Improving Survey Strategy and Risk Management for Offshore Infrastructure

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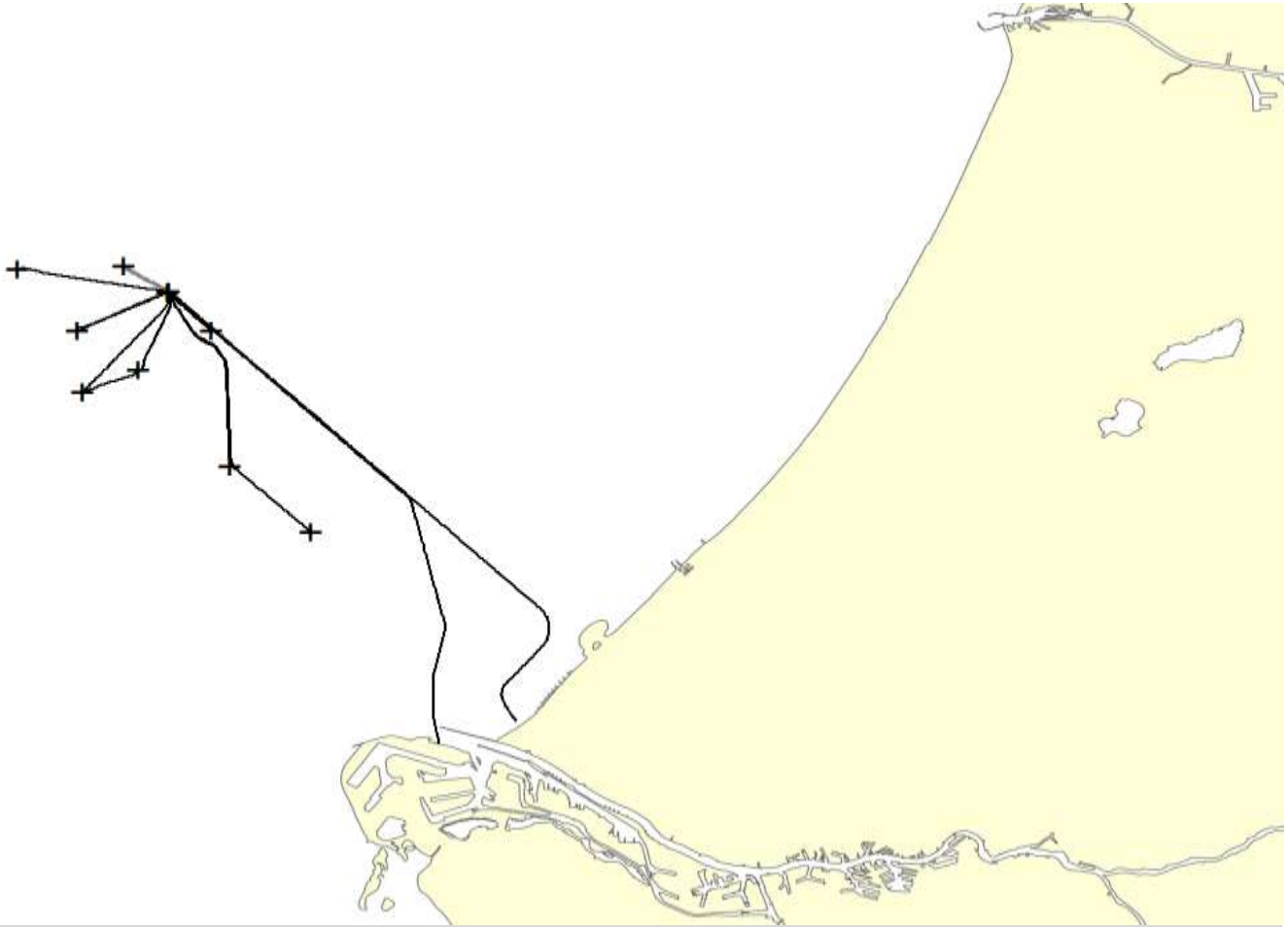
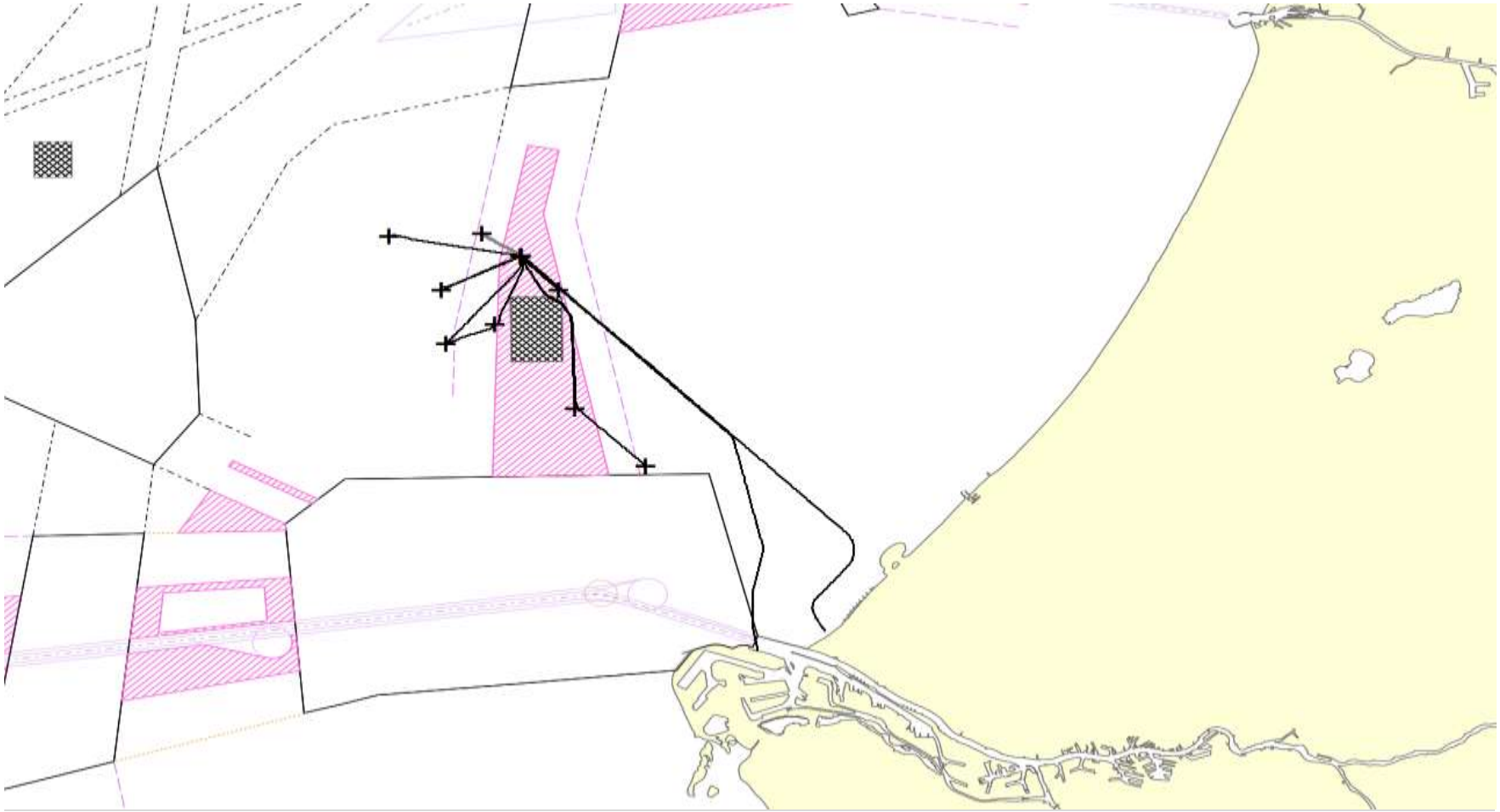
Introduction



Overview of study area, including TAQA infrastructure

Introduction



Crowded ocean

Problem

Delivery in paper charts and paper reports
Survey all infrastructure every year (standard routine)

- Maintenance -> Risk -> Data
- Government legislation

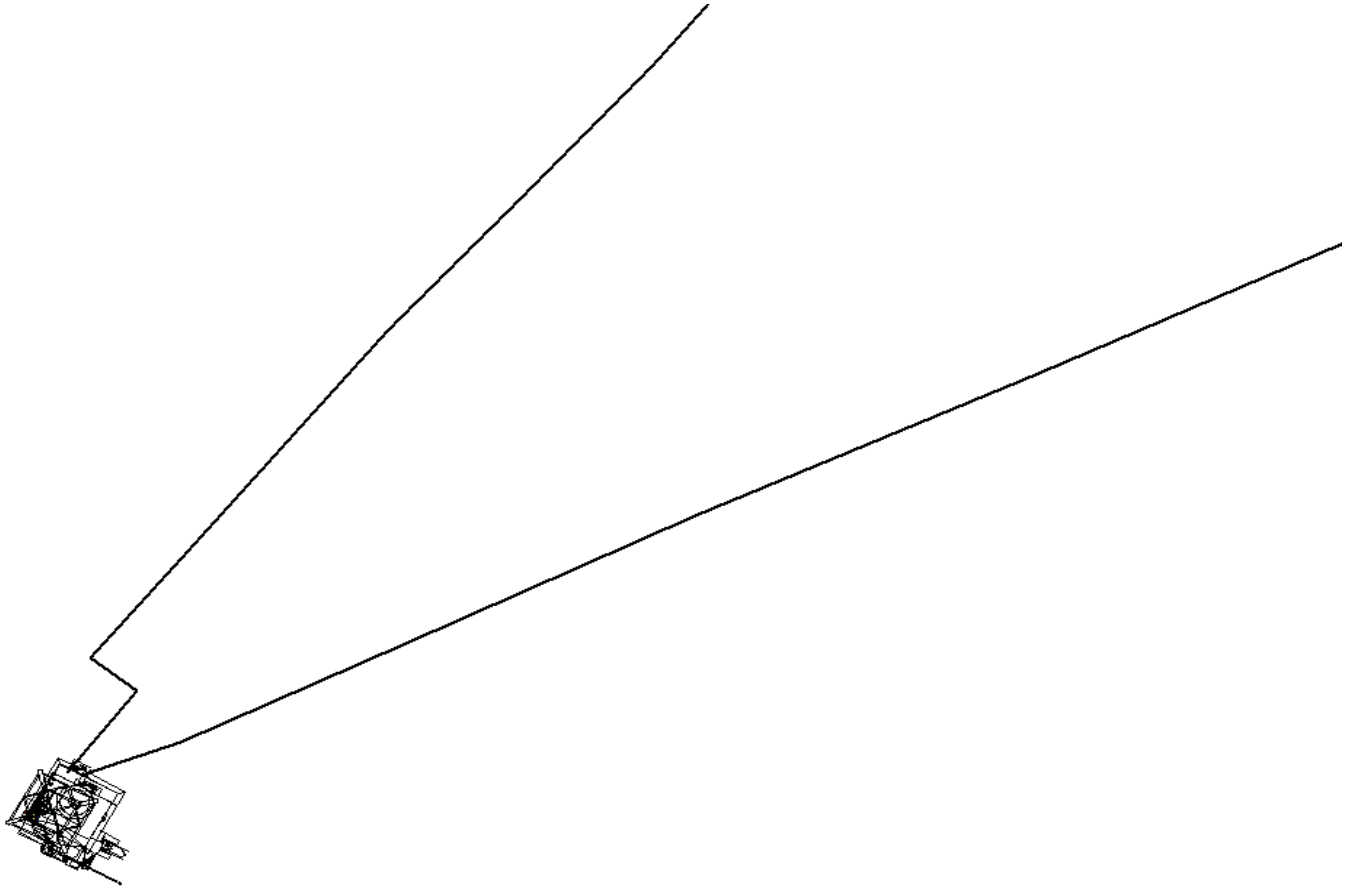
Goals:

Improve understanding of Risk

More efficient use of data

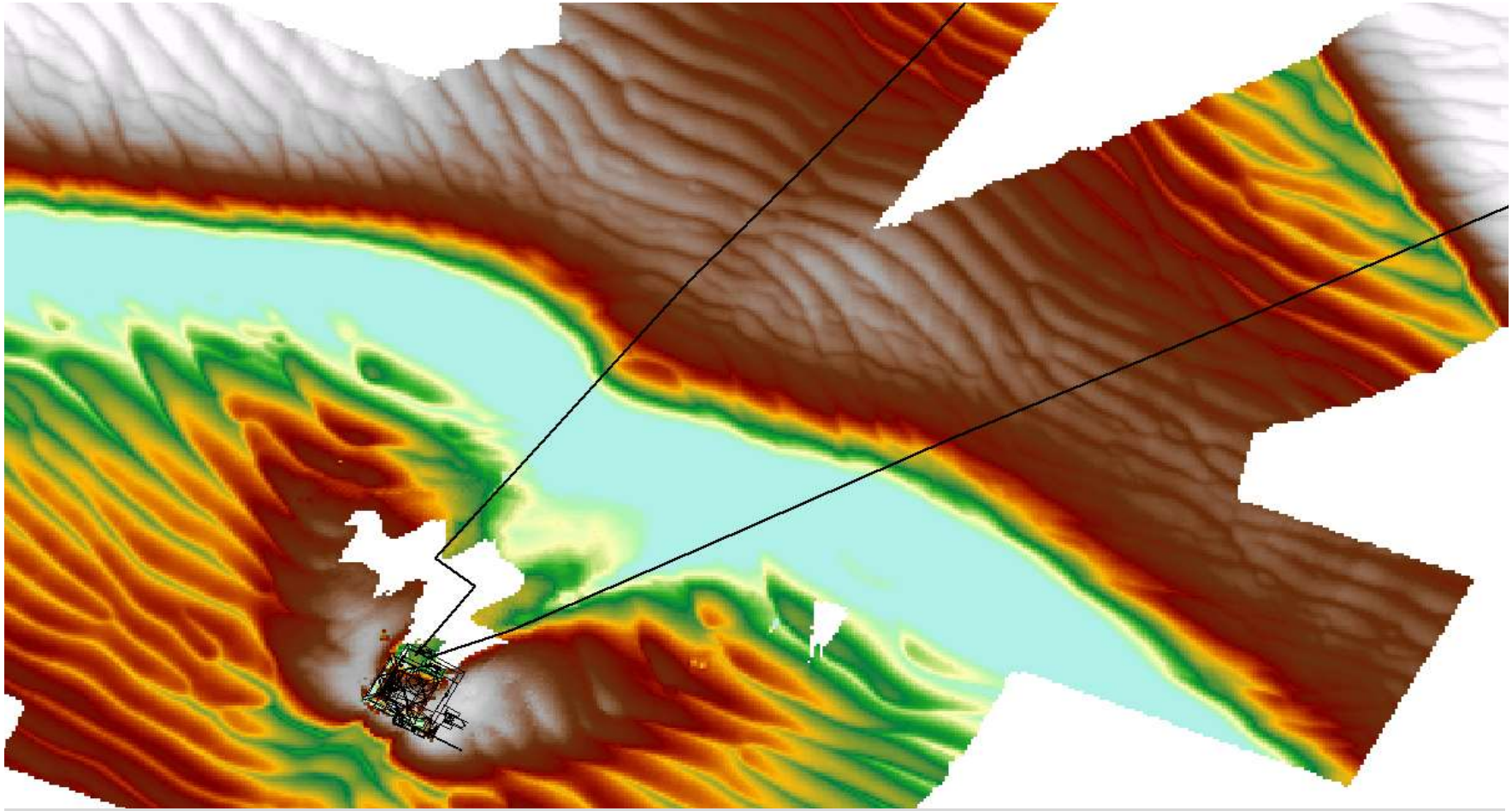
Save money

Survey Data



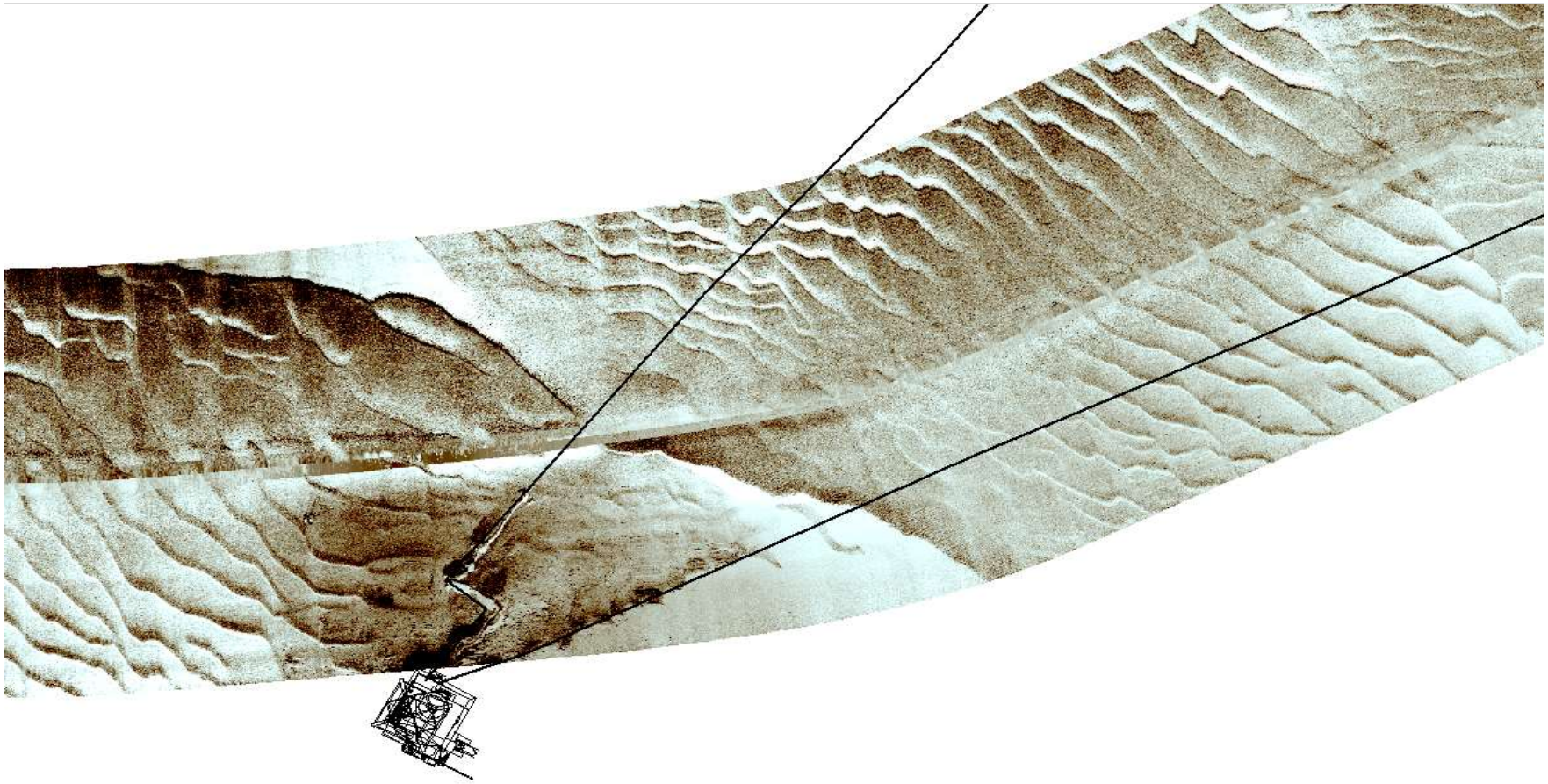
Infrastucture example

Survey Data



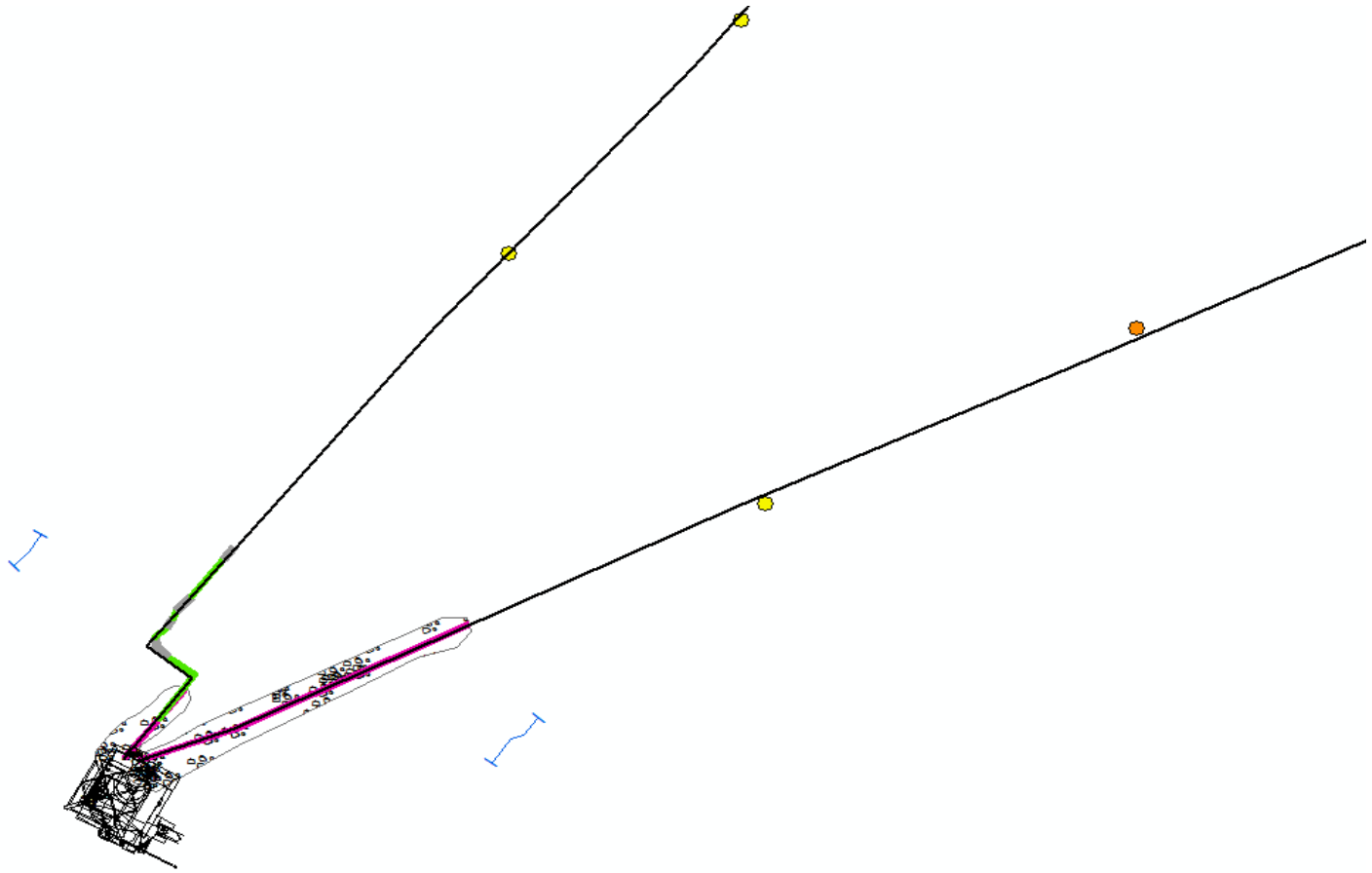
Bathymetry

Survey Data



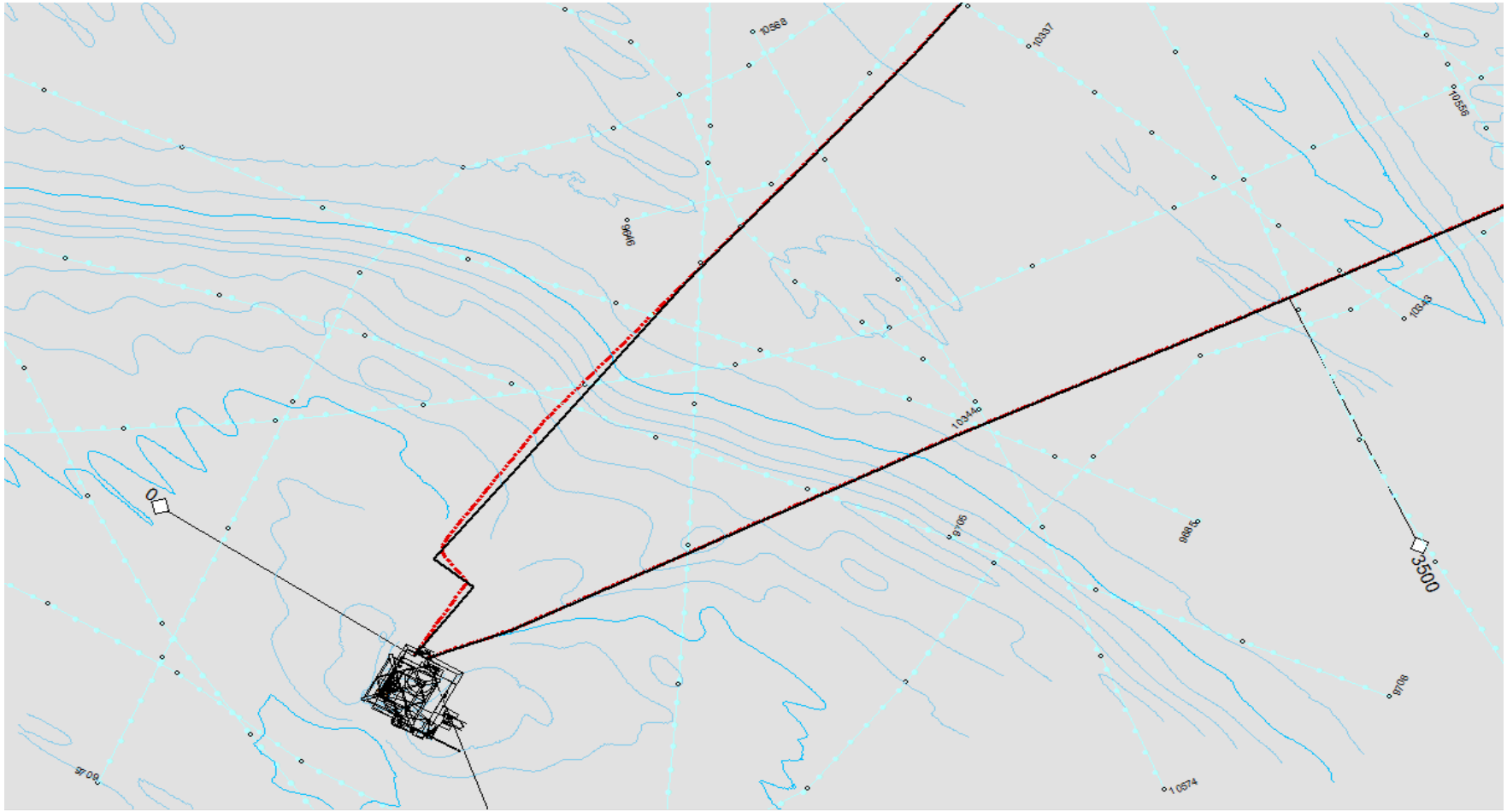
Side-scan sonar

Survey Data



Interpreted features (like rockdumps, exposures, freespans, debris)
Depth of Burrial of pipelines

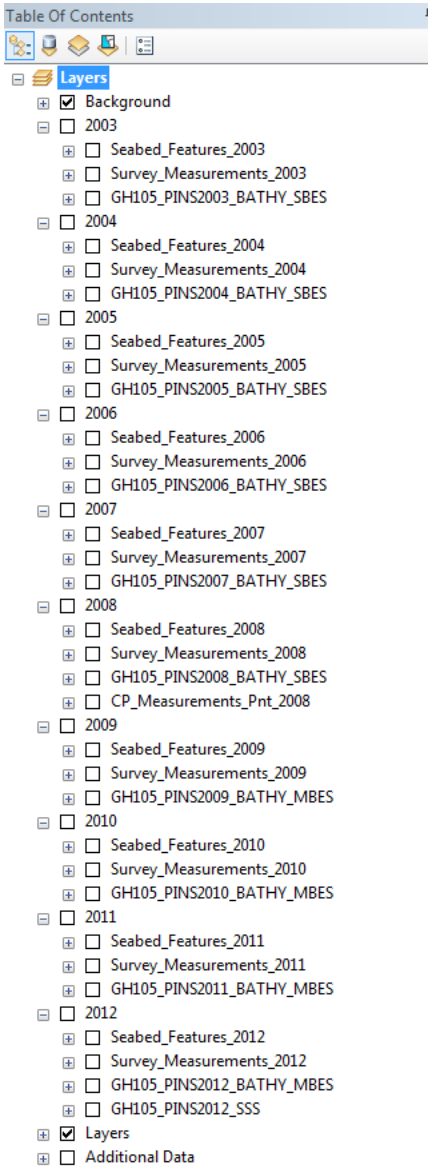
Survey Data



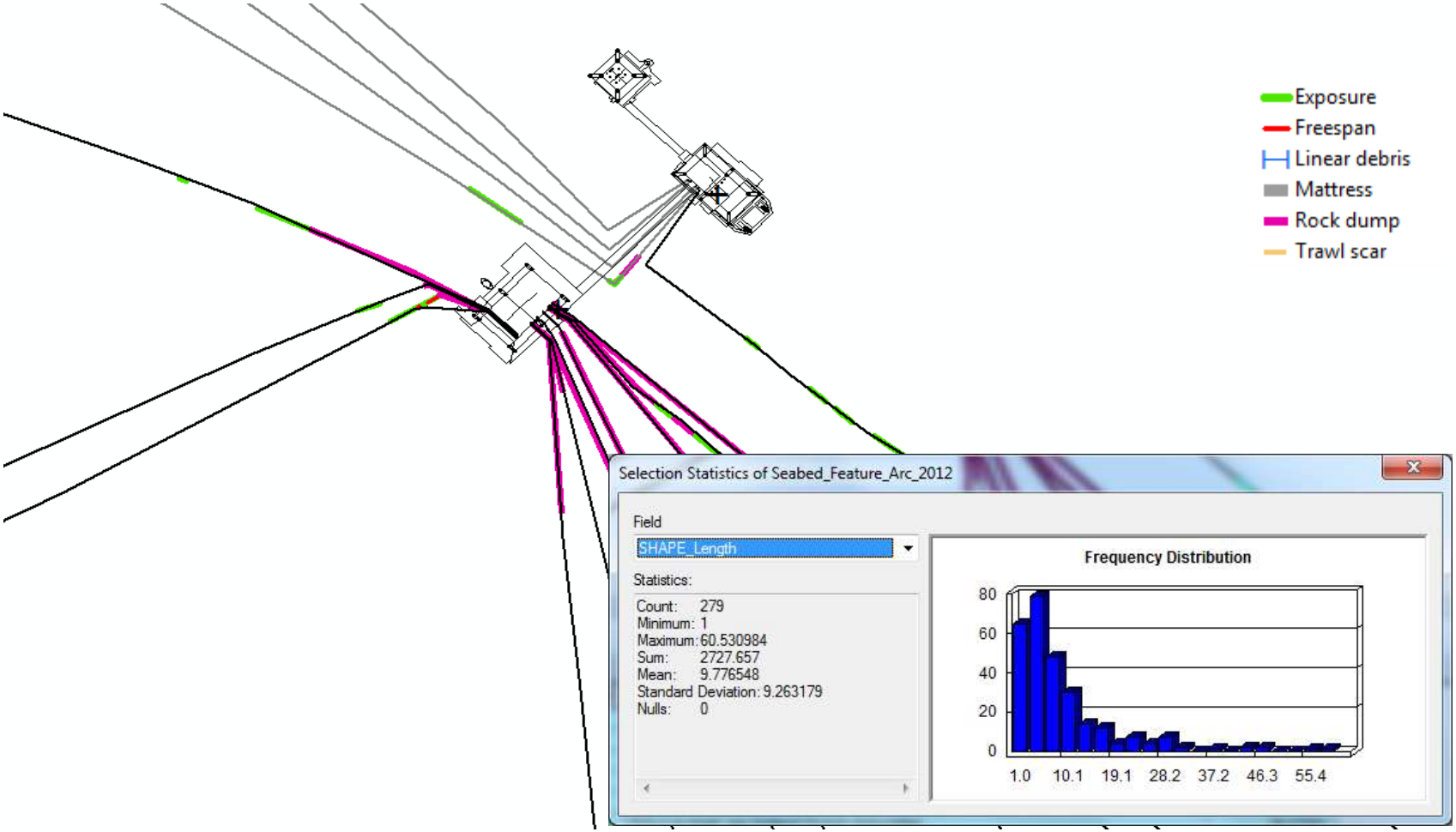
Additional information: tracklines, contours, chart-extent, etc.

Survey Data

10 years of hydrographic data is quite a lot...

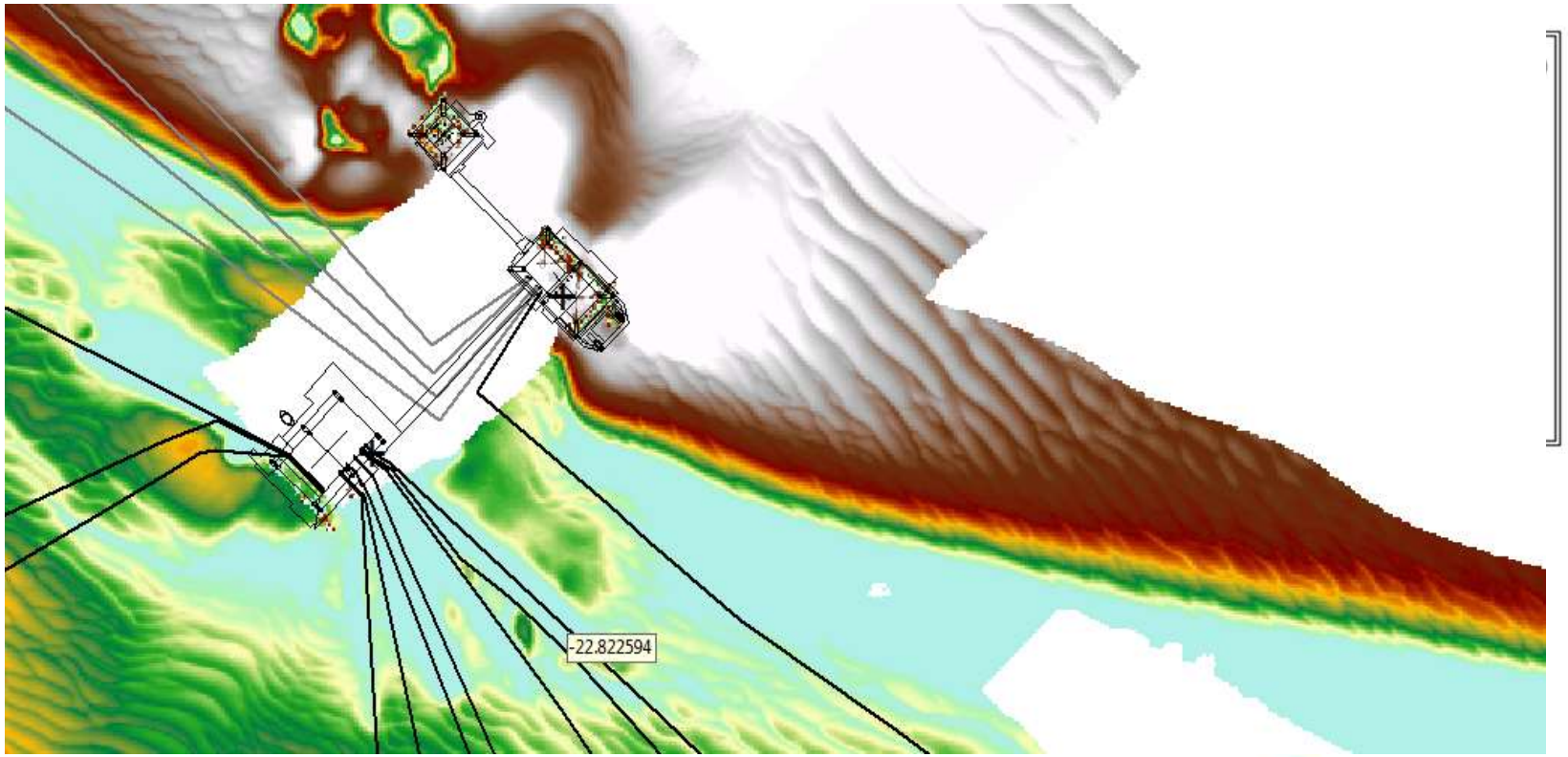


Results



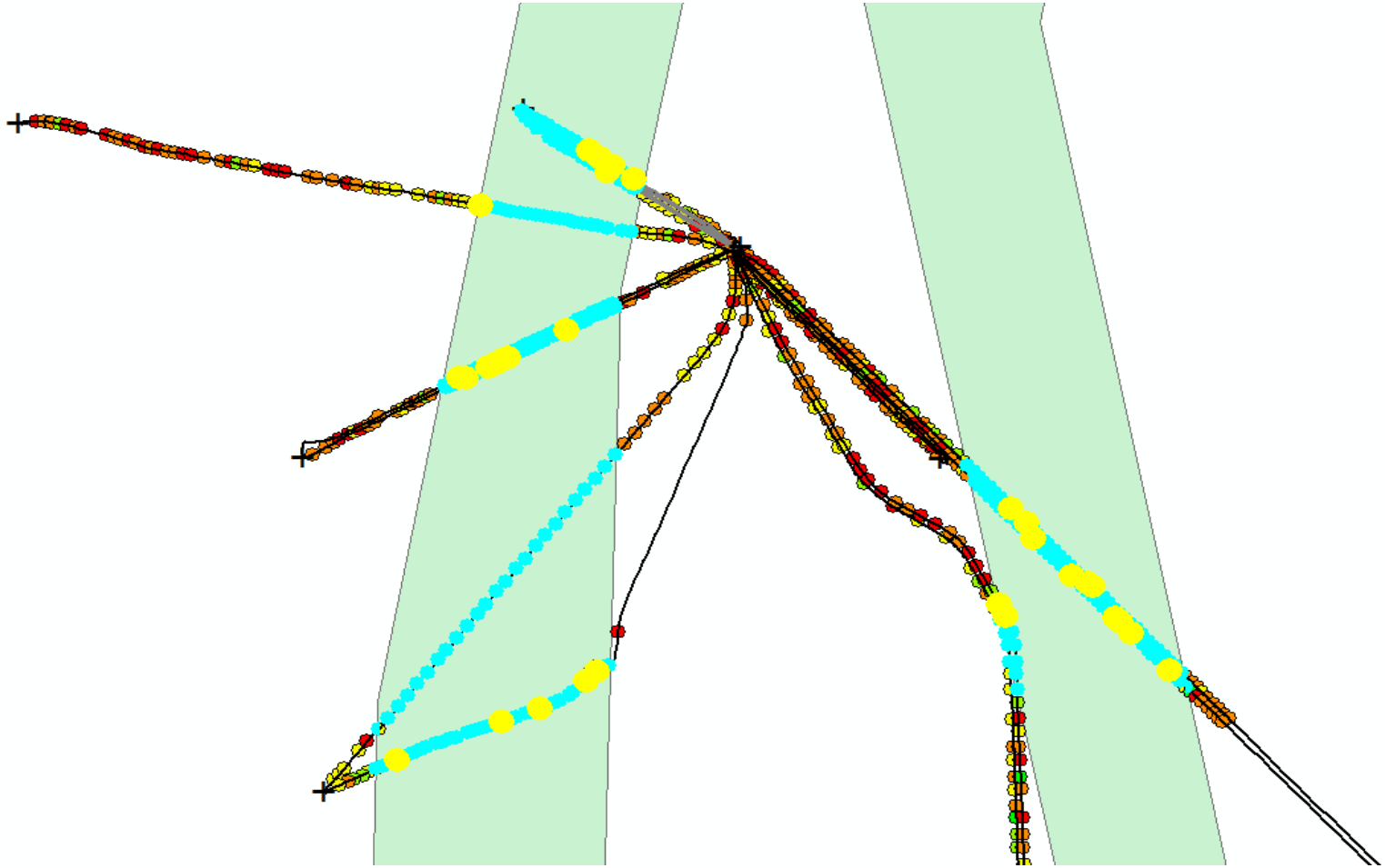
Get statistics on freespans and be able to compare easily

Results



Migration velocity of sandwaves (year-by-year comparison)

Results



Pipeline depth-of-burrial <0,5m in shippinglanes

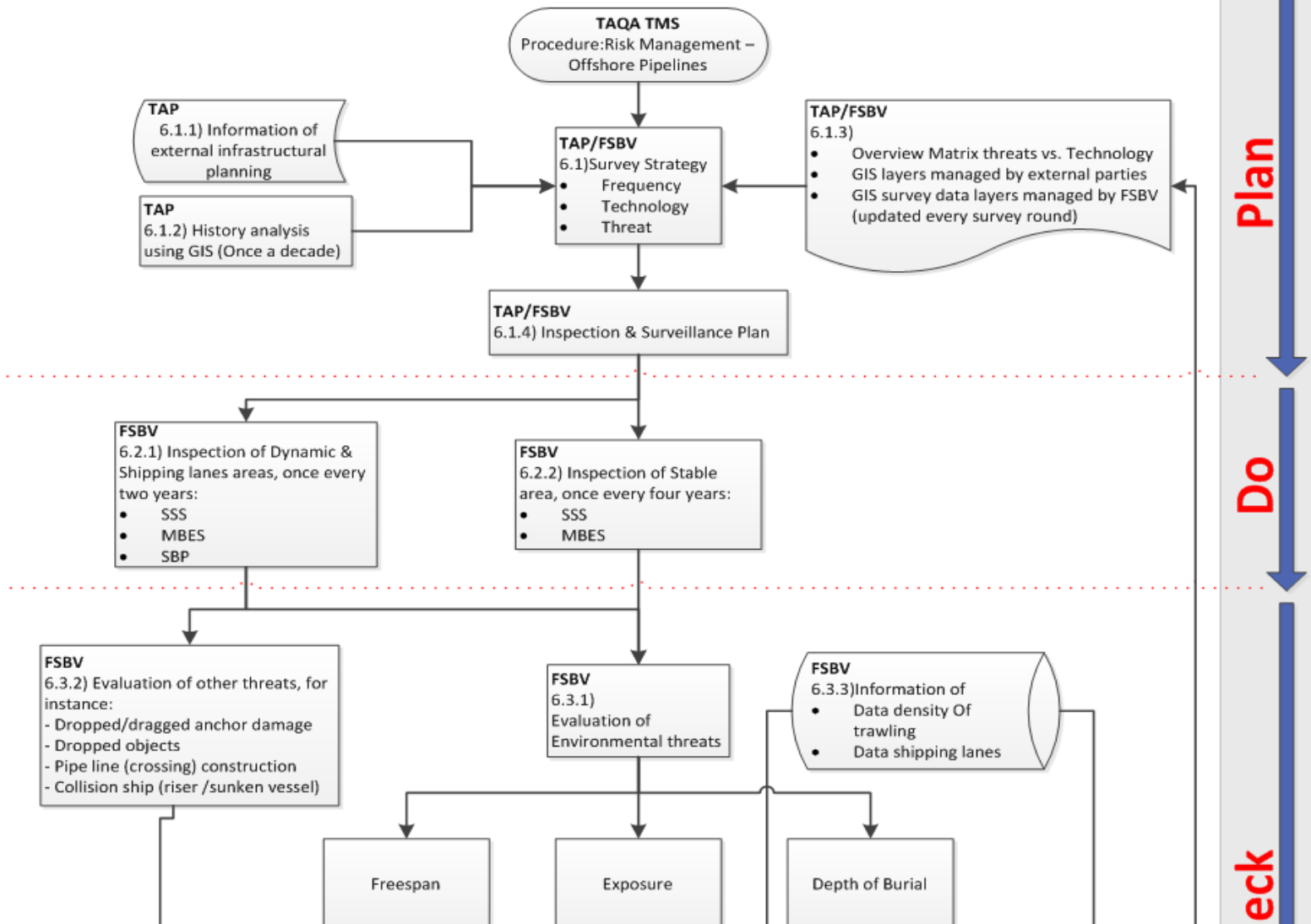
Results

Table 1: Identification methods to detect external threats		dropped/dragged anchor damage (emergency)				Dropped objects		Pipe line (crossing)		
		pipe lay vessel	rig operation	supply vessel	commercial ship traffic	Rig/platform lifting	loss of lay barge	trenching	gravel dumping	Ma
Annuel Inspection/Surveillance Information	**Remark**									
Multi Beam Echo Sounder	Bathymetry								XX	
Side Scan Sonar System	Seabed Map under angle					XXX	XXX		XXX	
Sub Bottem Profiler System	Depth of Burrial	E	E	E	E	E	E	E	E	
Wire CP System	CP (Anode Consumption)	E	E	E	E	E	E	E	E	
Contributing GIS layers	**Remark**									
History of previous annual surveys		E	E	E	E	E	E	E	E	
Shipping lanes					C					
Approach Areas					C					
Anchor Areas										
Military Areas										
Cable and Pipeline Crossings								C	C	
Wrecks										
Windmill Areas						C (2)				
AIS (Shipping & Fishing Density)					C					
Mining Areas		C	C	C		C	C			

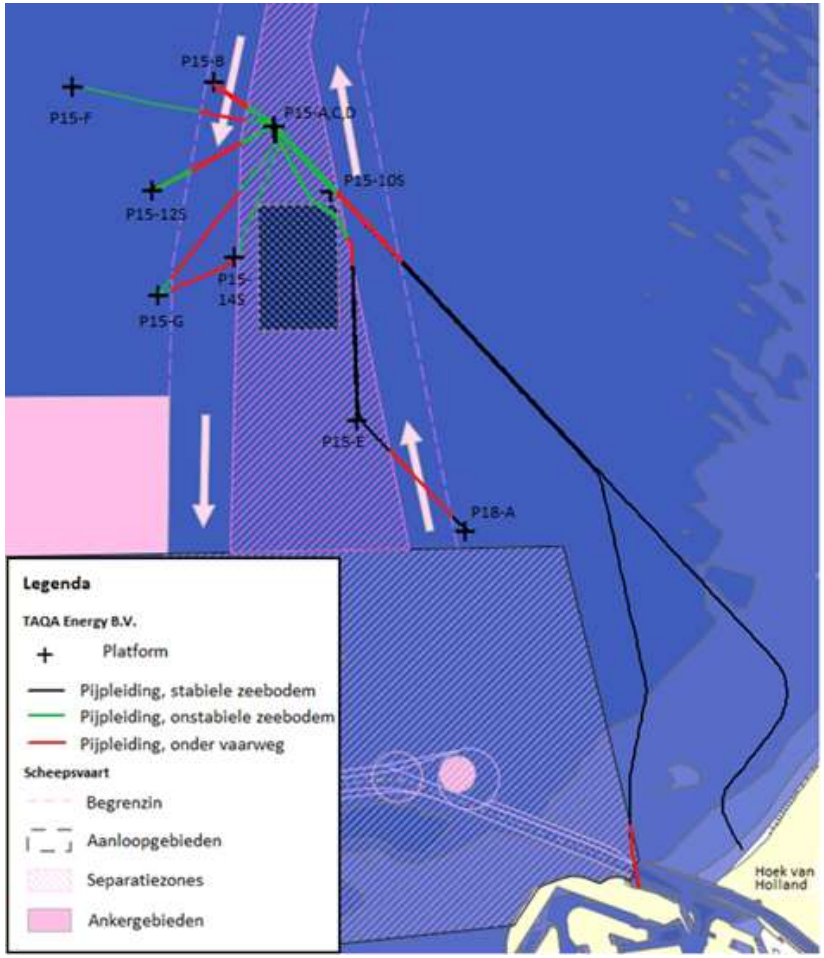
Risk matrix

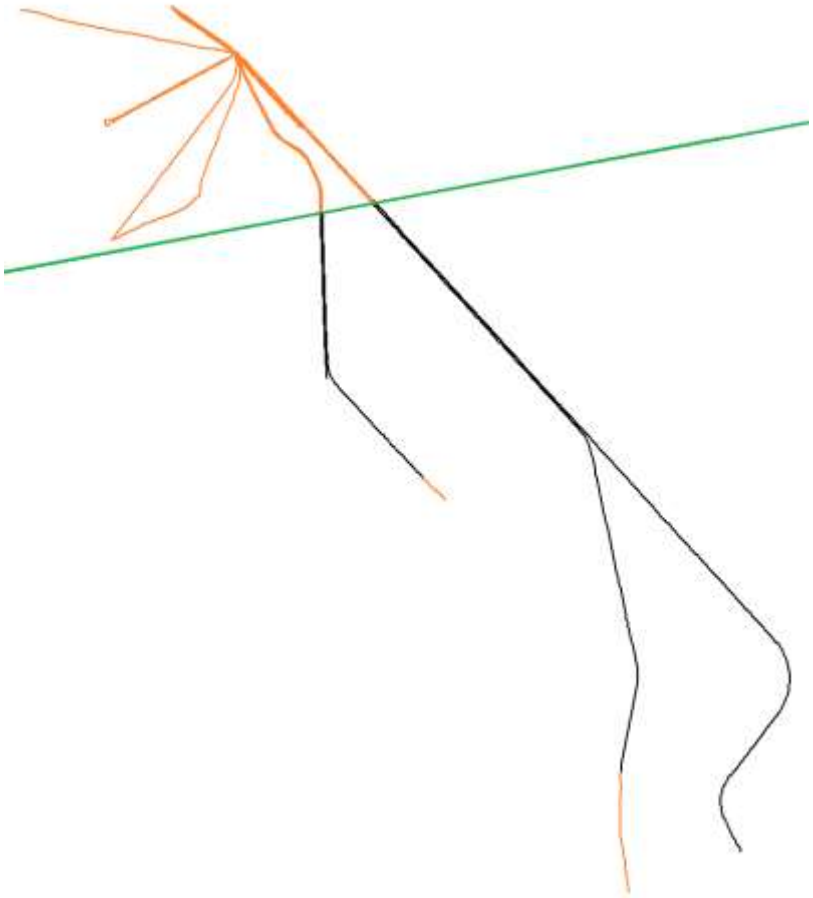
Results

Figure 1 - Flow diagram for subsea inspection & surveillance



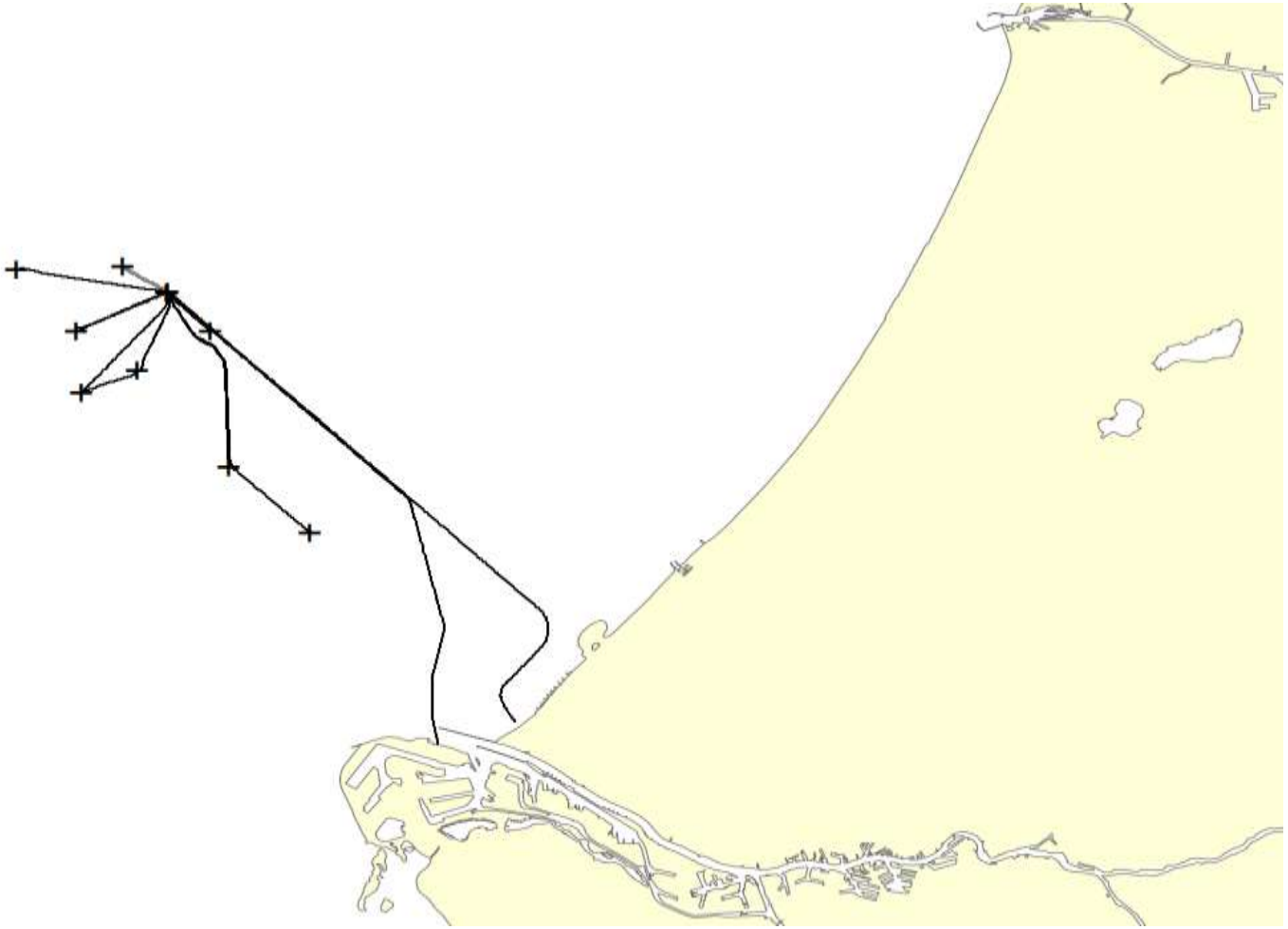
Results





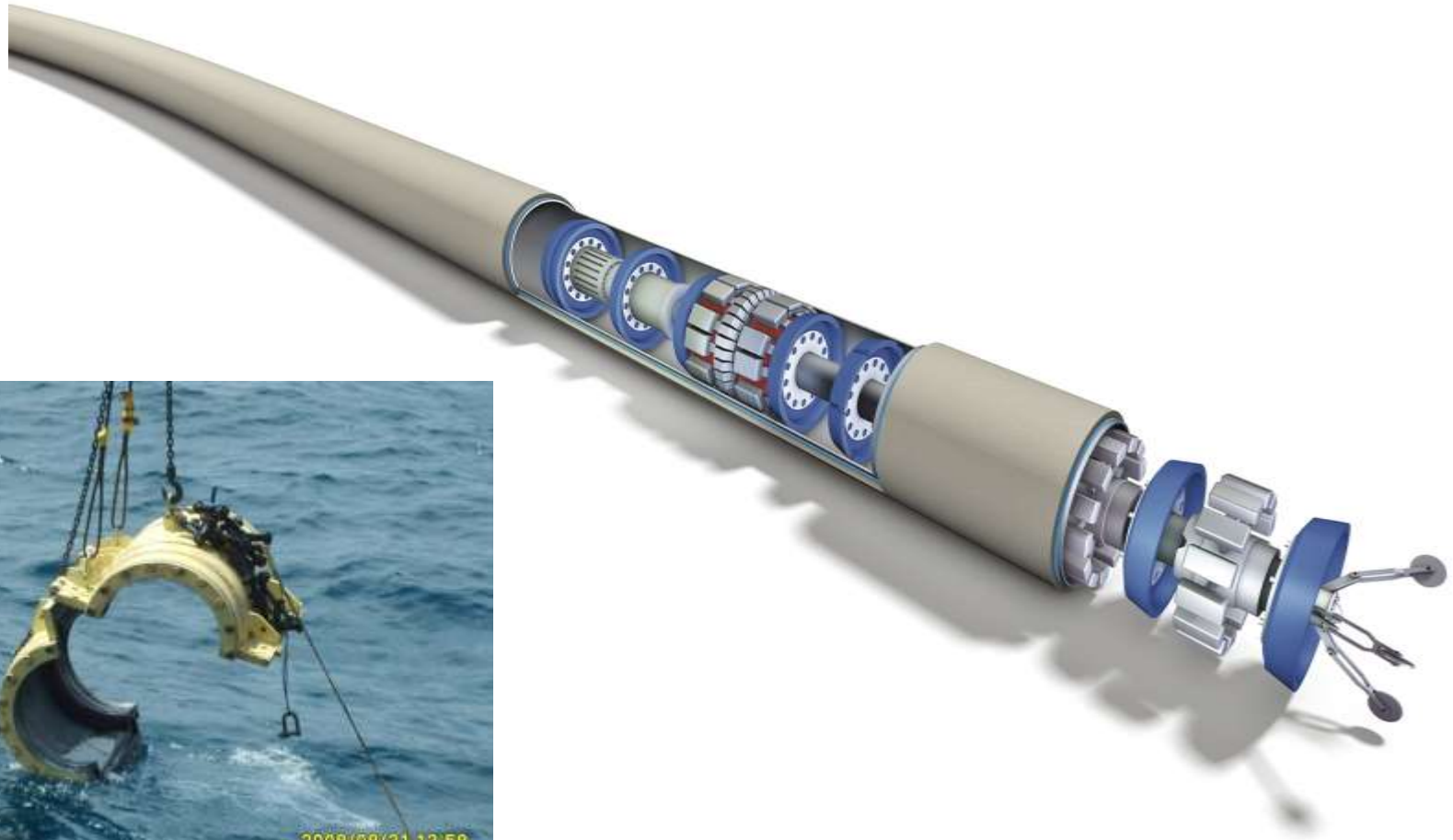
The end result is an inverterisation of risk areas, leading to a new survey design (area & frequency)

Future Work



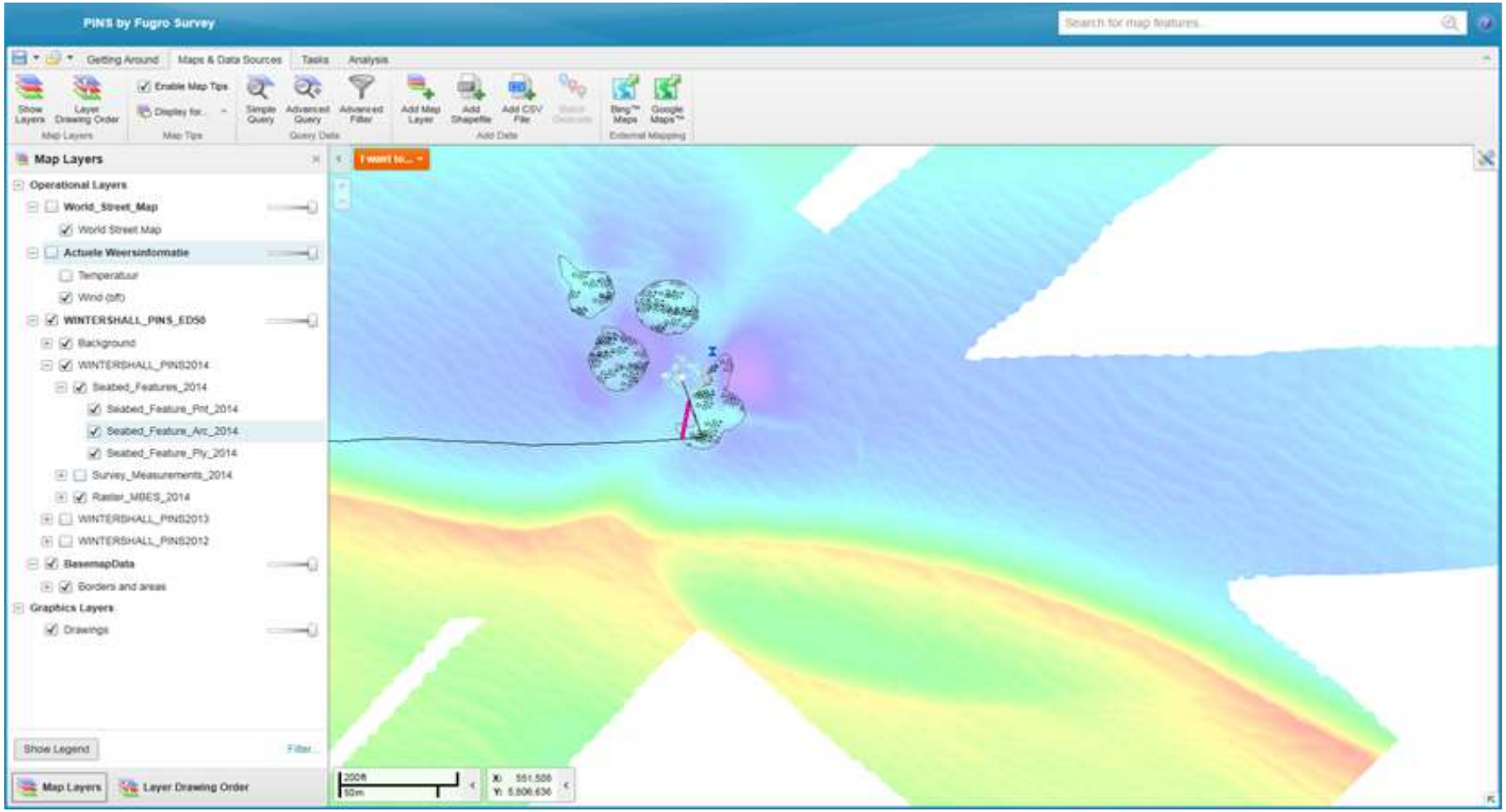
Adding in desity distribution of (shipping) vessels
Together with Imares

Future Work



Add additional datasets: Maintenance locations, intelligent PIG data

Future Work



Make data available via the web (Webmapservices and viewers)

Conclusions

- Able to introduce GIS within TAQA
- Convert (and re-use) historic survey data
- Combine this data with other (external) data sources
- Perform analysis
- Asses risks for offshore infrastructure
- Based on risks: make a new, optimized survey plan

Thank you

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ABSTRACT

The advantages of using GIS for improving risk analysis regarding external threats to offshore pipelines of TAQA Energy B.V. is discussed. For this an archive of 10 years of survey data was converted to GIS. External threats to the offshore pipelines were related to various survey methods and the related GIS data, and summarized in a threat-matrix. The result was the creation of a new risk-based survey strategy and work instruction. This lead to cost saving and an improved understanding of risks.