

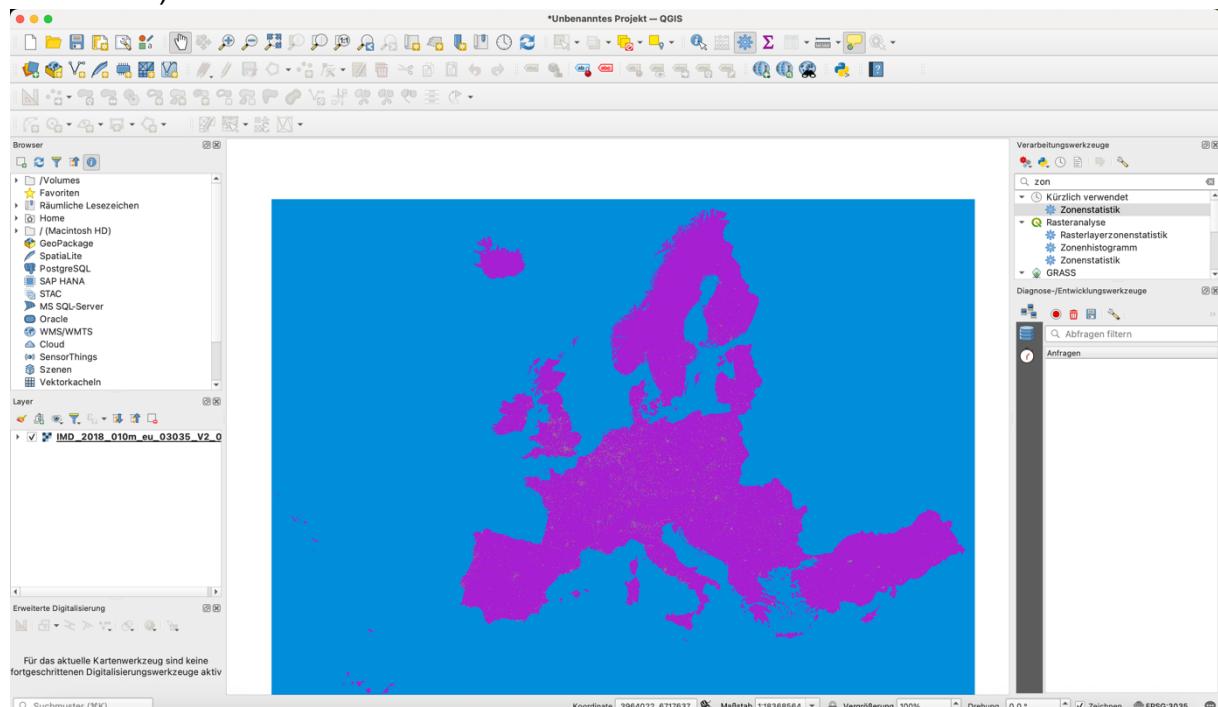
Lepmon - Imperviosness validation

Step by Step: Validation of imperviousness for potential Lepmon sites

Requirements: QGIS

Python (3.12) (git, pandas, pyproj, os)

1. Download and install GIS (<https://qgis.org/download/>)
2. Data: the base map is quite large (~9 GB)! It can be downloaded: <https://land.copernicus.eu/en/products/high-resolution-layer-imperviousness>
make sure you have a folder called "Imperviousness Density(IMD)_2018_010m_eu_03035_v020"
3. Create a new project in Gis and load the image "/DATA/IMD_2018_010m_eu_03035_V2_0.tif" as a layer: 'Projekt' → 'Neu' → drag and drop the tif into the project (in the white window in the middle)



The map of Europe now appears in the middle.

Note: this tif uses the coordinate reference system “EPSG:3035 - ETRS89-extended / LAEA Europe”

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4. Prepare the coordinates: the coordinates you get from Google maps are usually in the reference system "WGS84" thus, they are not compatible with that tif file. To convert them, I usually create a csv with a running nr, latitude and longitude as well as some additional information. This file looks something like this:

running	state	city	location	latitude	longitude	remark
1	Thuringia	Erfurt	Dom	50.97626	11.02364	awesome building
2	Thuringia	Jena	Paradies	50.91348	11.57847	nice holiday site

5. Then, I use a python script for batch processing. You can download it from GitHub: <https://github.com/DesBoe/KoordinatenKonverter> and use the terminal.

Note: Bold is the input you have to type- replace the directories with your actual paths. Normal text is terminal output.

→ **cd /path/to/github_folder**
→ **python3 KoordinatenKonverter_EPSG3035.py**

"Enter the path of the csv file that contains the coordinates in WGS84 format"

/path/to/your/data_in_WGS84.csv

"output saved as /path/to/your/data_in_WGS84_EPSG3035.csv"

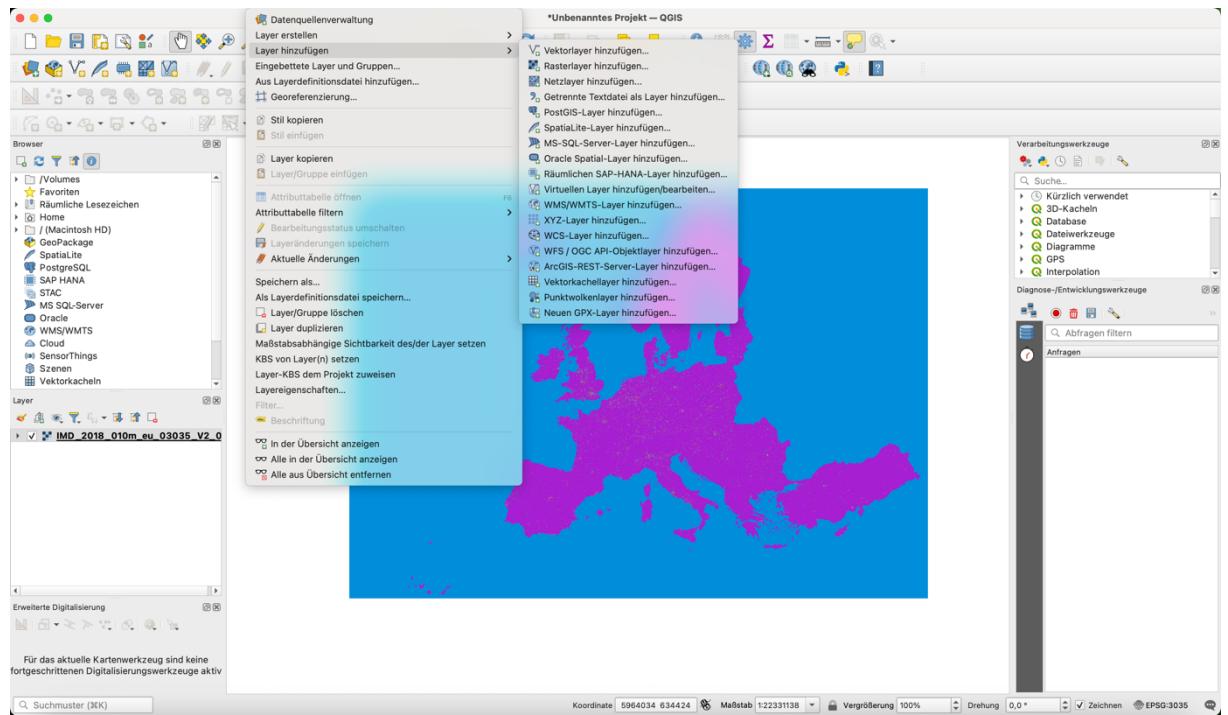
6. The generated csv contains X and Y coordinates

running	state	city	location	latitude	longitude	remark	X	Y
1	Thuringia	Erfurt	Dom	50.97626	11.02364	awesome building	4392892.58038633	3096604.575313815
2	Thuringia	Jena	Paradies	50.91348	11.57847	nice holiday site	4432003.646885053	3090315.0426209797

7. If you don't want to use python, you can do this online (single processing), e.g.: https://epsg.io/transform#s_srs=4326&t_srs=3035&ops=1149&x=NaN&y=NaN.

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8. Load this file into GIS as separate layer: 'Layer → Layer hinzufügen → getrennte Textdatei als Layer hinzufügen'

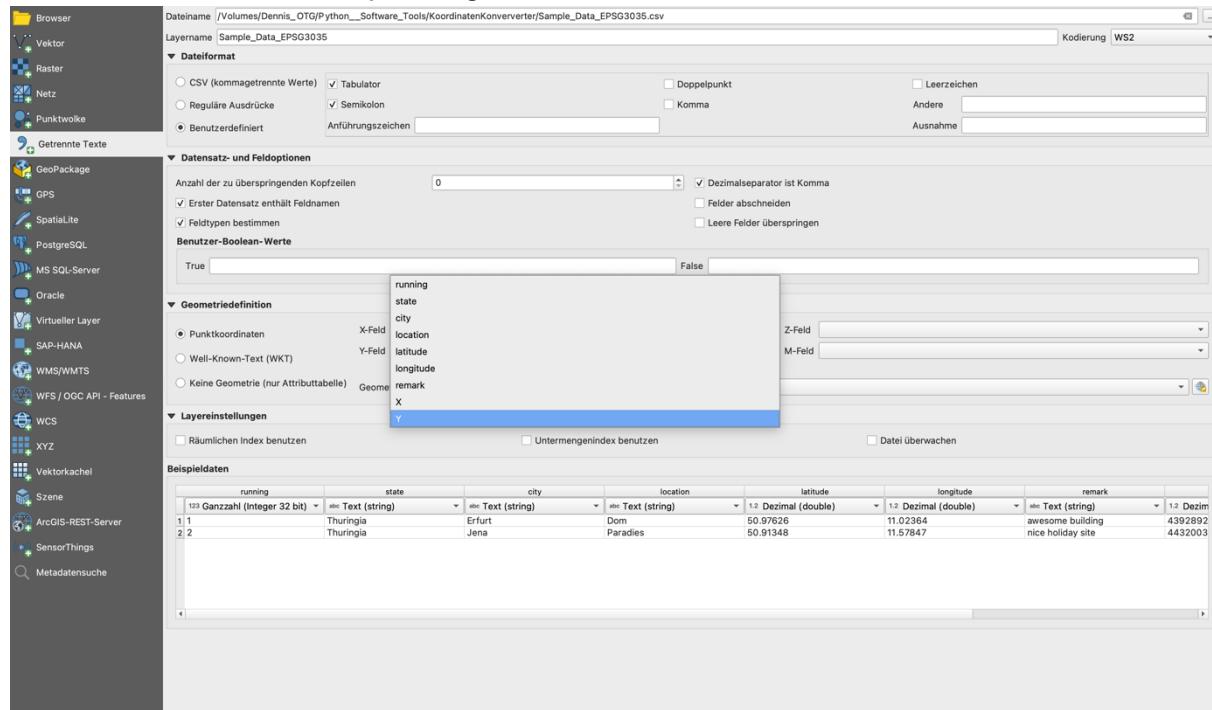


Provide the file path at "Dateiname":

running	state	city	location	latitude	longitude	remark
1	Thuringia	Erfurt	Dom	50.97626	11.02364	awesome building
2	Thuringia	Jena	Paradies	50.91348	11.57847	nice holiday site

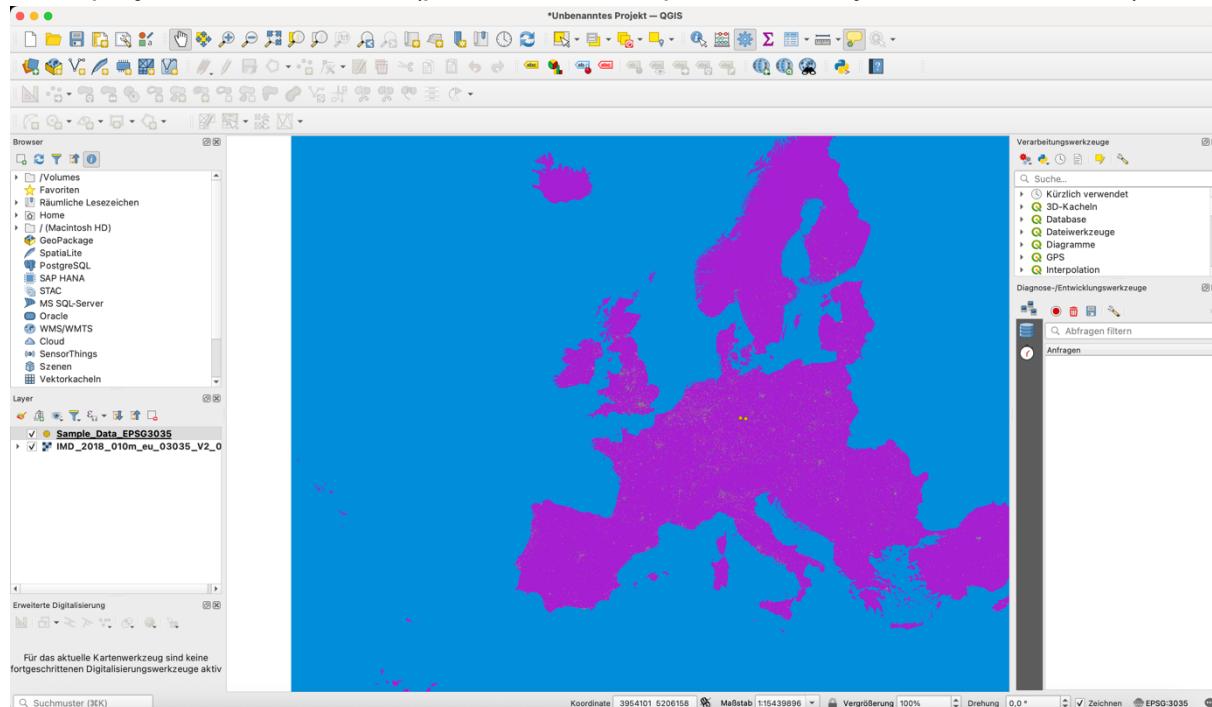
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9. Set X and Y to the corresponding columns of the csv



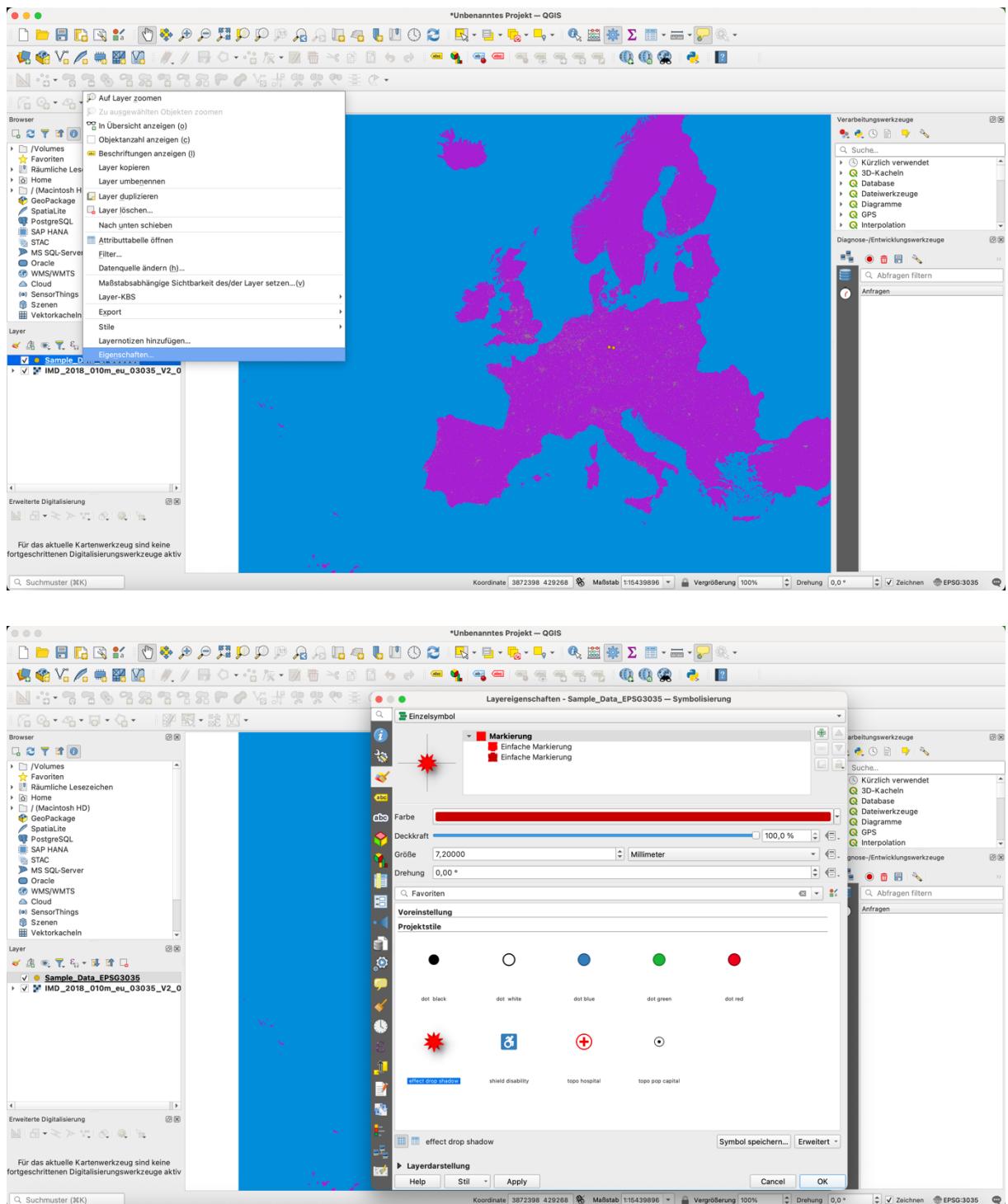
10. Hit "Add" (hinzufügen)

11. Your project looks like this (points at the map + a new layer on the left side) :



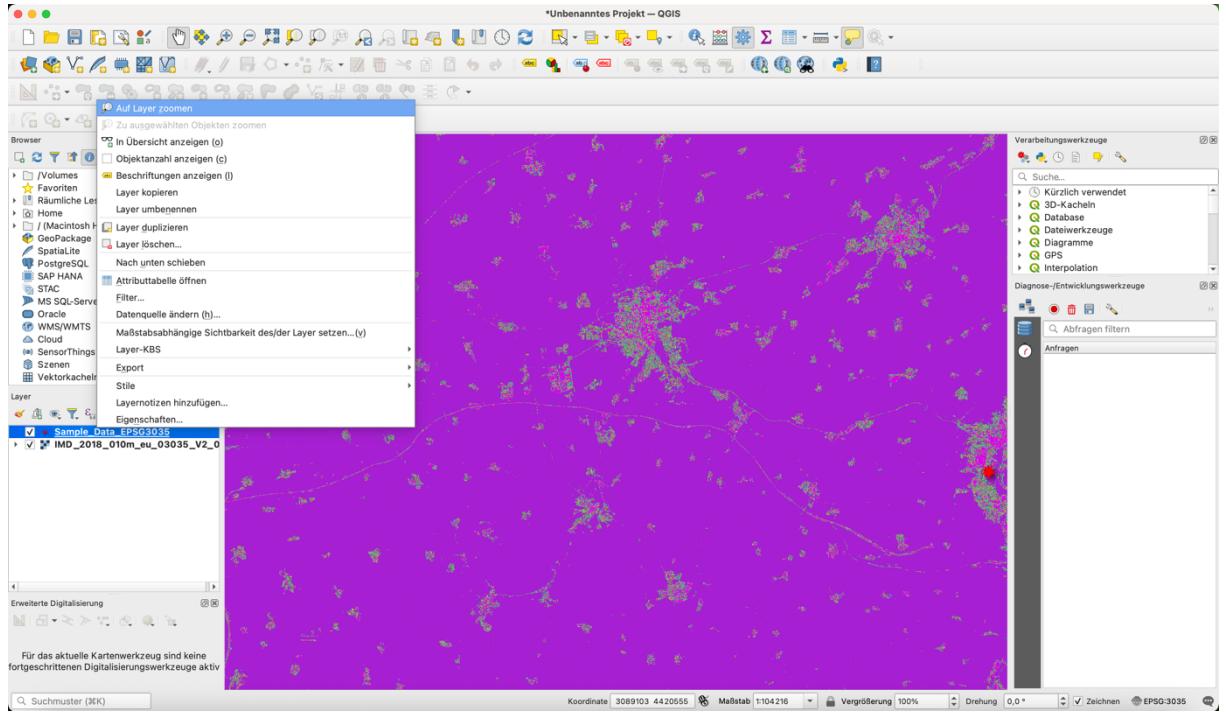
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12. You can make the sites easier readable: right click on that layer. Hit 'Eigenschaften' → 'Symbolisierung' and choose whatever you prefer

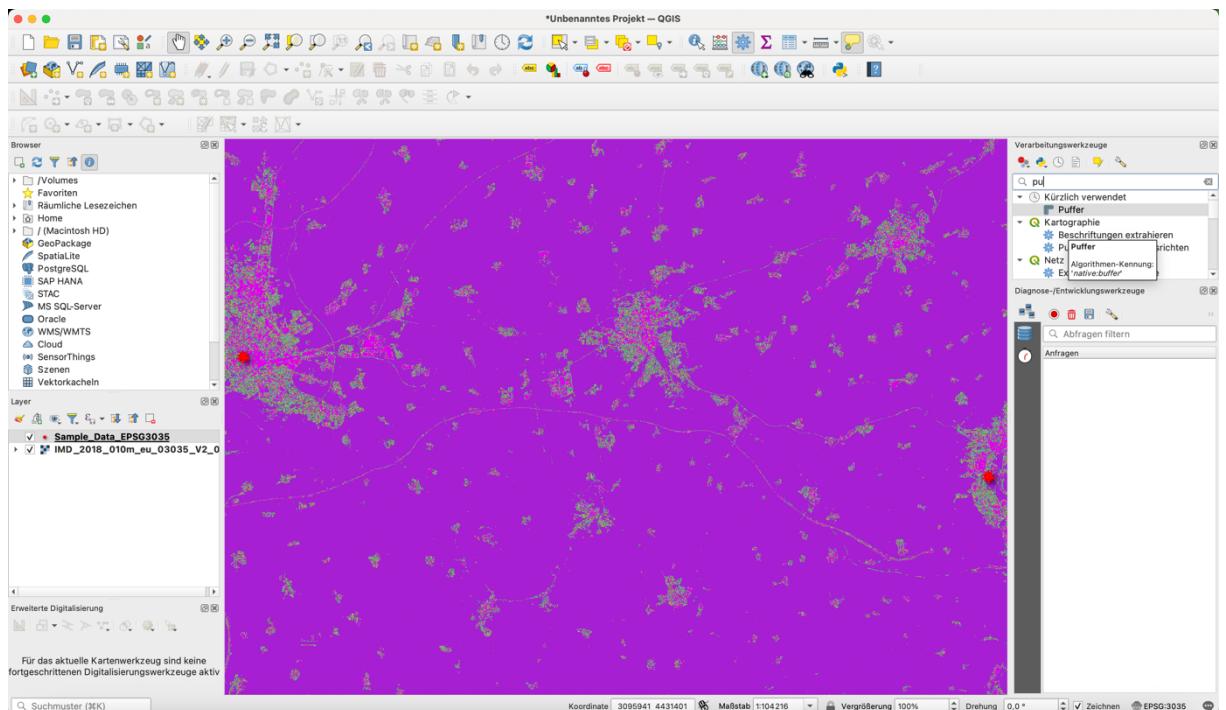


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13. Right click again “Auf layer zoomen” to zoom in



14. Get the surrounding areas/ “circles”: Go to “Verarbeitungswerkzeuge” and search for “Puffer”



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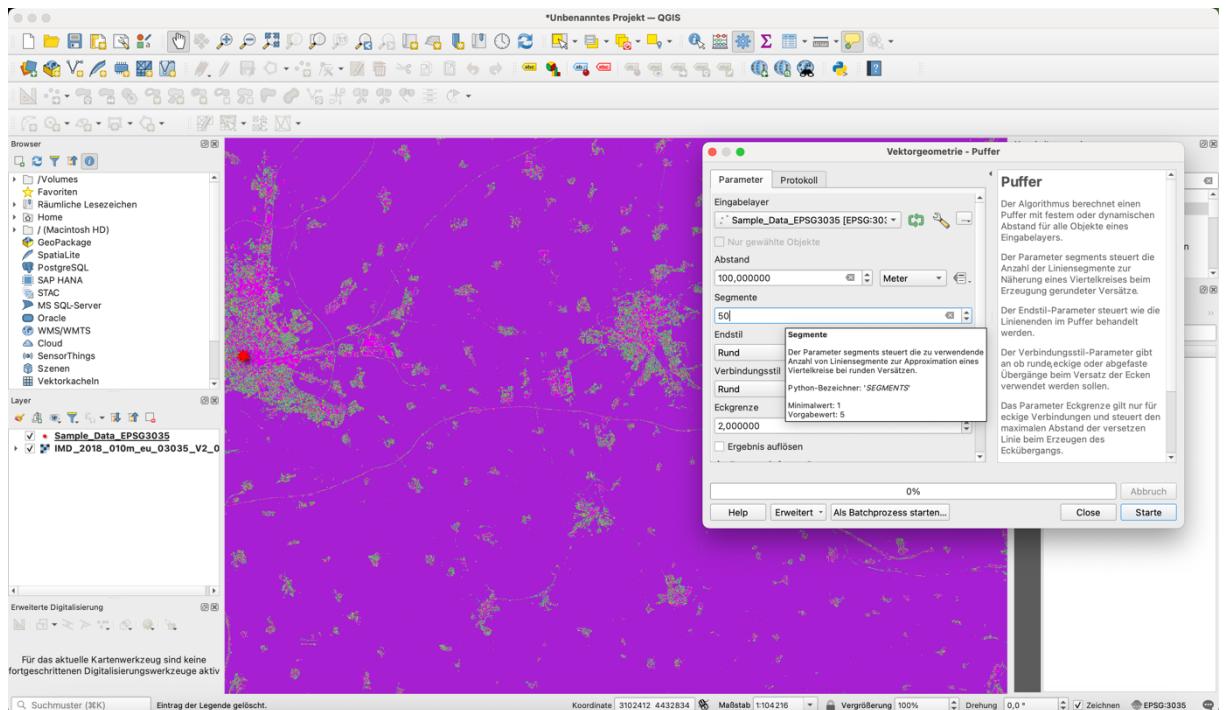
15. Select the site layer as “Eingabelayer”.

Set Abstand to 100

Set Segmente to 50

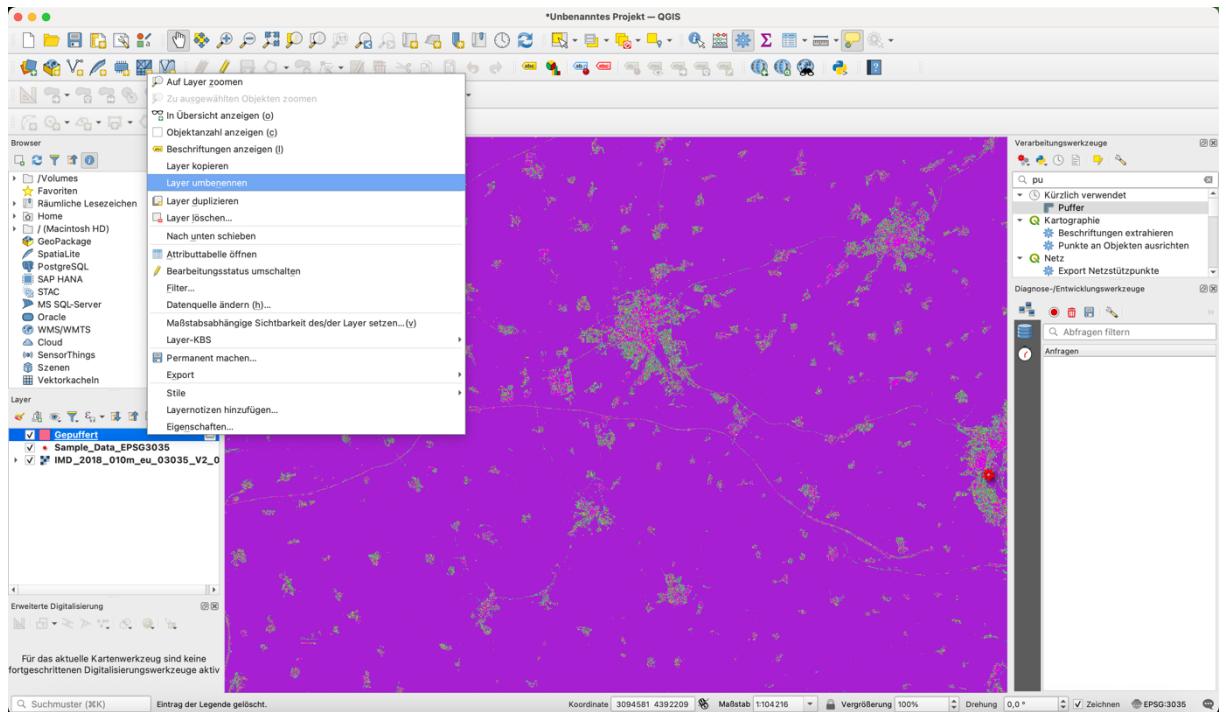
press Start

press close



16. There is a new layer “gepuffert”

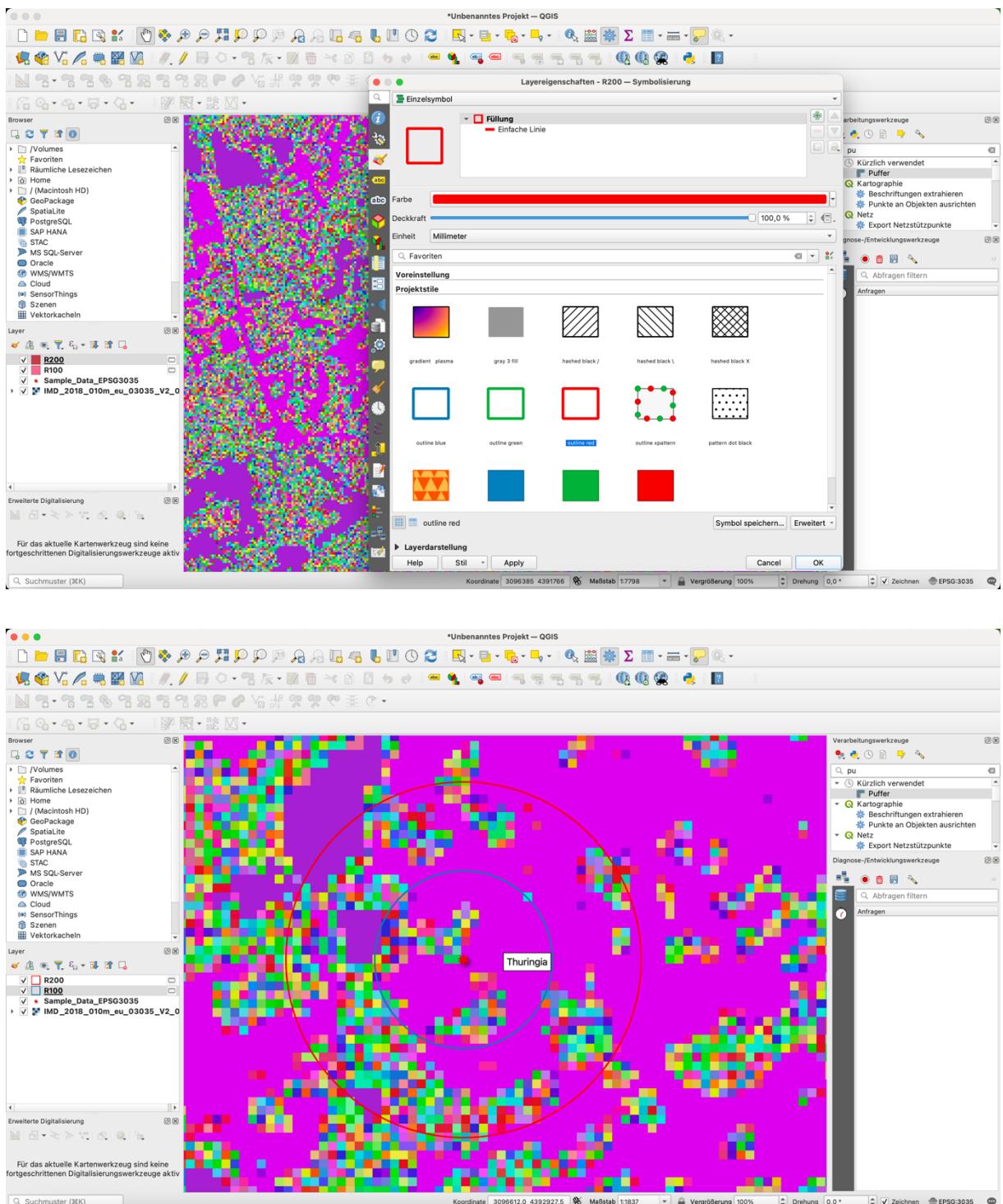
17. Right click onto it and rename it to “R100”



18. Repeat 14 – 17. But this time, set ‘Abstand’ to 200 and ‘Segmente’ to 100. Also, rename the layer R200

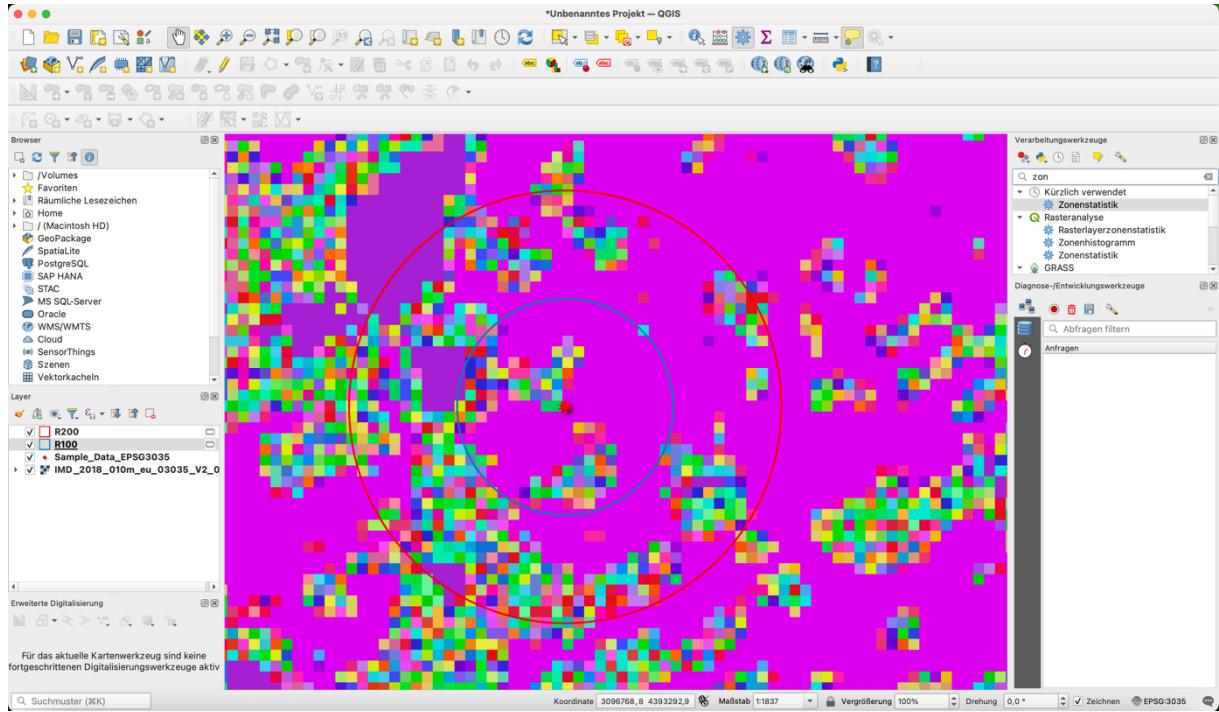
19. Optional: Gis displays these as the are of a circle. If you want to display only the outer edge: Pinch to zoom in. Then, adjust the aesthetics by right clicking on one layer → Eigenschaften → Symbolisierung → select your preference. Repeat with the other layer.

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20. Calculate the mean imperviousness: Go to ‘Verarbeitungswerzeuge → Zonenstatistik’

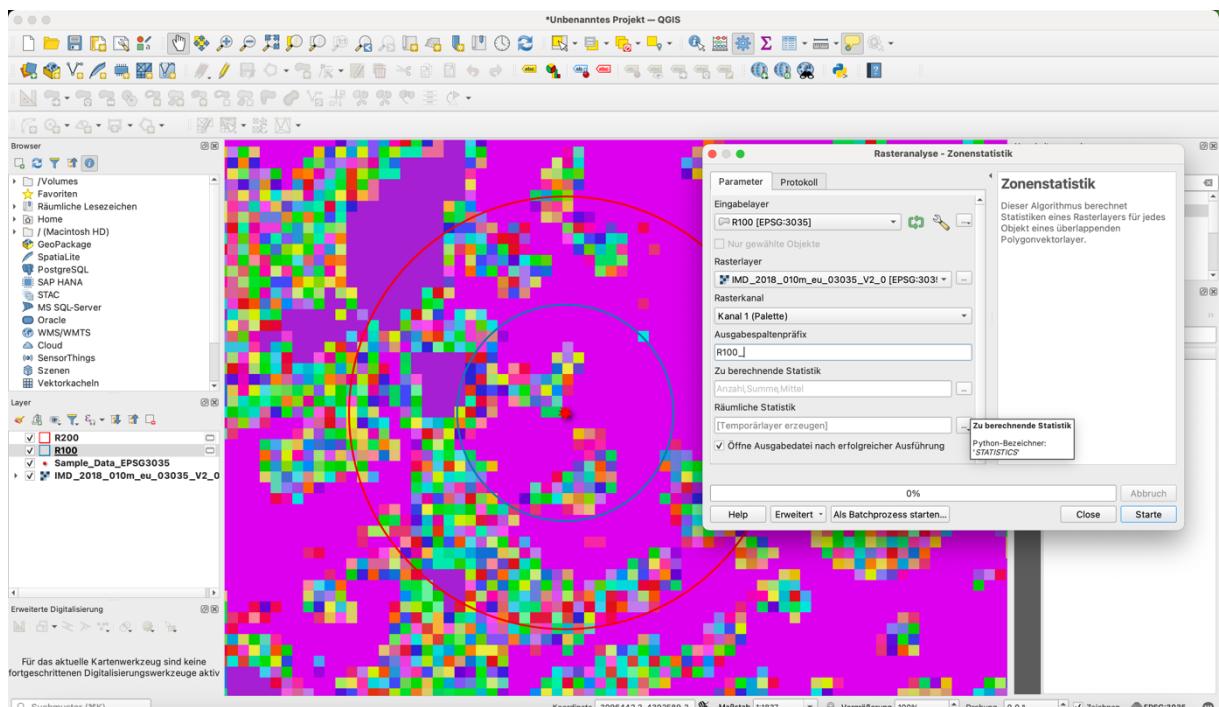


21. Set Eingabelayer “R100”

select Rasterlayer to “IMD_2018_010m_eu_03035_V2_0”

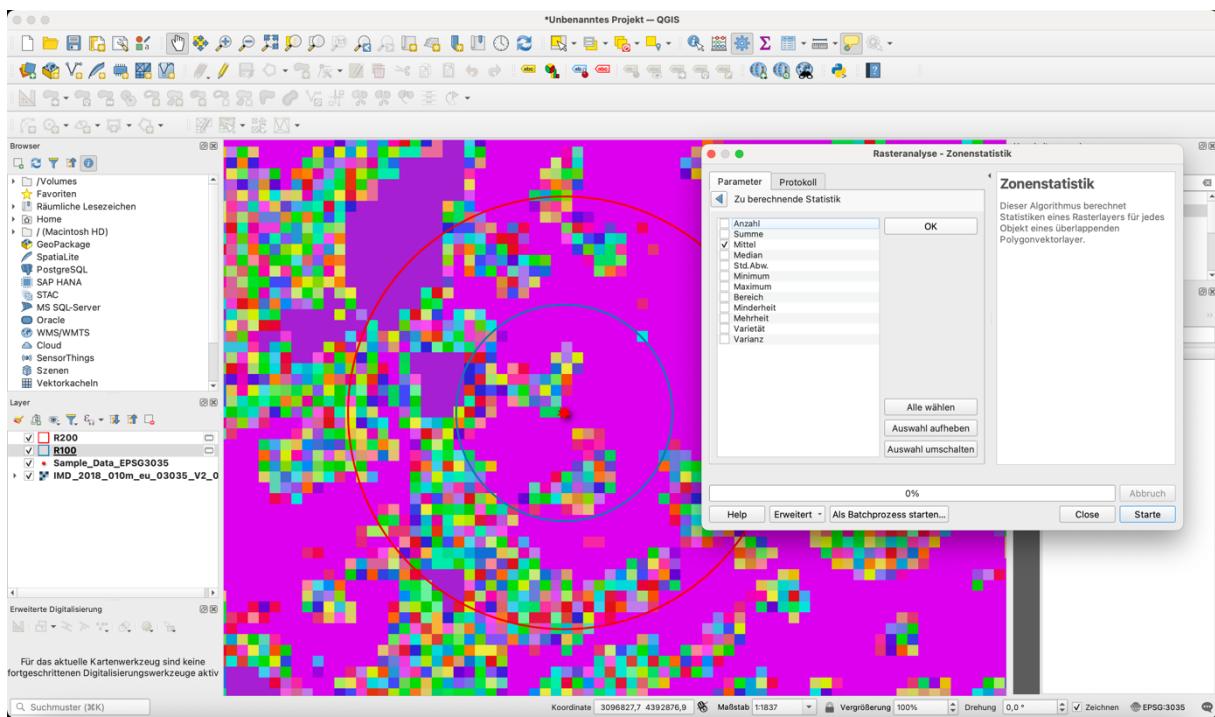
type Ausgabepräfix „R100_“

select the statistics – click on “zu berechnende Statistik”



we only need the mean/ Mittelwert

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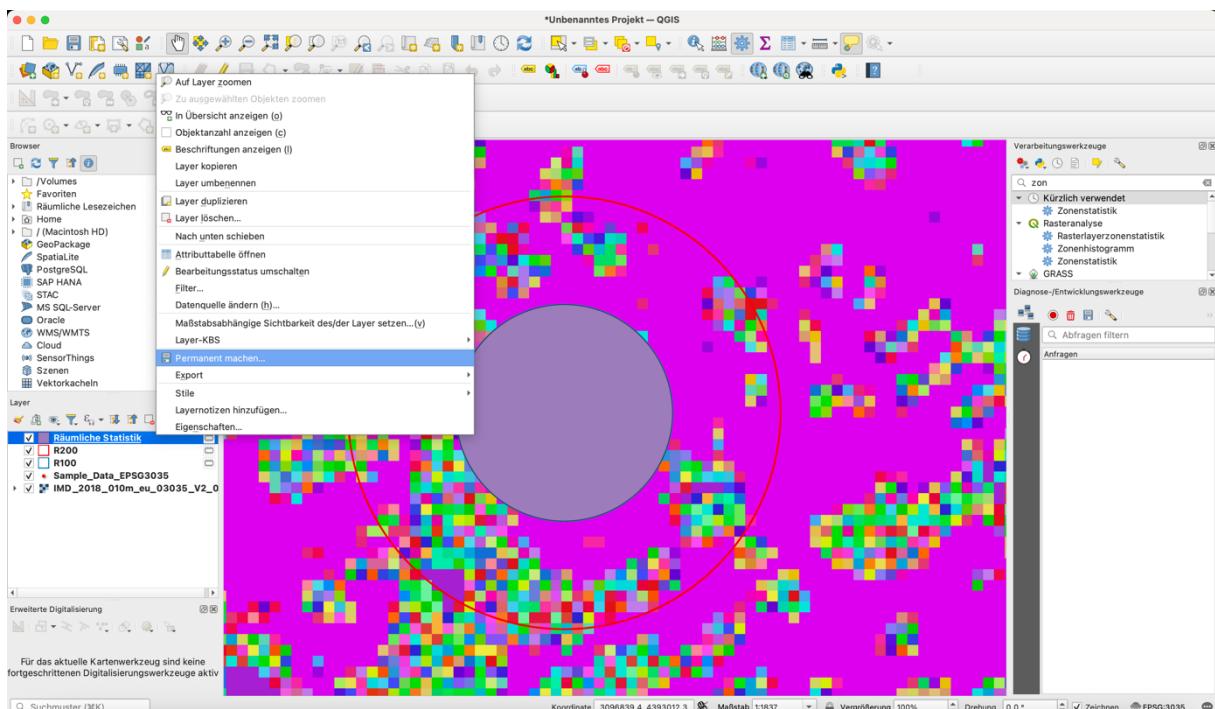


hit "ok"

hit "starte"

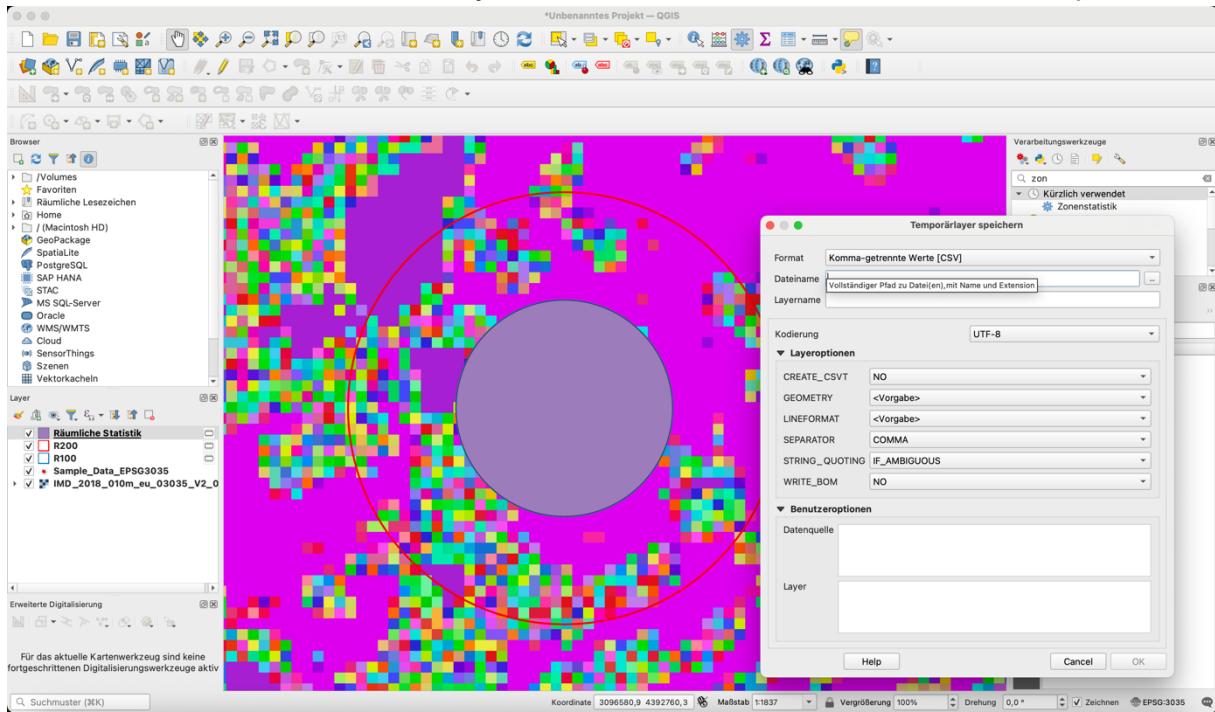
hit "close"

22. You'll get a new, temporary layer called "räumliche Statistik". Right click on it and select "permanent machen"

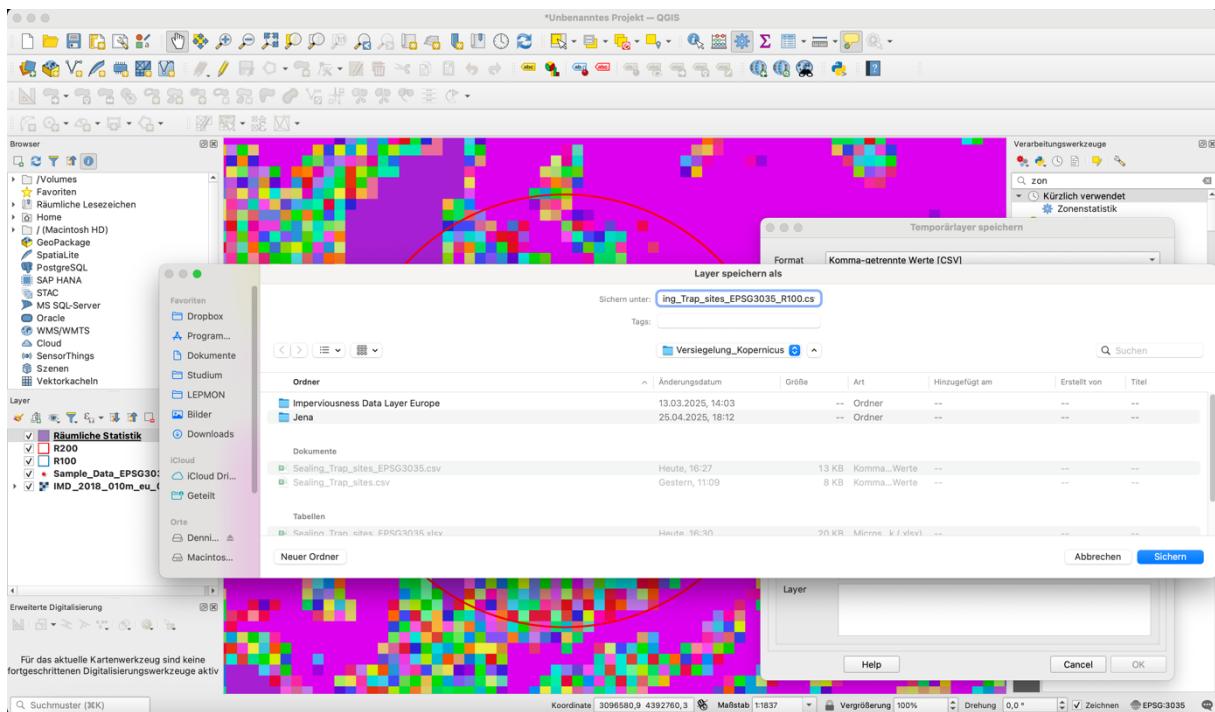


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23. Select a filename/ Dateiname. My recommendation is, to browse via the 3 points

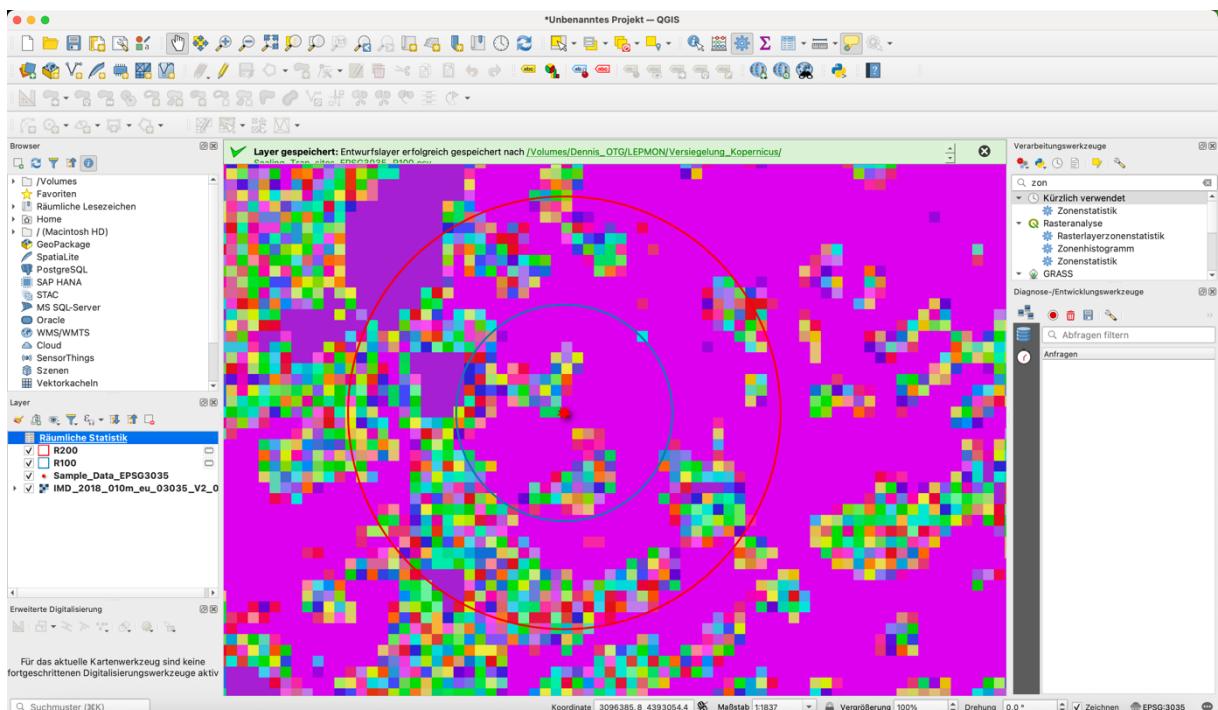


24. and append the already present csv filename by “_R100”



- 25.
- hit “save”
 - hit “ok”
 - you’ll get a message, that the file was saved

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26.

27. Repeat 20 – 26, but with R200 instead of R100.

28. You now have both imperviousness values for both radii calculated but in two separate files. Just copy paste one column into the other file and you have a complete dataset

running	state	city	location	latitude	longitude	remark	X	Y	R200_mean
1	Thuringia	Erfurt	Dom	50.97626	11.02364	awesome building	4392892.58038633	3096604.57531381	73.3459167330677
2	Thuringia	Jena	Paradies	50.91348	11.57847	nice holiday site	4432003.64688505	3090315.04262098	10.7246608140463

running	state	city	location	latitude	longitude	remark	X	Y	R100_mean	R200_mean
1	Thuringia	Erfurt	Dom	50.97626	11.02364	awesome building	4392892.58038633	3096604.57531381	88.4198717948718	73.3459167330677
2	Thuringia	Jena	Paradies	50.91348	11.57847	nice holiday site	4432003.64688505	3090315.04262098	8.63897763578275	10.7246608140463

29. Don't forget to save and have fun analysing!
30. Optional: there is a small R script for converting csv to Excel, in case you experience problems with the decimal sign (points and commas). Please adjust the file directory within the R script

Final note: I am not a GIS expert, most of this manual is based on trial and error. So, if you know a more efficient or elegant way, especially on handling the results at the end, please let me know.