

# How to Convert USGS Topographic GeoPDF<sup>1</sup> Maps to GeoTIFF using GDAL

This tutorial assumes that you have: 1) downloaded some USGS geopdfs, 2) a pdf reader such as Adobe Acrobat, and 3) GDAL installed on your computer. Below are the steps I used in converting USGS topo maps from geopdfs to geotiffs with GDAL. I am accessing GDAL using OSGeo4W Shell. The OSGeo4W installer bundles a set of open source geospatial software (e.g. QGIS, GDAL/OGR, GRASS, etc.) for the Windows OS environment. For more information, see website at <https://trac.osgeo.org/osgeo4w/>.

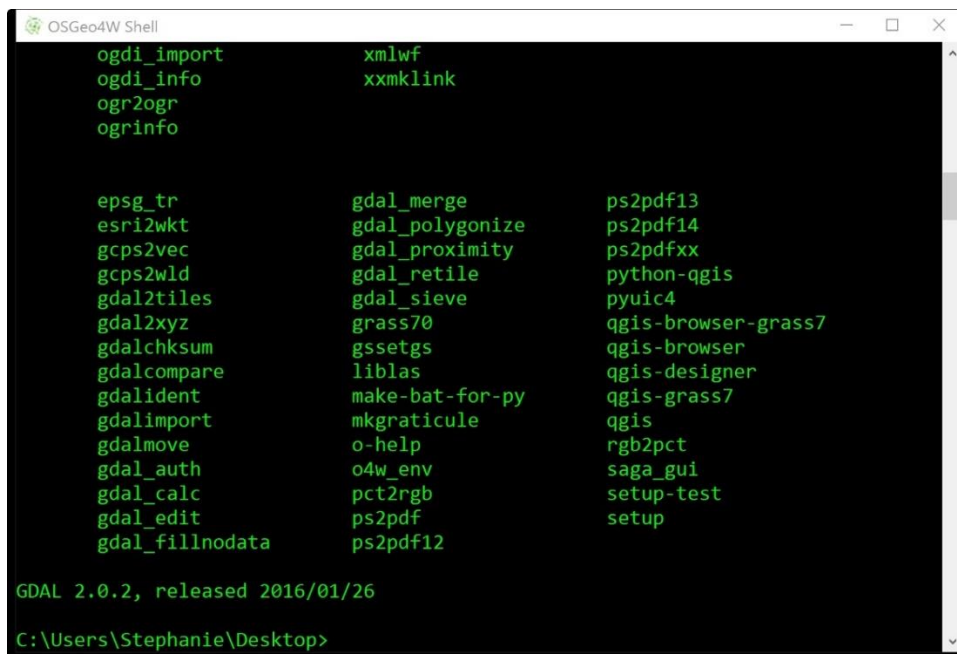
The USGS has a good, detailed document on how to do convert GeoPDF to Geotiffs using GDAL and other software. It can be found here at [http://nationalmap.gov/ustopo/documents/ustopo2gtif\\_current.pdf](http://nationalmap.gov/ustopo/documents/ustopo2gtif_current.pdf).

**Note 1:** Pathnames and filenames cannot have spaces or reserved characters in them, otherwise the geoprocessing tool may fail without giving any error. Use underscores or combination upper and lower characters.

**Note 2:** If you have many geopdfs to convert then make sure they are all in the same folder for easier processing.

## 1 Open OSGeo4W Shell and Get the PDF Layer Names

1. Open the OSGeo4W Shell. It should look something like the image below:



```

OSGeo4W Shell
ogdi_import      xmlwf
ogdi_info        xxmklmk
ogr2ogr
ogrinfo

eps_g_tr         gdal_merge      ps2pdf13
esri2wkt         gdal_polygonize ps2pdf14
gcps2vec         gdal_proximity  ps2pdfxx
gcps2wld         gdal_retile     python-qgis
gdal2tiles       gdal_sieve      pyuic4
gdal2xyz         grass70         qgis-browser-grass7
gdalchksum       gssetgs         qgis-browser
gdalcompare      liblas          qgis-designer
gdalident        make-bat-for-py qgis-grass7
gdalimport       mkgraticule     qgis
gdalmove         o-help          rgb2pct
gdal_auth        o4w_env         saga_gui
gdal_calc        pct2rgb         setup-test
gdal_edit        ps2pdf          setup
gdal_fillnodata  ps2pdf12

GDAL 2.0.2, released 2016/01/26
C:\Users\Stephanie\Desktop>
  
```

Figure 1: OSGeo4W Shell

2. Navigate to your drive and directory where your GeoPDFs are stored, by using the cd or change directory command and inputting your own parameters where denoted by < >.

<sup>1</sup> GeoPDF is a registered trademark of TerraGo Technologies. It is used in this document to refer to USGS digital topographic quadrangle maps in which GeoPDF is the current geospatial implementation.

```
cd <your drive letter>:\<path to directory>
```

Example: `cd C:\Temp\OahuTopos`

```
GDAL 2.0.2, released 2016/01/26

C:\Users\Stephanie\Desktop>cd C:\Temp\OahuTopos

C:\Temp\OahuTopos>
```

3. To see the list of folders in your directory, type in

```
dir
```

Example: `dir`

```
C:\Temp\OahuTopos>dir
Volume in drive C is Windows
Volume Serial Number is 626A-4EA9

Directory of C:\Temp\OahuTopos

05/14/2016  12:45 PM    <DIR>          .
05/14/2016  12:45 PM    <DIR>          ..
03/29/2016  11:19 AM             35,840,623 HI_Honolulu_20130410_TM_geo.pdf
03/29/2016  11:20 AM             30,579,357 HI_Koko_Head_20130402_TM_geo.pdf
03/29/2016  12:06 PM             34,304,652 HI_Schofield_Barracks_20130409_TM_geo.pdf

               3 File(s)      100,724,632 bytes
               2 Dir(s)  161,725,554,688 bytes free

C:\Temp\OahuTopos>
```

4. To find out the layer names, and coordinate system of a GeoPDF, use the `gdalinfo` command and inputting your own parameters where denoted by `<>`.

```
gdalinfo <GeoPDF filename> -mdd layers
```

Example: `gdalinfo HI_Honolulu_20130410_TM_geo.pdf -mdd layers`

```
C:\Temp\OahuTopos>gdalinfo HI_Honolulu_20130410_TM_geo.pdf -mdd layers
Driver: PDF/Geospatial PDF
Files: HI_Honolulu_20130410_TM_geo.pdf
Size is 14400, 17400
Coordinate System is:
PROJCS["UTM Zone 4, Northern Hemisphere",
  GEOGCS["unknown",
    DATUM["North_American_Datum_1983",
      SPHEROID["GRS 1980",6378137,298.257222101],
      TOWGS84[0.9738,-1.9453,-0.5486,0,0,0,0]],
    PRIMEM["Greenwich",0],
    UNIT["degree",0.0174532925199433]],
```

Take note of the layers and coordinate system for reference purposes. You will to know the layer names if you want to work with specific layers. See section 2 below in which specific layers were excluded in the conversion process.

```
TITLE=USGS 7.5-minute image map for Honolulu, Hawaii
Metadata (layers):
LAYER_00_NAME=Map_Collar
LAYER_01_NAME=Map_Collar.Map_Elements
LAYER_02_NAME=Map_Frame
LAYER_03_NAME=Map_Frame.Projections_and_Grids
LAYER_04_NAME=Map_Frame.Geographic_Names
LAYER_05_NAME=Map_Frame.Structure_Features_and_Names
LAYER_06_NAME=Map_Frame.Boundary_Features_and_Names
LAYER_07_NAME=Map_Frame.Transportation
LAYER_08_NAME=Map_Frame.Transportation.Road_Names_and_Shields
LAYER_09_NAME=Map_Frame.Transportation.Road_Features
LAYER_10_NAME=Map_Frame.Transportation.Railroad_Features_and_Names
LAYER_11_NAME=Map_Frame.Transportation.Airport_Features_and_Names
LAYER_12_NAME=Map_Frame.Hydrography_Features_and_Names
LAYER_13_NAME=Map_Frame.Terrain
LAYER_14_NAME=Map_Frame.Terrain.Contour_Features_and_Names
LAYER_15_NAME=Map_Frame.Terrain.Shaded_Relief
LAYER_16_NAME=Map_Frame.Woodland_Features
LAYER_17_NAME=Images
LAYER_18_NAME=Images.Orthoimage
```

## 2 Convert a Single GeoPDF to GeoTiff

---

To convert a single GeoPDF to GeoTiff, use the `gdal_translate` command and input your own parameters where denoted by `<>`.

**Option 1** default: this will export all pdf layers at 96 dpi.

```
Gdal_translate <GeoPDF filename> <Output Geotiff Filename> -of GTiff
```

**Note 3:** Using the option 1 default above will convert all pdf layers, which can take a long time to process and can be really big especially if the pdf layers include shaded terrain relief and orthoimagery.

**Option 2** with specific pdf layers off:

```
Gdal_translate <GeoPDF filename> <Output Geotiff Filename> -of GTiff
--config gdal_pdf_layers_off "<pdf layername 1>,<pdf layername 2>,<pdf
layername 3>" --config gdal_pdf_dpi <output dpi>
```

**Example 1:** `gdal_translate HI_Honolulu_20130410_TM_geo.pdf HonoluluTopo.tif -of GTiff`

```
C:\Temp\OahuTopos>gdal_translate HI_Honolulu_20130410_TM_geo.pdf
Honotest.tif -of GTiff
Input file size is 14400, 17400
0...10...20...30...40...50...60...70...80...90...100 - done.
```

**Example 2:** `gdal_translate HI_Honolulu_20130410_TM_geo.pdf HonoluluTopo.tif -of GTiff --config GDAL_PDF_LAYERS_OFF "Map_Collar, Map_Frame.Projections_and_Grids, Map_Frame.Terrain.Shaded_Relief, Images.Orthoimage" --config GDAL_PDF_DPI 100`

```
C:\Temp\OahuTopos>gdal_translate HI_Honolulu_20130410_TM_geo.pdf HonoluluTopo.tif
-of GTiff --config GDAL_PDF_LAYERS_OFF "Map_Collar,Map_Frame.Projections_and_Grids,Map_Frame.Terrain.Shaded_Relief,Images.Orthoimage" --config GDAL_PDF_DPI 100
Input file size is 2400, 2900
0...10...20...30...40...50...60...70...80...90...100 - done.
```

**Note 4:** This process will only convert the GeoPDF to GeoTiff and get rid of the information in the collar, but will not actually remove the collar. You will need to clip the collar separated to get a collarless topo image.

Figures 2 and 3 show sample converted geotiffs using option parameters above.



Figure 2: Example geotiff using option 1 (example 1) default parameters. Notice all the pdf layers were converted.

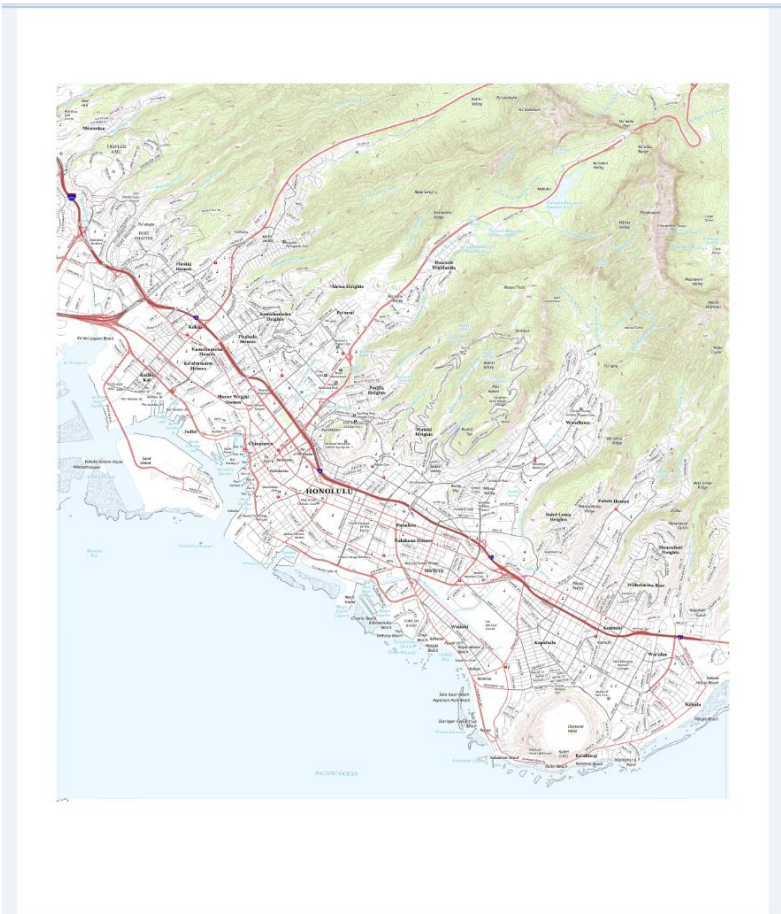


Figure 3: Example converted geotiff using option 2 (example 2) parameters. Notice collar is not clipped

### 3 Creating a Batch File to Convert Multiple GeoPDFs to GeoTiffs

To convert multiple GeoPDFs to GeoTiffs, you need to create a batch script. To do this, follow the steps below.

1. Open Notepad and type in the following script. Note parameters in purple are optional – you can put in your own parameters. In this example, 4 pdf layers: map collar, map projection and grid, shaded terrain relief, and the ortho image are excluded from the conversion process.

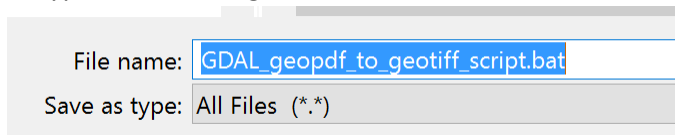
```
@echo=on
SETLOCAL EnableDelayedExpansion

FOR /F %%i IN ('DIR /B *.pdf') DO (

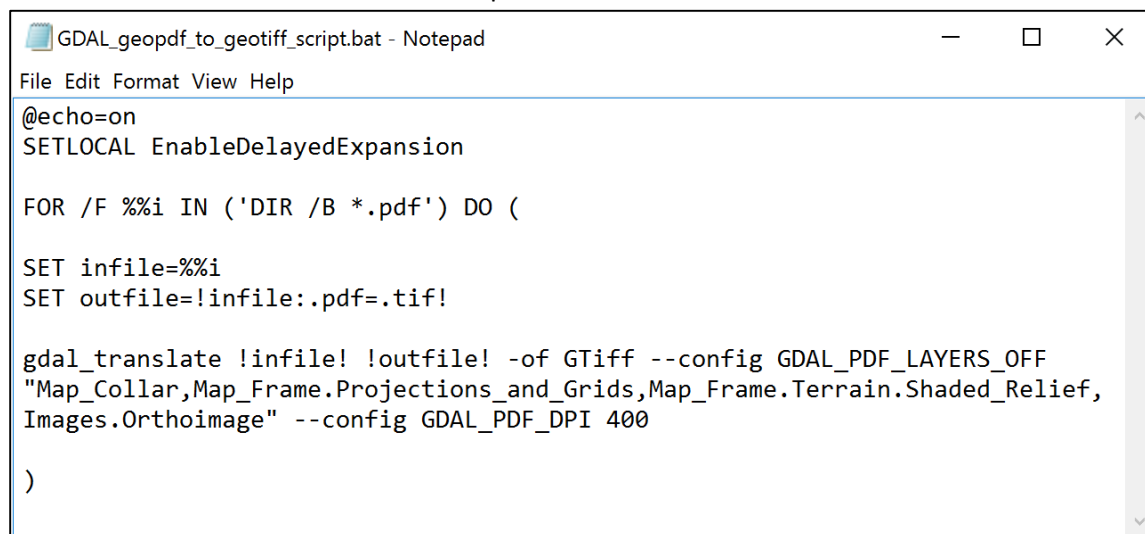
SET infile=%%i
SET outfile=!infile:.pdf=.tif!

gdal_translate !infile! !outfile! -of GTiff --config GDAL_PDF_LAYERS_OFF
"Map_Collar, Map_Frame.Projections_and_Grids,
Map_Frame.Terrain.Shaded_Relief, Images.Orthoimage" --config GDAL_PDF_DPI
400
)
```

2. Save the Notepad file with a .bat file extension in the same folder as your geoPDFs. Use Save As and select Save as type All Files and give it a filename.



Your batch file should look like the example below:



## 4 Run Batch File in OSGeo4W Shell

1. In the OSGeoW4 Shell – same as in step 1. Navigate to your directory where the geopdfs and the batch file are stored.

```
C:\Temp\OahuTopos>dir
Volume in drive C is Windows
Volume Serial Number is 626A-4EA9

Directory of C:\Temp\OahuTopos

05/14/2016  04:33 PM    <DIR>          .
05/14/2016  04:33 PM    <DIR>          ..
05/14/2016  04:35 PM             336 GDAL_geopdf_to_geotiff_script.bat
03/29/2016  11:19 AM       35,840,623 HI_Honolulu_20130410_TM_geo.pdf
03/29/2016  11:20 AM       30,579,357 HI_Koko_Head_20130402_TM_geo.pdf
03/29/2016  12:06 PM       34,304,652 HI_Schofield_Barracks_20130409_TM_geo.pdf
05/14/2016  03:41 PM       20,904,813 HonoluluTopo.tif
               5 File(s)      121,629,781 bytes
               2 Dir(s)      161,569,505,280 bytes free

C:\Temp\OahuTopos>
```

2. Use the TAB key on your keyboard to scroll through the files in your directory to select the batch (\*.bat) file.

```
C:\Temp\OahuTopos>GDAL_geopdf_to_geotiff_script.bat
```



Hit ENTER key when you have the \*.bat file selected. You should get something similar to what is shown below. The script will loop through all the geopdfs and convert them to geotiffs.

```
C:\Temp\OahuTopos>GDAL_geopdf_to_geotiff_script.bat
on

C:\Temp\OahuTopos>SETLOCAL EnableDelayedExpansion

C:\Temp\OahuTopos>FOR /F %i IN ('DIR /B *.pdf') DO (
SET infile=%i
SET outfile=!infile:.pdf=.tif!
gdal_translate !infile! !outfile! -of GTiff --config GDAL_PDF_LAYERS_OFF "Map_Collar,
Map_Frame.Projections_and_Grids,Map_Frame.Terrain.Shaded_Relief,Images.Orthoimage" --c
onfig GDAL_PDF_DPI 100"
)

C:\Temp\OahuTopos>(
SET infile=HI_Honolulu_20130410_TM_geo.pdf
SET outfile=!infile:.pdf=.tif!
gdal_translate !infile! !outfile! -of GTiff --config GDAL_PDF_LAYERS_OFF "Map_Collar,
Map_Frame.Projections_and_Grids,Map_Frame.Terrain.Shaded_Relief,Images.Orthoimage" --c
onfig GDAL_PDF_DPI 100"
)
Input file size is 2400, 2900
0...10...20...30...40...50...60...70...80...90...100 - done.

C:\Temp\OahuTopos>(
SET infile=HI_Koko_Head_20130402_TM_geo.pdf
SET outfile=!infile:.pdf=.tif!
gdal_translate !infile! !outfile! -of GTiff --config GDAL_PDF_LAYERS_OFF "Map_Collar,
Map_Frame.Projections_and_Grids,Map_Frame.Terrain.Shaded_Relief,Images.Orthoimage" --c
onfig GDAL_PDF_DPI 100"
)
Input file size is 2400, 2900
0...10...20...30...40...50...60...70...80...90...100 - done.
```

After you're done with the conversion process, you can then clip the collars off the geotiffs using the USGS 7.5 Minute grid cells as the clipping layer in a GIS software, such as ArcGIS or QGIS. Make sure that this layer is in the same coordinate system as your geotiffs before you do the clipping.

Here is an example showing the converted Honolulu Topo geotiff with collar before it is clipped by the Honolulu 7.5 minute grid cell layer shown as magenta line.

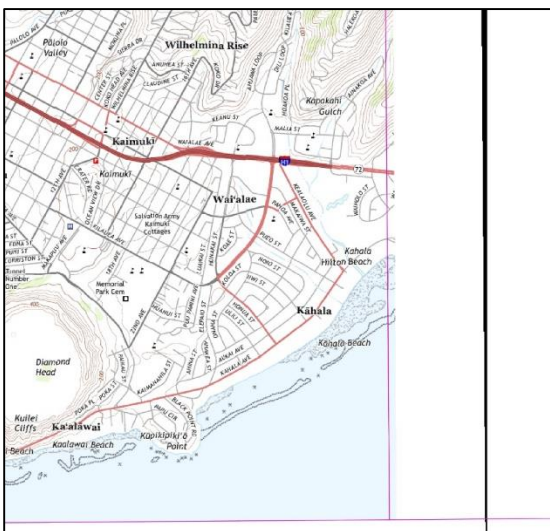


Figure 5: Honolulu topo quad geotiff with collar before being clipped with the corresponding 7.5 minute grid cell (magenta line)

Figures 6 and 7 below show 2 topo quads, Honolulu and Koko Head as they are viewed in QGIS after having the collars clipped off.

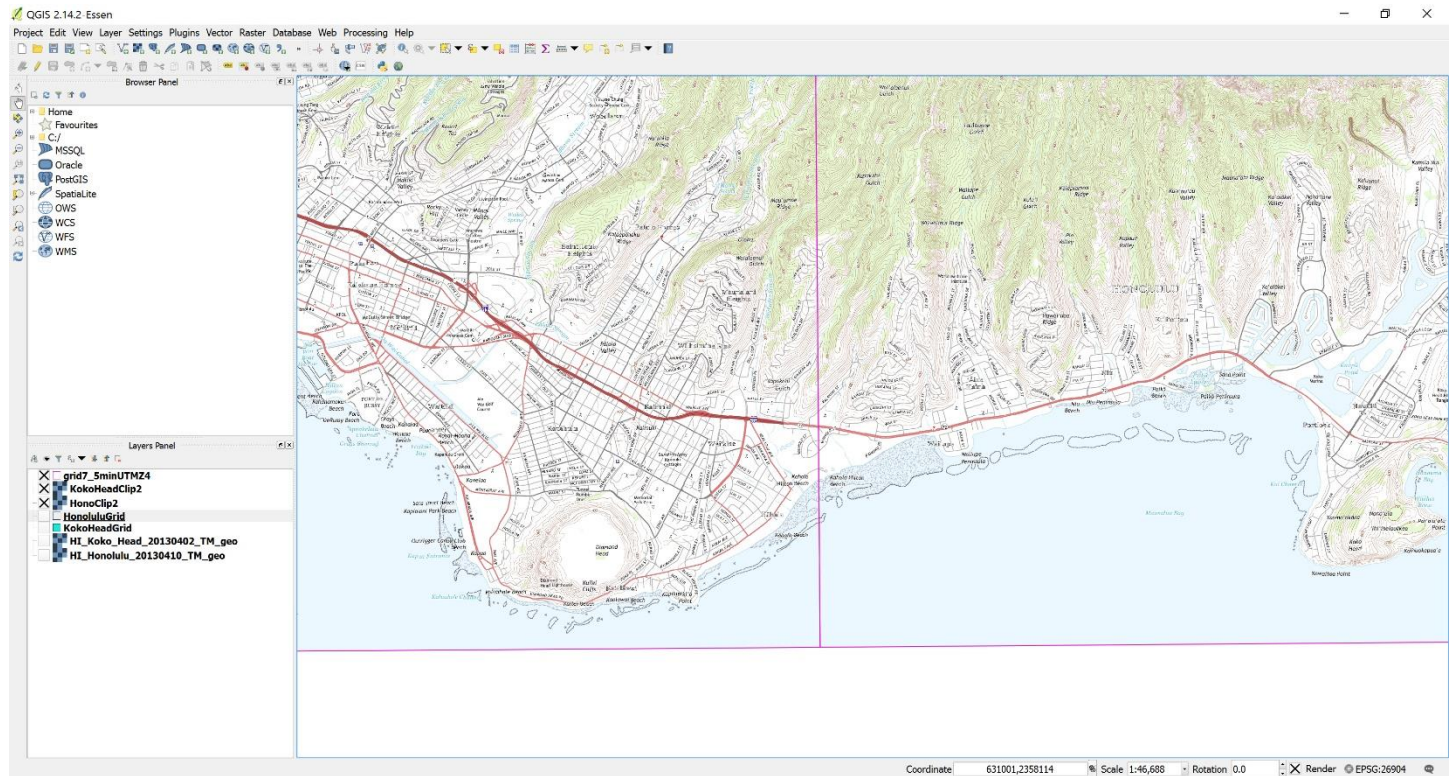


Figure 6: Honolulu and Koko Head topo quads shown with their corresponding 7.5 minute grid cells (magenta lines)

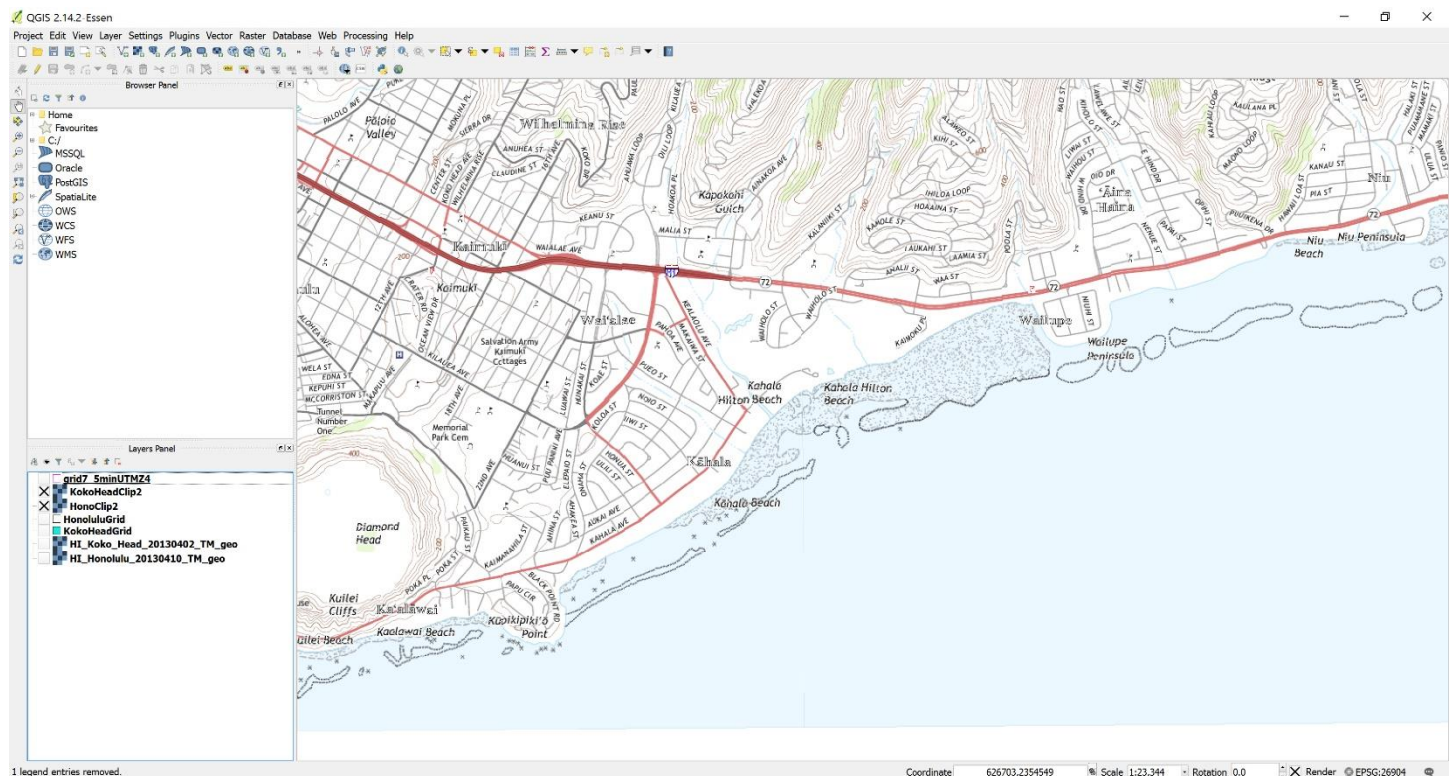


Figure 7: Seamless view of Honolulu and Koko Head topo quads shown together without 7.5 minute grid cells.