

# Creating a grid layout plugin for QGIS

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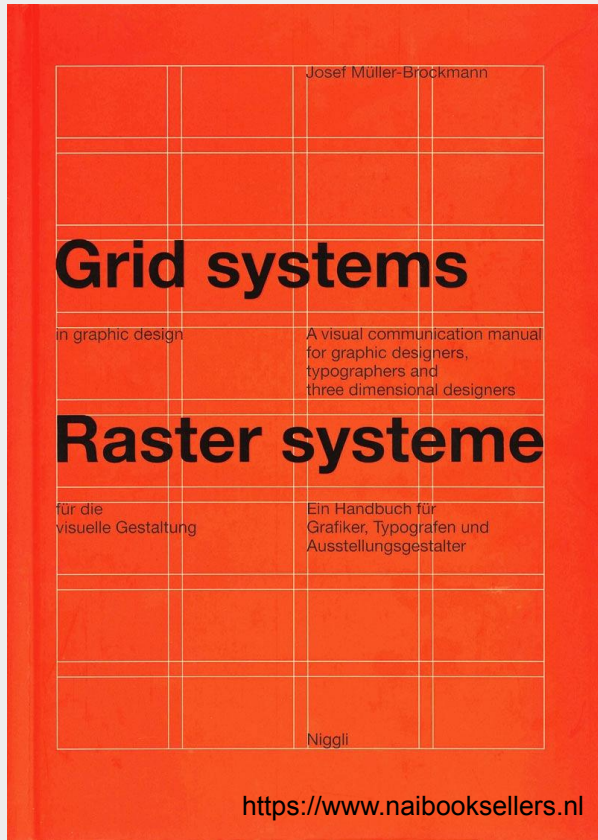
FOSS4GUK Bristol

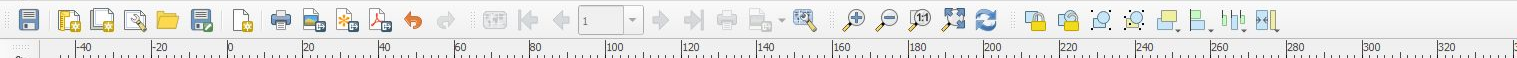
12 November 2024

# Background

- Do lots of training on QGIS
- How to help people make good-looking layouts with minimal effort?
- Good use of space, balance, alignment

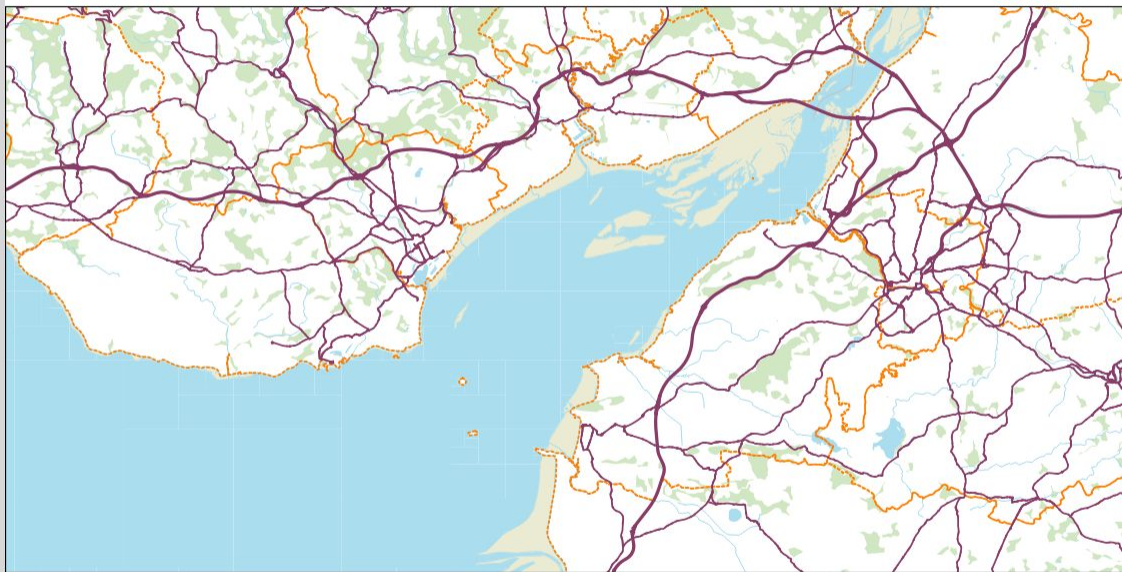
# Grid systems to structure layout





# Local authorities around the Severn Estuary

Production date:  
11/11/2024

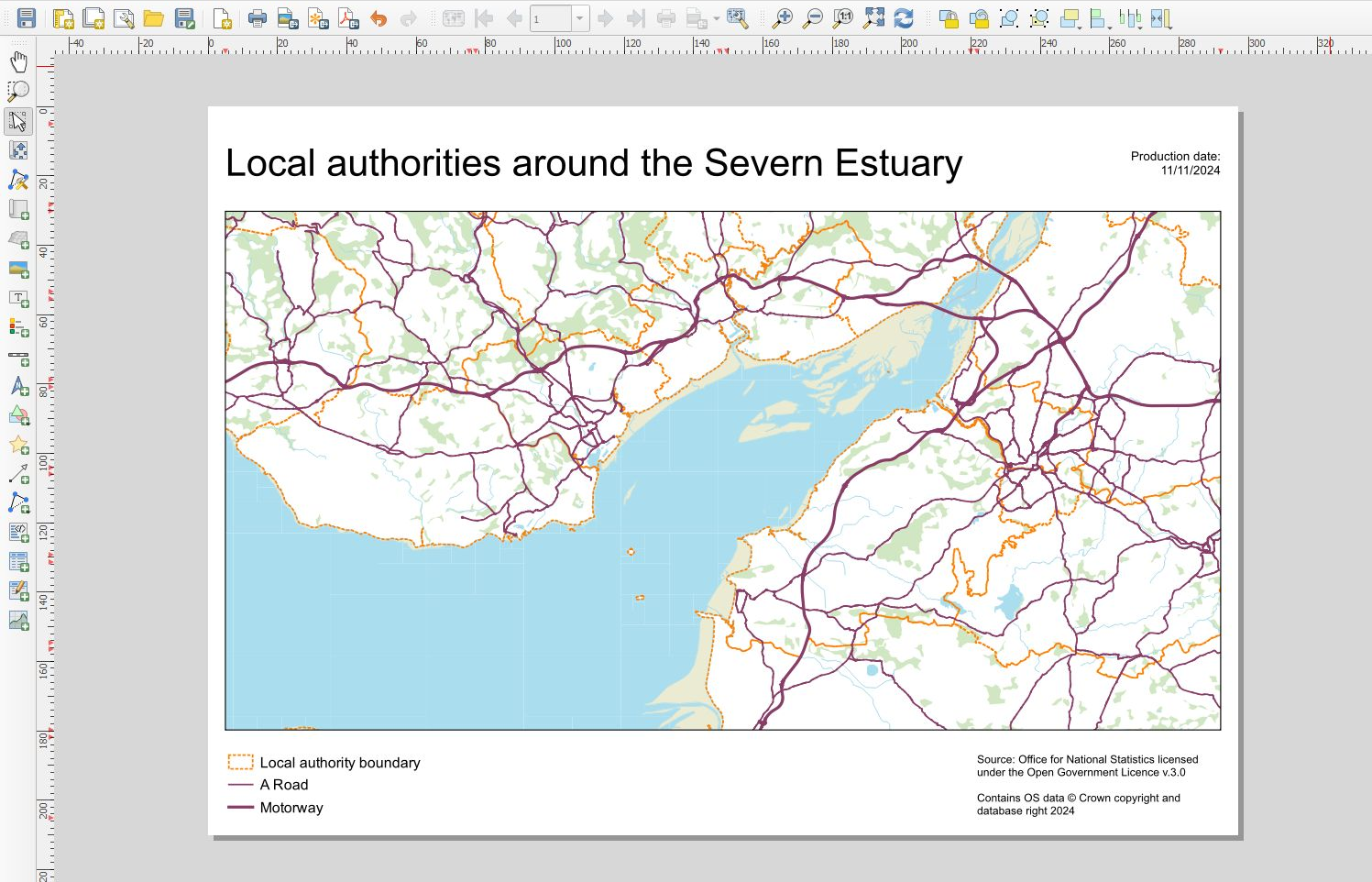


- Local authority boundary
- A Road
- Motorway

Source: Office for National Statistics licensed under the Open Government Licence v.3.0

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Item
<input checked="" type="checkbox"/> <input type="checkbox"/> Source: Office for Nation...
<input checked="" type="checkbox"/> <input type="checkbox"/> <Legend>
<input checked="" type="checkbox"/> <input type="checkbox"/> Map 1
<input checked="" type="checkbox"/> <input type="checkbox"/> Production date: 11/11/20...
<input checked="" type="checkbox"/> <input type="checkbox"/> Local authorities around...



**Items**

- Item
- Source: Office for Nation...
- <Legend>
- Map 1
- Production date: 11/11/20...
- Local authorities around...

**Item Properties** | **Layout** | **Guides** | **Atlas**

**Guides**

Page 1

**Horizontal Guides**

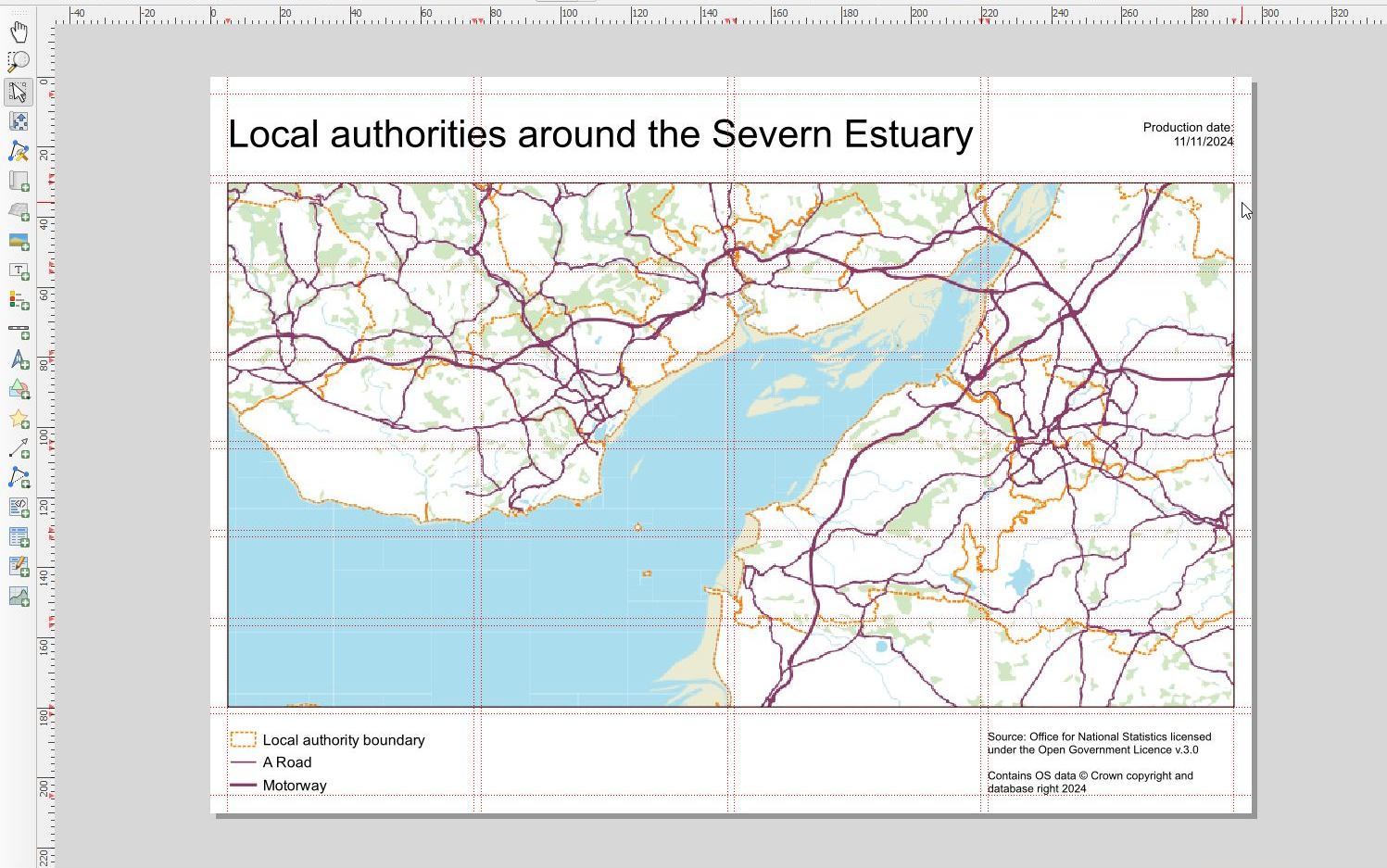
5	mm
28.25	mm
30.25	mm
53.5	mm

**Vertical Guides**

5	mm
75.25	mm
77.25	mm
147.5	mm

Apply to All Pages  
Clear All Guides





Items

Item	Item Properties	Layout	Guides	Atlas
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Source: Office for Nation...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <Legend>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Map 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Production date: 11/11/20...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Local authorities around...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Item Properties Layout Guides Atlas

Guides

Page 1

Horizontal Guides

5	mm
28.25	mm
30.25	mm
53.5	mm

Vertical Guides

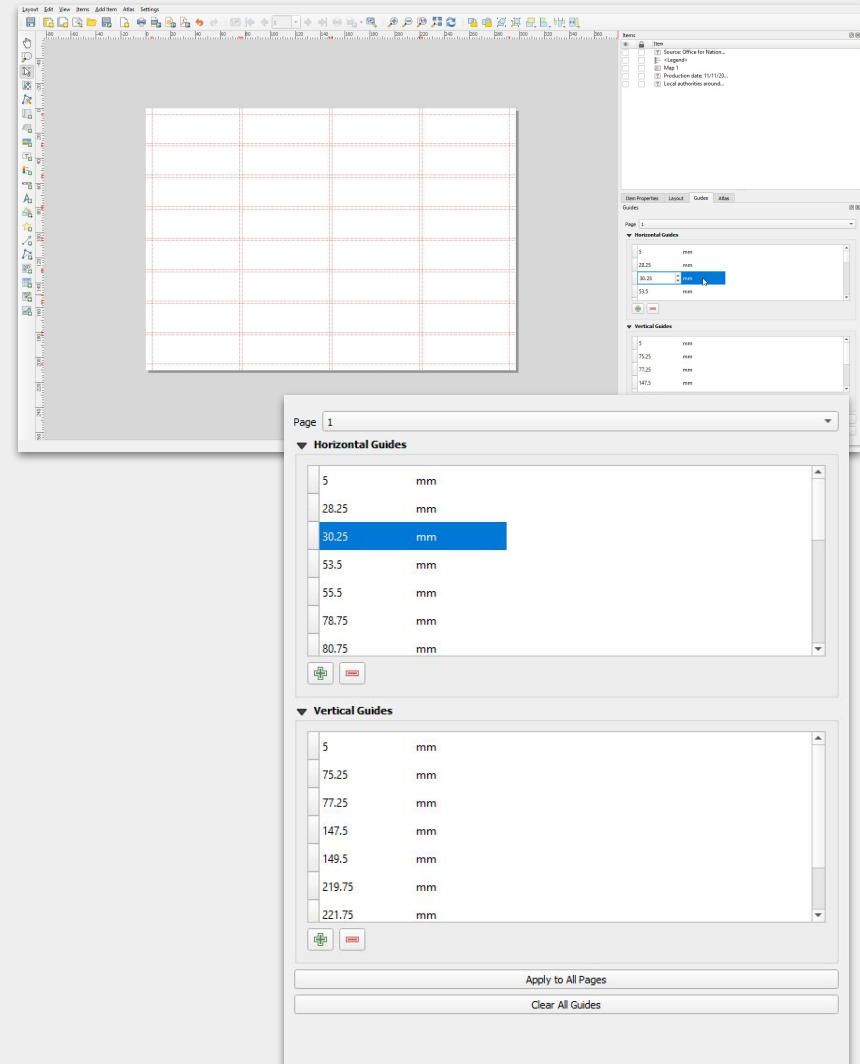
5	mm
75.25	mm
77.25	mm
147.5	mm

Apply to All Pages

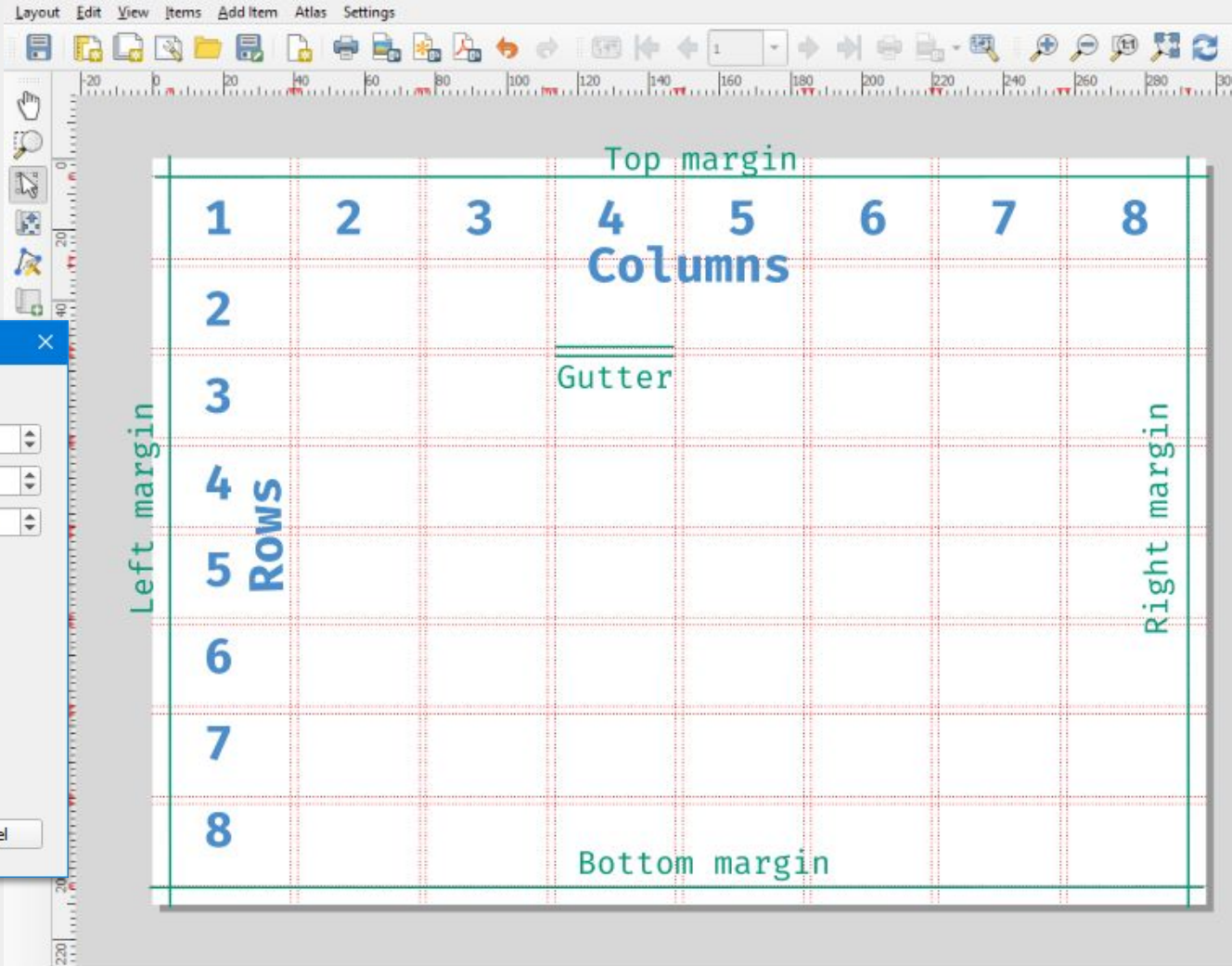
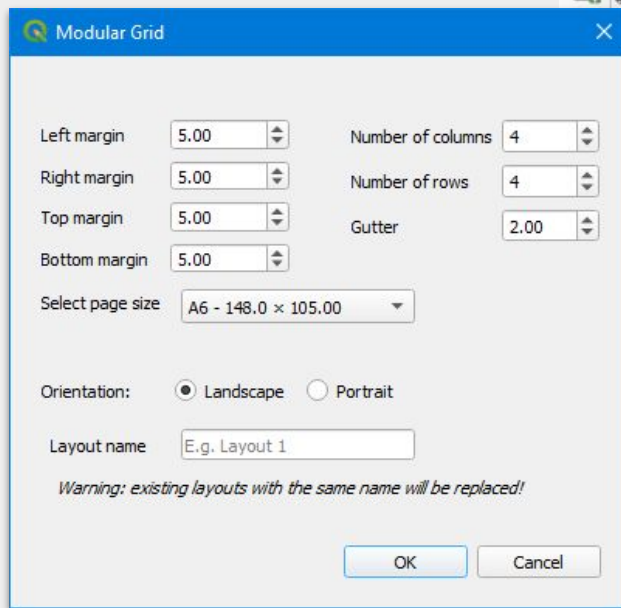
Clear All Guides

# QGIS

- You can add grids in QGIS' layout editor, but ...
- Adding in lots of grid lines is painful
  - Need 24 guides to make a 4 x 8 grid with gutters and margins
- Editing them is even more painful!
  - Not ergonomic to work with long lists of entries
- Have to do lots of calculations to get the right measurements to use
  - And hope you don't make any mistakes



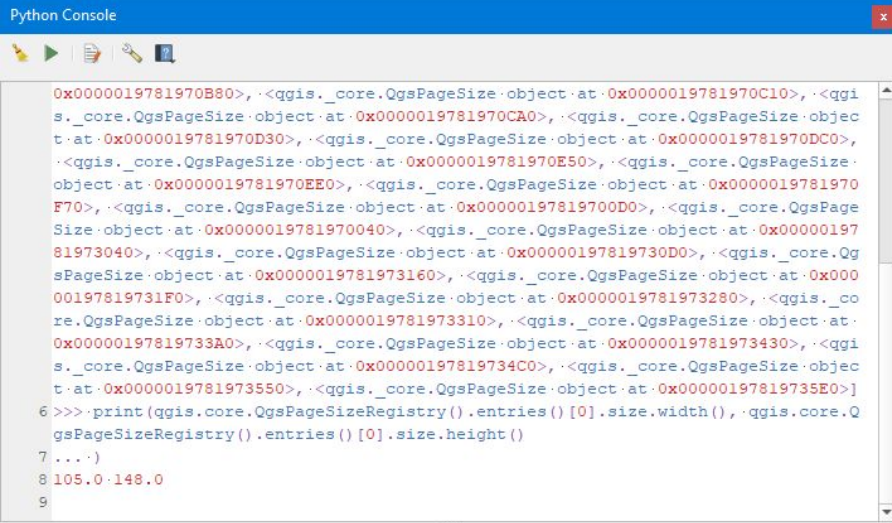
# The plugin





# Getting started

- Prototype in Python (basic calculations)
- Prototype in QGIS Python interface (QGIS interface interactions)
- Add to QGIS Plugin template
- Test, test, test

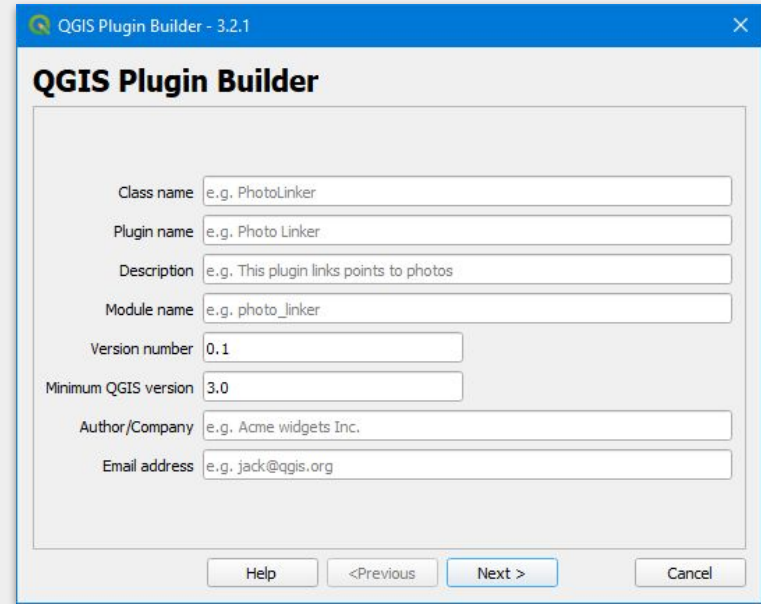


```
Python Console
0x0000019781970B80>, <QGIS.QgsPageSize object at 0x0000019781970C10>, <QGIS.QgsPageSize object at 0x0000019781970CA0>, <QGIS.QgsPageSize object at 0x0000019781970D30>, <QGIS.QgsPageSize object at 0x0000019781970DC0>, <QGIS.QgsPageSize object at 0x0000019781970E50>, <QGIS.QgsPageSize object at 0x0000019781970EE0>, <QGIS.QgsPageSize object at 0x0000019781970F70>, <QGIS.QgsPageSize object at 0x0000019781970D0>, <QGIS.QgsPageSize object at 0x0000019781970040>, <QGIS.QgsPageSize object at 0x0000019781973040>, <QGIS.QgsPageSize object at 0x00000197819730D0>, <QGIS.QgsPageSize object at 0x0000019781973160>, <QGIS.QgsPageSize object at 0x00000197819731F0>, <QGIS.QgsPageSize object at 0x0000019781973280>, <QGIS.QgsPageSize object at 0x0000019781973310>, <QGIS.QgsPageSize object at 0x00000197819733A0>, <QGIS.QgsPageSize object at 0x0000019781973430>, <QGIS.QgsPageSize object at 0x00000197819734C0>, <QGIS.QgsPageSize object at 0x0000019781973550>, <QGIS.QgsPageSize object at 0x00000197819735E0>]
6 >>> print(qgis.core.QgsPageSizeRegistry().entries()[0].size.width(), qgis.core.QgsPageSizeRegistry().entries()[0].size.height())
7 ...
8 105.0 148.0
9
>>>
```

```
column_width = (page_width - margin_left - margin_right - (gutter * (num_columns - 1))) / num_columns
row_height = (page_height - margin_top - margin_bottom - (gutter * (num_rows - 1))) / num_rows
vertical_guides = list(range_alternate_steps(margin_left, (page_width - margin_right), (column_width, gutter)))
vertical_guides.append(vertical_guides[-1]+column_width)
horizontal_guides = list(range_alternate_steps(margin_top, (page_height - margin_bottom), (row_height, gutter)))
horizontal_guides.append(horizontal_guides[-1]+row_height)
```

# Building the plugin

- Plugin template / Plugin Builder 3
  - Walks through key metadata
  - Exports an empty template to fill in
- Plugin Reloader plugin
  - Lets you reload the plugin quickly without needing to reinstall the plugin



The screenshot shows the 'QGIS Plugin Builder - 3.2.1' dialog box. It contains several input fields for plugin metadata:

Class name	e.g. PhotoLinker
Plugin name	e.g. Photo Linker
Description	e.g. This plugin links points to photos
Module name	e.g. photo_linker
Version number	0.1
Minimum QGIS version	3.0
Author/Company	e.g. Acme widgets Inc.
Email address	e.g. jack@qgis.org

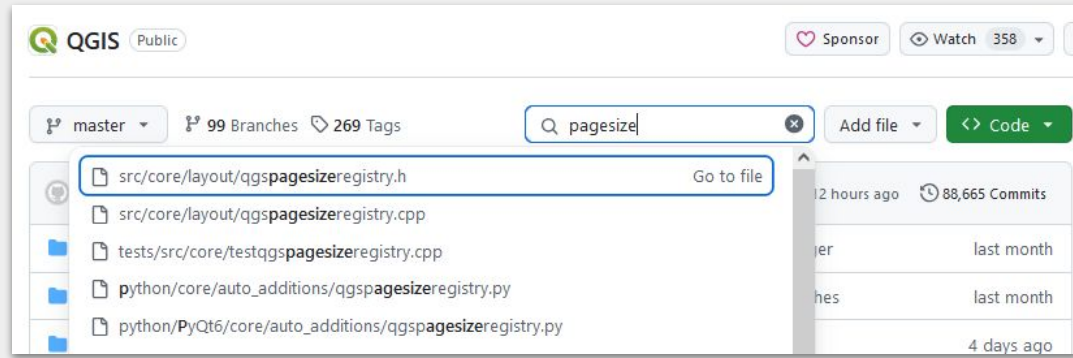
At the bottom, there are four buttons: 'Help', '<Previous', 'Next >', and 'Cancel'.



The screenshot shows the 'Reload a plugin' dialog box. It prompts the user to 'Select the plugin you want to reload' and features a dropdown menu with 'modular\_grid\_builder' selected. At the bottom, there are 'OK' and 'Cancel' buttons.

# Getting help

- Tutorials
- Python API docs
- C++ docs
- PyQt docs
- QGIS source code



```
1  /*****
2      qgspagesizeregistry.cpp
3      -----
4      begin      : June 2017
5      copyright   : (C) 2017 by Nyall Dawson
6      email      : nyall dot dawson at gmail dot com
7  *****/
8  /*****
9      *
10     * This program is free software; you can redistribute it and/or modify *
11     * it under the terms of the GNU General Public License as published by *
12     * the Free Software Foundation; either version 2 of the License, or *
13     * (at your option) any later version. *
14     * *
15     *****/
16
17 #include "qgspagesizeregistry.h"
18 #include "qgslayoutmeasurementconverter.h"
19 #include "qgis.h"
20
21 //
22 // QgsPageSizeRegistry
23 //
24
25 QgsPageSizeRegistry::QgsPageSizeRegistry()
26 {
27     add( QgsPageSize( QStringLiteral( "A6" ), QgsLayoutSize( 105, 148 ), QObject::tr( "A6" ) ) );
28     add( QgsPageSize( QStringLiteral( "A5" ), QgsLayoutSize( 148, 210 ), QObject::tr( "A5" ) ) );
29     add( QgsPageSize( QStringLiteral( "A4" ), QgsLayoutSize( 210, 297 ), QObject::tr( "A4" ) ) );
30     add( QgsPageSize( QStringLiteral( "A3" ), QgsLayoutSize( 297, 420 ), QObject::tr( "A3" ) ) );
31     add( QgsPageSize( QStringLiteral( "A2" ), QgsLayoutSize( 420, 594 ), QObject::tr( "A2" ) ) );
```

# Publishing

- Adding to GitHub
- Creating metadata and documentation
- Submitting to QGIS Plugin Repository

## Links:

- GitHub  
[https://github.com/ioalexey/modular\\_grid\\_builder](https://github.com/ioalexey/modular_grid_builder)
- QGIS plugin  
[https://plugins.qgis.org/plugins/modular\\_grid\\_builder](https://plugins.qgis.org/plugins/modular_grid_builder)

# Gotchas

- Difference between using Python interface inside QGIS and standalone script
- Plugin structure
- How PyQt links to Python code
- Python API and QGIS data structures

... mostly resolved through trial and error!



# Next steps

- Address the bugs on GitHub!
- Add new functionality: preview, grid templates
- Submit feature requests to improve grids in QGIS
- Make more plugins!

# Resources

## QGIS documentation

- PyQGIS Developer Cookbook  
[https://docs.qgis.org/3.34/en/docs/pyqgis\\_developer\\_cookbook/index.html](https://docs.qgis.org/3.34/en/docs/pyqgis_developer_cookbook/index.html)
- QGIS C++ API  
<https://api.qgis.org/api/3.34/>
- QGIS Python API  
<https://qgis.org/pyqgis/3.34/>
- QGIS source code  
<https://github.com/qgis/qgis>
- PyQt docs  
<https://doc.qt.io/qtforpython-6/>

## Useful tutorials

- Spatial Thoughts  
<https://courses.spatialthoughts.com/pyqgis-masterclass.html>
- Open Source Options  
<https://opensourceoptions.com/pyqgis-create-and-print-a-map-layout-with-python/>
- QGIS Plugin Builder  
<http://g-sherman.github.io/Qgis-Plugin-Builder>
- QGIS Tutorials  
[https://www.qgistutorials.com/en/docs/3/building\\_a\\_python\\_plugin.html](https://www.qgistutorials.com/en/docs/3/building_a_python_plugin.html)