



Infrastructure Mapper - Roads

Lindie Strijdom

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About Me

- Intern at **Kartoza**
- Background in spatial analysis
- Passionate about data-driven decision making and map design

Analysis Problem

- What's the shortest route between two points?
- Which roads need repair?



Why These Problems?

Poor road conditions near my home inspired me to analyze routes and identify problem areas.



The Workflow



The Tools

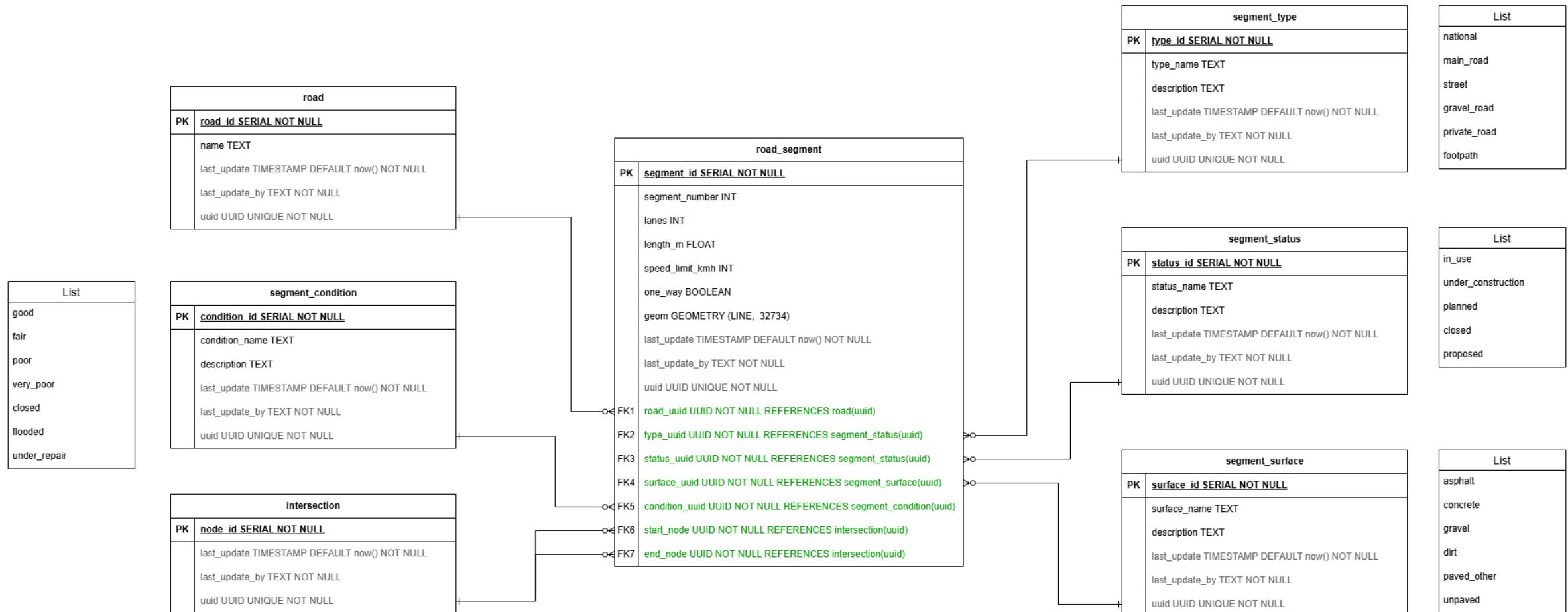
QGIS
QFieldCloud
QNEAT3
Git and GitHub

PostgreSQL/PostGIS
pgAdmin
VS Code
Marp



The Model





The Forms

The screenshot displays the Infrastructure Mapper application interface, specifically the 'The Forms' section. It shows two main configuration panels for form fields.

Form Layout:

- id**: A field labeled 'Form Layout' with a dropdown menu containing 'id'.
- ID**: A configuration panel with the following fields:
 - Alias**: ID
 - Comment**: The unique intersection ID. This is the Primary Key.
 - Editable**: (selected)
 - Reuse last entered value**:
 - Label on top**:

Form Layout:

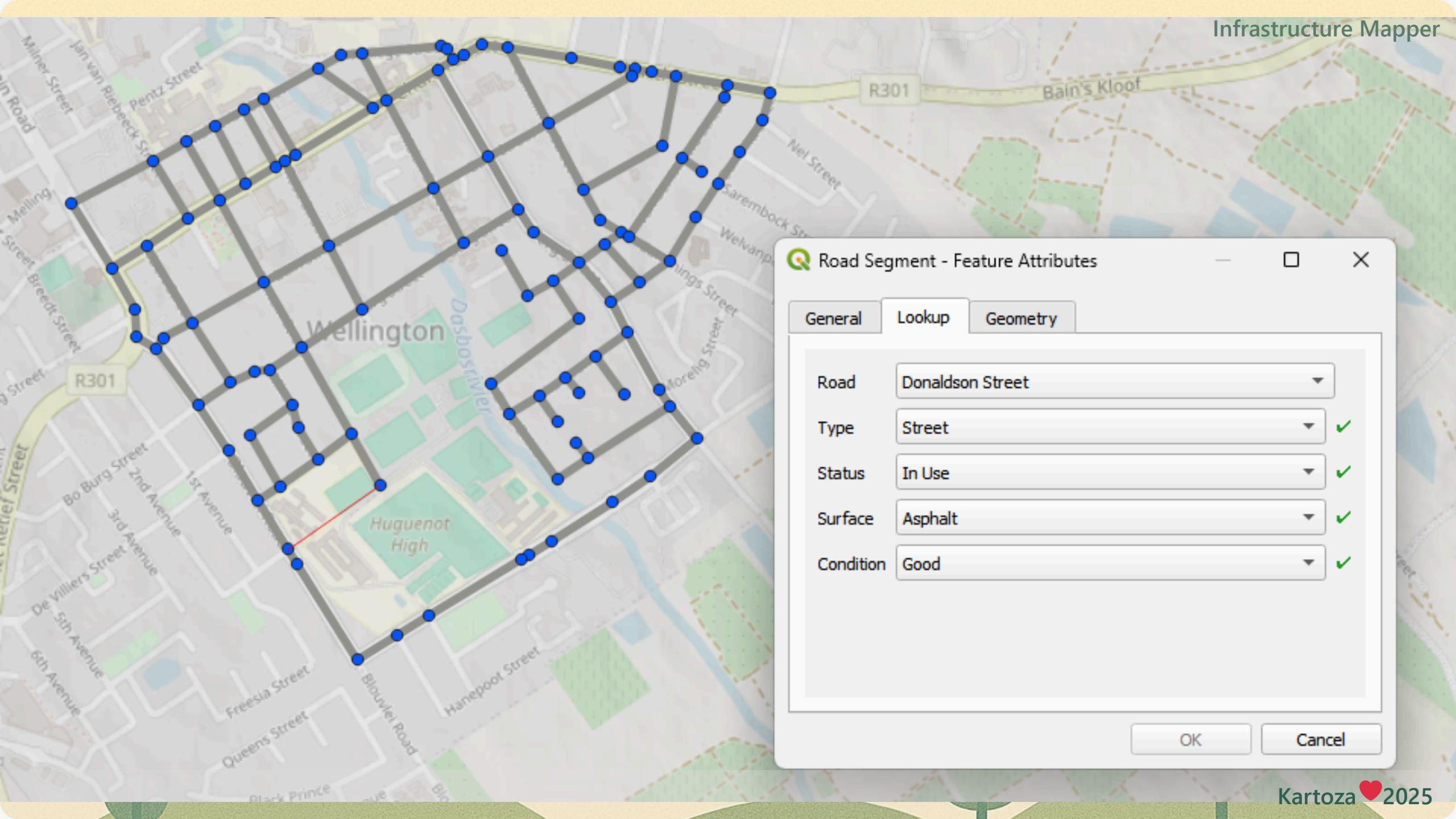
- General**: segment_number, lanes, speed_limit_kmh, one_way
- Lookup**: road_uuid, type_uuid, status_uuid, surface_uuid, condition_uuid
- Geometry**: start_node, end_node

Condition: A configuration panel with the following fields:

- Alias**: Condition
- Comment**: The foreign key which references the uid from the road segment condition table.
- Editable**: (selected)
- Reuse last entered value**:
- Label on top**:

Value Relation: A configuration panel with the following fields:

- Select layer, key column and value column**:
 - Layer**: Segment Condition
 - Key column**: abc uuid
 - Value column**: abc condition_name



✓ Add feature on Intersection ✎

ID
112

✓ Add feature on Road Segment ✎

General Lookup Geometry

Segment Number
1

✓ Add feature on Road Segment ✎

General Lookup Geometry

Start Node
13

End Node
14

✓ Add feature on Road Segment ✎

General Lookup Geometry

Lanes
2

Speed Limit (km/h)
40

One Way
False

✓ Add feature on Road Segment ✎

General Lookup Geometry

Road

Type
Street

Status
In Use

Surface
Asphalt

Condition
Fair

Field Collection

Data collected in the field
using the QFieldCloud
mobile app





Collection Results

- 108 points
- 139 lines
- 1,9 km² study area

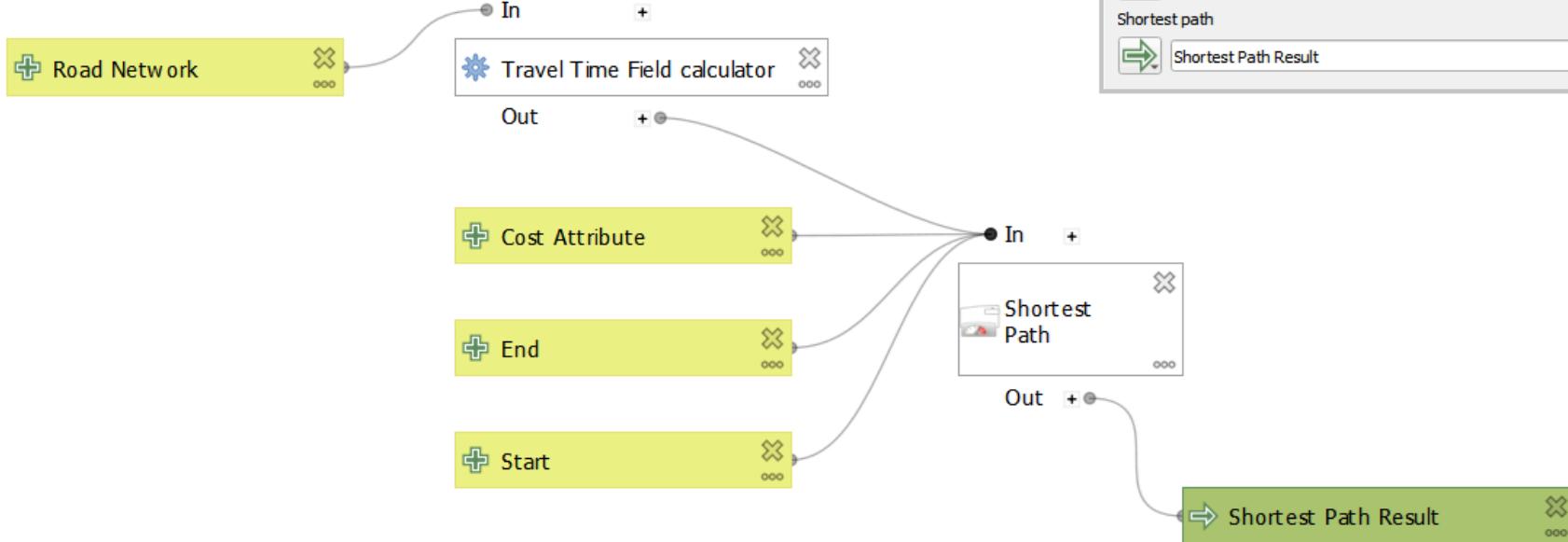


Methodology



Travel Time Expression

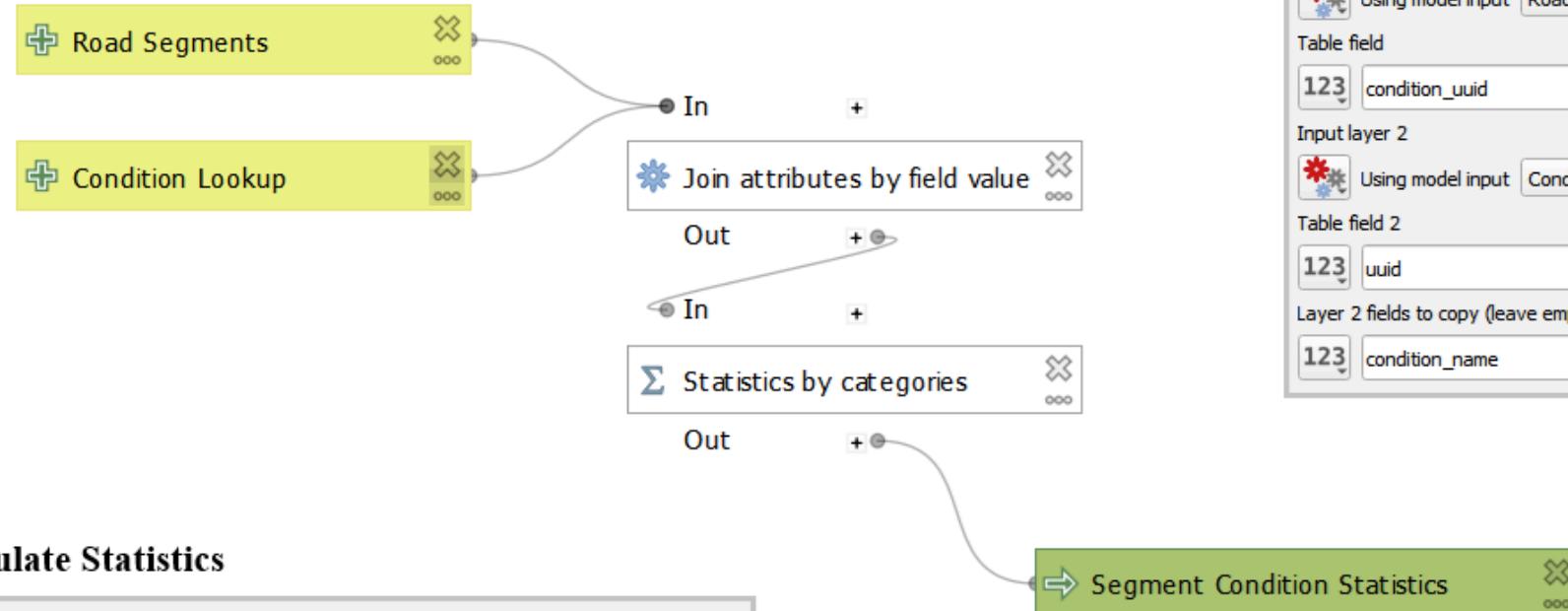
```
"length_m" / 1000 / ( "speed_limit_kmh" / 60 )
```



Shortest Path Tool

Vector layer representing network	Using algorithm output "Calculated" from algorithm "Travel Time Field calculator"
Path type to calculate	Using model input Cost Attribute
Start point	Using model input Start
End point	Using model input End
Shortest path	Shortest Path Result

Direction field [optional]	123 one_way
Value for forward direction [optional]	123 True
Value for backward direction [optional]	123 False
Value for both directions [optional]	123 Both directions
Default direction	123 Both directions
Speed field [optional]	123 speed_limit_kmh
Default speed (km/h)	123 40,000000



Calculate Statistics

Input vector layer	
Using algorithm output	"Joined layer" from algorithm "Join attributes by field value"
Field to calculate statistics on (if empty, only count is calculated) [optional]	length_m
Field(s) with categories	condition_name
Statistics by category	Segment Condition Statistics

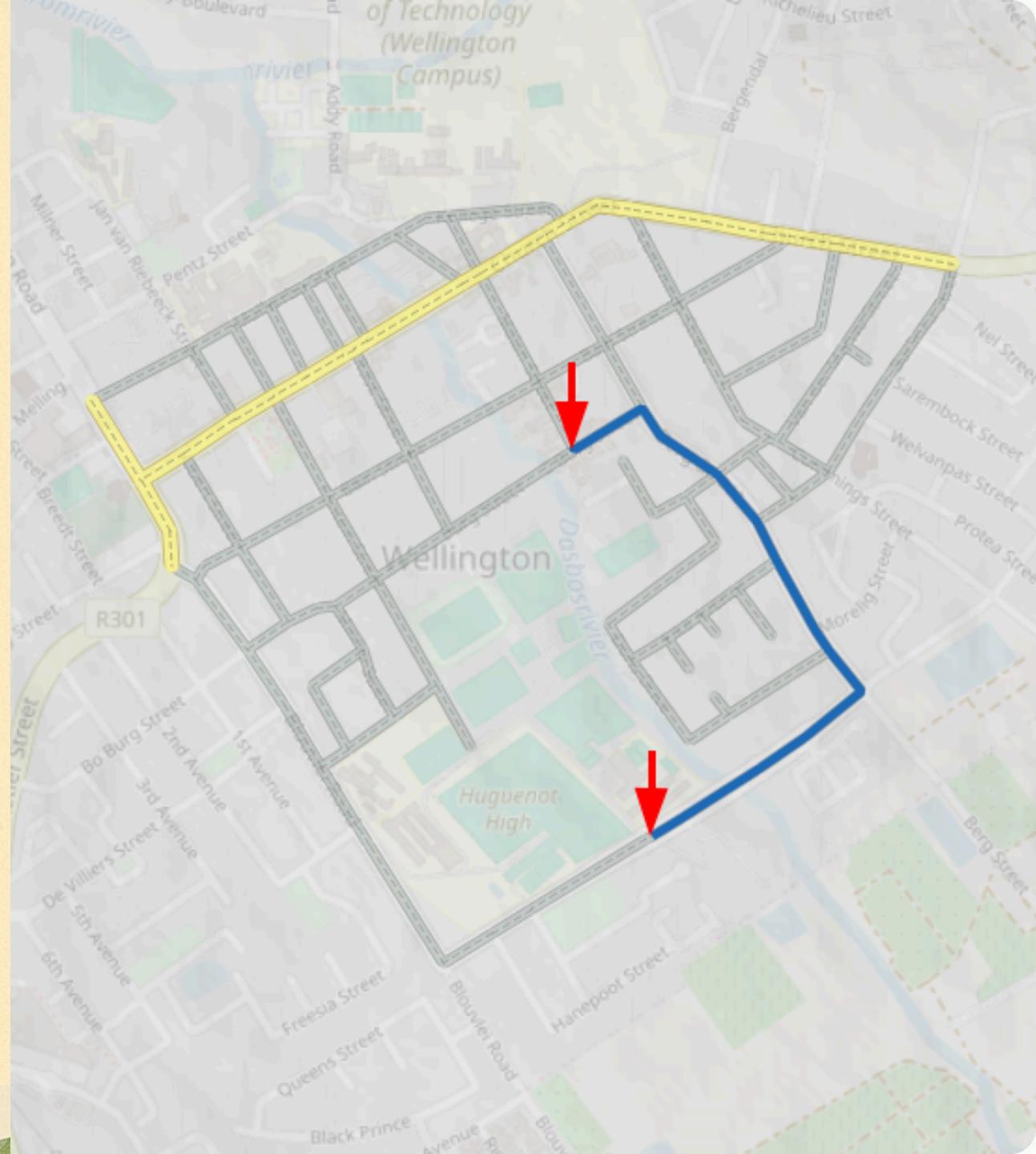
Attribute Join

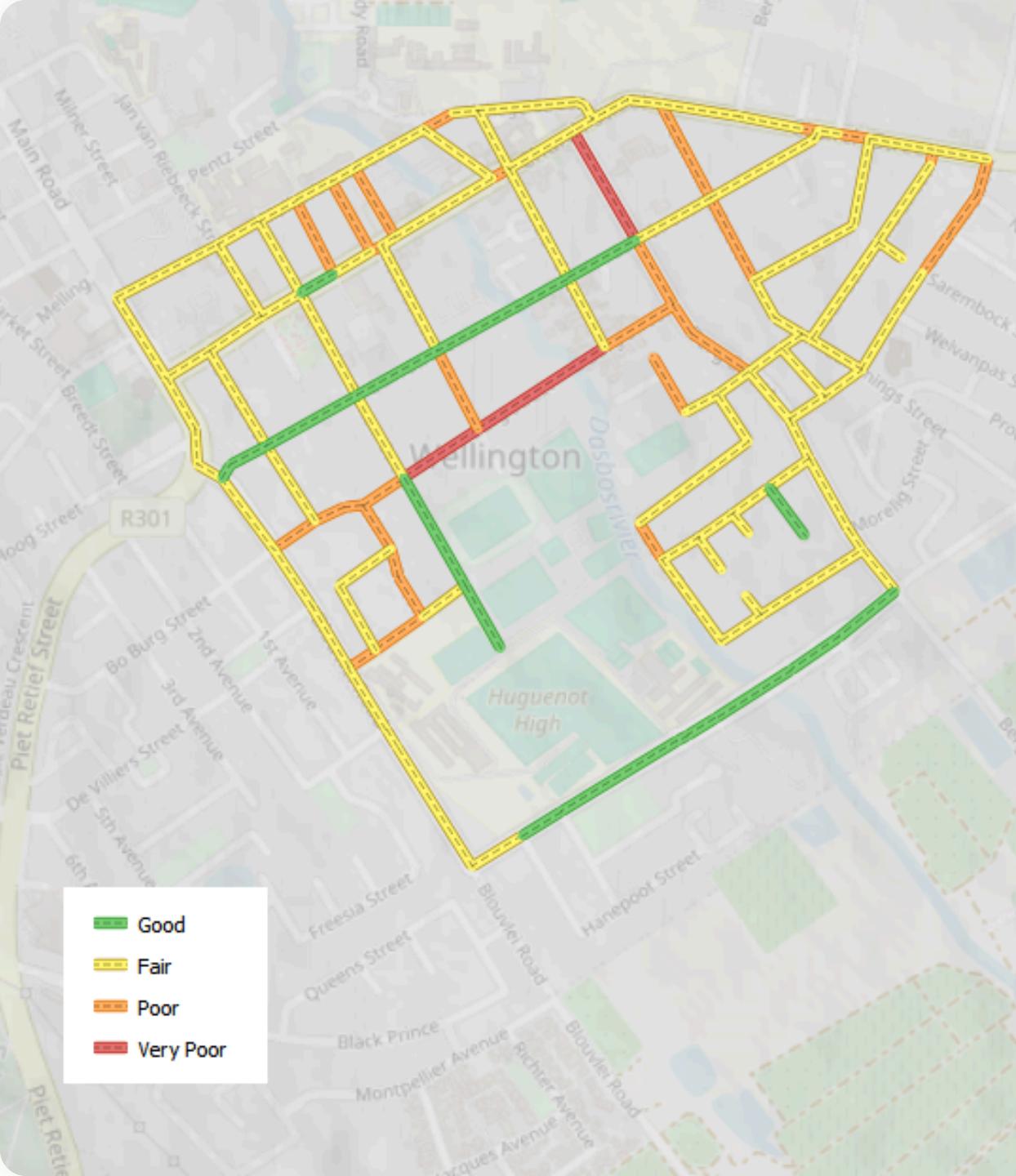
Input layer	Using model input	Road Segments
Table field	123	condition_uuid
Input layer 2	Using model input	Condition Lookup
Table field 2	123	uuid
Layer 2 fields to copy (leave empty to copy all fields) [optional]		
123 condition_name		

Results - 1

Shortest distance analysis

- ~1,2 km travel distance
- ~2 min travel time





Results - 2

Road condition

- 24% in need of repair



Insights

- 30 segments need repair (~2,6 km total)
- 3 segments critical (~639 m total)



Recommendation

- Fully reconstruct Burg Street
- Partially repair Berg Street



Further Research

If I had more time, I would:

- Use more advanced networking tools (pgRouting)
- Digitize bridge and speed bump features
- Increase the study area



My Internship Experience

Highlights

-  Learned to use QGIS and multiple other software/tools
-  Collaborated on a real project and gained experience
-  Gained confidence in presenting and communication
-  Learned effective time management



Other Projects



Bob Ross in QGIS

Recreated a Bob Ross scene
using only QGIS symbology
and tools.



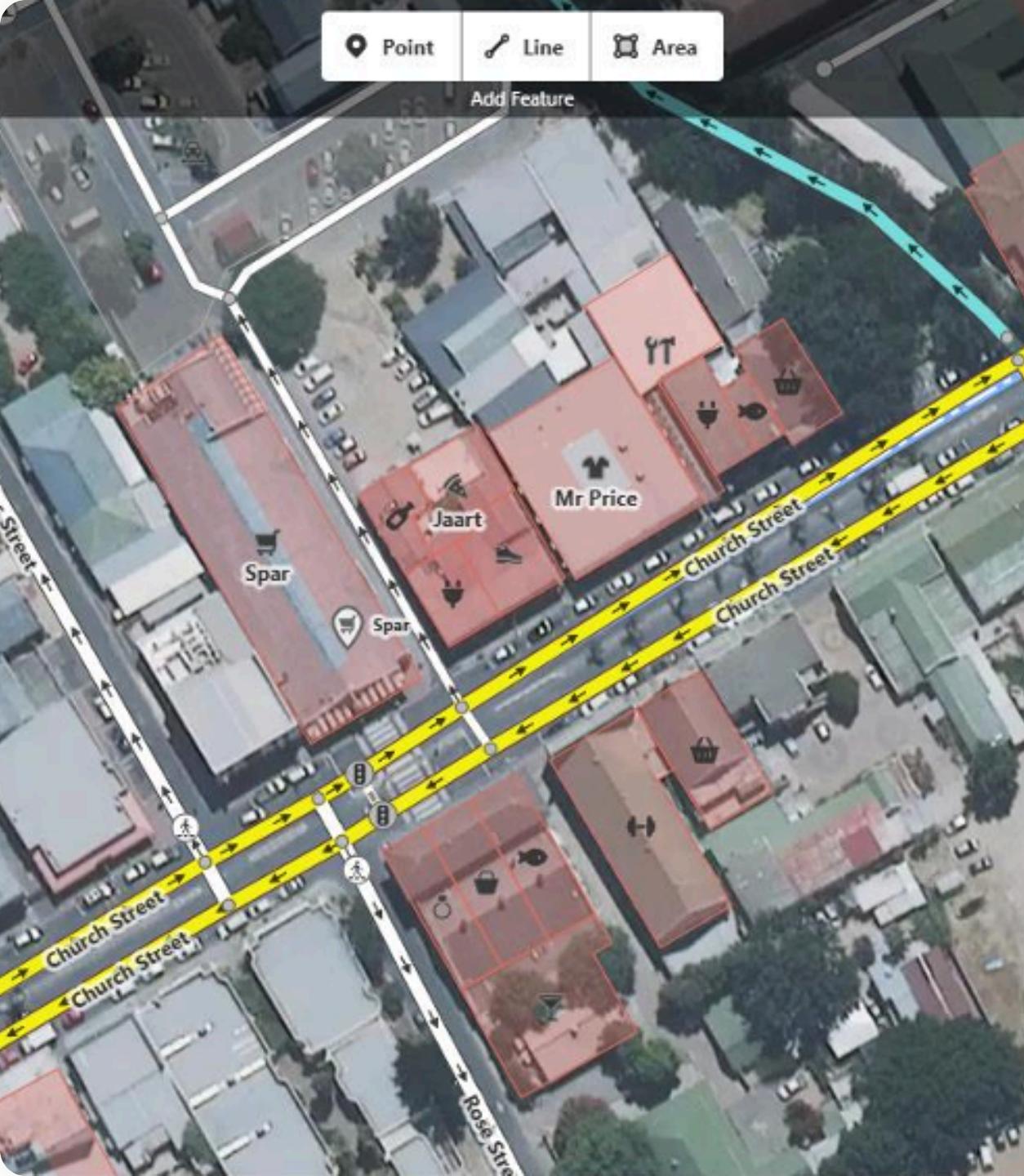
Point

Line

Area

Add Feature

Infrastructure Mapper



OpenStreetMap

Mapped local features by capturing geometry and key attributes.



Contact Me

 Lindie Strijdom

 instagram.com/sickly_hippie

 lindiestrijdom@gmail.com

 github.com/linstrijdom

