



Nieuwe  
Sluis

TERNEUZEN

# NEW LOCK TERNEUZEN

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The background image shows a wide view of the New Lock Terneuzen, a large maritime infrastructure project. A long, straight lock structure extends into the water, with a large crane-like structure on the left side. The sky is blue with some clouds, and a few birds are visible. The water is calm and reflects the sky.

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TERNEUZEN

# New Lock Terneuzen

“A NEW SEA LOCK IN TERNEUZEN WITH EQUAL DIMENSIONS  
AS THE PANAMA CANAL EXPANSION PROJECT”

Joint paper by Sassevaart (contractor) and VNSC (client)

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# Overview

## 1. Introduction

## 2. Timeline & procedure

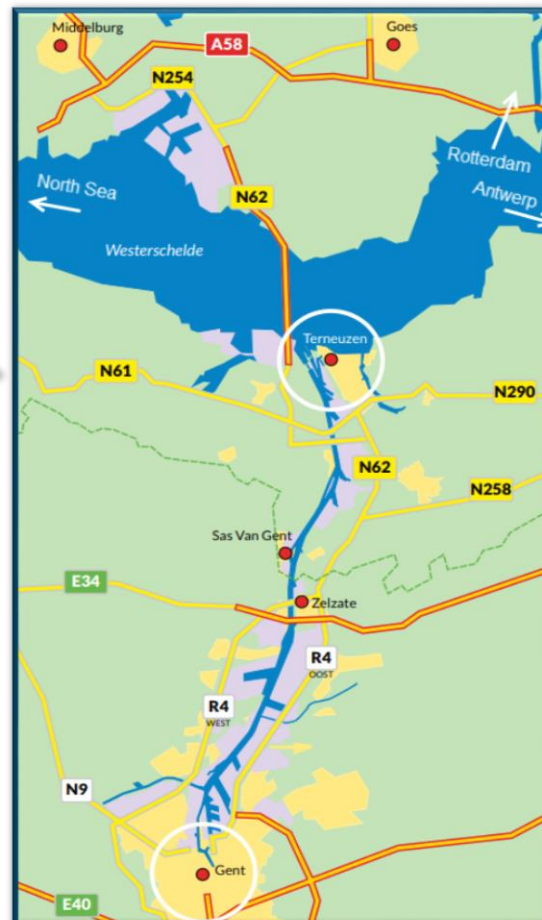
## 3. The project

1. Phasing
2. Navigation & reducing navigational hinder
3. Construction techniques
4. Geo-hydrology
5. More than just a lock



# 1. Introduction

## Bottlenecks on the Rotterdam-Paris waterway



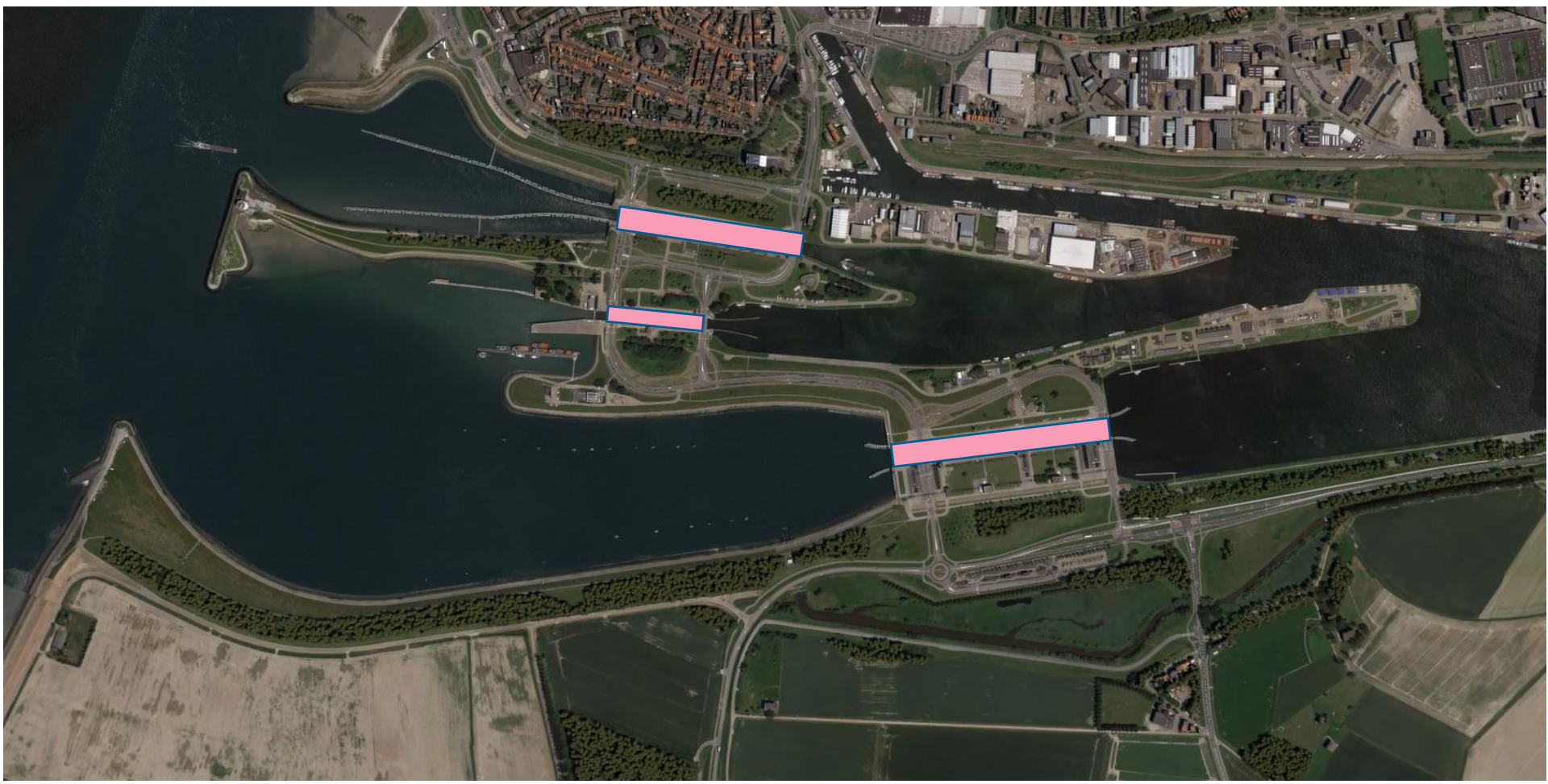
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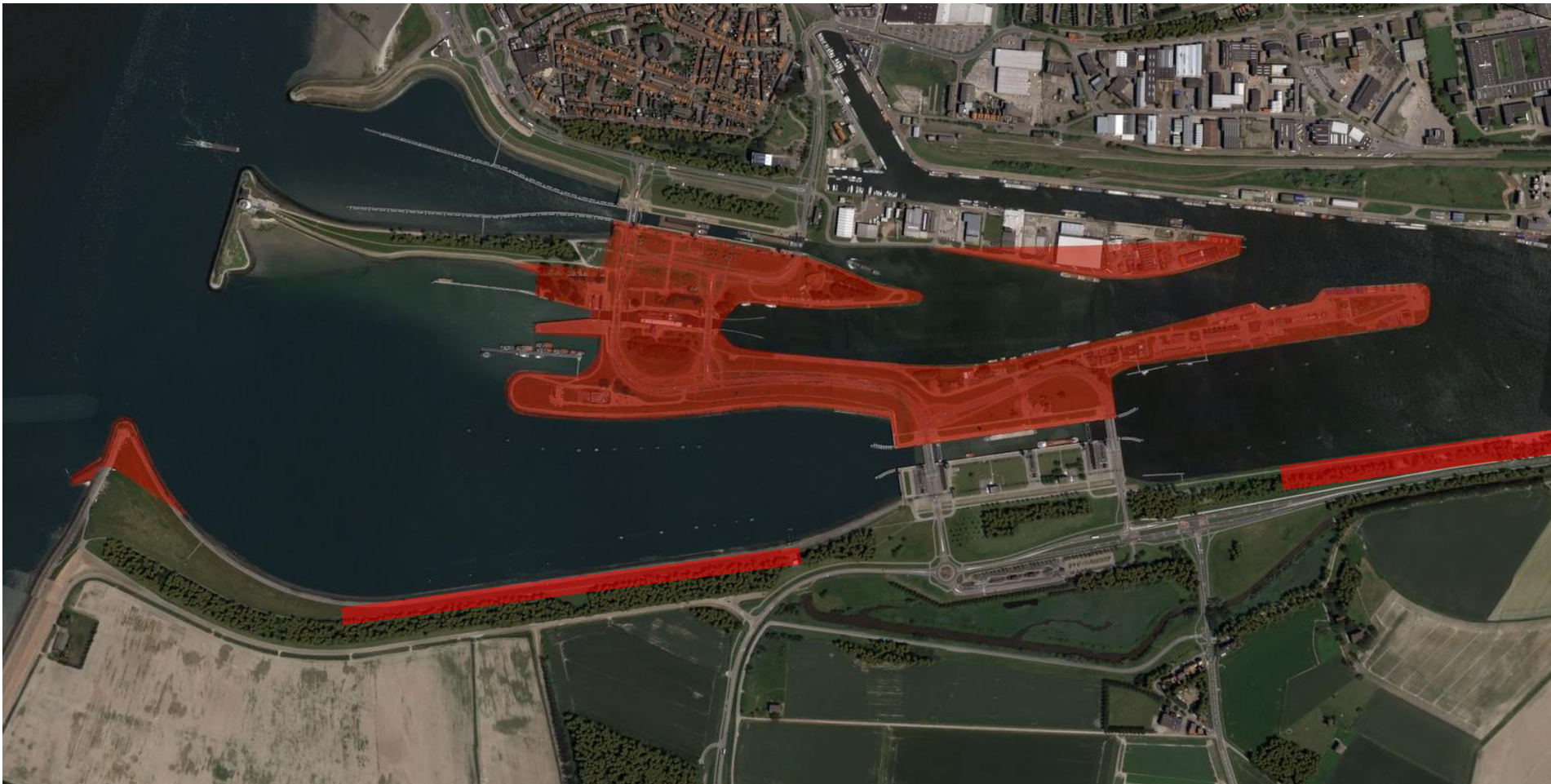
# 1. Introduction

## Terneuzen Lock Complex





## Terneuzen Lock Complex



## Terneuzen Lock Complex



## Terneuzen Lock Complex

- Eastern Lock (1963): 280m x 24m, inland waterway;
- ~~- Middle Lock (1910): 140m x 18m, inland waterway + sea going vessels d = 7.2m;~~
- Western Lock (1968): 290m x 40m, inland waterway + sea going vessels d = 12.5m;
- New Lock Terneuzen (2022): 427m x 55m, inland waterway + sea going vessels d = 14.5m



5 year construction period  
lock complex remains operational

- Canal Ghent – Terneuzen: +2.13mNAP
- Westerscheldt: tidal variation -1.89mNAP to +2.29mNAP



## Overview

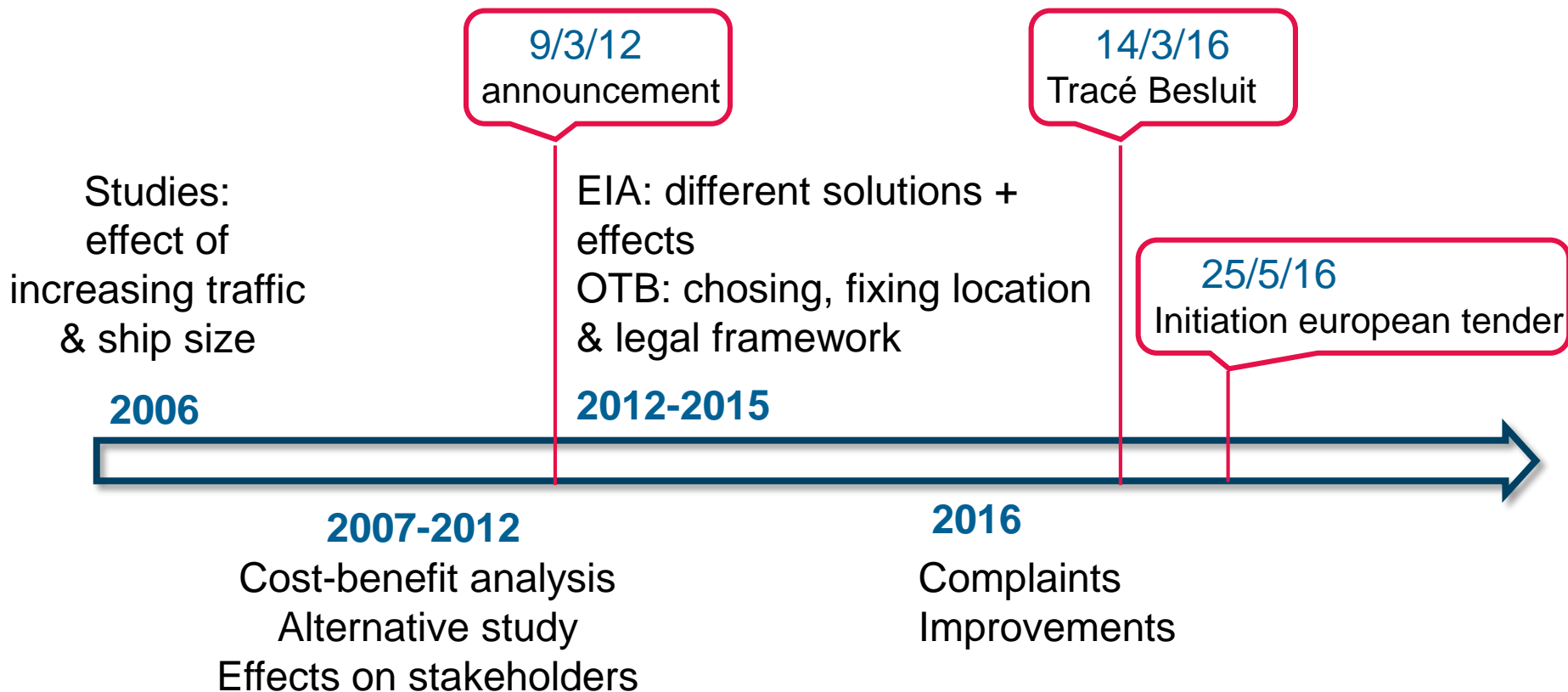
### 1. Introduction

### 2. Timeline & procedure

### 3. The project

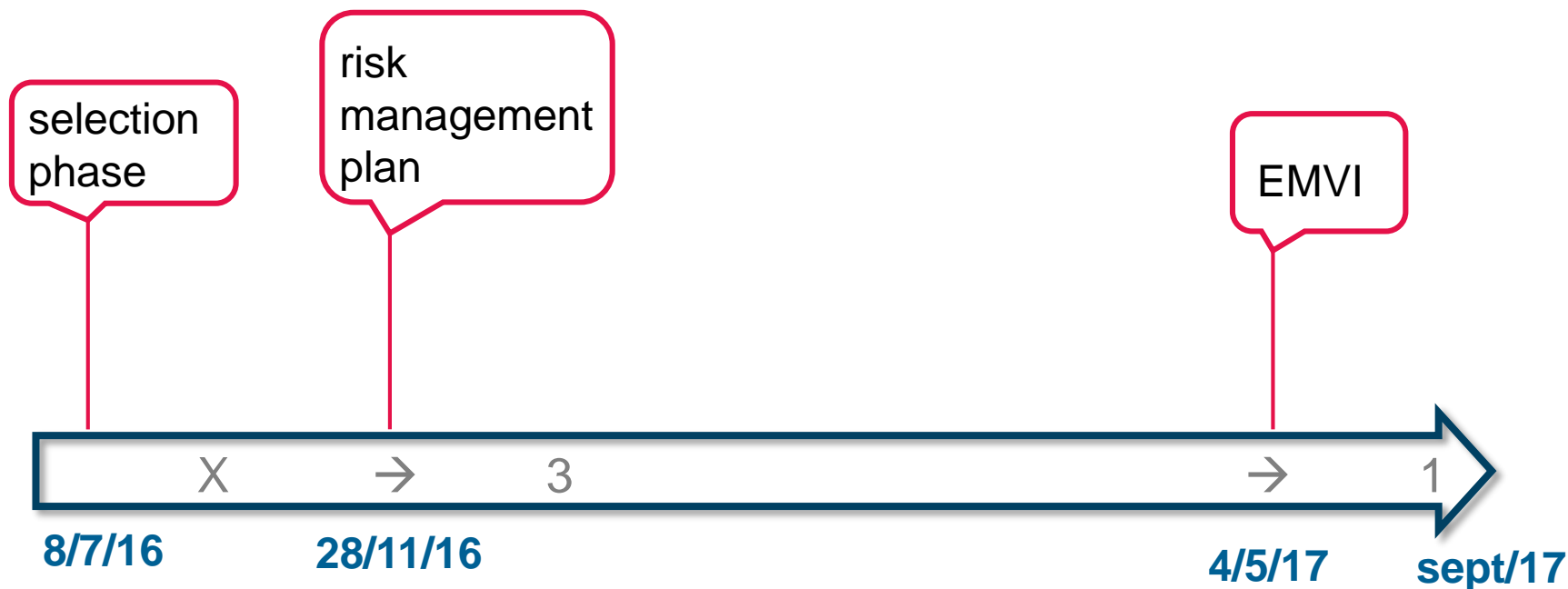
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## 2. Timeline & procedure



## 2. Timeline & procedure

### Tender procedure





## 2. Timeline & procedure

### EMVI

Economical Most Valued Offer: not only the best price wins!

- Insufficient knowledge and control of the subsoil. Design and construction methods are not aligned with the geotechnical and geo-hydrological situation of the subsoil (10 M€);
- Damage to the existing lock complex (40 M€);
- Delay on schedule (30 M€);
- Time delay and the experience of hinder for navigation (25 M€);
- Quality of the works, integrated design in combination with internal processes by the Contractor that are not mastered (25 M€);
- Imperfect connection in the existing lock complex; not or insufficient functioning of the industrial automated control of the New Lock (25 M€);
- Increased Life Cycle Cost (40 M€).

➔ Risk Management Plan (max score virtual 195 M€)

- 2.9Mm<sup>3</sup> sand foreshore nourishment to Belgian coast (3€/m<sup>3</sup>)

## 2. Timeline & procedure

### EMVI

Economical Most Valued Offer: not only the best price wins!

JV 1: price 600M€, EMVI **100M€** => virtual price 500M€

JV 2: price 620M€, EMVI **150M€** => virtual price 470M€

=> JV 2 wins tender, despite higher price

Maximum budget: 700M€ excl VAT

## 2. Timeline & procedure

### CLIENT



**Flanders**  
State of the Art



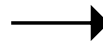
**Kingdom of the Netherlands**



**Rijkswaterstaat**



**VNSC project team**



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## 2. Timeline & procedure

### CLIENT



**Flanders**  
State of the Art



**696(+)<sup>M</sup>€**



**Kingdom of the Netherlands**



**190<sup>M</sup>€**



**48<sup>M</sup>€ CEF**



**New  
Lock**

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**753<sup>M</sup>€ building cost**  
**181<sup>M</sup>€ staff & preparation**

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## 2. Timeline & procedure

### CONTRACTOR



622,6M€ excl VAT (753M€ incl VAT)

Cooperating companies: Engie, Fugro

Engineering: Sassevaart VOF, Arcadis, IV-Infra

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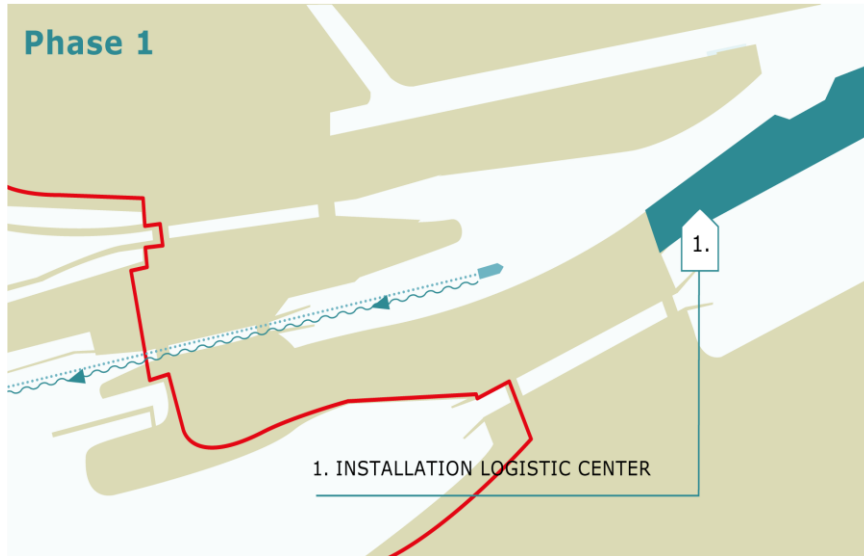
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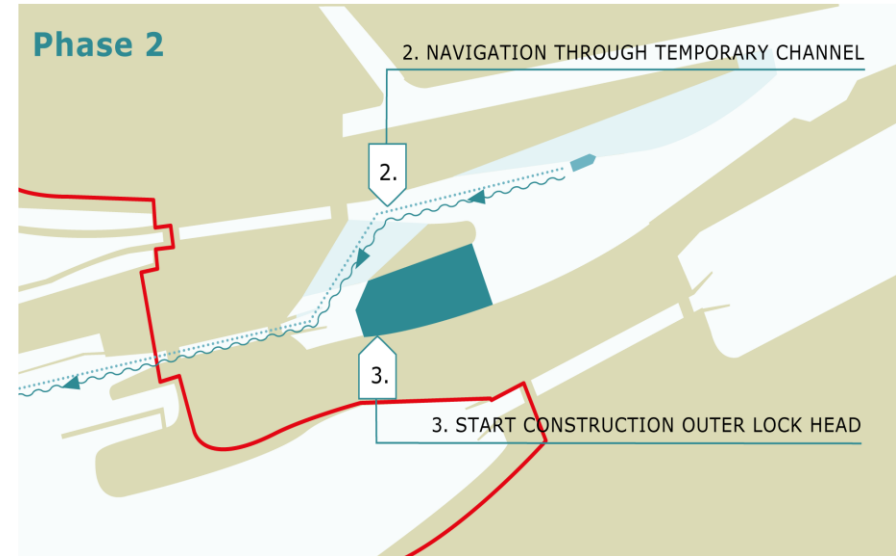


## 3. The Project - phasing

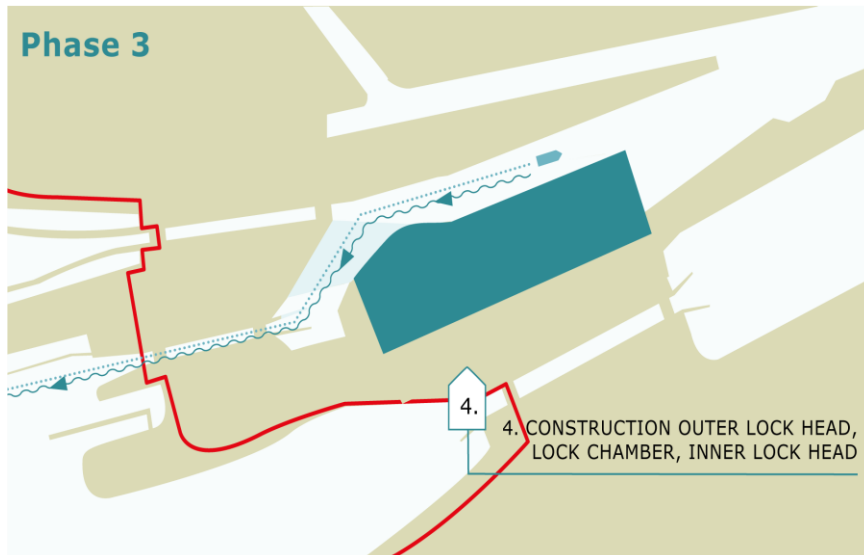
### Phase 1



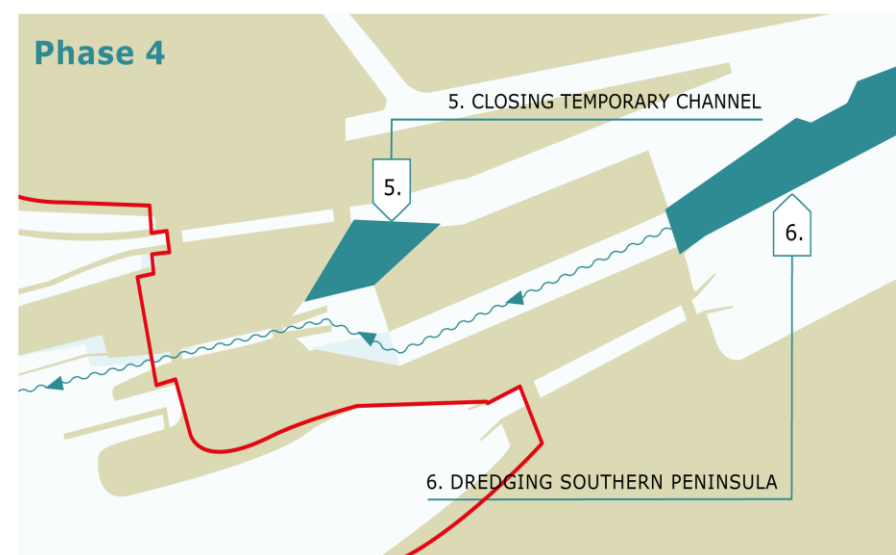
### Phase 2



### Phase 3

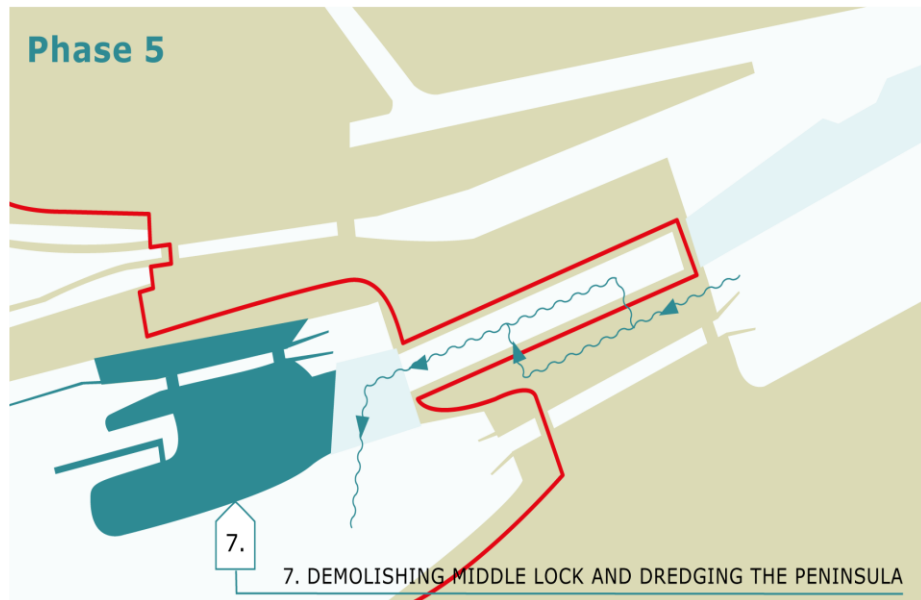


### Phase 4

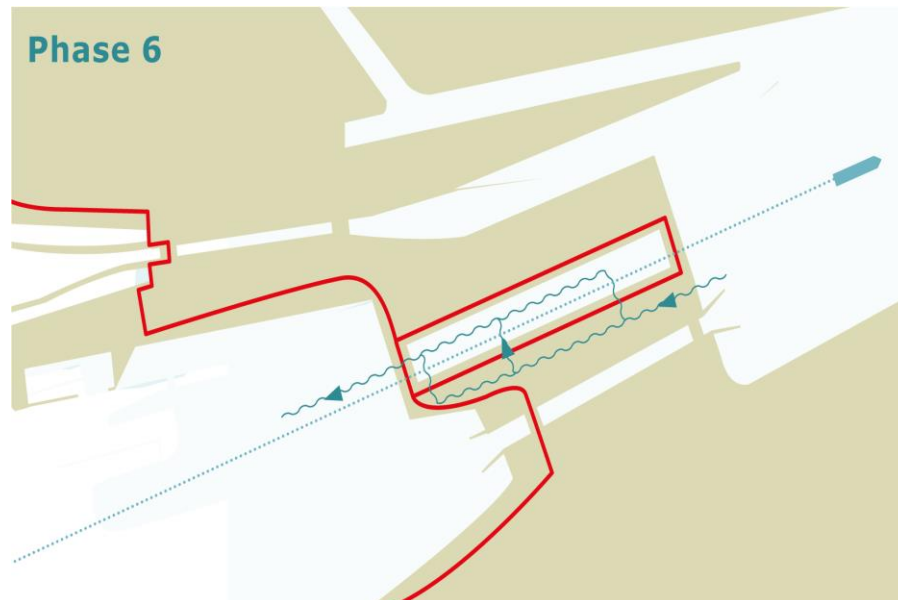


### 3. The Project - phasing

#### Phase 5



#### Phase 6



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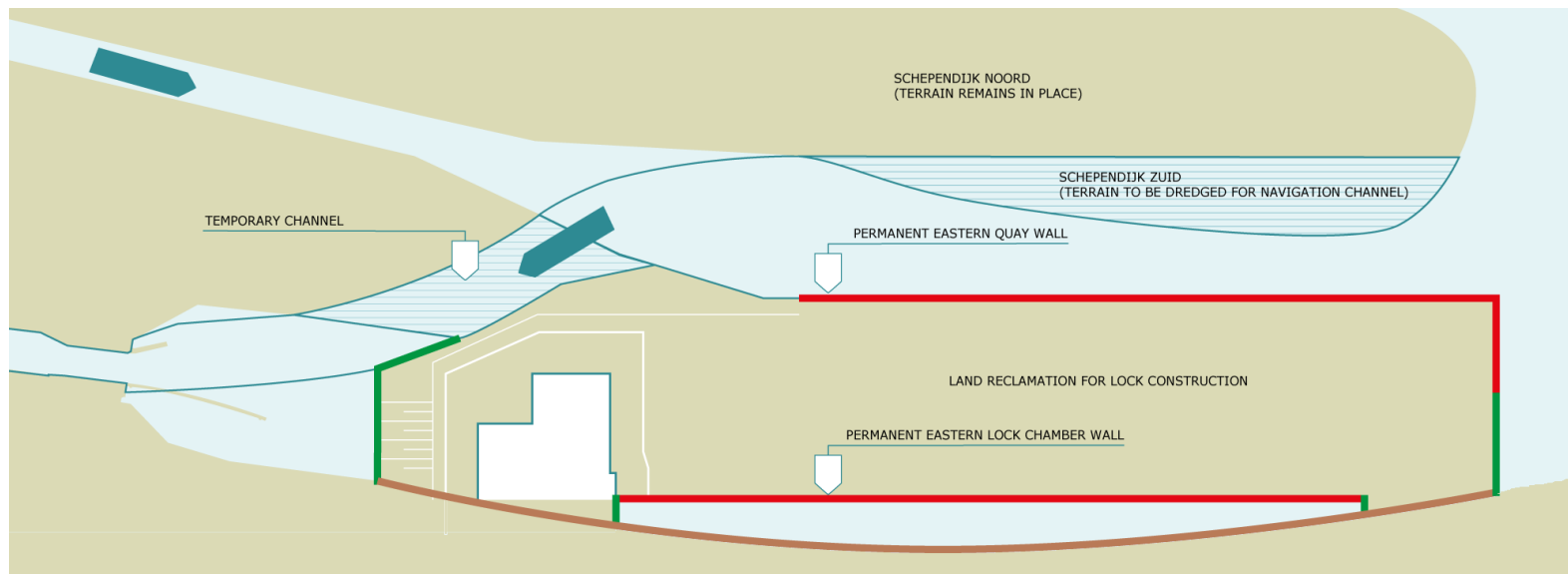


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## 3. The Project – reduced navigational hinder

### Temporary Navigation Channel – CEMT IVa



### Benefits:

- Keeping middle lock open for 4 years (only closed for 11 months)
  - Reduction of lost navigation hours 50.000 to 75.000
  - Reduced navigation time 25%
- 22 to 34 M€

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### 3. The Project – reduced navigational hinder

Dredging with minimal lock use

9Mm<sup>3</sup> - 13Mm<sup>3</sup> soil to be removed

40% on canal side

- Disposal locations along same side of locks as where we dredge
- Transport over lock complex via pipelines



- Extra barges
- Using locks in lee hours

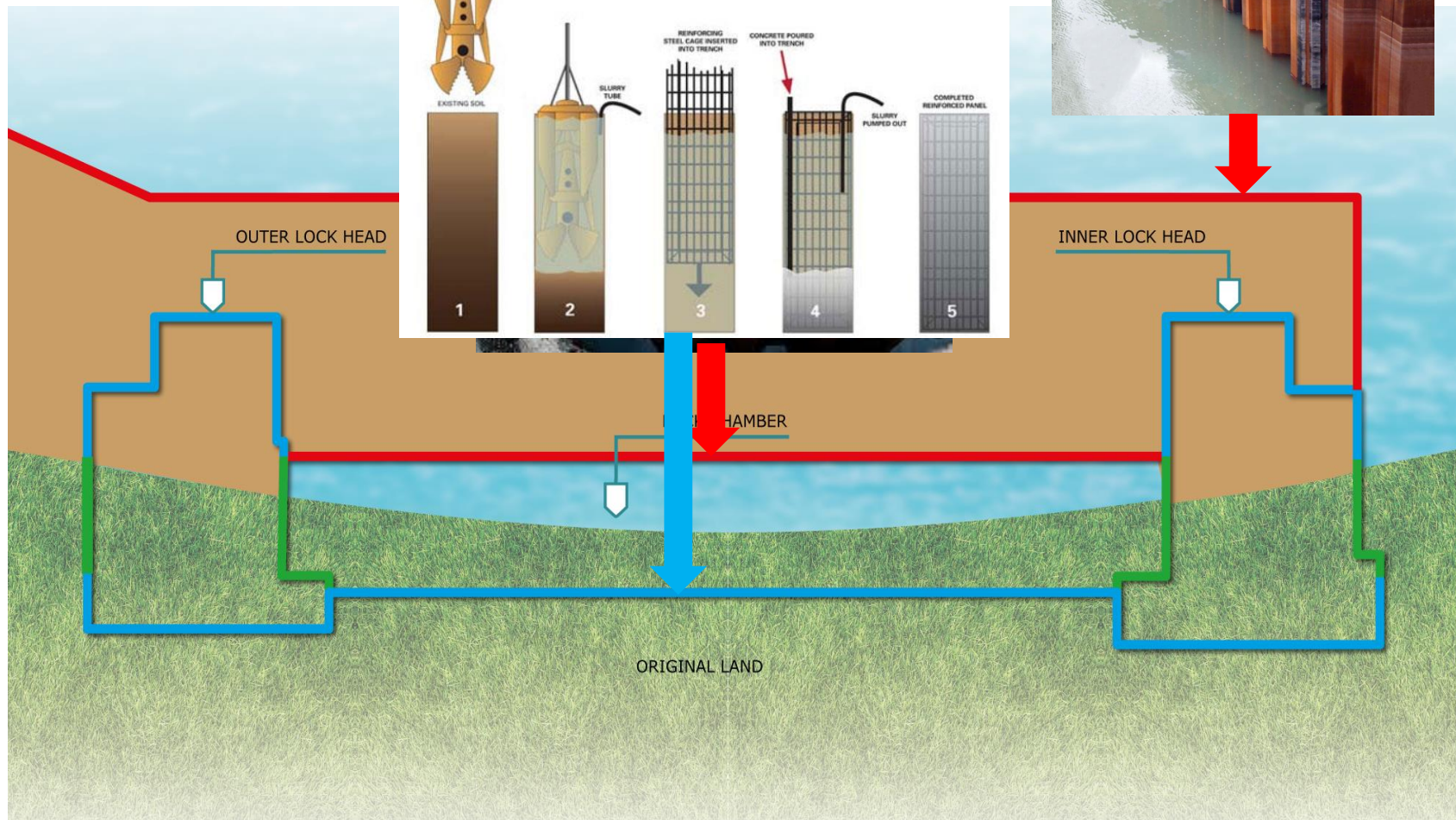
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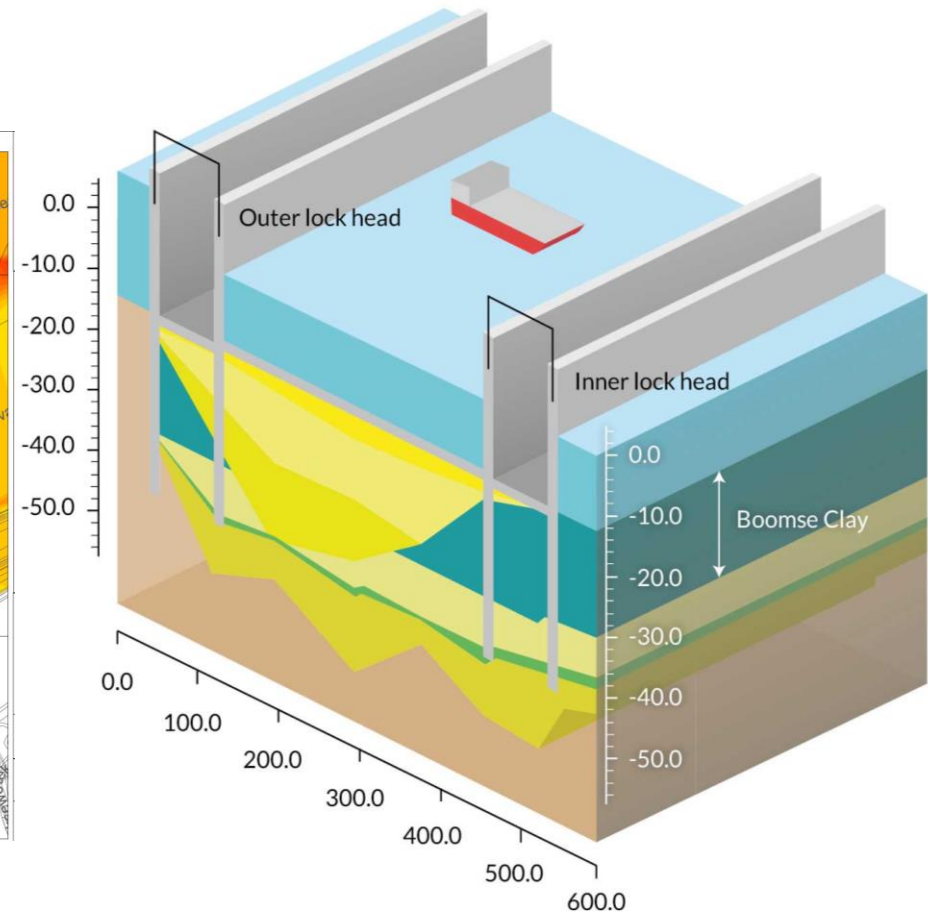
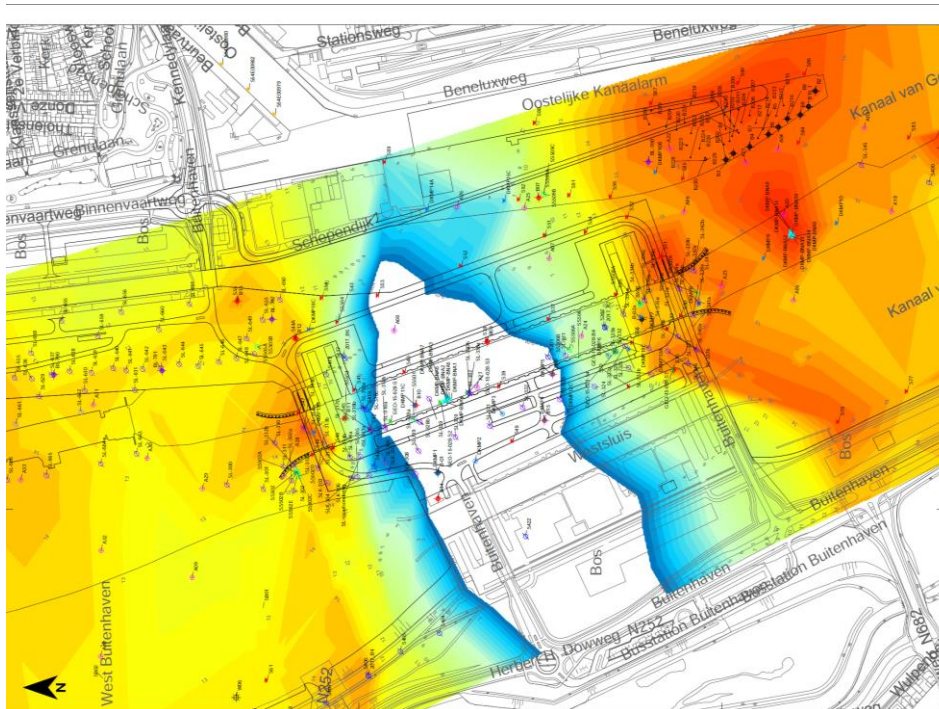


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### 3. The Project – geo-hydrology

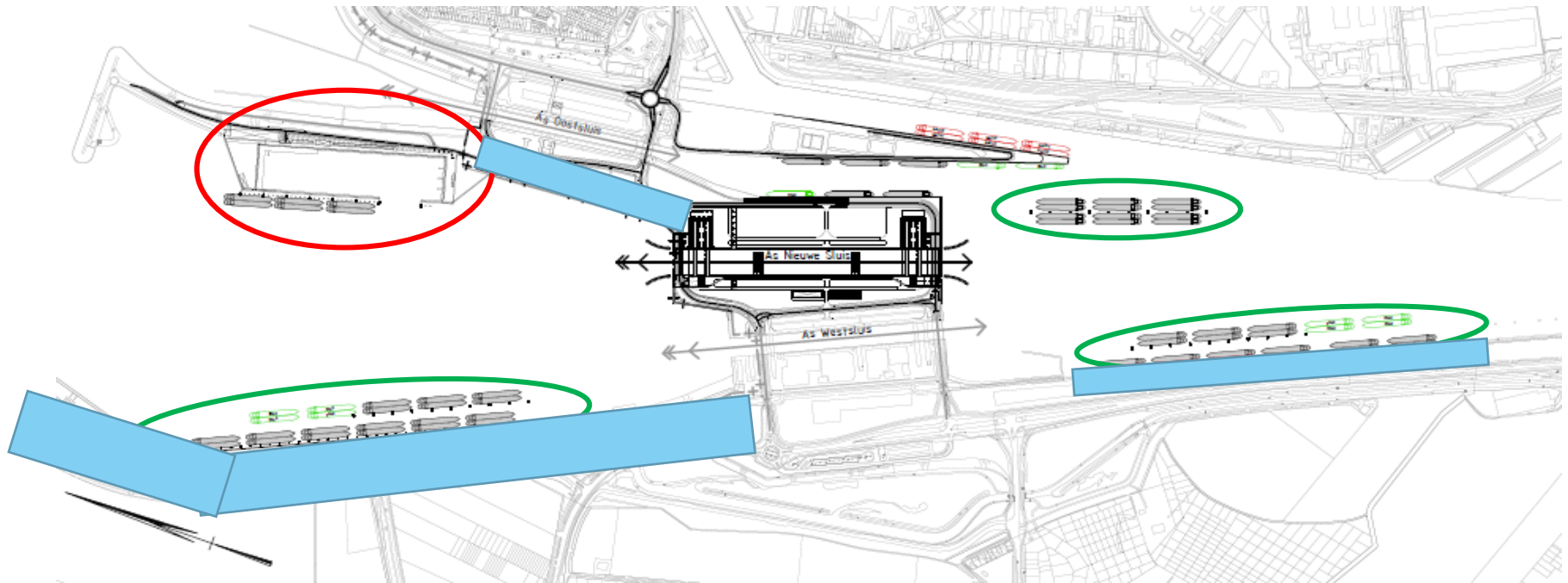
- Boom Clay, water impermeable
- Ancient gully, open connection



### 3. The Project – geo-hydrology

- No open construction
  - ⇒ wet where we need, dry where we can
- Full excavation of lock head
  - ⇒ High uplift water pressures
  - ⇒ Pulling anchors: too many, uneconomic, unpractical, pinching of clay
  - ⇒ (very) deep diaphragm walls
- Horizontal permeability >> vertical permeability
  - ⇒ Geohydrological engineering & pumping test
  - ⇒ Deep diaphragm walls to -45mNAP
  - ⇒ Limited pumping & returning water
  - ⇒ Only for lock head, not for lock chamber

### 3. The Project – more than a lock



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## The end

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