Spatial Databases

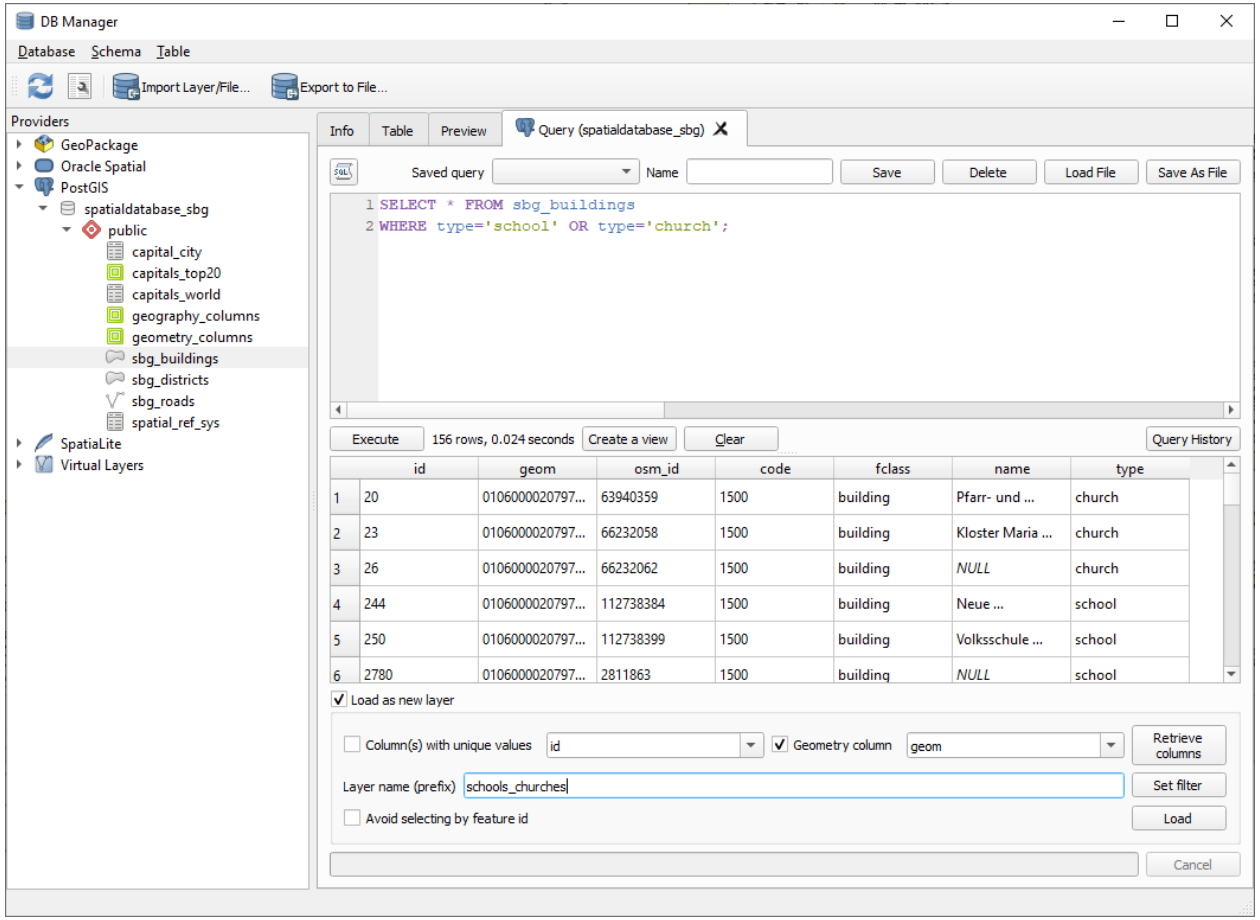
+

Sample assignments

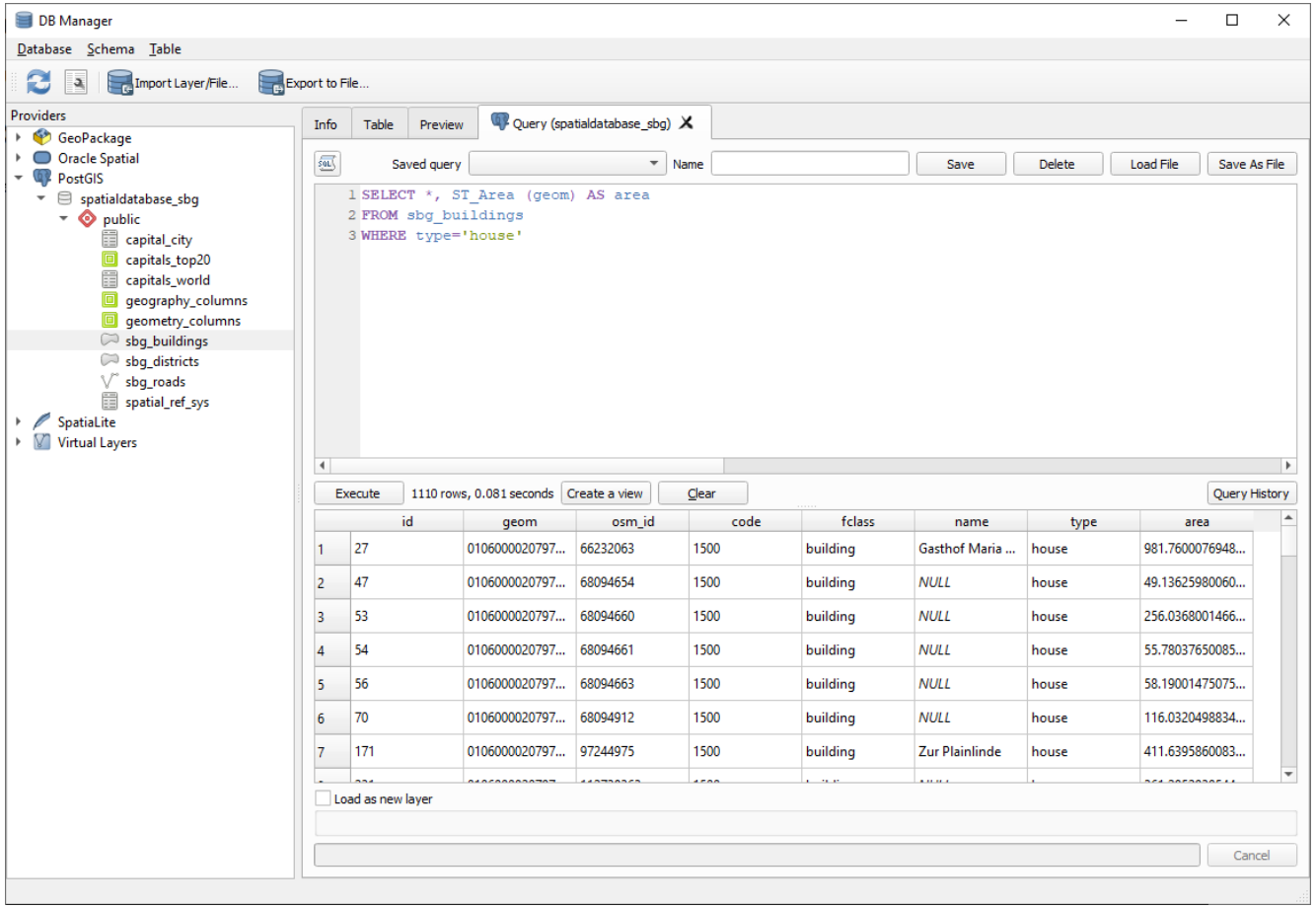
Exercise 6: SQL-I

Mohamed Dhia TURKI

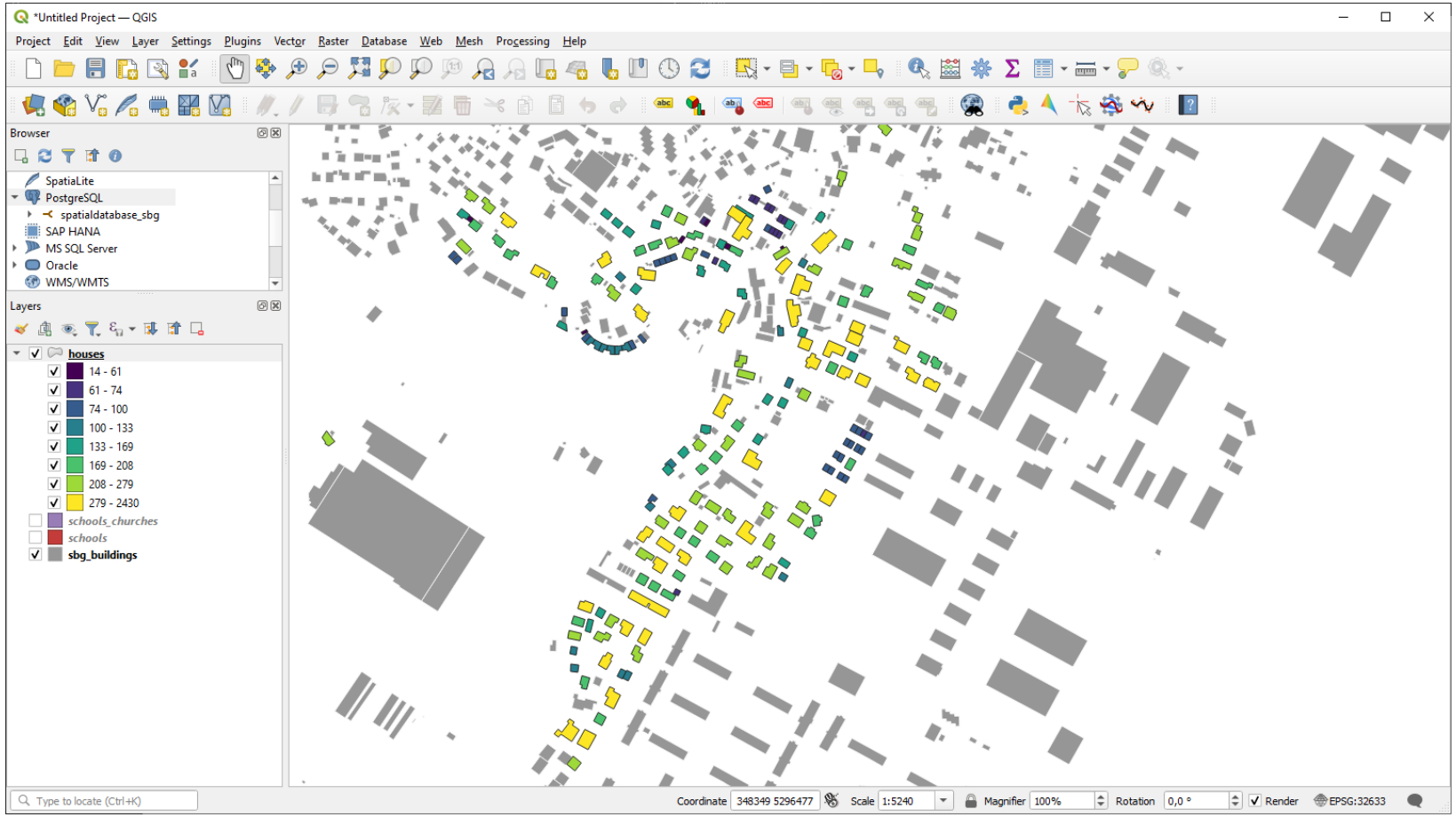
Schools & Churches



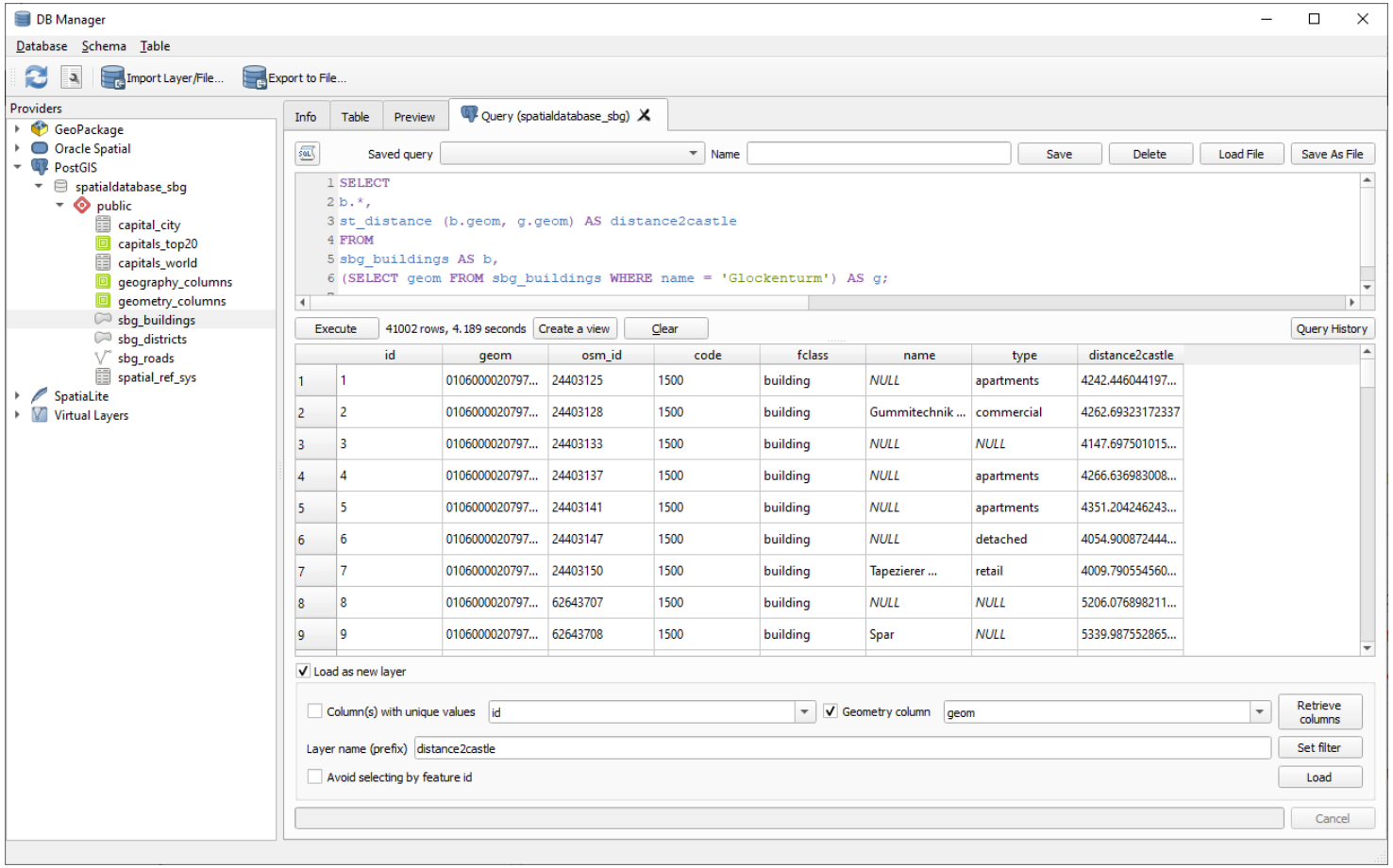
Houses & area


DB Manager
Database Schema Table
Import Layer/File...
Export to File...
Providers
GeoPackage
Oracle Spatial
PostGIS
spatialdatabase_sbg
public
capital_city
capitals_top20
capitals_world
geography_columns
geometry_columns
sbg_buildings
sbg_districts
sbg_roads
spatial_ref_sys
SpatiaLite
Virtual Layers
Info
Table
Preview
Query (spatialdatabase_sbg)
Saved query
Name
Save
Delete
Load File
Save As File
1 SELECT *, ST_Area (geom) AS area
2 FROM sbg_buildings
3 WHERE type='house'
Execute
1110 rows, 0.081 seconds
Create a view
Clear
Query History
id geom osm_id code fclass name type area
1 27 0106000020797... 66232063 1500 building Gasthof Maria ... house 981.7600076948...
2 47 0106000020797... 68094654 1500 building NULL house 49.13625980060...
3 53 0106000020797... 68094660 1500 building NULL house 256.0368001466...
4 54 0106000020797... 68094661 1500 building NULL house 55.78037650085...
5 56 0106000020797... 68094663 1500 building NULL house 58.19001475075...
6 70 0106000020797... 68094912 1500 building NULL house 116.0320498834...
7 171 0106000020797... 97244975 1500 building Zur Plainlinde house 411.6395860083...
Load as new layer
Cancel

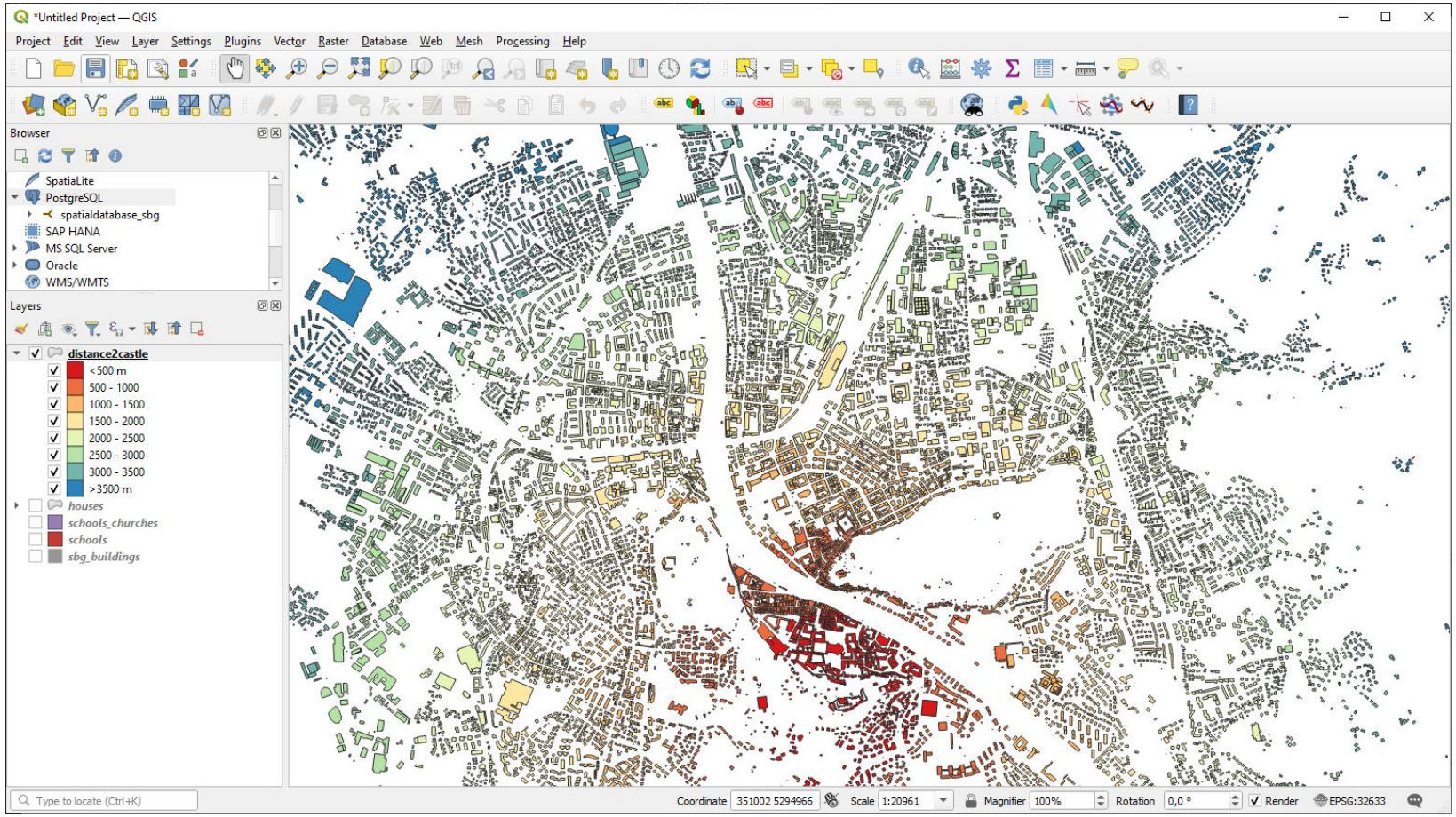
Houses & area


*Untitled Project — QGIS
Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
Browser
SpatiaLite
PostgreSQL
spatialdatabase_sbg
SAP HANA
MS SQL Server
Oracle
WMS/WMTS
Layers
houses
14 - 61
61 - 74
74 - 100
100 - 133
133 - 169
169 - 208
208 - 279
279 - 2430
schools_churches
schools
sbg_buildings
Type to locate (Ctrl+K)
Coordinate 348349 5296477
Scale 1:5240
Magnifier 100%
Rotation 0,0 °
Render
EPSG:32633

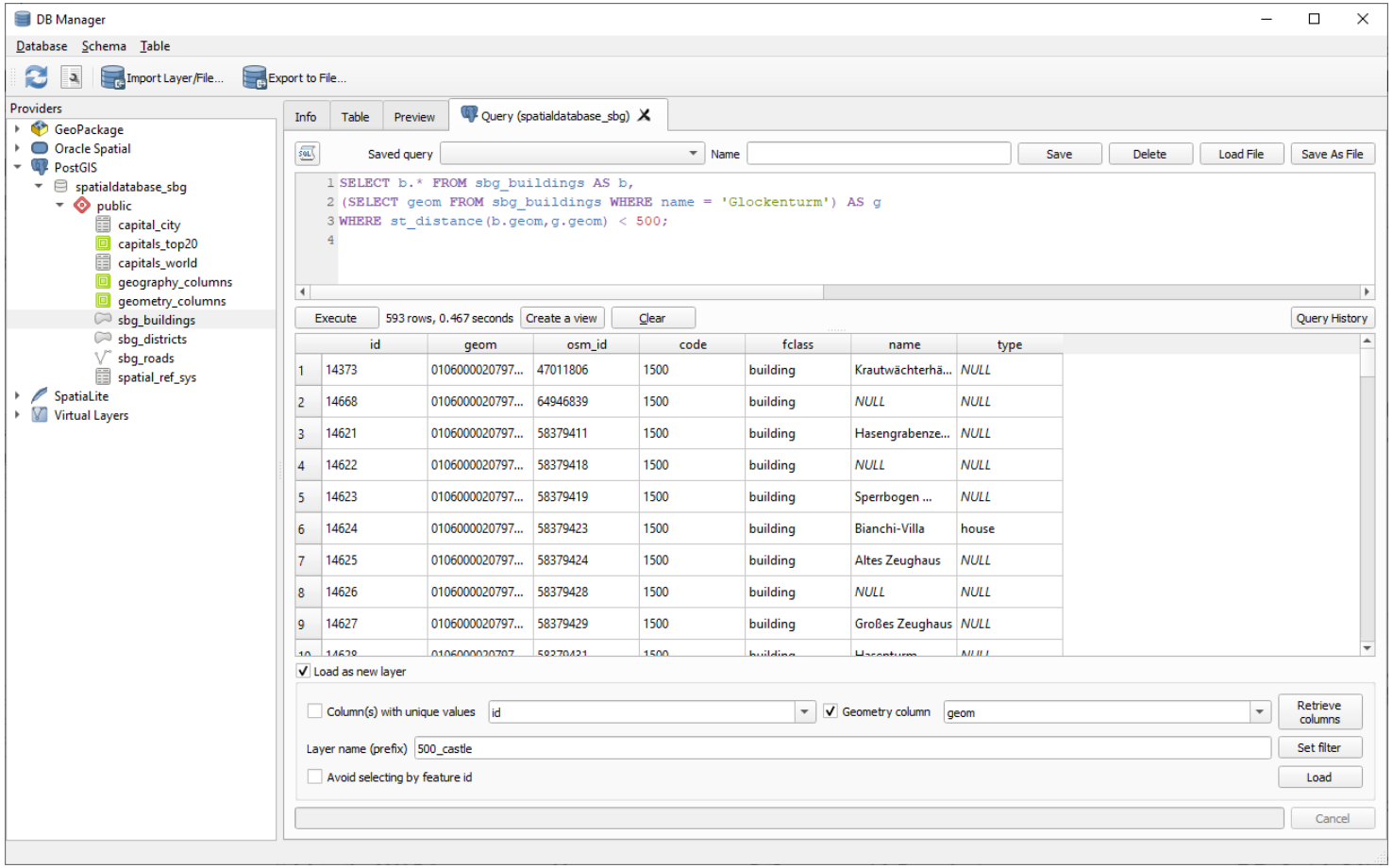
Distance buildings to the castle



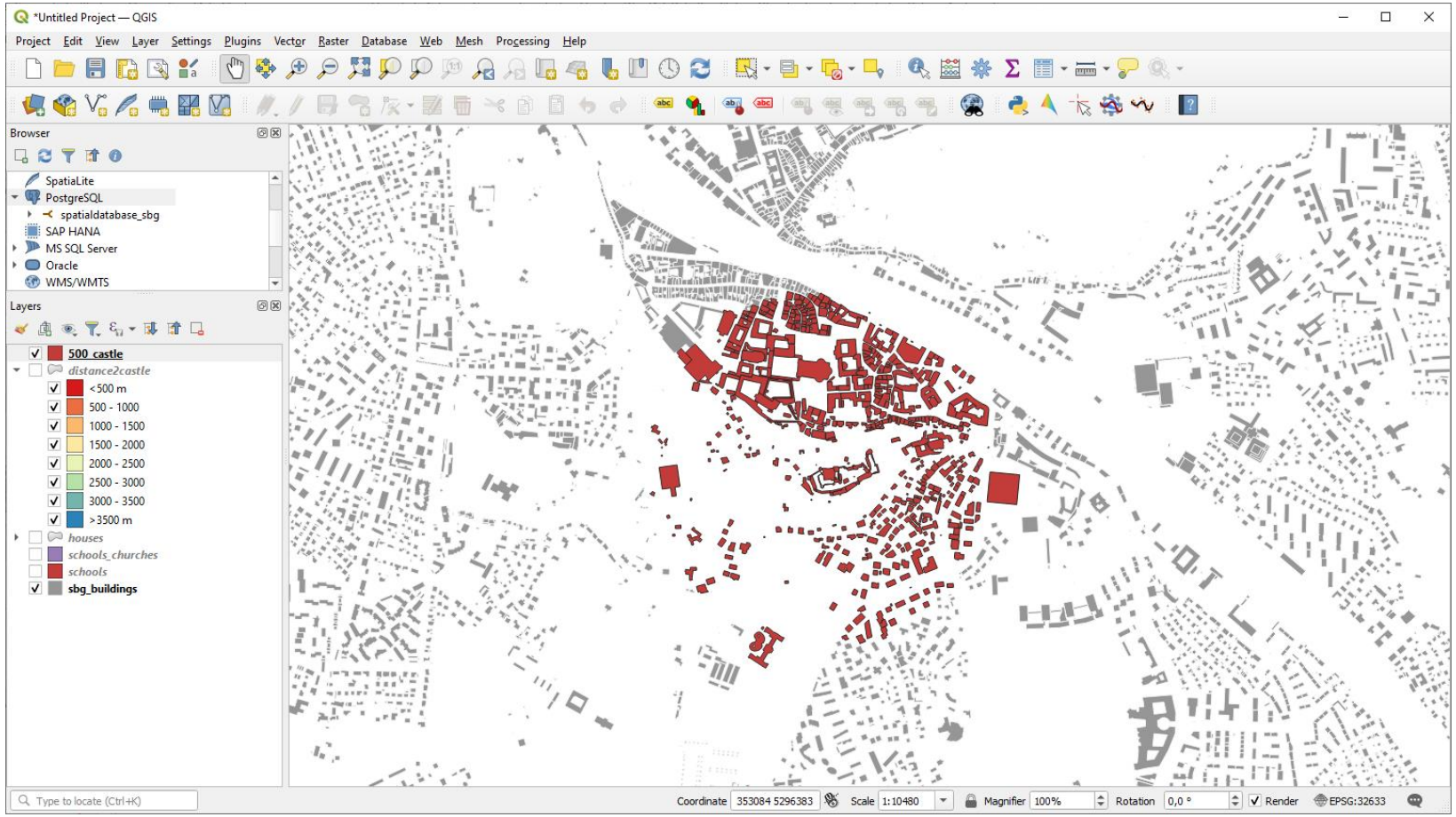
Distance buildings to the castle



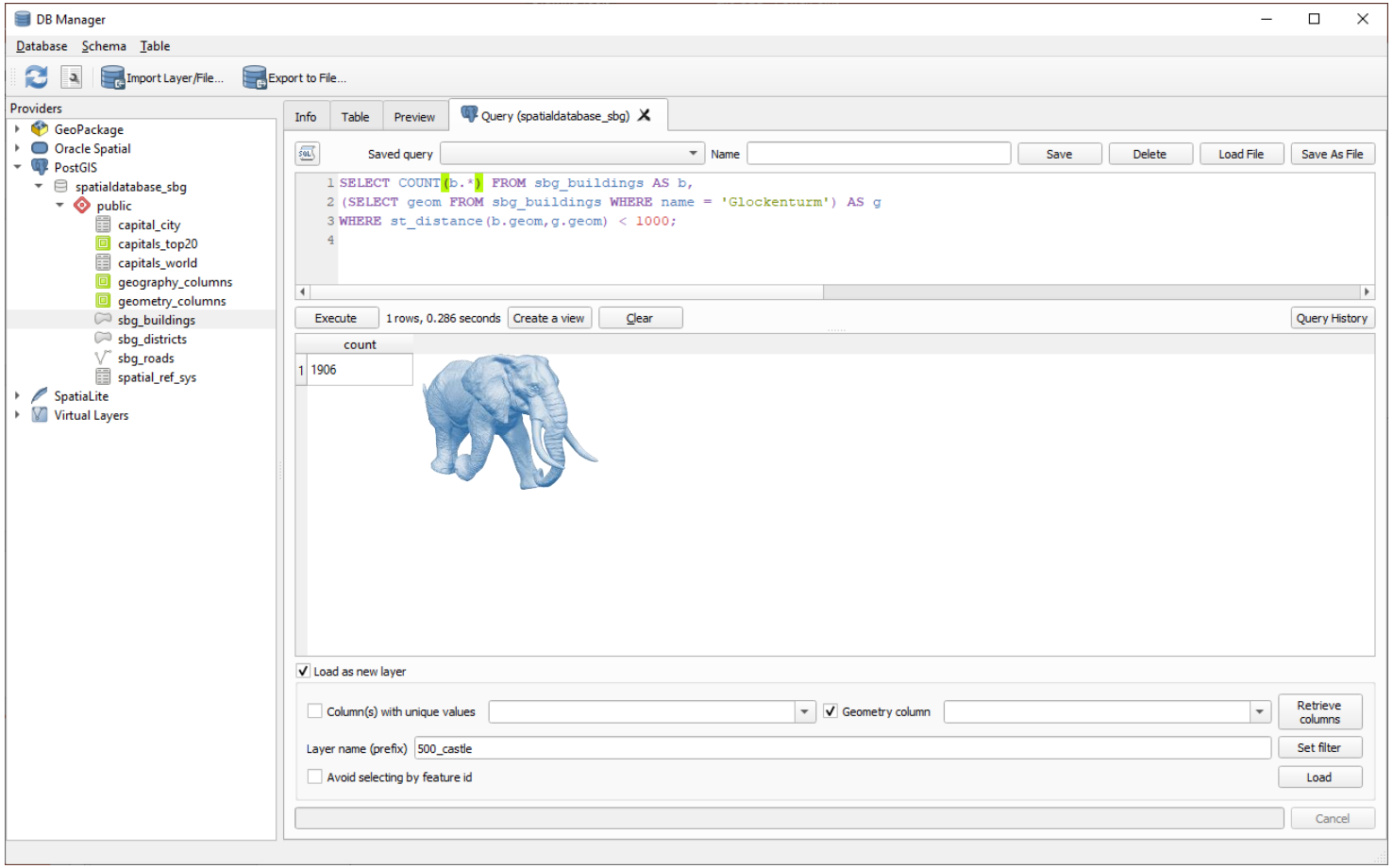
Buildings within 500m of castle



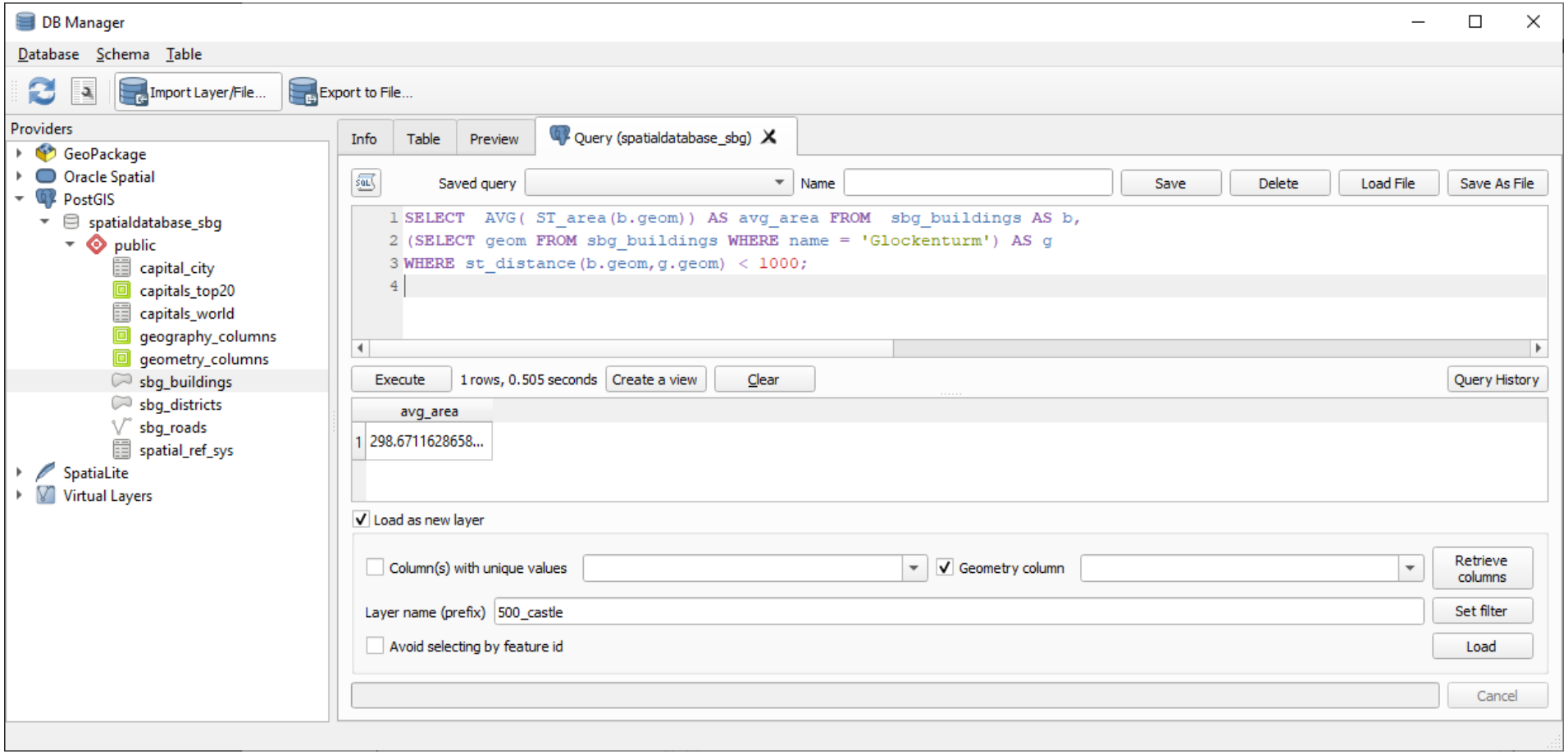
Buildings within 500m of castle



Number of buildings within 1km of castle



average size of all buildings, which are within 1km distance to the fortress



Explanation

- We use the previous selection of the buildings within 1km to select the buildings
- We add an area column for the buildings ST_area(geom)
- We wrap it all in an AVG() function

E10 User Access & Security

Mohamed Dhia TURKI

4.3 Creating and configuring users

dynamic_salzburg_turkim/postgres_edu@dynamic_salzburg

Query Editor | Query History

```
1  CREATE ROLE carto_tur
2  LOGIN PASSWORD 'map';
3
4  CREATE ROLE intern_tur
5  LOGIN PASSWORD 'intern';
```

Data Output | Explain | Messages | Notifications

```
ERROR:  role "carto_tur" already exists
SQL state: 42710
```

DB Manager

Database | Schema | Table

Import Layer/File... | Export to File...

Providers

- GeoPackage
- Oracle Spatial
- PostGIS
  - carto
    - public
      - capital_city
      - capitals_top20
      - capitals_world
      - geography_columns
      - geometry_columns
      - intern_view
      - raster_columns
      - raster_overviews
      - salzburg_dem
      - sbg_buildings
      - sbg_districts
      - sbg_roads
      - security_geofence
      - spatial_ref_sys
  - intern
- SpatiaLite
- Virtual Layers

Info | Table | Preview

sbg_buildings

General info

Relation type:	Table
Owner:	postgres_edu
Pages:	4675
Rows (estimation):	41002
Privileges:	select

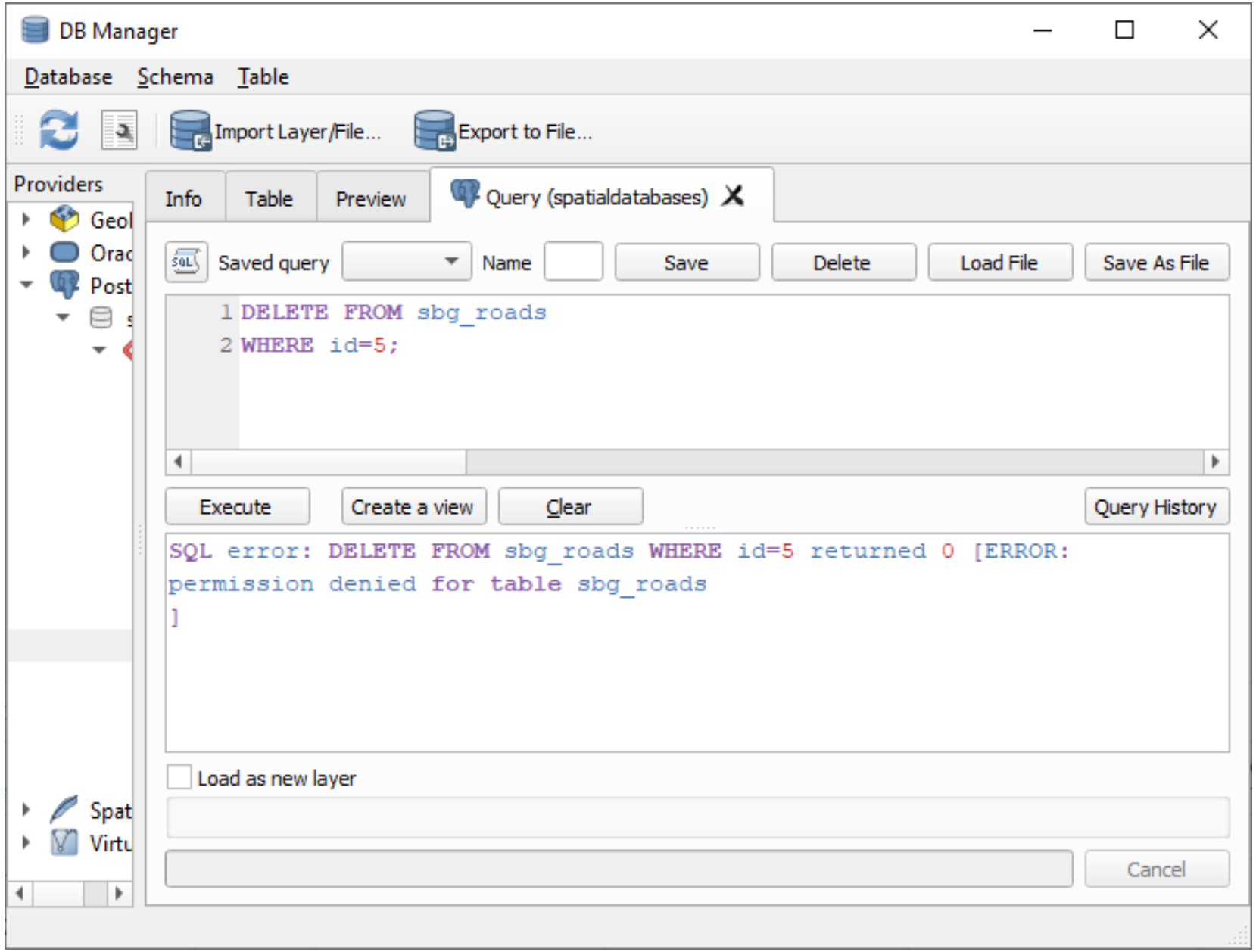
This user has read-only privileges.

PostGIS

Column:	geom
Geometry:	MULTIPOLYGON
Dimension:	2
Spatial ref:	WGS 84 / UTM zone 33N (32633)
Estimated extent:	344880.25000, 5289227.00000, 360574.96875, 5303193.00000
Extent:	(unknown) (find out)

No spatial index defined (create it)

Fields


DB Manager
Database
Schema
Table
Import Layer/File...
Export to File...
Providers
Geol
Orac
Post
Spat
Virtu
Info
Table
Preview
Query (spatialdatabases)
Saved query
Name
Save
Delete
Load File
Save As File
1 DELETE FROM sbg_roads
2 WHERE id=5;
Execute
Create a view
Clear
Query History
SQL error: DELETE FROM sbg_roads WHERE id=5 returned 0 [ERROR:
permission denied for table sbg_roads
]
Load as new layer
Cancel

TASK

- How to void passwords being known?

  - Asking the user to create a new password on first login
  - Using a sort of encryption to secure the passwords

4.6 Column-level security

dynamic_salzburg_turkim/postgres_edu@dynamic_salzburg

Query Editor | Query History

```
1 REVOKE ALL ON sbg_buildings FROM intern_tur;
2 GRANT SELECT (id, name, geom, code, fclass, type) ON sbg_buildings TO intern_tur;
3
```

Data Output | Explain | Messages | Notifications

```
GRANT

Query returned successfully in 50 msec.
```

DB Manager

Database | Schema | Table

Import Layer/File... | Export to File...

Providers

- GeoPackage
- Oracle Spatial
- PostGIS
  - carto
  - intern
    - public
      - capital_city
      - capitals_top20
      - capitals_world
      - geography_columns
      - geometry_columns
      - intern_view
      - raster_columns
      - raster_overviews
      - salzburg_dem
      - sbg_buildings
      - sbg_districts
      - sbg_roads
      - security_geofence
      - spatial_ref_sys
- SpatiaLite
- Virtual Layers

Info | Table | Preview

sbg_buildings

General info

Relation type:	Table
Owner:	postgres_edu
Pages:	4675
Rows (estimation):	41002
Privileges:	This user has no privileges!

PostGIS

Column:	geom
Geometry:	geometry
Spatial ref:	Undefined (-1)
Estimated extent:	344880.25000, 5289227.00000, 360574.96875, 5303193.00000
Extent:	(unknown) (find out)

There is no entry in geometry_columns!

No spatial index defined (create it)

Fields

DB Manager

Database Schema Table

Import Layer/File... Export to File...

Providers

- GeoPackage
- Oracle Spatial
- PostGIS
  - carto
  - intern
    - public
      - capital_city
      - capitals_top20
      - capitals_world
      - geography_columns
      - geometry_columns
      - intern_view
      - raster_columns
      - raster_overviews
      - salzburg_dem
      - sbg_buildings
      - sbg_districts
      - sbg_roads
      - security_geofence
      - spatial_ref_sys
- SpatiaLite
- Virtual Layers

Info | Table | Preview | Query (intern)

Saved query | Name | Save | Delete | Load File | Save As File

```
SELECT id, name, geom, code, fclass, type FROM sbg_buildings;
```

Execute | 41002 rows, 3.503 seconds | Create a view | Clear | Query History

	id	name	geom	code	fclass	type
1	2903	NULL	0106000020797...	1500	building	NULL
2	6103	NULL	0106000020797...	1500	building	NULL
3	8741	NULL	0106000020797...	1500	building	NULL
4	12827	NULL	0106000020797...	1500	building	NULL
5	13781	NULL	0106000020797...	1500	building	NULL

Load as new layer

Cancel

4.7 Row-level security

dynamic_salzburg_turkim/postgres_edu@dynamic_salzburg

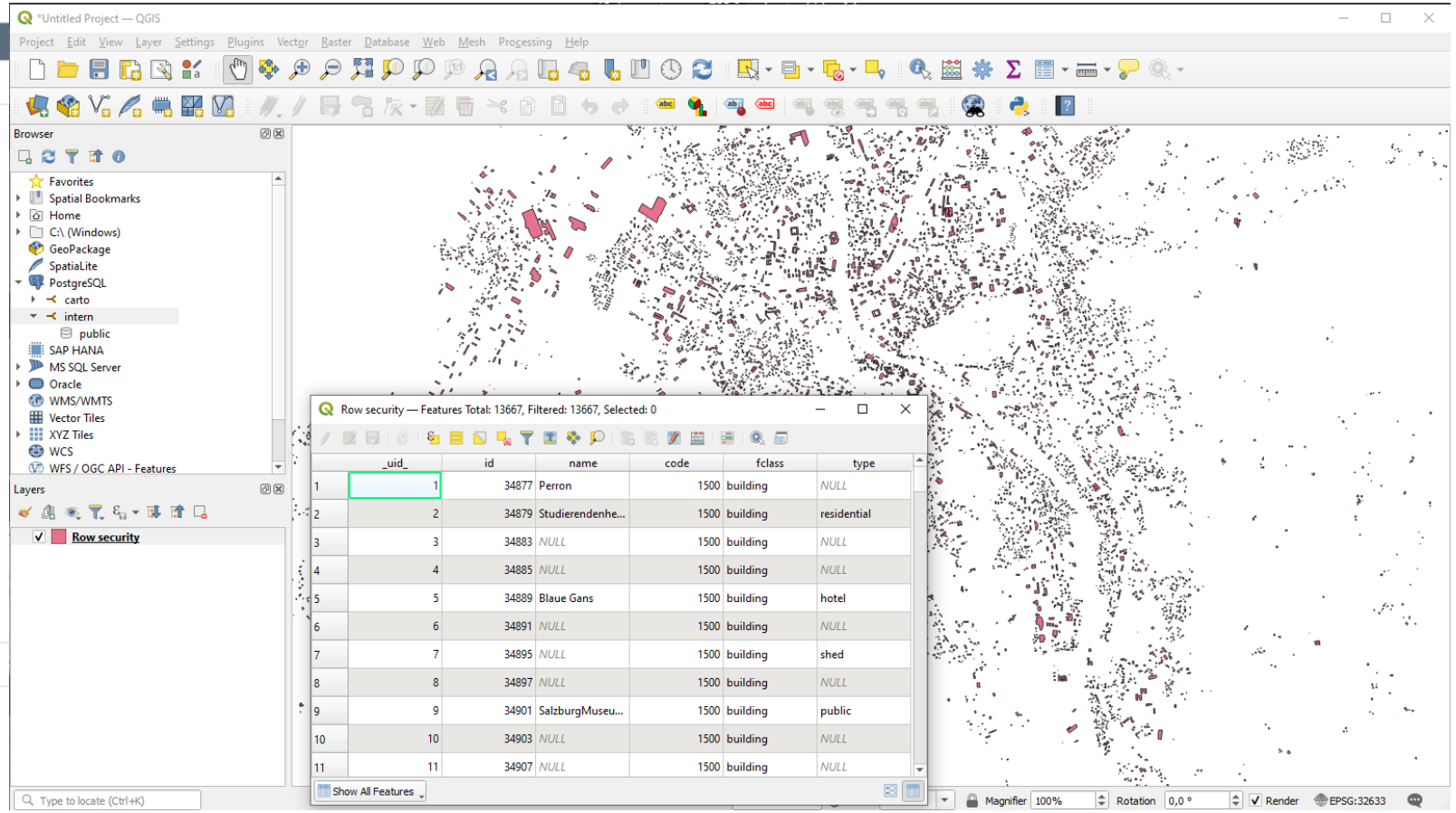
Query Editor | Query History

```
-- create policy
CREATE POLICY intern_shield ON sbg_buildings FOR ALL TO intern_tur
USING (security_level='public');
-- enable row-level security on table (only once)
ALTER TABLE sbg_buildings ENABLE ROW LEVEL SECURITY;
```

Data Output | Explain | Messages | Notifications

```
ALTER TABLE

Query returned successfully in 67 msec.
```



	uid	id	name	code	fclass	type
1	1	34877	Perron	1500	building	NULL
2	2	34879	Studierendenhe...	1500	building	residential
3	3	34883	NULL	1500	building	NULL
4	4	34885	NULL	1500	building	NULL
5	5	34889	Blaue Gans	1500	building	hotel
6	6	34891	NULL	1500	building	NULL
7	7	34895	NULL	1500	building	shed
8	8	34897	NULL	1500	building	NULL
9	9	34901	SalzburgMuseu...	1500	building	public
10	10	34903	NULL	1500	building	NULL
11	11	34907	NULL	1500	building	NULL

4.7 Row-level security (with intersection)

dynamic_salzburg_turkim/postgres_edu@dynamic_salzburg

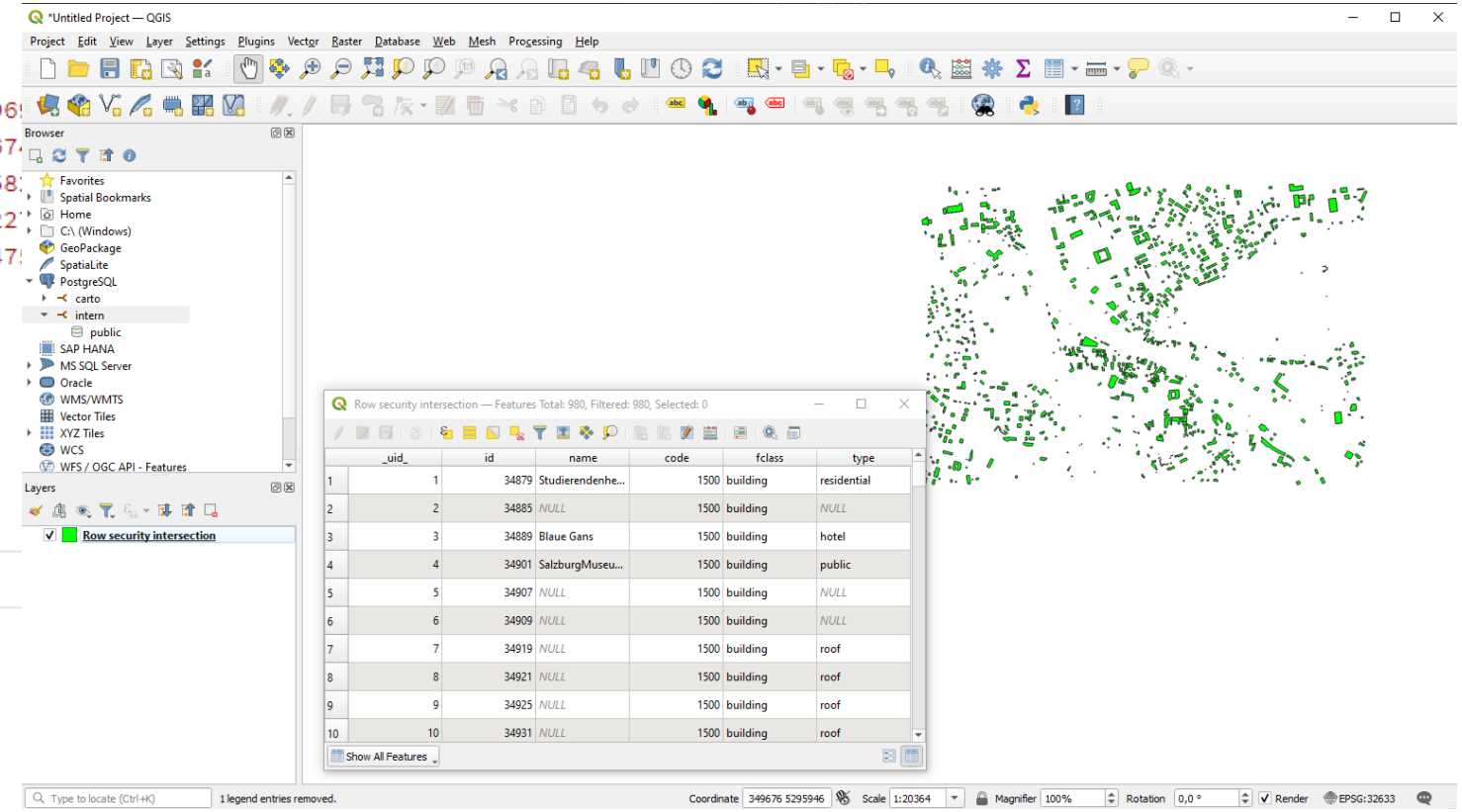
Query Editor | Query History

```
DROP POLICY intern_shield ON sbg_buildings;
CREATE POLICY intern_shield
ON
sbg_buildings FOR ALL
TO
intern_tur USING ( st_intersects(
    geom, ST_GeomFromText('Polygon ((352387.999041571340058 5296
                           354909.84093548177042976 5296931.33667
                           354909.84093548177042976 5295245.06758
                           352387.999041571340058 5295245.0675822
                           352387.999041571340058 5296931.3366747
AND security_level='public');
```

Data Output | Explain | Messages | Notifications

```
CREATE POLICY

Query returned successfully in 66 msec.
```



TASK

- Security risks

  - The password can be leaked somehow. Having the database only accessible through a local network or a VPN is more secure.
  - The data can be lost or damaged so backups should be made regularly. Also, the database server should be secured against physical damage.
  - Hacking and SQL injections. Use prepared statements.