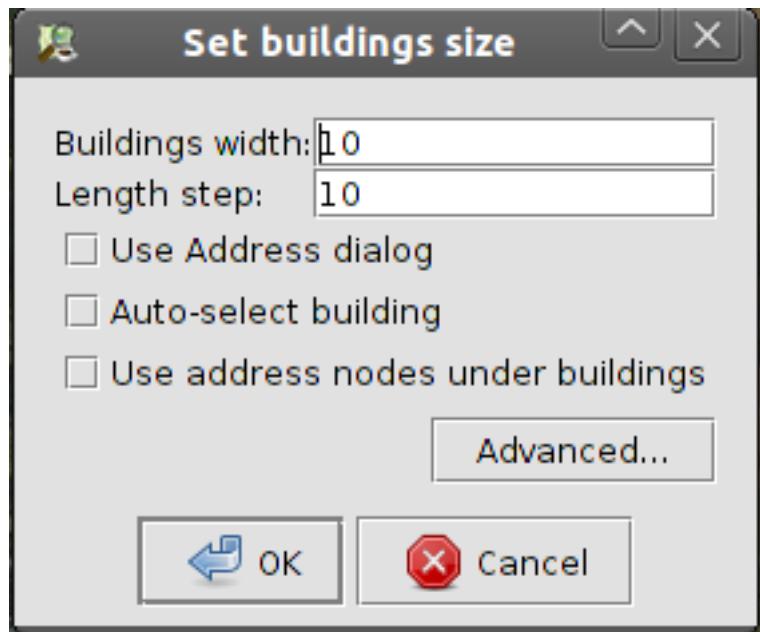


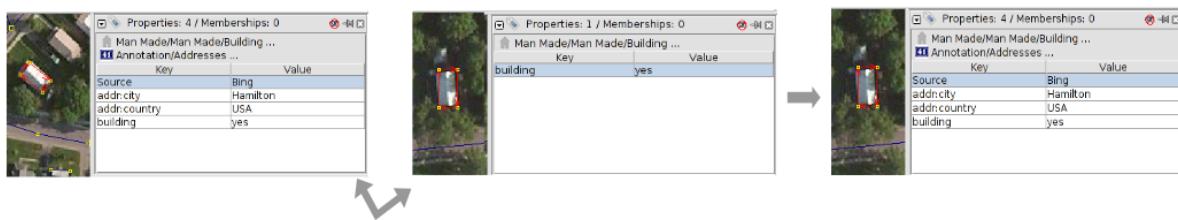
Figure 106: Building size tab

- **Add Nodes at Intersections:** This tool is very helpful for adding missing nodes in intersections of selected ways. It is good practice that roads and rivers should always have common nodes where they intersect.



Add nodes at intersection

- **Copy Tags from Previous Selection:** This function makes copying tags easier. If you want to create many objects with the same tags, first draw the objects. Then add the tags to one object. Click on another object and press Shift + R to copy the tags from the previously selected object. You can do this for all objects that you want to tag. Remember that the tags will be copied from the **previously selected object**, so if you click on an untagged object and then another untagged object, you will not be able to copy any tags.



Copy Tags

- **Add Source Tag:** This tool simplifies adding a source tag. It remembers the source that was specified

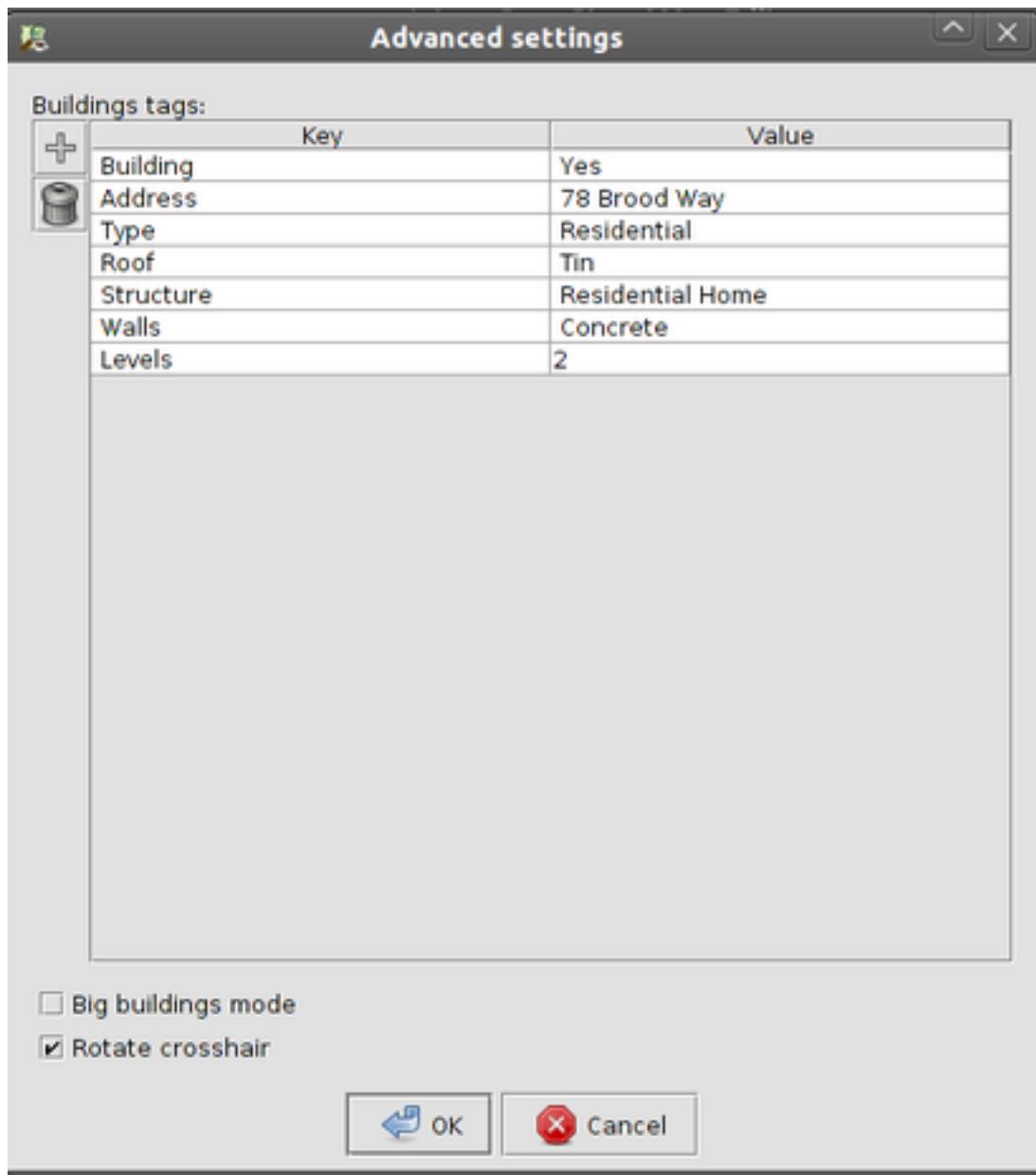


Figure 107: Advance settings

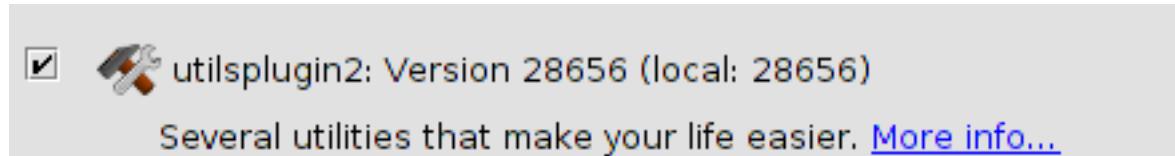
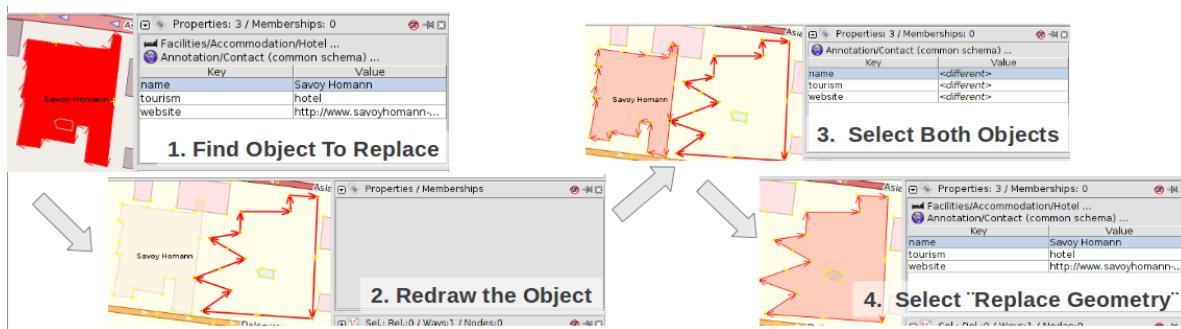


Figure 108:

last and adds it as remembered source tag to your objects. You can insert the source with just one click.



Add source tags

- **Replace Geometry:** This tool is great if you want to redraw a poorly shaped object, but want to keep the history, attributes and ID number of that object. For example, if you come across a building that is complicated and drawn in a poor fashion, then instead of painfully changing each node, you can (2) just draw the object again

(3) select the old and new object (4) press “Replace Geometry” to transfer all the information over.

**Utilsplugin2 (Selection):** And you also have access to more <<Selection>> tool:

| Selection                  |              |
|----------------------------|--------------|
| Select Way Nodes           | Ctrl+Shift-N |
| Adjacent nodes             | E            |
| Unselect nodes             | Shift-U      |
| Middle nodes               | Alt+Shift-E  |
| Adjacent ways              | Shift-E      |
| All connected ways         | Ctrl+Shift-E |
| Intersecting ways          | I            |
| All intersecting ways      | Ctrl+NumPad  |
| All inside [testing]       | Alt+Shift-I  |
| Select last modified nodes | Shift-Z      |
| Select last modified ways  | Alt+Shift-Z  |
| Undo selection             | Ctrl+Shift-Z |
| Select Highway             | Ctrl+Alt-W   |
| Area boundary [testing]    | Shift-Slash  |

Selection

These tools have proved to be the most useful:

- **Unselect Nodes:** This tool lets you deselect nodes, which makes it useful for tagging the objects selected. This tool is necessary if you have mapped several polygon objects with similar attributes and would like to tag the objects without tagging the nodes. To do so, select all of the objects— polygons, ways and relations— unselect the nodes and **tag** appropriately.
- **Select Last Modified Nodes:** This tool permits you to go back to the nodes that you most recently changed. It is like undo: node style.

Have fun using them!

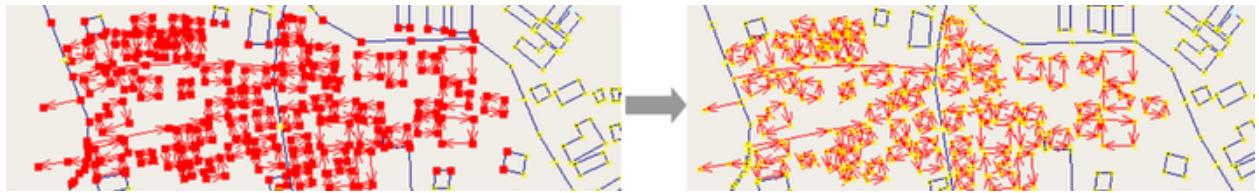


Figure 109: Unselect Nodes

## Relations

In the Beginner's Guide we learned that there are three types of objects that can be drawn in OpenStreetMap - points (nodes), lines (ways), and polygons. Lines contain numerous points, and the line itself carries the attributes that define what it represents. Polygons are the same as lines, except that the line must finish where it begins in order to form a shape.

In fact, there is one other type of object in OpenStreetMap, and these are called **relations**. In the same way that a line consists of other points, a relation contains a group of other objects, be they points, lines, or polygons. If you are looking to obtain advanced editing skills, then understanding and knowing how to properly edit relations is important.

For example, imagine that you want to map a building that has courtyards in the center. You would need to draw a polygon around the outside of the building, and you would want other polygons around the courtyards to indicate that they are not part of the building. This is an example of a relation. The relation would contain several polygons - and the attributes of the building would be attached to the relation, not the polygons.



Relations are used to represent anything that requires a collection of objects to define. Other examples are bus routes (a collections of lines), long and complex objects (rivers or roads), or multiple polygons that are all part of one location (like buildings in a university).

There are mainly four types of relations you will encounter in OSM: **Multipolygons, Routes, Boundaries, and Restrictions** (such as, no left turns). In this section we will go over Multipolygons and Routes.

### Editing Relations:

The multipolygon above contains a polygon for the outer limits of the building and two more to mark the inner courtyards. To create a relation from these three polygons you need to:

1. Select all of the polygons.
2. Go to “Tools” and near the bottom “Multi-polygon”

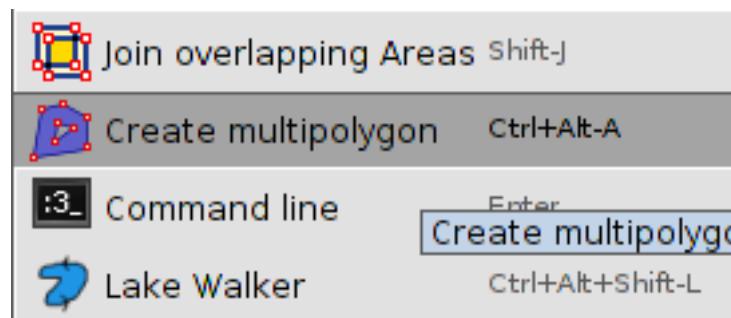


Figure 110: Create Multipolygon

3. The polygons should automatically be created as a multi-polygon.

| Member Of   | Role        | Position |
|---|-------------|----------|
| <a href="#">multipolygon (0, 3 members)</a> [id: 0] | <different> | 1-3      |

Multi-polygon

You will then see your building as a solid shape with the inner polygons represented with gaps. The data behind the relation in this example is visible on OpenStreetMap: <http://www.openstreetmap.org/browse/relation/2435797>. The building is rendered by Mapnik as in this image:



Figure 111: Rendered Building

[OSM Wiki: Relation: MultiPolygon](#)

### Another MultiPolygon

This river is another example of a multipolygon. Effectively it is the same as the building example, but with a greater number of members and covering a much larger area. It can be viewed on the OpenStreetMap site

here: <http://www.openstreetmap.org/browse/relation/1046961>.



River multi-polygon

This river contains ten ways that are connected like a long polygon.

### Linestring Relations

Relations are also very useful for creating, labeling and editing large linestrings; for example, bus routes, hiking trails, bicycle paths, etc. These differ from multipolygons because they are relations with members, as opposed to complex areas. A linestring could simply be one line with multiple members, these can be tagged as such. Additional features, such as bus stops represented by separate nodes can also be tagged as relation members.

1. Make sure that all of the ways in which the route runs along are appropriately tagged. For example, `highway=footway`.
2. Select all of the highways or ways that the bus takes. If you would only like to select certain parts of the way, then, sadly, you must divide the way into the section you would like to select. This creates more work, but you can easily do it with the “Split Way” tool. Once some or all of the ways are selected, click *Edit* in the relation panel. The relation editing dialog will pop up.
3. Go to the *Presets* Menu and down at the bottom click “Public Transport” and then “Route” or “Route Master”. Route master is the main route that a bus takes, while route is a variant path of the bus.
4. Fill in the corresponding information about the bus route.

**Comment:** relation extension

**Tags:**

- `source = OS OpenData StreetView`
- `type = multipolygon`
- `waterway = riverbank`

**Members:**

- Way [176683673](#) as inner
- Way [66723598](#) as inner
- Way [176686608](#) as inner
- Way [176683669](#) as inner
- Way [176683670](#) as inner
- Way [176683675](#) as inner
- Way [176768213](#) as inner
- Way [176982921](#) as outer
- Way [46671729](#) as inner
- Way [95658269](#) as inner

Figure 112: Building multi-polygon

Relations are difficult to understand and do not have to be used often, but they are necessary to know about. As you get more developed with your OSM skills and want to create more complex building, river and routes, relations will be useful.

## Editing Techniques: The Dos and Do Nots

In this section we will go over some common mistakes in JOSM and provide some editing tips for making your maps great.

### ***Some Objects Should Not Connect***

When you are creating polygons and lines that are not supposed to be connected, make sure that they are not merged together by sharing a node. For example, highway nodes should not be snapped to buildings, because no one likes a road that leads directly into a wall! If you want to disentangle two or more objects that share the same node, select the node and press <<G>>.

### ***But, Some Objects Should Connect***

However, **some objects SHOULD connect!** Road intersections should *always* be snapped together. If two roads do not share a common node, then the computer has no way of knowing that the roads actually connect to each other.

### ***Overlapping Objects***

A common error is to have overlapping polygons when the objects they represent do not overlap in real life. A building cannot overlap another building. This mistake is commonly made with buildings and landuse



Figure 113: Linestring 1



Figure 114: Linestring 2

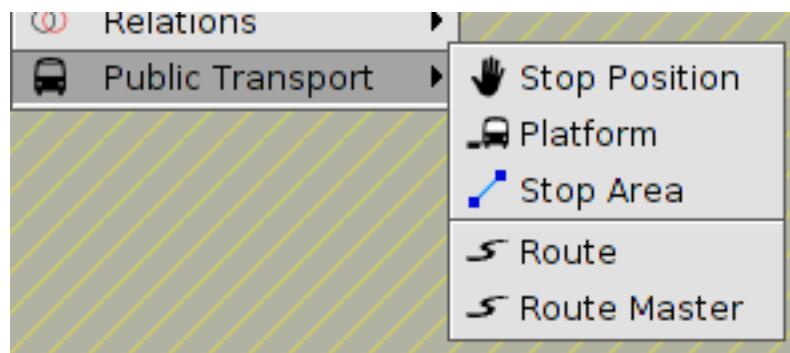


Figure 115: Route

**Selection unsuitable!**

Edit Route

Route type:

Name:

Reference:

Symbol description:

Description:

Optional Attributes:

Network:

Operator:

Route state:

Color (hex):

[More information about this feature](#)

Figure 116: Bus Route



Figure 117: Wrong connection

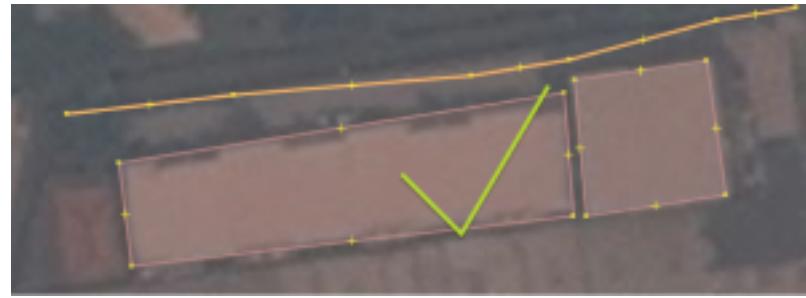


Figure 118: Correct connection



Figure 119: Objects shoul connect

polygons. For example, a polygon drawn to represent a park outside a building should not overlap with the building. Instead it should be drawn next to the building.

There are some exceptions to this rule, such as schools. Within a school yard you might identify individual buildings using polygons, yet you also might want to create a polygon around the entire school yard. In this case it is fine for the polygons to overlap, but the rule to follow here is to make sure that the buildings are completely inside the landuse polygon.

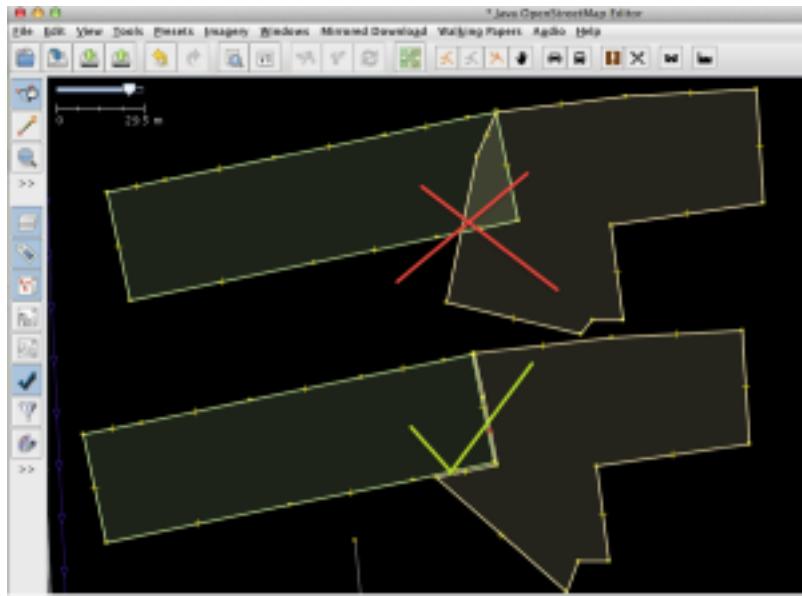


Figure 120: Polygon to overlap

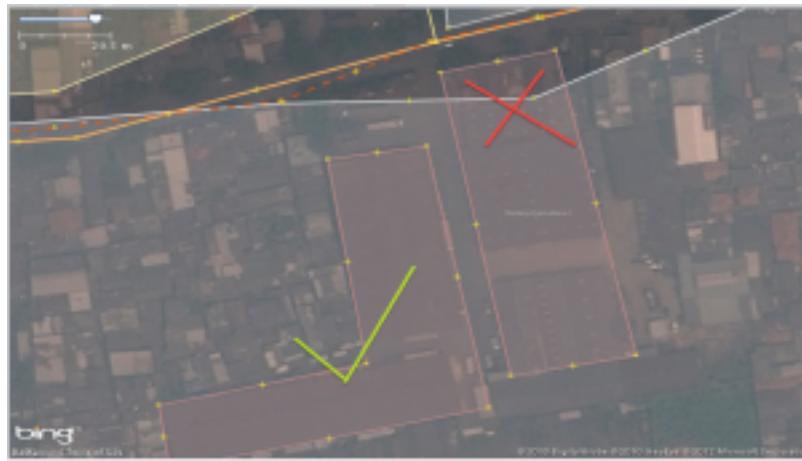


Figure 121: Polygon to overlap

We all make mistakes, and as you map more you will make less mistakes! Just remember that even if you upload data that contains mistakes, it is simple to fix your mistakes and upload the change again. This is what is great about OSM: you can always make it better!

### **Tracing Correctly**

OSM can do amazing things with identifying where objects end and what labels these objects should have; however, it needs your help in doing so. For example, if you create a road that turns into another road without a distinct node, then JOSM will continue labeling the road as the previous one. Therefore, it is necessary that you make all of your roads and objects as clearly and rigid as possible.

[a]



Figure 122: Tracing correctly

We will end this chapter with this gift:

- ROTATE OBJECT: If you hold the SHIFT + CTRL and drag your mouse click, you can rotate the selected objects.

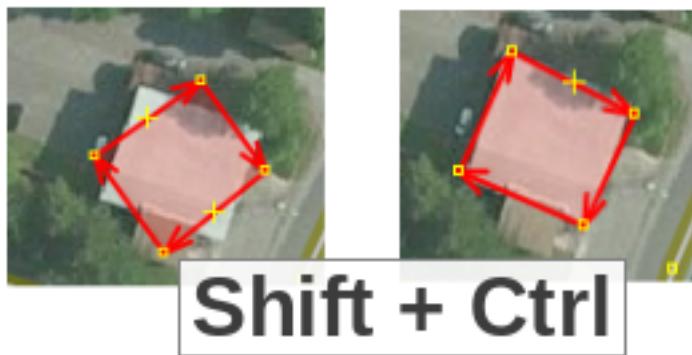


Figure 123: Rotate object

## **Summary**

As you can see there are many additional features that make JOSM a powerful tool for making maps. Remember that the more you practice with these tools, the better you will become at adding information to OpenStreetMap.

## **Appendix**

### **Keyboard Shortcuts**

Sometimes it can be annoying to click over and over to select different options and menus in JOSM. Luckily there are shortcut keys on the keyboard that allow you to do many common tasks (I highly recommend the DEL shortcut). Here is a list of some of the most commonly used shortcut keys, along with what they do:



Chooses the *Select* tool



Deletes Selected Object



Chooses the *Draw* Tool



Chooses the *Zoom* tool



Zoom In



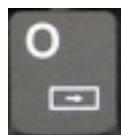
Zoom Out



Split Way



Combine Ways



Align in Circle



Align in line



Orthogonalize (make a shape square)

## More information on the <<Selection>> Tools.

All of this information was taken from <http://wiki.openstreetmap.org/wiki/JOSM/Plugins/utilsplugin2>.

**Select adjacent nodes (E):** Selects neighbours of already selected nodes. Remembers active ways when used first and fills them before advancing to other ways. If some ways are already selected, we only use them to advance selection. If only ways are selected, its nodes are selected instead.

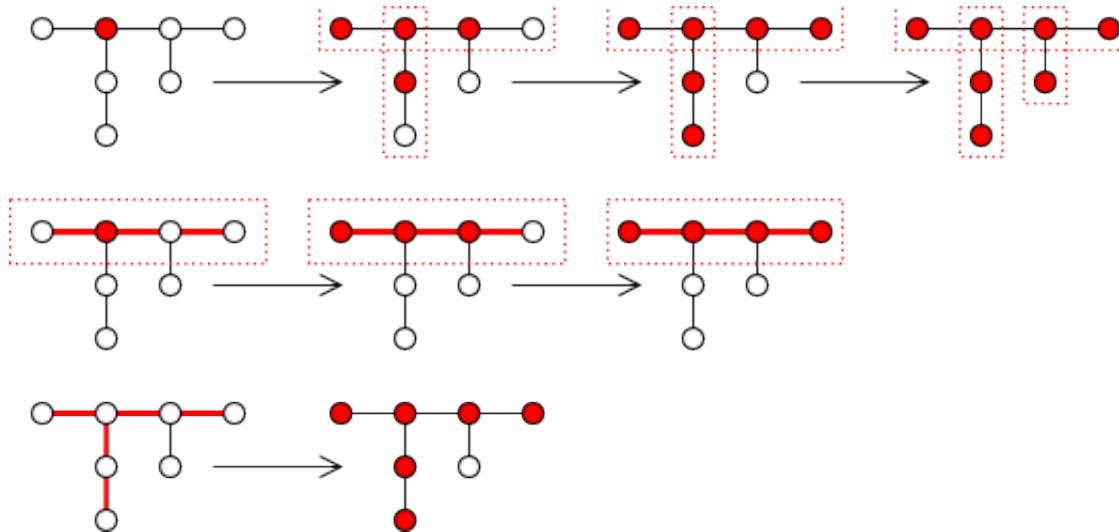


Figure 124: Adjacent nodes

Example of usage: select one node (and possibly its way), press E (3 nodes are selected now), press L to put the node on straight line.

**Select adjacent ways (Shift-E):** If some ways or nodes are selected, selects adjacent ways (non-recursively).

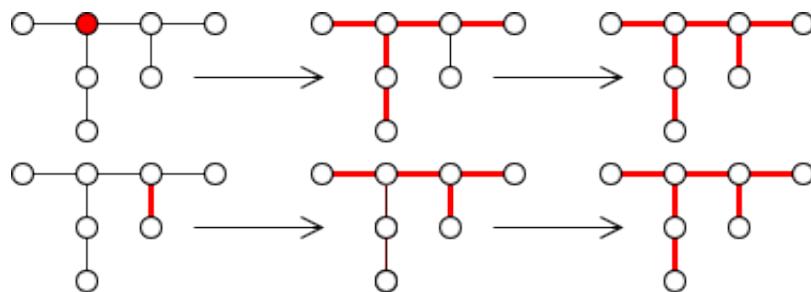


Figure 125: adjacent ways

**Select all connected ways (Ctrl-Shift-E):** If some ways or nodes are selected, selects adjacent ways recursively (as a result, all connected ways are selected).

**Select intersecting ways (I):** If some ways are selected, adds intersecting ways to selection. Useful with function **Add nodes at intersections**.

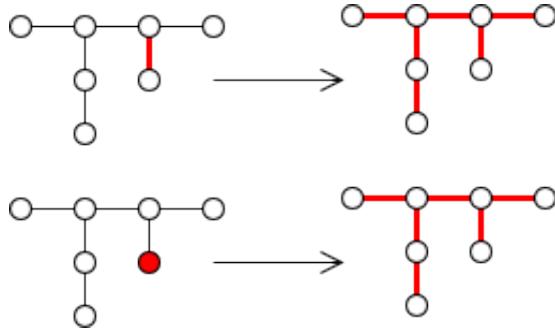


Figure 126: connected ways

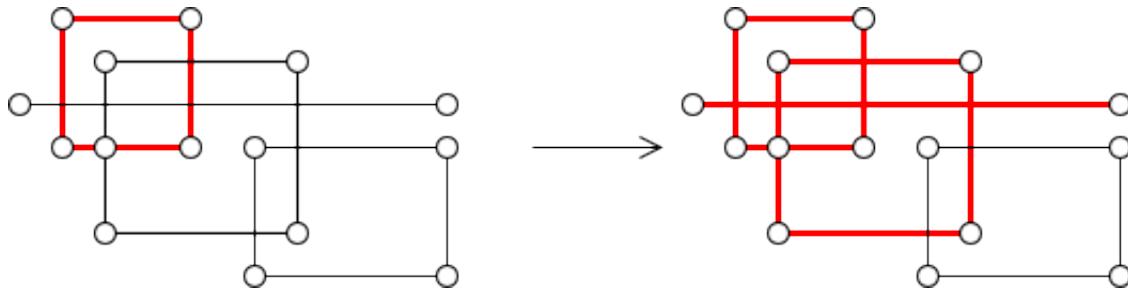


Figure 127: intersecting ways

**Select all intersecting ways (Ctrl-Shift-I):** If some ways are selected, selects all adjacent and intersecting ways recursively. Useful for selecting parts of the building to join.

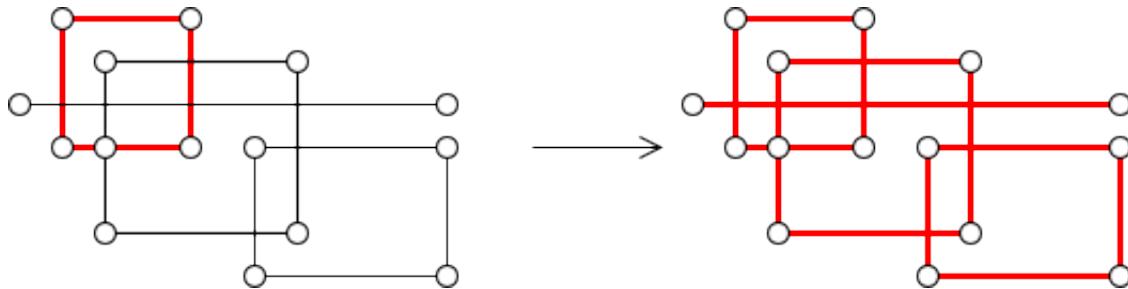


Figure 128: intersecting ways

### Relation Details

Every object within a relation is tagged as having a **role** and these roles define what each object does within a relation. So in this example, the polygon around the outside of the building would be given the role **outer** to indicate that is on the outside, and the interior polygon(s) are given the role **inner** to indicate that they are holes inside the polygon.

**A more Complex way of Multi-Polygon Relations:** The multipolygon above contains a polygon for the outer limits of the building and two more to mark the inner courtyards. To create a relation from these three polygons you need to:

1. Use the select tool to drag a box around all three polygons to select them all at once.

2. Click <<Presets>> <<Relations>> <<Multipolygon>>.

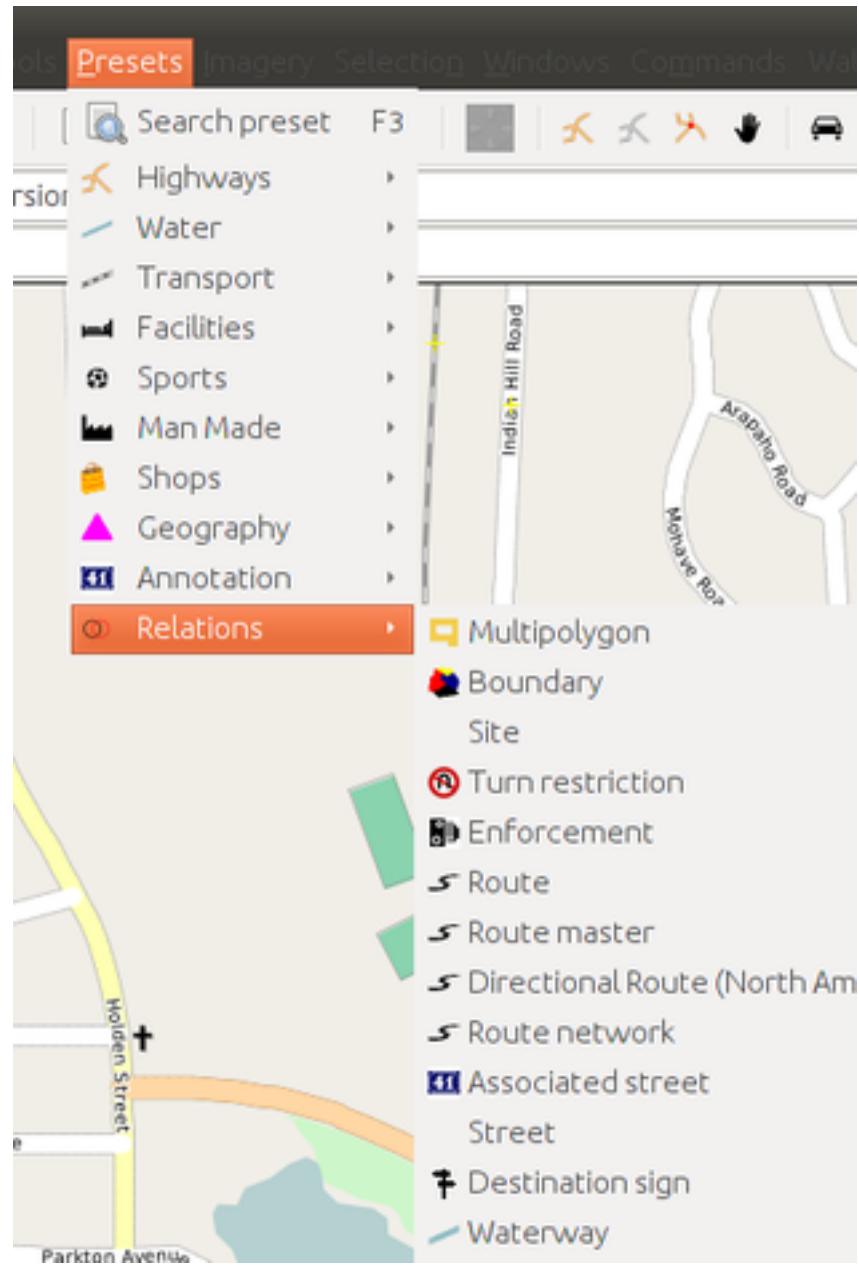


Figure 129: Relations

3. Click “New relation”
4. You will then be presented with the relation properties window:  
There is a large amount of data presented here, but most of it can be ignored for now. The important aspects in this window are the tag lines on top.
5. In these tag lines on top, in the Key/Value table, add the tags for the relation. The actual ways do not need to be tagged unless there is something unique about them, such as different data sources.
6. Next, you need to define the roles within your relation; for a multipolygon you need to define the outer and the inner ways. Essentially, JOSM needs to know which polygons are the outer layer and which ones

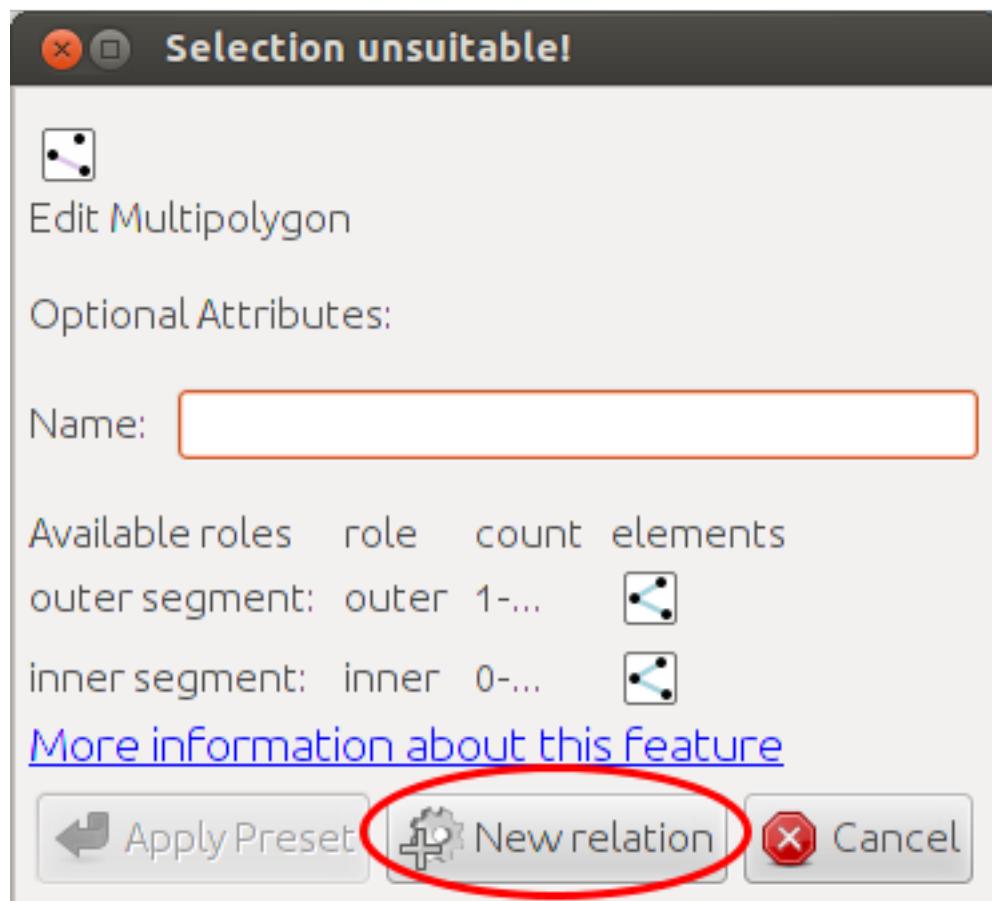


Figure 130: New relations

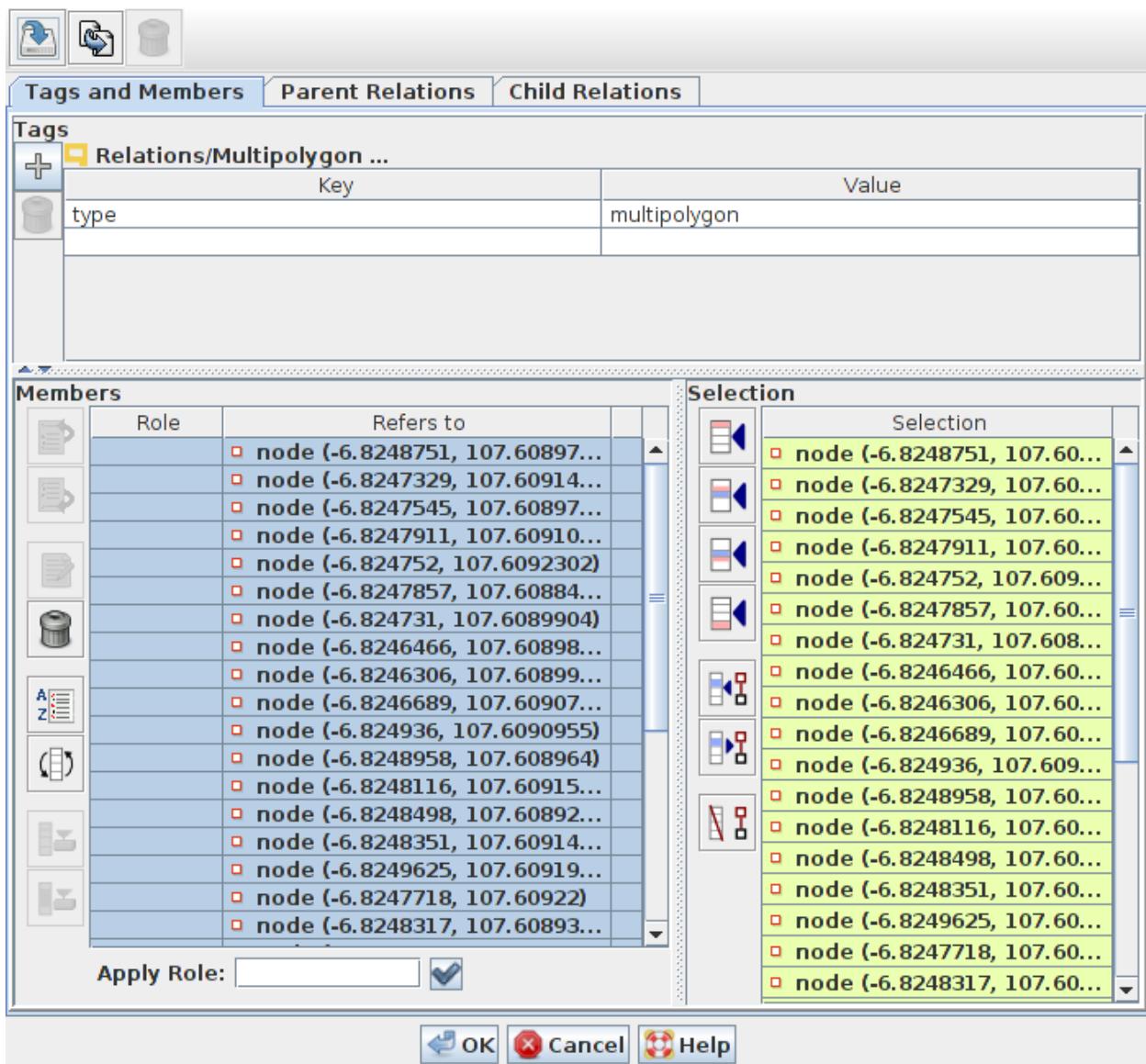


Figure 131: relation properties

| Man Made/Man Made/Building ... |                             |
|--------------------------------|-----------------------------|
| Relations/Multipolygon ...     |                             |
| Key                            | Value                       |
| type                           | multipolygon                |
| building                       | yes                         |
| Name                           | Majestic Castle             |
| Year Built                     | 1887                        |
| Source                         | Majestic Historical Records |

Figure 132: Large amount of Data presented

are the inner layers so that it can determine which area is the multipolygon. Select the ways that are the courtyards and mark them as the two inners and the building line with the outer role:

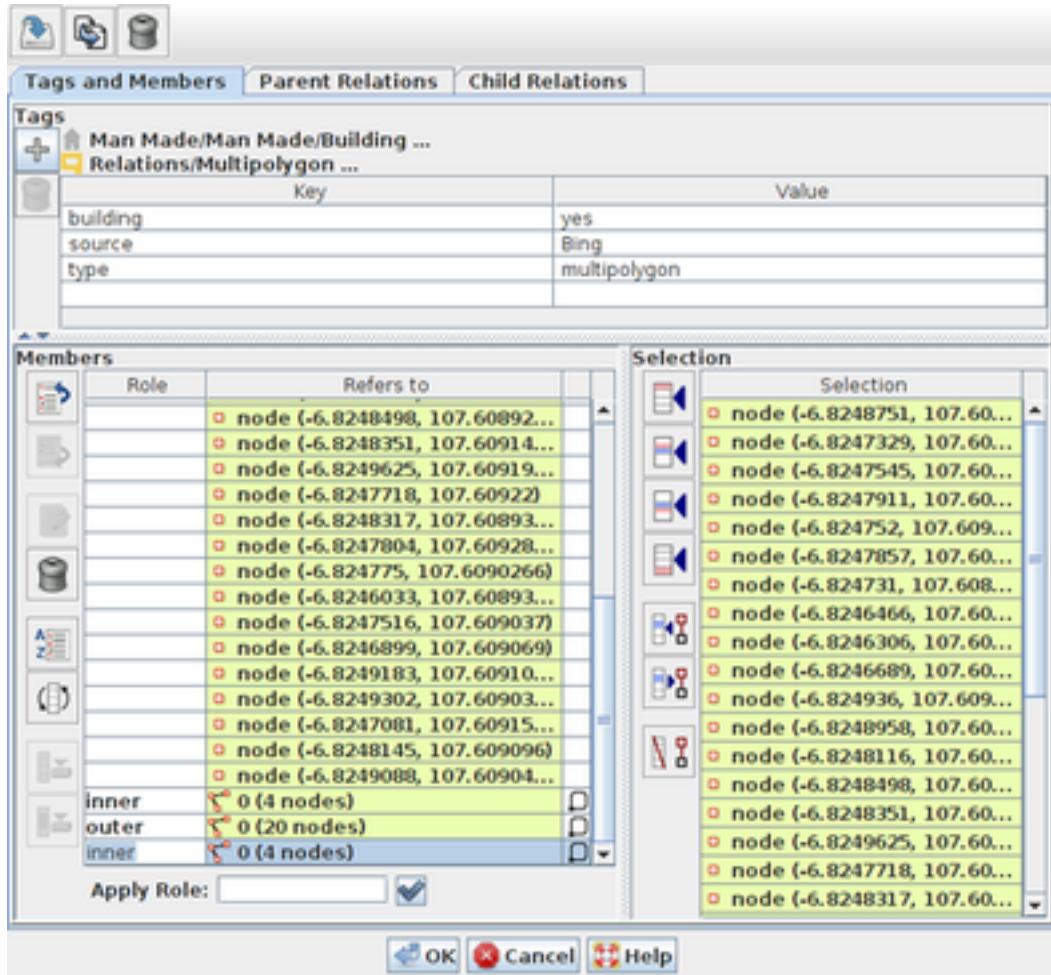


Figure 133: Roles with relations

- Click “OK” and the box will close. You will then see your building as a solid shape with the inner polygons represented with gaps. The data behind the relation in this example is visible on OpenStreetMap: <http://www.openstreetmap.org/browse/relation/2435797>. The building is rendered by Mapnik as in this image:

[OSM Wiki: Relation: MultiPolygon](#)

#### River Relation:

This example of a river requires you to create the outer and inner banks, as well as the area covering inside. The inner and outer banks were drawn and then connected and labeled as a relation. As you can see below there is only one way that is an OUTER member because it is the only outer polygon drawn. All other polygons represent inner members- either branches of the river or holes in the polygon.

**Bus Station Relation:** Unlike inner and outer, the roles that these members play in a relation will be forward, backward or stop. Stop corresponds to where there is a bus stop and forward/backward correspond to the direction the bus goes along the road.



Figure 134: Rendered building

| Tags   |   |
|--|---|
| <input type="button" value="+"/> Relations/Route ...                             |   |
| <input type="button" value="+"/> Relations/Directional Route (North America) ... |   |
|  |   |
| Key  | Value   |
| description  | Blackbird Leys - Cowley Centre - Cowley Road - City Centre - Railway Station  |
| frequency  | 10  |
| network  | Oxford  |
| note   | Ways complete. Stops currently unnumbered and incomplete.   |
| operator   | Oxford Bus Company  |
| ref  | 5   |
| route  | bus   |
| service  | city  |
| <hr/>  |   |
| Members  |   |
| Role   | Refers to   |
|  | <input type="checkbox"/> incomplete [id: 93,494,719]<br><input type="checkbox"/> incomplete [id: 8,126,536]<br><input type="checkbox"/> incomplete [id: 184,005,881]<br><input type="checkbox"/> incomplete [id: 184,005,875] |
| forward  | <input type="checkbox"/> Knights Road (14 nodes) [id: 8,316,957]<br><input type="checkbox"/> Balfour Road (43 nodes) [id: 8,316,986]<br><input type="checkbox"/> Cowley Road (32 nodes) [id: 10,565,819]                      |
| forward  | <input type="checkbox"/> incomplete [id: 14,815,087]<br><input type="checkbox"/> Blackbird Leys Road (2 nodes) [id: 23,262,939]   |
| forward  | <input type="checkbox"/> Field Avenue (40 nodes) [id: 23,393,329]<br><input type="checkbox"/> Blackbird Leys Road (2 nodes) [id: 23,692,613]  |
| forward  | <input type="checkbox"/> Blackbird Leys Road (7 nodes) [id: 23,692,614]   |
| forward  | <input type="checkbox"/> Between Towns Road (3 nodes) [id: 24,249,383]  |
| forward  | <input type="checkbox"/> Oxford Road (2 nodes) [id: 25,494,807]   |
| forward  | <input type="checkbox"/> Between Towns Road (4 nodes) [id: 25,494,809]  |
| forward  | <input type="checkbox"/> Between Towns Road (4 nodes) [id: 39,538,327]  |
|  | <input type="checkbox"/> incomplete [id: 27,895,984]<br><input type="checkbox"/> incomplete [id: 27,895,986]  |
|  | <input type="checkbox"/> incomplete [id: 108,912,965]   |

Figure 135: Bus station relation

1. Make sure that all of the ways in which the route runs along are appropriately tagged. For example, highway=footway.
2. Open the relation panel (Alt + R) and select New in the relation panel to create a new relation.
3. Enter in the proper tags in the new dialog box. For this bus route, it is type=route and name=Route 5.
4. Click OK.
5. Select all of the highways or ways that the bus takes. If you would only like to select certain parts of the way, then, sadly, you must divide the way into the section you would like to select. This creates more work, but you can easily do it with the <<Split Way>> tool. Once some or all of the ways are selected, click <<Edit>> in the relation panel. The relation editing dialog will pop up.
6. Click Add selection in that dialog box to add those selected ways.

## Dealing with Conflicts

### Introduction

Sometimes you are working in JOSM and when you upload all of your beautiful edits you get an *evil* message like this:

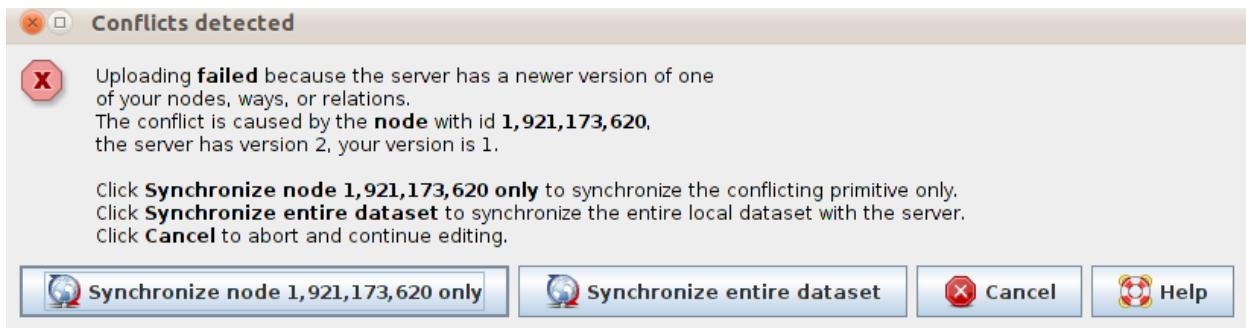


Figure 136: Conflicts detected

*This message is telling you that uploading did not work because another user has uploaded their edits already. It is telling you that you downloaded the area before someone else because you have version 1 and the server has the more recent version. More specifically, the node with ID:1,921,173,620 is the problem child. This is the object that has been edited by someone else.*

This pop-up is a **conflict**, which is essentially a confusion by JOSM as to determine which edits to use. Basically, the OSM server has received edits that altered the same or similar objects and JOSM does not know which one to use.



Figure 137: Conflict warning

### Conflicts

When you edit in JOSM you are editing a copy, or clone, of the main map. JOSM loads OSM objects from the main server and keeps them in memory on your computer. You encounter **conflicts** when you upload altered, added or deleted components from your map to the main server that someone else has also edited. Since you are working on a local copy of OSM on your computer other users can still retrieve, edit and upload the same OSM objects. You don't own the objects that you are currently working on; you share them. Therefore, when objects that have both been edited are uploaded at similar times, the OSM server gets confused. It does not know which upload to be saved and used.

However, JOSM is able to deduce some conflicts and sometimes you will encounter an error, such as this one:



Figure 138: Resolved conflicts

*This window reveals that JOSM deleted some of your objects that were previously deleted.*

This means that JOSM has automatically decided that items in your local dataset will not be uploaded to main server because they have already been deleted by another user.

In some conflicts, however, there is no easy action for JOSM to take and so it leaves the decision up to the user to determine what the best course of action is. Therefore, the conflict needs to be resolved:



Figure 139: Determine best action

*This tells you to look at all of your conflicts in Layer 1 in the **Dialog List** box.*

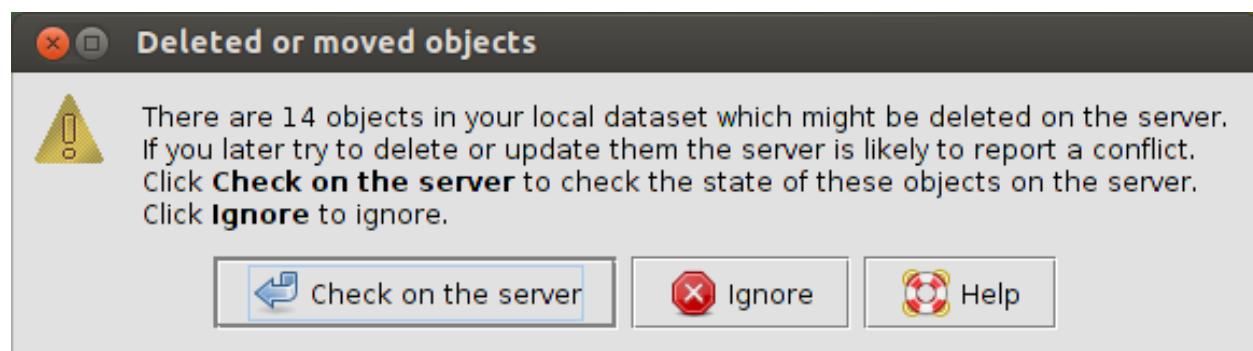


Figure 140: Dialog List

*This window provides you with a warning as to whether you are likely to experience a conflict with your edits. If you check on the server you will be able to fix the editing issues that would arise.*

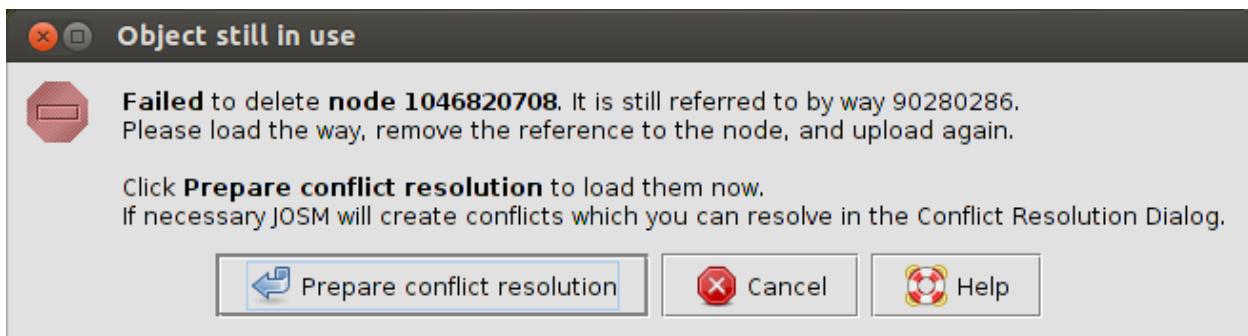


Figure 141: Conflict with own edit

*This warning tells you that JOSM failed to delete a node due to it still being referenced in a way. In order to remedy this, the user has to go back into JOSM and resolve the conflict before uploading the data.*

## Conflict Resolution

**Resolving Conflicts** are important because none of the edits will save if you do not select one version or merge the edits. To resolve a conflict you must choose the best option for each specific edit. When you are given this Conflict Detected pop-up it is always best to choose <>. This option saves you time and headache because it only looks at the conflict at hand. If you chose to <>, then your server must talk with the main server about all of the edits and objects. This option is only really necessary if you have a mess of conflicts and edits. It is quite cumbersome and at times confusing.

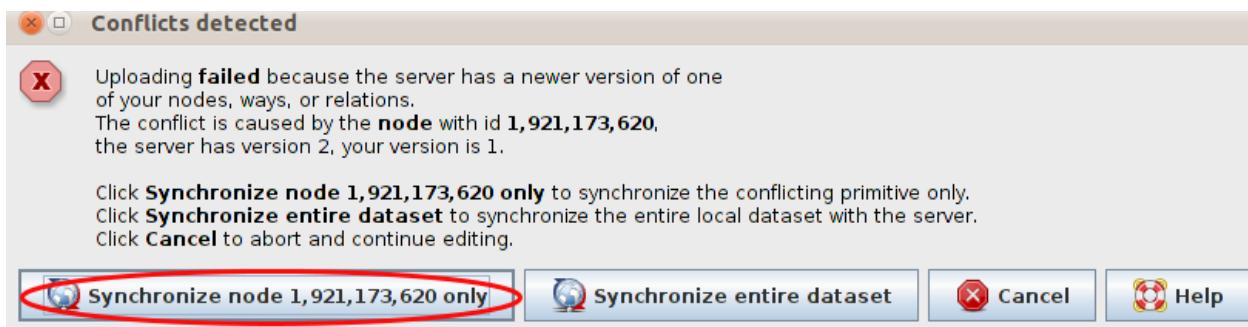


Figure 142: Resolving Conflicts

Next, you will get a pop-up that details your conflict. The error message that appears looks complicated, but it is rather simple. You will know what type of conflict you have by the symbol



Figure 143: Point

in the top tab. This one refers to the properties, such as the location and existence of the object, of the object. This is why the coordinates and deleted state are listed.

**Properties:** Moved (coordinates) or deleted

**Tags:** tags do not match

**Nodes:** there is a difference in the list of nodes in two ways

**Members:** there is a difference in the list of members in a relation

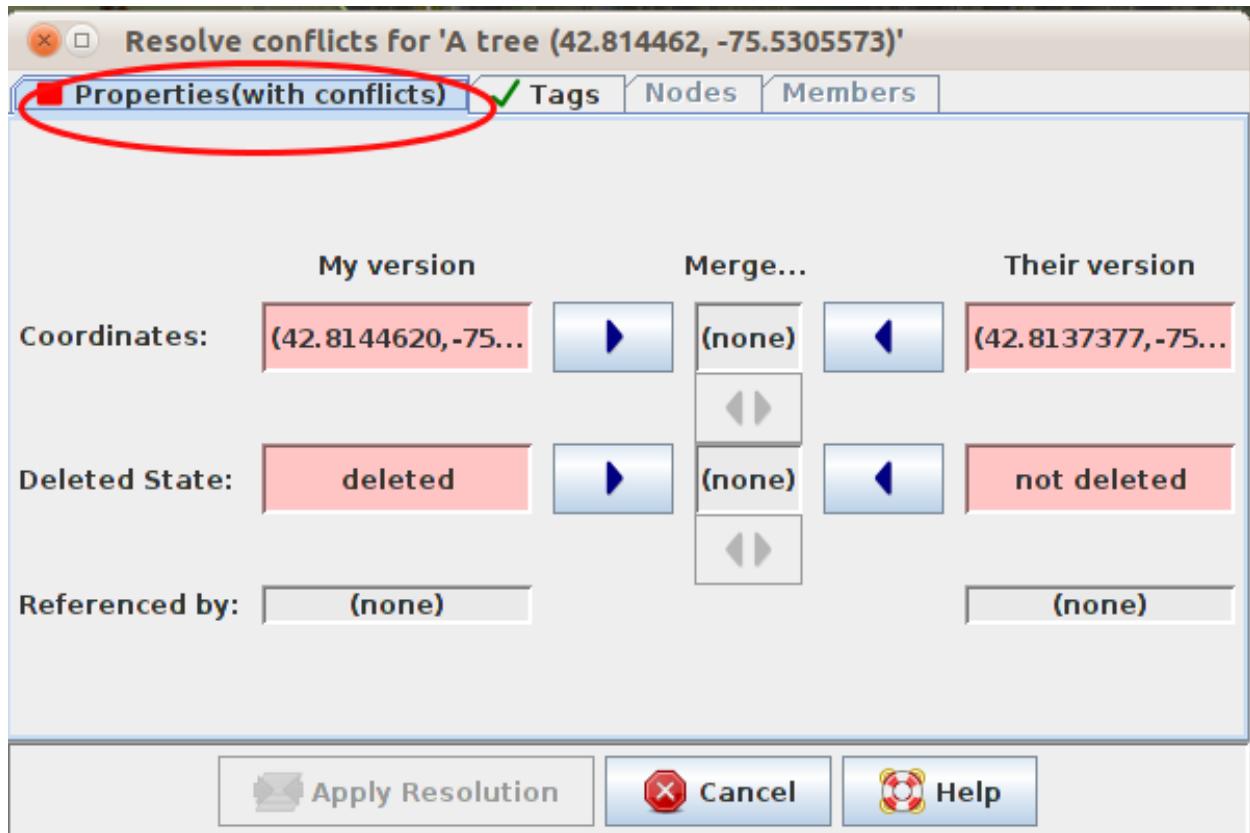


Figure 144: Tab for conflicts

Conflicts only appear with two different edits at a time. If there are three or more conflicts, then a chain of conflicts will pop-up. Therefore you have to choose or merge with only two conflicts at a time. You can choose your version, the other version or, at times, merge the two. In this example you do not have the option of merging. Click on the first column, or <> if you believe that your edits are correct. Click on << Their version>> if you think that the other edits are better.

Once you have selected which version you think is best, then click <>. A few more windows will pop up and you will be on your way toward being able to upload your edits.

Do some more editing. Then click 'Upload'. You will get a pop-up that says:

On your Windows menu you have a **Conflict List Dialog**

. This window displays a list of conflicts. The total number of unresolved conflicts is shown in the header. You can select or resolve a conflict by clicking on it. This is useful when you have many conflicts to deal with.

You cannot upload your changes until this is empty.

\* SHIFT+ALT+A turns the right Window display on or off during of the Authors Dialog

\* SHIFT+ALT+C turns the right Window display on or off during of the Conflict Dialog

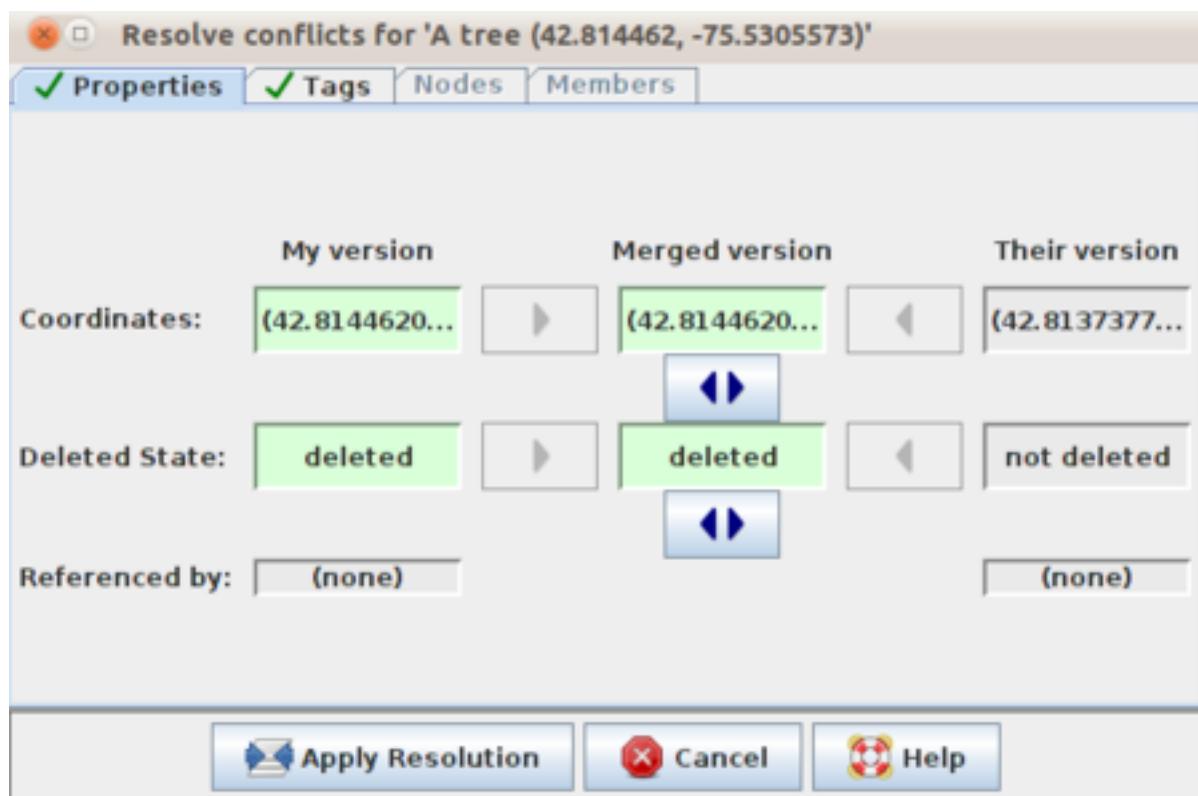


Figure 145: Option for Merging

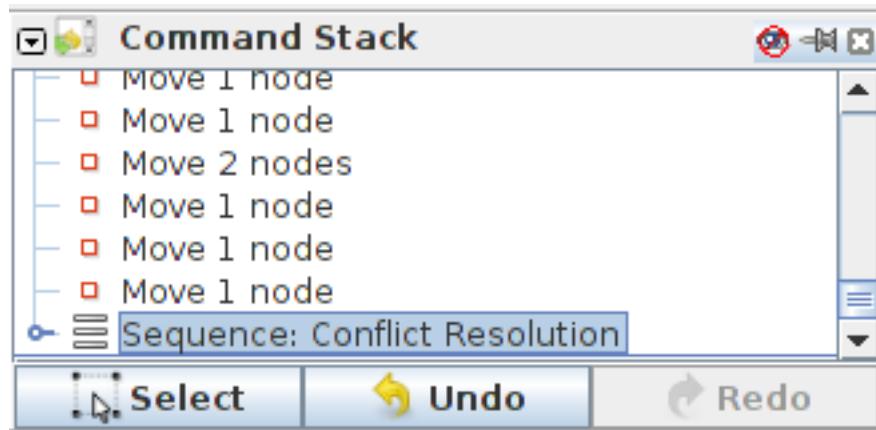


Figure 146:



Figure 147: Conflict List Dialog

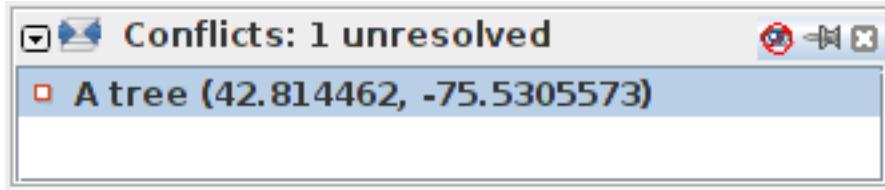


Figure 148: Unresolved conflicts

## Ways to Avoid Conflicts

To minimize the chance and number of conflicts it is useful to upload regularly. Conflicts appear more frequently for those who tend to save the area they are working on in their local server and wait a while to upload it. It is best to download the area you are working on, edit it and then immediately upload it.

Editing in the specific area you have downloaded minimizes conflict risk. Make sure you do not edit outside of the area that you have downloaded and dividing up the work using the Task Manager. Both of these actions avoid multiple users editing in the same area.

Lastly, because conflict pop-up are so cumbersome, and at times annoying, it helps to check if any changes have been made in the area you were editing before you upload (via osm.org).

## Summary

When you edit in JOSM, which downloads copies of the OSM map, you run the risk of running into conflicts. Conflicts occur when an object has been edited by two people at a similar time.

## Appendix. More Specific Conflicts

### Tag Conflicts

If the tags of one version of an objects are different from the tags of another version, the Conflict dialog shows a



Figure 149: Point

in the tab Tags. Click on the tab to display a dialog for resolving tag conflicts.

There are three tables displayed in this dialog, from left to right:

- **My version:** shows the tags of the first object version participating in this conflict. These are usually the tags of the object version in your local data set.
- **Merged version:** shows the merged tags. This table is initially empty. The more tag conflicts you resolve, the more tag values will we be displayed in this table.
- **Their version:** shows the tags of the second object version participating in this conflict. These are usually the tags of the object version currently stored on the server.

In the example below both versions have a tag “name”. The values in the two object versions are different, though, and JOSM therefore displays the row with a red background. The value of the first version is “Secondary School”, the opposite version has a value “Elementary School”. You now have to decide which of these values you want to keep and which you want to discard.

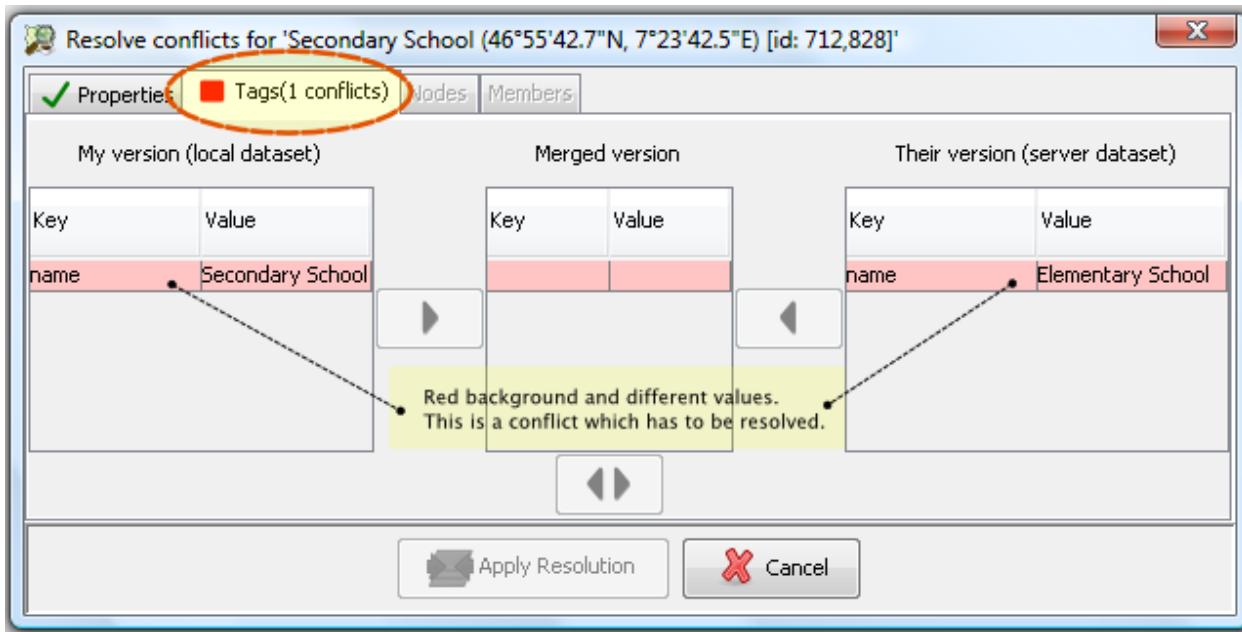


Figure 150: Tags

Click on the value you want to keep, in the example for instance on the value on the left. If you either double-click on the value or you decide to keep the value and to discard the opposite value. The table in the middle now displays the value to keep and the background color turns to green.



Figure 151:

When the button **Apply Resolution** is enabled you can apply your decision. The values you've chosen will be applied and the dialog will be closed.

### Resolving differences in the node list of two versions of a way

If you see this symbol

in the tab **Nodes** then you have to resolve differences in the list of [nodes](#) of two [ways](#). There are three columns in the respective panel (see screen shot below):

- the leftmost table displays the list of nodes of the local object version
- the rightmost table displays the list of nodes of the server object version
- the table in the middle shows the list of nodes of the merged ways

Initially, the middle table is empty. You should now decide which nodes to keep from the local dataset (the leftmost table) and which from the server dataset (the rightmost table).

### The standard workflow

The standard workflow to resolve conflicts in the node lists of two [object versions](#) consists of three steps:

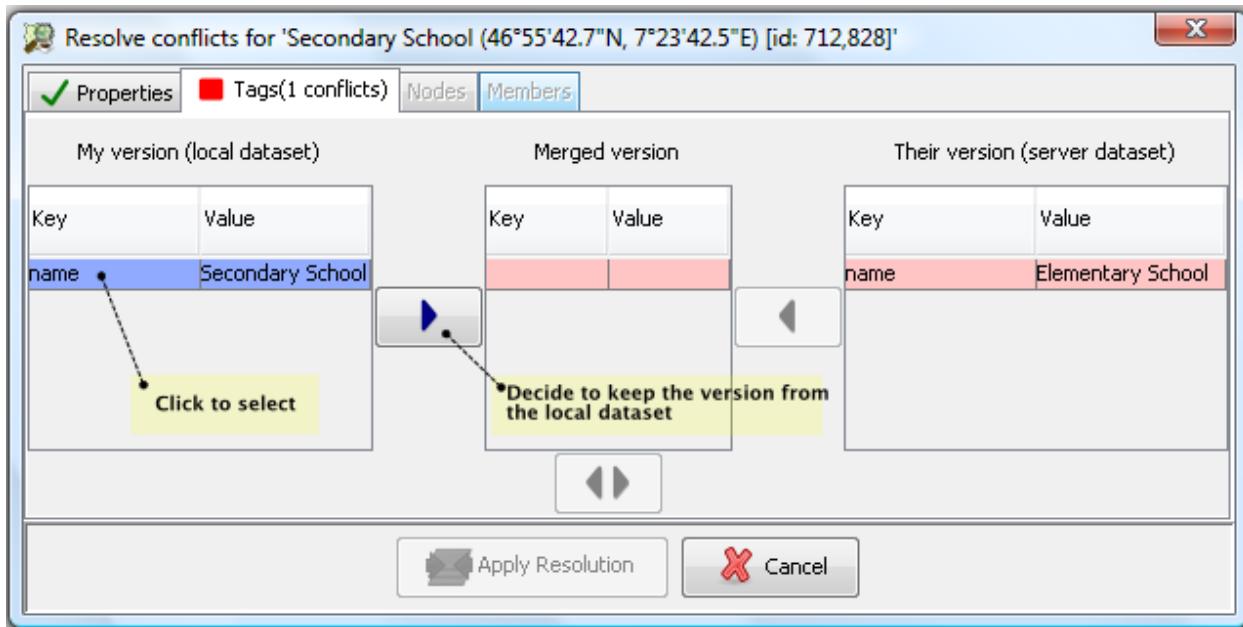


Figure 152:

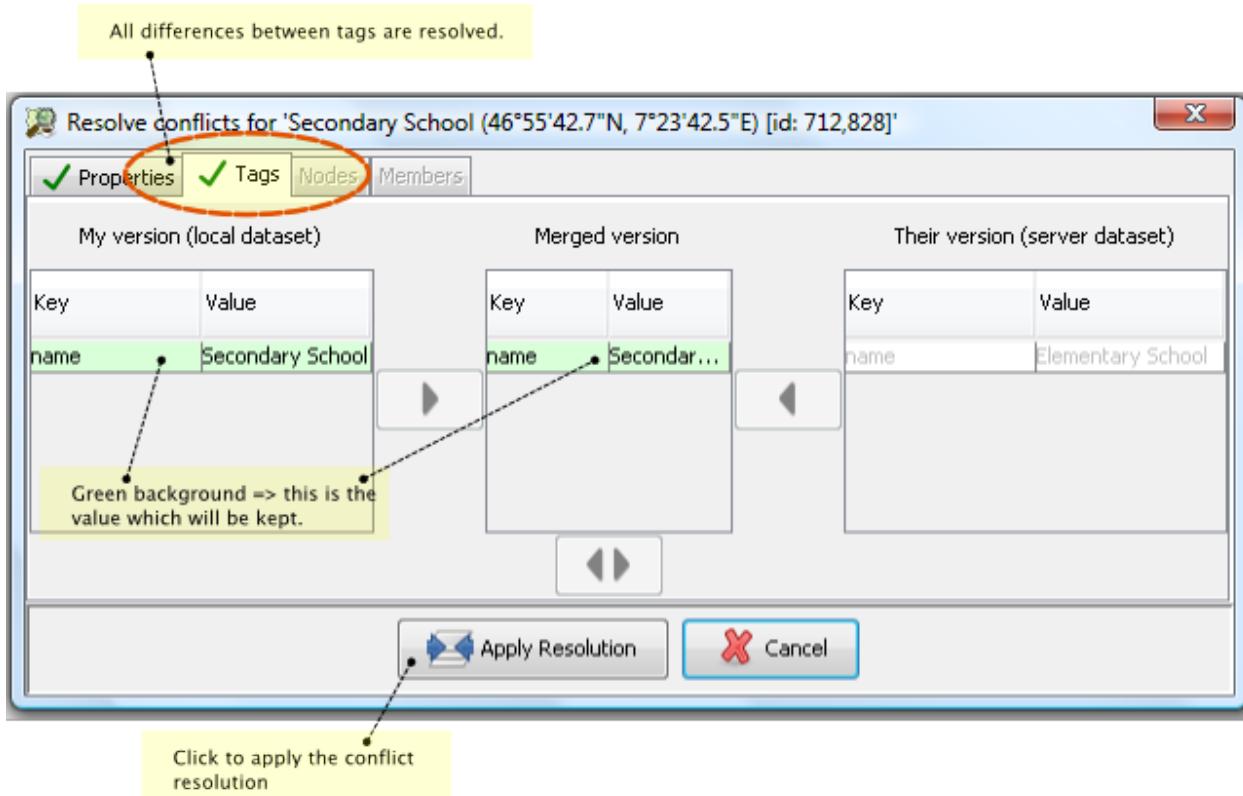


Figure 153: Apply resolution



Figure 154:

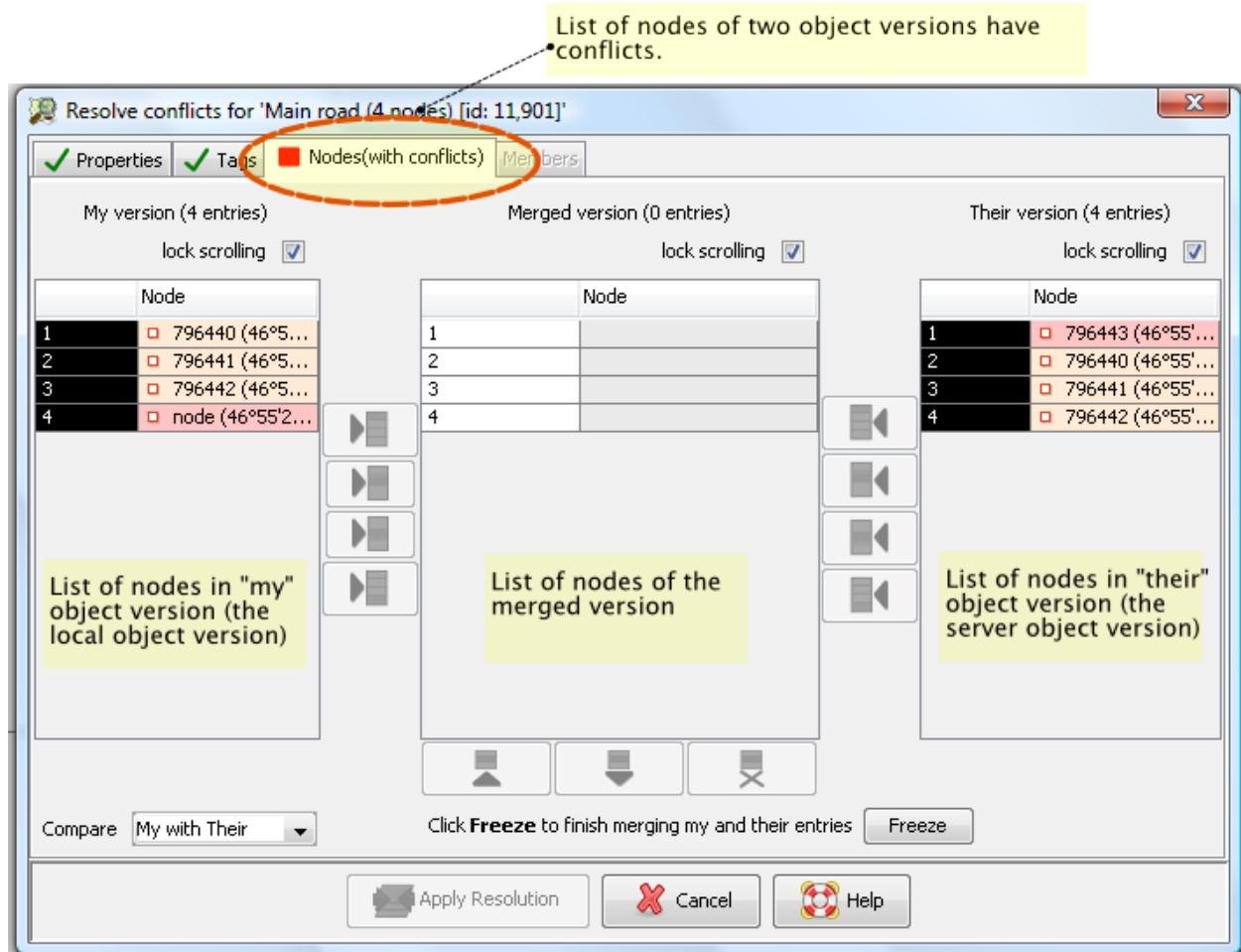


Figure 155:

1. Pick nodes from either object version and reorder the resulting node list if necessary
2. **Freeze** the resulting merged node list by clicking on the button



Figure 156: Freeze button

- . When you freeze the merged node list you tell JOSM that all conflicts in the node list are resolved.
- 3. Apply the resolution

### A simple workflow: Keep the node list from your local object version

The following example shows the workflow when you decide to keep all nodes in the same order from your local object version.

First, select all elements in the leftmost table (either using the mouse or by pressing Ctrl-A in the table) (see next screen shot):

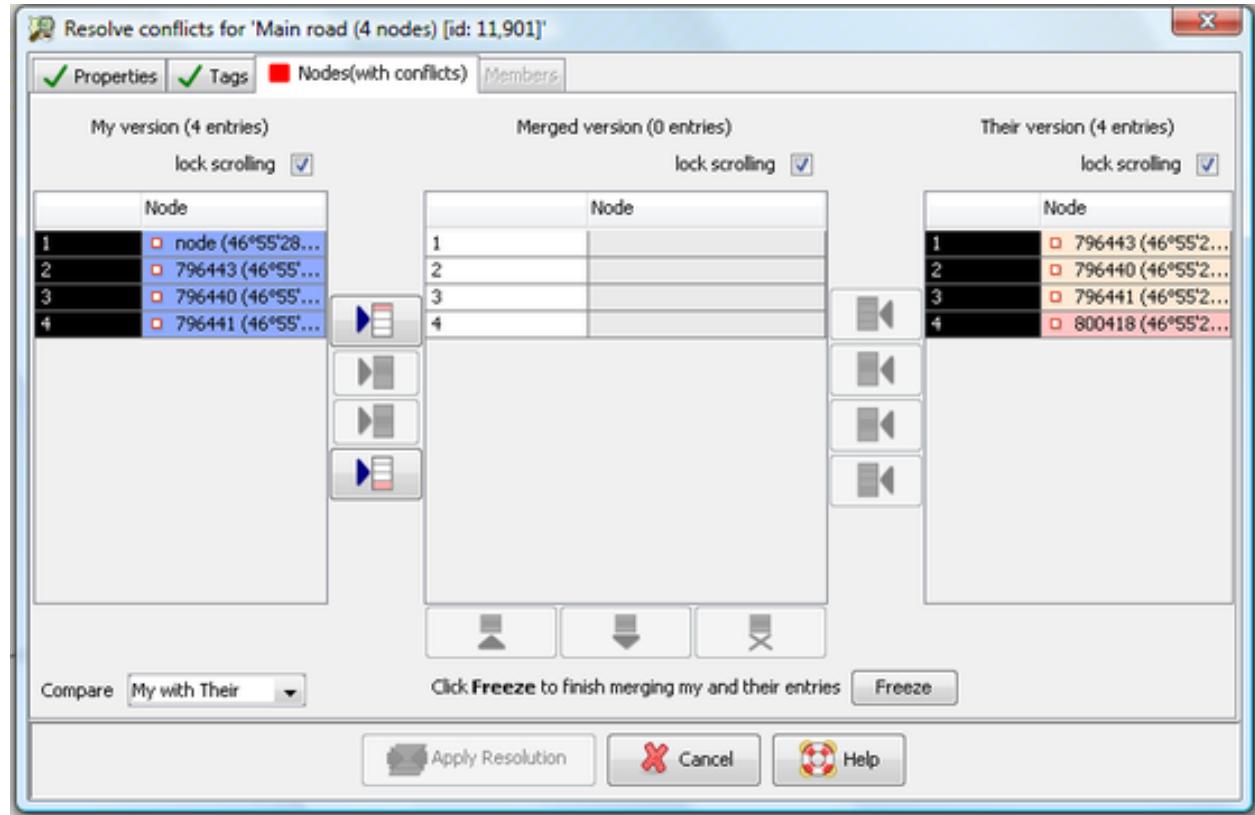


Figure 157: Conflict Resolution Window

Then, click

to copy the selected nodes to the middle table with the merged nodes:

Finally, click

to freeze the resulting merged node list:



Figure 158:

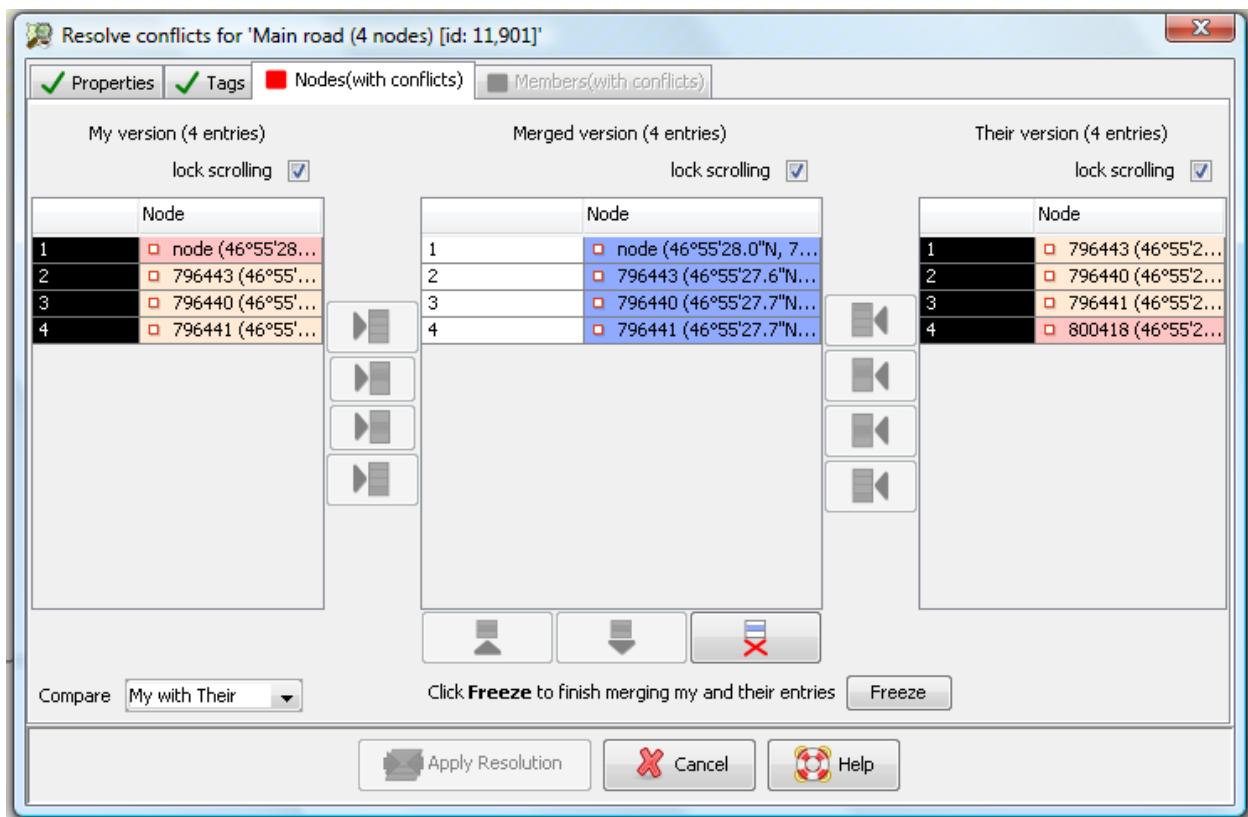


Figure 159:

Freeze

Figure 160:

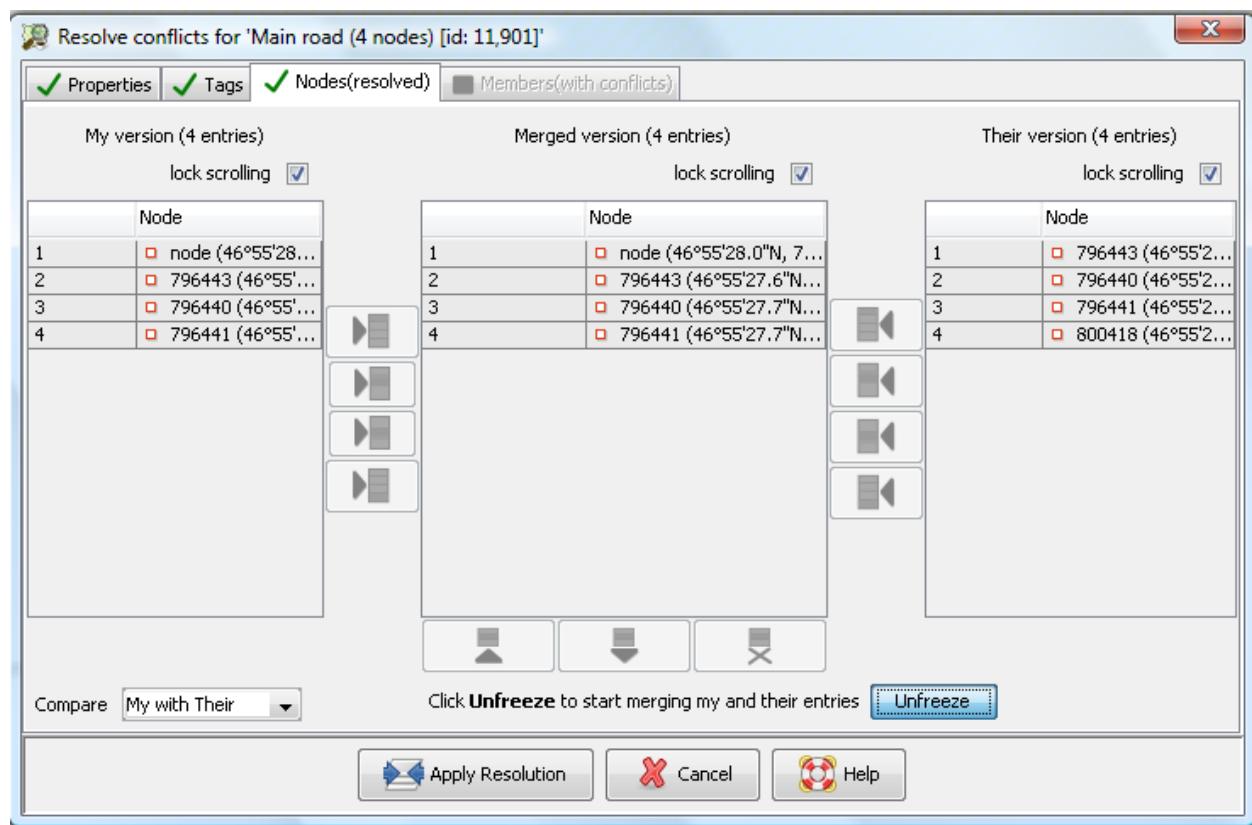


Figure 161:

The symbol in the nodes tab now switched to



Figure 162:

and you can apply the merge decisions.

## Support for comparing node lists

It can be difficult to find the differences between the node list of two object versions, in particular for ways with many nodes.

The Conflict Dialog supports you in finding the differences. It can compare two of the node lists displayed (“my” node list, the merged node list, and “their” node list) and it can render the differences between them with specific background colors.

From the following combo box you can select which pair of node lists to compare:

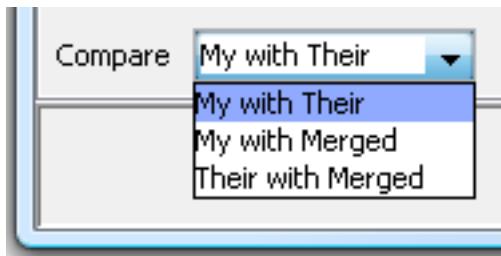


Figure 163:

- **My with Their:** compares the leftmost table with the rightmost table in the Conflict Dialog
- **My with Merged:** compares the leftmost table with the middle table in the Conflict Dialog
- **Their with Merge:** compares the middle table with the rightmost table in the Conflict Dialog

Depending on the position of a node in the list different background colors are used:

- The node is in this list only. It isn't present in the opposite list:



Figure 164: Node list

- The node is in both lists, but it is on different positions:
- White background means that a node is in both lists at the same position.

□ 796441 (46°55'...

Figure 165:

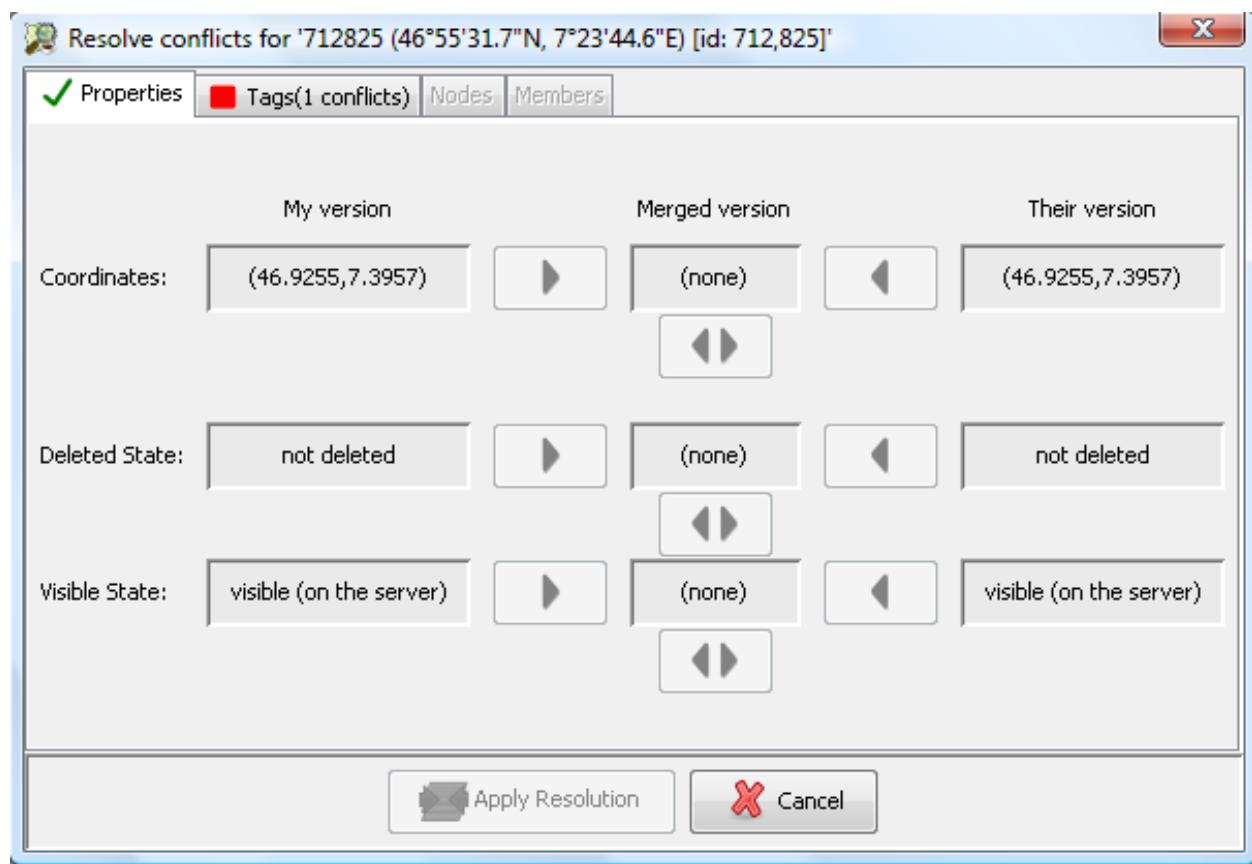


Figure 166:

# Quality Assurance

## Introduction

Contributing to OpenStreetMap is easy to learn, but difficult to master. Everybody makes mistakes, but the system works because even when one person does something the “wrong” way, there are always other mappers ready to help and fix errors. As you map more and more, it will continue to get easier, and you will learn the “proper” way to do things. This chapter is devoted to helping you contribute well. We will begin by discussing various editing techniques in JOSM that will make your work better, and common mistakes that beginning mappers make. We will then discuss the JOSM validator tool, which is an automated way of checking for errors. Lastly, we will cover the HOT Tasking Manager, which is a tool that mappers can use to sort an area into a grid, and work together to map an area in an organized way.

Drawing your maps correctly for the first time will save you a lot of time later on!

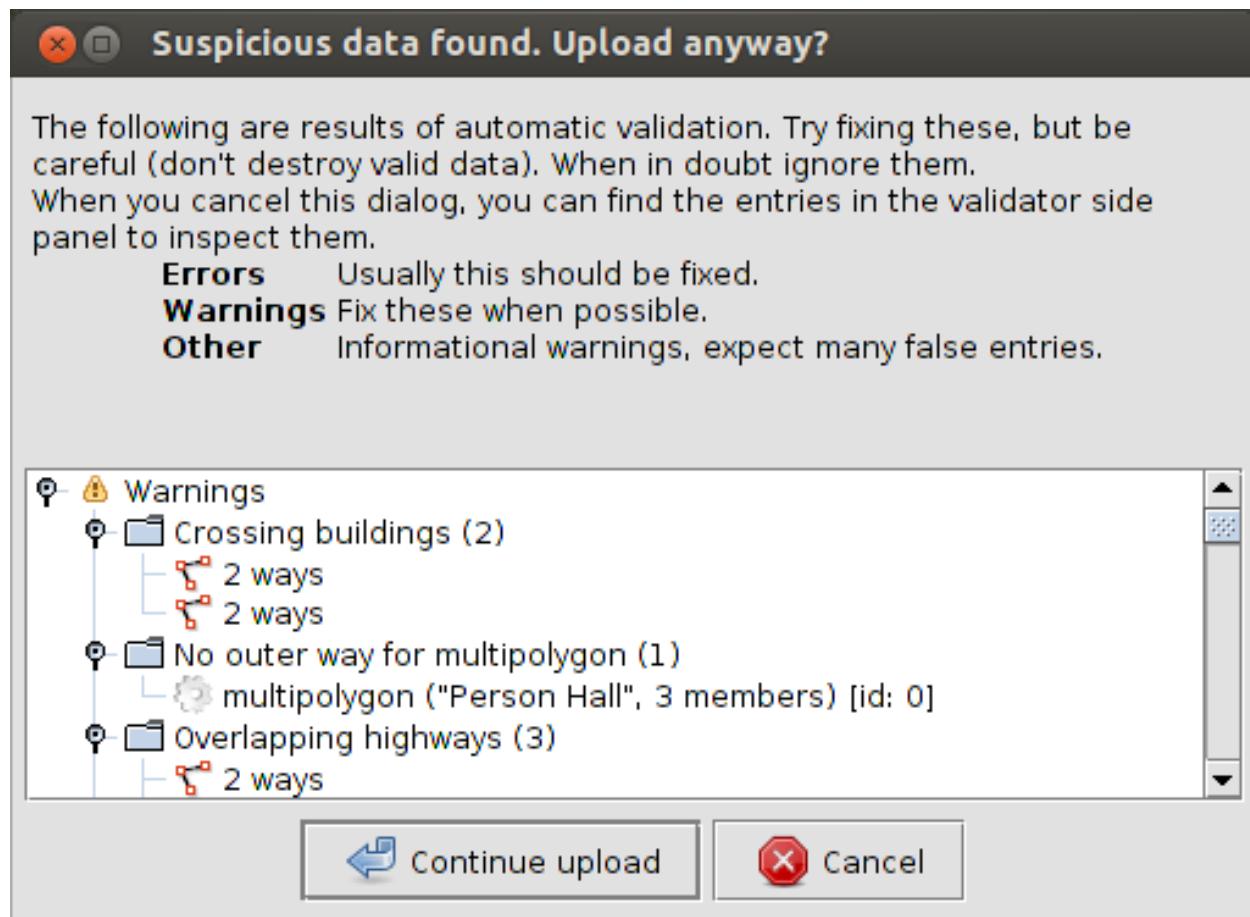


Figure 167: Upload Window

*This warning claims that there is suspicious data in your edits and that you should review the specific errors, warnings and possible false entries. This window is an OSM method of creating better quality data and getting rid of untagged, overlapping and incomplete objects.*

## The Validation Tool

JOSM comes with a tool that does an automated analysis of possible mistakes. This is useful for finding errors that you may have overlooked. When you run the validation tool, it will return two lists of problems:

- **Errors** These are important to fix, and therefore usually you should not ignore these. Examples of errors include duplicated objects or overlapping lines and polygons.
- **Warnings** These are problems that are important to fix, but in some cases, they are tolerable.

One thing to note is if you download large area of the map and run the validation tool, you may get a very long list of errors and warnings. This is because the validation tool works on the whole map— not only the changes that you have made. So you may see mistakes that other mappers have made, and you can fix them, or ignore them. But the validation tool gives you the opportunity to look at the mistakes one by one.

Let's see how to use the validation tool:

1. In JOSM, download a section of the map.
2. If you don't see the "Validation Results" window in the right panel, click on the blue checkmark on the left to show it.

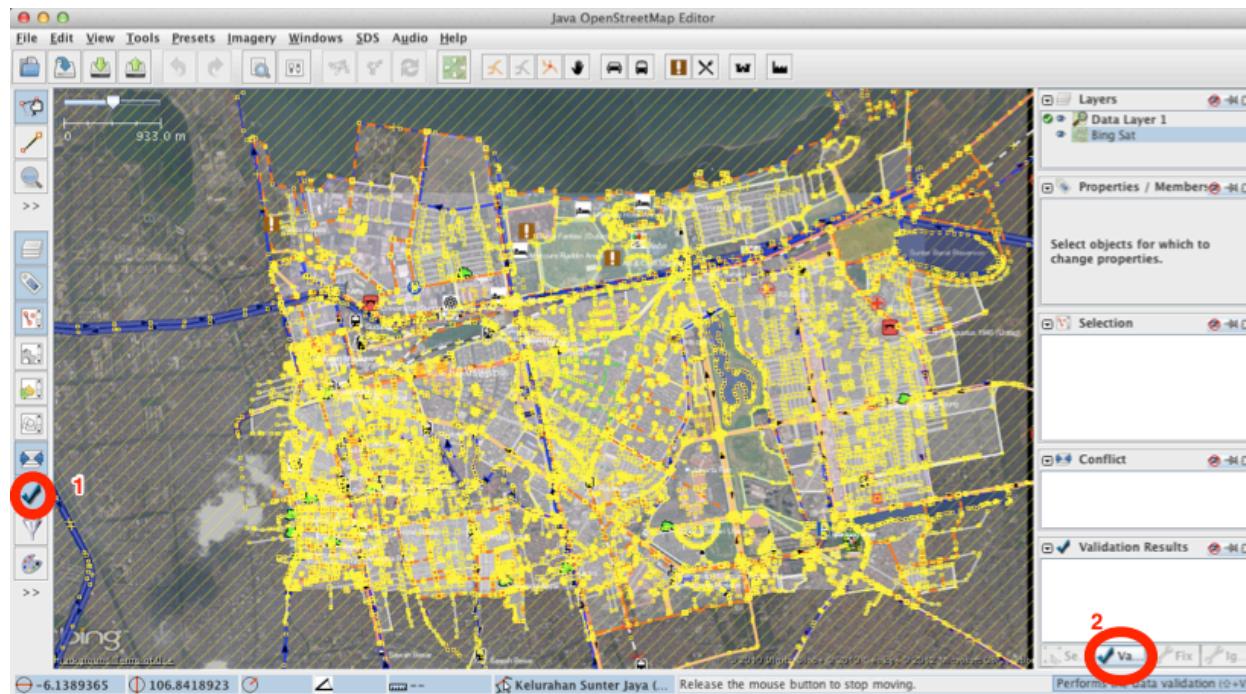


Figure 168: Validation result

3. Ensure that nothing on the map is selected. If you run the validation tool with anything selected, it will only validate what you have selected, and not the whole map.
4. Hover your mouse in the validation window and click "Validation."

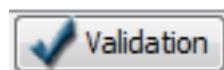


Figure 169: Validation button

- The map will change and any warnings will be circled in yellow, errors in red. In the “Validation Results” window you will see a list of warnings and errors, if there are any.

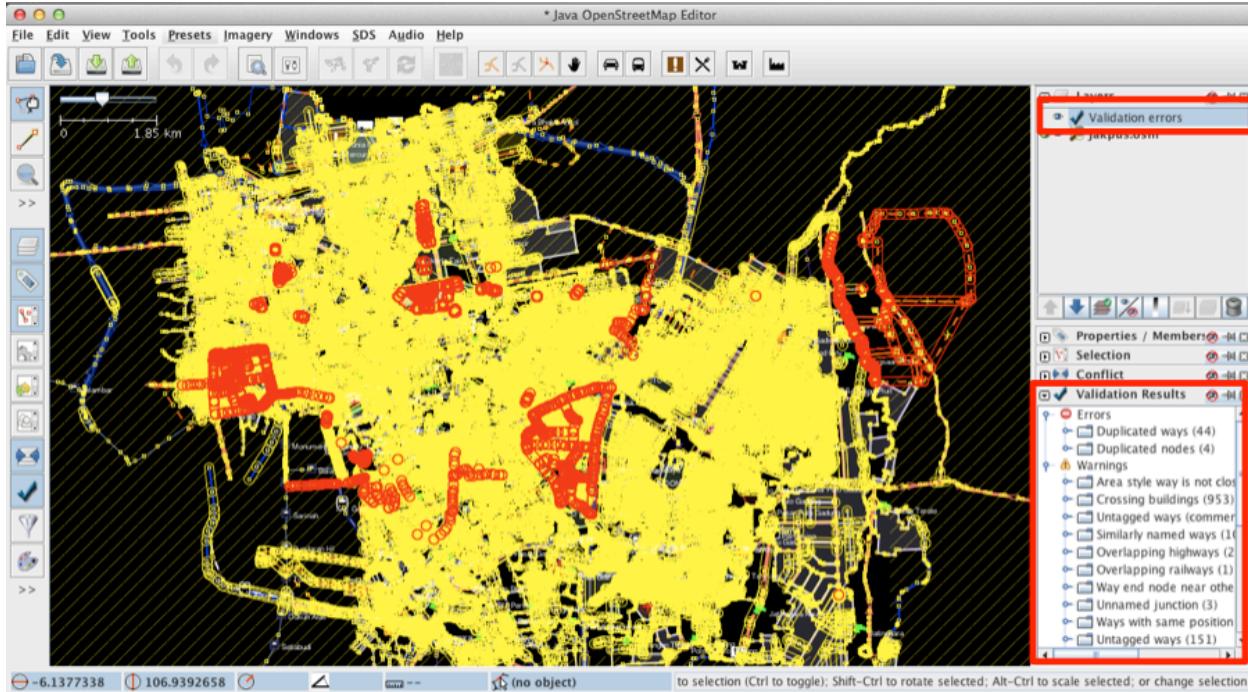


Figure 170: Validation result

- Errors should be fixed always. You can zoom to an error, by right clicking on it in the window and selecting “Zoom to Problem.” Then you can fix the mistake manually.
- Some errors can be automatically fixed, such as “Duplicated nodes” errors. You can click on the folder for these types of errors and click the “Fix” button in the window. Many errors, however, need to be corrected manually.



Figure 171: Fix button

- Usually there are many more warnings than errors. By giving you a warning, JOSM is telling you that it is probably a mistake, but not always. So you will need to use your judgement to see if it is an error or not.
- If you select a warning from the list and decide that it is not a problem, click “Ignore” and it will be removed from the list.
- You can re-run the validation tool at any time by clicking “Validation.”

### Common Warnings

- Ways that are not closed** — usually a line that does not form a polygon. Common examples are buildings where the first node does not meet the last node.

To fix this, select both nodes and go to Tools -> Merge Nodes to connect them.



Figure 172: Ways that are not closed

- **Crossing Buildings (Overlapping Buildings)** — buildings that overlap each other.

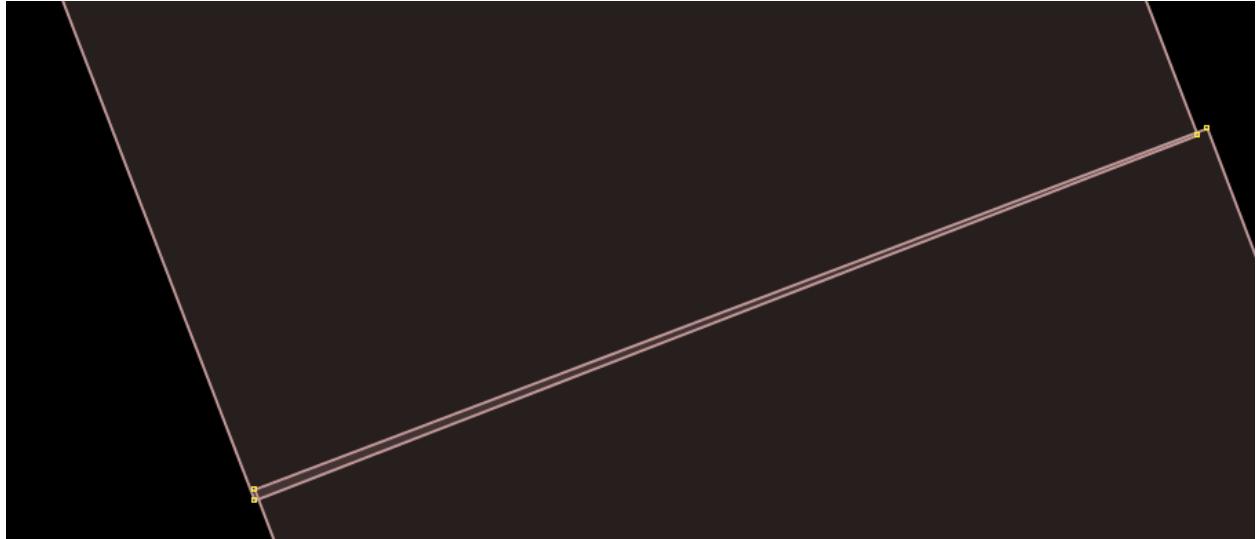


Figure 173: Crossing building

To fix this, move the nodes of one of the buildings outside of the other building.

- *Untagged Nodes or Ways* — If someone draws a point or a line but forgets to give it any tags, then it is useless, because it doesn't mean anything.

To fix this, apply tags to the object to identify it, or delete it if it is a mistake.

- End node near another way- If a line ends very close to another line but does not connect, this raises a warning. Many times this warning is not important, but it helps to find road intersections that are supposed to connect but do not.
- Crossing ways- Lines that cross other lines without being connected will raise warnings. Many times this is not a problem, because the crossing ways are intentional - such as in the case of bridges, or streets and rivers that cross landuse polygons. It is sometimes helpful, however to find errors.

OpenStreetMap depends on people correcting and editing mistakes. Editing and validating data is important for improving maps. If you do not have time to get in the field with a GPS or trace imagery, validating

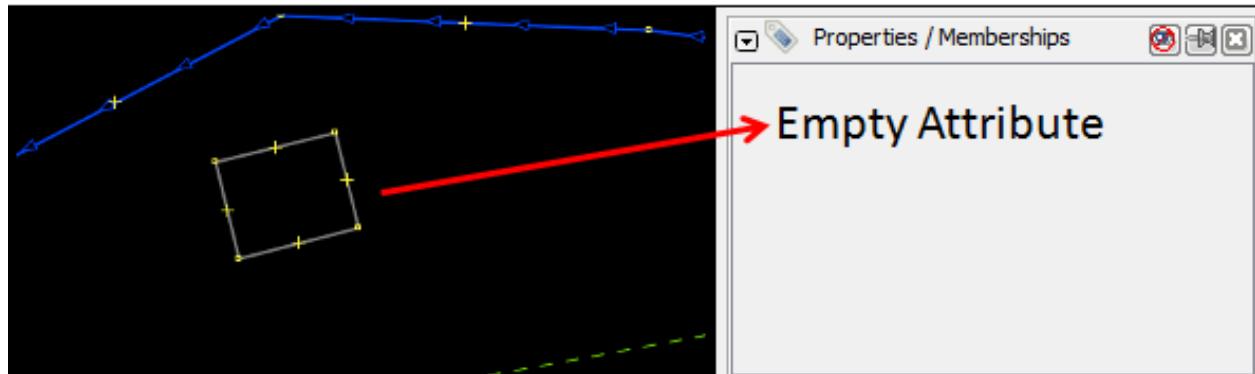


Figure 174: Untagged nodes

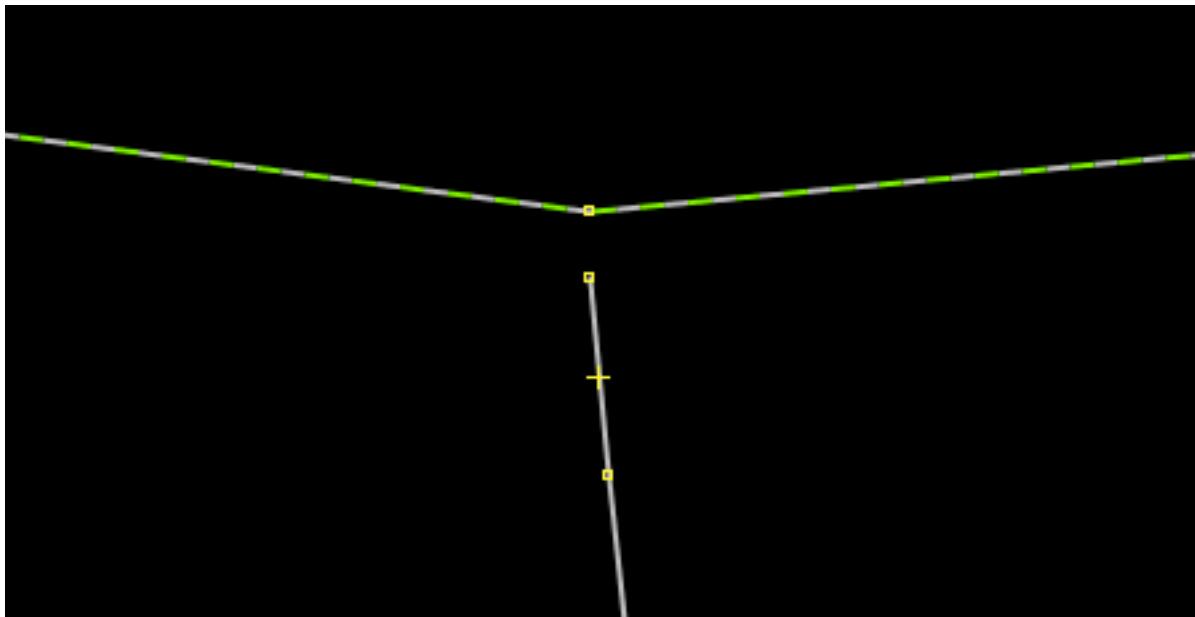


Figure 175: End node near another way

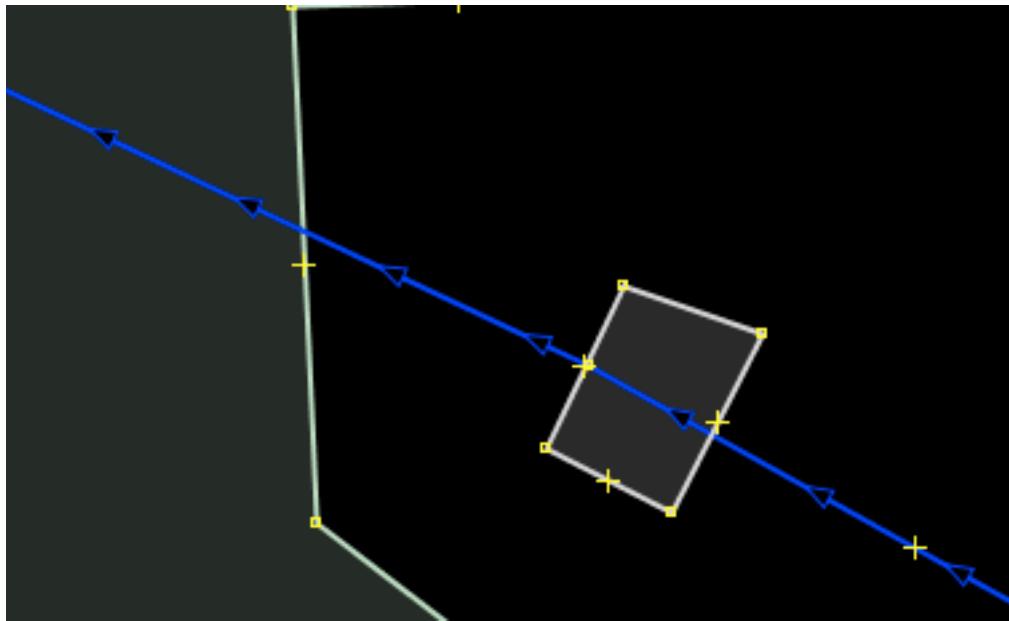


Figure 176: Crossing ways

objects and attribute data is a good way to contribute.

## Summary

In this chapter we have covered several ways of improving our contributions to OpenStreetMap. We have discussed some common problems mappers have when editing with JOSM, and how to avoid such mistakes. We have looked at the JOSM validation tool, which helps keep OpenStreetMap free from errors, and helps us keep the data clean and good. Finally, we looked at HOT's Tasking Manager tool, which is a great way for mappers around the world to coordinate on a project.

## Tasking Manager

In the previous chapter, we looked at various ways to ensure quality when contributing to OpenStreetMap. In this section, we will take a look at the HOT Tasking Manager, a tool that mappers can use to sort an area into a grid, and work together to map an area in an organized way.

One consistent challenge is coordinating field and/or remote workers to map an area together. To help address this, HOT has developed an OpenStreetMap Tasking Tool to make it easier for administrators to define the areas of mapping interest and to delegate workers. The idea behind this tool is that if there is an area, let's say a city, that we want to map, and we have some people mapping on the ground, and some people mapping remotely using satellite imagery, this tool will allow us to create a grid of the entire area. Collaborators can select blocks in the grid that they plan to map, and when they finish, they can mark that area as complete. In this way a team of many people can coordinate to map the entire grid.

To see how the tasking manager works, let's take a closer look.

- Open your Internet browser and go to [tasks.hotosm.org](http://tasks.hotosm.org). You will see a page like this:

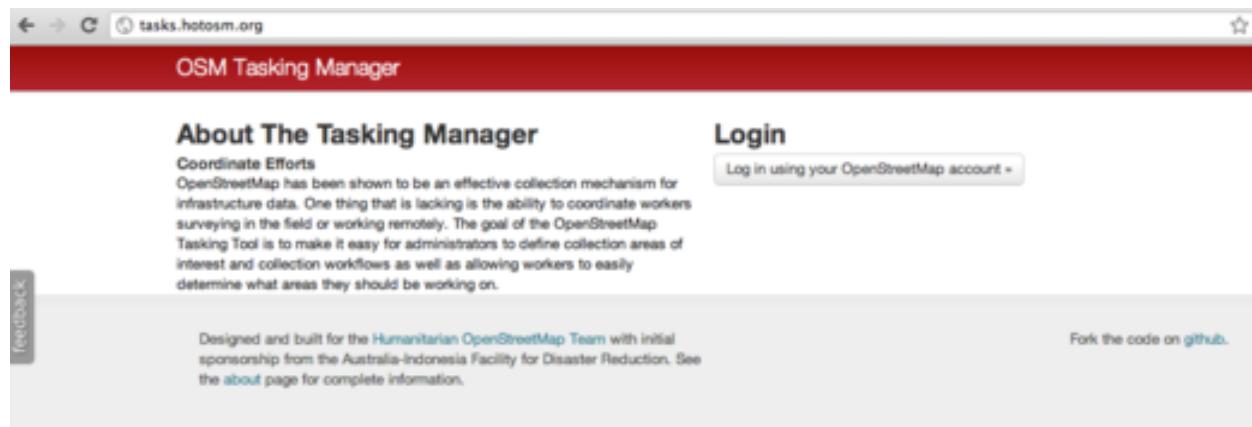


Figure 177: HOTOSM Page

- Click "Log in using your OpenStreetMap account >>"
- Here you are agreeing to allow this application some access to your OpenStreetMap account. Click "Save Changes."

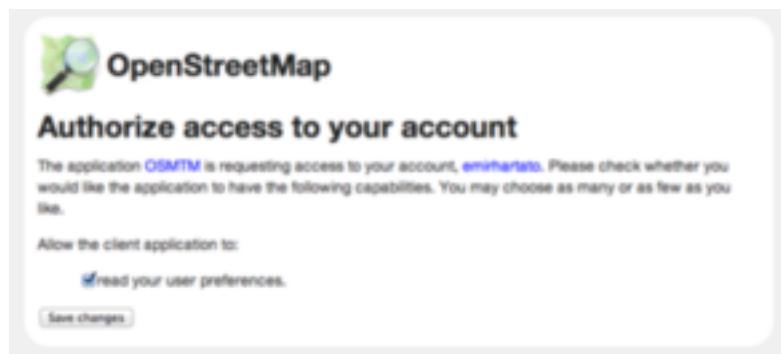


Figure 178: Authorization to access account

- Now you will see the current list of projects. These are different places that people are coordinating to map.

Find a job...

All Jobs    Featured Jobs    My Jobs

**Lira/Red Cross ↗**    1    12%

New job, w/ better sized task

Help the Red Cross prepare for disasters by mapping the city of Lira in northern Uganda. The resulting maps will be complemented by on-the-ground data collection by Red Cross volunteers and affected communities. We'll use this map to mitigate the spread of fires and the impact of floods and reduce the number of lives lost to traffic accidents.

Last updated 5 minutes

**Gulu/Red Cross ↗**    1    11%

New job w/ better sized tasks

Help the Red Cross prepare for disasters by mapping the city of Gulu in northern Uganda. The resulting maps will be complemented by on-the-ground data collection by Red Cross volunteers and affected communities. We'll use this map to mitigate the spread of fires and the impact of floods and reduce the number of lives lost to traffic accidents.

Last updated 34 minutes

**Help Map Iran after earthquake ↗**    49%

[From Andrew Buck via HOT Mailing List]

There has been a major earthquake in northern Iran. USGS has two earthquakes recorded, a magnitude 6.3 and a 6.4. Here are the links for the relevant information. [BBC](#) | [USGS](#)

OSM Permalink to the 6.4 epicenter (the 6.3 is right near here too)

Last updated 17 hours, 12 minutes

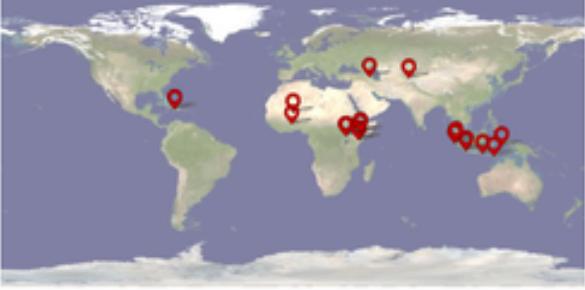


Figure 179: Current list of tasks

- Click on one of the projects to see more information about it.

## Lira/Red Cross

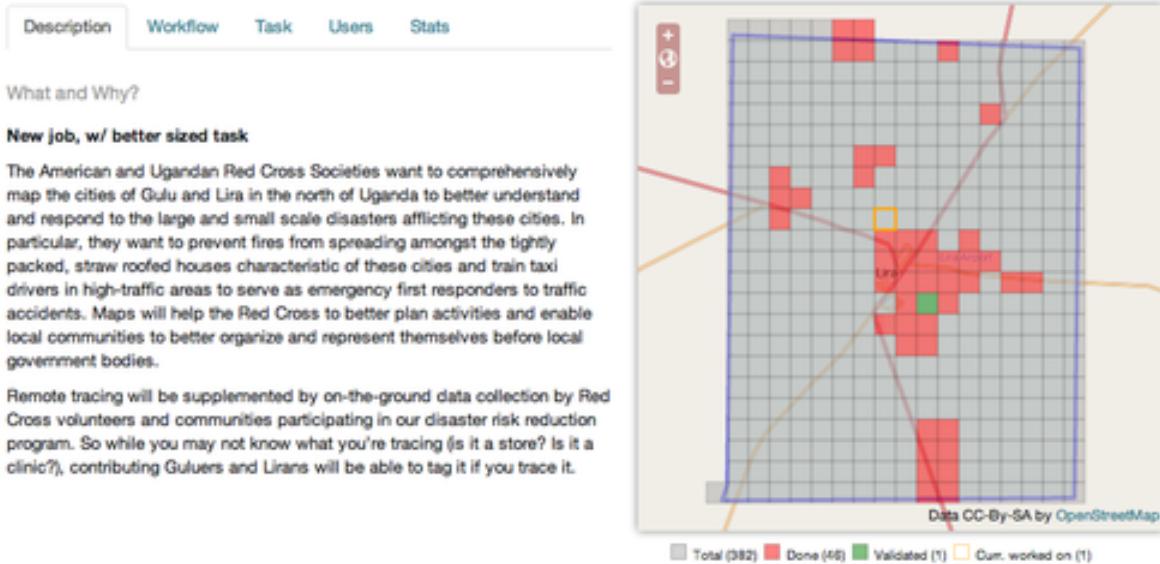


Figure 180: Task's Information

- This page shows you everything you need to know about the project. On the left side of the page is the description of mapping project and how to make it organized. You can click on the different tabs to get more information. On the right side is a grid showing the area to be mapped. Red grid squares have been completed, green squares have been completed and checked by another person, and the remaining squares still need to be mapped or are being worked on. By clicking on the “Workflow” tab, you can get information about how collaborators are meant to help map. By clicking on “Task,” you can take a grid square to work on yourself.
- Here, you see a view of square that you have offered to map. You can automatically open the area up for editing with JOSM, Potlatch 2, or create a Field Paper.
- If you’re going to edit on JOSM, you need to enable JOSM plugin before you will be able to launch the application from the Tasking Manager. To do this, open JOSM and go the Preferences menu. Click on the “Remote Settings” tab and check the box next to “Enable remote control.” Restart JOSM.
- Go back to the Tasking Manager and choose JOSM. If you have JOSM open and you correctly enabled the remote control, the grid area of the map you selected will automatically be loaded into JOSM.
- You may now edit the area using the instructions provided in the project information. When you are finished, you can return to the tasking manager website and add comments about your changes. Click “Mark task as done” to let other collaborators know that you have finished this grid square. If you were unable to complete the task, click “Unlock it” to make it available again for other mappers.
- If you are wondering what happens when you finish an area, the grid square will turn red on the map to indicate that is done. Someone else will then look at your work to make sure it is good, and if they agree that you’ve completed the square well, the grid square will turn green, meaning it is complete!

## Summary

The Tasking Manager can be quite useful for mapping an area rapidly and ensuring completeness and data quality. It can be quite helpful in managing many various mappers both in one location and around the

## Lira/Red Cross

Description Workflow Task **Users** Stats

1. Open the area in your favorite editing tool.

JOSM Potlatch 2 Walking Papers

Link to .osm file.

2. Trace the elements.

Access to this imagery is limited by the NextView license agreement.  
You need to review and acknowledge the agreement.

3. Add a comment and mark the task as done.

Comment

Mark task as done

Can't work on this task right now? No problem. [Unlock it!](#). Otherwise, it will be automatically unlocked in 118 minutes.

Data CC-BY-SA by OpenStreetMap

Total (382) Done (46) Validated (1) Curr. worked on (2)

Figure 181: Take a task

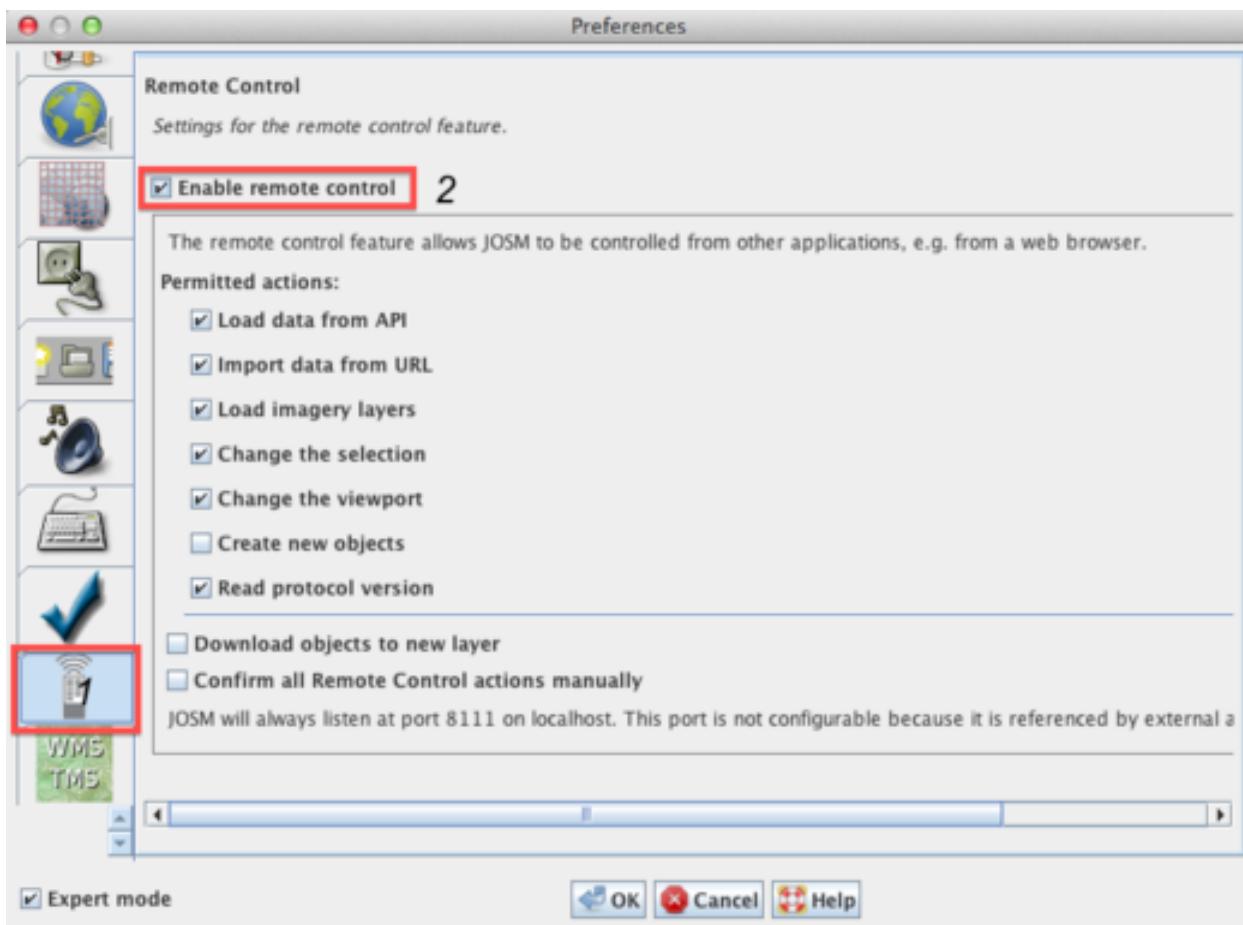


Figure 182: Enable remote control

3. Add a comment and mark the task as done.

Comment

Mark task as done

Can't work on this task right now? No problem. [Unlock it!](#). Otherwise, it will be automatically unlocked in 105 minutes.

Figure 183: After taking task

world.

## **GPS Essentials**

In this chapter we will see how we can record tracks and waypoints without a GPS Garmin device. We will use an application called GPS essentials, a GPS tool that you can get for your mobile device, which allows you to record tracks, waypoints, routes, and geotag photos. This chapter will teach you how to download the application and use its feature such as marking a waypoint, recording tracks and geotagging photos.

### **Installation of GPS Essentials**

1. Tap the “Google Play Store” app icon on your Android device’s home screen to open the Android Market.
2. Tap the “Search” icon in the upper right corner.
3. Use the search bar at the top to search for “GPS Essentials”.
4. Tap the GPS Essentials icon and select “Install”. The icon looks like this:

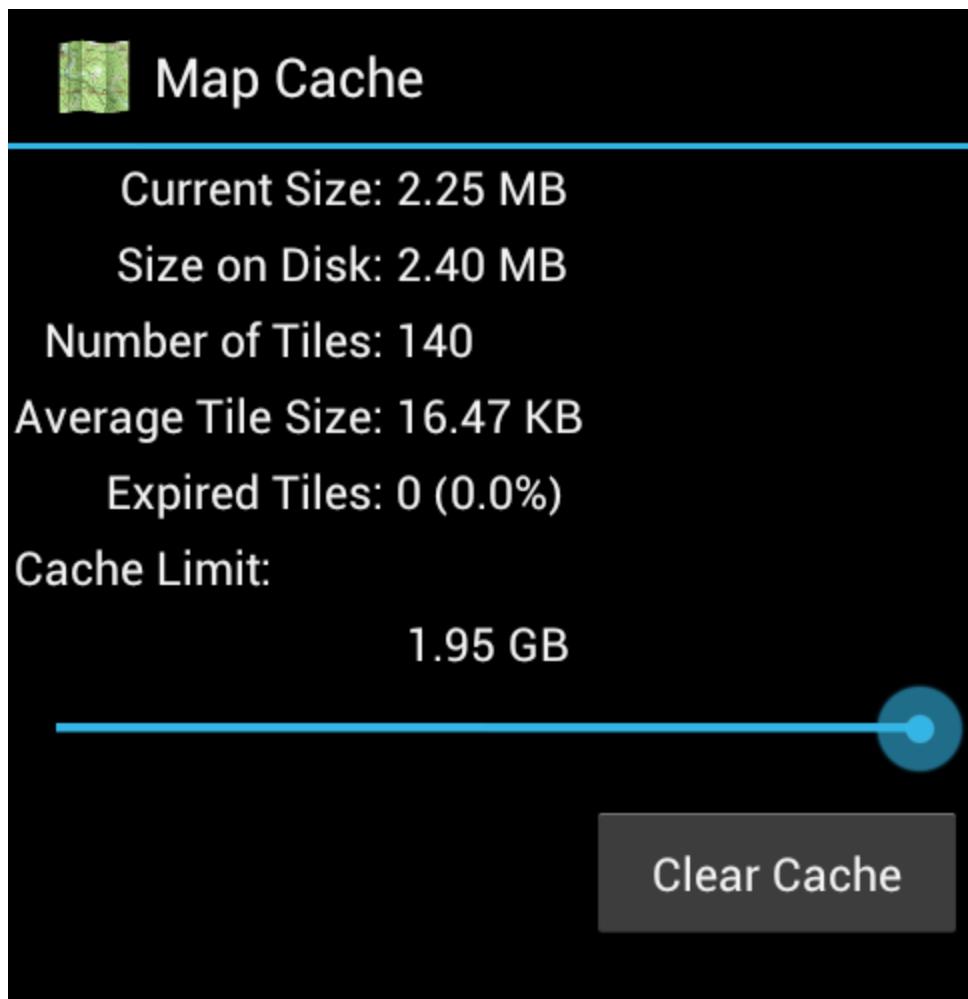


Figure 184: GPSElogo

If you don’t have access to Google Play or if you want to download versions other than the stable release such as older versions or the latest beta, you can download GPS Essentials from <http://www.gpsessentials.com>.

### **Configure GPS Essentials to Work Offline**

1. Open GPS Essentials. Go to Settings and select Map Cache. Move the cache limit to maximum.

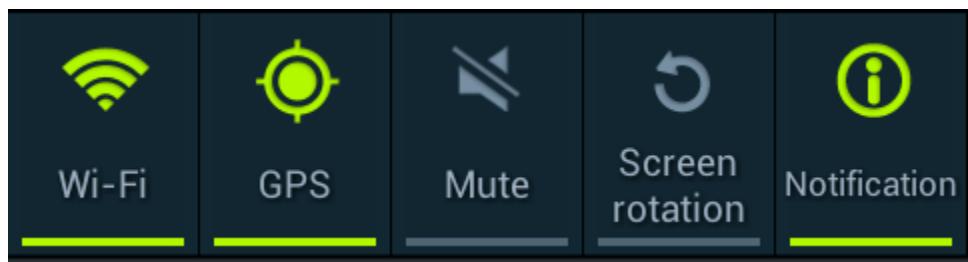


Map Cache

2. Find a strong network connection. From main screen, select ‘Portable Maps’. Every map you view in portable map mode automatically saves to the Android’s memory. Save maps you will need offline in as much detail as possible, and slowly zoom in on each waypoint.
3. Disconnect from the network and view maps in portable map mode. If some maps lack detail, re-connect to a network and slowly zoom in on the map location you need.

### GPS feature on Android phone

Before using the GPS Essentials Application, make sure the GPS in your Android phone is enabled.



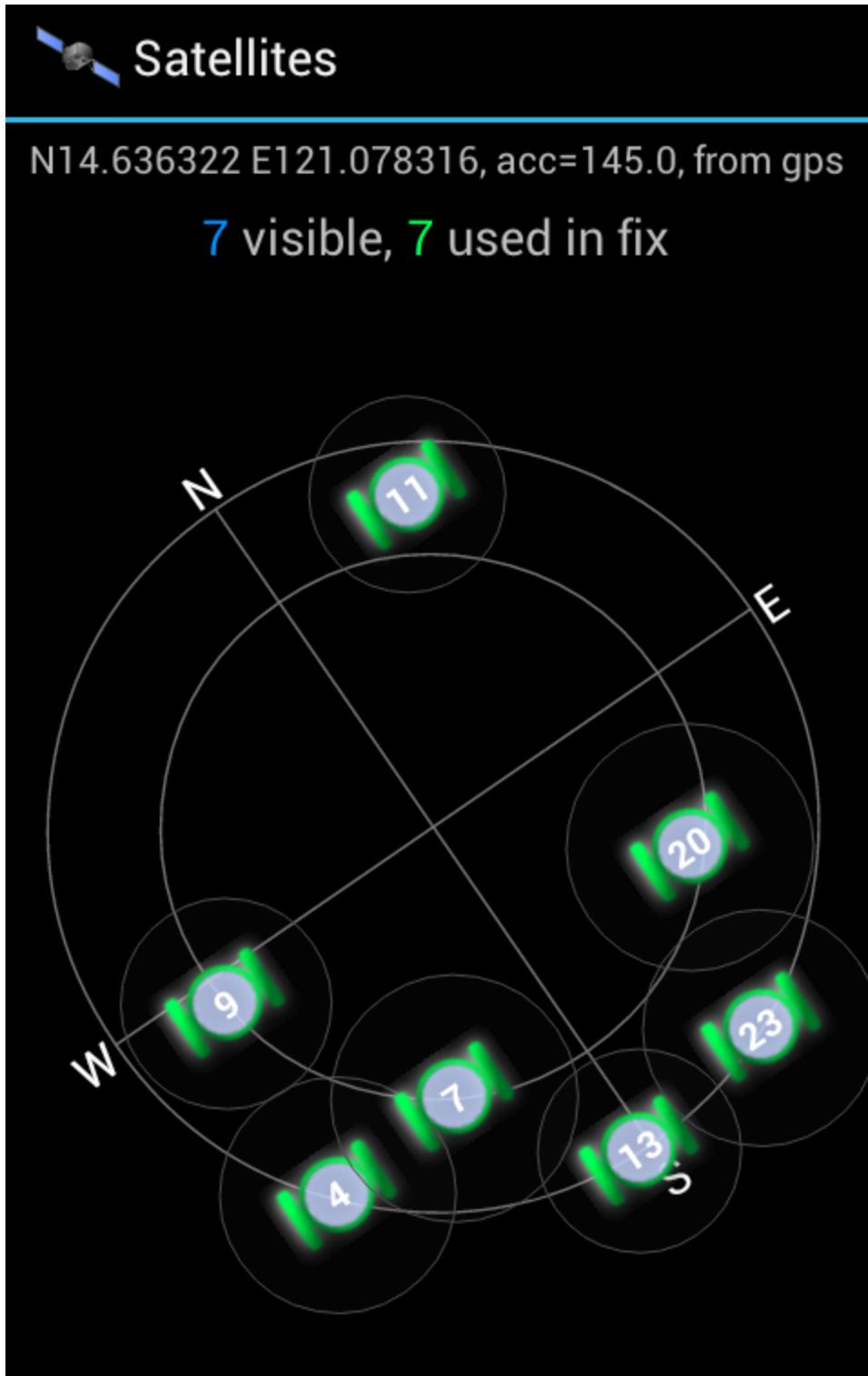
GPS Feature

## **Acquiring Satellites**

Before a GPS receiver emits a location (also called a GPS fix), it must receive signals from at least 4 satellites. The lower the satellite is above the horizon, the longer its signals travel through the atmosphere so satellites high above the horizon usually have better signals.

To check the satellites in your area:

1. From the main menu, select Satellites.

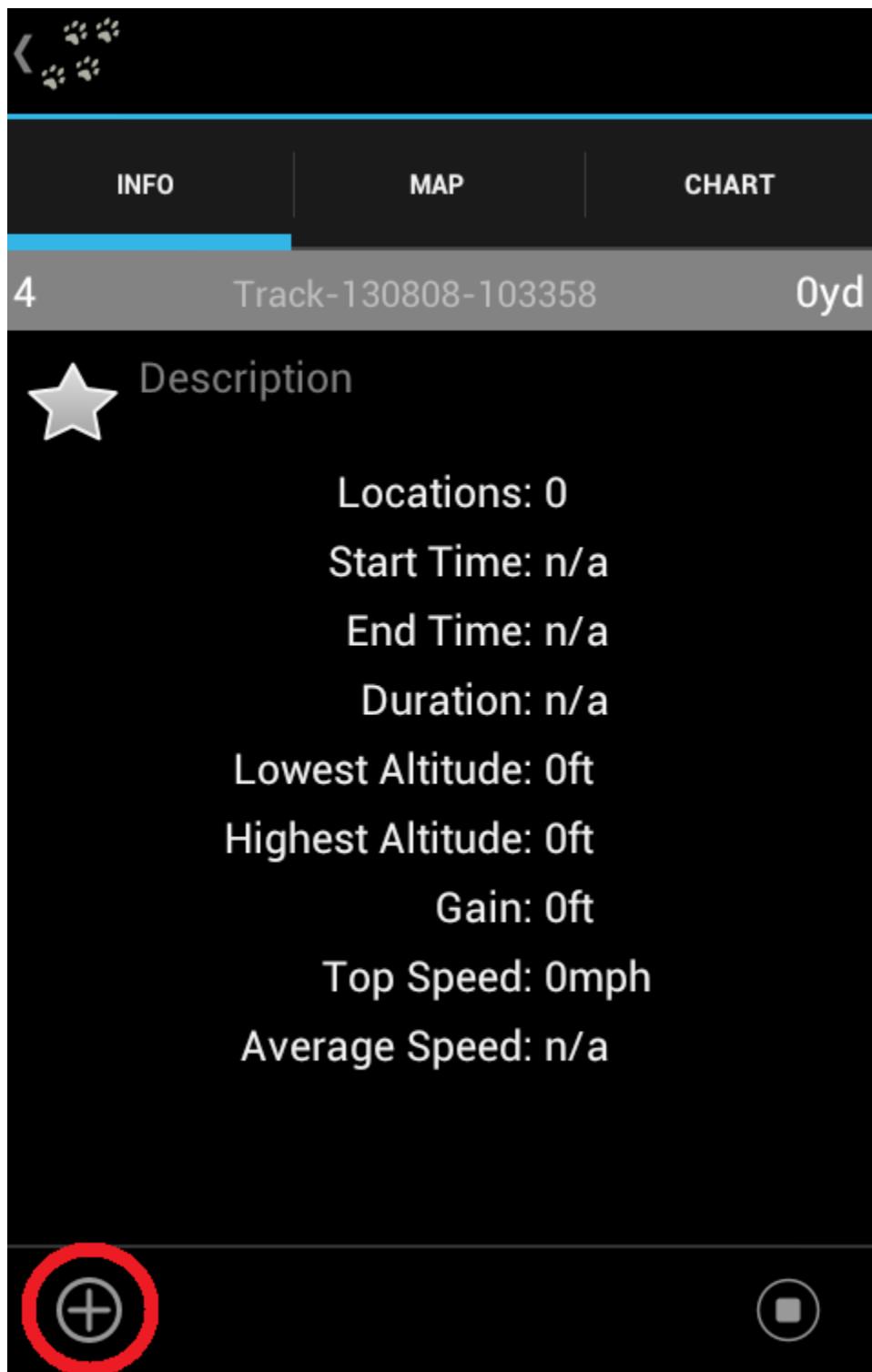


2. If there are at least 4 satellites used in fix, then you may start using the GPS Essentials features.

## Creating Tracks

1. From the main menu, select Tracks.

2. Tap on Start from the toolbar. It will create a new track and start recording. Wait some seconds until GPS fix is available.



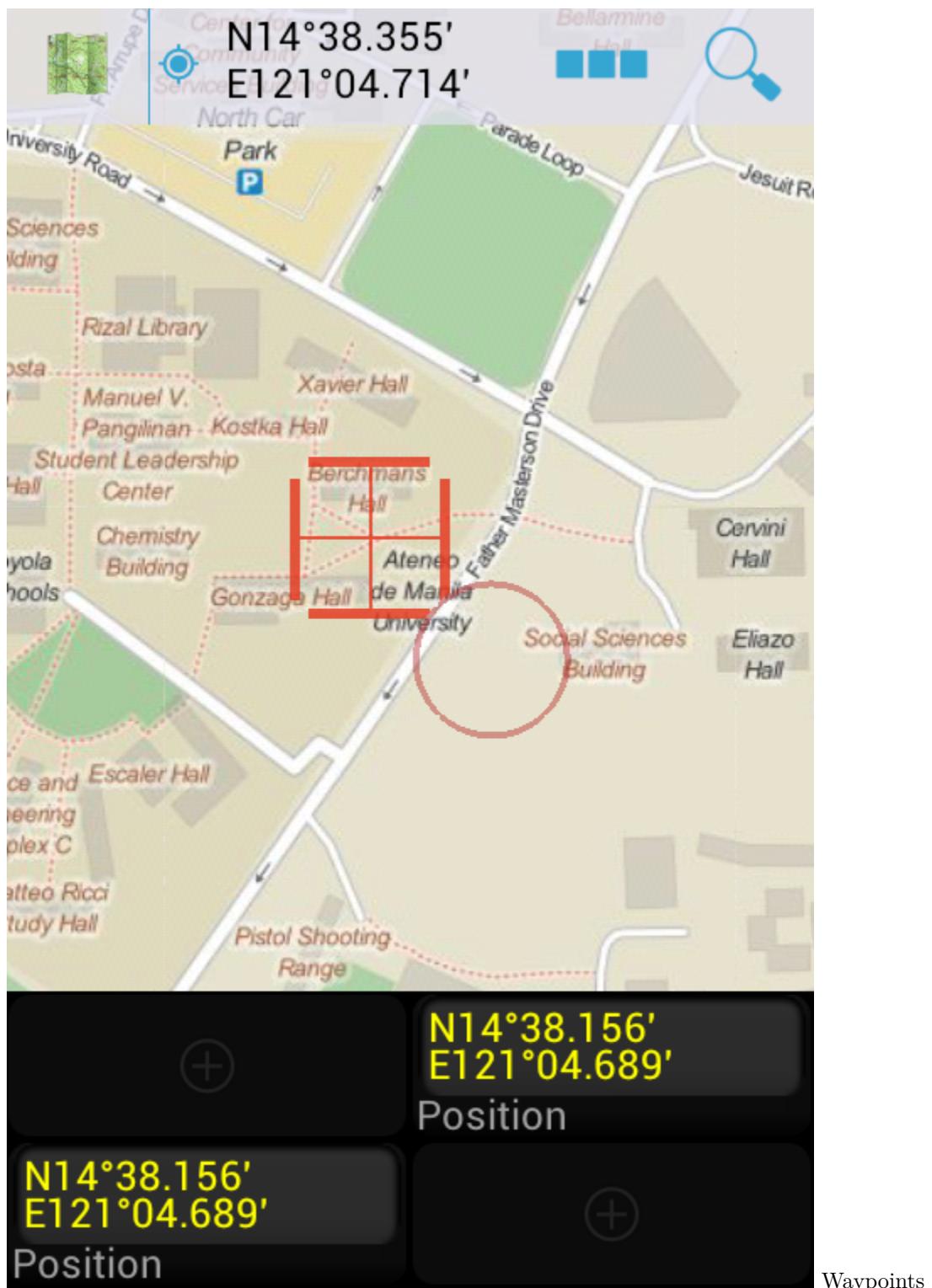
3. Select Pause button to pause recording. If you want to continue recording, press it again.

## **Creating Waypoints**

### **Using Portable Maps**

1. From the main menu, select Portable Maps.

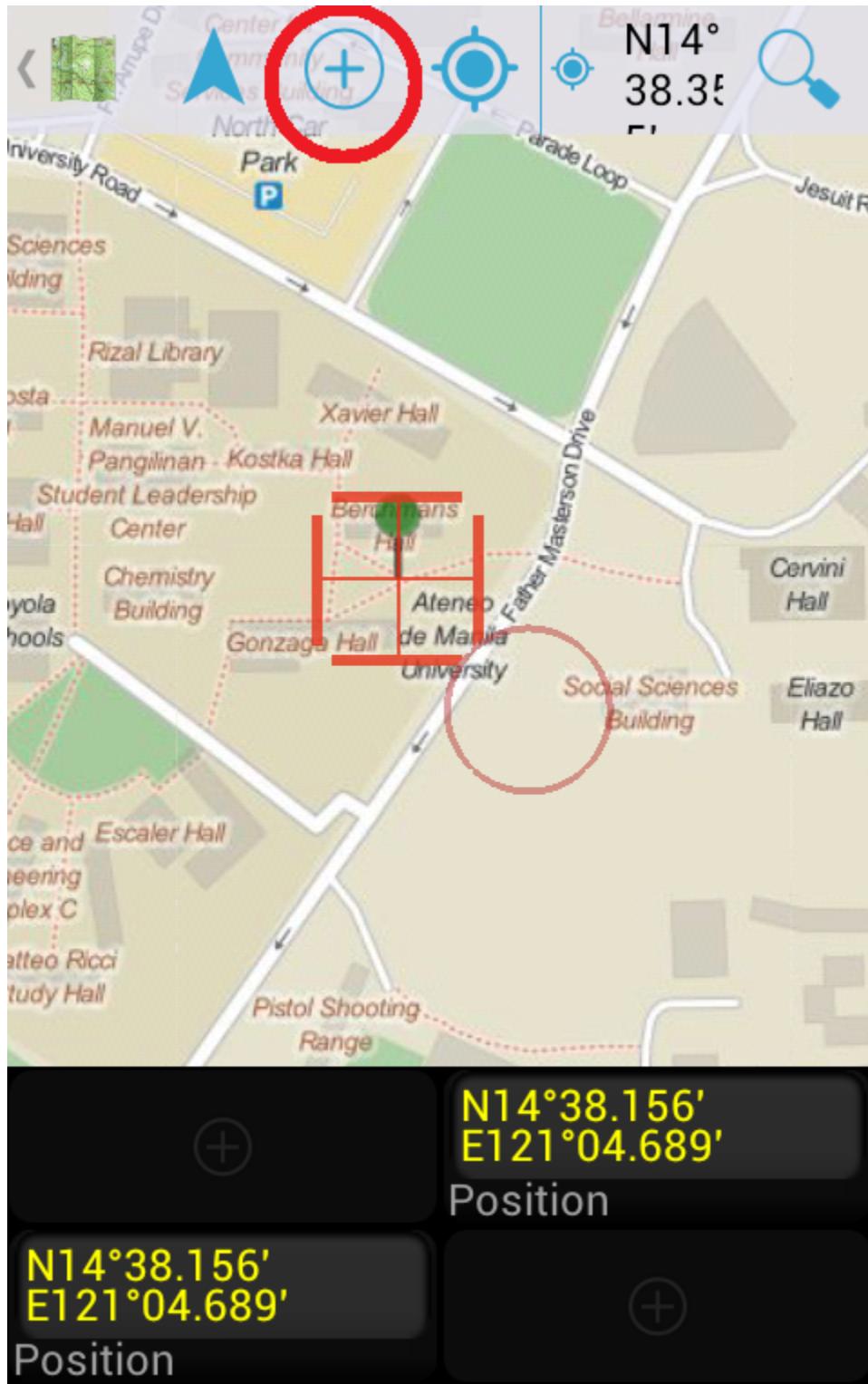
2. Tap and hold on the map to create a new cursor.



3. Drag the cursor onto the location where you want the new waypoint.
4. Tap on Actions to show the actions pane. The Actions icon looks like this:
5. Select the Add Tool to create the waypoint.

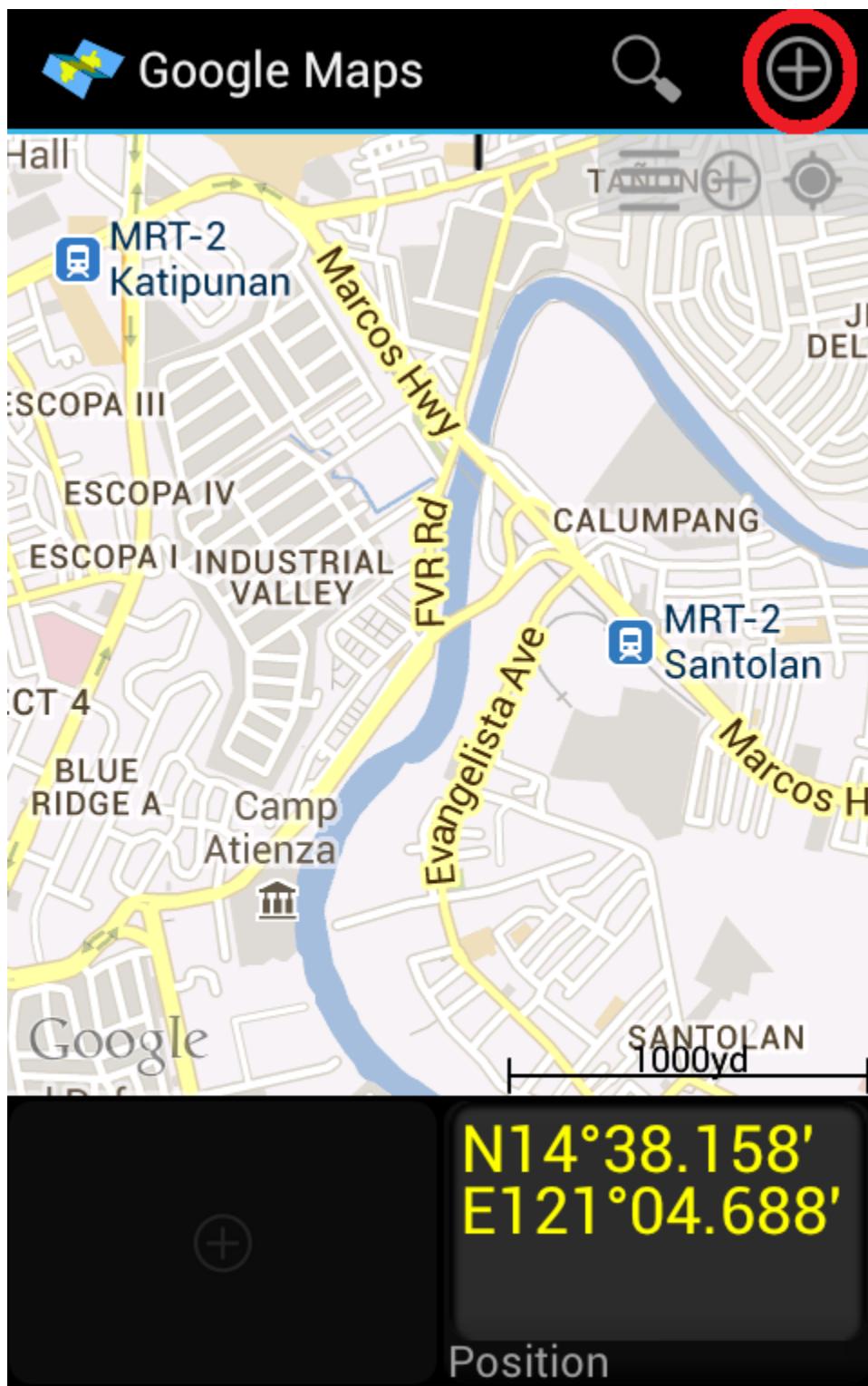


Figure 185: Actions



## **Using Google Maps**

1. From the main menu, select Google Maps.
2. Go to the location where you want to add your waypoint.
3. Select the Add Tool to create the waypoint. Tap on the location on the map to create a Waypoint there. If you want to create a waypoint at your current location, tap the Add Waypoint button again.

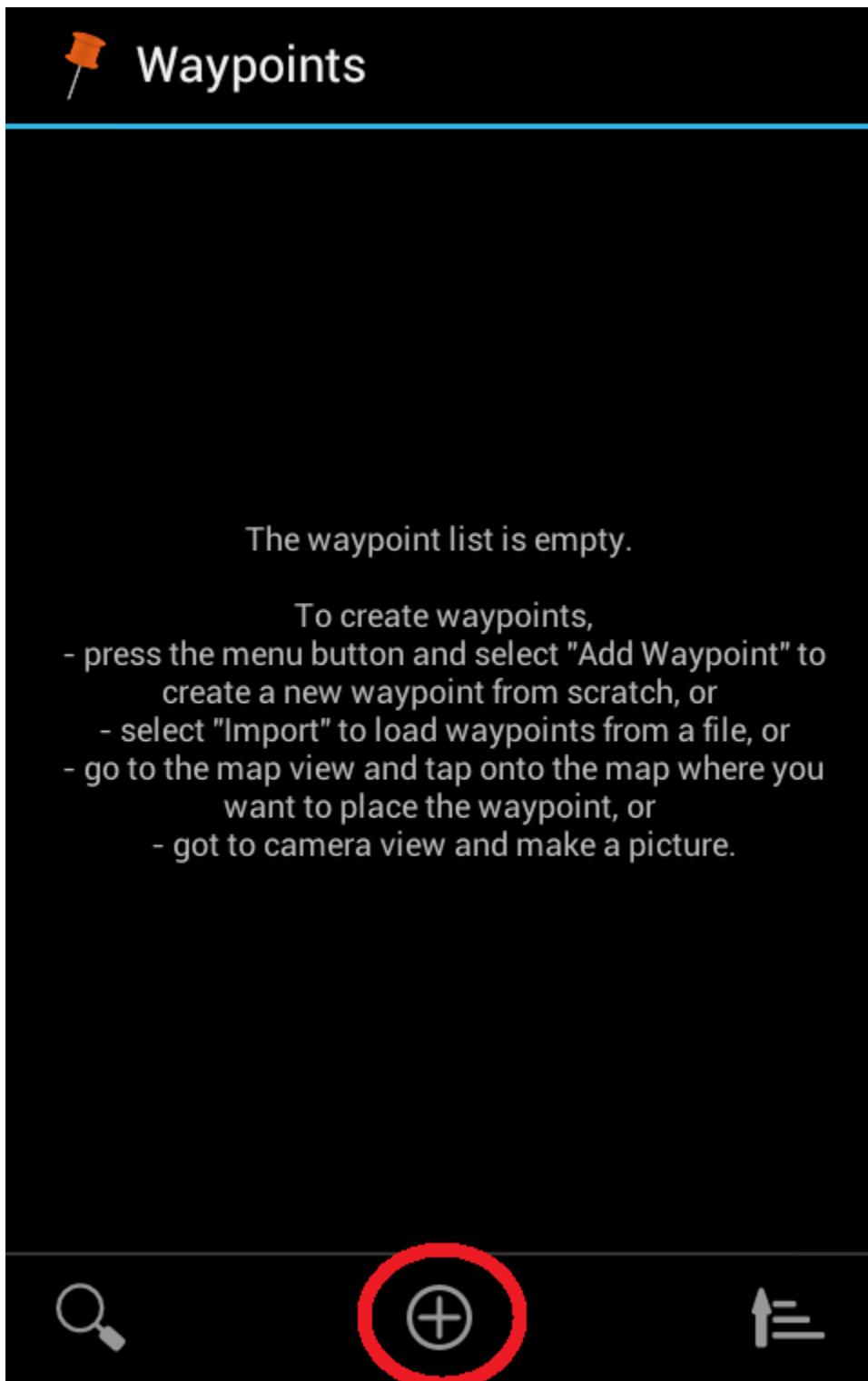


4. Repeat steps b and c until you are finished recording your desired waypoints.

#### Using Waypoints page

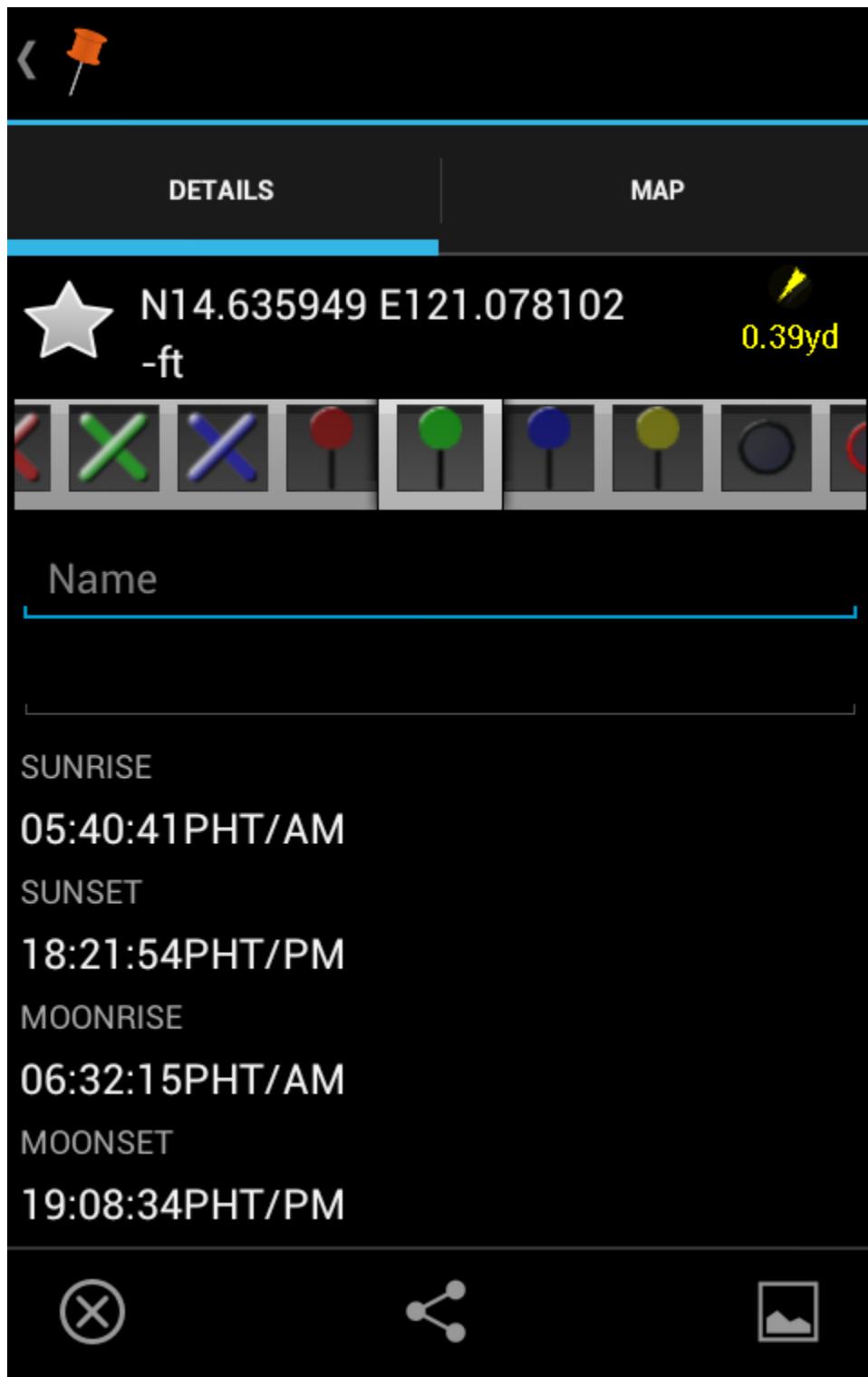
1. From the main menu, select Waypoints.

2. Select the Add tool to create the waypoint.



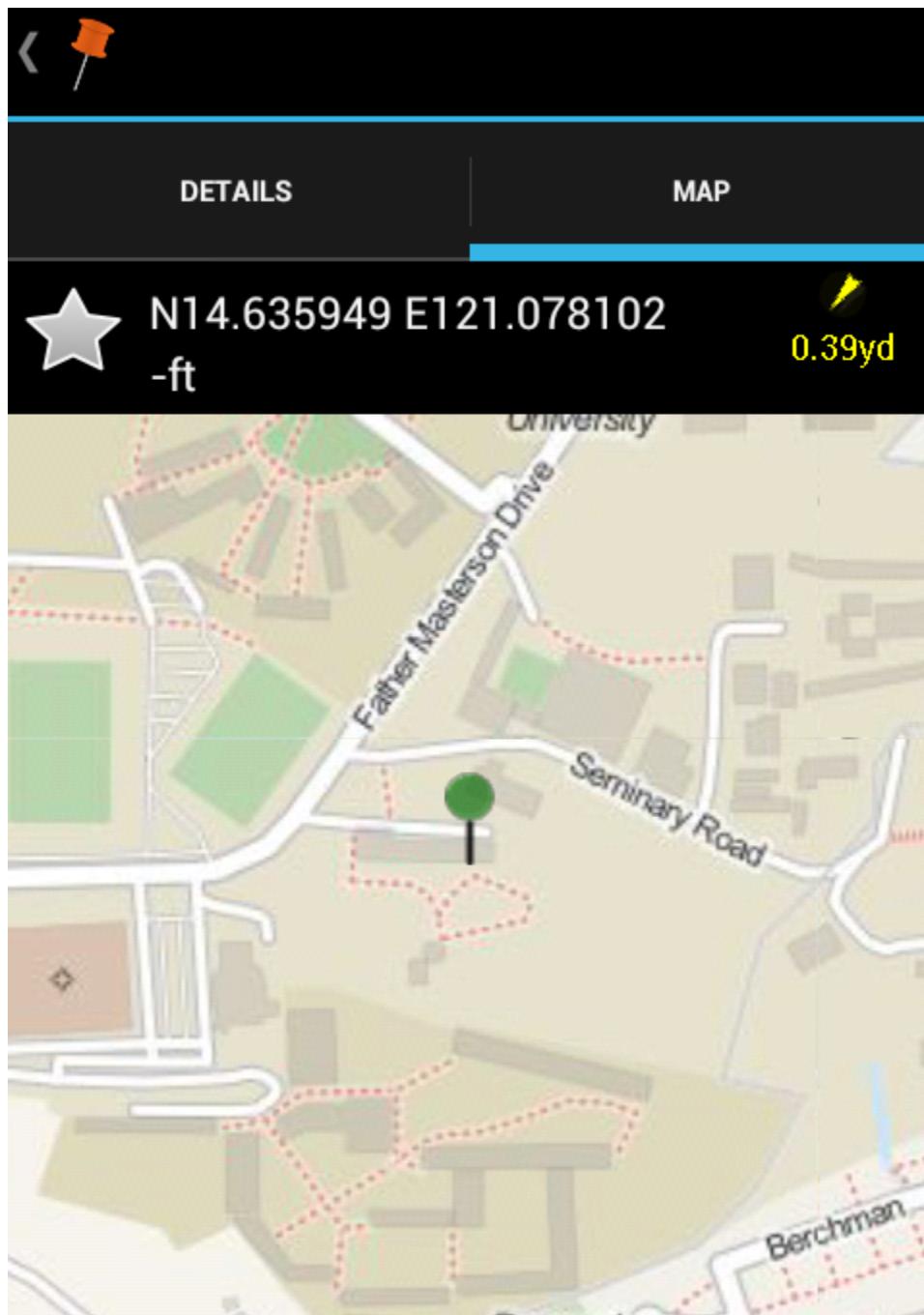
Waypoints Page 1

3. It will start recording your 1st waypoint. You may change the attributes of the waypoint and then press Back to get back to the list.



Waypoints Page 2

4. When you select the Map pane, you will see where your waypoint is located on the map.



Waypoints Page 3

5. Select Close icon to save your waypoint. The Close icon looks like this:



Figure 186: Close

## **Geotagging Photos**

1. From the main menu, select Camera.
2. Take a picture of your desired area for geotagging.
3. The photo you took will serve as a waypoint and automatically be saved on the Portable Maps and Google Maps page.
4. The data (picture location and the photo file name) will also be logged on the Waypoints page. You may also choose which icon to be used for a particular image. The icon will be shown on the Portable Maps and Google Maps page as well.

## **Saved Photos**

All your pictures are in the folder com.mictale.images/images on your SD card. You can delete pictures from this folder and you can even add new ones. GPS Essentials scans this folder regularly to see what's new.

## **Exporting/Saving Waypoints**

1. From the main menu, select Waypoints. It will show you the list of waypoints you recorded.
2. To export all the waypoints, select Export from the Options button. If you want to export a single waypoint, select the desired waypoint, click the Options button and select Export.
3. The dropdown box will let you select what type of file you want your data to be exported. For now, click KML (Google Earth).



## Export

KML (Google Earth)

### KML (Google Earth)

Exports KML optimized for Google Earth (uses gx:track elements)

### KML (Google Maps)

Exports KML optimized for Google Maps

### GPX 1.0

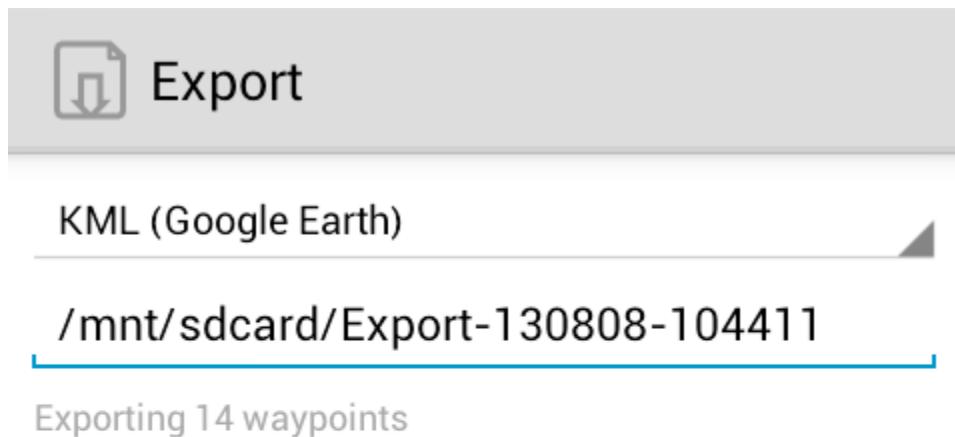
Exports GPX version 1.0

### GPX 1.1

Exports GPX version 1.1

Export 1

4. Select the SD card icon to manually select your desired location of the file.



5. Click this icon to Save.



Figure 187: Arrow

## Exporting/Saving Tracks

1. From the main menu, select Tracks. It shows the data from the current track you recorded.
2. Select Export from the Options button to write the contents of the current track to a file.
3. If you want to export the previous track you recorded, select Tracks icon and choose the desired track. Click the Options button and select Export. The Tracks icon looks like this:

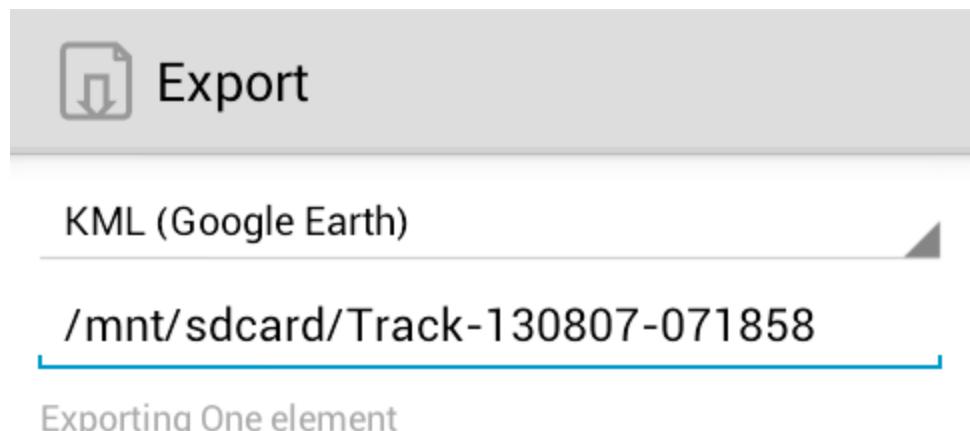


Figure 188: Footprints

4. The dropdown box will let you select what type of file you want your data to be exported. For now, click KML (Google Earth).



5. Select the SD card icon to manually select your desired location of the file.



6. Click this icon to Save.



Figure 189: Arrow

## **CC0 1.0 Universal (CC0 1.0) Public Domain Dedication**

CREATIVE COMMONS CORPORATION IS NOT A LAW FIRM AND DOES NOT PROVIDE LEGAL SERVICES. DISTRIBUTION OF THIS DOCUMENT DOES NOT CREATE AN ATTORNEY-CLIENT RELATIONSHIP. CREATIVE COMMONS PROVIDES THIS INFORMATION ON AN “AS-IS” BASIS. CREATIVE COMMONS MAKES NO WARRANTIES REGARDING THE USE OF THIS DOCUMENT OR THE INFORMATION OR WORKS PROVIDED HEREUNDER, AND DISCLAIMS LIABILITY FOR DAMAGES RESULTING FROM THE USE OF THIS DOCUMENT OR THE INFORMATION OR WORKS PROVIDED HEREUNDER.

### **Statement of Purpose**

The laws of most jurisdictions throughout the world automatically confer exclusive Copyright and Related Rights (defined below) upon the creator and subsequent owner(s) (each and all, an “owner”) of an original work of authorship and/or a database (each, a “Work”).

Certain owners wish to permanently relinquish those rights to a Work for the purpose of contributing to a commons of creative, cultural and scientific works (“Commons”) that the public can reliably and without fear of later claims of infringement build upon, modify, incorporate in other works, reuse and redistribute as freely as possible in any form whatsoever and for any purposes, including without limitation commercial purposes. These owners may contribute to the Commons to promote the ideal of a free culture and the further production of creative, cultural and scientific works, or to gain reputation or greater distribution for their Work in part through the use and efforts of others.

For these and/or other purposes and motivations, and without any expectation of additional consideration or compensation, the person associating CC0 with a Work (the “Affirmer”), to the extent that he or she is an owner of Copyright and Related Rights in the Work, voluntarily elects to apply CC0 to the Work and publicly distribute the Work under its terms, with knowledge of his or her Copyright and Related Rights in the Work and the meaning and intended legal effect of CC0 on those rights.

1. Copyright and Related Rights. A Work made available under CC0 may be protected by copyright and related or neighboring rights (“Copyright and Related Rights”). Copyright and Related Rights include, but are not limited to, the following:
  - i. the right to reproduce, adapt, distribute, perform, display, communicate, and translate a Work;
  - ii. moral rights retained by the original author(s) and/or performer(s);
  - iii. publicity and privacy rights pertaining to a person’s image or likeness depicted in a Work;
  - iv. rights protecting against unfair competition in regards to a Work, subject to the limitations in paragraph 4(a), below;
  - v. rights protecting the extraction, dissemination, use and reuse of data in a Work; vi. database rights (such as those arising under Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, and under any national implementation thereof, including any amended or successor version of such directive); and
  - vi. other similar, equivalent or corresponding rights throughout the world based on applicable law or treaty, and any national implementations thereof.
2. Waiver. To the greatest extent permitted by, but not in contravention of, applicable law, Affirmer hereby overtly, fully, permanently, irrevocably and unconditionally waives, abandons, and surrenders all of Affirmer’s Copyright and Related Rights and associated claims and causes of action, whether now known or unknown (including existing as well as future claims and causes of action), in the Work (i) in all territories worldwide, (ii) for the maximum duration provided by applicable law or treaty (including future time extensions), (iii) in any current or future medium and for any number of copies, and (iv) for any purpose whatsoever, including without limitation commercial, advertising or promotional purposes

(the “Waiver”). Affirmer makes the Waiver for the benefit of each member of the public at large and to the detriment of Affirmer’s heirs and successors, fully intending that such Waiver shall not be subject to revocation, rescission, cancellation, termination, or any other legal or equitable action to disrupt the quiet enjoyment of the Work by the public as contemplated by Affirmer’s express Statement of Purpose.

3. Public License Fallback. Should any part of the Waiver for any reason be judged legally invalid or ineffective under applicable law, then the Waiver shall be preserved to the maximum extent permitted taking into account Affirmer’s express Statement of Purpose. In addition, to the extent the Waiver is so judged Affirmer hereby grants to each affected person a royalty-free, non transferable, non sublicensable, non exclusive, irrevocable and unconditional license to exercise Affirmer’s Copyright and Related Rights in the Work (i) in all territories worldwide, (ii) for the maximum duration provided by applicable law or treaty (including future time extensions), (iii) in any current or future medium and for any number of copies, and (iv) for any purpose whatsoever, including without limitation commercial, advertising or promotional purposes (the “License”). The License shall be deemed effective as of the date CC0 was applied by Affirmer to the Work. Should any part of the License for any reason be judged legally invalid or ineffective under applicable law, such partial invalidity or ineffectiveness shall not invalidate the remainder of the License, and in such case Affirmer hereby affirms that he or she will not (i) exercise any of his or her remaining Copyright and Related Rights in the Work or (ii) assert any associated claims and causes of action with respect to the Work, in either case contrary to Affirmer’s express Statement of Purpose.

4. Limitations and Disclaimers.

- a. No trademark or patent rights held by Affirmer are waived, abandoned, surrendered, licensed or otherwise affected by this document.
- b. Affirmer offers the Work as-is and makes no representations or warranties of any kind concerning the Work, express, implied, statutory or otherwise, including without limitation warranties of title, merchantability, fitness for a particular purpose, non infringement, or the absence of latent or other defects, accuracy, or the present or absence of errors, whether or not discoverable, all to the greatest extent permissible under applicable law.
- c. Affirmer disclaims responsibility for clearing rights of other persons that may apply to the Work or any use thereof, including without limitation any person’s Copyright and Related Rights in the Work. Further, Affirmer disclaims responsibility for obtaining any necessary consents, permissions or other rights required for any use of the Work.
- d. Affirmer understands and acknowledges that Creative Commons is not a party to this document and has no duty or obligation with respect to this CC0 or use of the Work.