

BOSKALIS: AN INNOVATIVE CONTRACTOR SAND FOR HONG KONG INFRASTRUCTURE

GERARD VAN RAALTE

HONG KONG – AGS (HK) 1-DAY SEMINAR ON RECLAMATION

29 NOVEMBER 2014





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01 BOSKALIS ACTIVITIES

02 SAND FOR HONG KONG

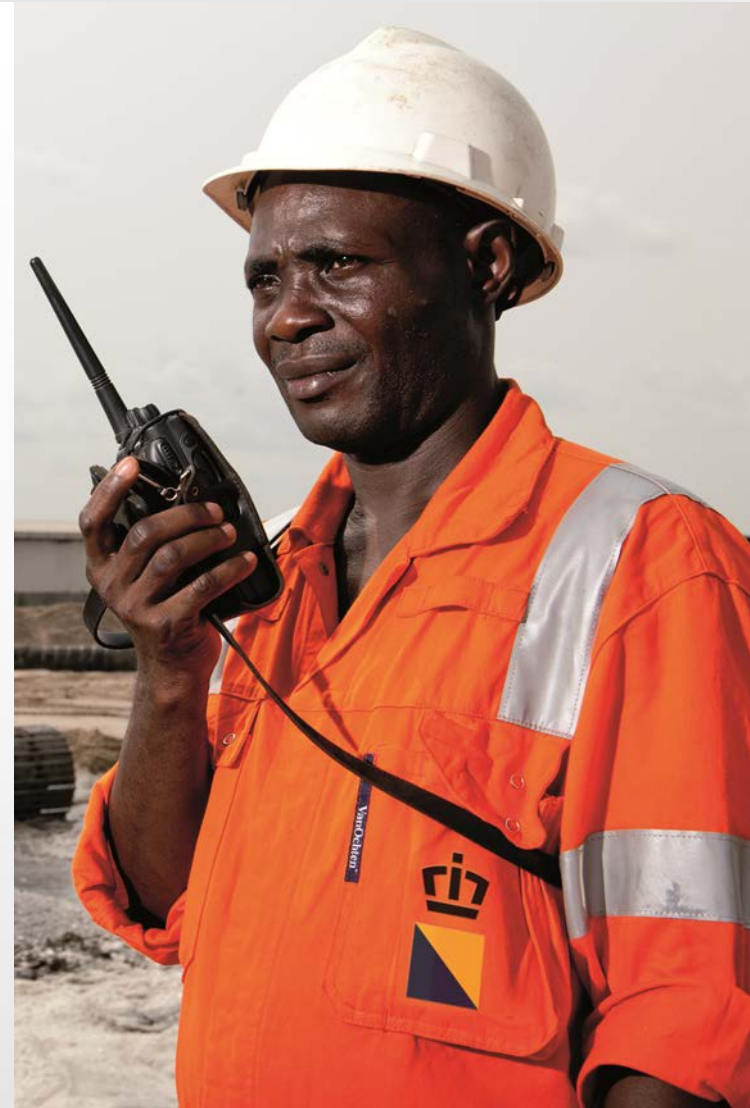
03 ROAD AHEAD





COMPANY OVERVIEW

- Leading global dredging & maritime expert
 - With 11,000 employees and 1,000 vessels
 - Active in 75 countries across 6 continents
 - Customers in Energy, Ports and Infra
 - Headquarters in Papendrecht, The Netherlands
-
- Revenue 2013: EUR 3.5 bln
 - Order book EY13: EUR 4.0 bln
 - Listed in AEX Euronext





LAND DEVELOPMENT & SERVICES





INFRASTRUCTURE





HYDRONAMIC IN-HOUSE ENGINEERING

CLOSE LINK BETWEEN DESIGN AND CONSTRUCTION

- in depth knowledge RBW construction methods
- value engineering
- monitoring of construction works, evaluation

COMMERCIAL INTERESTS CONTRACTOR

- exploring the limits of engineering practice
- necessity for constant development, R&D work

LIABILITY OF CONTRACTOR

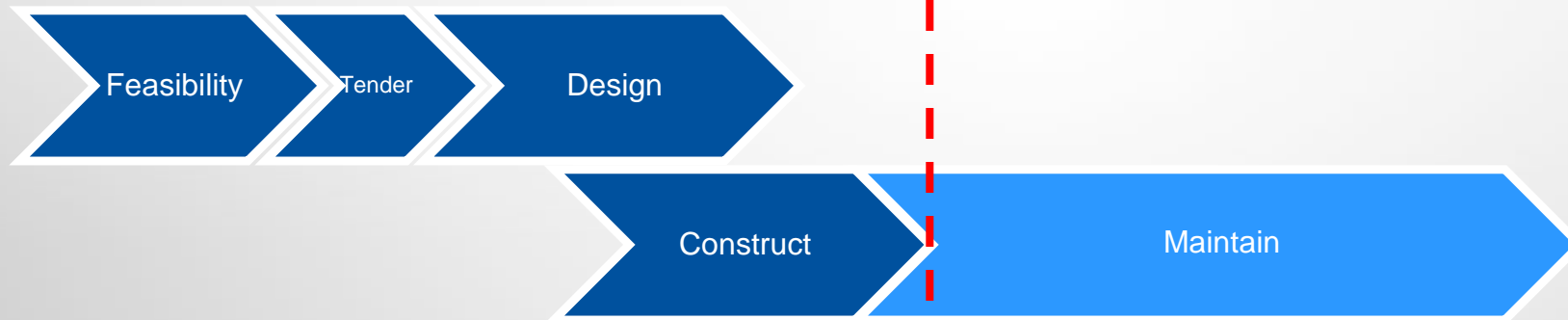


REDUCING TIME TO MARKET

Traditional Approach

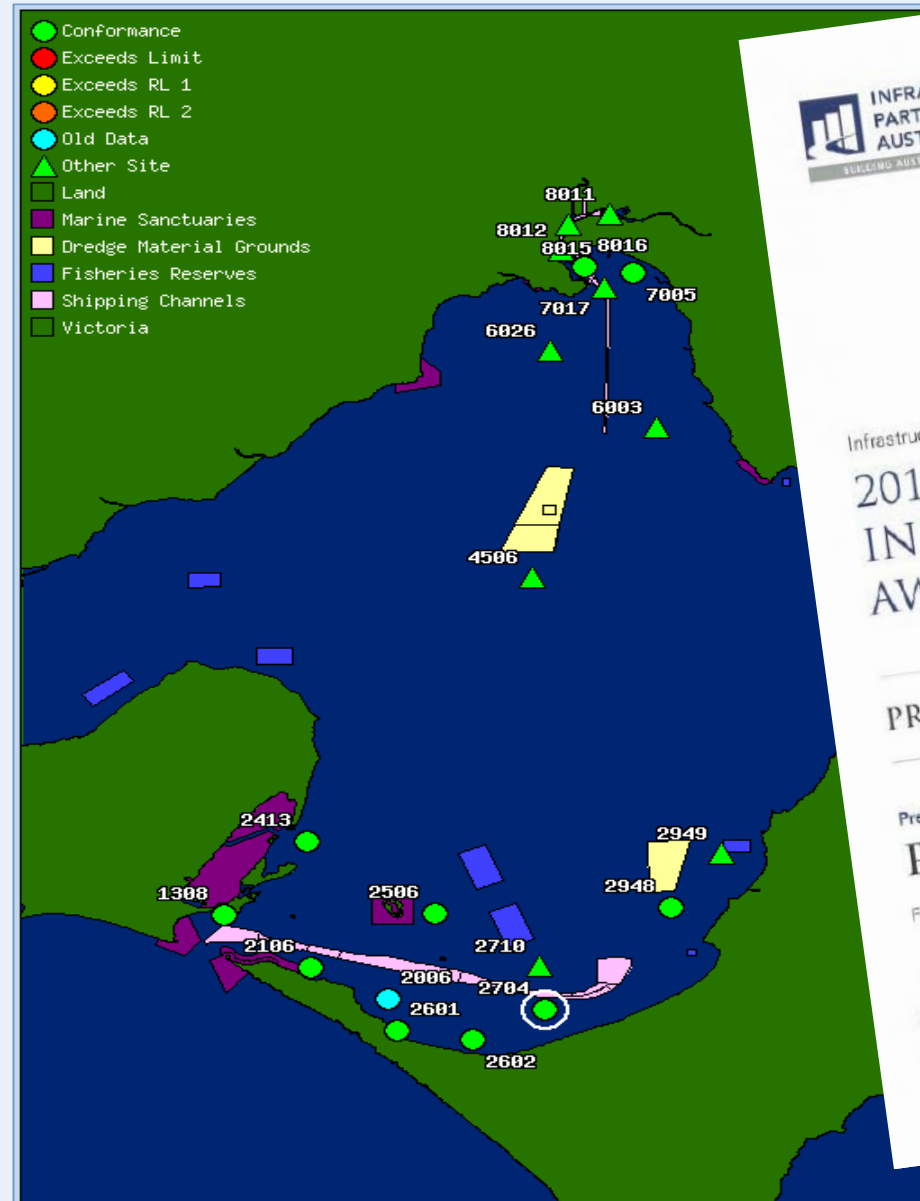


Early Contractor Involvement



MELBOURNE DREDGING

Site: Port of Melbourne



ARUP

Infrastructure Partnerships Australia
2010 NATIONAL
INFRASTRUCTURE
AWARDS WINNER

PROJECT OF THE YEAR

Presented to

ROYAL BOSKALIS WESTMINSTER

For the Melbourne Channel Deepening Project

Mark Birrell

The Hon Mark Birrell
Chairman, Infrastructure Partnerships Australia

- 20 Middle Ground Shelf
- 2949 Mornington
- 4506 PoM DMG South F

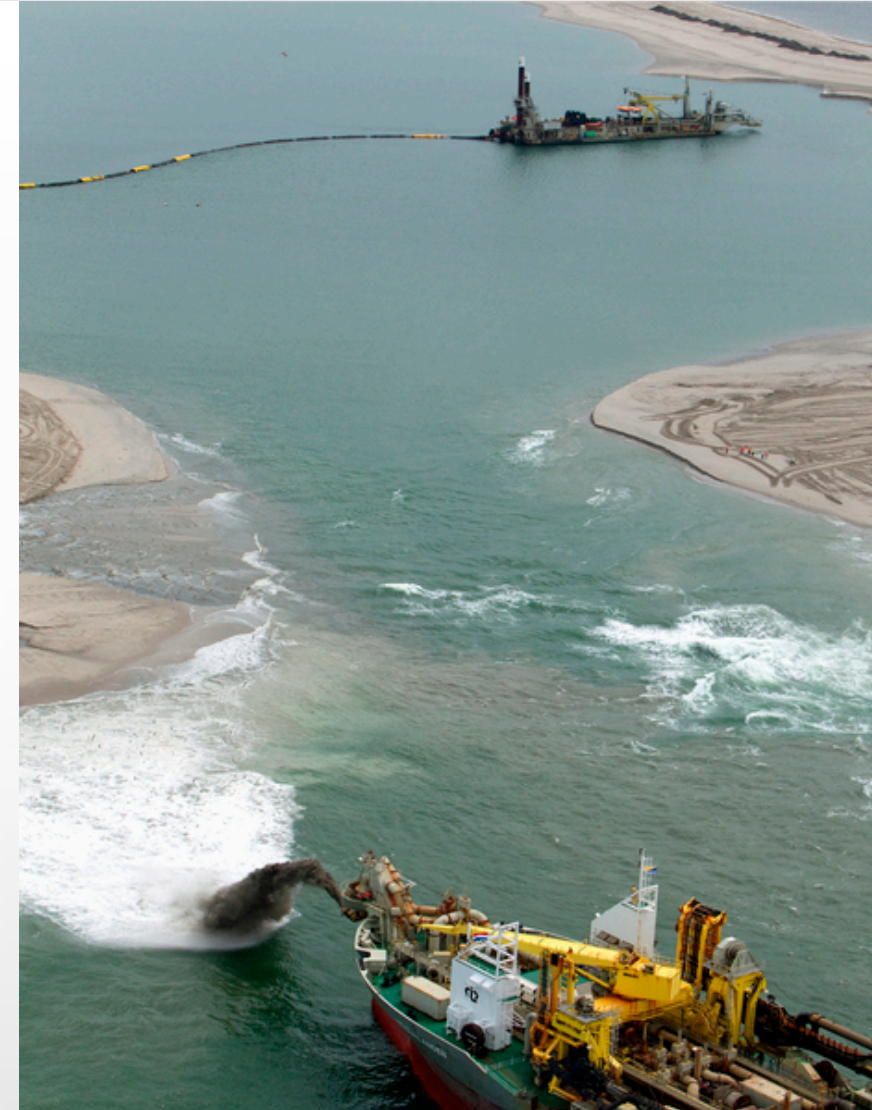


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SAND SOURCES USED

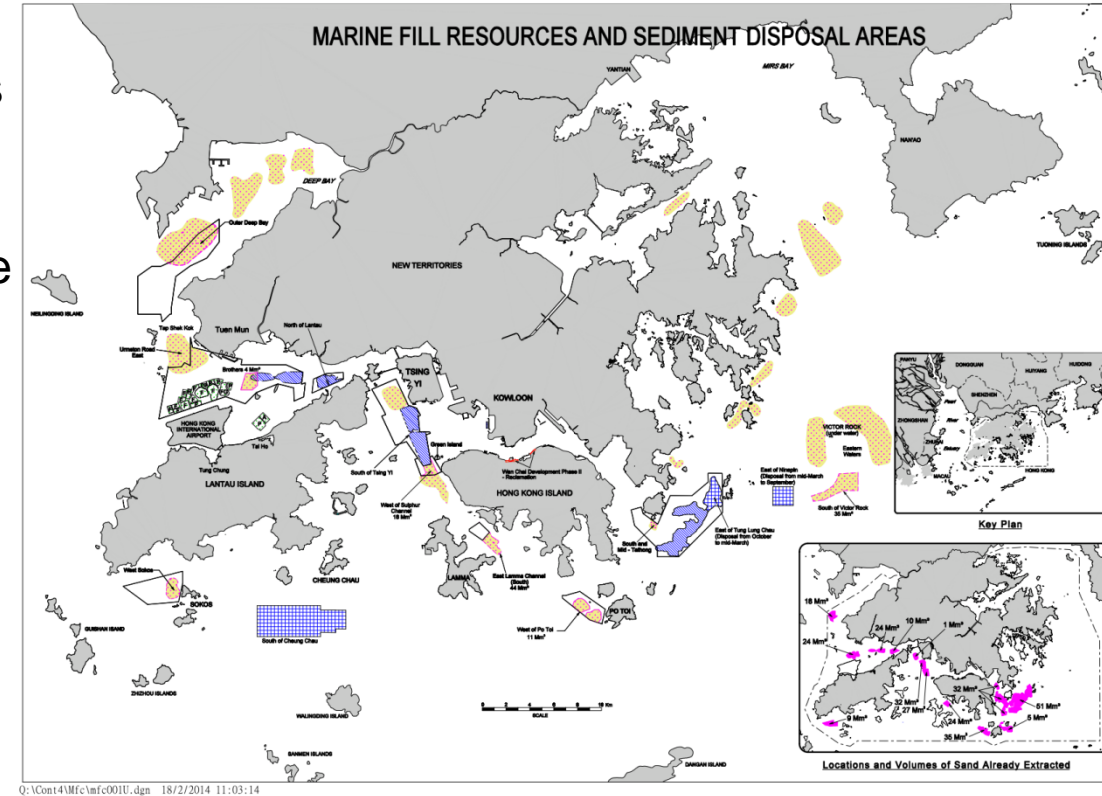
TRADITIONAL SAND SOURCES

- Riverine and Marine sand deposits in HK waters
- Overburden removal required
- Environmental restrictions preventing further use

CURRENT SAND SOURCE

- HK offshore sources Wai Ling Ding
- Substantial reserves available
- One concession given

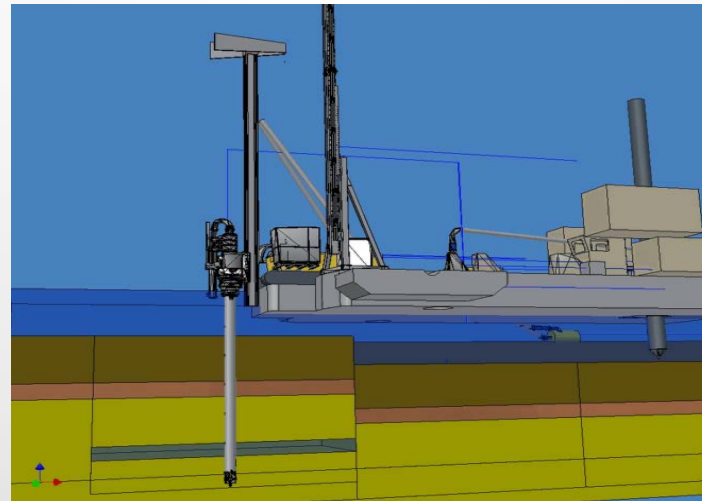
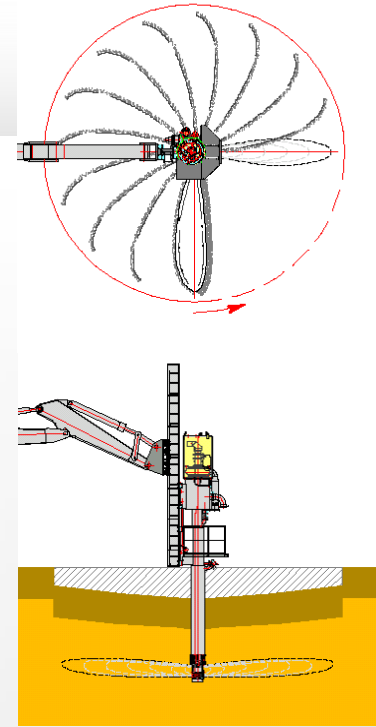
COST LEVEL (FOR LATER COMPARISON): 100



FUTURE SAND SOURCES?

ALTERNATIVE SAND SOURCES

- Upstream Pearl River estuary sources?
 - Low fines content, some with overburden
 - Access to China sources subject to regulations
- Taking sand without removing overburden
 - Tested in HK (Tin Shui Wai, 1986): not successful
 - New development Beaudredge; successfully tested in NL
 - Substantial further research needed to demonstrate technical and economical viability



LONG DISTANCE SAND SOURCES

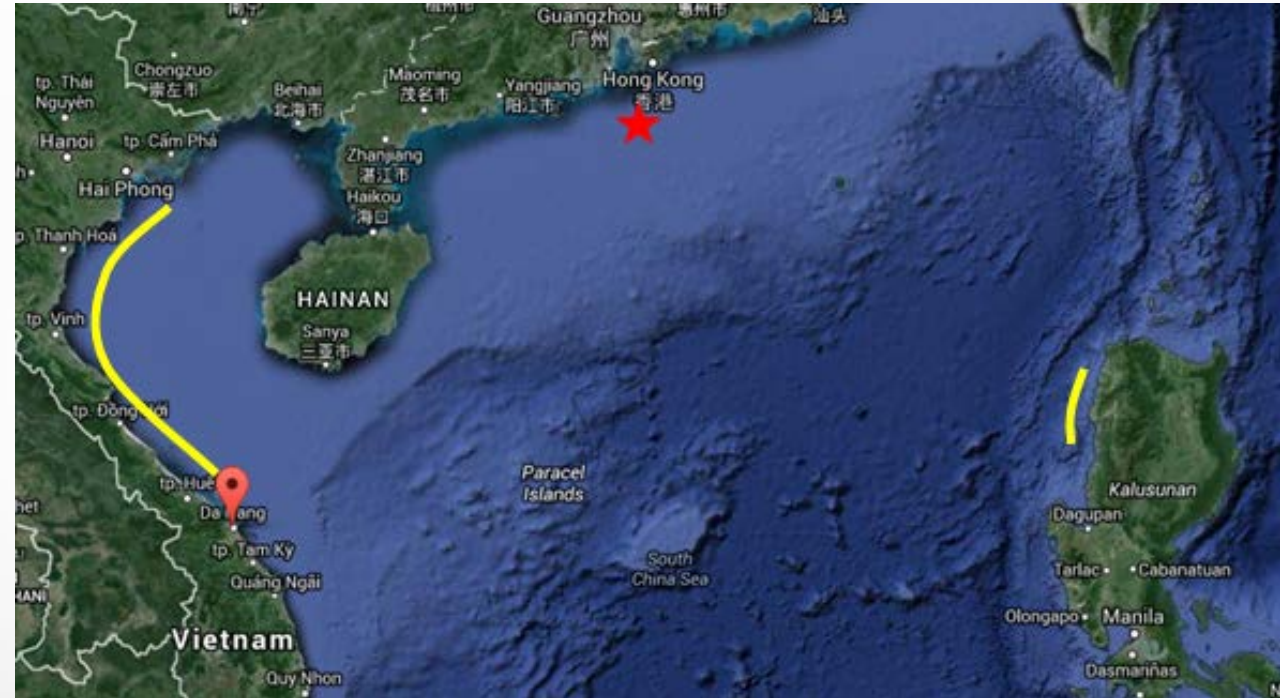
LESSONS FROM SINGAPORE

FROM VIETNAM

- North Vietnam coast at ~1000 km sailing distance
- Suitable sand sources expected to be available
- Export options to be investigated

FROM PHILIPPINES

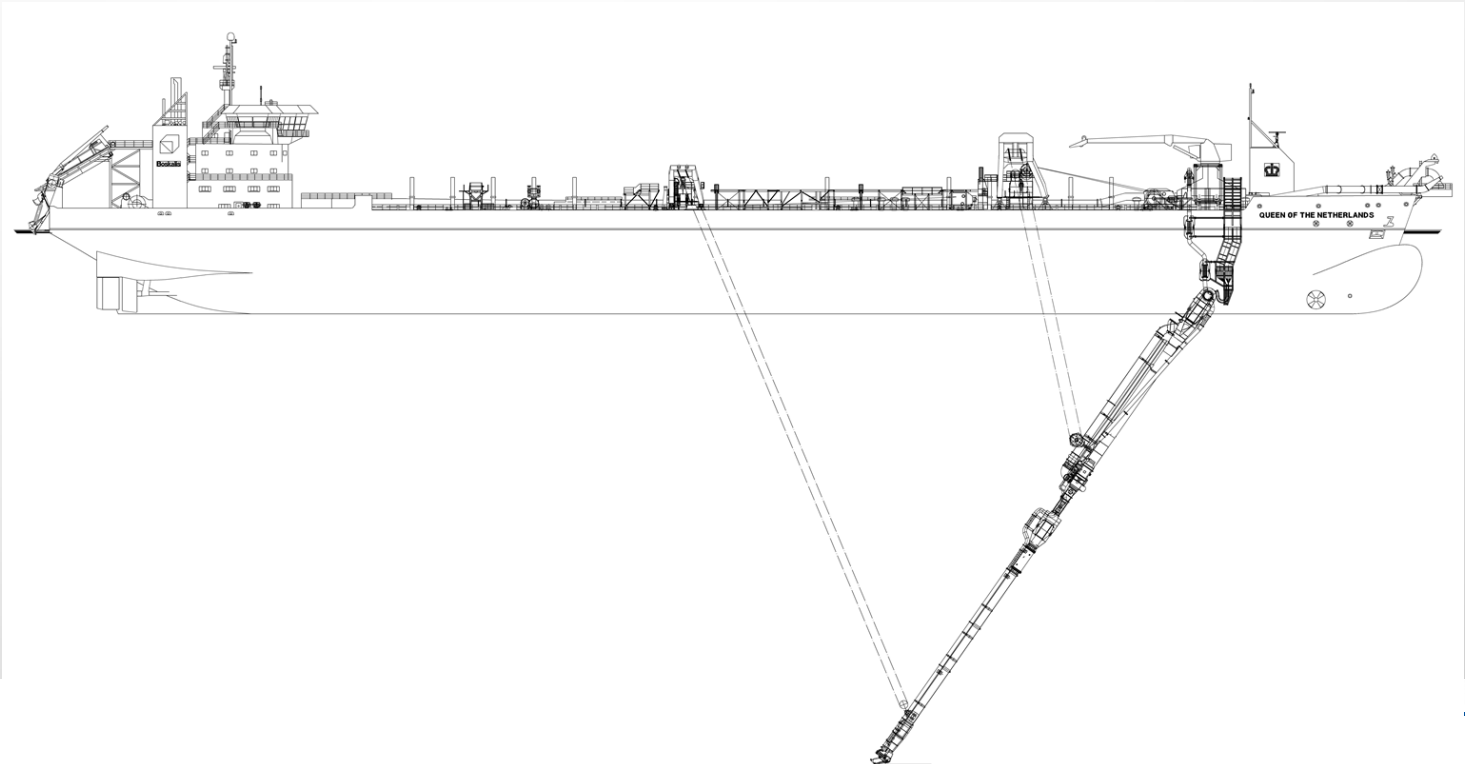
- North islands of Philippines have good quality sand
- Sailing distances to HK ~800 km
- Export likely to be possible



LONG DISTANCE SAND TRANSPORT

BASED ON SINGAPORE EXPERIENCES

- Large bulk carriers very effective
- Separate local loading and unloading equipment required
- Latest generation Trailer Suction Hopper Dredgers capable to work at competitive cost levels.



TSHD DEVELOPMENT

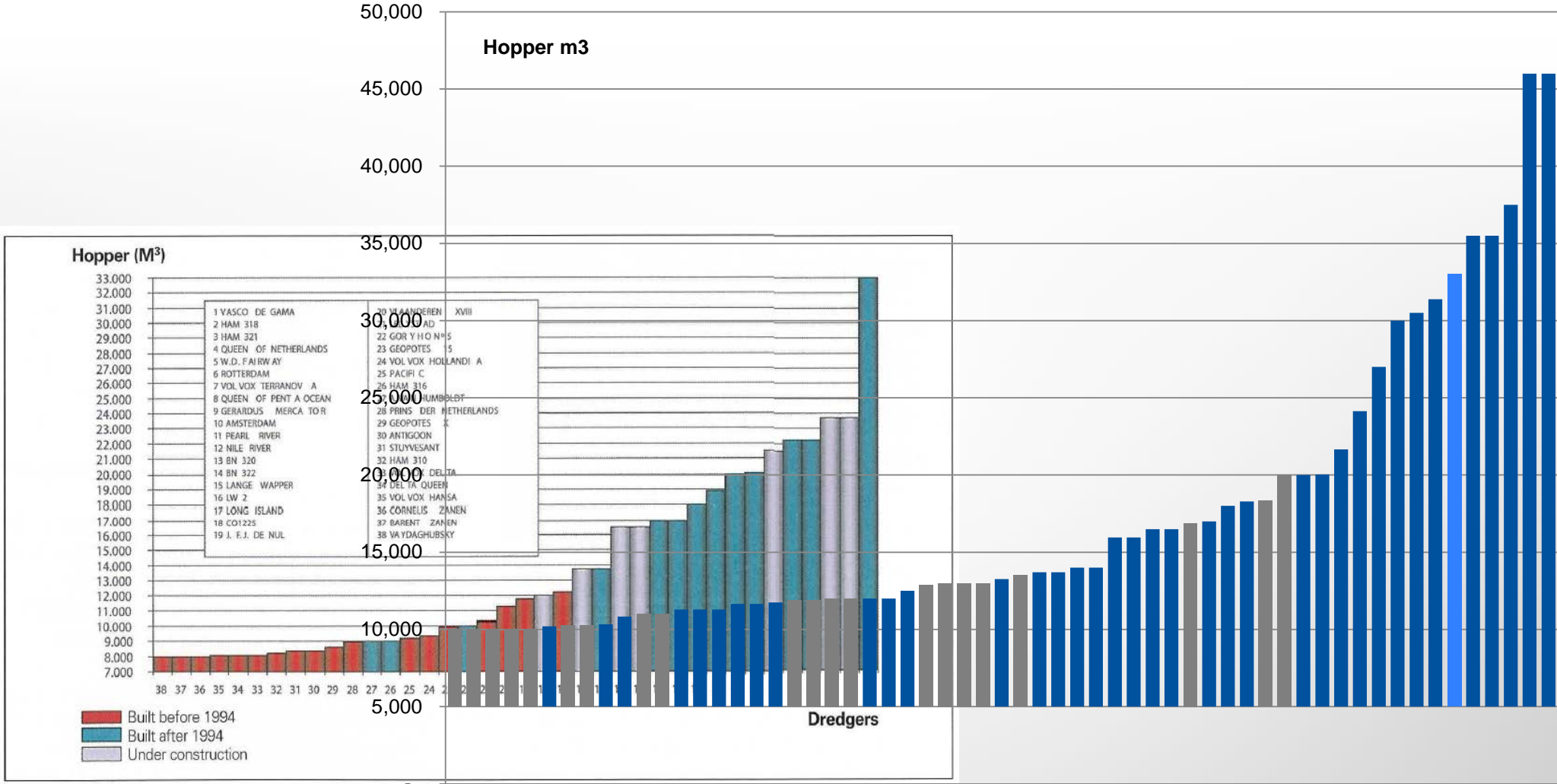
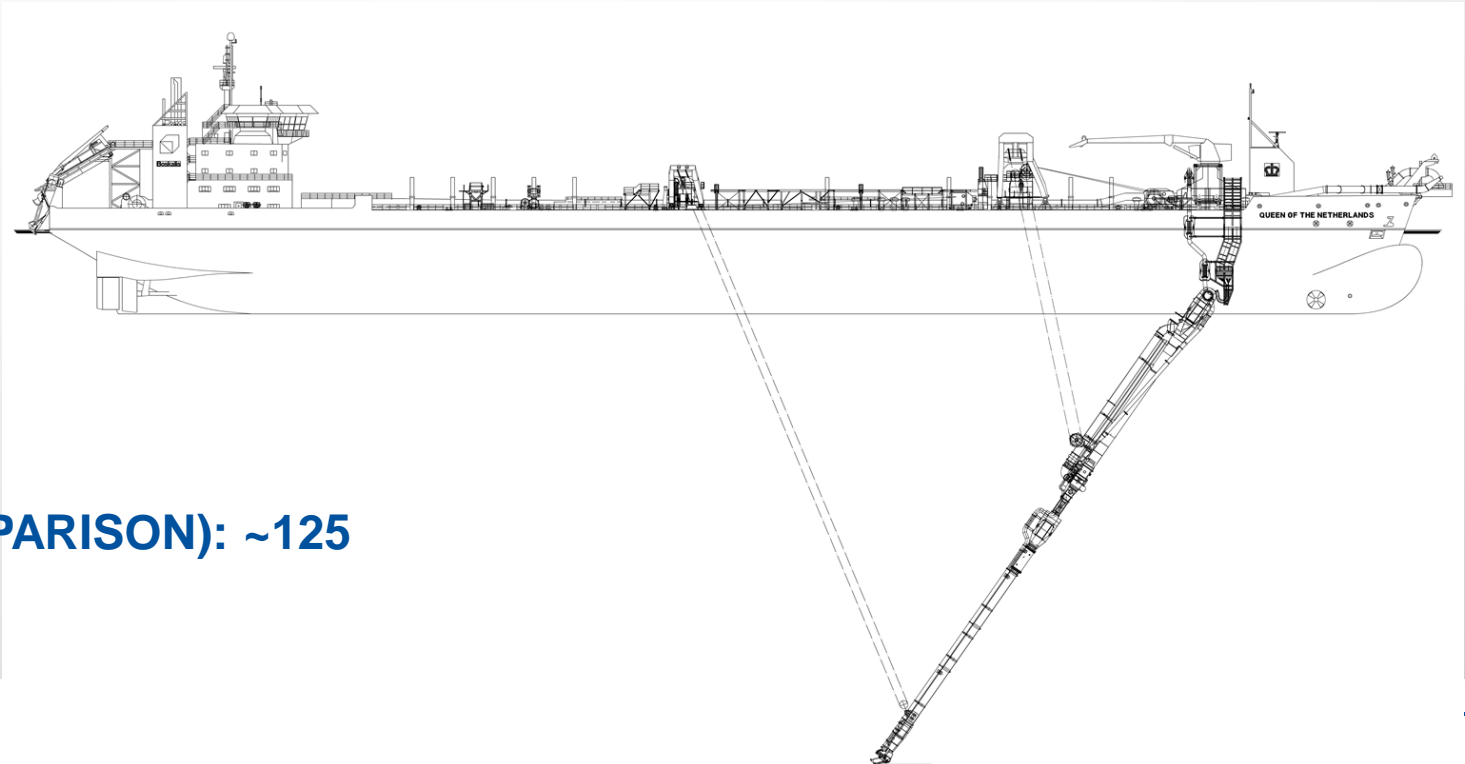


Figure 10. Chart of large and jumbo trailers in 2000.

LONG DISTANCE SAND TRANSPORT

BASED ON SINGAPORE EXPERIENCES

- Large bulk carriers very effective
- Separate local loading unloading equipment required
- Latest generation Trailer Suction Hopper Dredgers capable to work at competitive cost levels.



COST LEVEL (FOR COMPARISON): ~125



OTHER OFFSHORE SOURCES??

SUITABLE SOURCES AVAILABLE OFFSHORE AT SHORTER DISTANCES??

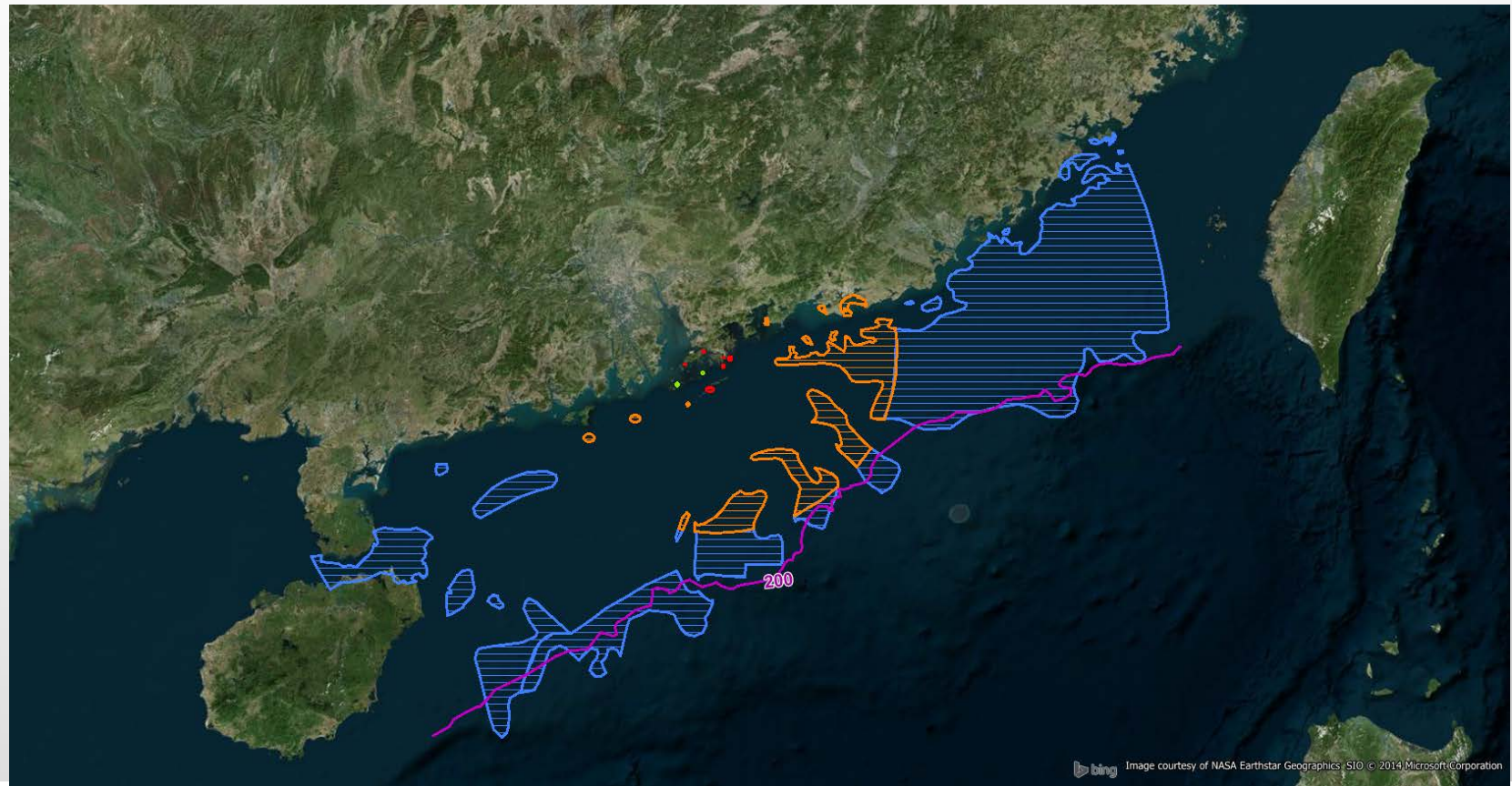
- Likely several explorations already executed:
 - Outside HK waters? further offshore – in deeper water
 - Geological study??
 - Geophysical ‘ geographic physiological studies??
 - Field investigations??
- Study of available Boskalis in-house database of (surface) info shows potential areas.



OTHER OFFSHORE SOURCES??

DATA BASE ANALYSIS

- Offshore HK: distance <200 km, depth 50-80m (orange)
- Offshore HK: distance <500 km, depth 60-250m (blue)

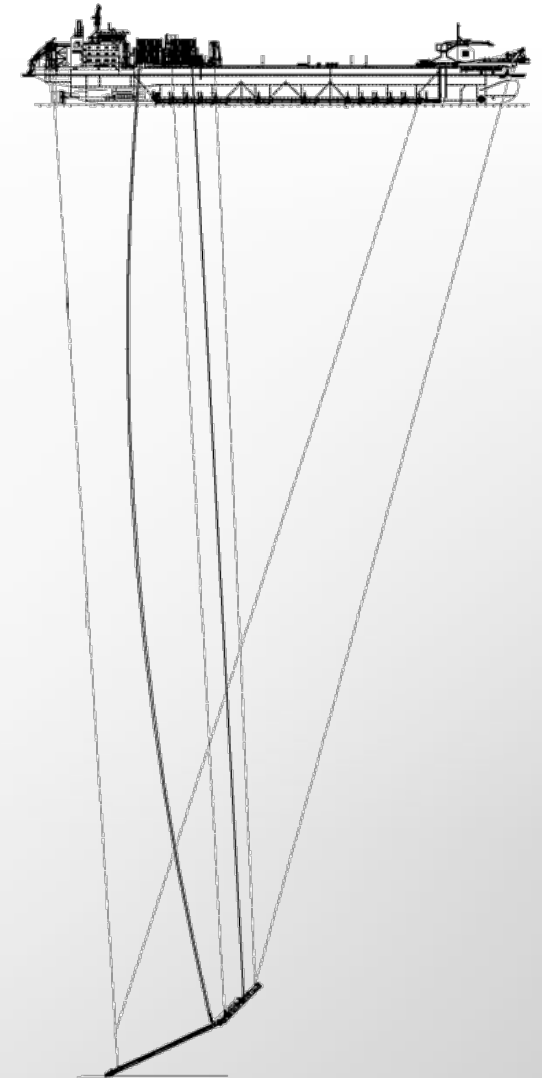
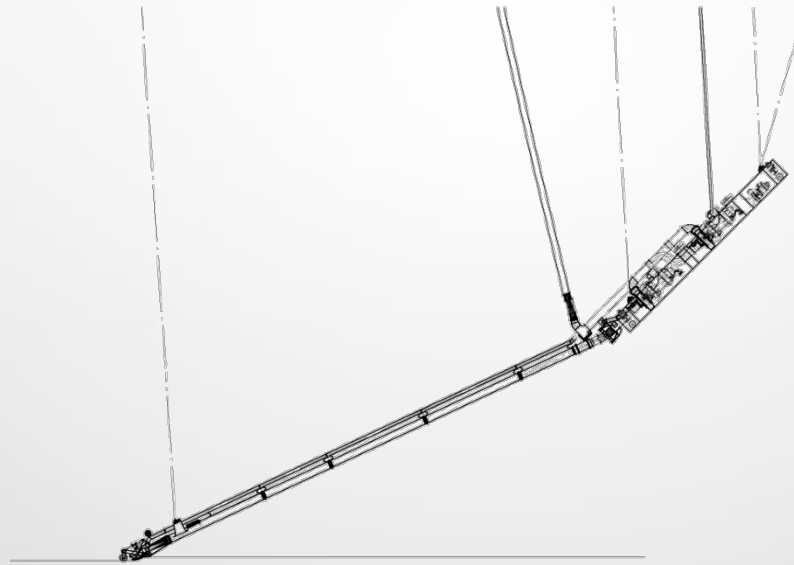




OTHER OFFSHORE SOURCES??

SAND AVAILABLE OFFSHORE AT SHORTER HAUL DISTANCES

- Shallow waters, close-by most attractive,
- But deep water dredging becoming feasible: deep trail unit





OTHER OFFSHORE SOURCES??

SAND AVAILABLE OFFSHORE AT SHORTER HAUL DISTANCES

- To be explored:
 - resource reserves,
 - commercial feasibility,
 - environmental aspects,
 - concessions (who to apply?) & permitting

COST LEVEL (FOR COMPARISON): ~110??

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WHAT NEXT?

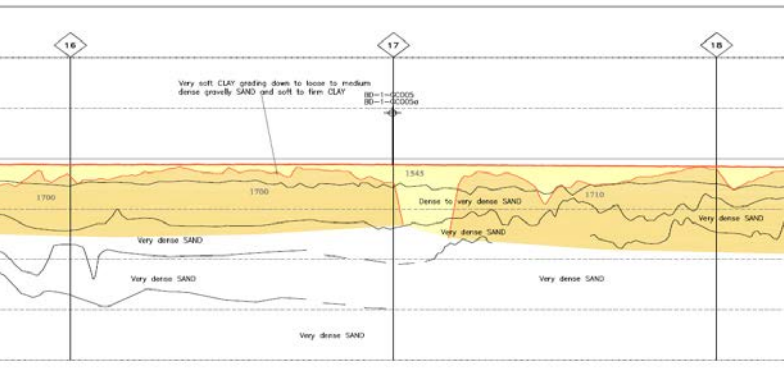
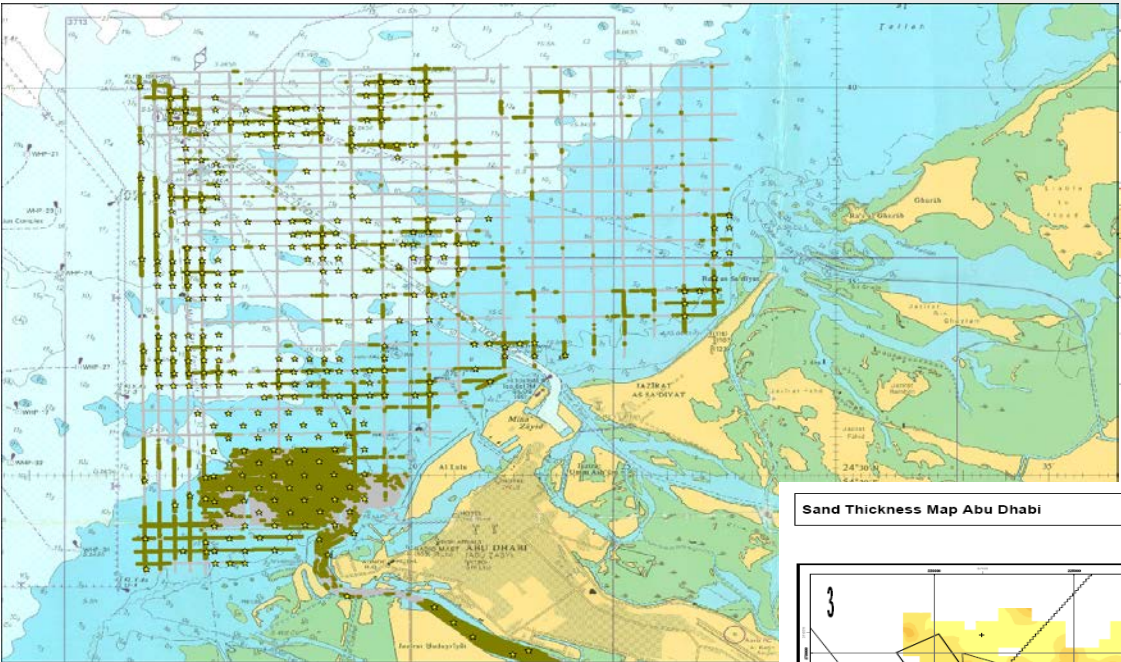
GEOTECHNICAL INVESTIGATIONS

- Understanding the resources
- Systematic exploration: geophysical investigations and study
- Geotechnical investigations (vibrocore)
- Engage knowledge of contractors

LEGAL / CONTRACTUAL ARRANGEMENTS

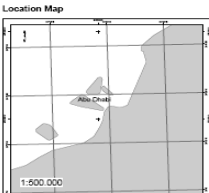
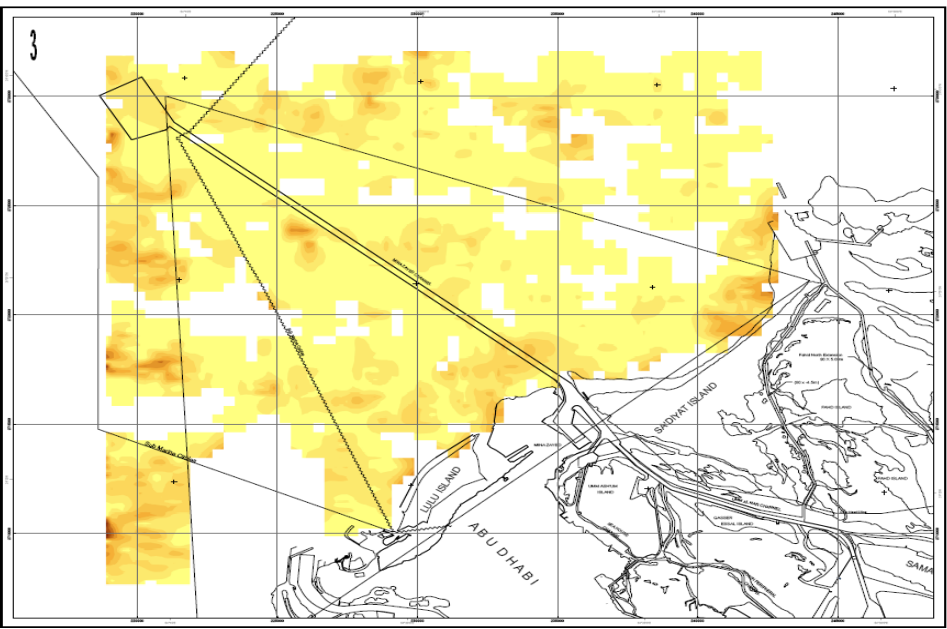
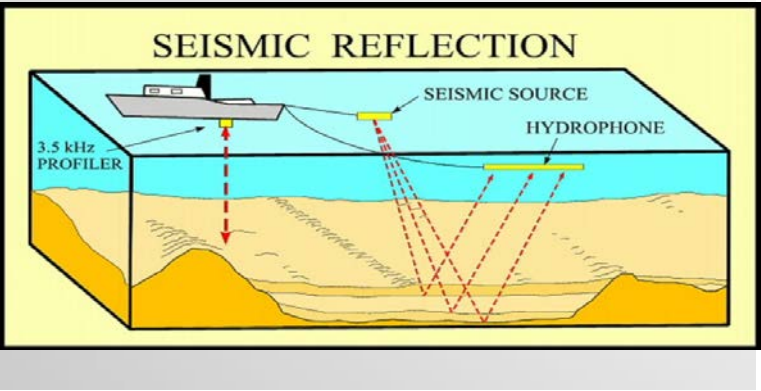
- Who to undertake? Project developer or suppliers.

SOIL INFORMATION AND INVESTIGATION



Sand Thickness Map Abu Dhabi

Project number: 005.25133



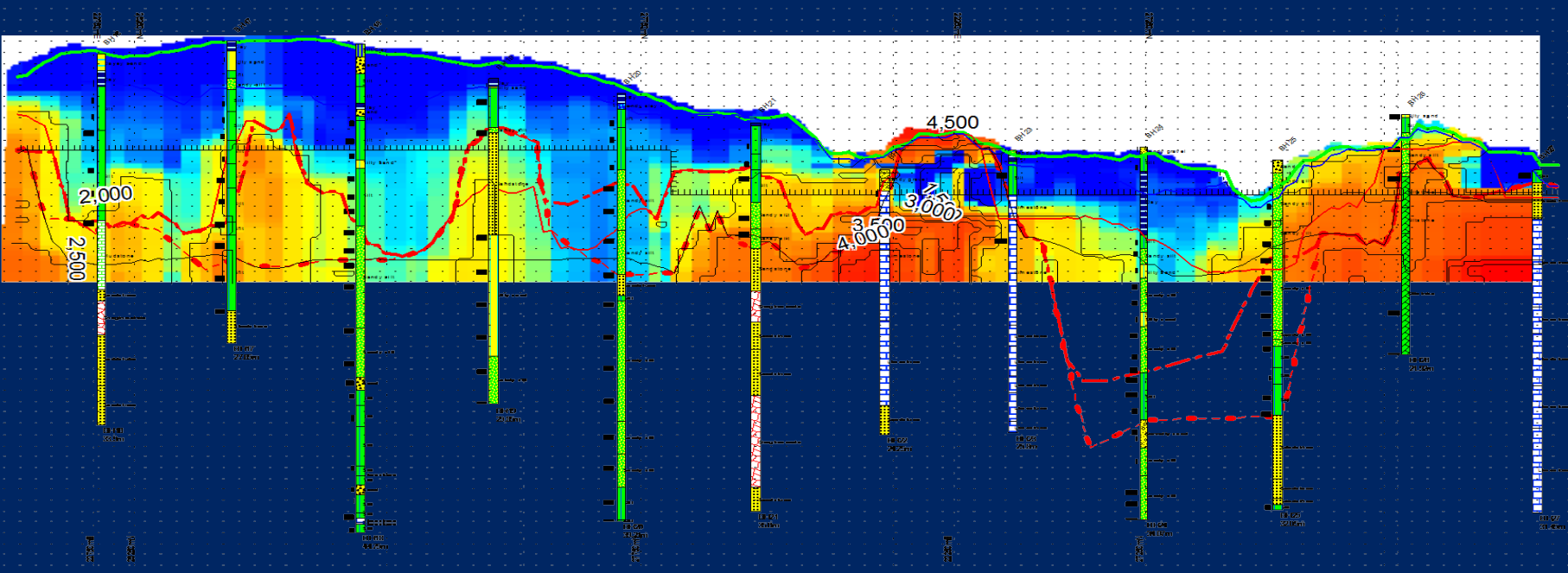
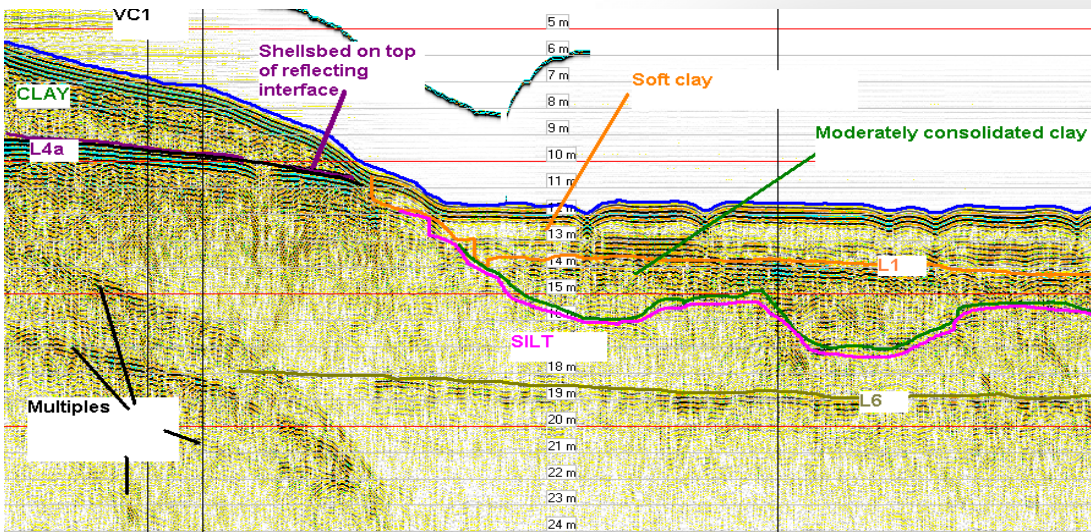
Project information and contact details for Royal Boskalis Westminster BV.

Project information:
Project name: Sand Thickness Map Abu Dhabi Project
Project number: 005.25133
Project start: 15 January 2005
Project end: 15 January 2005
Project location: Abu Dhabi, United Arab Emirates

Contact details:
Royal Boskalis Westminster BV
Rondehoef 22
3584 LX Papendrecht
The Netherlands
Phone: +31 (0)78 636 6000
Fax: +31 (0)78 636 6001
Email: info@boskalis.nl
Website: www.boskalis.nl

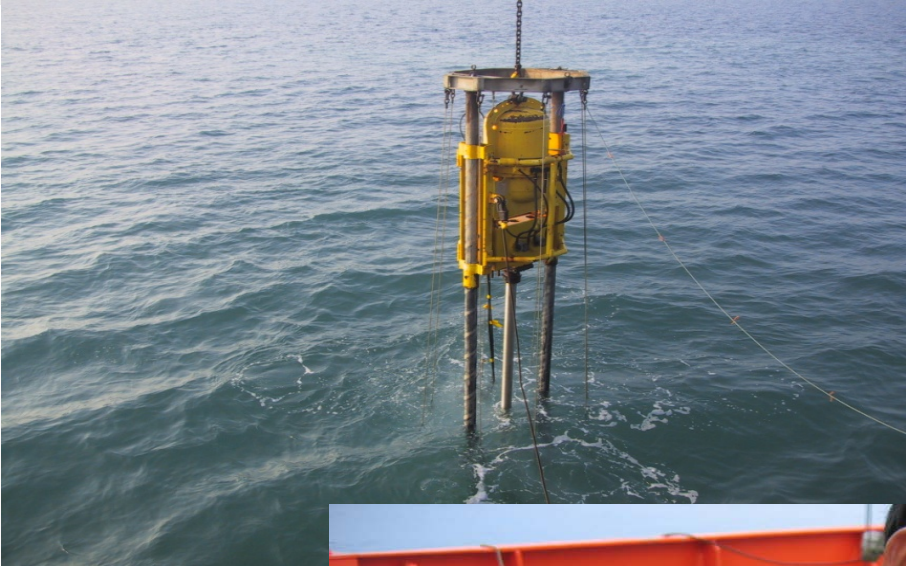


SOIL INFORMATION AND INVESTIGATION





SOIL INFORMATION AND INVESTIGATION



QUALITY OF DATA





QUALITY OF DATA



CONCLUSION

SAND SUPPLY TO HK LARGE INFRASTRUCTURE PROJECTS

- Alternative sources to be studied
- To be well engineered
- In cooperation between all partners
- Contractors, like Boskalis, ready to participate

