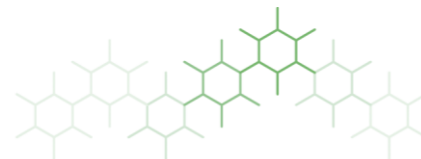# Data quality with Field Domain
or Attributes Form

September 10, 2024

Jeroen Hovens
jeroen@groenebij.nl

- Use Attributes Form in the Layer Properties

- Improve data quality by using 'dropdown list' for text values or range for numerical values

- Set constraints

- [Link to documentation on widgets](#)
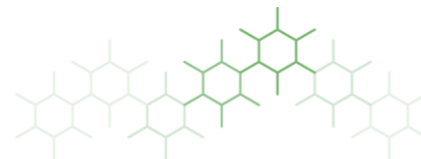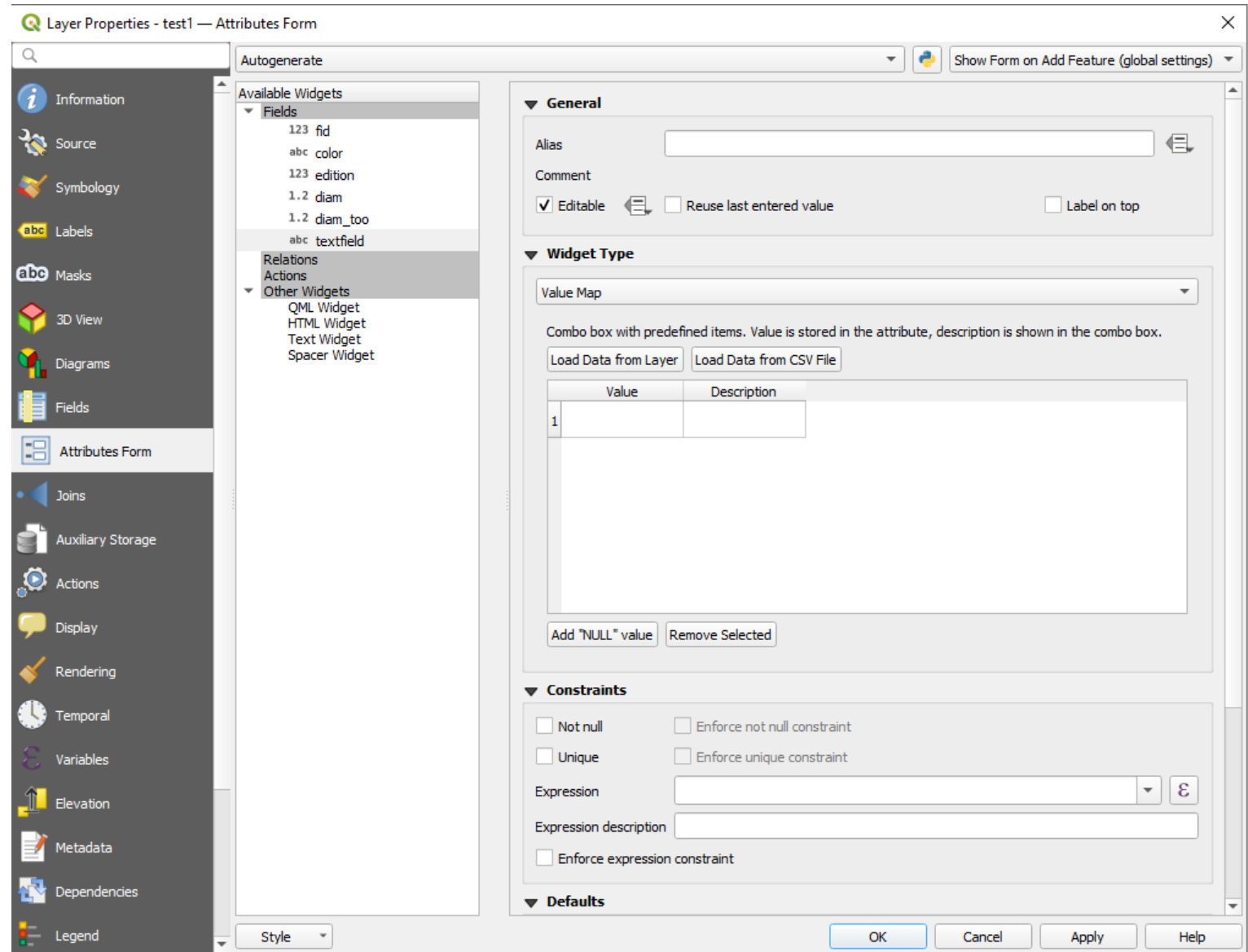
- Works great within QGIS

- Applying a single Value Map or Range to multiple fields or even multiple layers can be time consuming.

- Attributes Form is a layer property, it is not an integral part of the dataset

- When you share the datafile, you need to share the QGIS styling as well for others to benefit from your value maps and ranges
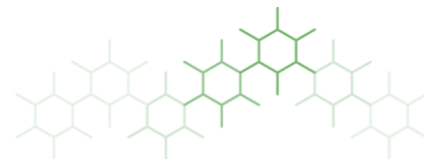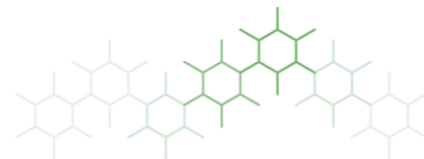
Geopackage support the use of data column constraints

- [Link to geopackage specifications](#)

You can create Field domains:

- Enumeration, which is a coded value map or 'drop down list'
- Range, used for numerical values
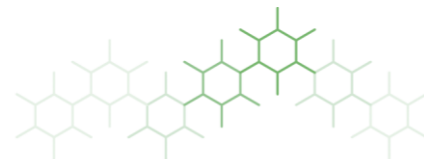- Glob, never used it ☺

In QGIS 3.26

Field domain management capabilities were added to the browser
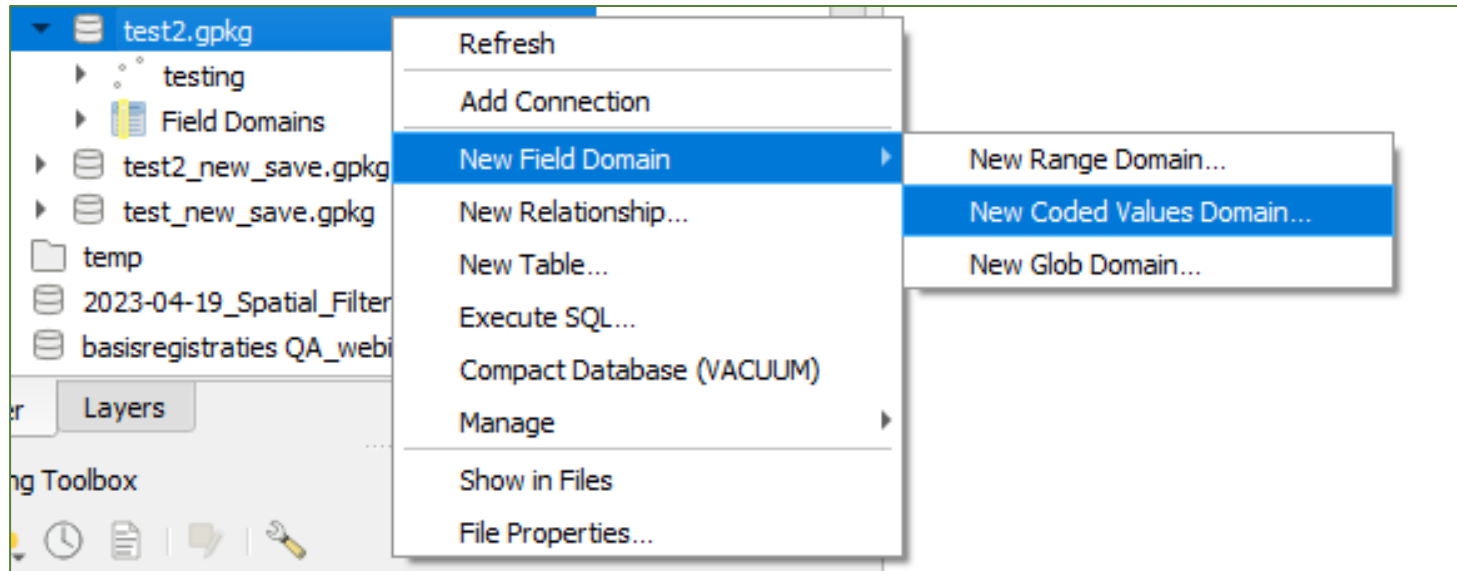- Only for geopackages
- [Link to visual changelog](#)

In QGIS 3.28

Field domain management was added for non-gpkg OGR sources
- create and use domains in FGDB
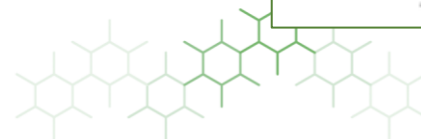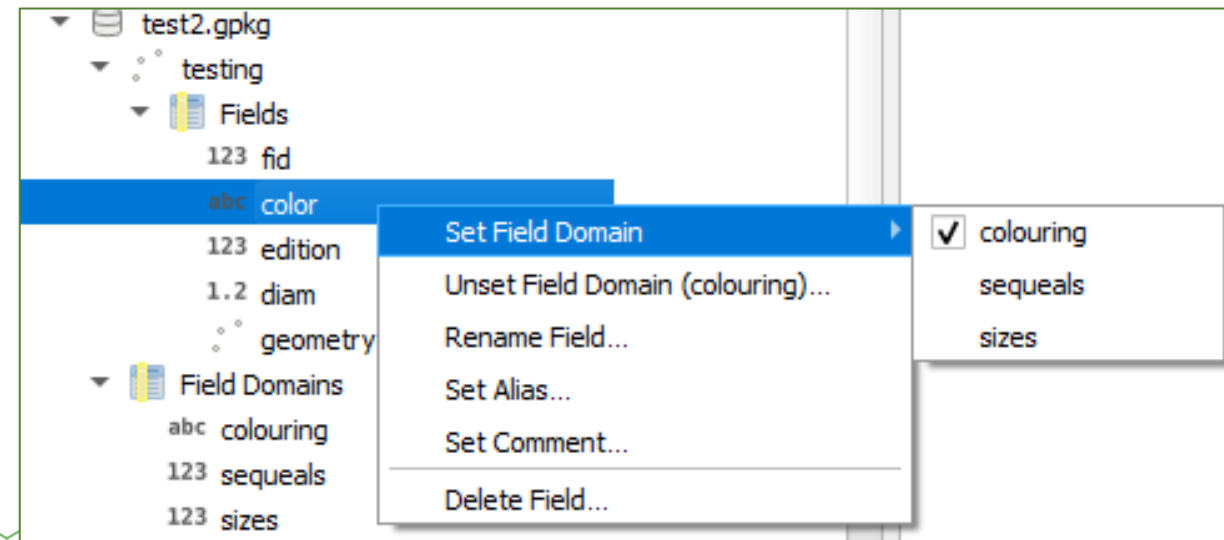- [Link to visual changelog](#)

Field domain management in Browser panel

Field domains can be assigned to any type-matching field in any layer within the geopackage

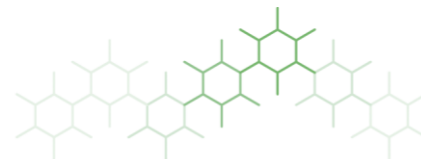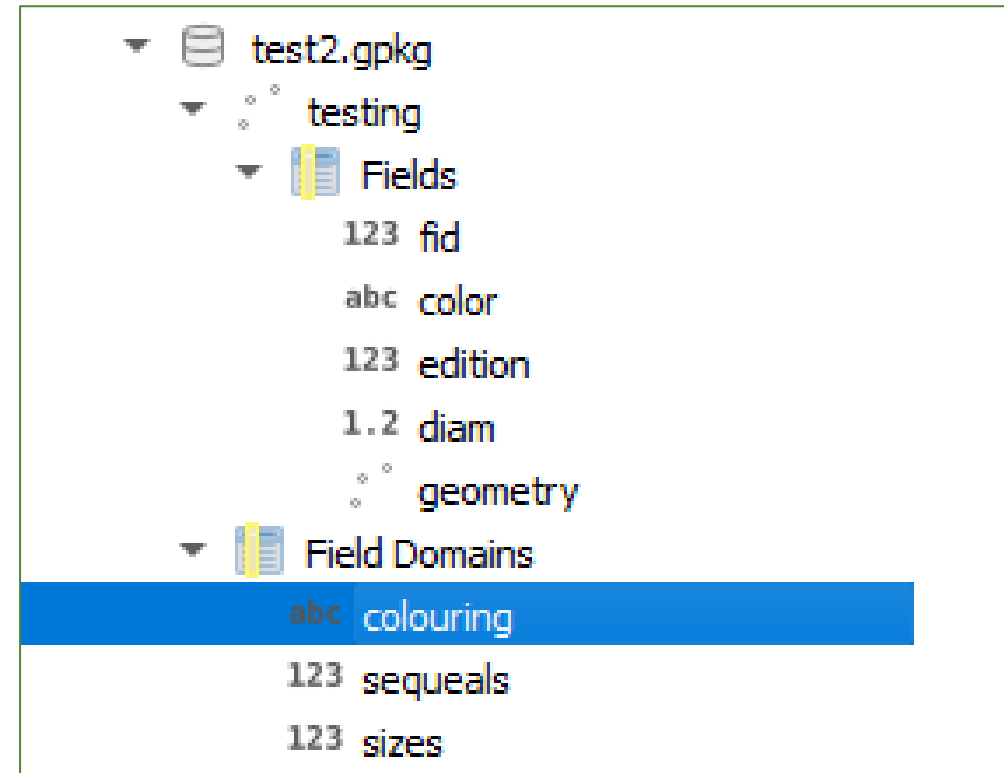Multiple fields can have the same Field domain assigned

Once created, right clicking the created Field Domain doesn't do anything
- You can't see the values or ranges
- You can't edit the field domains

Actually you can, using SQL…

Feature request?
- [Link to feature request #55257](#)

Field domains and to which fields they are assigned are stored in special geopackage tables

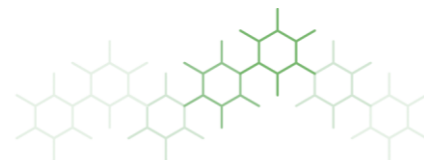QGIS needs to interpret these 'data column constraints'

Coded values domain 'show' as a Value Map widget in Attributes Form
Range for integer 'show' as a Range widget in Attributes Form
Range for decimal 'show' as a Range widget in Attribute Form

The coded value and integer range work fine,
However there is something going on with the decimal range
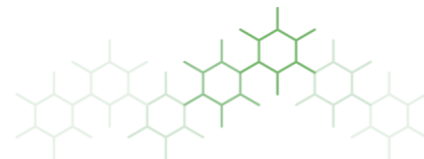
The field domain 'sequals' is of integer type

The field domain 'sizes' is of decimal type

Actually, they are both 'numerical'

Field Domains
abc colouring
123 sequeals
123 sizes
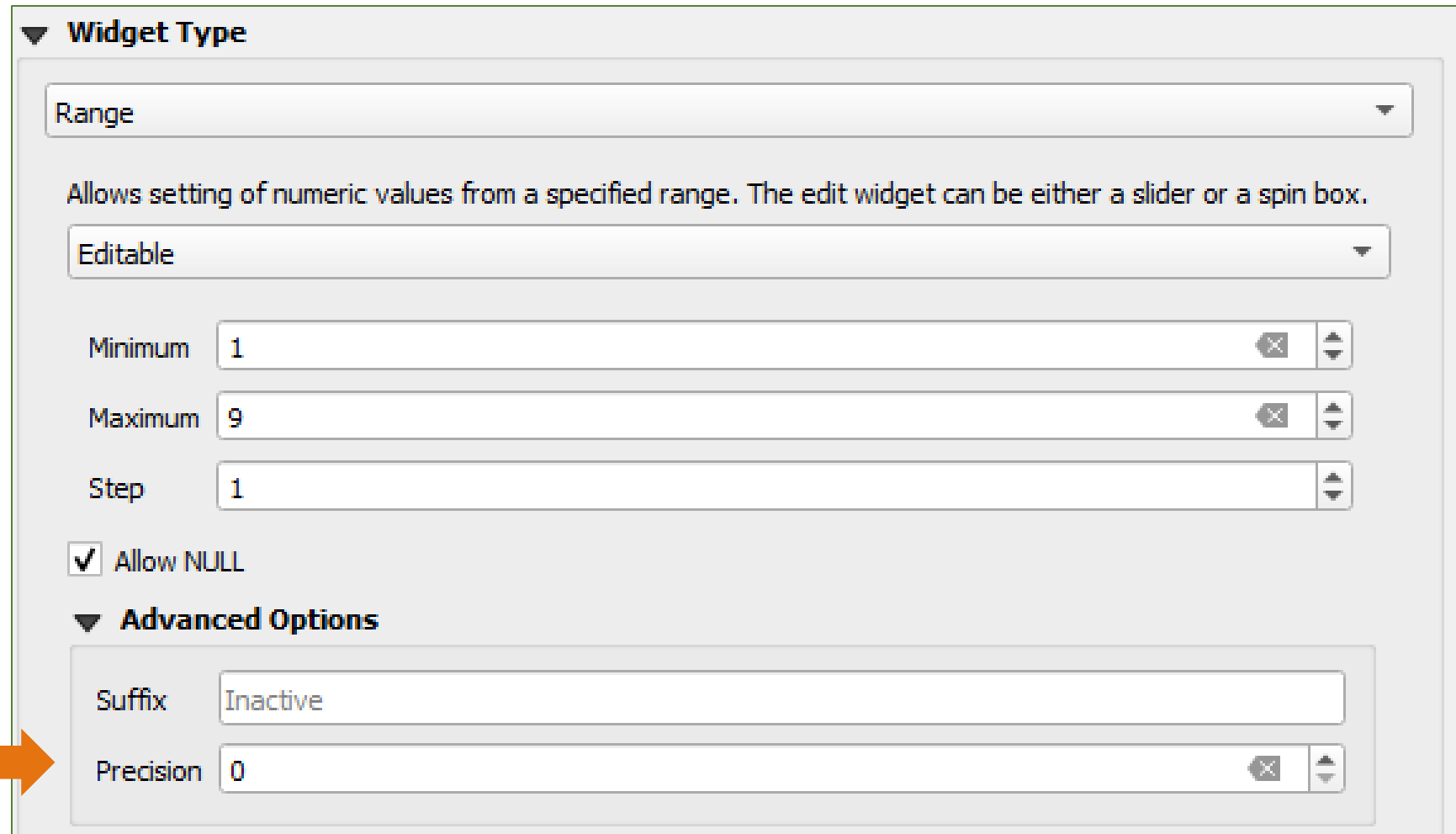
Range for decimal 'show' as a Range widget in Attribute Form ??
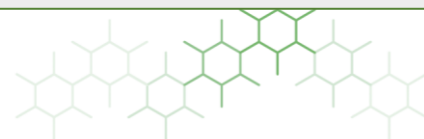
Range for decimal 'show' as a Range widget in Attribute Form ??

Issue created:

- Link to issue #56146

Help on solving this is greatly appreciated, as with bugs and feature request in general
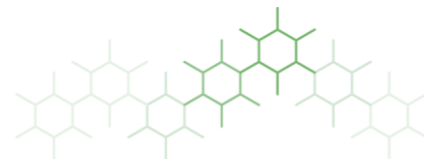
Collaboration on data editing

Field domains are part of the gpkg, not of the QGIS styling, so…

- Editing data will always use the applied value maps and ranges
  - Or does it???

- It should be possible to edit the data using the field domains in other software that can handle geopackages
  - Do you have examples of such software?

- Exporting a layer to a new geopackage also copies the <u>applied</u> field domains
  - it didn't actually, but is was fixed / added in 3.36, but not backported to LTR 3.34
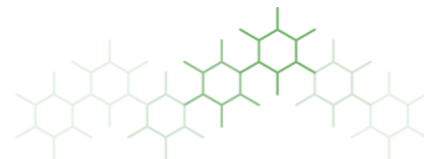
Editing data will always use the applied value maps and ranges
- Or does it???

Don't change the widget type

When you change the widget type from Value Map / Range to Hidden, or anything else, you can not get your Value Map or Range back…

- You have to remove and add the layer for the Value Map and Range to be effective again

Bug? Or Feature-request?
- Link to issue #58594
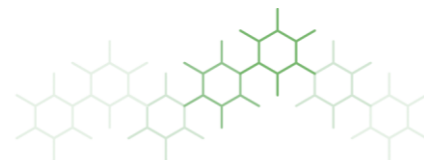
Early conclusions

I like the potential of Field Domains

It does need additional work in QGIS to grow to its potential

Questions?

Jeroen Hovens
jeroen@groenebij.nl
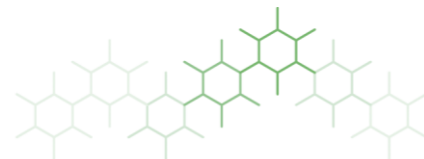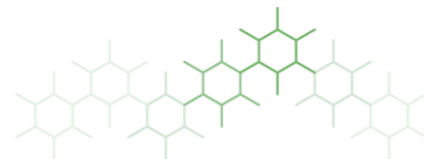
Bonus sheet 1

Using sql you can create, but also view and edit field domains

You can do this in the QGIS Browser panel or in any other program where you can edit geopackages, for example DB Browser

You need three queries to implement the field domain option, or use the pro tip on bonus sheet 5
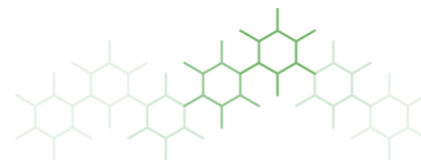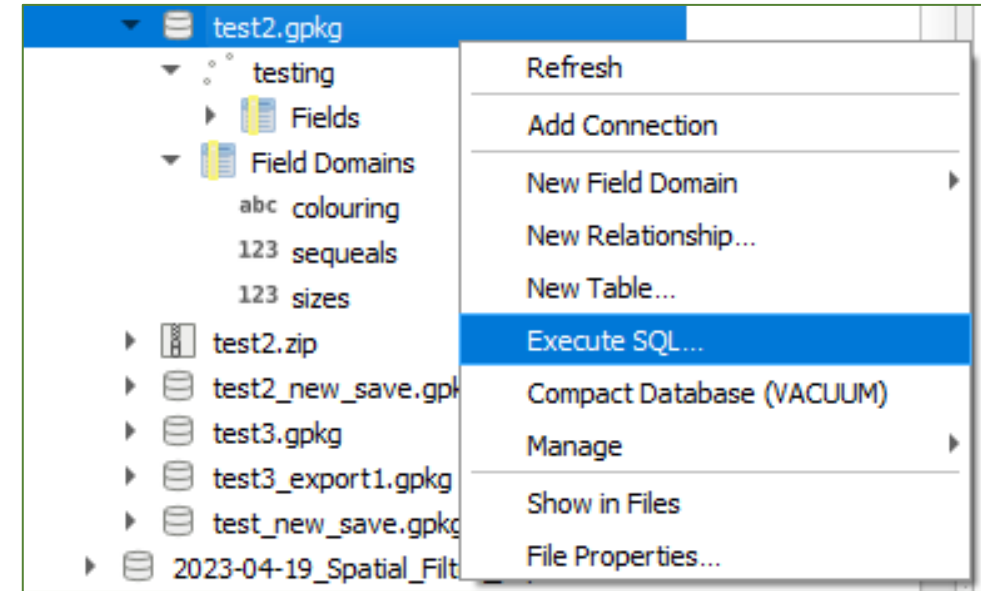
Bonus sheet 2

To view the contents of existing domain fields

SELECT * FROM gpkg_data_column_constraints

To view assigned field domains and the fields
to which they are assigned

SELECT * FROM gpkg_data_columns

Bonus sheet 3

1) Table where all Field domains will be stored:

CREATE TABLE gpkg_data_column_constraints (constraint_name TEXT NOT NULL, constraint_type TEXT NOT NULL, value TEXT, min NUMERIC, min_is_inclusive BOOLEAN, max NUMERIC,max_is_inclusive BOOLEAN, description TEXT,CONSTRAINT gdcc_ntv UNIQUE (constraint_name, constraint_type, value))
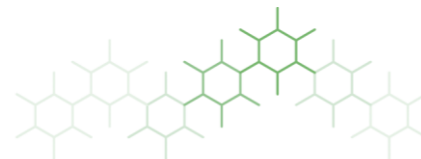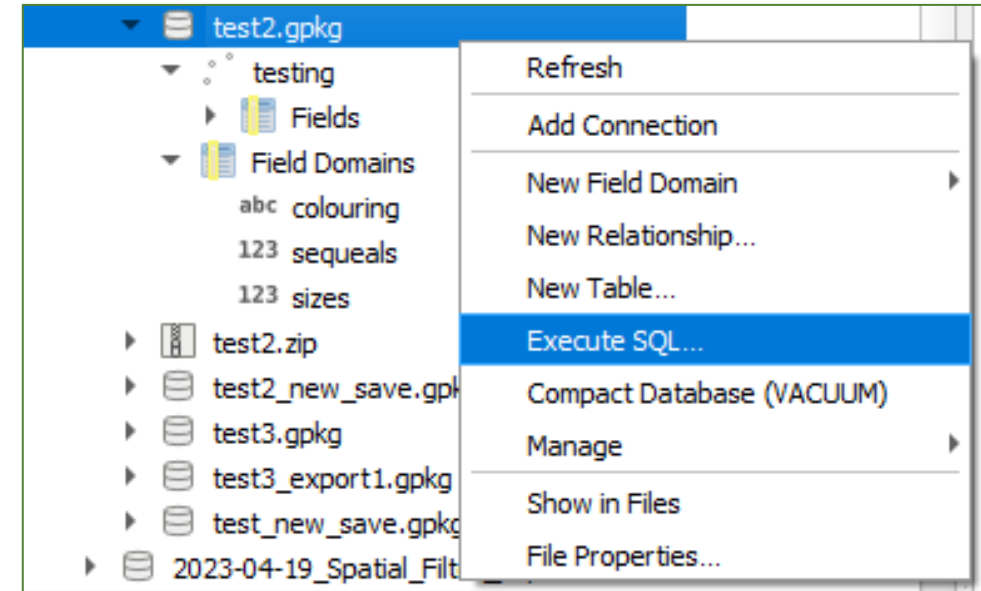
2) Table where Field domains are assigned to fields

CREATE TABLE gpkg_data_columns (table_name TEXT NOT NULL, column_name TEXT NOT NULL, name TEXT,title TEXT, description TEXT, mime_type TEKST ,constraint_name TEXT,CONSTRAINT pk_gdc PRIMARY KEY (table_name, column_name),CONSTRAINT gdc_tn UNIQUE (table_name, name))

3) To make sure the new tables are integrated in the gpkg (or see the pro tip next sheet)

INSERT INTO gpkg_extensions (table_name, extension_name, definition, scope)

VALUES ('gpkg_data_columns', 'gpkg_schema', 'http://www.geopackage.org/spec121/#extension_schema', 'read-write'), ('gpkg_data_column_constraints', 'gpkg_schema', 'http://www.geopackage.org/spec121/#extension_schema', 'read-write')
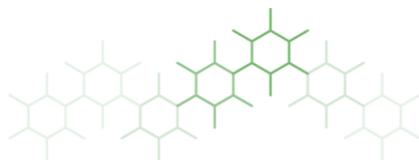
Bonus sheet 4

1) Insert a coded value Field domain 'colouring' with two values 'blue' and 'pink':

INSERT INTO gpkg_data_column_constraints (constraint_name, constraint_type, value, description)

VALUES ('colouring', 'enum', 'blue', 'blue'), ('colouring', 'enum', 'pink', 'pink')

2) Insert a range Field domain 'sizes' with decimals and including the min and max values 3,2 and 7,8

INSERT INTO gpkg_data_column_constraints (constraint_name, constraint_type, min, min_is_inclusive, max, max_is_inclusive)

VALUES ('sizes', 'range', 3.2, 1, 7.8,1)

3) Assign Field domain 'colouring' to field 'color' in layer 'testlayer'

INSERT INTO gpkg_data_columns (table_name, column_name, constraint_name)

VALUES ('testlayer', 'color', 'colouring')

Note there are more fields in gpkg_data_columns which I ignore for now

Note: powerpoint of course messes up the quotes in the queries above…

If you understand all this, you can probably figure out how to edit or delete an existing field domain and edit assignments
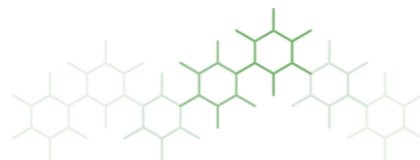
Bonus sheet 5

Pro tip!

To avoid the steps in bonus sheet 3

Simply create a temporary domain field in your geopackage using the browser panel gui "new field domain" and do not assign it to any field

This creates the two tabels and the items in gpkg_extensions table

From here just use the insert querries from bonus sheet 4

Delete the temporary table