NEOFrontiers Enterprise Innovation Support Fund (NEOFrontiers EISF):

3D Flood Simulation for Disaster Risk Assessment

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- Aphelion world sets out to bring Earth Observation (EO) technology to our everyday decisions by providing information about the earth and its infrastructure.

- We provide solutions regarding sustainable urban growth
  - Resource monitoring
  - Infrastructure Monitoring
  - Disaster Risk assessment and mitigation
  - Planning

- By solving every day challenges using EO, we aim to bridge the gap between users and EO data:

Technologies and products

- Earth Observation Data Ground Segment
- 3D Maps of urban environments
- Remote sensing, Photogrammetry
  - Deep learning, feature detection, computer vision
  - Orthophoto production and Mosaics
  - Digital Elevation and Terrain Modeling
  - Big data processing (3Vs)
- Full stack application development
- GEOBIM and BIM model creation
- Cultural Object Documentation

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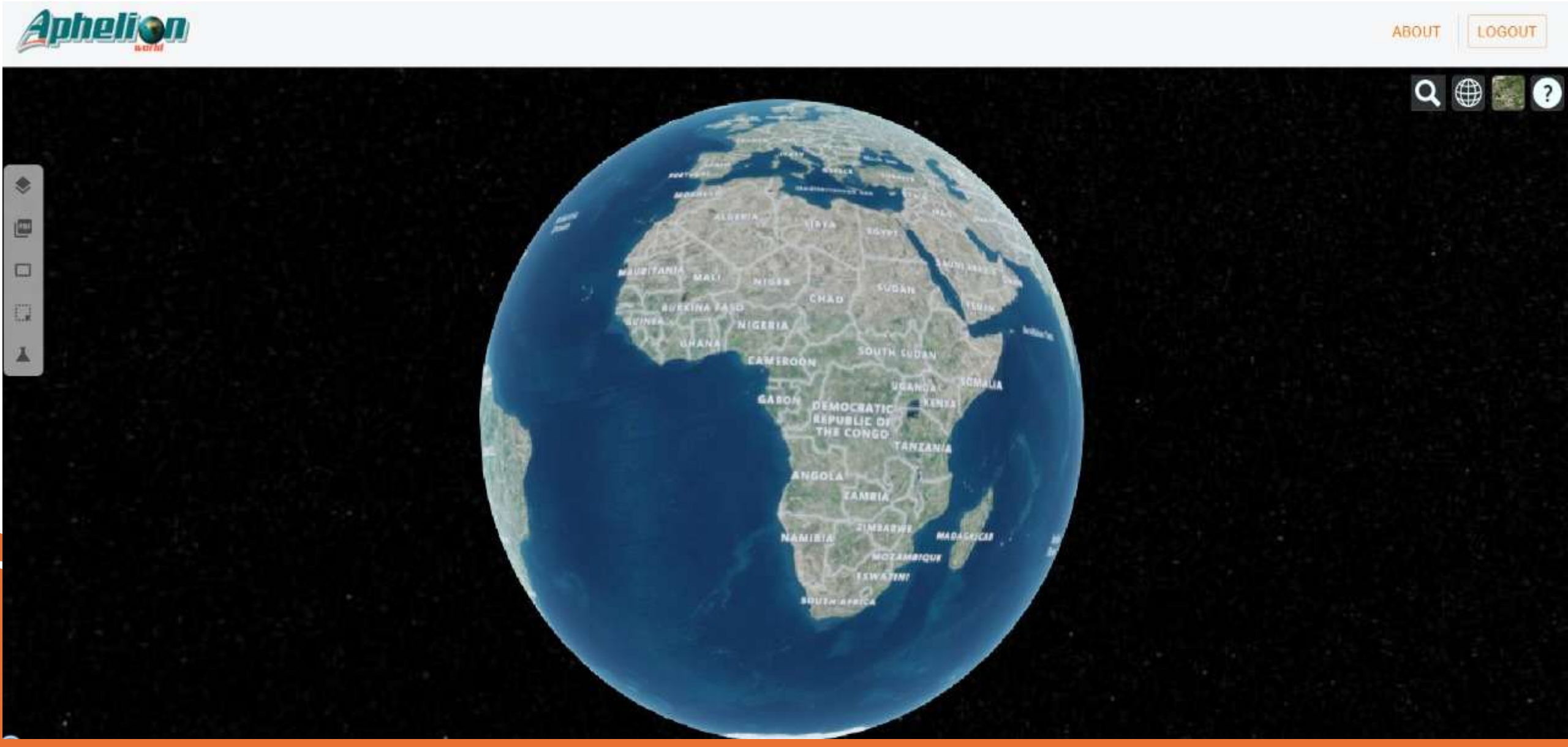
NEOFrontiers EISF Project Aim

- Develop a system that simulates and demarcates regions that will be most affected by floods in 3D
- 3D simulation provides accurate extents of vulnerable infrastructure and street furniture namely buildings, roads, streetlights, etc (it is about height)
- Quantifying expected damage allows for interventions that will minimise loses to **lives, livelihoods** and infrastructure (NDP and SGDs) by decision makers and stakeholders

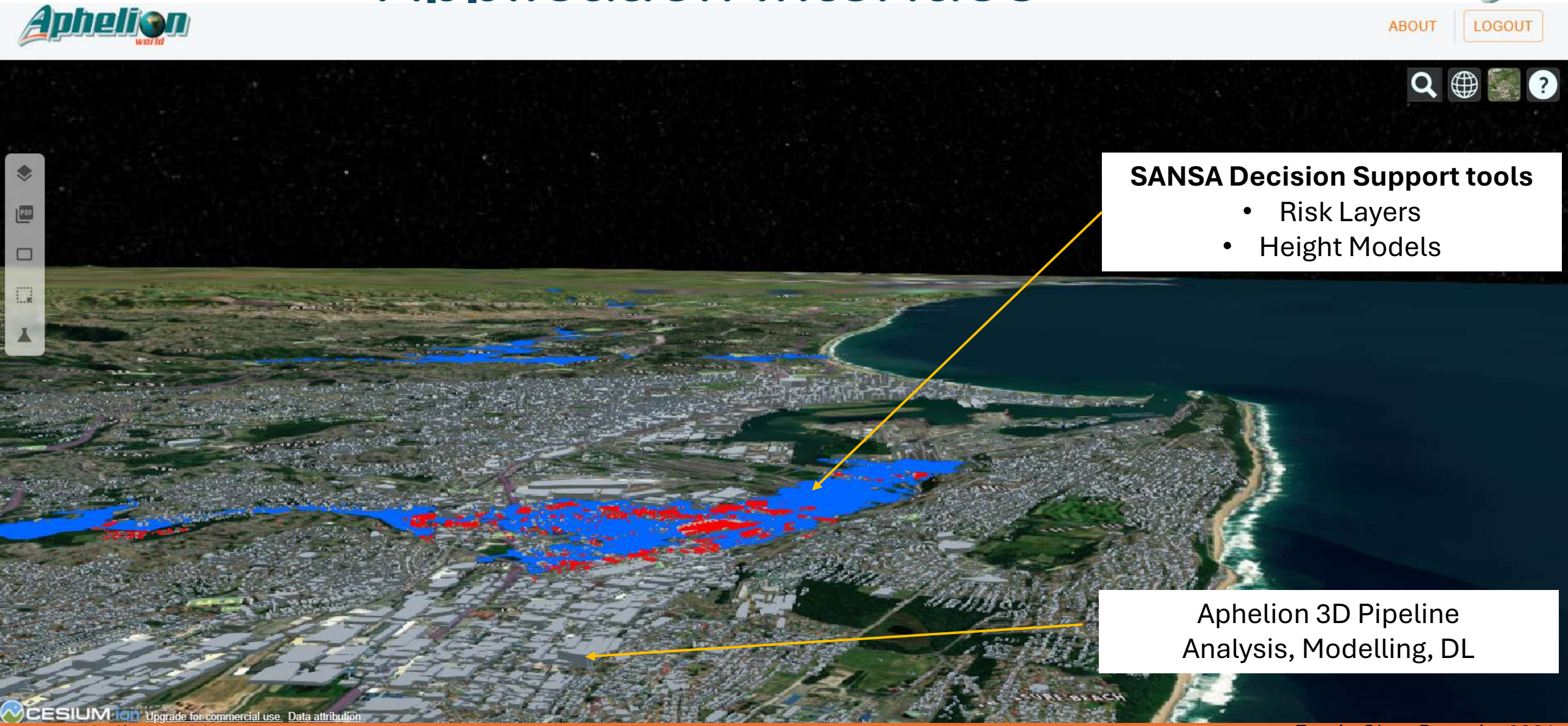
Innovation

- Ability to Simulate floods and the effects thereof using Earth Observation in 3D with detailed quantification (with visualisation).
- Allow real time planning of rescue operations (even in areas not easily accessible during disasters).
- Allow infrastructure risk assessment for proper insurance evaluation.
- Urban Planning, contribution to digital twins for smart cities.
- **Stakeholders**
  - National Disaster Management Centre (NDMC)
  - Local Municipalities, Rescue Mission Operators
  - Finance sectors
  - Urban Planners, Inventory/Documentation

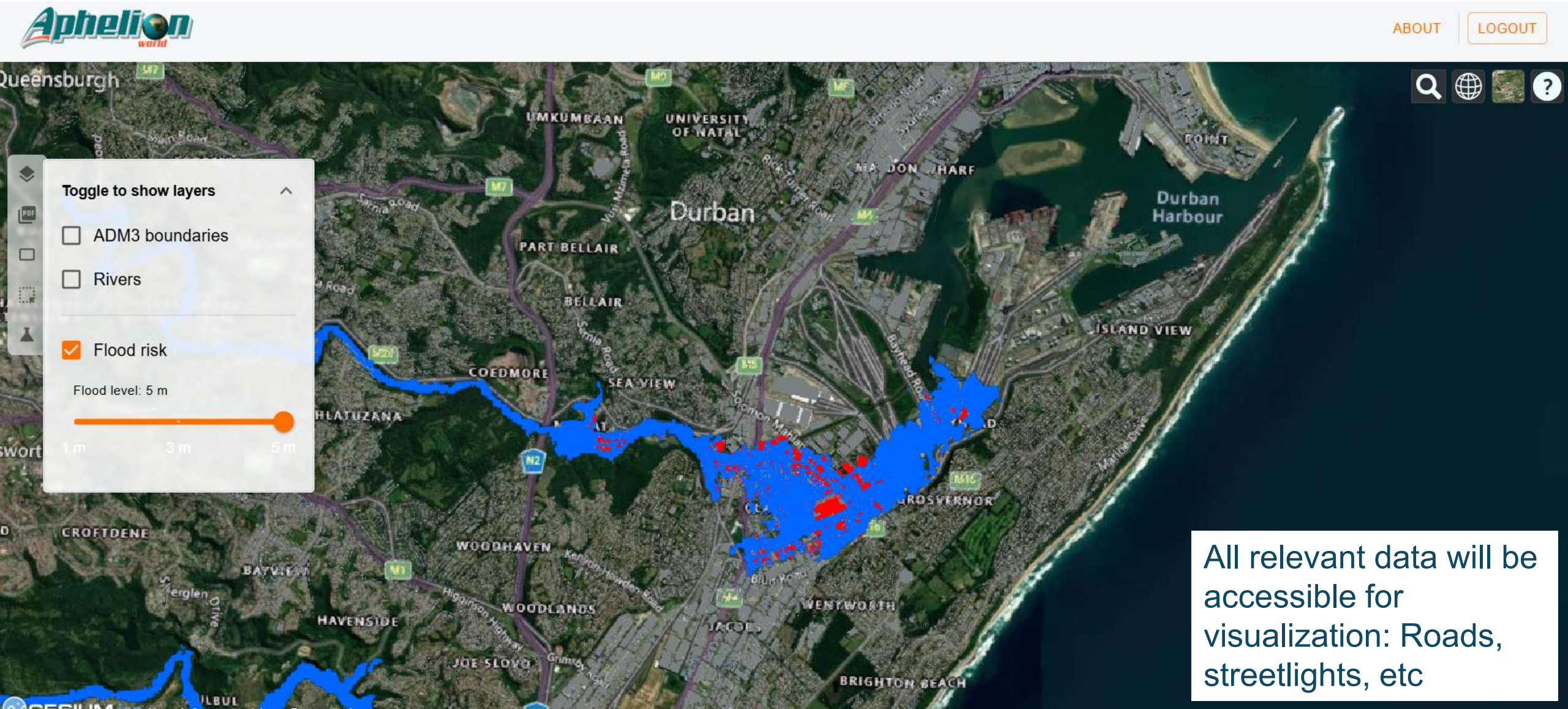
Application Interface



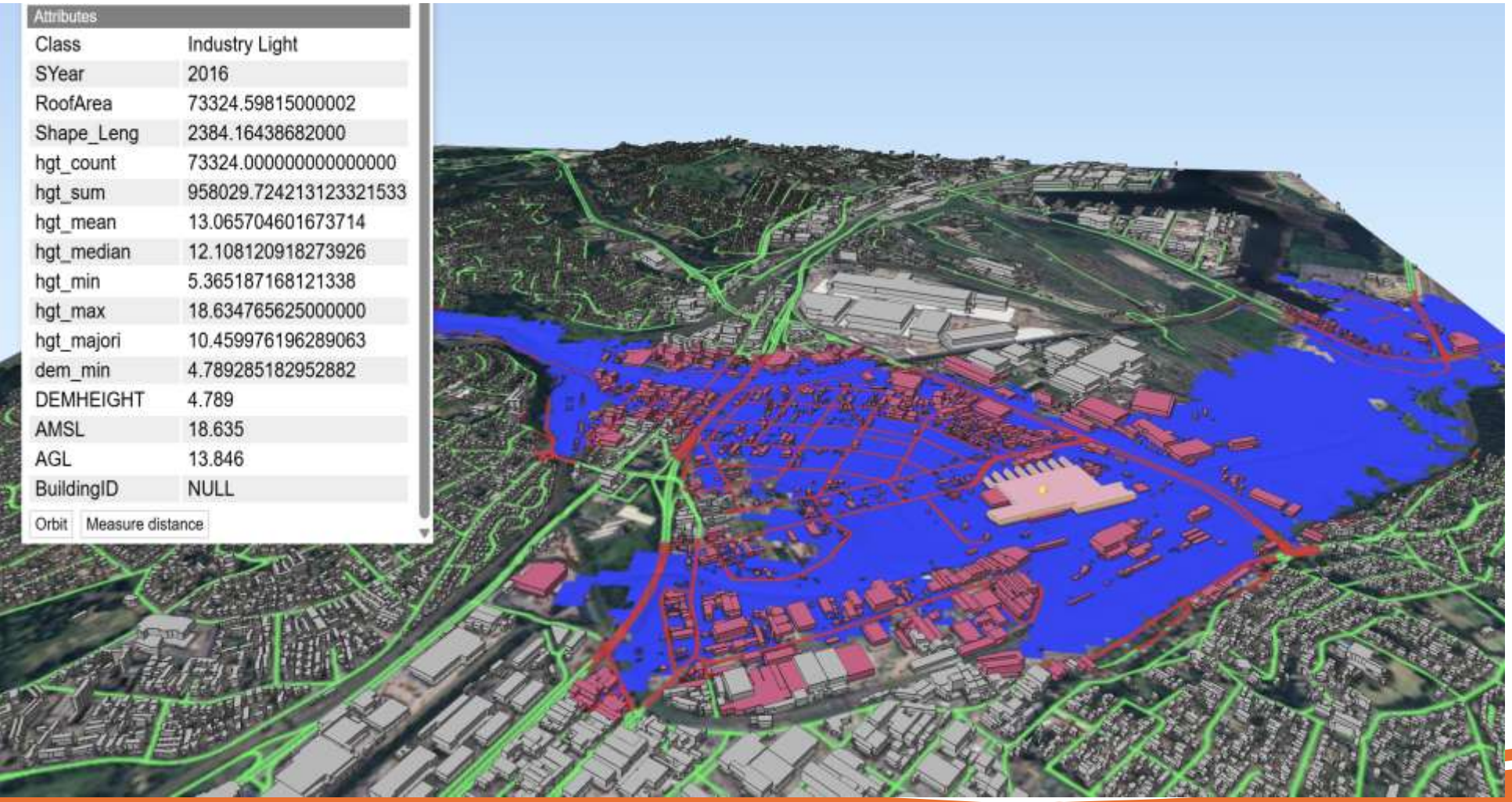
Application Interface



Application Interface



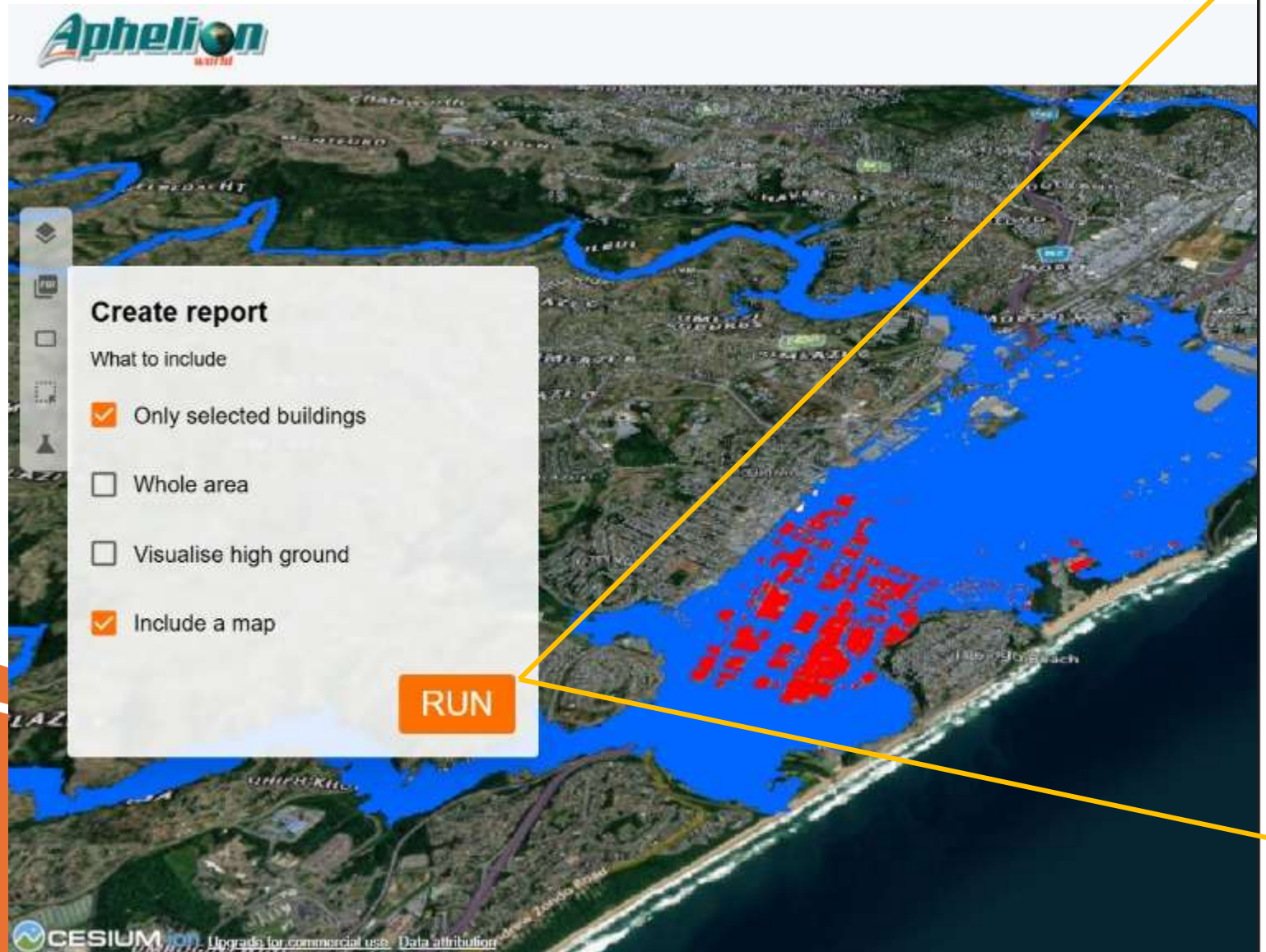
Attribute Information



~900 k buildings

We are in the process of building attribution. This will assist in identifying critical infrastructure

Simulation Reports



Flood Impact Report for eThekwini, KwaZulu-Natal

Generated: 2025-08-21

This report details the potential effects of floods for eThekwini located in KwaZulu-Natal. The purpose of the report is to quantify infrastructure vulnerable to flooding at different inundation levels. At present, this version reports only on buildings. The map and table below reflect the 5 m inundation context where applicable.

On the map, vulnerable buildings are highlighted in red. Buildings that remain above the flood up to 5 m are indicated in orange and may offer safer rally points if roofs are accessible.

Figure 1. Flood simulation context and vulnerable buildings (eThekwini, KwaZulu-Natal).

Total buildings (in AOI / dataset)	4066
Buildings flooded at 1 m	207
Buildings flooded at 3 m	305
Buildings flooded at 5 m	305

Table 1. Quantified results for buildings at multiple inundation levels.

eThekwini Emergency Contacts

Emergency Response Call Centre (24 hours): 031 361 0000 Metro Police, Fire & Disaster
Disaster Management (weekdays): 031 367 0000
Police (24 hours): 10111

Deliverables and Benefits

- Deliverables
  - Web based EO application for flood simulation in 3D
  - Disaster mitigation and planning (Visualisation platform)
  - Insurance valuation and infrastructure risk API
  - API to access targeted/ localised risk information
- Benefits
  - 3D detailed modelling and digital twin creation is an area facing growth
  - Who will create these models (HCD, SMMEs)
  - These models have multiple uses over and above simulation for floods
  - Employment opportunities
    - Training at University
    - Jobs/Internships

Thank You

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