



**Biogass Midt-Norge**

# **Biogas Mid- Norway**

Project leader Julia Olsson



## Biogass Midt-Norge

**Who am I ?!**

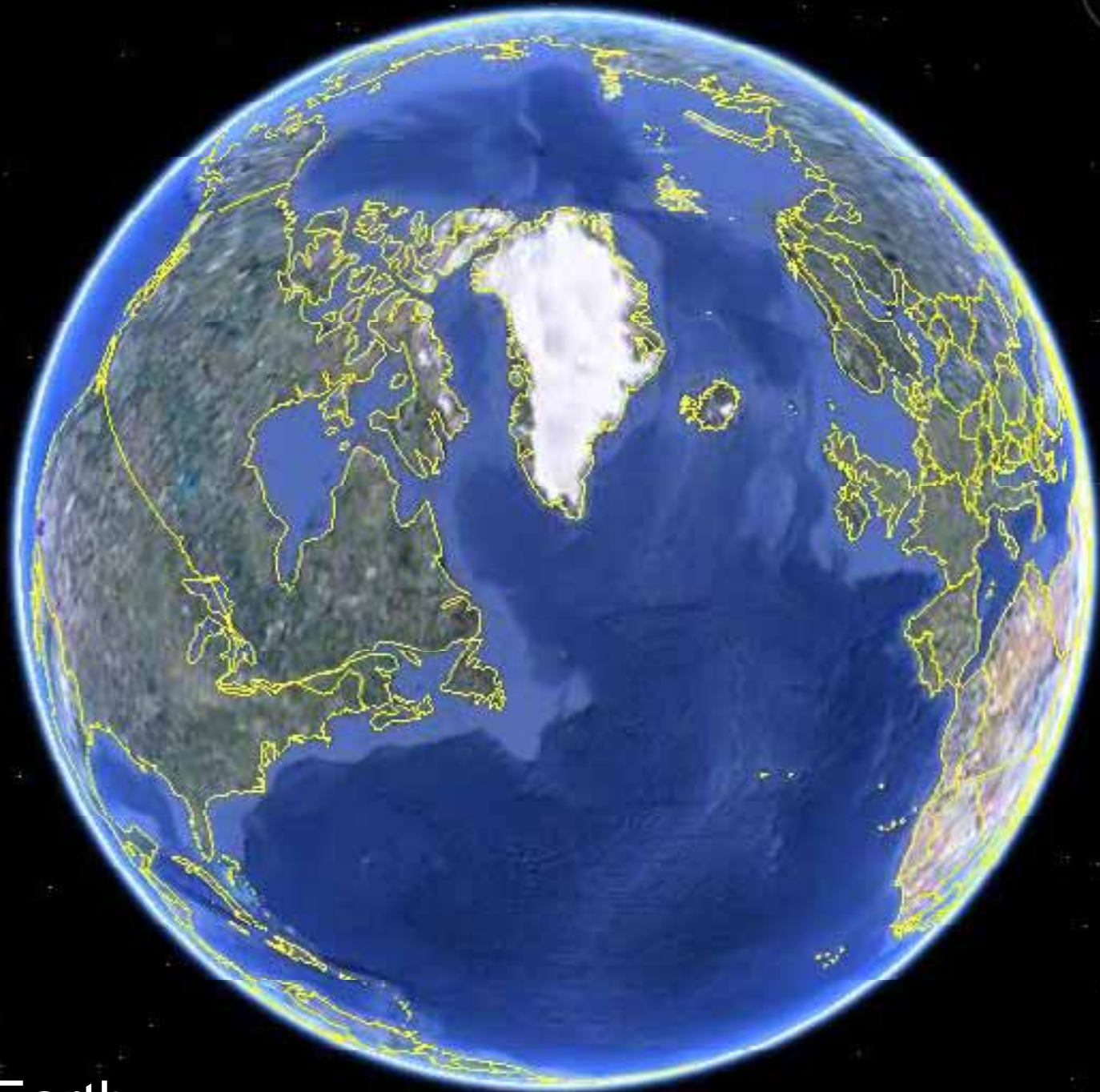


Google Earth



Google Earth





Google Earth



Google Earth





Google Earth



Google Earth





## Biogass Midt-Norge

# Joined Project

- Sømna
- Ørland
- Meldal
- Orkdal





## Biogas Mid-Norge

# Aim

- Develop and evaluate a Geographic information system (GIS) based assessment method for mapping biogas potential from livestock manure with an economical and logistical perspective



## Biogas Mid-Norge

**Climate change** because of increased **greenhouse gases** in the atmosphere is widely recognized and is our times biggest environment, social and economical **threat worldwide !**





## Biogas Midt-Norge

Converting livestock manure into a **renewable energy resource** such as **biogas** contributes to **lowering greenhouse gas** emissions and takes advantage of local energy resources in a **sustainable way !**



## Biogass Midt-Norge

Norway has a **national goal** to produce biogas from **30%** of the livestock manure in the country within the next **10 years**



## Biogass Midt-Norge



From the book Biogass by Svein Lilleengen





## Biogas Midt-Norge



360 Nm<sup>3</sup> biogas / year



## Biogass Midt-Norge



360 Nm<sup>3</sup> biogas / year



120 Nm<sup>3</sup> biogas / year



## Biogas Midt-Norge



➔ 360 Nm<sup>3</sup> biogas / year

1 Nm<sup>3</sup> biogas correspond  
to 1 liter fuel or 6 kWh



➔ 120 Nm<sup>3</sup> biogas / year





## Biogas Midt-Norge

# What is Biogas ?

- Biogas is a gas produced by **anarobic** (absent of oxygen) digestion of organic matter



## Biogas Midt-Norge





## Biogass Midt-Norge







## Biogas Midt-Norge







## Biogass Midt-Norge





## Biogass Midt-Norge



<http://www.treehugger.com/gm-rice-h-i-001.jpg>





## Biogas Midt-Norge





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# What is Biogas ?

- Biogas is a gas produced by anarobic (absent of oxygen) digestion of organic matter
- Biogas consists mainly of methane ( $\text{CH}_4$ ), same as in fossile Naturegas





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- **Renewable Energy**





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- **Renewable Energy**
  - Fuel





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- **Renewable Energy**
  - Fuel
  - Electricity- and heat production





## Biogas Mid-Norge

Livestock manure has a relatively **low energy density** and contains **large quantities of water**, therefore the **geographical localization** of the biogas plant and the **transport logistics** are critical factors when planning a centralized biogas plant



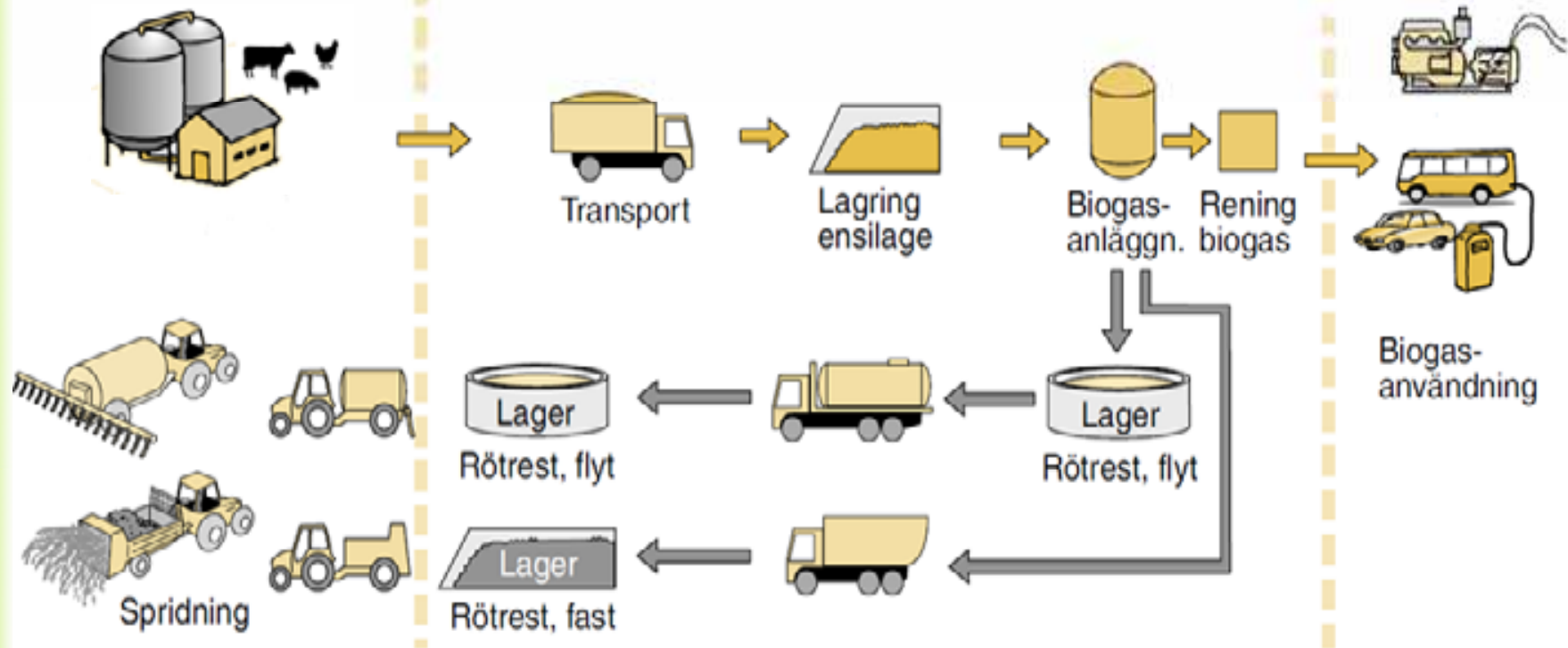


## Biogass Midt-Norge

Jordbrukssystem

Biogassystem

Urbana system





## Biogass Midt-Norge

Jordbrukssystem

Biogassystem

Urbana system



Transport



Lagring  
ensilage



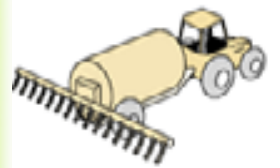
Biogas-  
anläggning



Rening  
biogas



Biogas-  
användning



Spridning

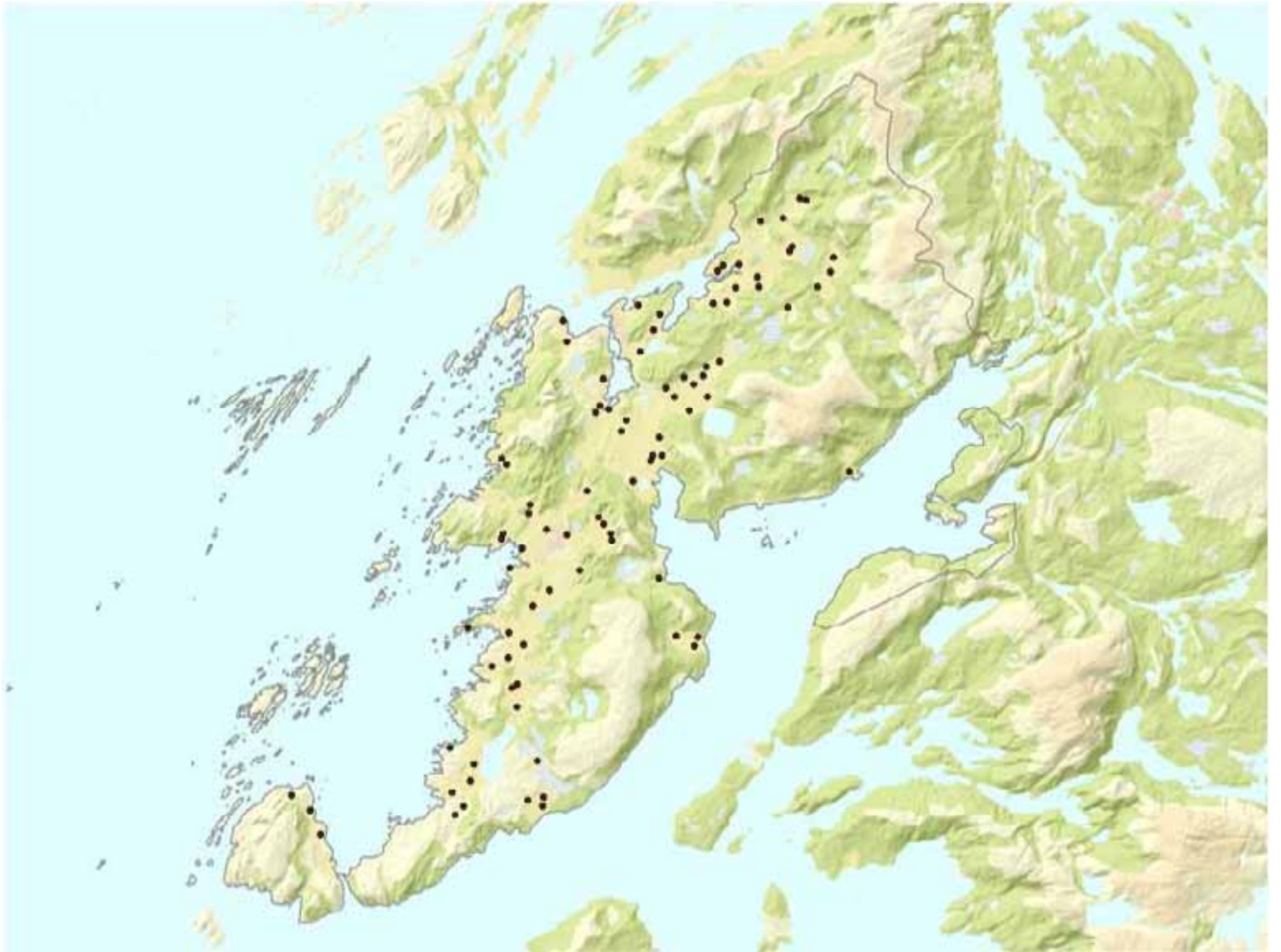


Lager  
Rötrest, flyt



Lager  
Rötrest, fast







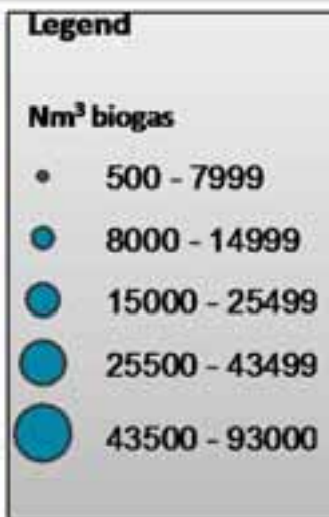
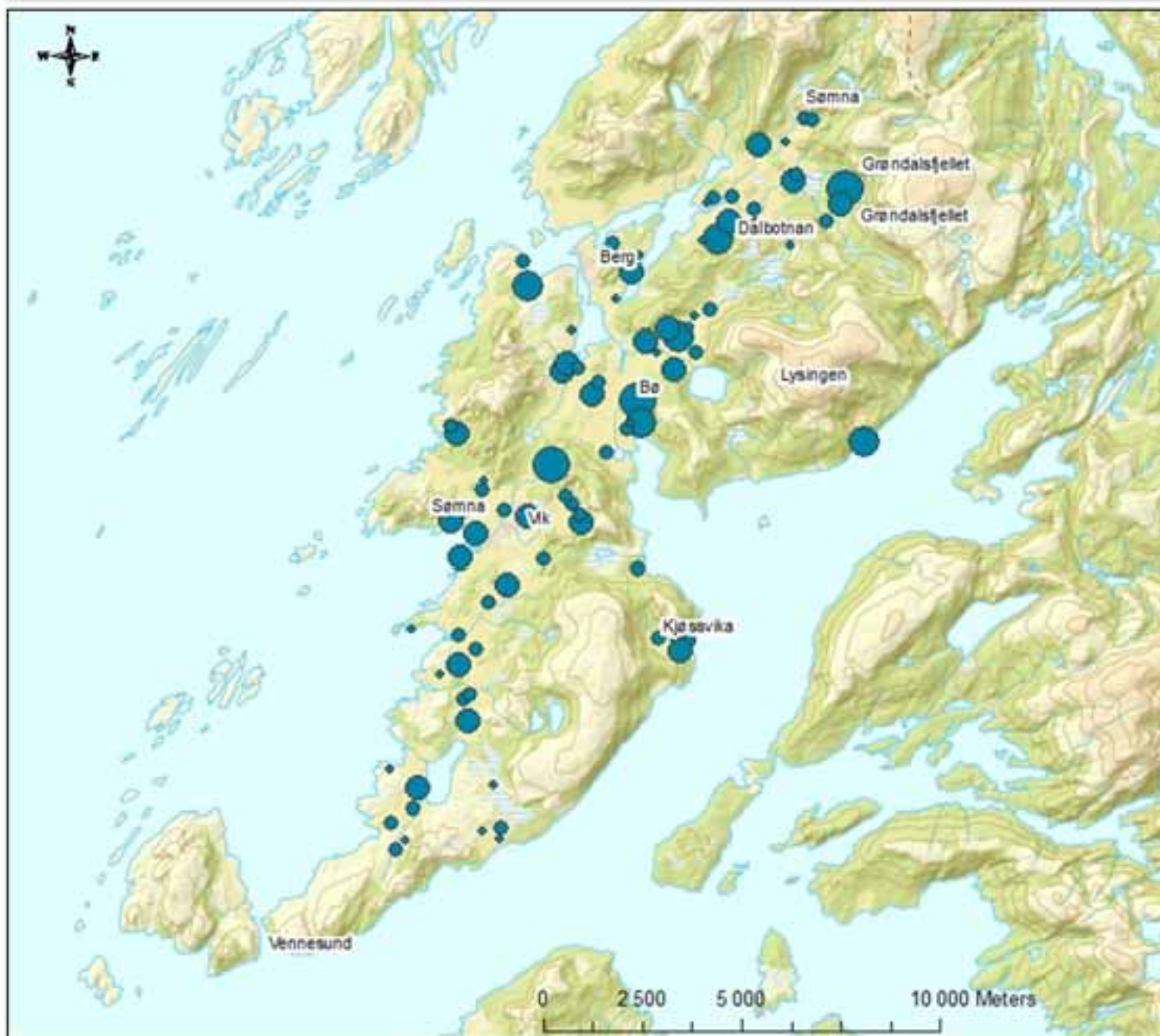


## Biogas Midt-Norge

# Biogas potential

- Quantity- and type of animals
- Volume of manure
- Biogas potential from different manure types

# Distribution of biogas potential (CH<sub>4</sub>) in Sømna municipality



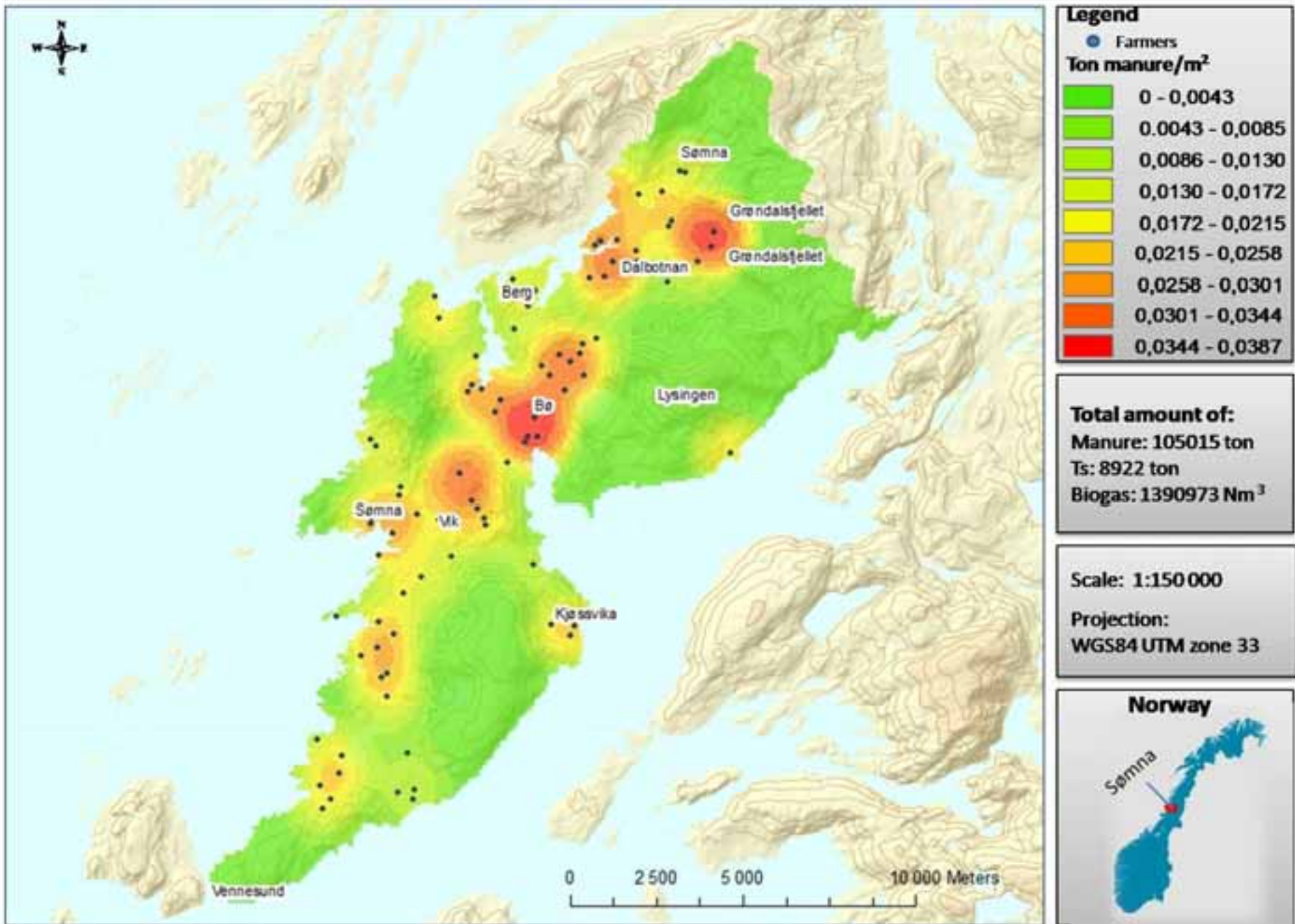
**Total amount of:**  
Manure: 105015 ton  
Ts: 8922 ton  
Biogas: 1390973 Nm<sup>3</sup>

Scale: 1:150 000  
Projection:  
WGS84 UTM zone 33





# Density of biogas potential (CH<sub>4</sub>) in Sømna municipality







## Biogass Midt-Norge

### Jordbrukssystem



Transport



Lagring  
ensilage



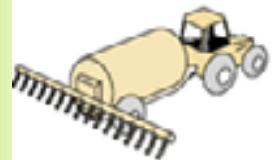
Biogas-  
anläggning



Rening  
biogas



Biogas-  
användning



Spridning



Lager  
Rötrest, flyt



Lager  
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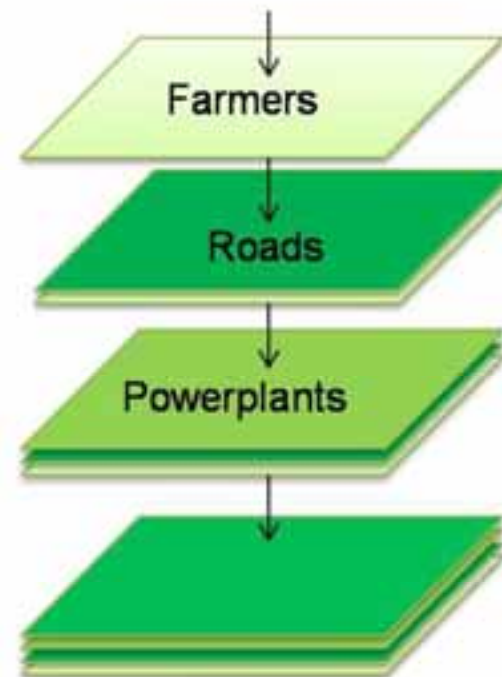


## Biogas Mid-Norge

Limiting factors



Positive factors



||

Suitability map

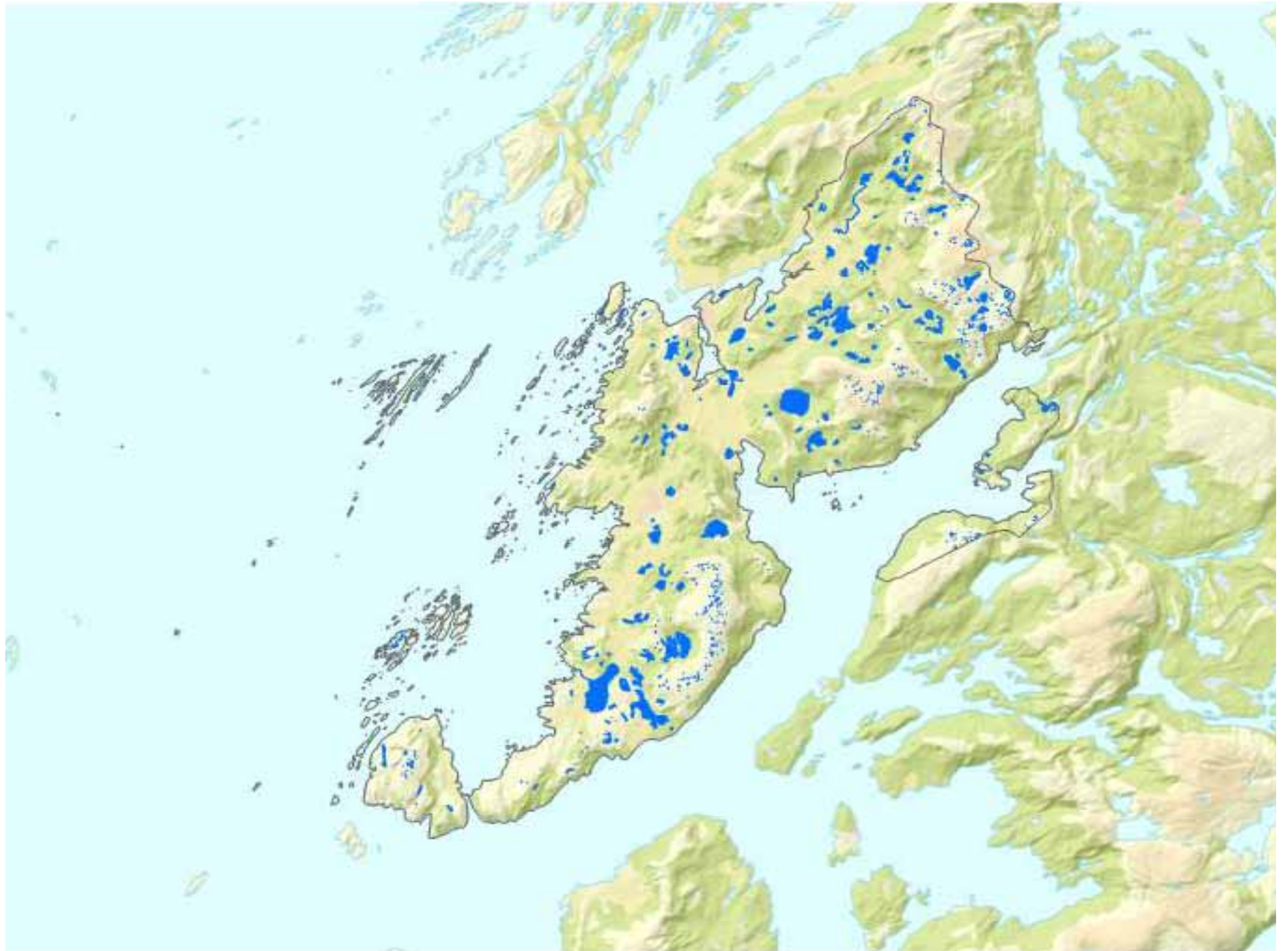




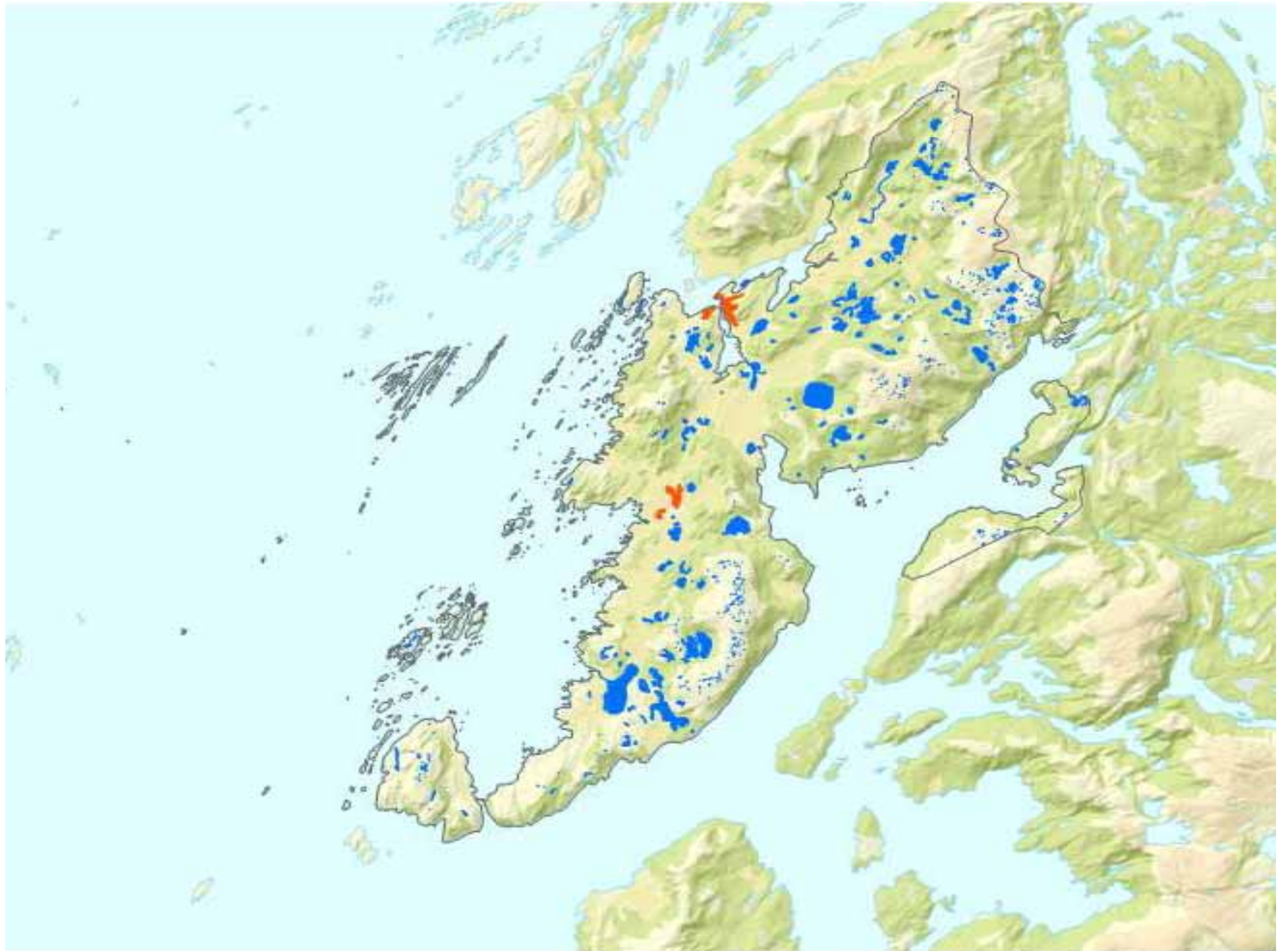


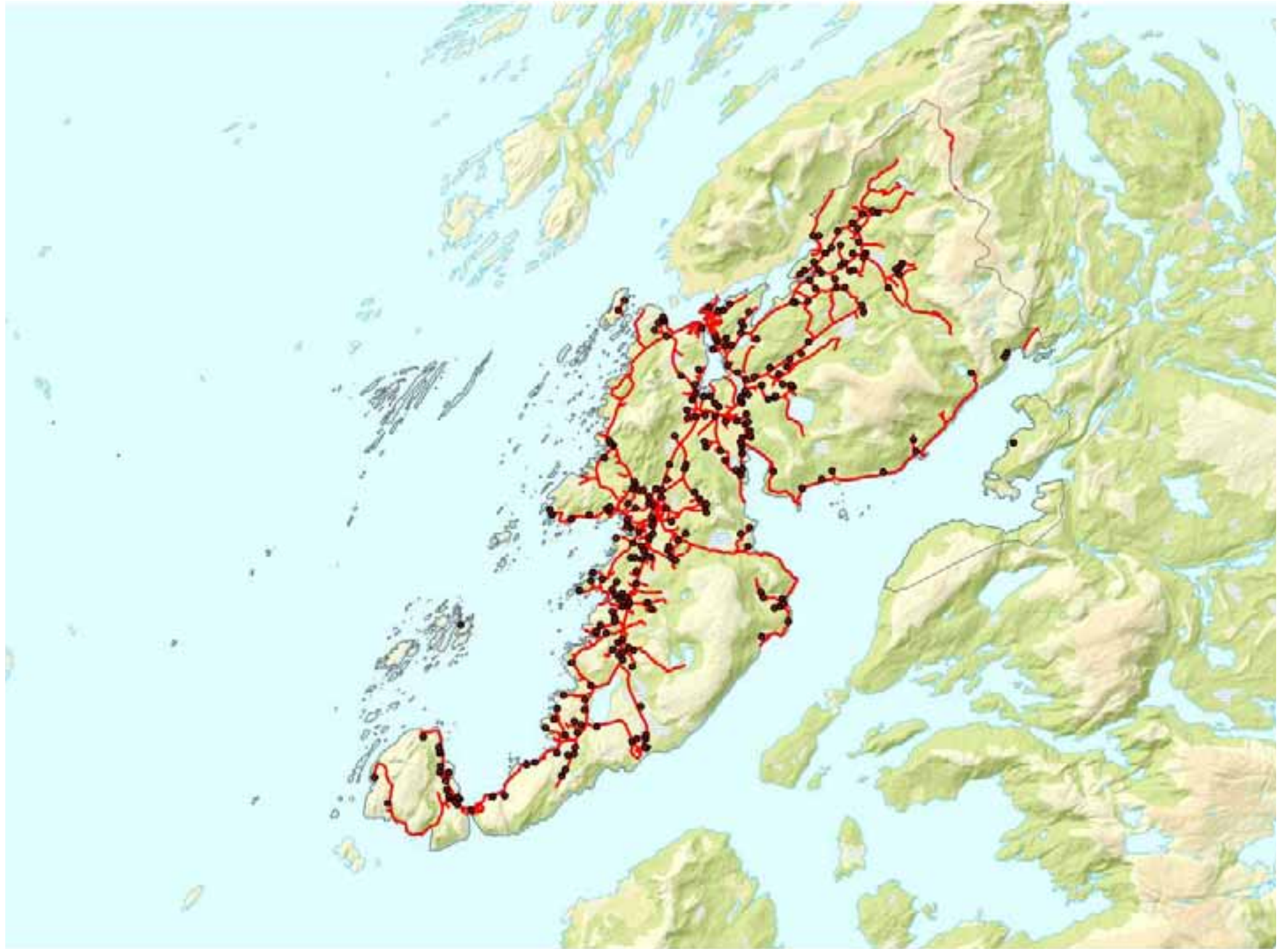




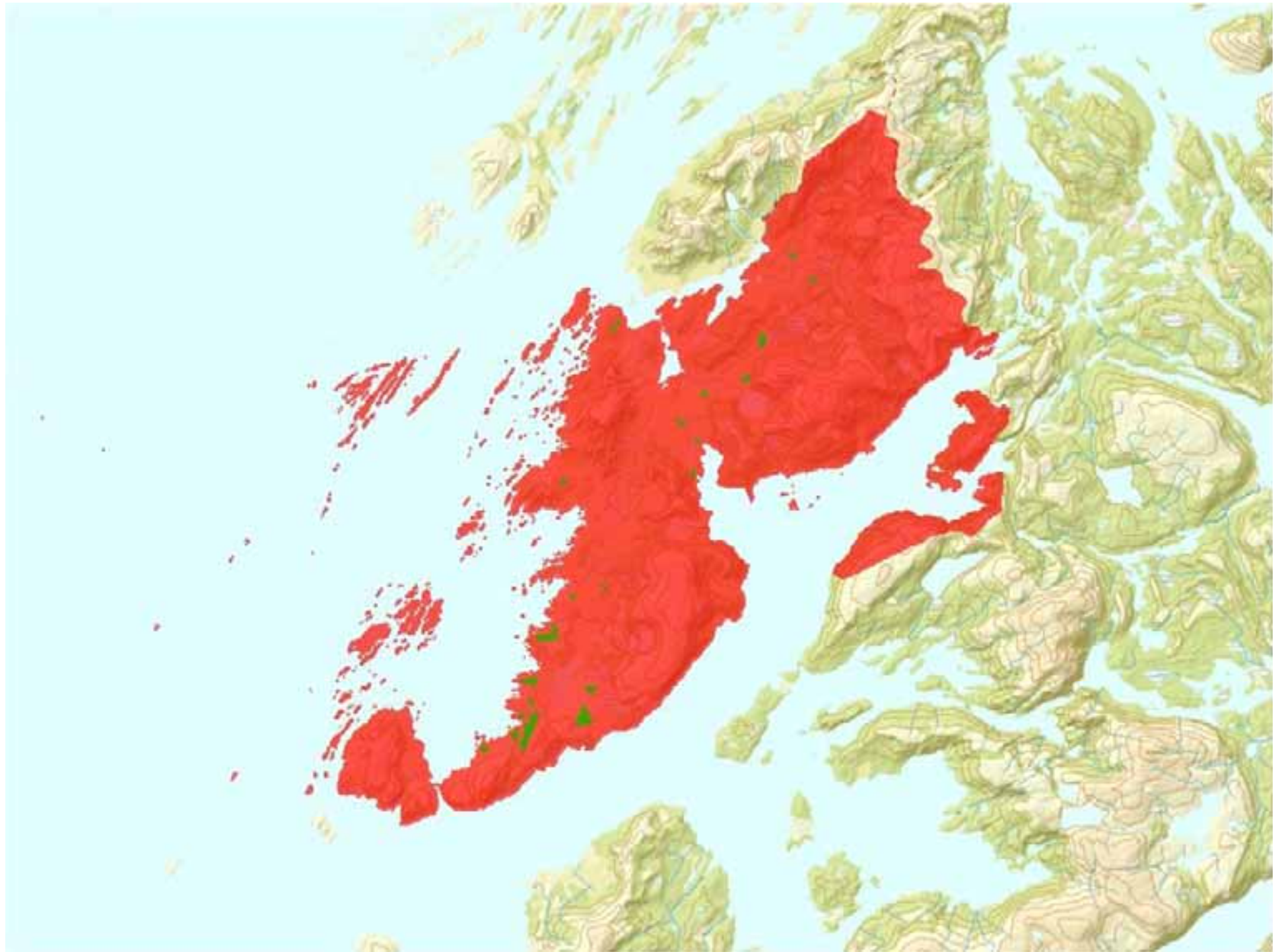




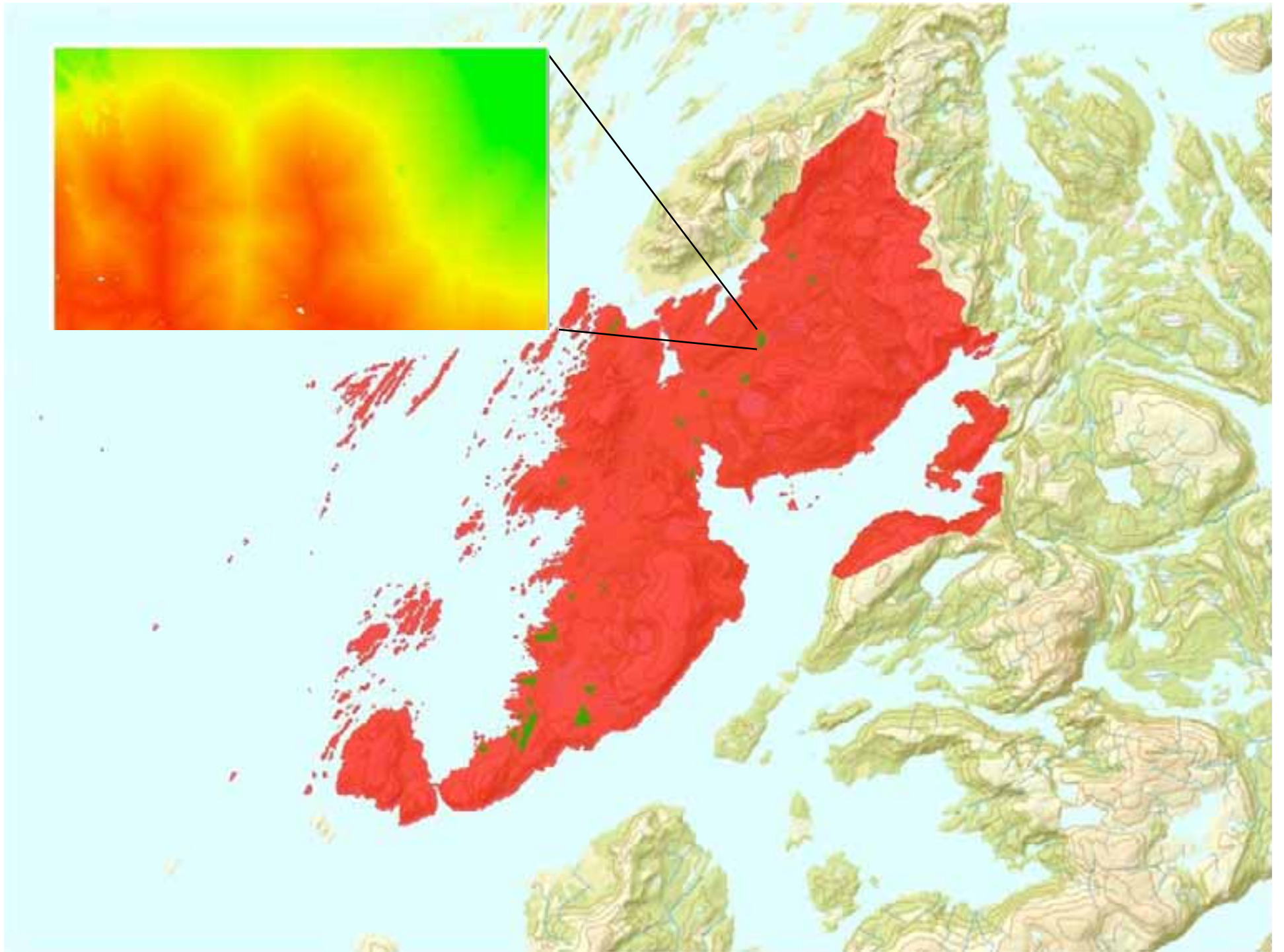




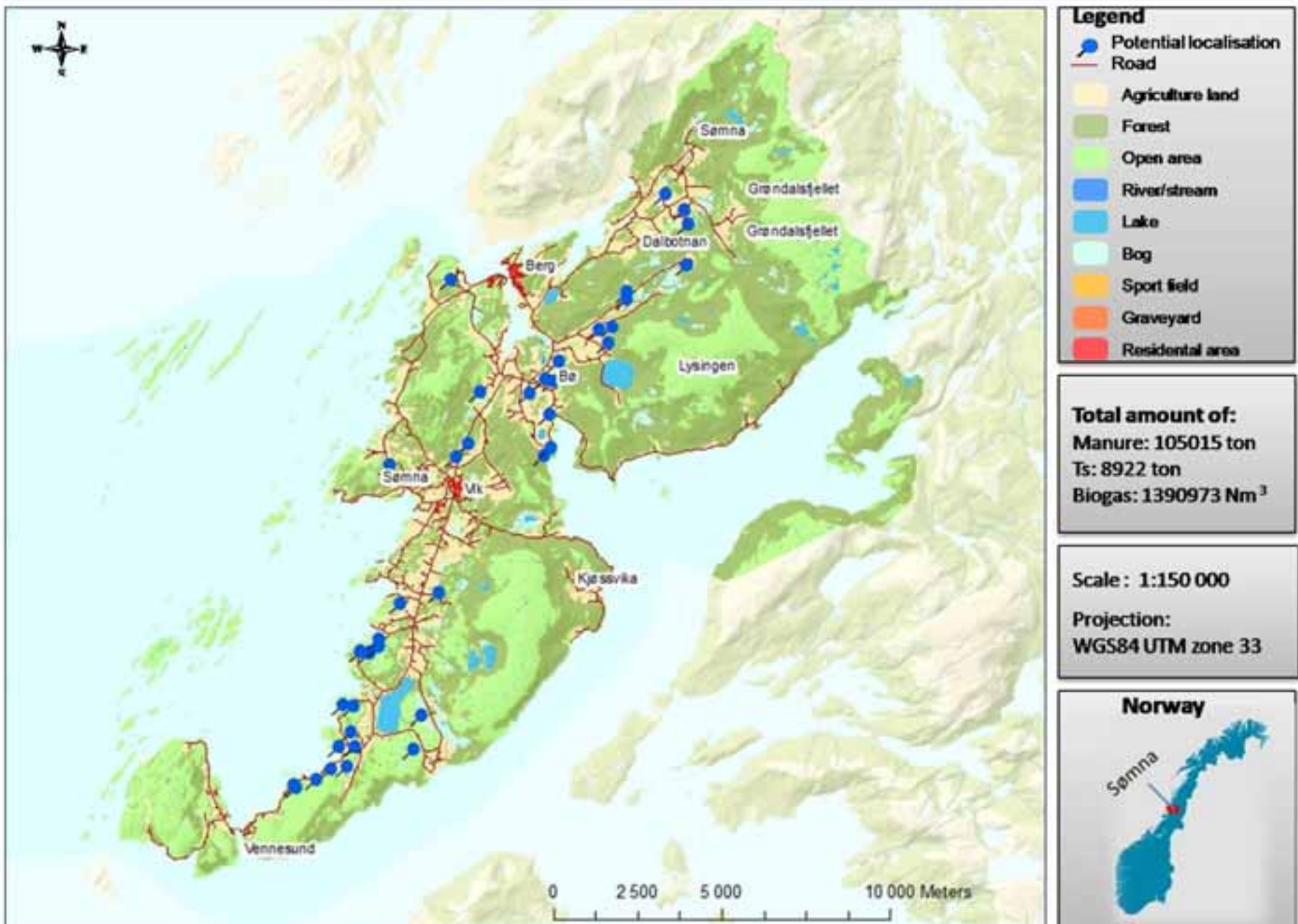






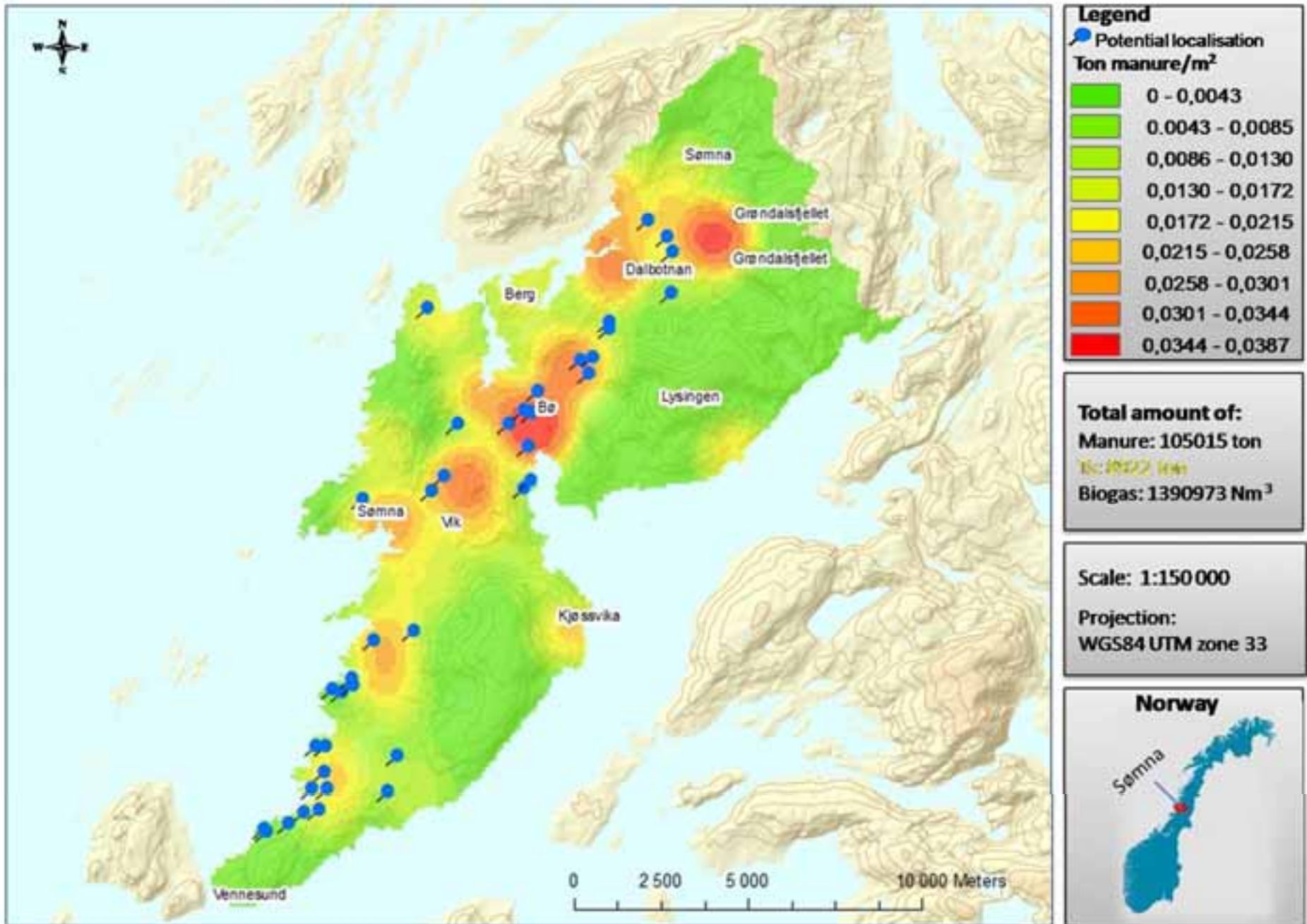


# Potential localisations for biogas plants in Sømna municipality





# Density of biogas potential (CH<sub>4</sub>) in Sømna community





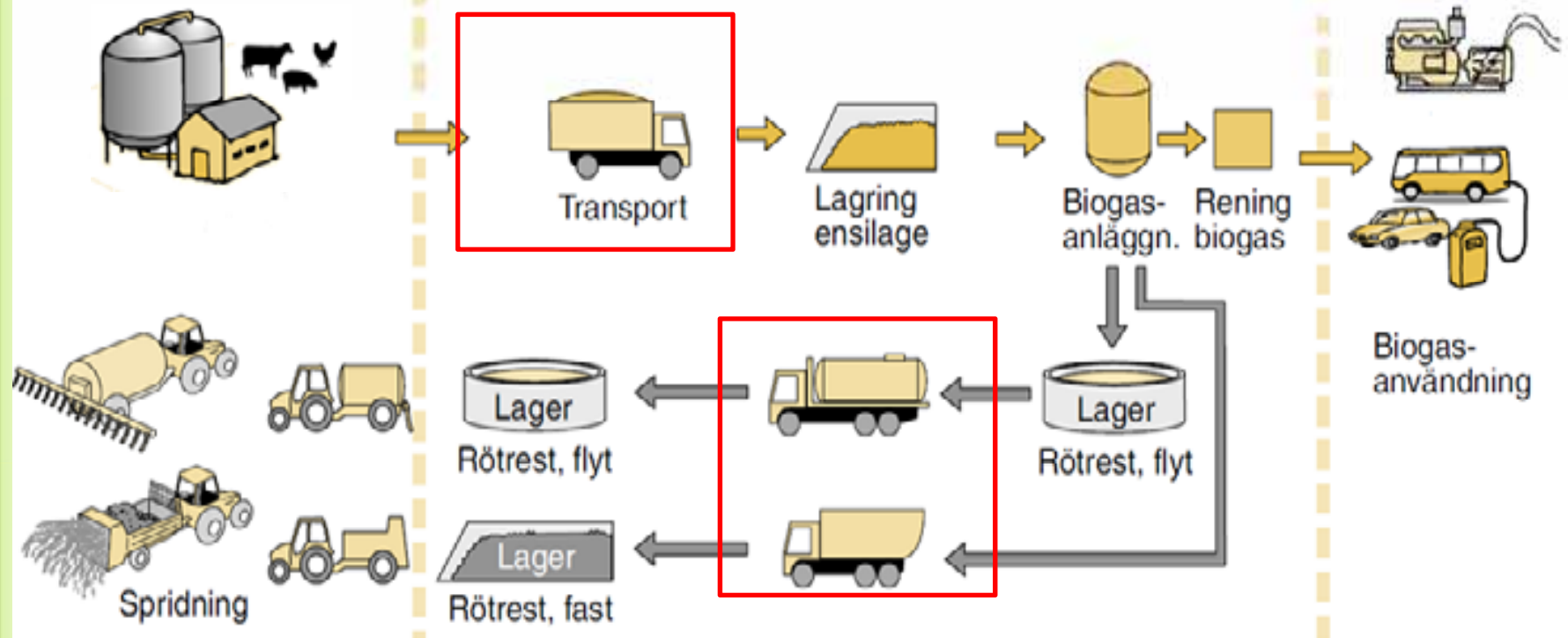


## Bioaass Midt-Norae

### Jordbrukssystem

### Biogassystem

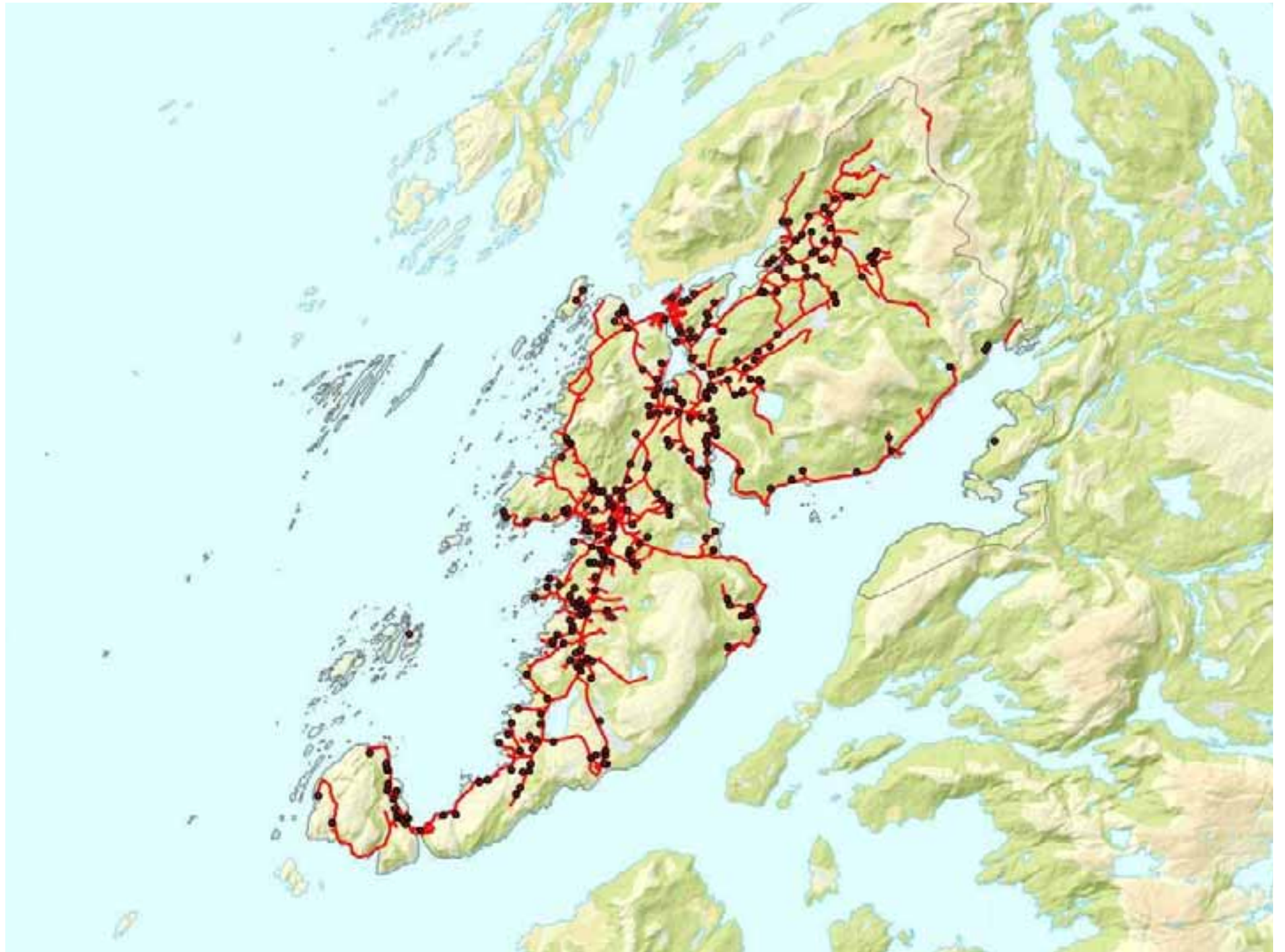
### Urbana system





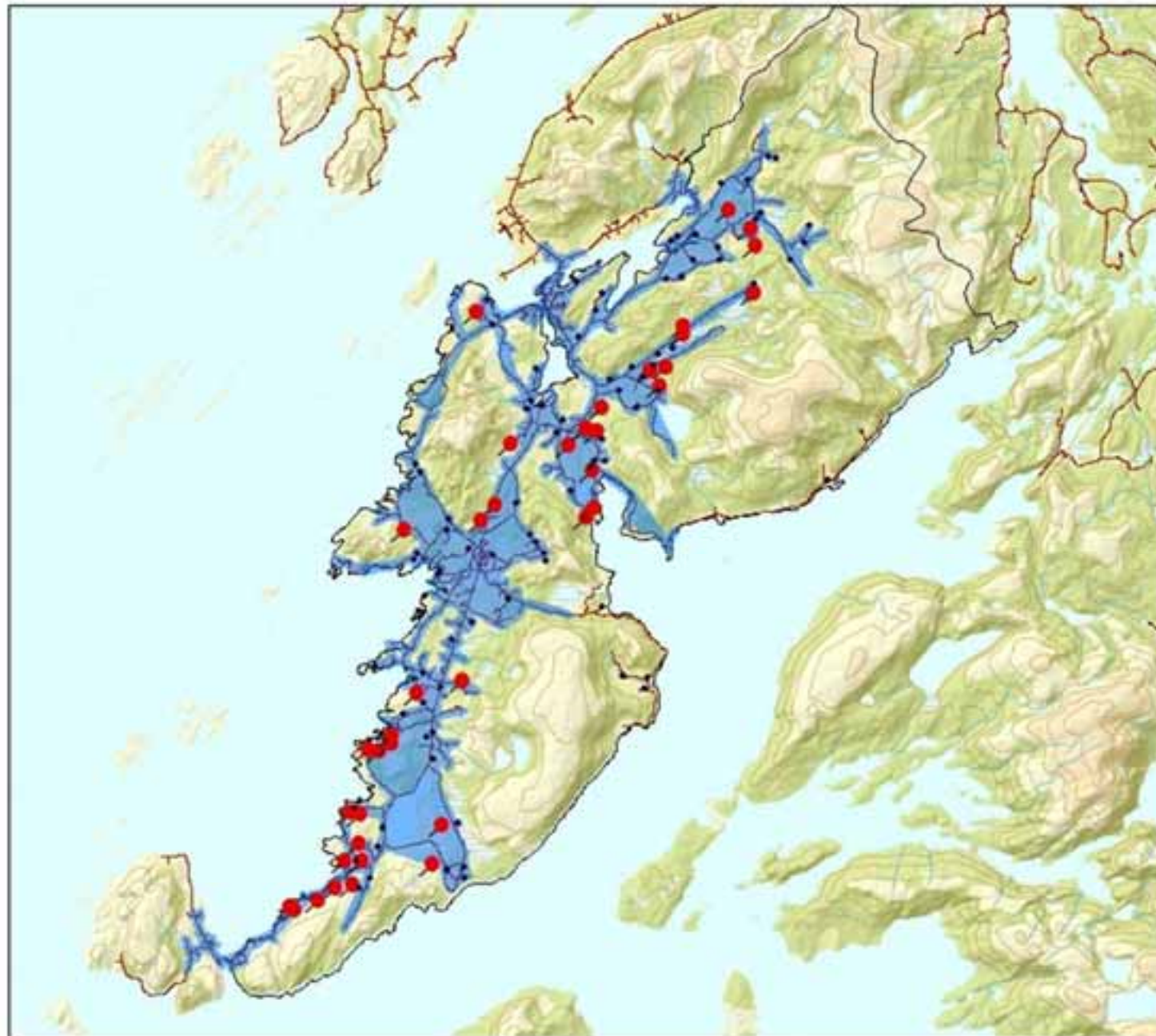
**Biogass Midt-Norge**

# Network Analysis





## Network Analyse from potential locations to farmers in Sømna municipality



### Legend

- Farmers
- Potential localisation
- Service Area
- Road

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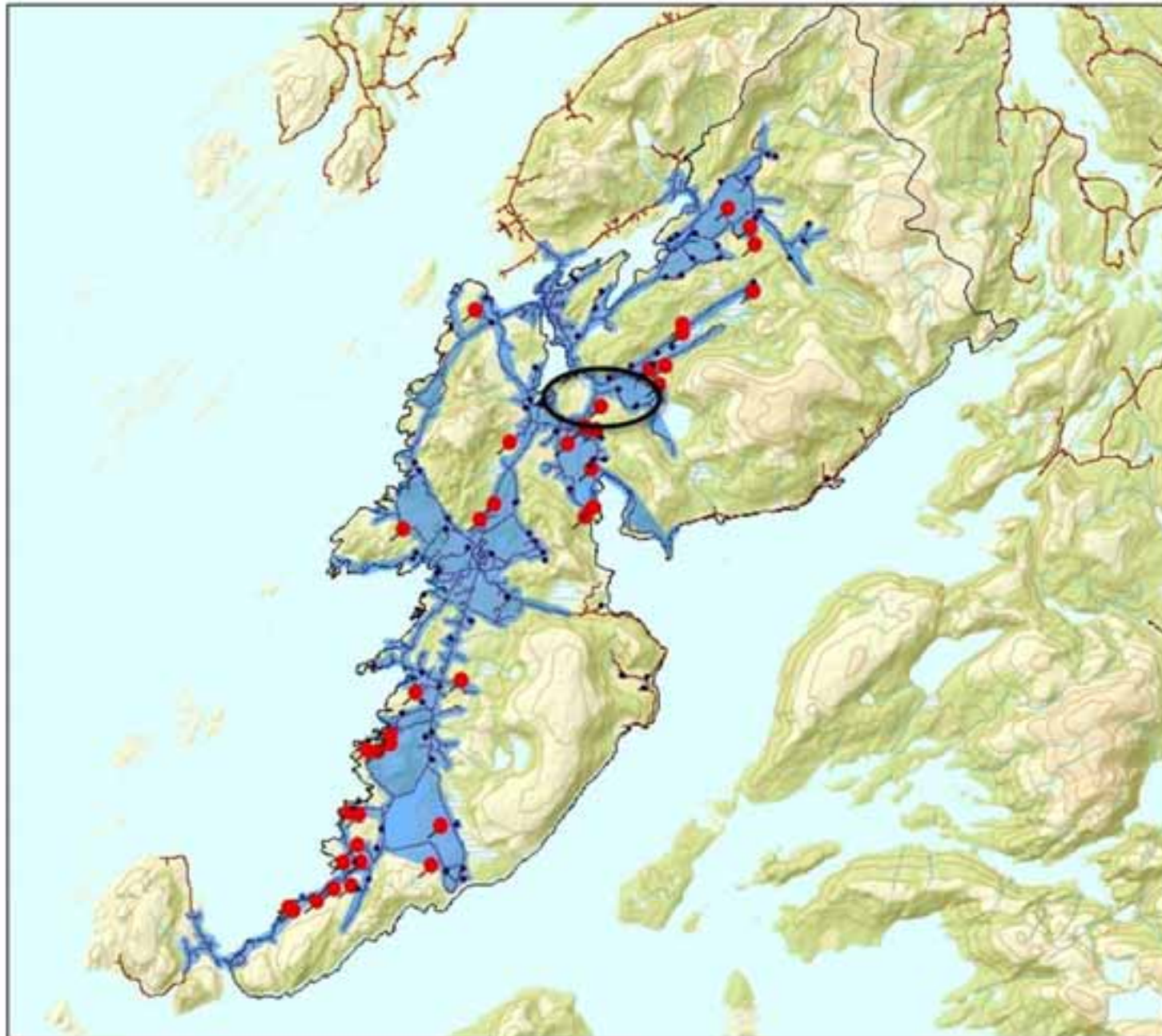
Scale: 1:150 000

Projection:  
WGS84 UTM zone 33

### Norway



# Network Analyse from potential locations to farmers in Sømna municipality



## Legend

- Farmers
- Potential localisation
- Service Area
- Road

55 farmers can be reached within 8 km from the market location which represents 65 % of the farmers in the area

Scale: 1:150 000

Projection:  
WGS84 UTM zone 33

## Norway







## Biogass Midt-Norge

# Thank you for your attention !

Julia Olsson

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