Use of historical maps

for climate adaptation

Or are the maps only important for genealogists or others interested in what the properties once looked like?

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Danish Geodata Agency

Original cadastral maps from the 1800s reveal Denmark's pre-industrial landscape—before major drainage transformed the terrain.

Can these historical maps now guide modern environmental restoration and climate initiatives ?

Based on a study “Can lowland soils on old maps be used in connection with various climate and environmental initiatives?” by Peter Winther Lundbye and answers from 8 danish municipalities about their need for access to historical cadastral map.

Note

- In the coming years, both society and individuals will face major changes to meet our climate and environmental obligations. One element of the Danish landscape has come into particular focus — the lowland soils. These areas include wetlands, bogs, wet meadows, lakes, and watercourses — essentially any land that is or has been affected by water.

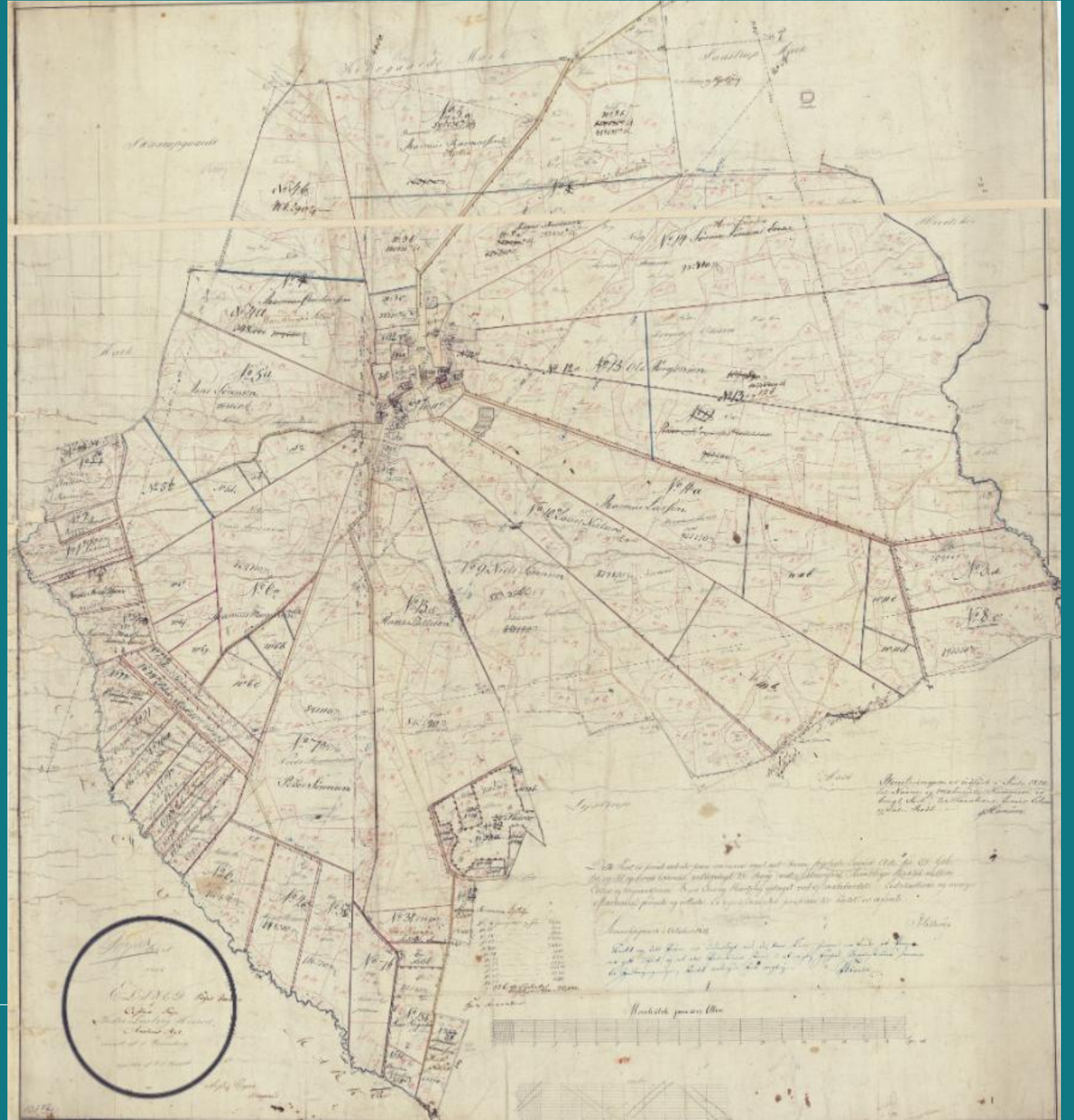
- Over time, organic material accumulated in these wet soils and stored large amounts of nitrogen and carbon.

- When such areas were later drained and exposed to oxygen, decomposition began — releasing greenhouse gases and nutrients. In other words, the way humans have handled lowlands over the past centuries has contributed to today’s climate and environmental problems.

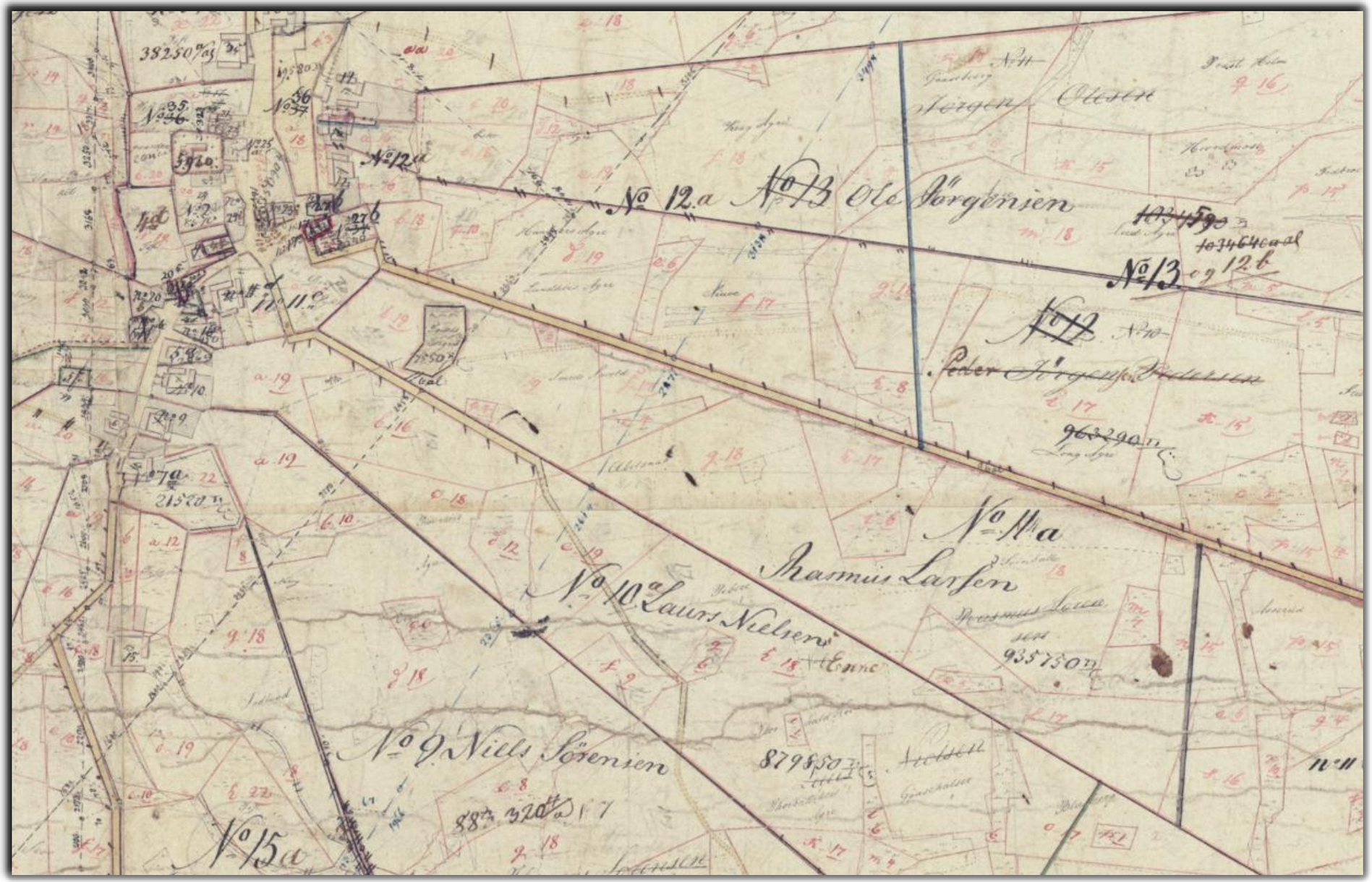
The first cadastral maps, called Original 1

A hidden treasure?

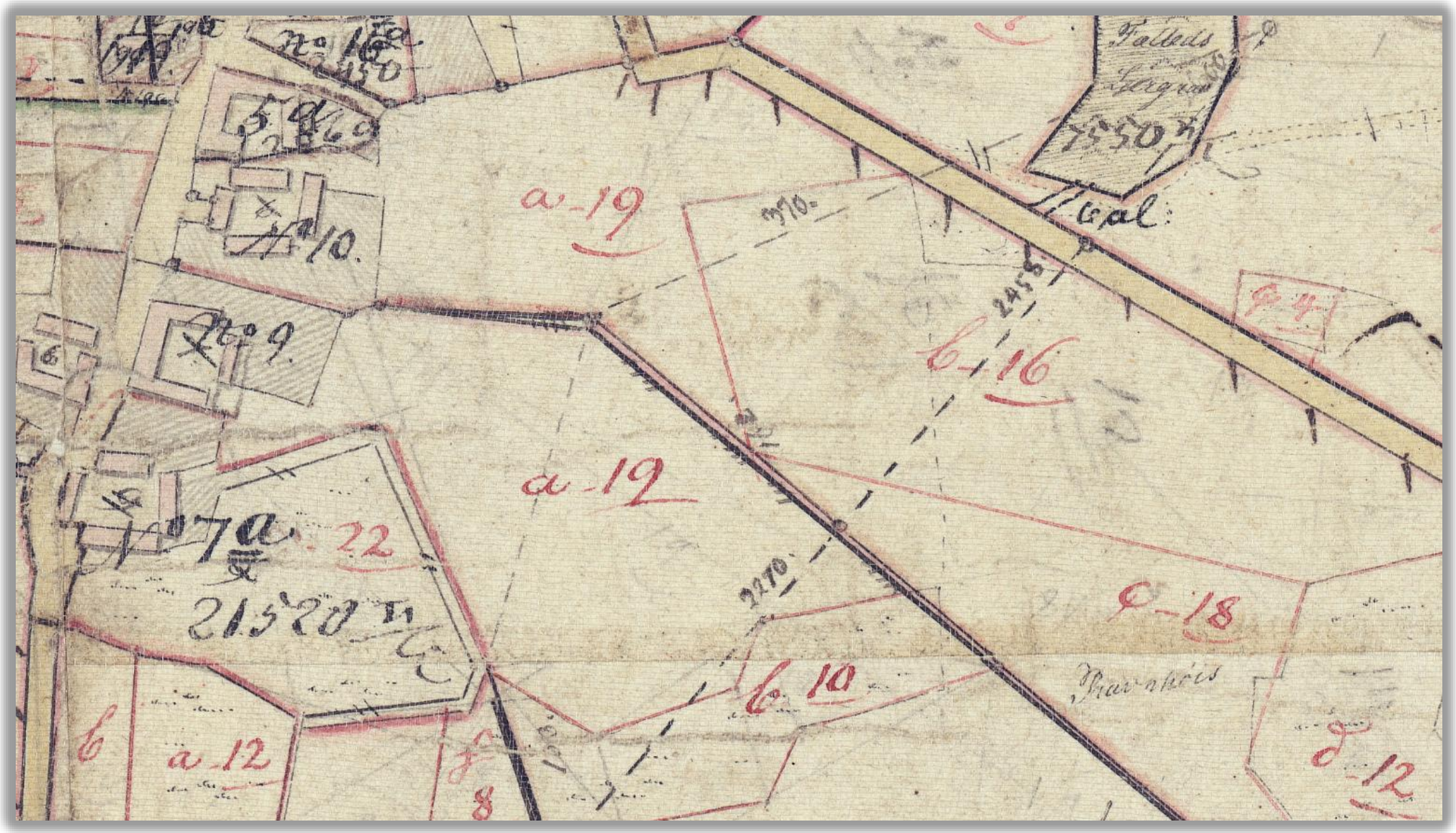
- Surveyed around the 1790s
- Drawn in the first part of the 19th century
- Drawn in 1:4000
- No legend
- Updated until the 1860s
- There are over 9,000 maps



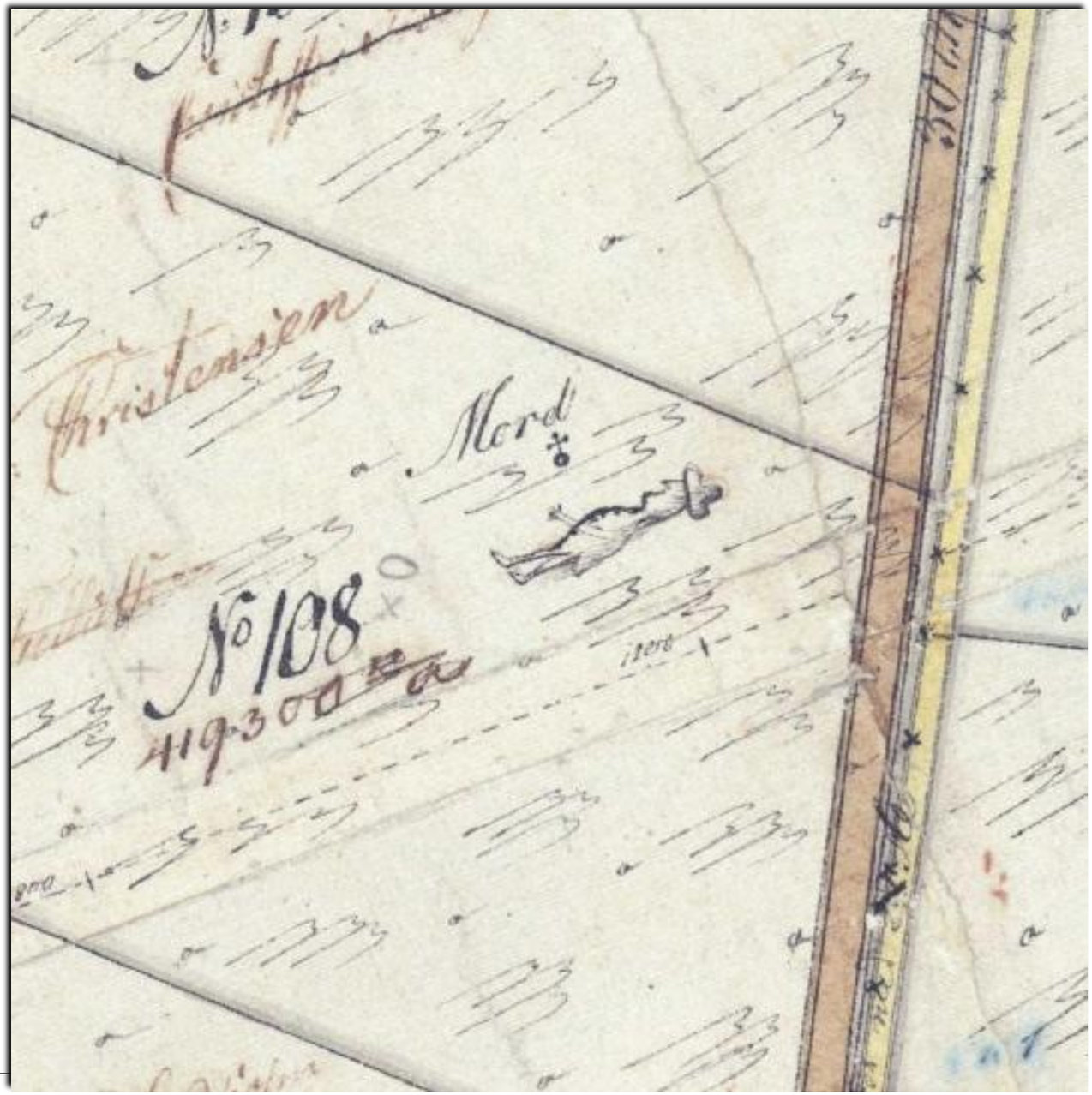
The properties back then.



soil quality and buildings



and other details



Statistics and maps of lowland soils on various maps

O1-kort:

Første årtier af 1800-tallet

Økonomiske interesser

Georefereret og digitaliseret

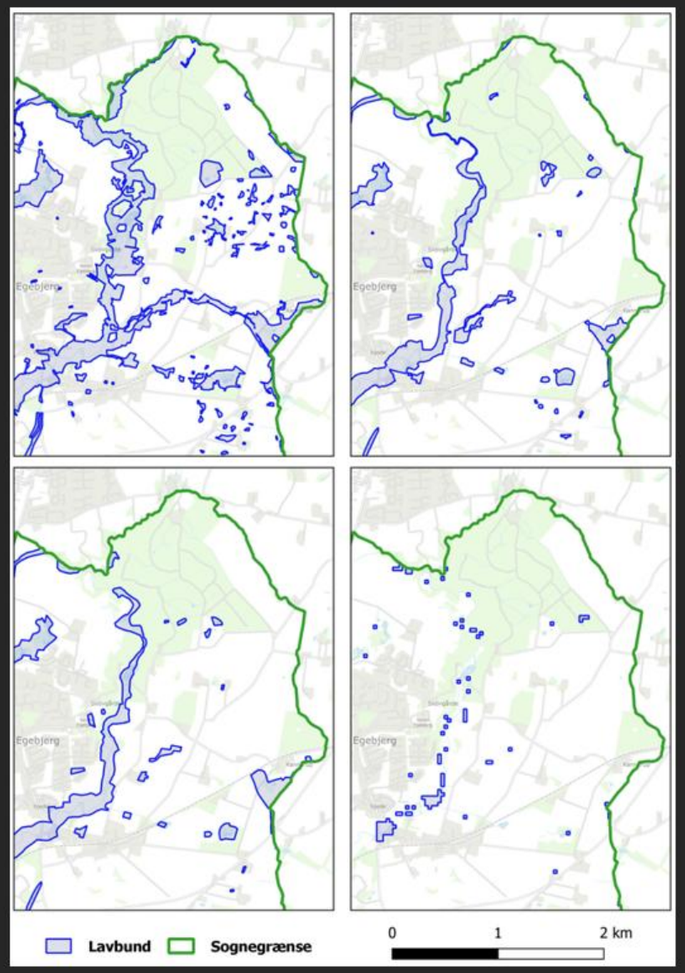
Her er søer og flere vandløb med

Okkerkortet:

1900-tallet

Miljøinteresser og økonomiske

Georefereret og digitaliseret



Højemålebordsblade:

Anden halvdel af 1800-tallet

Militære interesser

Georefereret og digitaliseret

Her er søer og flere vandløb med

Tekstur 2014:

(1900-tallet) - de sidste ti år

Miljøinteresser og økonomiske

Georefereret, digitaliseret

og beregnet

Hansted sogn	
Antal lavbunds områder	Samlet areal (he)
131	403,72
73	355,45
52	330,66
125	158,06

Hansted sogn		
Mindste areal (ha)	Største areal (ha)	Gennemsnit (ha)
0,01	337,54	3,08
0	312,15	4,87
0	290,6	6,36
0	112,53	1,26

Note

- The two oldest maps were created before large-scale drainage began, which makes them particularly interesting when we want to reconstruct the natural extent of lowlands.
- 3. **Okkerkortet** – a nationwide soil dataset developed in the 1980s to classify areas by acidity and ochre risk.
- 4. **Tekstur 2014** – a modern soil map showing organic content, based on Aarhus University's national soil database.
- All four datasets were handled and analyzed in QGIS.
- On the *Original 1* and *Høje målebordsblade* maps, the wetlands cover a much greater area than in the two modern datasets. The *Tekstur 2014* map, for example, only includes soils with more than 6% organic matter, which naturally reduces its completeness.

- Even when accounting for lakes and rivers that may inflate the figures, the historical maps still show a far more extensive presence of lowland soils. This indicates that these old maps can reveal valuable information about the original hydrological conditions of the landscape.

Municipal Survey Results

(preliminary)

In autumn 2025 municipalities were asked about their need for historical cadastral map access.

100%

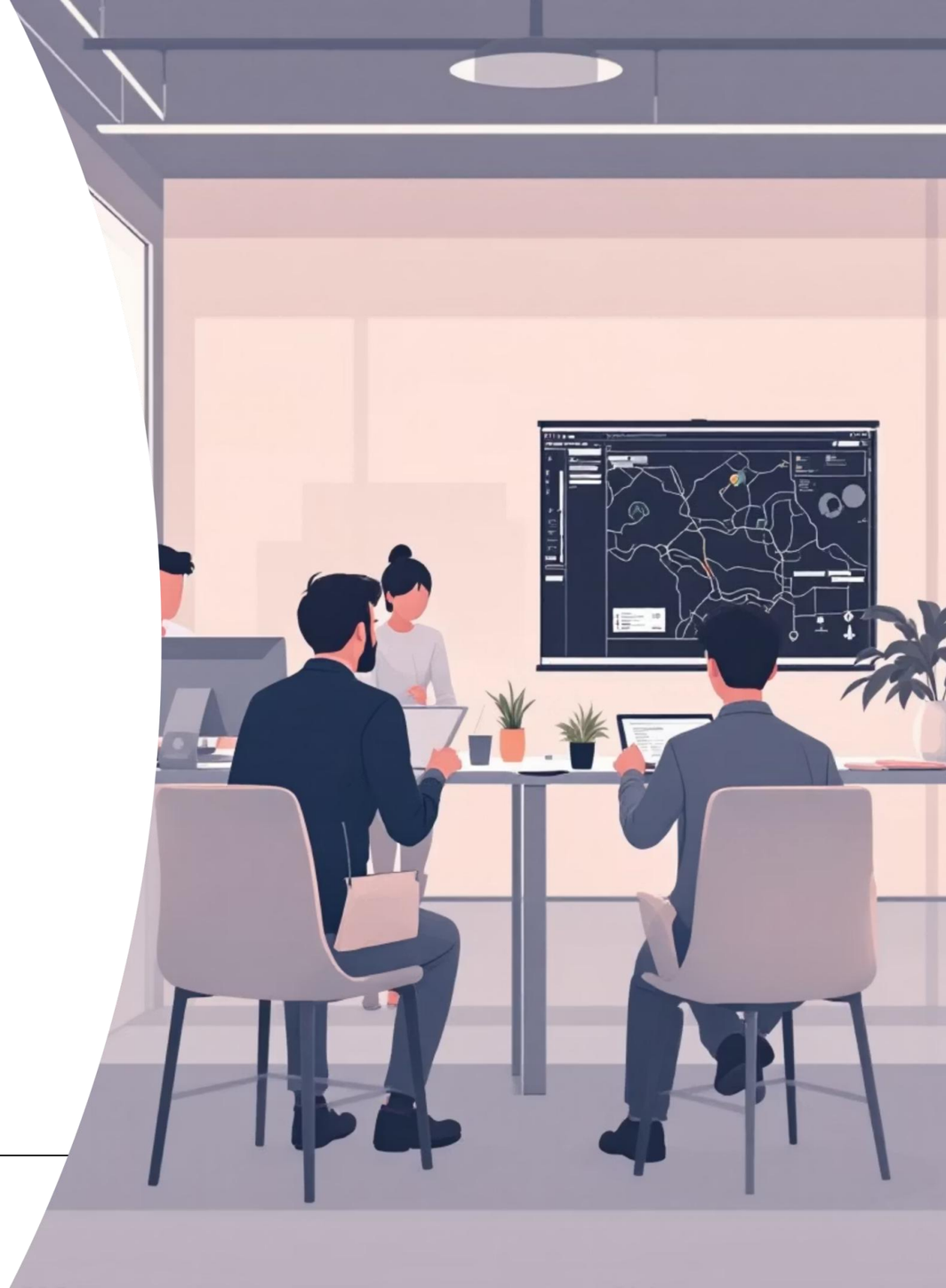
Broad Agreement

Historical maps are highly valuable tools in municipal work—especially with GIS integration.

4

Key Use Areas

Planning, nature management, cultural heritage, and property servitudes.



Why Original-1 Maps Matter

Pre-Industrial Snapshot

Show landscapes immediately after land reforms, before extensive 19th-century drainage and ditching altered the terrain.

Original Wetlands

Reveal locations of former bogs, wetlands, and village ponds that have since disappeared from the landscape.

Digital Integration

Combined with modern elevation and carbon maps, they enable powerful landscape analysis for restoration projects.

Key Applications

Cultural Heritage

Supporting SAVE registrations, cultural environment assessments, and archaeological investigations.

Planning & Zoning

Understanding historical development, preservation interests, and street naming.

Nature & Water

Identifying former wetlands, streams, and lowland areas including Green Tripartite projects.

Property & Easments

Clarifying historical parcel boundaries and recorded rights.

Cultural Heritage Applications

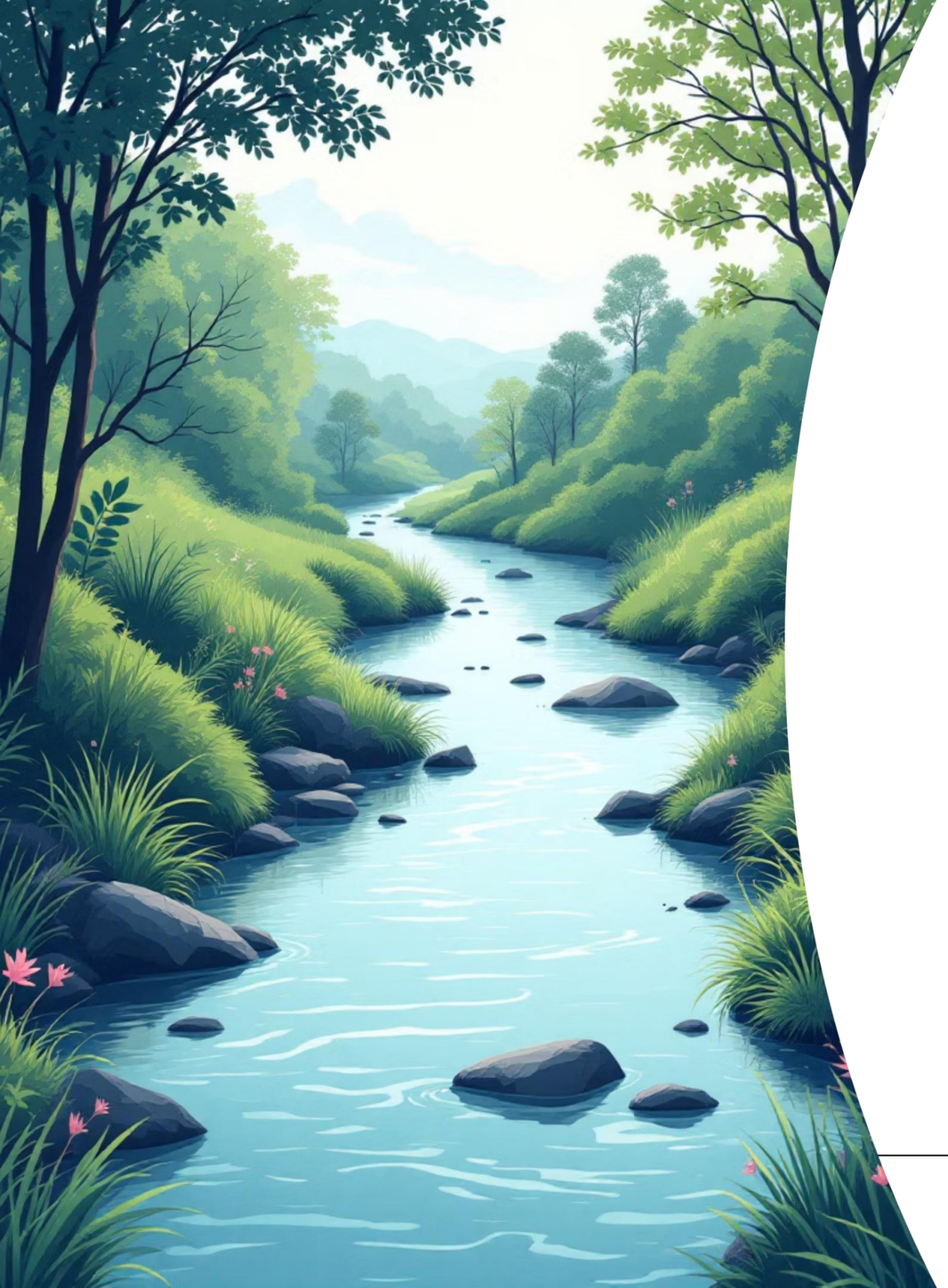
Preserving the Past

- Support SAVE registrations and cultural environment assessments
- Guide archaeological investigations
- Understand historical development for planning and zoning
- Determine age of natural areas in §3 protection cases
- Strengthen landscape and cultural history analyses

Planning and Zoning Insights

Historical cadastral maps provide essential context for understanding how urban and rural areas have evolved over time.

- Track historical development patterns
- Identify preservation interests
- Research street naming origins
- Support informed planning decisions



Key Applications in Water Management

Watercourse Restoration

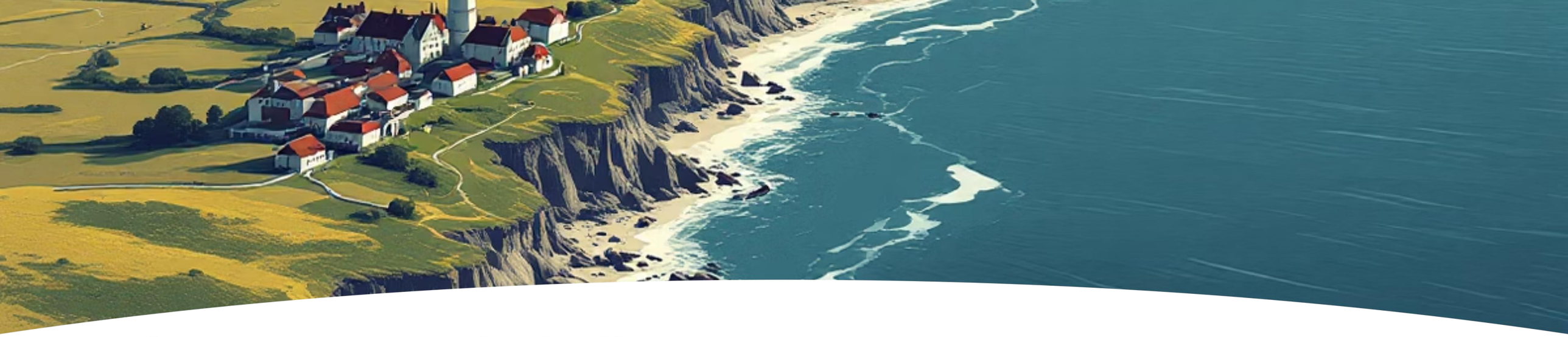
- Rediscover streams and bogs altered by time
- Support nature and stream restoration projects
- Guide work under Green Tripartite Agreement
- Analyze hydrological connections when drains are removed

Municipal Water Cases

- Manage surface water on municipal properties
- Determine if water results from drained wetlands
- Predict water flow after drain removal
- Handle §3 protected nature type cases

Note

- Around water supply wells, new *protection zones have been established. By overlaying these protection zones with the four datasets, it was striking how many more potential risk areas appear when older maps are considered.
- Using flood-risk data from a site Scalgo Live, I compared areas at risk of flooding with historical lowlands. Once again, there was a strong overlap between flood-prone zones and the wetlands visible on the old O1 maps. This suggests that these maps can be useful tools in climate adaptation planning.



Solving Practical Challenges

Georeferencing Historical Records

Locate old regulations, decisions, and agreements that reference cadastral numbers no longer in existence. Cadastral boundaries serve as essential reference points.

Finding Hand-Drawn References

Maps help locate structures and boundaries that are difficult to identify when parcel boundaries have changed over time.

Coastal Management Insights

Assess erosion and geological changes over time, and evaluate the legality of coastal protection structures.

Nature and Water Management

01

Identify Historical Features

Locate former wetlands, streams, and lowland areas using historical maps.

02

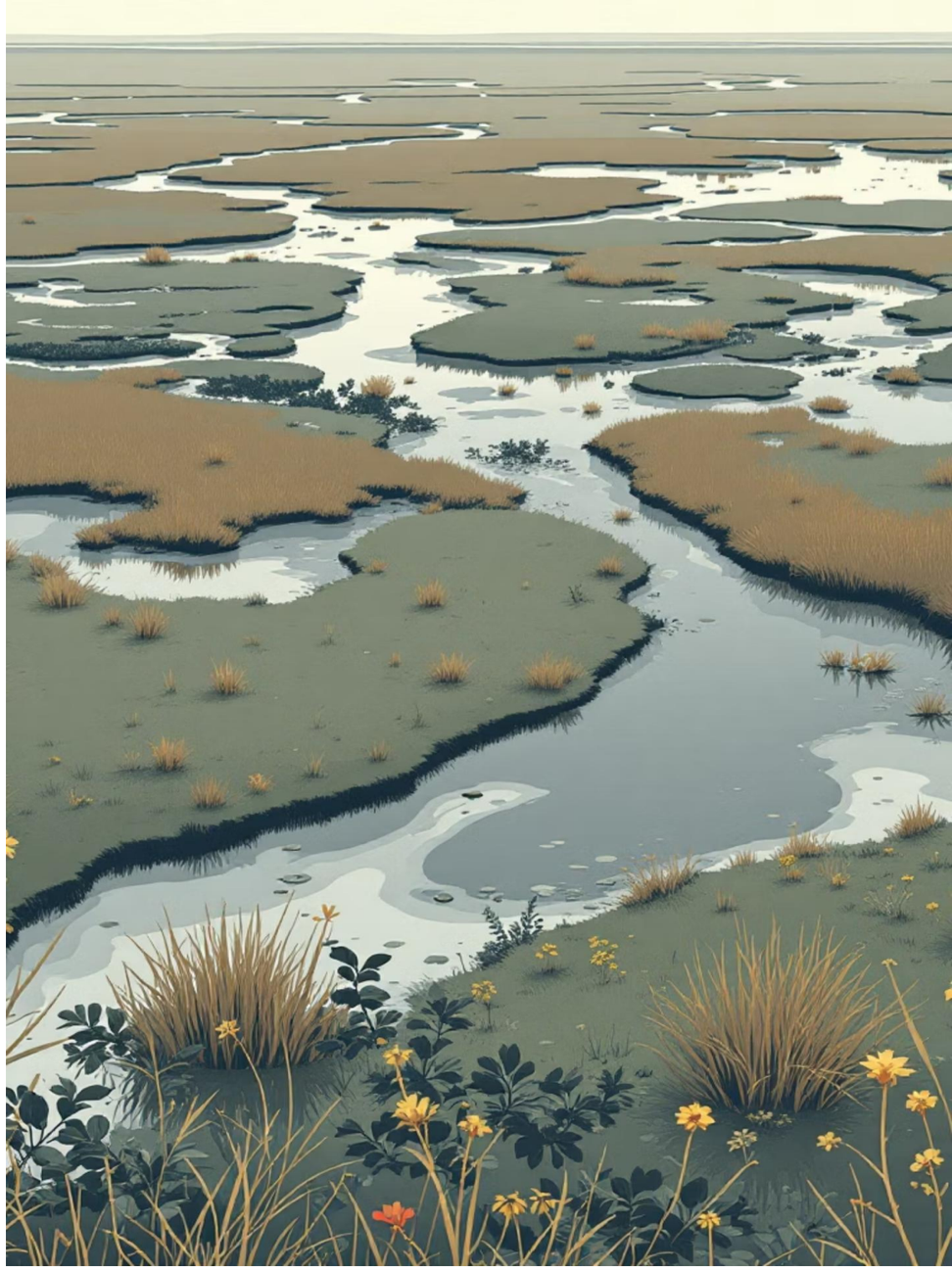
Support Green Projects

Apply insights to Green Tripartite environmental initiatives.

03

Inform Restoration

Guide nature restoration and water management strategies.




0
50
100 m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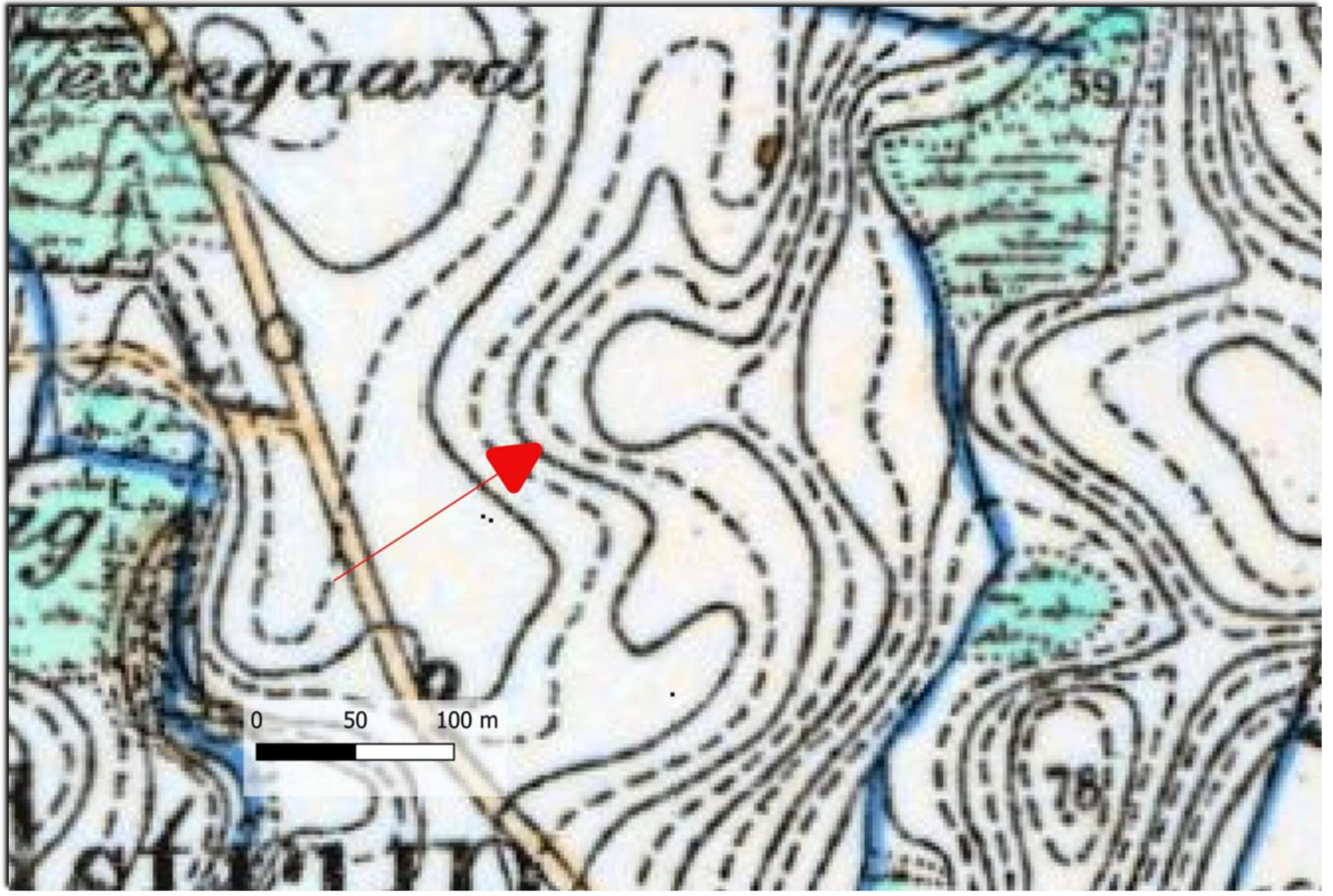
59
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100 m


Lauritshøj Legeplads
Kapini
Guldsmed
Parcelforeningen Lauritshøj
Andelsboligforeningen Tjørnen
Tjørnebak
Tagmosevej
Lauritshøj
Ny Studstrupvej
Industrisl
Kirkepladsen
Engskovvej
FDF Løgten
Skødstrup Kirke
Skødstrup Sognegård
Andelsboligforeningen Væksthuset
Forlaget Pind og Bjerre
Engskovgård
Engskovhaven


CO_2

Expected Benefits

Enhanced Case Processing

Faster, more informed decision-making with historical context.

Improved Data Quality

More accurate documentation and spatial information.

Green & Heritage Support

Stronger foundation for environmental and cultural projects.

Overall Assessment

> Access to historical cadastral maps would **enhance case processing**, **improve data quality**, and **support green and cultural heritage projects** across municipalities.

Historical maps are not just archives—they're essential tools for building Denmark's sustainable future.
In short, historical maps are not just relics of the past — they are active tools for building a more sustainable future.

Especially when accessible directly within local GIS systems.

MOMU

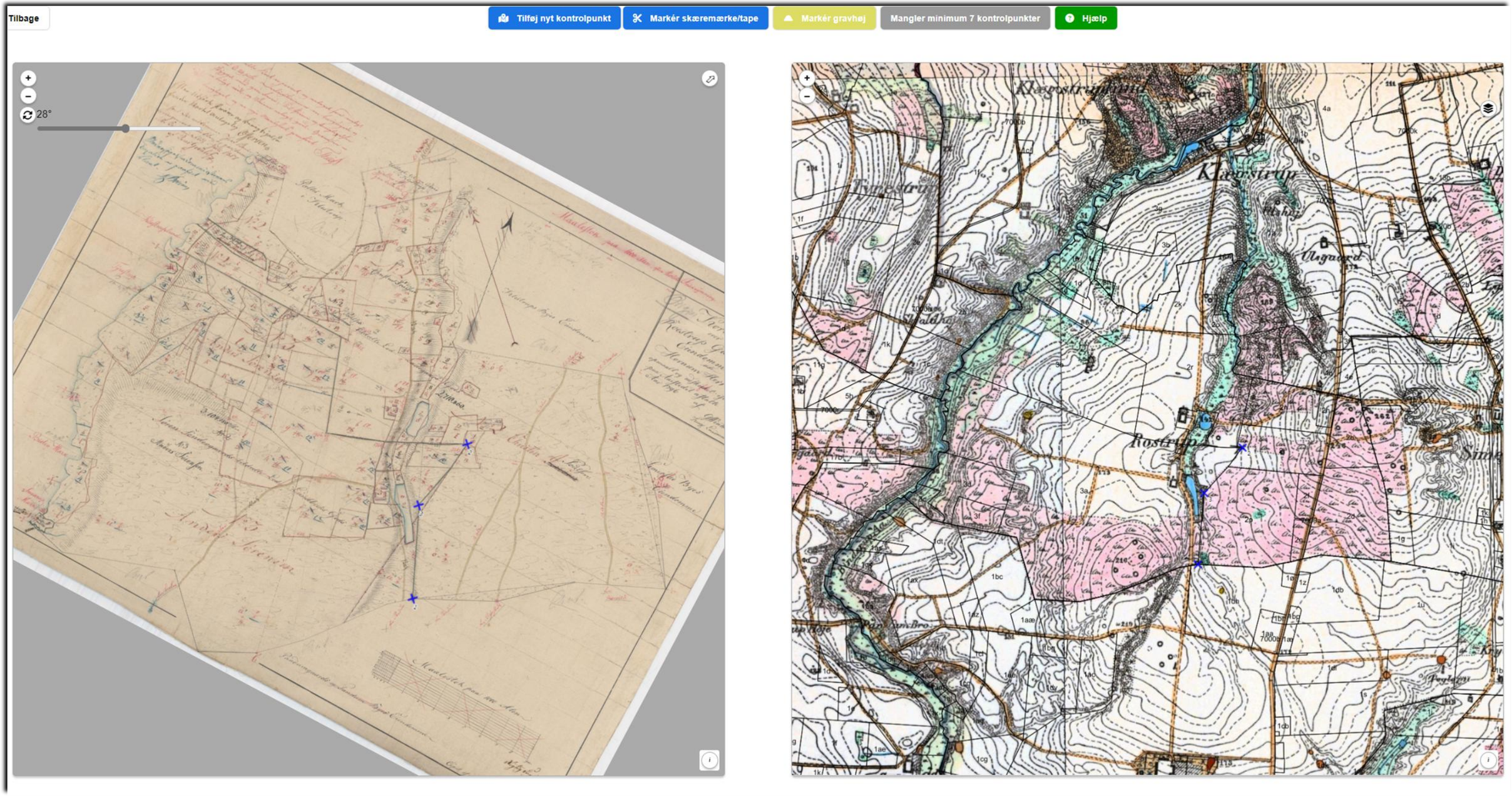
MOESGAARD MUSEUM

Archaeological IT

The georeferencing was initiated by Moesgaard Museum and completed with the assistance of volunteers.

The georeferenced maps are hosted at the “Data Distributor”

and is retrieved and used in various GIS solutions

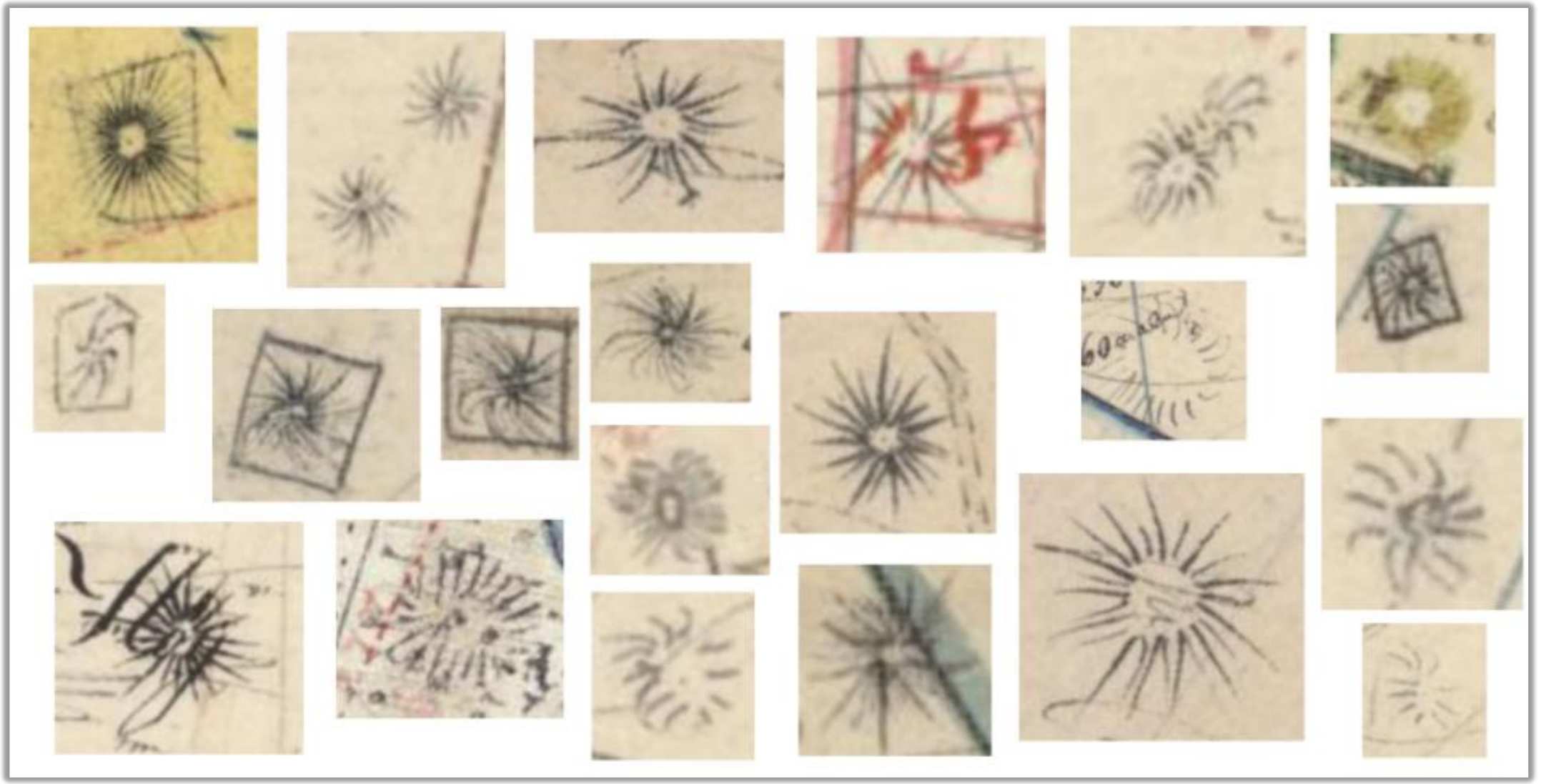

Tilbage
Tilføj nyt kontrolpunkt
Markér skæremærke/tape
Markér gravhøj
Mangler minimum 7 kontrolpunkter
Hjælp
28°
Klaregaarde
Ulgaard
Rostrup

Note

The georeferencing was done by first identifying common points, e.g. burial mounds or unchanged property boundaries in newer maps and the Original-1 maps, respectively, after which the Original-1 maps were moved into place.

Finally, Moesgaard Museum has carried out a quality control

Signatures for Chambered tomb and other buriel mounds



Almost all of Denmark is covered by georeferenced cadastral maps from the 19th century.

However, this does not apply to Southern Jutland. Until 1921 Southern Jutland was part of Germany and we therefore do not have Original-1 maps from this area.

Beyond Original-1 Maps

Municipalities request access to additional historical map types to strengthen landscape and cultural history analyses:

Original-2 Maps

Extended cadastral documentation for deeper historical insights.

Land Consolidation Maps

Udskiftningskort showing agricultural reorganization and land reforms.

Quartermaster Maps

General military maps providing landscape and settlement patterns.