Web Processing - Standardized GIS Analyses for Cable Route Planning

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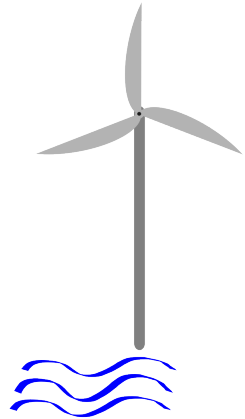
Topic and Motivation

Topic

- ▶ route planning, e.g. connection of offshore wind farms to the power grid
- ▶ conflicts with land usage, land coverage, regulation
- ▶ routing cables from landing point to final position
- ▶ offer a standard web service for the routing

Motivation

- ▶ Energy Security
- ▶ Contribution to important real world problems

Timetable

Start Date	End Date	
09/23/2022		Project Start
09/23/2022	10/10/2022	Initial Literature Study
10/01/2022	10/23/2022	Initial Data Search
10/14/2022		Kick-Off Presentation
10/16/2022	10/28/2022	Data Conversion/Costs/test execution
10/28/2022	12/31/2022	provide WPS/implement LCP
12/02/2022		Midterm Presentation
12/14/2022	02/01/2022	Optimization/Research Issue
02/01/2022		Feature Freeze
02/01/2022	02/28/2023	Finalizing Report
02/28/2023		Submission
03/15/2023		Final Presentation

Get Land coverage/ usage planning

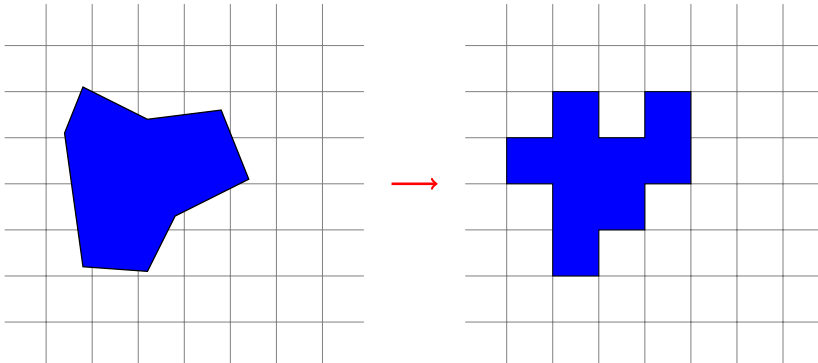| Datatype	Sources
Protected Areas	German Environment Agency[1]
land usage	Federal Agency for Cartography and Geodesy[2]
planning land usage	'Metropolplaner' (Planing data Lower Saxony & Bremen)[3]
Houses (Level of Detail 1)	State Office for Geoinformation and Land Surveying of Lower Saxony[4]
transformers, power lines	OpenStreetMap

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[1] https://geodienste.bfn.de/schutzgebiete?lang=de
[2] https://gdz.bkg.bund.de/index.php/default/open-data.html
[3] https://metropolplaner.de/metropolplaner/
[4] https://opengeodata.lgln.niedersachsen.de/

Rasterization

- ▶ vector (point, line, polygon) −> raster
- ▶ all touched <− false

Rasterization

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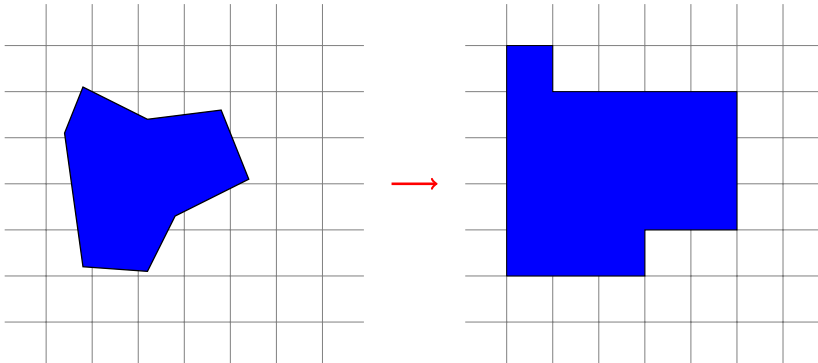
Costs and Configuration

Configuration
- ▶ resolution, all touched
- ▶ calculate by layer:
    - ▶ filtering by attribute values
    - ▶ buffering by value or/and attribute value
- ▶ cost calculation: maximum of al layers

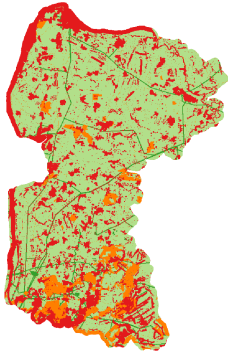| Cost Level	Cost (numeric)	Example
Prohibited	500	National Parks, Buildings
strongly Restricted	10	Bird Sanctuary
Restricted	5	industrial areas
No Restriction	0.5	default
Preferential	0.1	power grid, motorways buffers

Cost Raster
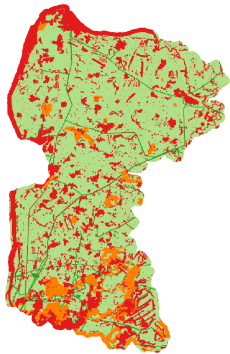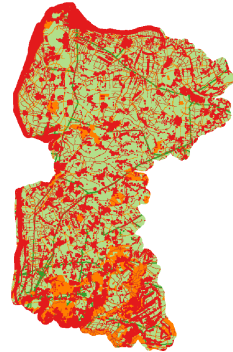

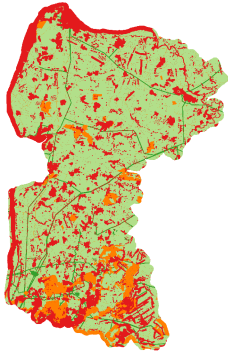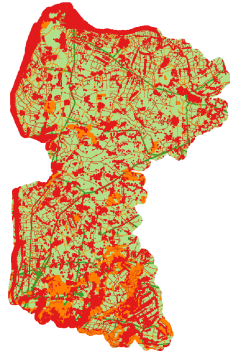Figure: 100 m Resolution with all touched false.

Cost Raster

Figure: 100 m Resolution with all touched false.

Figure: 100 m Resolution with all touched true.

Topic and Motivation
Timetable
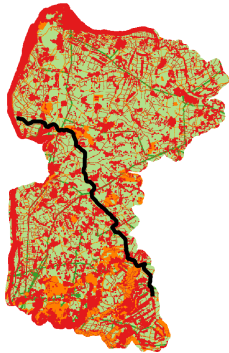Create the cost raster
web processing server

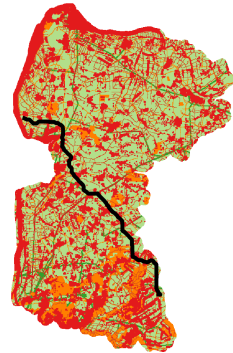# Cost Raster

Figure: 50 m Resolution with all touched false.

Figure: 50 m Resolution with all touched true.

Cost Paths

Figure: 100 m Resolution with all touched false.

Figure: 50 m Resolution with all touched true.

web processing server

- ▶ goals:
  - ▶ use wps as a simple easy to use way calculate the cost path
  - ▶ optimize search algorithm
- ▶ current:
  - ▶ testing pywps[5]
  - ▶ cost path (open Dijkstra implementation - QGIS-plugin)[6]
- ▶

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[5]https://pywps.readthedocs.io/en/latest/index.html
[6]https://github.com/Gooong/LeastCostPath