



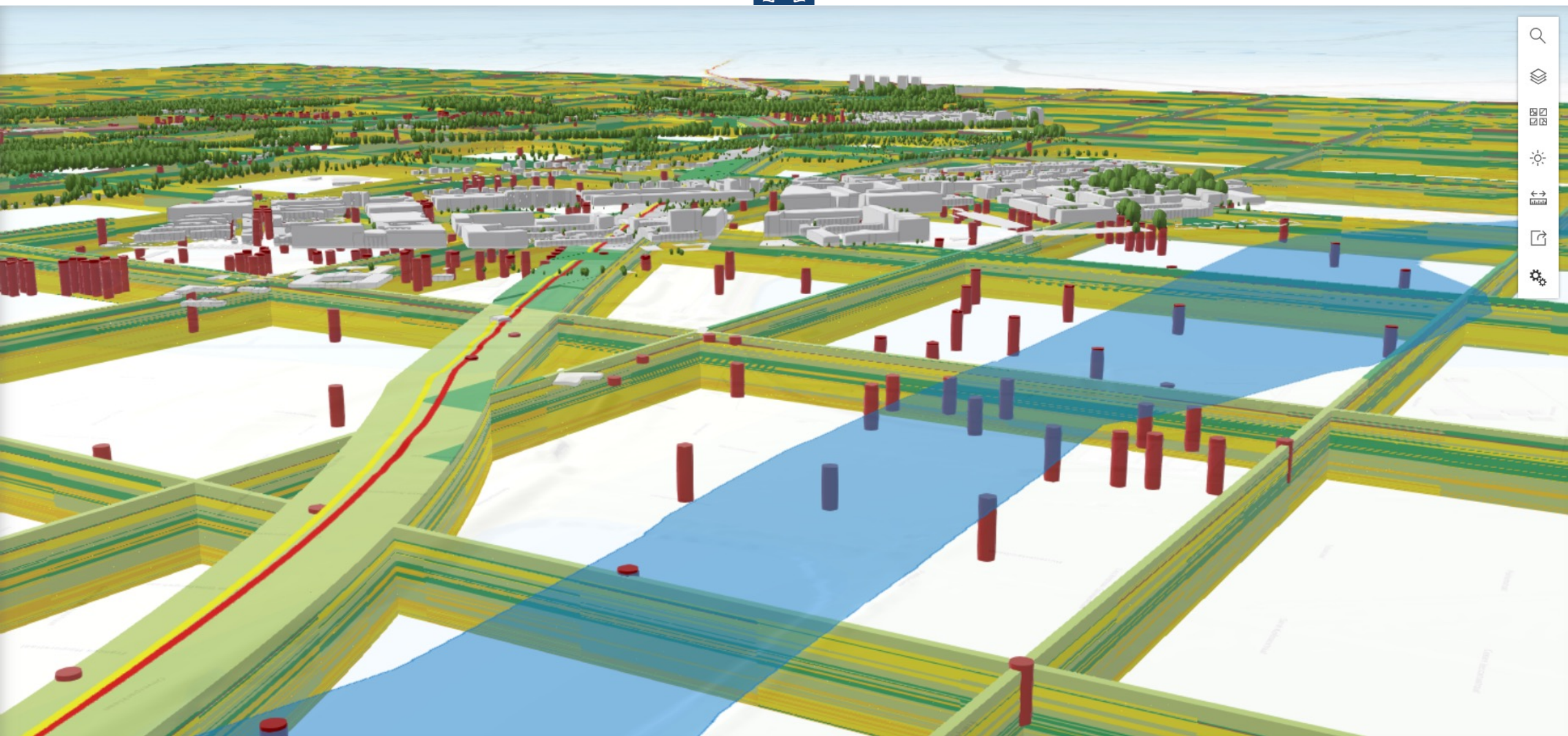
Ministerie van Binnenlandse Zaken en
Koninkrijksrelaties



Ontwikkeling BRO 3D Services

Rob van der Krogt (TNO)
Maarten Welmers (ESRI)
Romée Kars (TNO)

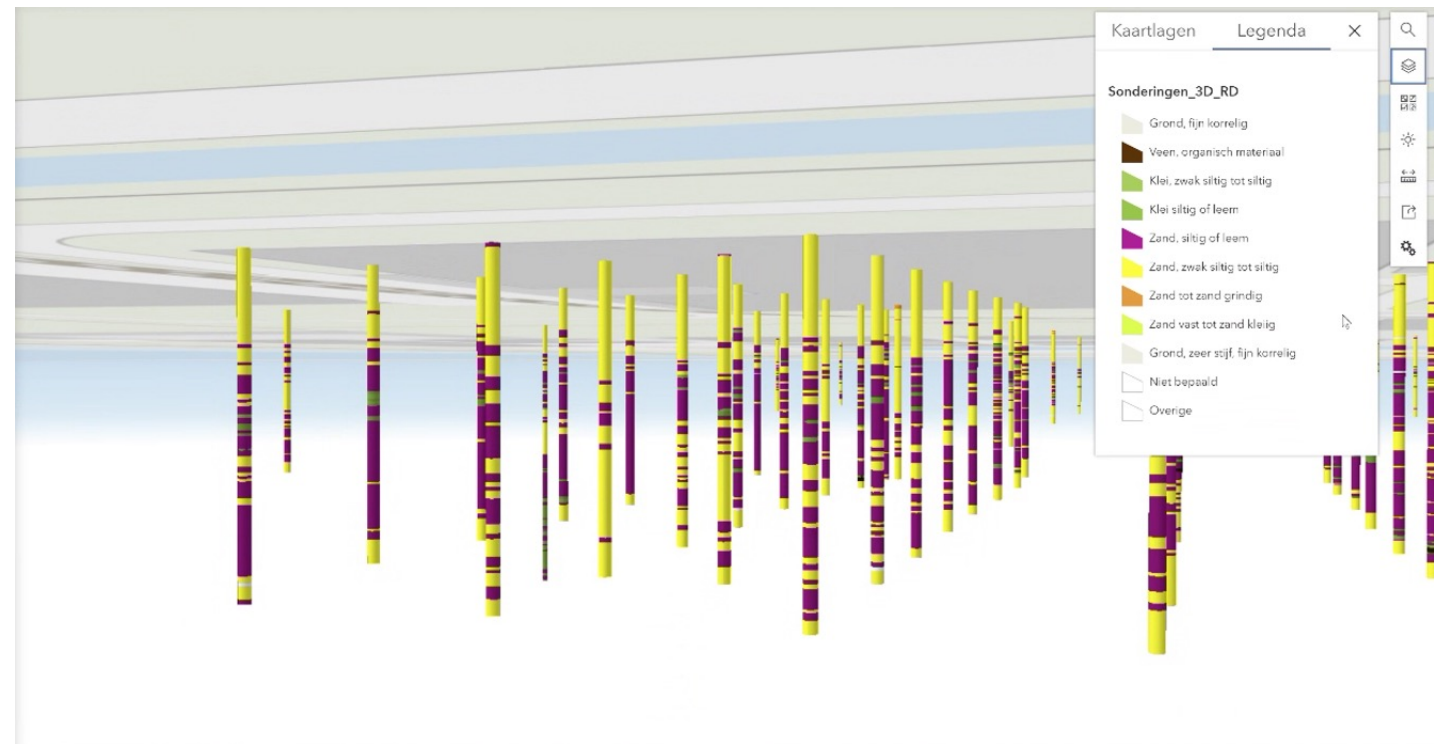
15 juni 2023





Het project BRO 3D Services

- > Landsdekkende 3D BRO data en modellen
- > Voor breed en toegankelijk, online gebruik in eigen (GIS-) werkomgeving
- > Beschikbaar via open source platform en API's
- > Inclusief generiek te gebruiken functies (visualisaties, filters, ...)
- > Scope fase 1:
 - GeoTOP
 - Sonderingen
 - REGIS II
 - Grondwaterputten en -standen





Het project BRO 3D Services; context

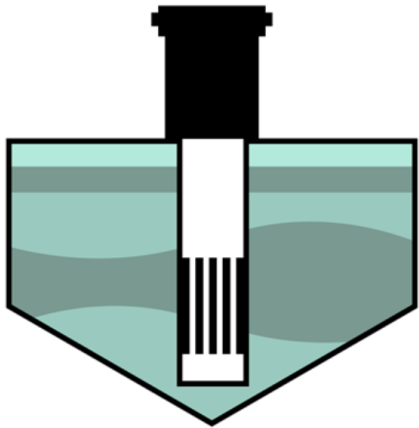
- > Projectsubsidie Kadaster
- > Kadaster coördineert '3D Basisvoorziening'
- > Initiatief van MinBZK (coördinatie BRO): ondergrond meenemen
- > Gefinancierd vanuit WaU
- > Uitvoering door TNO, samenwerking ESRI



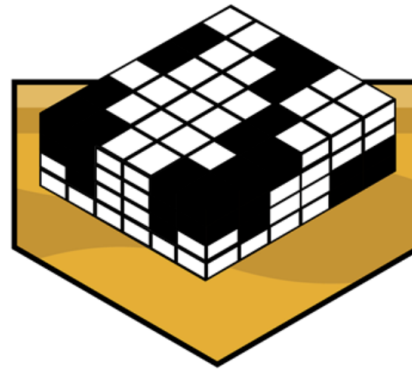
Basisregistratie
Ondergrond







Grondwatermonitorsputten



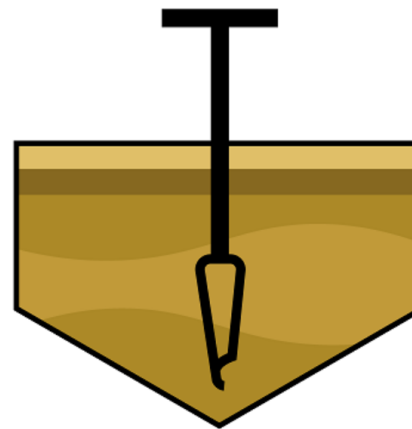
Geotop



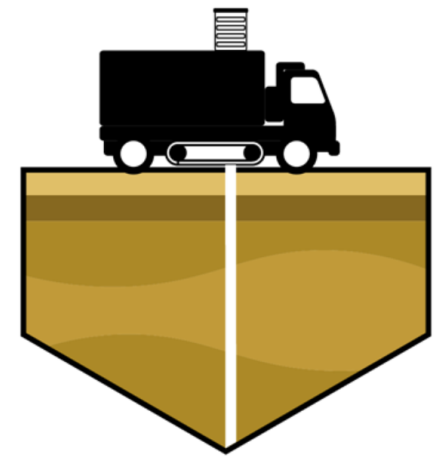
REGIS II



Digitaal Geologisch Model



Booronderzoek



Geotechnisch
sondeeronderzoek



Uitwerking objecten – voorbeeld GeoTOP

- GeoTOP als I3S Voxel Scene Layer Service
 - Preparatie
 - Data publiceren in projectie EPSG 28992
 - Data publiceren in projectie EPSG 3857
- GeoTOP als I3S 3D Object Scene Layer Service
 - Preparatie + verrijking met attribuutwaarden van een geografische duiding (gemeentenaam)
 - Data publiceren in projectie EPSG 28992
 - Data publiceren in projectie EPSG 3857
- GeoTOP fences/slices (100 x 100 m) als I3S 3D Object Scene Layer Service
 - Preparatie fences + verrijking met attribuutwaarden van een geografische duiding (gemeentenaam)
 - Fences publiceren met visualisatie Lithoclass in projectie EPSG 28992
 - Fences publiceren met visualisatie Lithoclass in projectie EPSG 3857



Basisregistratie Ondergrond

Ontdek hier de kant en klare 3D webservices
uit de BRO

Alle informatie van de Nederlandse bodem en ondergrond komt samen in de Basisregistratie Ondergrond (BRO). De Geologische Dienst Nederland, onderdeel van TNO, is operationeel verantwoordelijk voor de realisatie en het beheer van de Landelijke Voorziening BRO. Deze website is de plek om geïnspireerd te raken door de mooie data van de ondergrond in Nederland.



GeoTOP webservice



The screenshot displays the GeoTOP webservice interface. On the left, a sidebar contains the following information:

- GeoTOP demo Oostelijke Wadden WGS**
- Inge van den Meiracker**
External Organization
- [View Full Details](#)
- Details**
 - 3D Map**
Web Scene
 - May 25, 2023**
Date Updated
 - May 25, 2023**
Published Date
 - Privately Shared**
Select groups can see this content
 - No License Provided**
Request permission to use

The main area shows a 3D map of the Oostelijke Wadden WGS, rendered in a grid of yellow and red blocks. A mouse cursor is visible over the map. On the right side, there is a vertical toolbar with icons for search, home, and other map controls.

GeoTOP in Pro



The screenshot displays the GeoTOP in Pro software interface. The top menu bar includes Project, Map, Insert, Analysis, View, Edit, Imagery, Share, BRO, Esri Nederland, Help, Voxel Layer, and Data. The ribbon below the menu bar contains various tool groups: Clipboard (Cut, Copy, Paste, Copy Path), Navigate (Explore, Bookmarks, Go To XY), Layer (Basemap, Add Data), Selection (Select, Select By Attributes, Select By Location, Clear, Zoom To), Inquiry (Measure, Locate, Infographics, Coordinate Conversion), Labeling (Pause, Lock, View Unplaced, More), and Offline (Download Map, Sync, Remove). The main workspace shows a 3D map of a landscape with a city and surrounding fields. The left sidebar contains the Contents pane with a search bar and a Drawing Order list. The right sidebar shows the Voxel Exploration panel for the layer 'kans op het voorkomen van grind'.

Contents

- Scene
- 3D Layers
 - GeoTOP_isosurface_grind
 - GeoTOP_isosurface_veen
 - GeoTOP_doorsnede
 - GeoTOP_de_Vecht
- 2D Layers
 - Topo RD
- Elevation Surfaces
 - Ground

Voxel Exploration: GeoTOP_iso...

Name: kans op het voorkomen van grind

Variable: kans op het voorkomen van grind

Value: 24.78389773

Color: [Color Selection]

Transparency: 0%

GeoTOP Nederland



GeoTOP: Almere

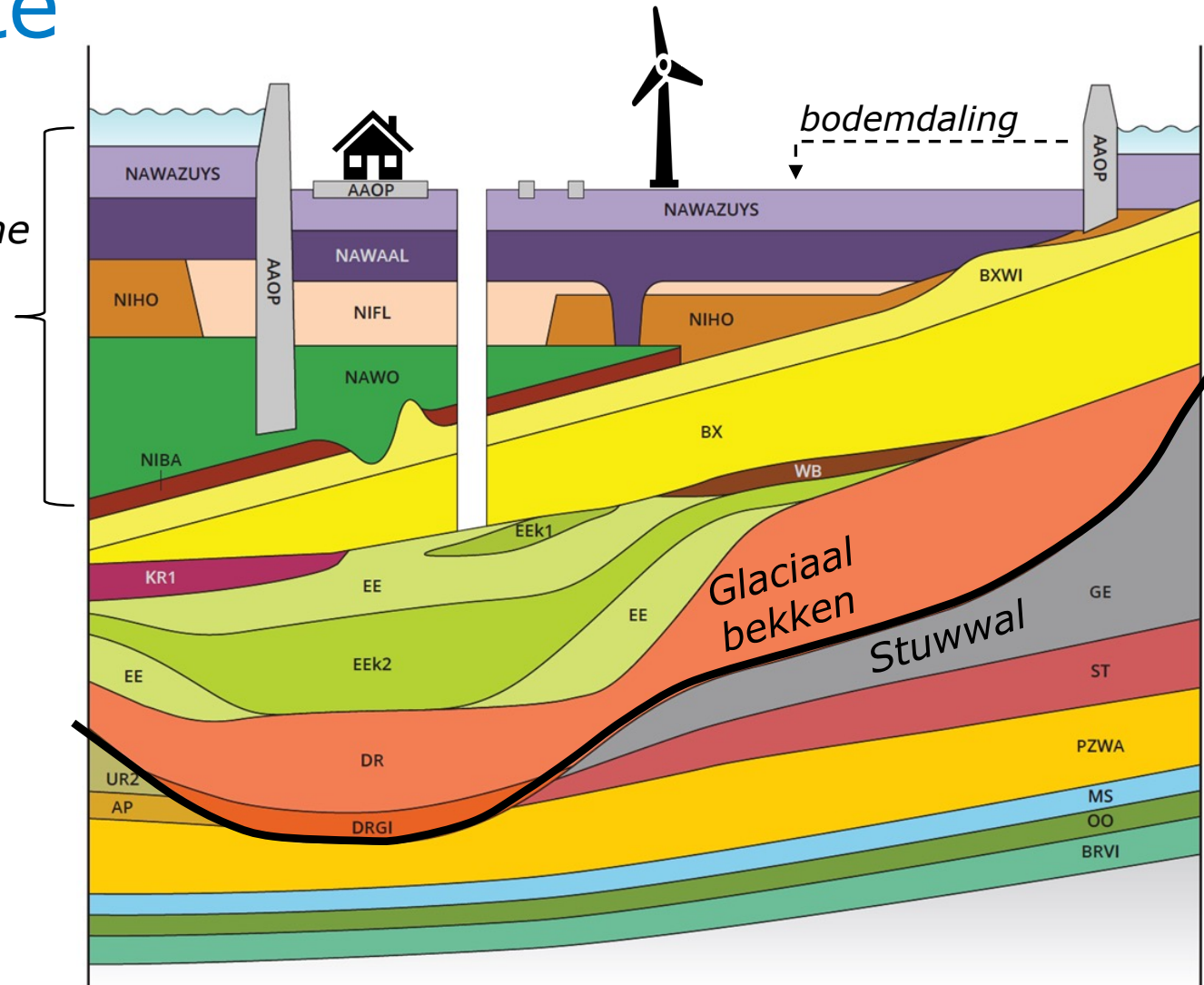




Uitdagingen gemeente Almere

- > Energietransitie
- > Watermanagement
- > Slappe grond, bodemdaling

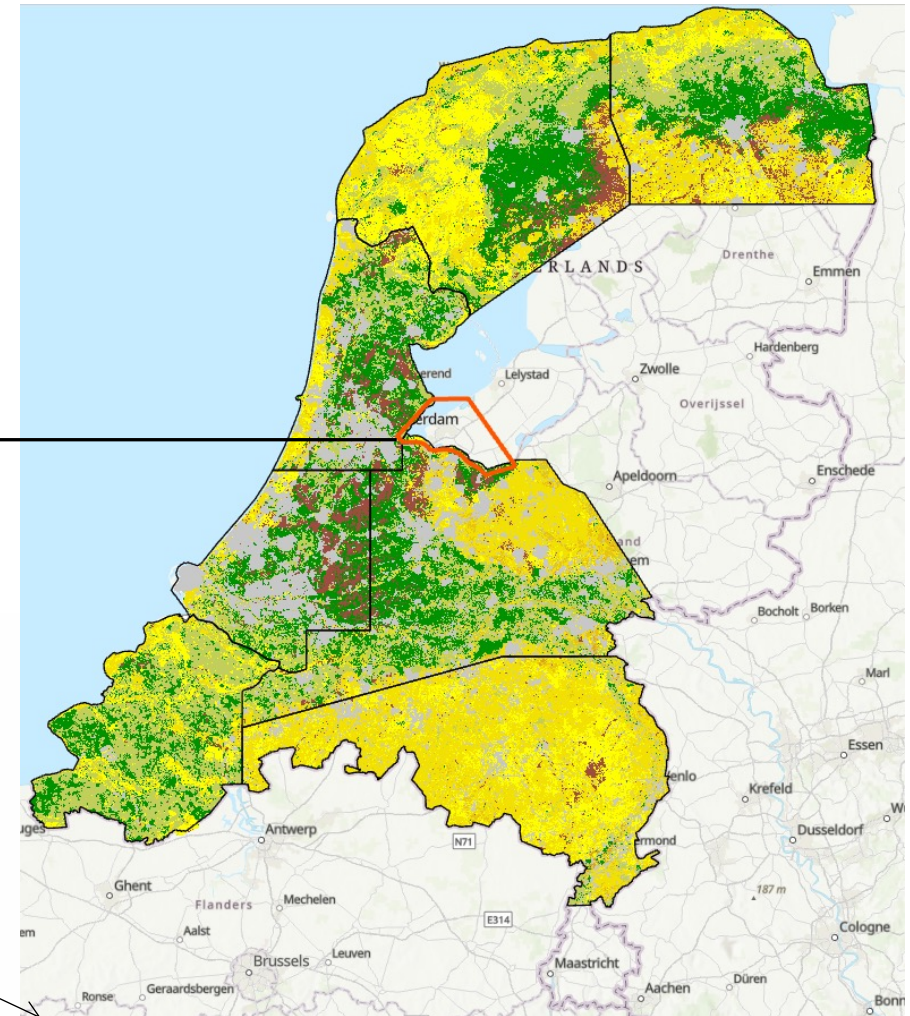
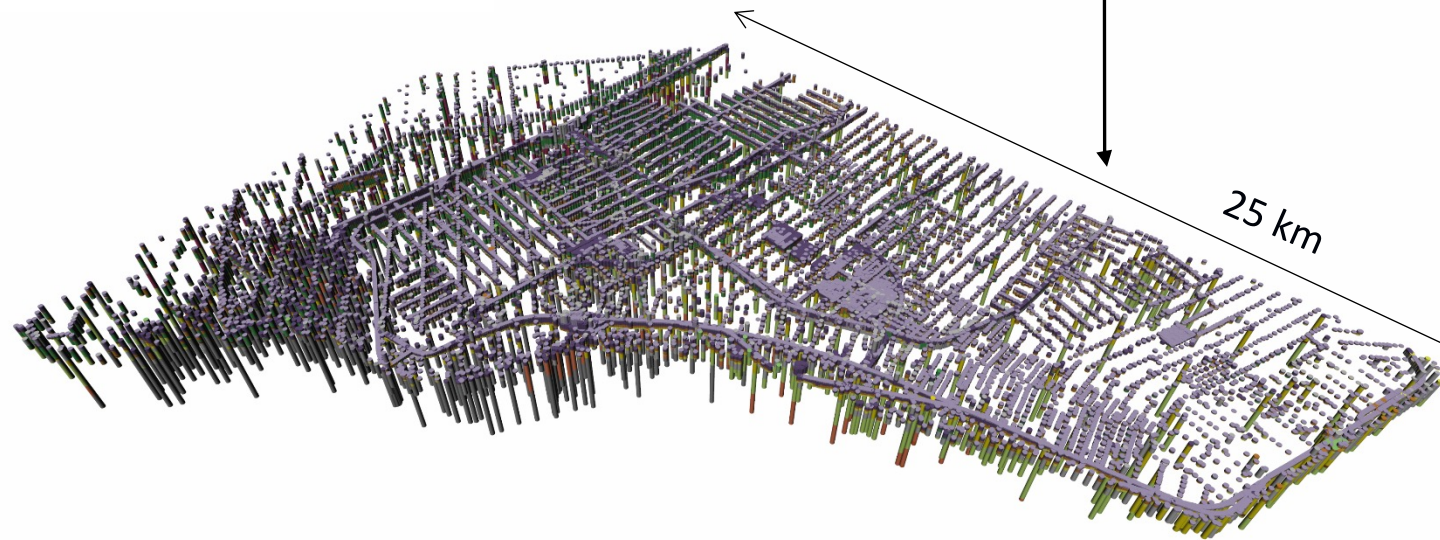
Holocene wig

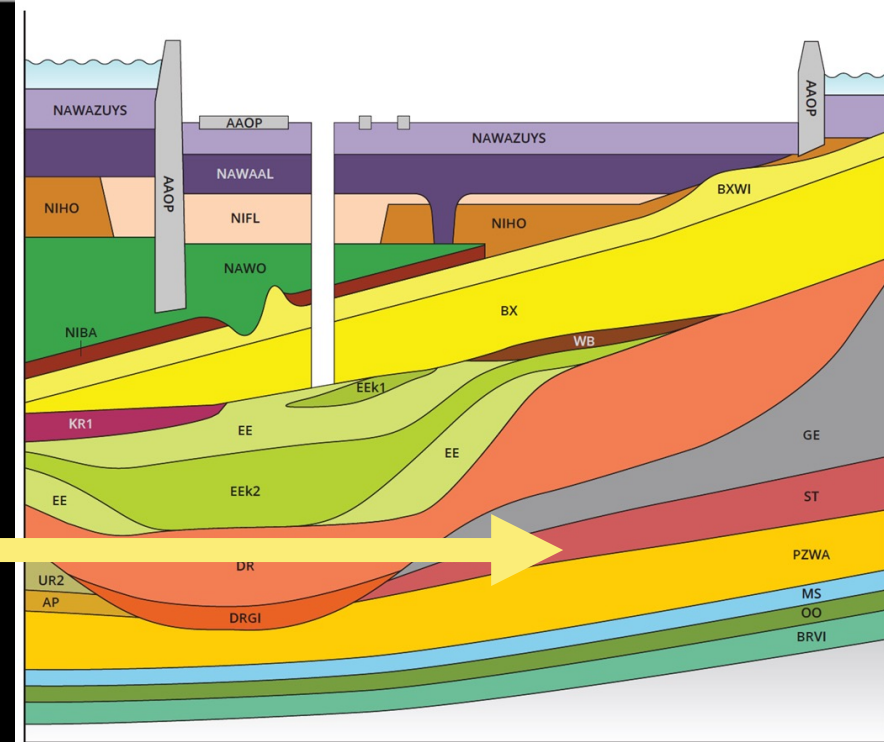


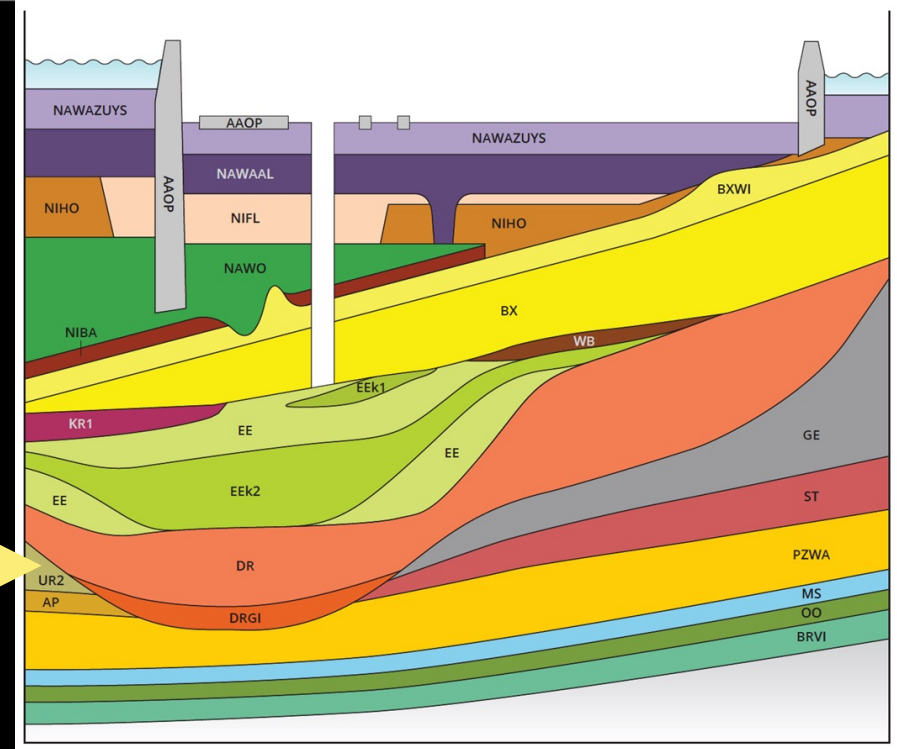


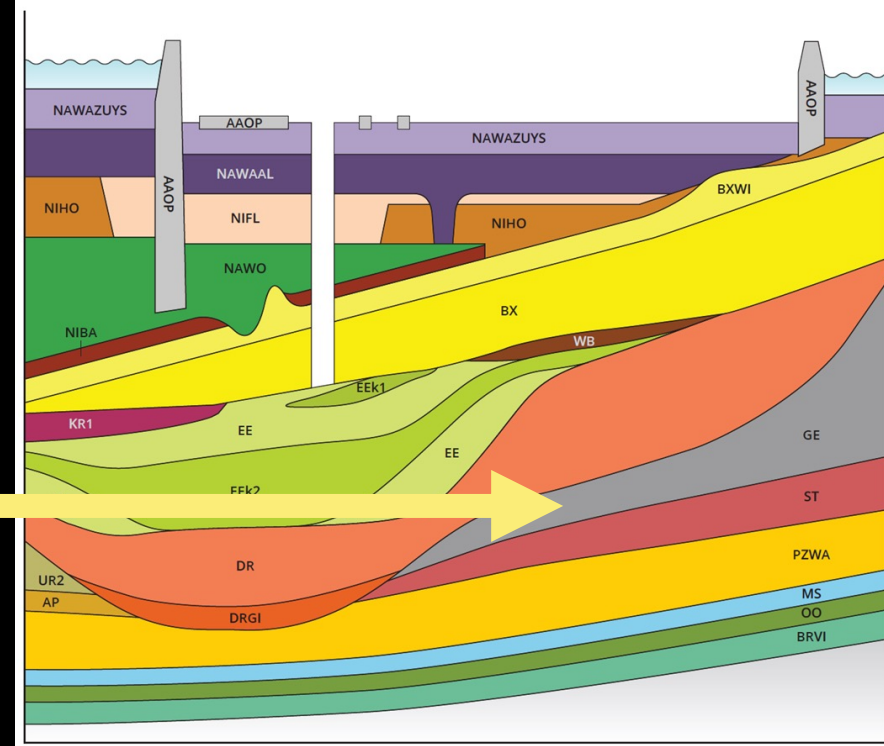
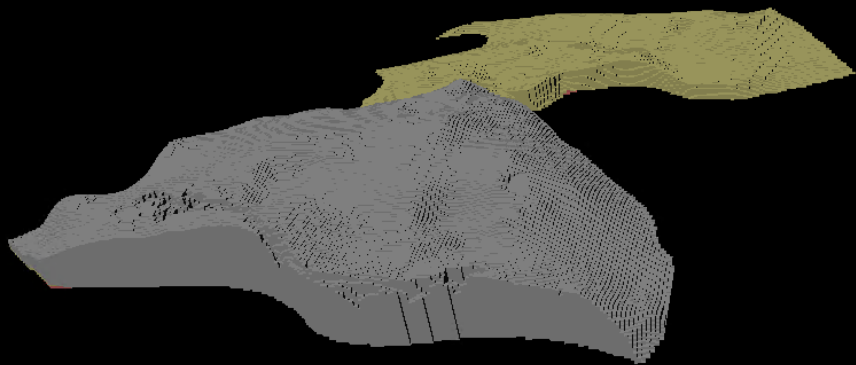
Boringen

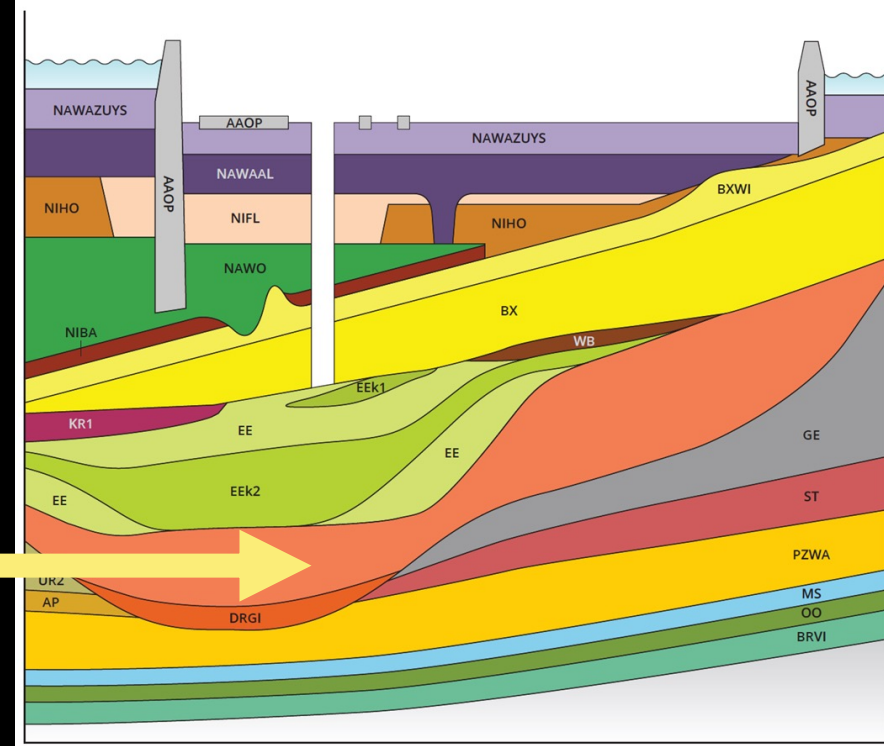
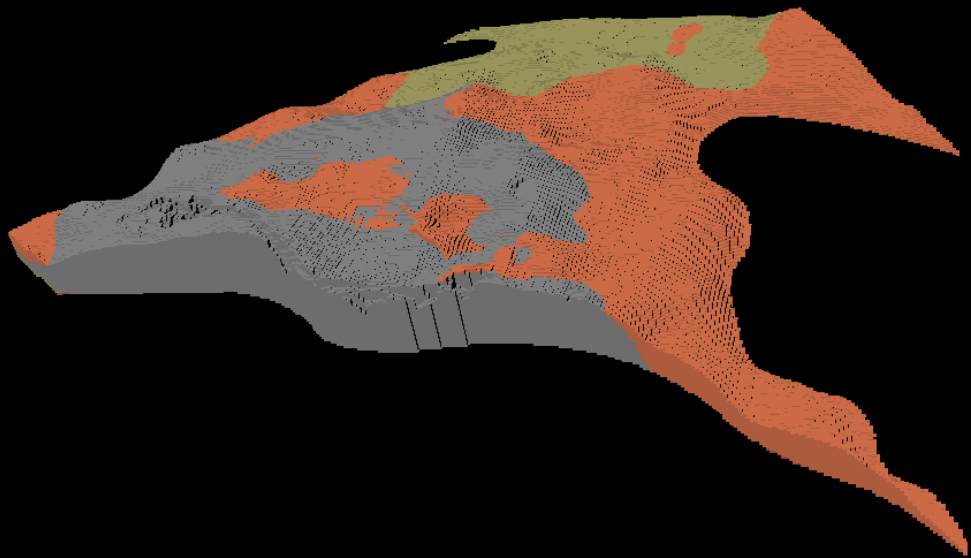
17,500 boringen met
geologische interpretatie

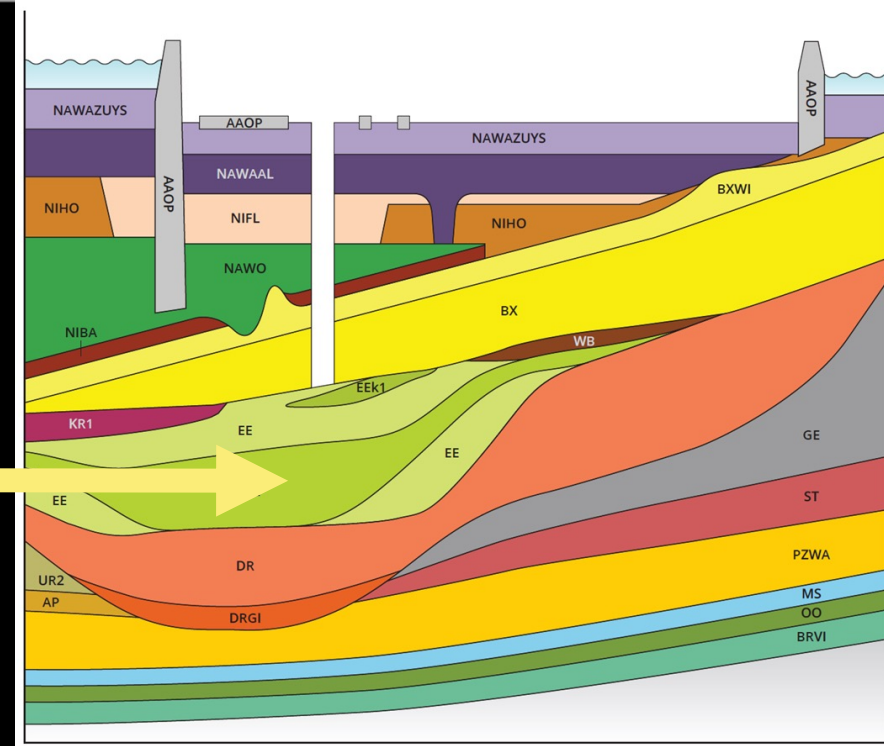
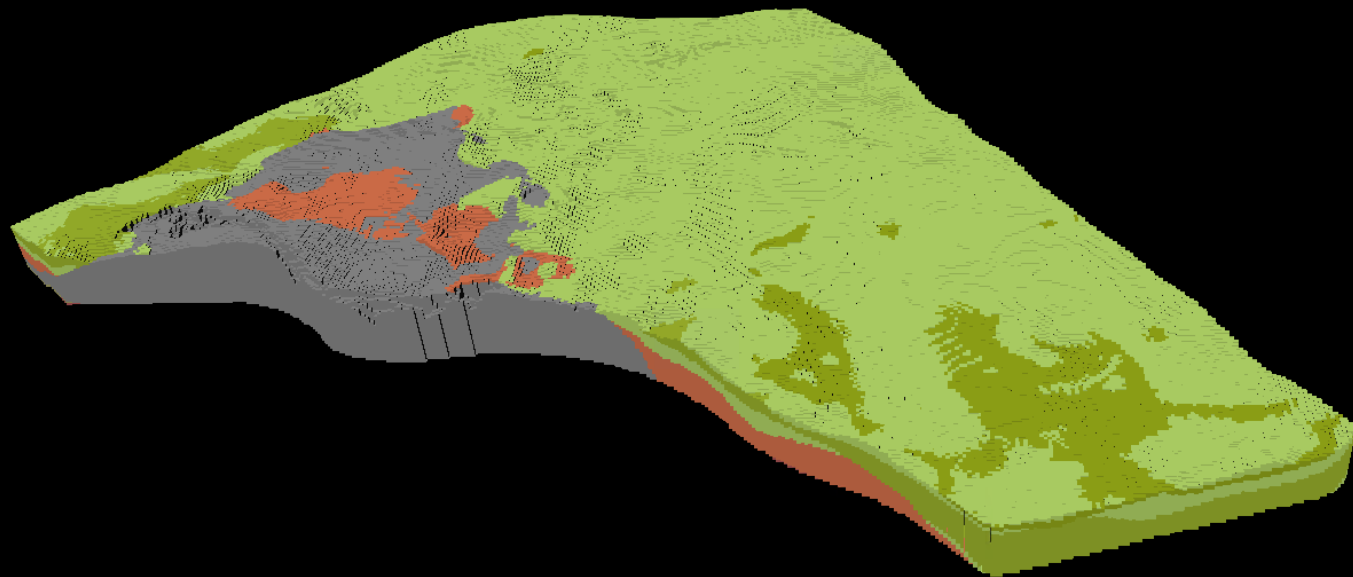


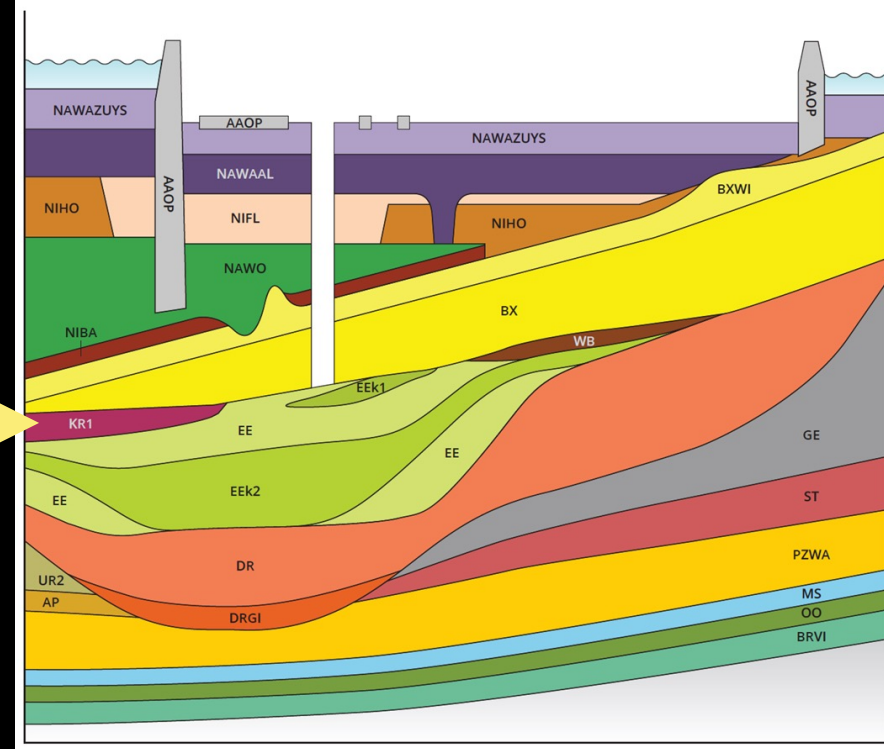
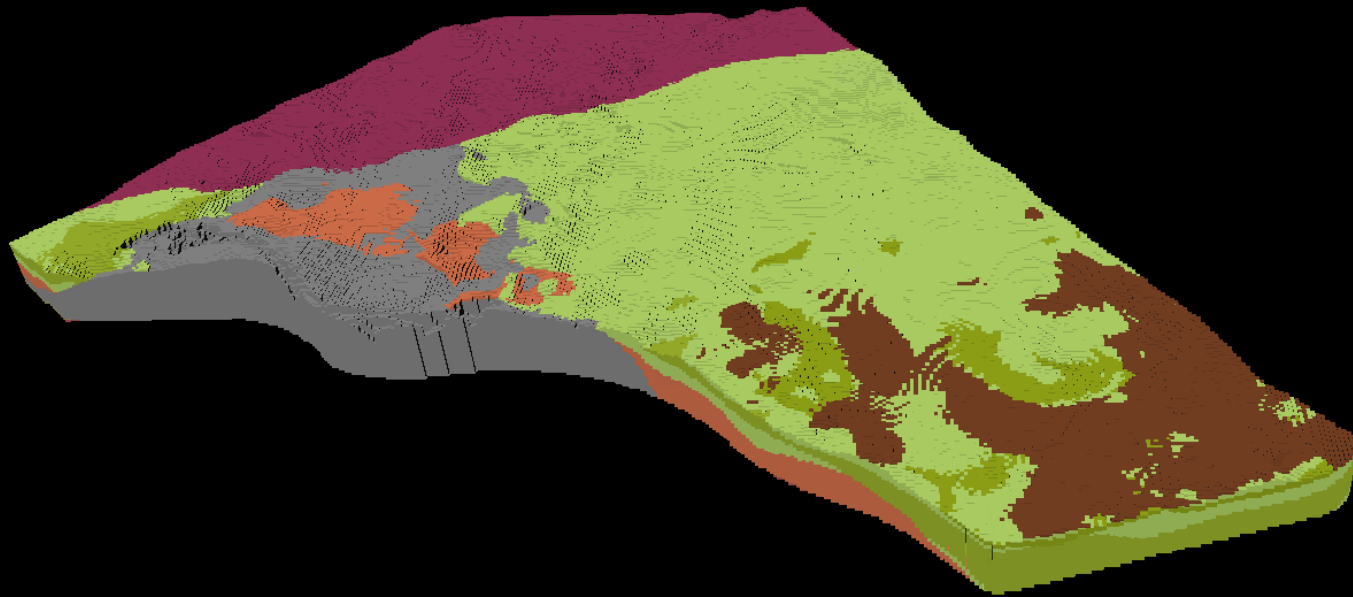


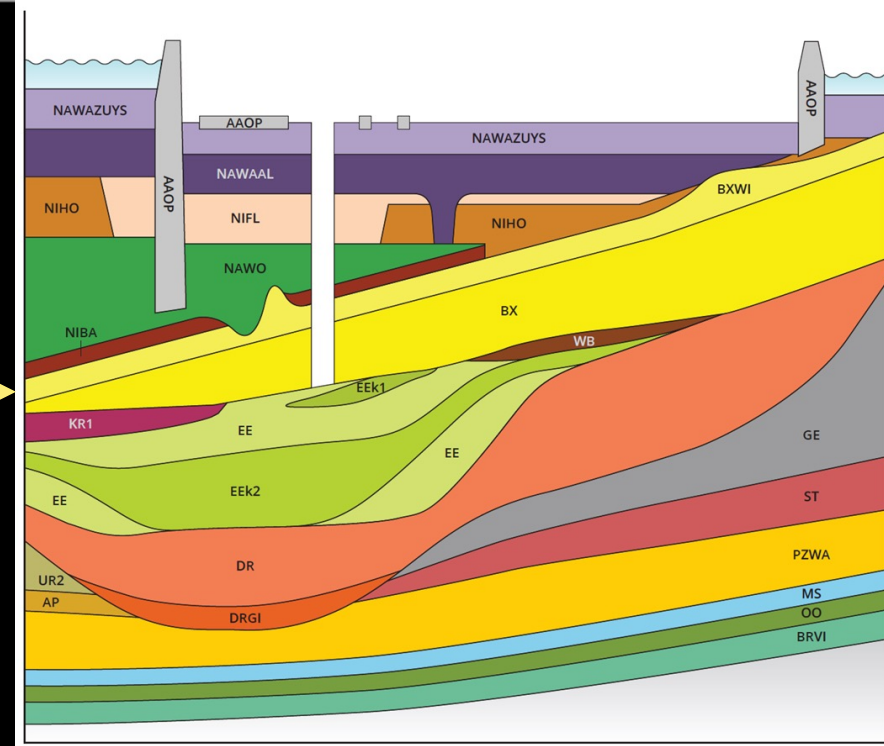
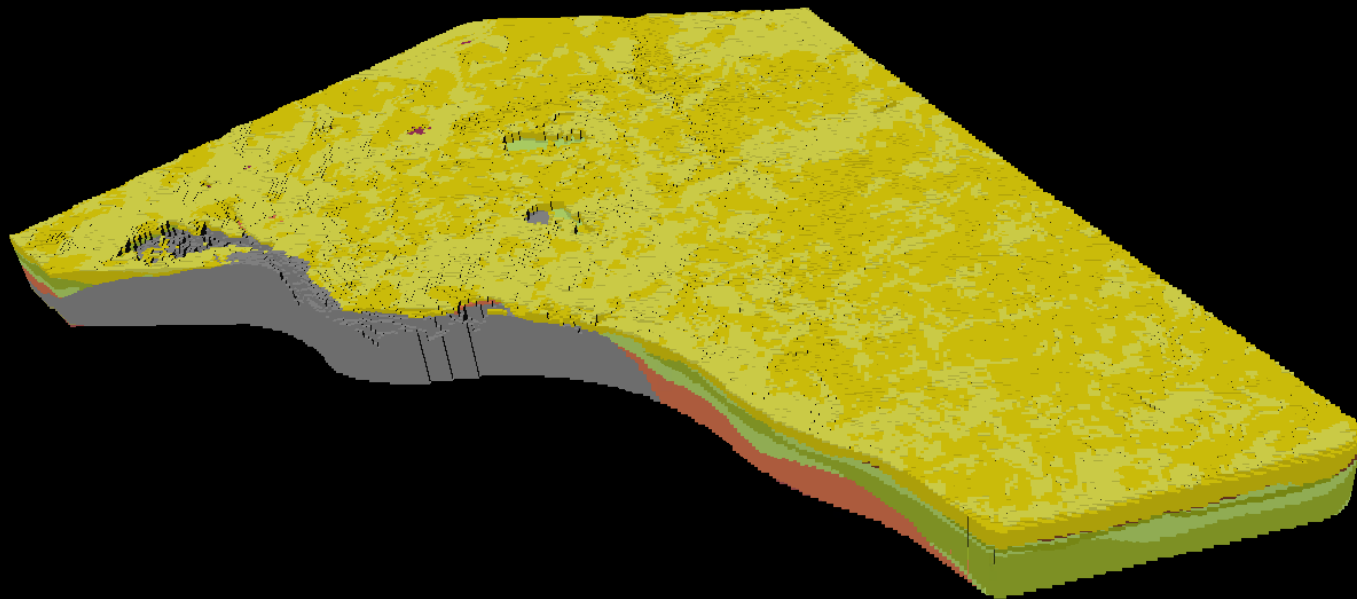


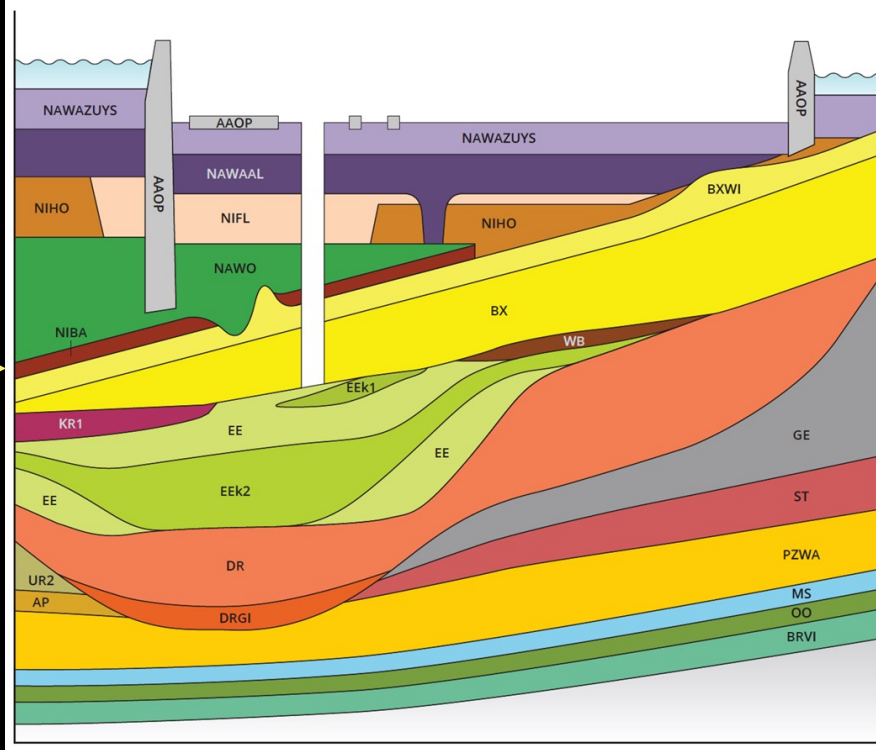
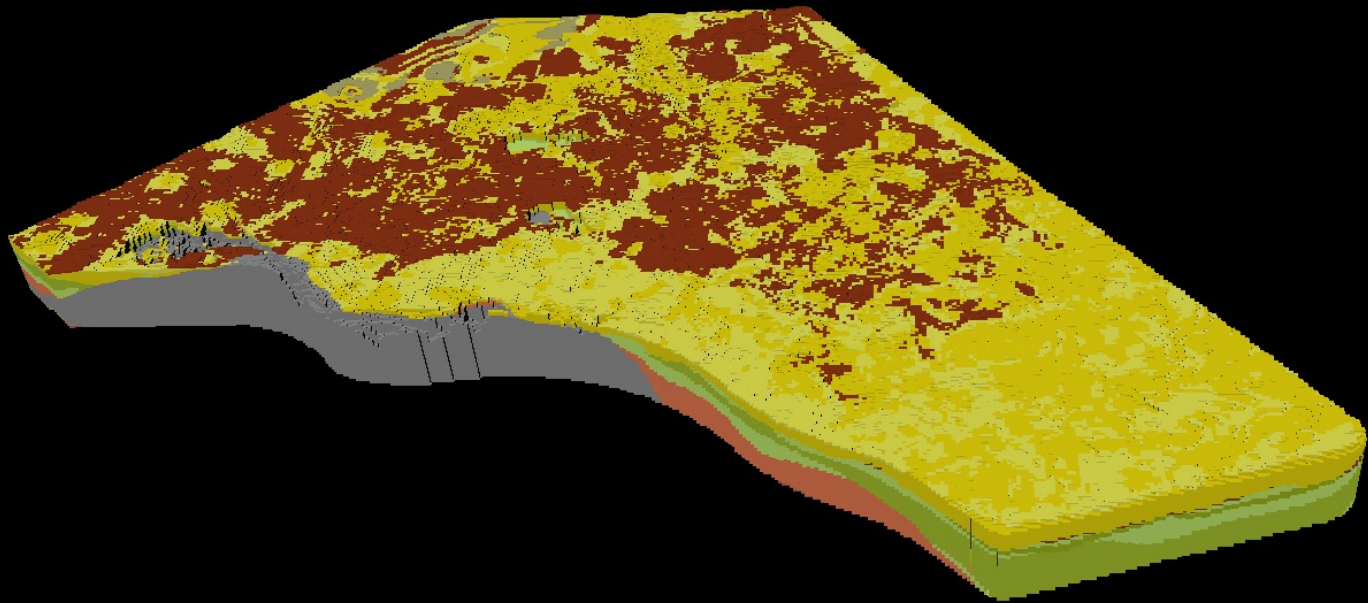


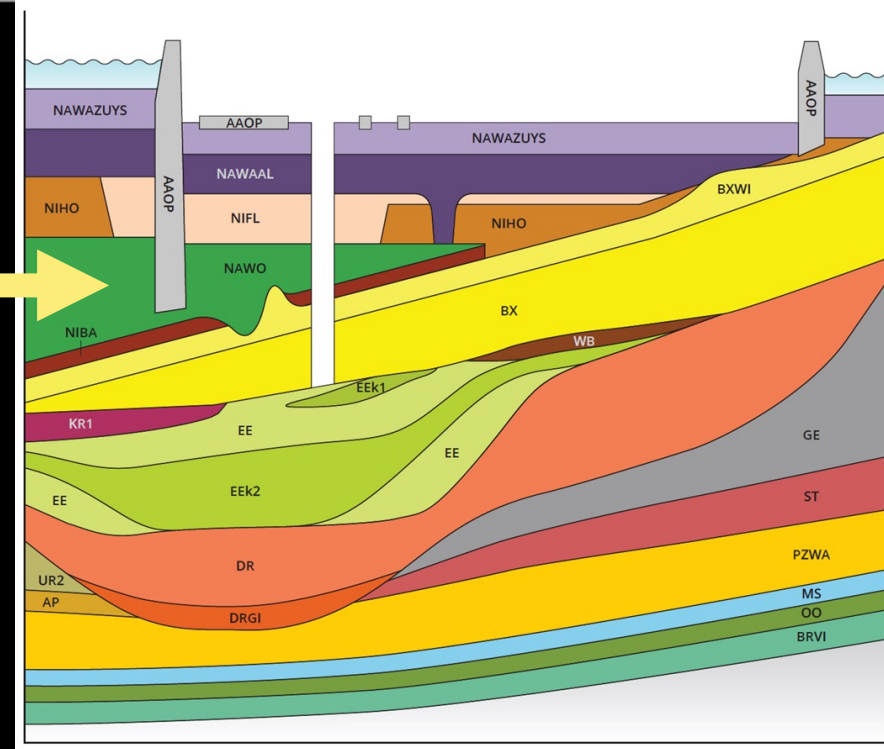
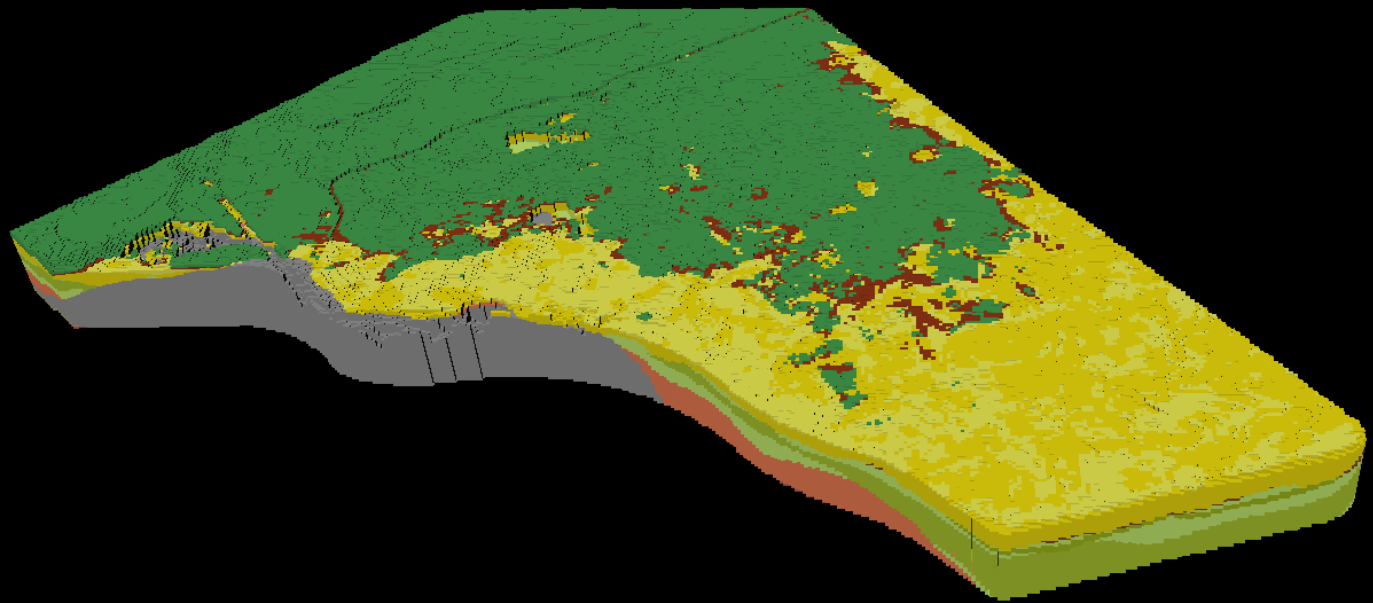


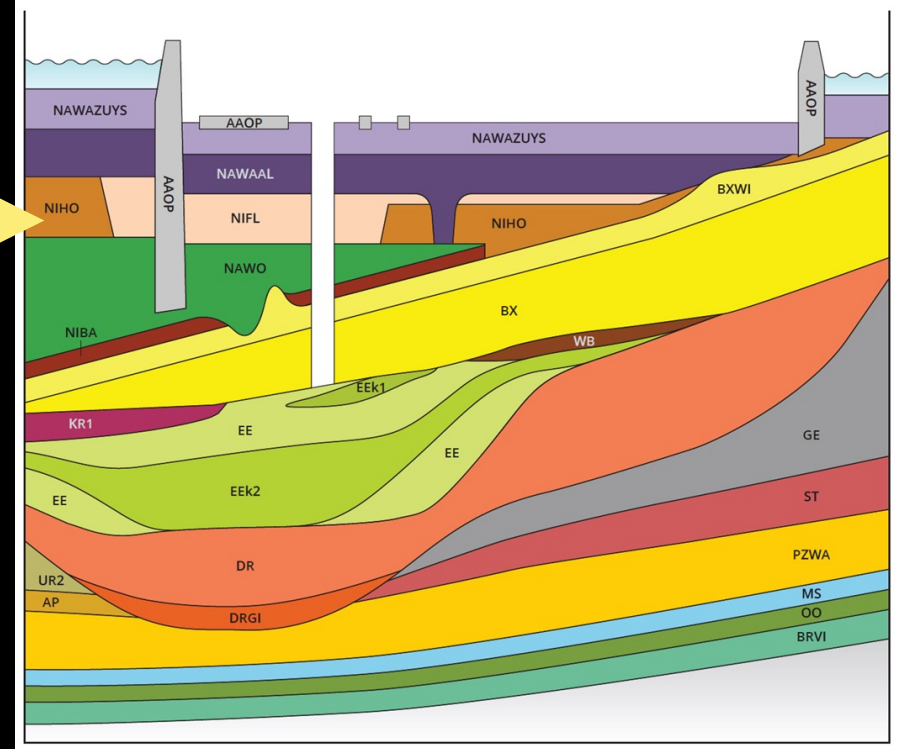
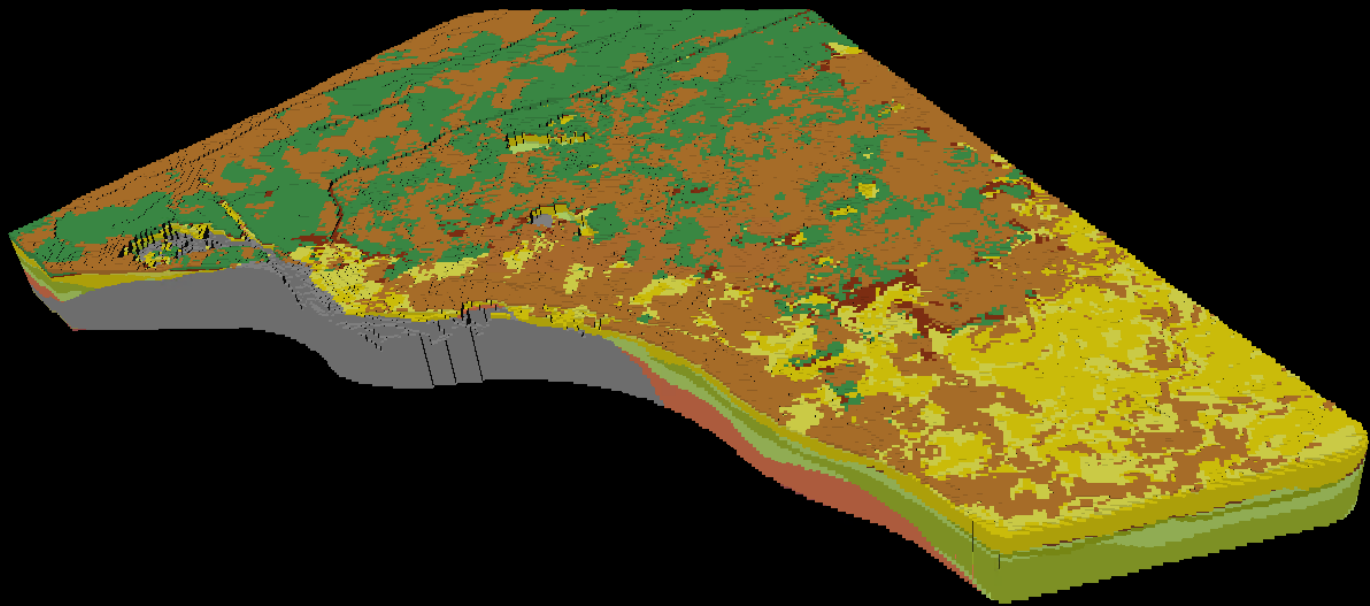


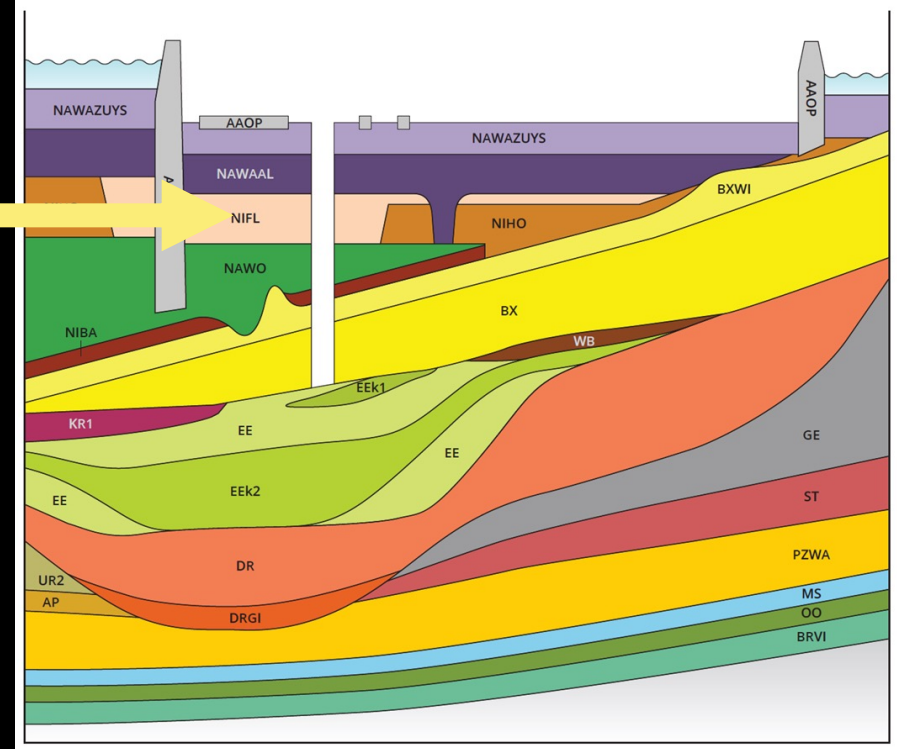
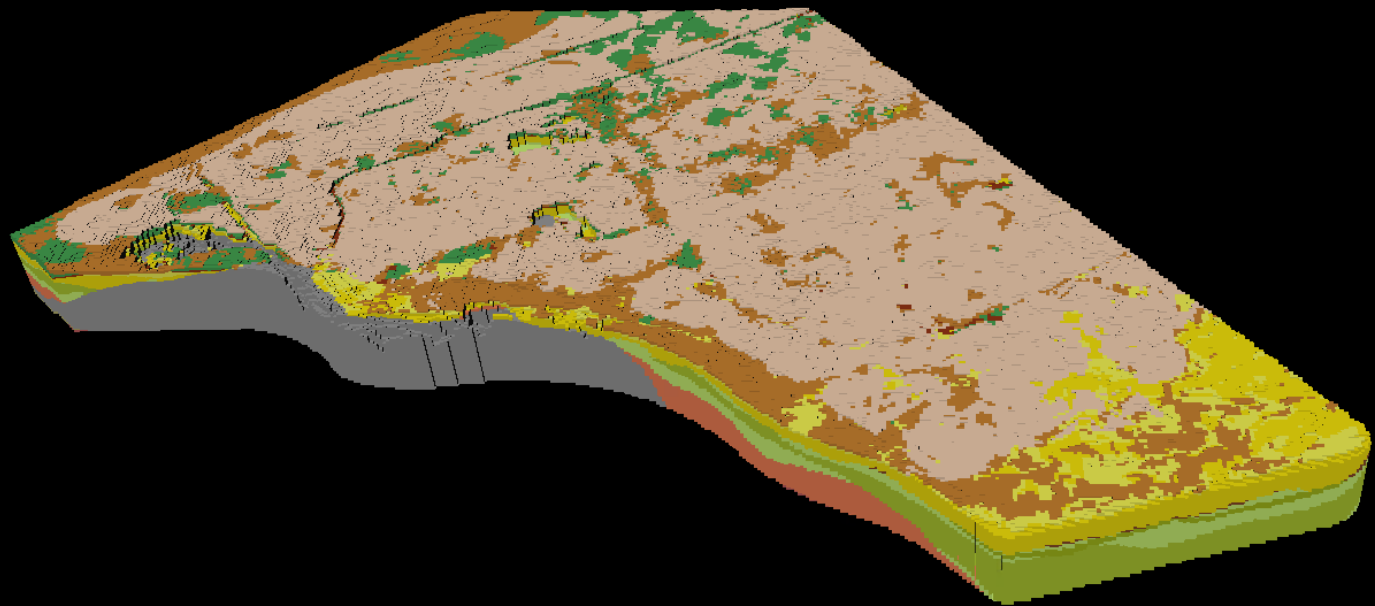


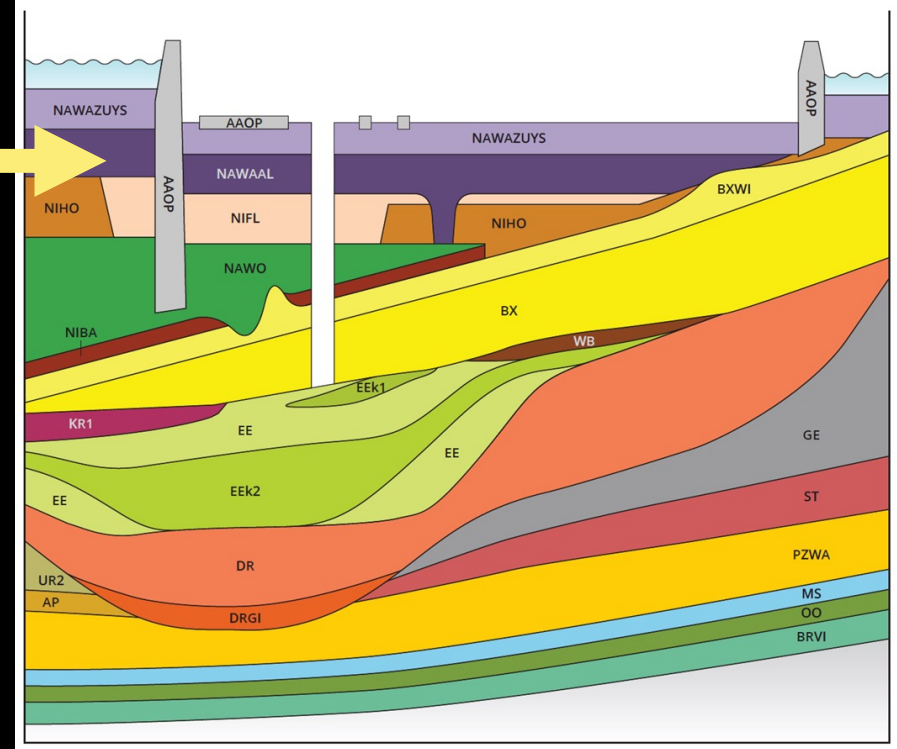
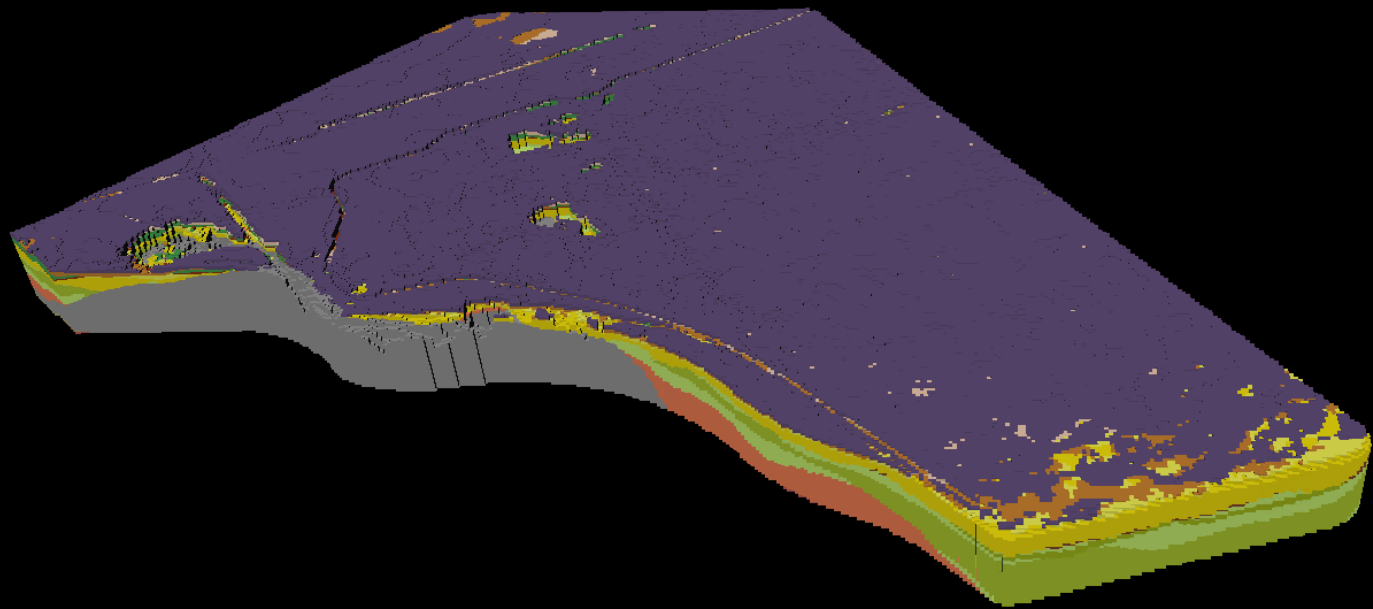


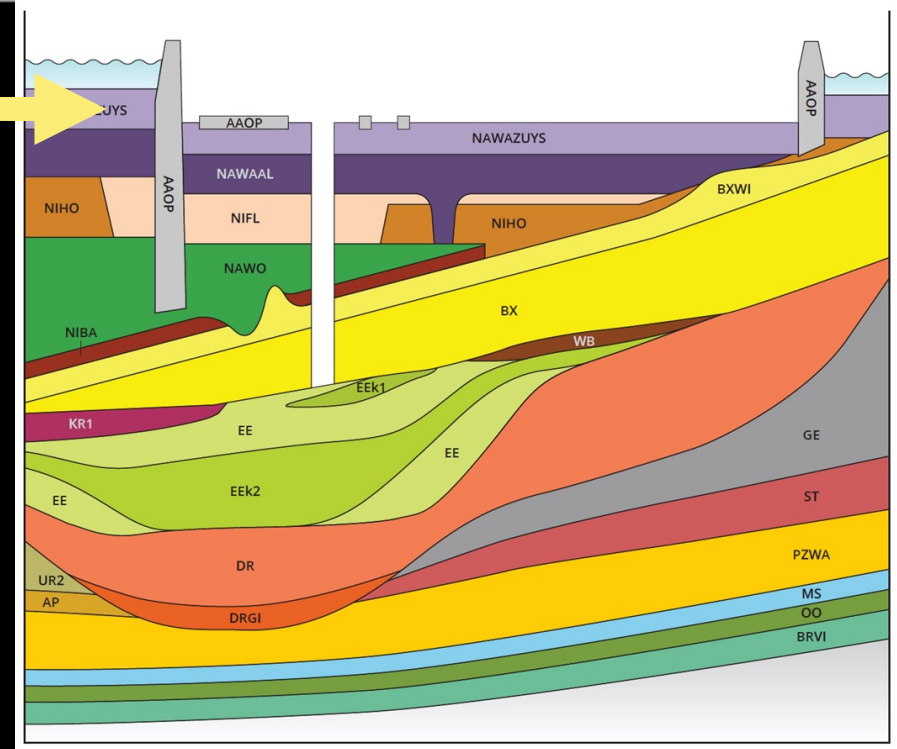
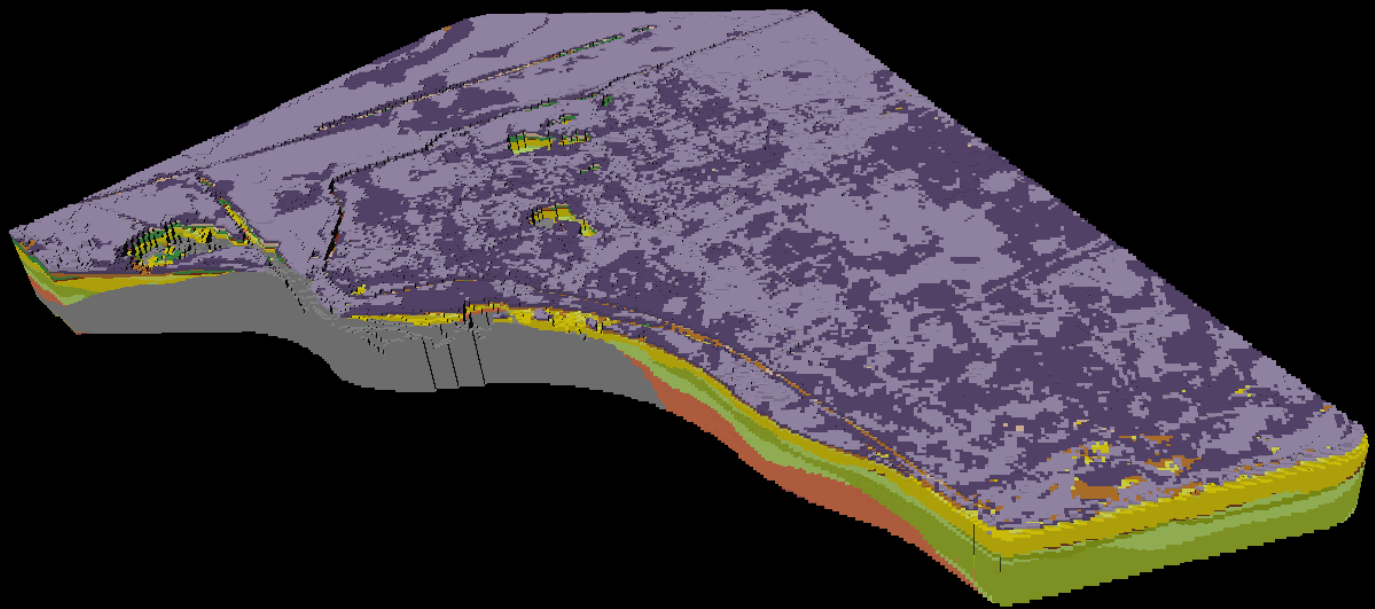


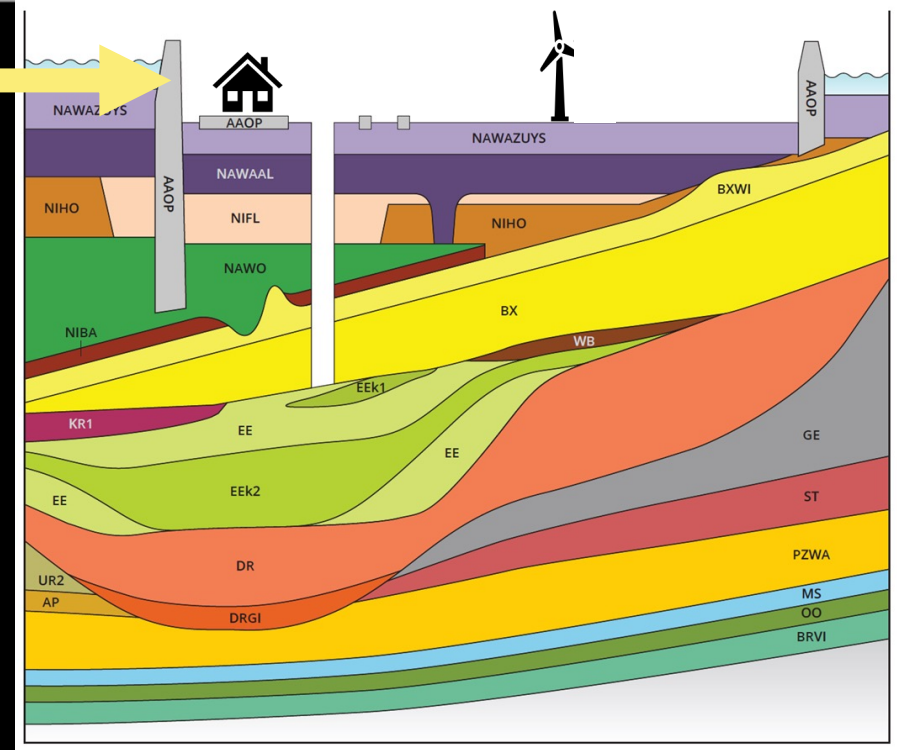
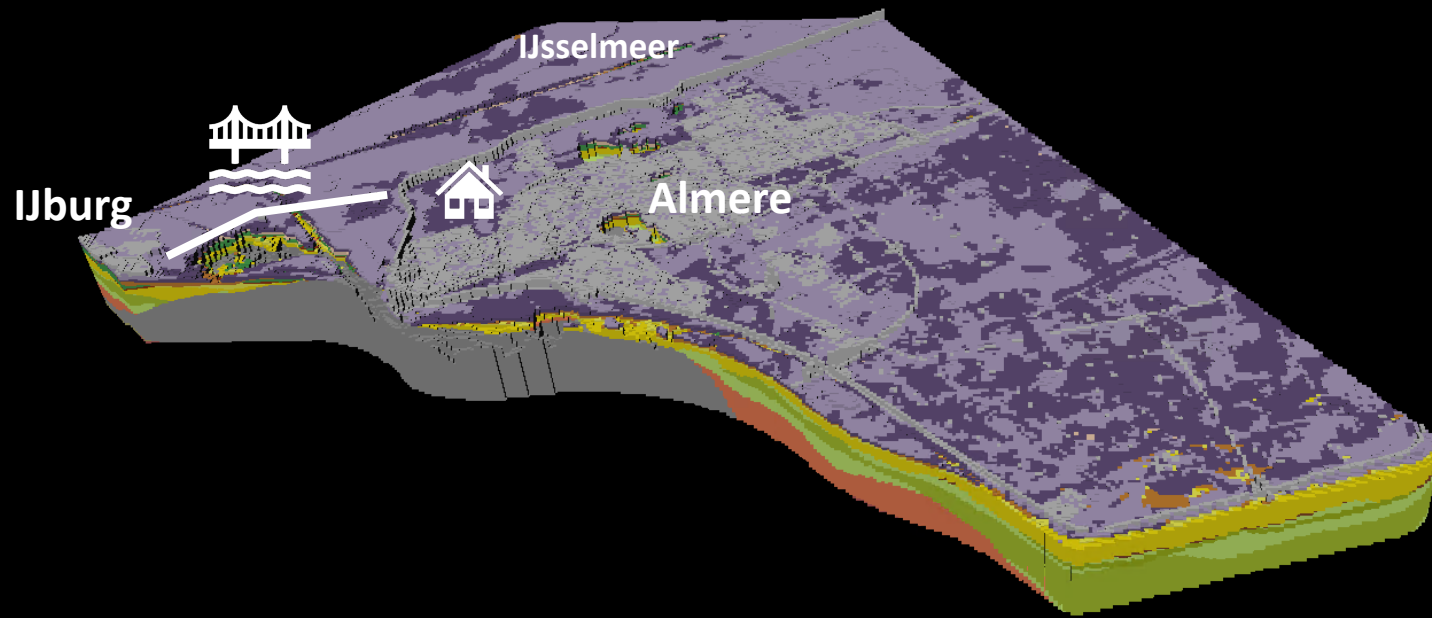


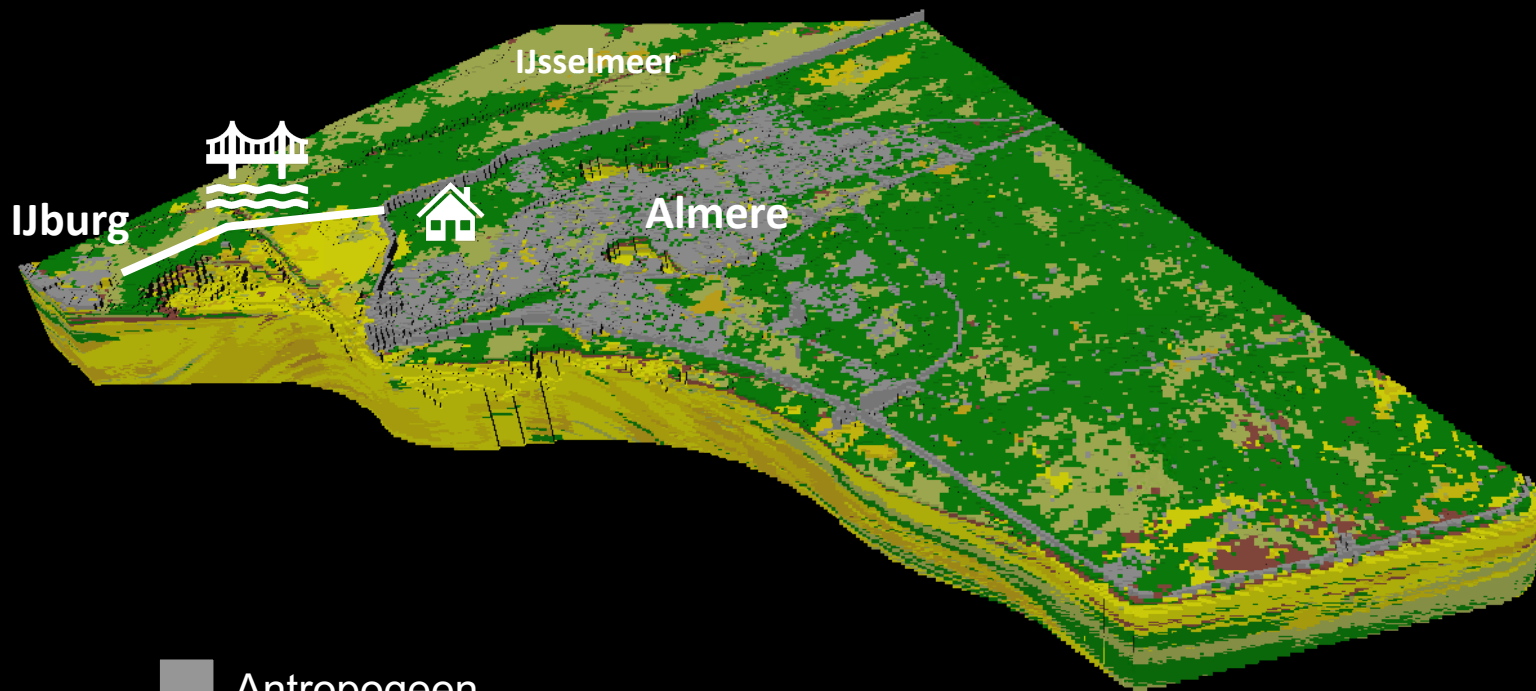






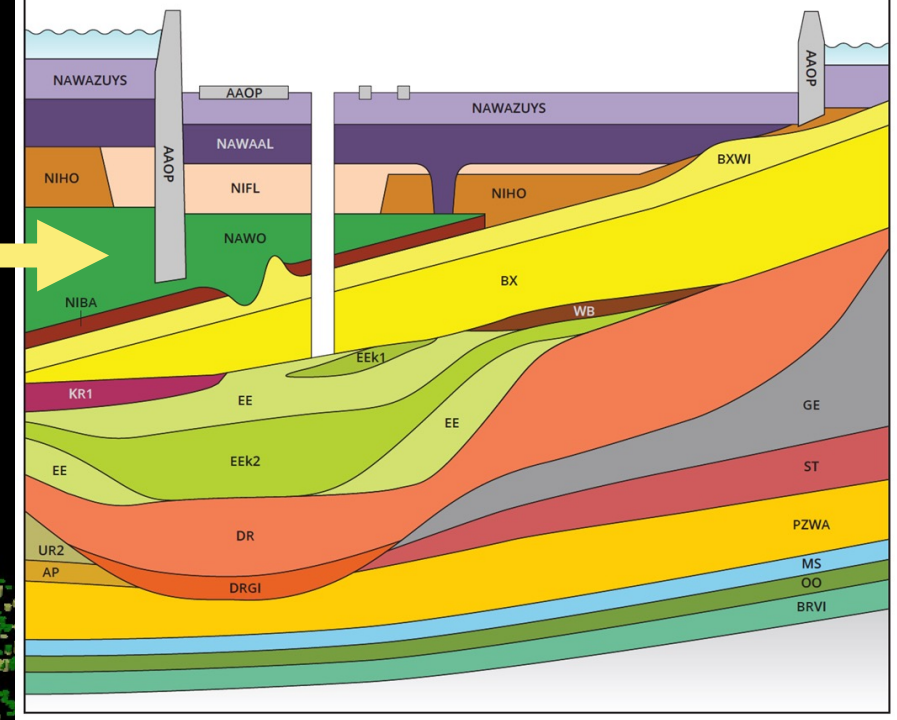
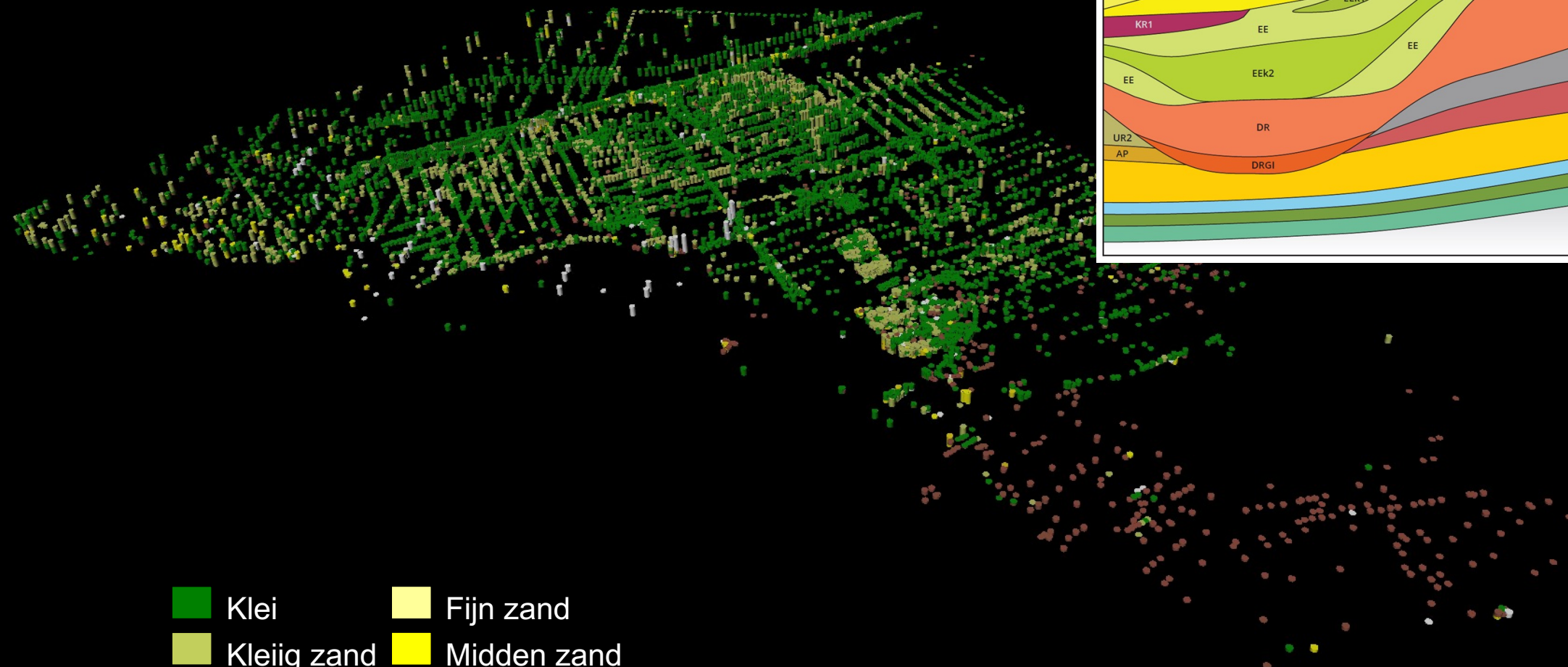






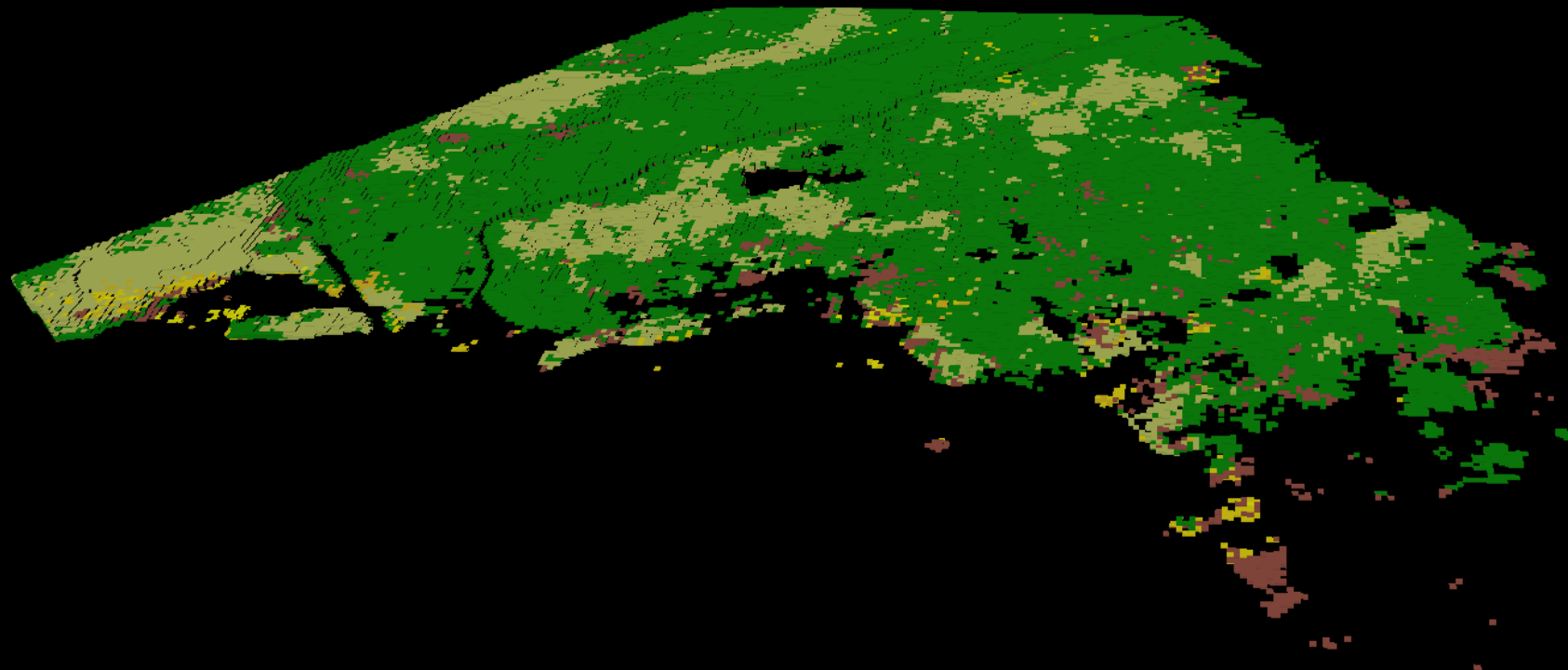
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- Klei
- Kleilig zand
- Veen
- Fijn zand
- Midden zand
- Grof zand





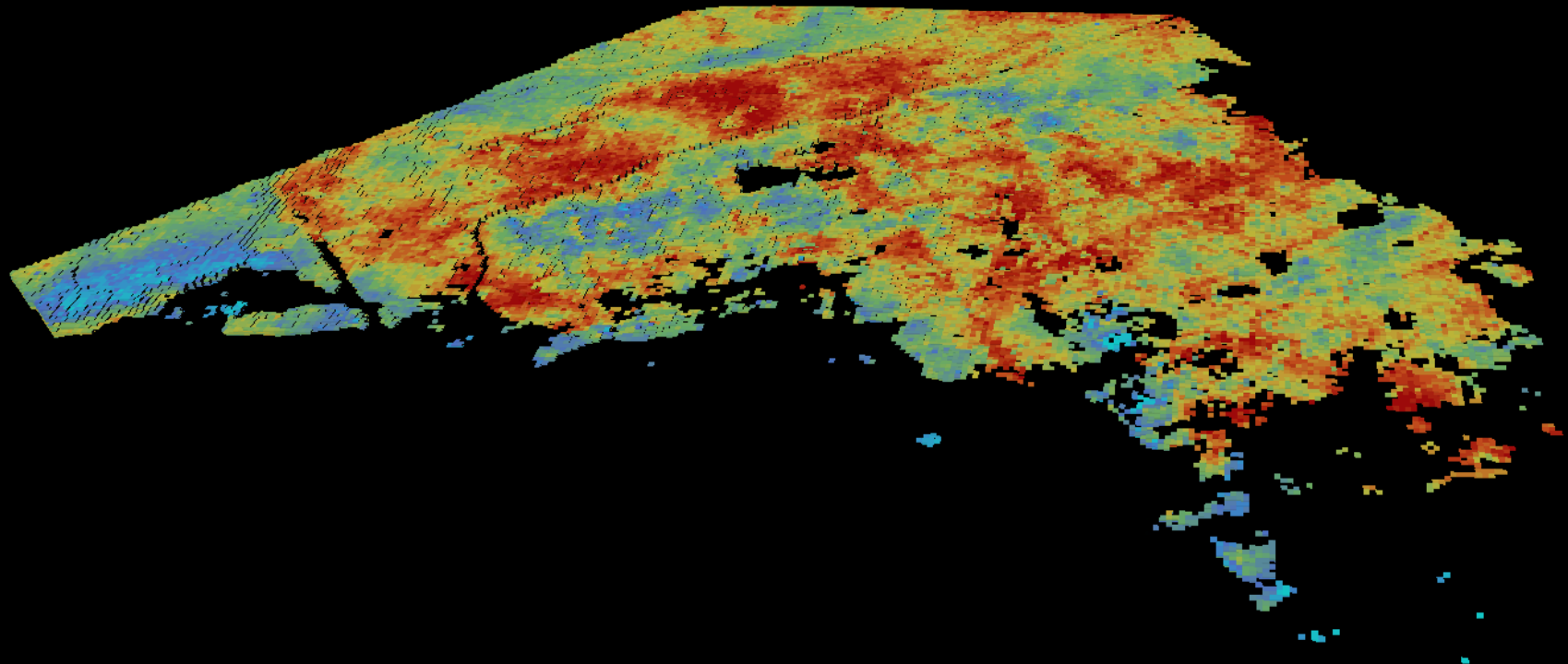
- | | |
|--|---|
| Klei | Fijn zand |
| Kleilig zand | Midden zand |
| Veen | Grof zand |





- | | |
|--|---|
|  Klei |  Fijn zand |
|  Kleilig zand |  Midden zand |
|  Veen |  Grof zand |





REGIS II

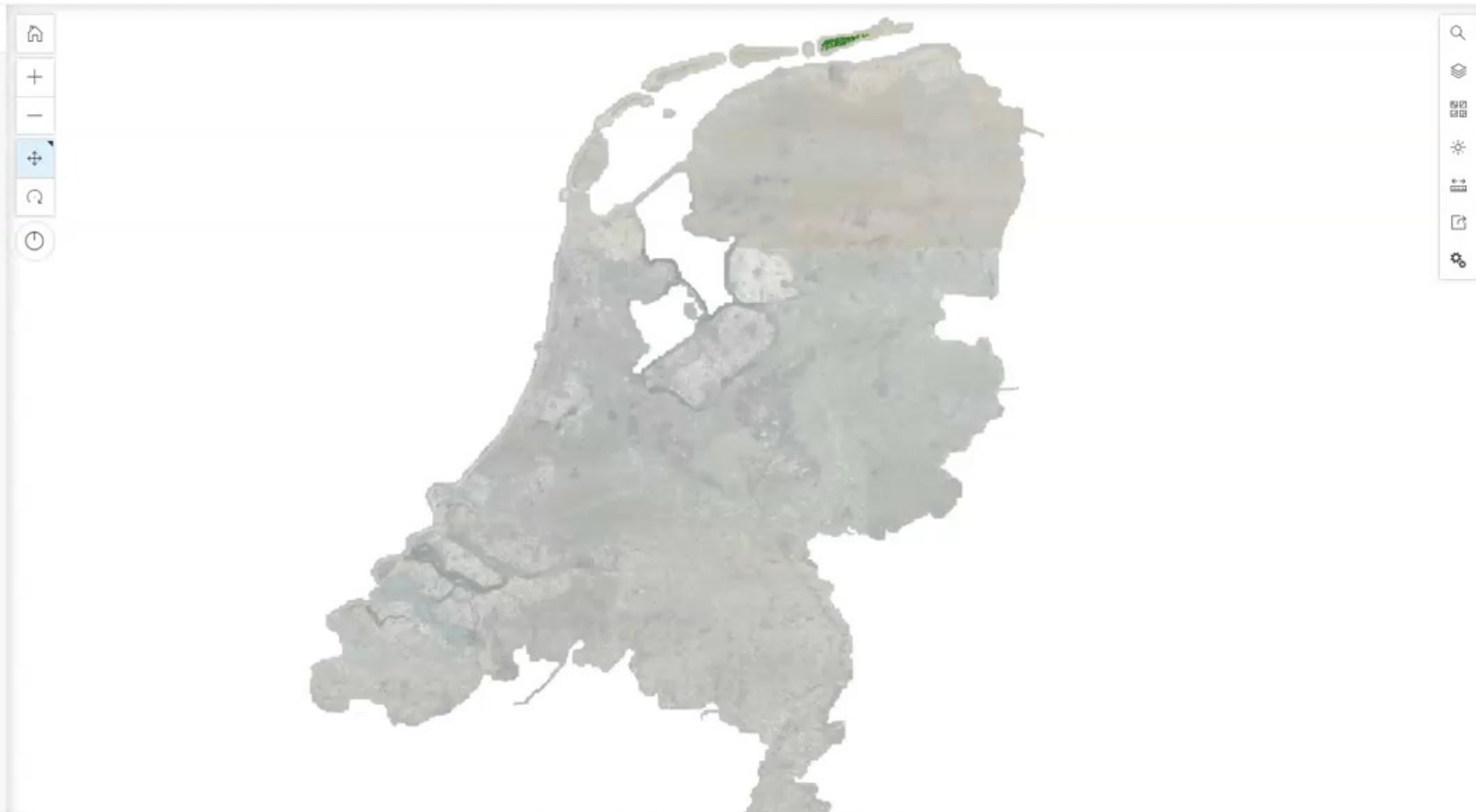


Home ▾ Schiermonnikoog 🏠

New Scene ▾ Maarten ▾

Layers

- REGIS II - Schiermonnikoog Test - Schier...
- > Ground



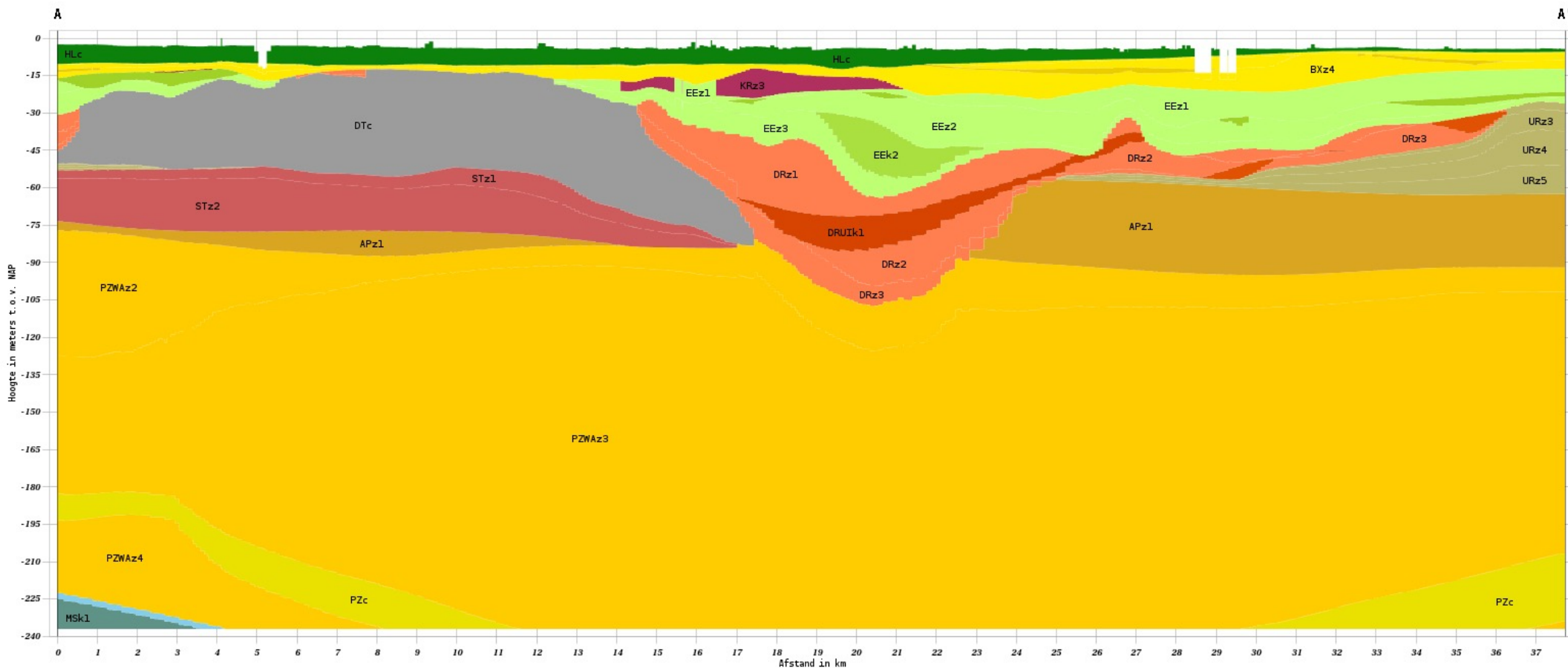


REGIS II: hydrogeologisch model

BROloket
Alle informatie uit de Basisregistratie Ondergrond

Ondergrondgegevens Ondergrondmodellen ★ Feedback

Verticale Doorsnede BRO REGIS II v2.2.1



BRO REGIS II v2.2.1

Hydrogeologie

HLc	EEk2	URz3	MS
BXz2	EEz3	URz4	MS
BXz3	DRz1	URz5	
BXz4	DRUIk1	STz1	
KRz3	DRz2	STz2	
WBv1	DRz3	DRGIIk1	APz1
EEz1	DTc	PZWaz2	PZWaz3
EEk1	URz1	PZc	
EEz2	URz2	PZWaz4	

Hoogte t.o.v. NAP
Tussen -237 en 0 m

Opslaan als PDF



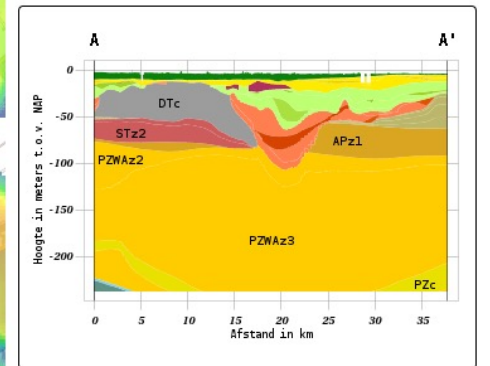
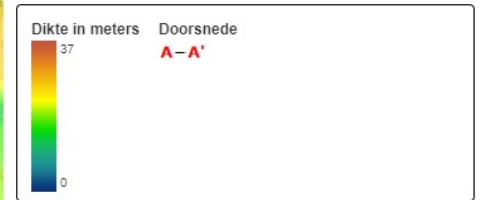
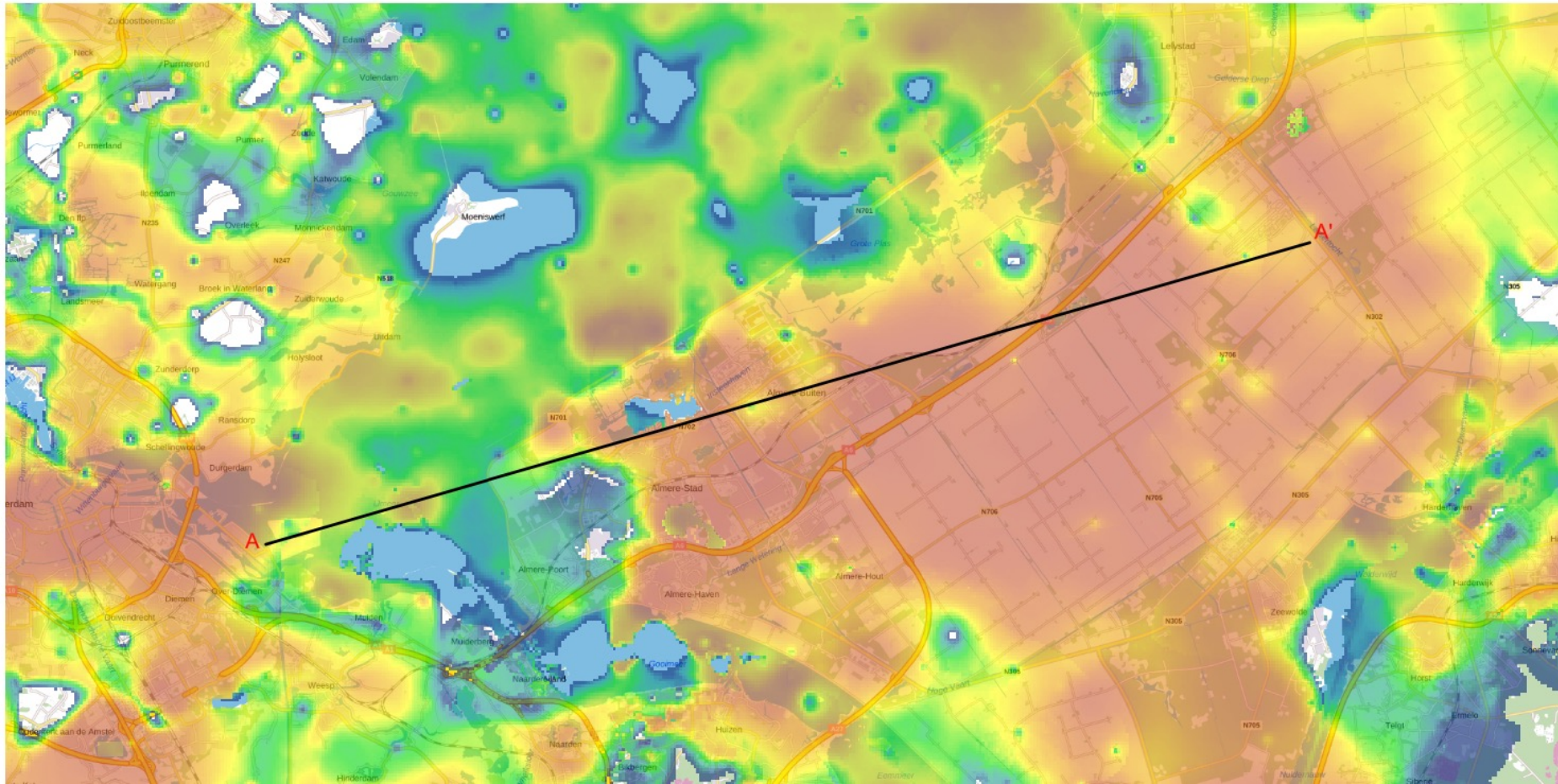
REGIS II: laagdikte

BROloket
Alle informatie uit de Basisregistratie Ondergrond

Ondergrondgegevens Ondergrondmodellen ★ Feedback

Formatie van Boxtel, vierde zandige eenheid (BRO REGIS II v2.2.1)

Opslaan als PDF





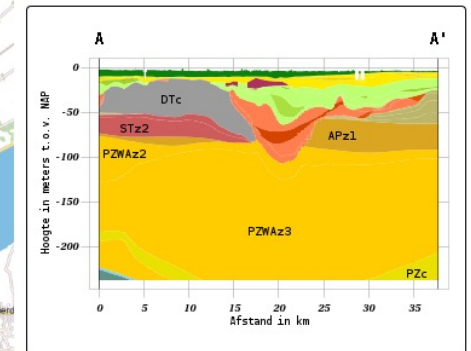
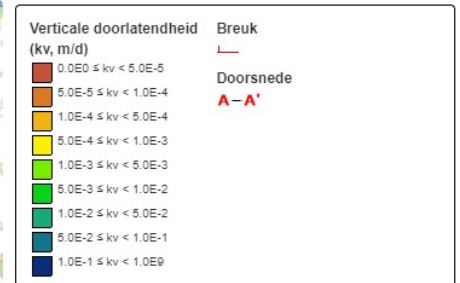
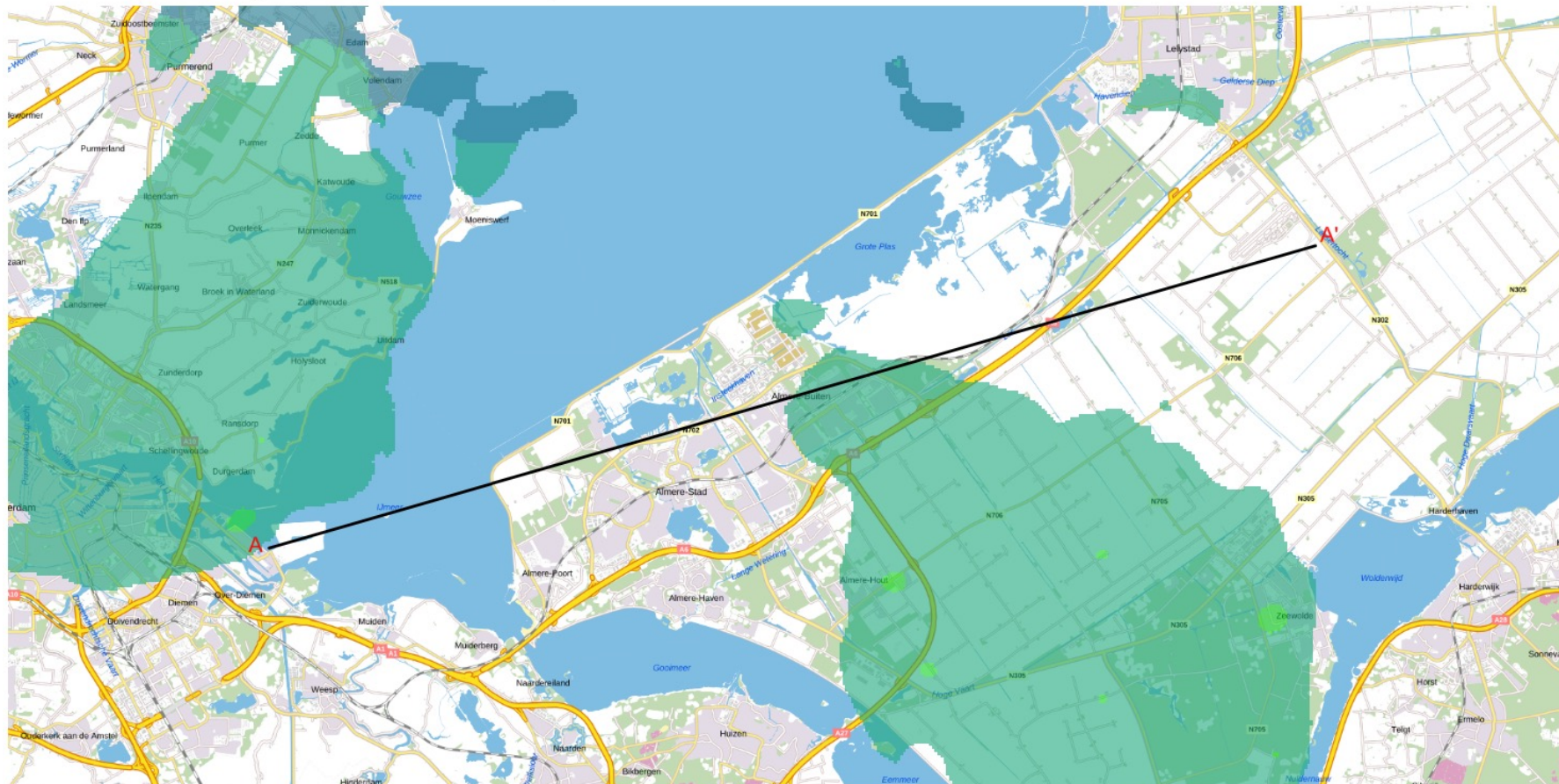
REGIS II: verticale doorlatendheid

BROloket
Alle informatie uit de Basisregistratie Ondergrond

Ondergrondgegevens Ondergrondmodellen ★ Feedback

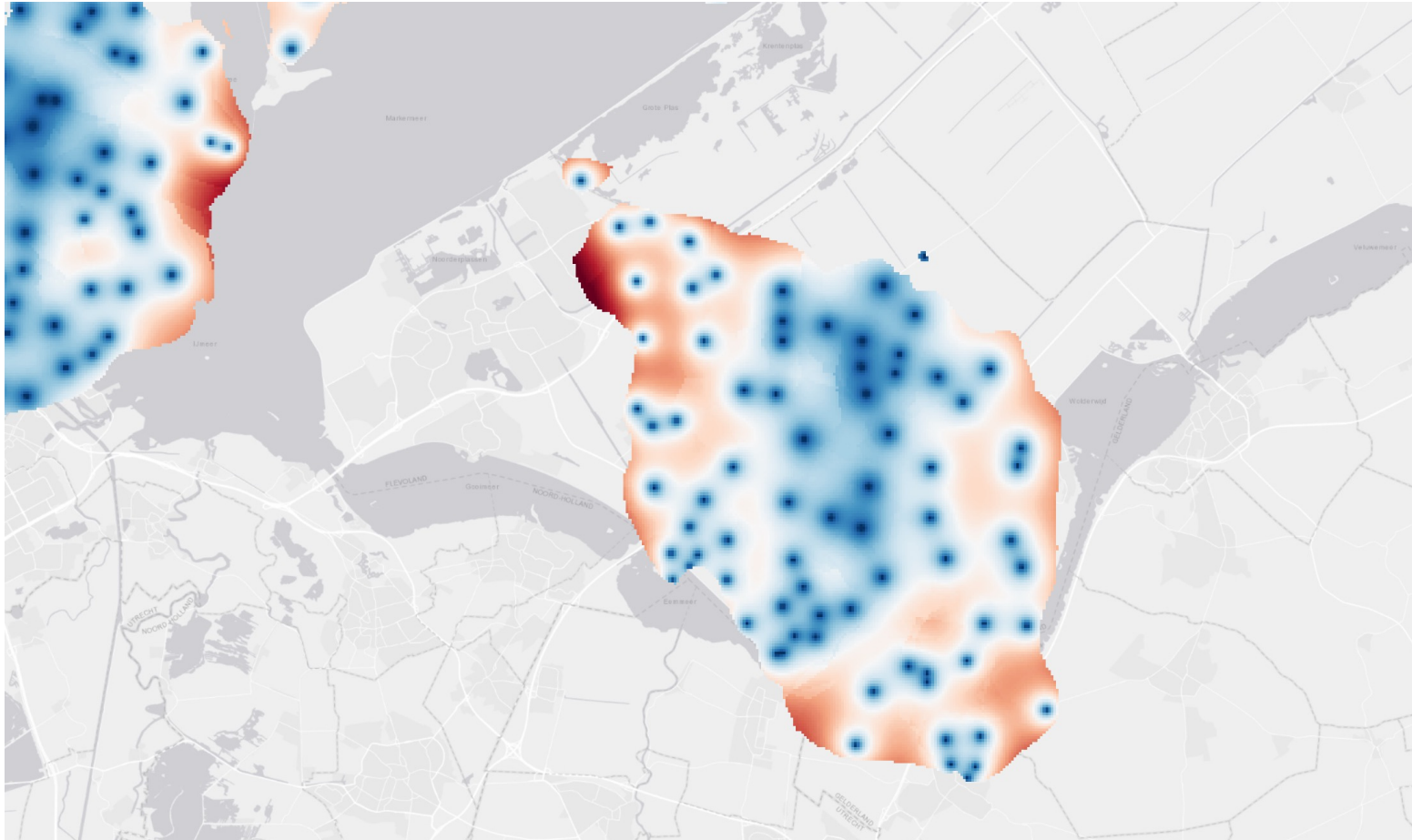
Eem Formatie, tweede kleiige eenheid (BRO REGIS II v2.2.1)

Opslaan als PDF





REGIS II: onzekerheden geometrie





Het project BRO 3D Services; vooruitblik (1)

- TNO en ESRI werken verder aan '**basisversie**':
 - GeoTOP, sonderingen, REGISII, putten, waterstanden
 - DGM

- **2 stakeholdersessies** (22 en 26 juni)

- **Werkplan** vervolgonwikkeling
 - Verbeteringen lopende registratieobjecten
 - Aanvullende registratieobjecten
 - Aanvullende functionaliteit
 - Documentatie en storymaps
 - Communicatie en interactie gebruikers



Het project BRO 3D Services; vooruitblik (2)

- Verkenning en ontwikkeling **andere OGC-standaarden**
 - I3S (lopend)
 - 3D Tiles
 - CityGML/ CityJSON

- **Beheerplan**
 - Architectuur en implementatie BRO
 - Hosting
 - Uitgifte (o.a. PDOK)
 - Financiering
 - Governance
 - Doorontwikkeling





Dank voor jullie vragen en inbreng!

Om 11.10 uur start de Ketendemo over de wetswijziging BRO.

Binnenkort staan de opname en presentatie van dit webinar op www.basisregistratieondergrond.nl

- Het volgende BRO'tje is op **14 september** en gaat over het programma Digitale Stad (DS) van de gemeente Rotterdam.