

## World's Biggest Challenges

Pressures on Delta's  
The window of the world's water sector stability

EuDA annual meeting November 2011

Hendrik Postma  
www.deltaplan.nl



## Population

Growth  
Migration



Social & Economic Pressures



## Climate Change

Sea level rise

Sea level rise  
Extreme storm events  
Land subsidence



River discharge



Creating system resilience



Altered percolation  
Flooding  
River navigation  
Fresh water management

Pressure on Safety and Environment

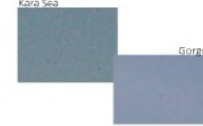


## Scarce Resources

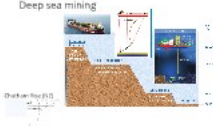
Pressures on resources

Demand for (alternative) energy and resources

Working at remote areas



Mining at extreme locations



## Stakeholder Involvement

Safety



Attitude

More safety, more value, more economic and all while protecting the environment



Technology

Innovative solutions

Equipment  
Engineering  
Design  
Methods  
Tools



Legislation



In Summary

Melbourne  
- Project completed ahead of schedule  
- At least \$200 million under budget  
- High compliance with environmental limits  
- IPA National Infrastructure Project of the year 2010



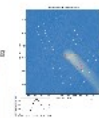
## Research



Early days - Research on equipment  
*'How to dredge?'*

Nowadays - Research on integrated approaches to protect the environment  
*Combining hydraulic engineering with ecology*

But also:  
- Model tests  
- Field tests  
- Plume modelling



Building with Nature



Building with Nature



EUROPEAN DREDGING ASSOCIATION



Royal Boskalis Westminster nv  
International Dredging & Marine Contractors

# World's Biggest Challenges

## *Pressures on Delta's*

The answer of the maritime contractor industry

EuDA annual meeting November 2011

Hendrik Postma

*General Manager Dredging Department & Hydronamic*



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Social & Economic Pressures



Long-term sustainable solutions  
Combined with short-term measures

## Climate Change

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System-based approach  
IC, I, A, A, F, J, S, C

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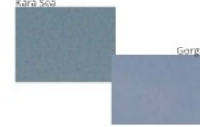


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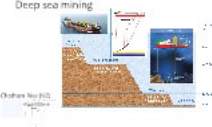
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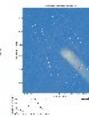
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Building with Nature

Hydraulic engineering  
Ecology  
Sediment transport  
Water quality  
Fisheries  
Recreation

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Water quality  
Sediment transport  
Fisheries  
Recreation  
Hydraulic engineering  
Ecology



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Growth  
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Social & Economic Pressures

Maasvlakte 2

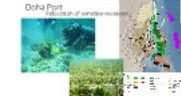


Long-term sustainable solutions  
Combined with short-term interests

Reclamation



Economic development





# Social & Economic Pressures

Maasvlakte 2



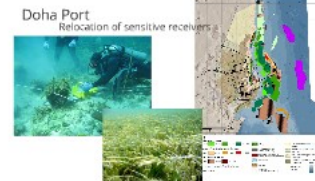
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## Reclamation

Creating space for living  
Creating space for sustainable economic development



## Economic development



# Long-term sustainable solutions

## Combined with short-term interests

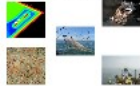
### Reclamation

Creating space for living  
Creating space for sustainable economic development

Bahrain



Ecological mining pit



### Economic development

Doha Port

Relocation of sensitive receivers



Zone	Color
Ecological mining pit	Green
Water	Blue
Land	Brown
Urban	Yellow

# Reclamation

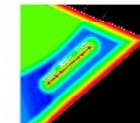
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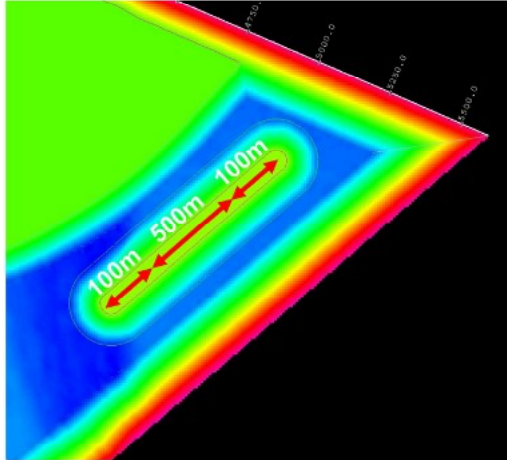


Ecological mining pit





# Ecological mining pit

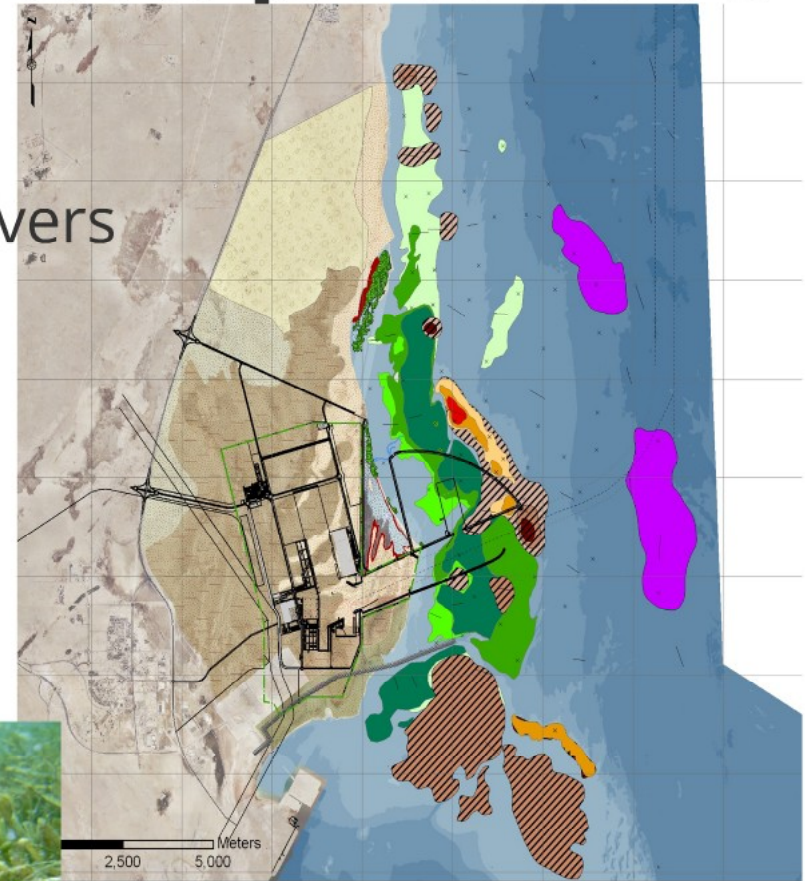




# Economic development

## Doha Port

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System-based approach  
 (IC, I, A, P, J)

River discharge



Creating system resilience

Altered precipitation  
 Flooding  
 River navigation  
 Fresh water management

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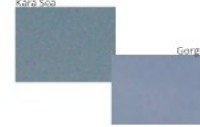


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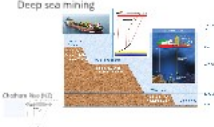
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Mining at extreme locations



## Stakeholder Involvement

Safety



Attitude



Technology



Legislation



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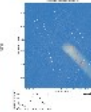
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Building with Nature

• Nature-based solutions  
 • Ecosystem services  
 • Resilience  
 • Sustainability

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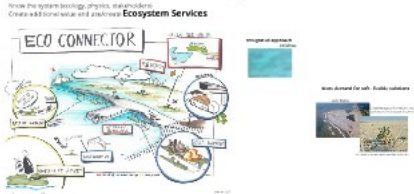
# Climate Change

## Sea level rise

Sea level rise  
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System-based approach



## River discharge



Creating system resilience  
*Not always stronger/higher*



Altered precipitation  
Flooding  
River navigation  
Fresh water management

## *Pressure on Safety and Environment*



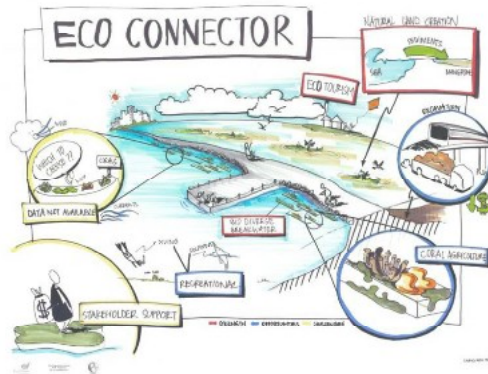


# Sea level rise

Sea level rise  
Extreme storm events  
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## System-based approach

Know the system (ecology, physics, stakeholders)  
Create additional value and use/create **Ecosystem Services**



More demand for soft - flexible solutions

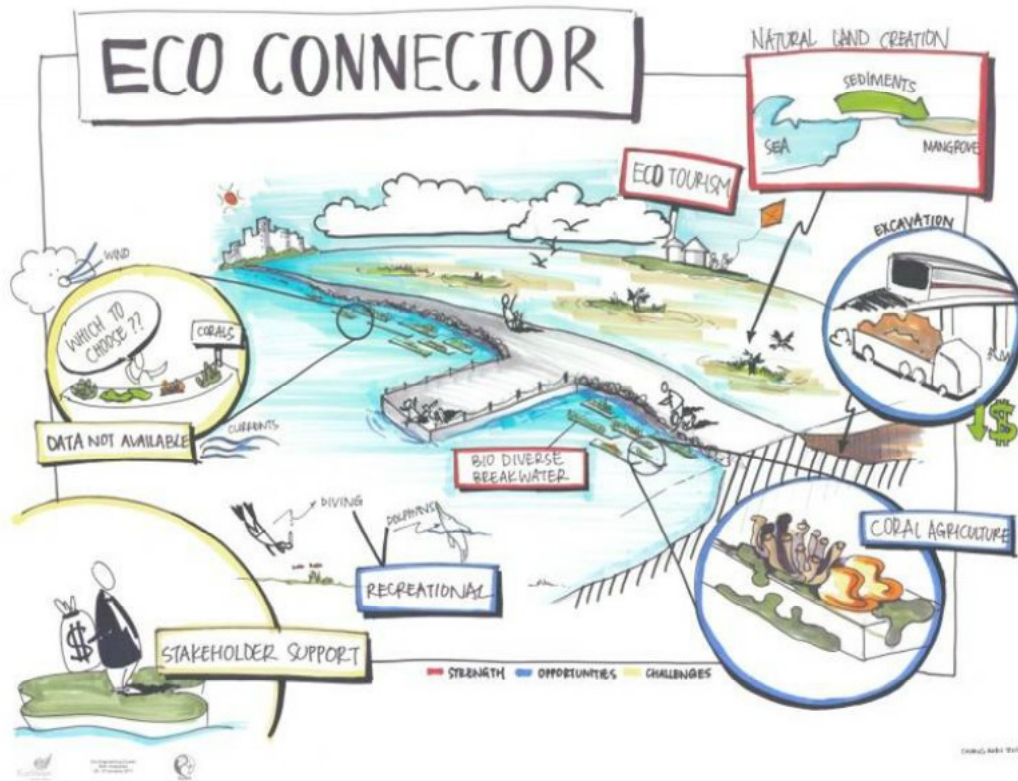




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Integrated approach  
Velidhoo



More demand for soft - flexible solutions

Sand Engine



Creating space for nature, recreation, safety and increasing biodiversity



Rare survival of sand engine (Atrypa incana) project (pilot model)

# Integrated approach

## *Velidhoo*



# More demand for soft - flexible solutions

## *Sand Engine*



Creating space for nature, recreation, safety and increasing biodiversity



<http://www.zeetoren.nl/zeetoren/newsitems/ni000489>

Rare saltbush at sand engine (*Atriplex laciniata* (dutch: gelobde melbe))



# River discharge



Creating system resilience  
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Altered percipation  
wet/dry periods  
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# Creating system resilience

*Not always stronger/higher*

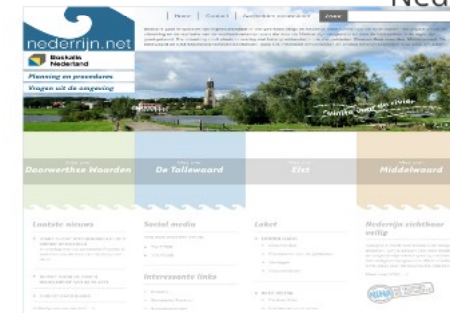
Managed retreat

Wallasea



Room for the river

Nederrijn



stakeholder involvement

# Managed retreat

Wallasea



# Room for the river

## Nederrijn

nederrijn.net

Boskalis Nederland

Planning en procedures  
Vragen uit de omgeving

Home | Contact | Aanmelden nieuwsbrief Zoek:

Boskalis gaat in opdracht van Rijkswaterstaat in vier gebieden langs de Nederrijn meer ruimte voor de rivier maken. Het project omvat de uitwerking en de realisatie van de voorkeursvarianten zoals die door de Minister zijn vastgesteld en door de bestuurders in de regio zijn goedgekeurd. Die uitwerking vindt plaats in overleg met belanghebbenden in de vier gebieden: Doorwerthse waarden, Middelwaard, De Tollewaard en Elst (Machinistenschool/steenfabriek). Deze site informeert omwonenden en andere belanghebbenden over deze projecten.

ruimte voor de rivier

Alles over: **Doorwerthse Waarden**

Alles over: **De Tollewaard**

Alles over: **Elst**

Alles over: **Middelwaard**

**Laatste nieuws**

- **START SLOOP STEENFABRIEK ELST 3 WEKEN UITGESTELD**  
In overleg met de gemeente Rheden is besloten om de start van de sloop van de st...
- **RUIJTE VOOR DE RIVIER NIEUWSBRIEF VAN 22-05-2011**
- **ONRUST OVER RIVIER**

Volledig nieuwsoverzicht... >

**Social media**

Volg deze projecten ook op:

- TWITTER
- YOUTUBE

**Interessante links**

- > Boskalis
- > Gemeente Renikum
- > Staatsbosbeheer

**Loket**

- **DOWNLOADS**
  - > Documenten
  - > Plankaarten van de gebieden
  - > Verslagen
  - > Nieuwsbrieven
- **IN DE MEDIA**
  - > Persberichten
  - > Kranten en publicaties

**Nederrijn zichtbaar veilig**

Veiligheid heeft voor Boskalis de hoogste prioriteit. Om te zorgen voor een incident- en ongevalvrije werkomgeving hebben we het veiligheidsprogramma NINA ontwikkeld. NINA staat voor No Injuries No Accidents.

Meer over NINA... >

**NINA NO INJURIES NO ACCIDENTS**

stakeholder involvement

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## Population

Growth  
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Social & Economic Pressures



## Climate Change

Sea level rise

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River discharge



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Altered percolation  
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Fresh water management



Pressure on Safety and Environment



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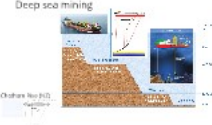
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Mining at extreme locations



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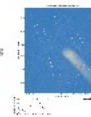
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Building with Nature

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EUROPEAN DREDGING ASSOCIATION



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# Scarce Resources

*Pressures on resources*

*Demand for (alternative) energy and resources*

Working at remote areas

Kara Sea

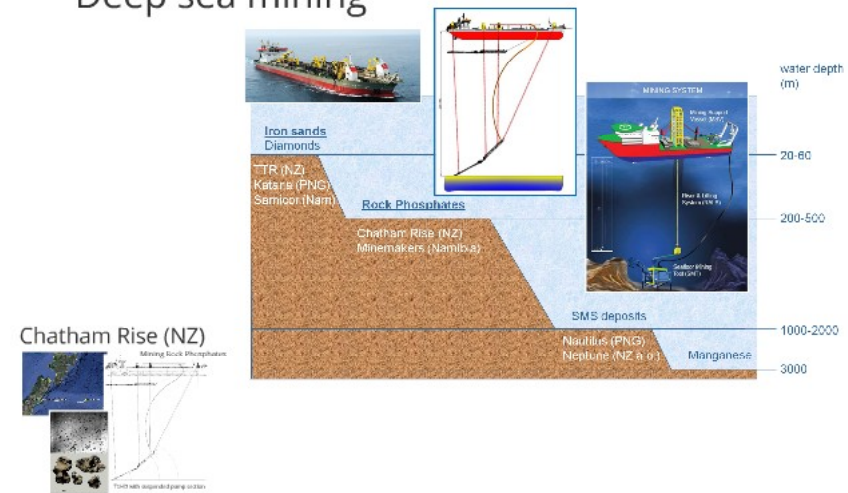


Gorgon



Mining at extreme locations

Deep sea mining



# Working at remote areas

Kara Sea

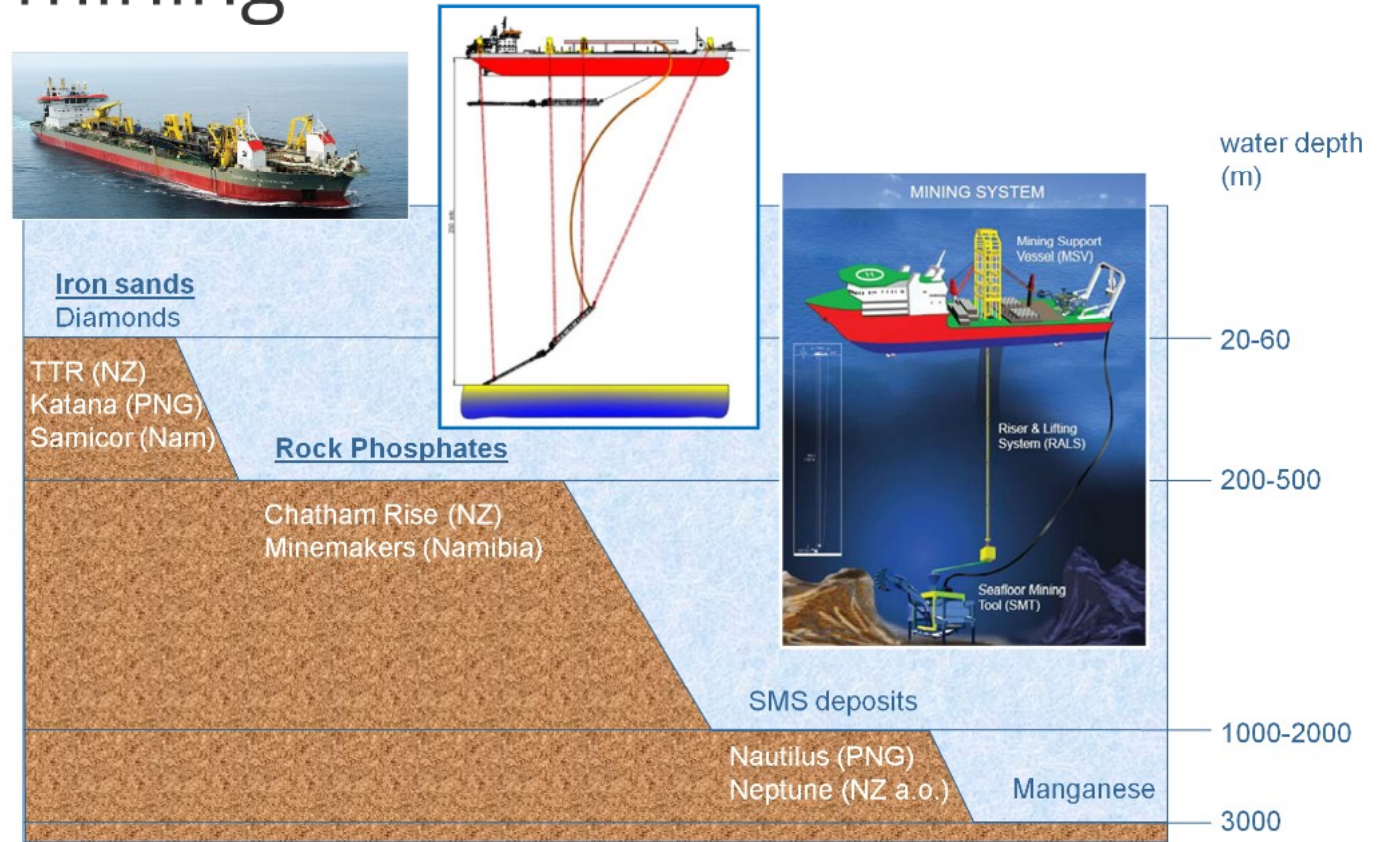


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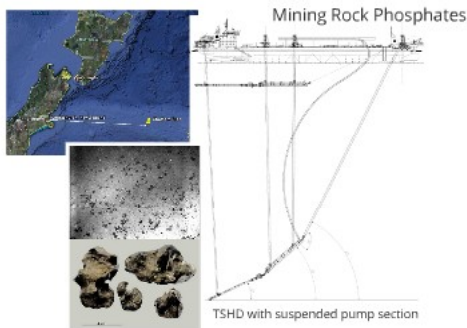


# Mining at extreme locations

## Deep sea mining



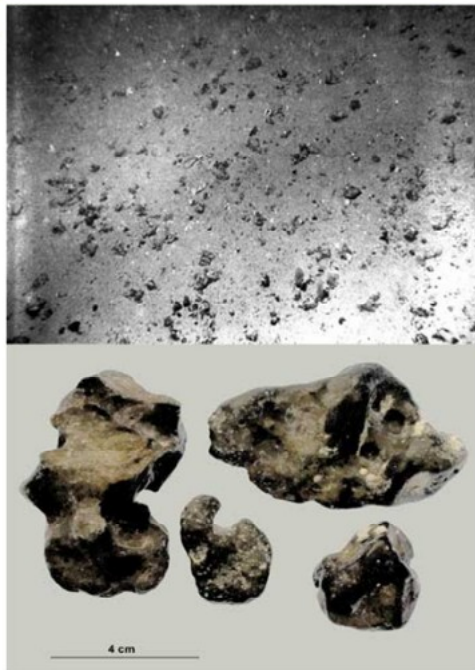
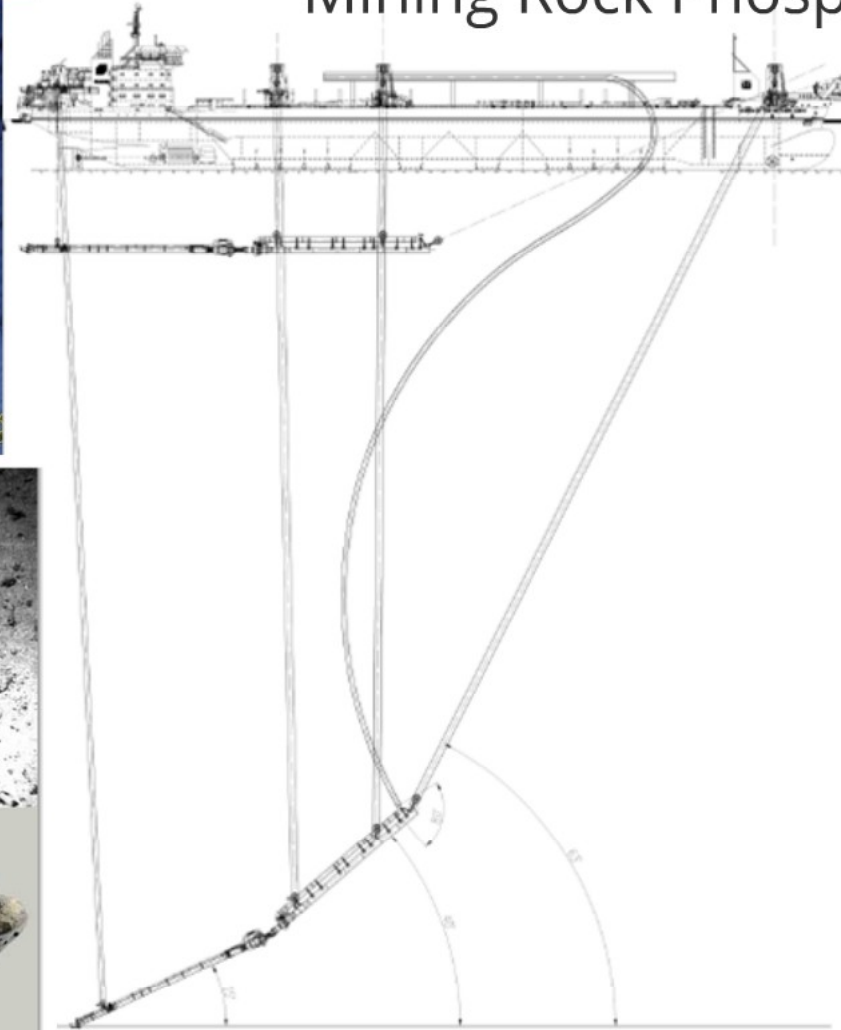
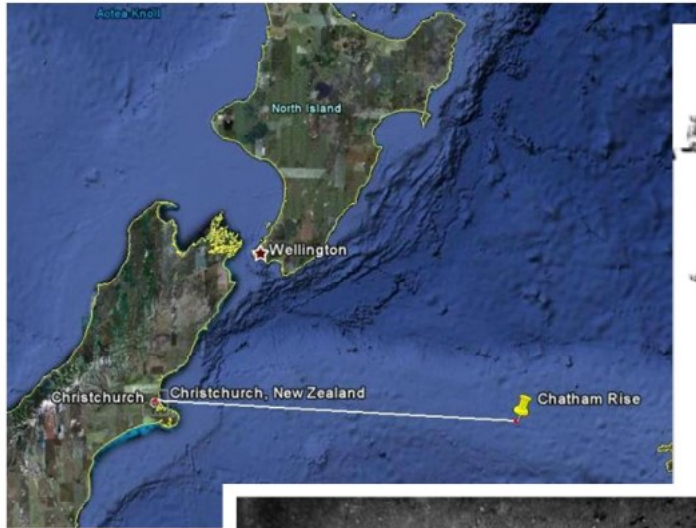
### Chatham Rise (NZ)





# Chatham Rise (NZ)

Mining Rock Phosphates



TSHD with suspended pump section

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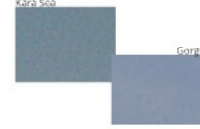


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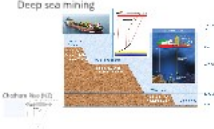
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Helps create a better work, more economic and of which is protecting the environment

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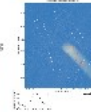
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Hydraulic engineering  
Ecology  
Environmental engineering  
Civil engineering  
Marine engineering  
Structural engineering

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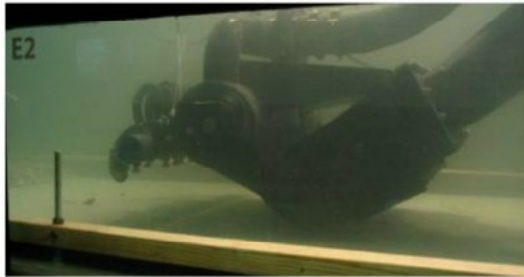


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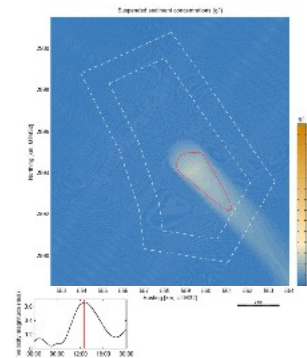


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## Building with Nature

### Objectives

- Ecosystem knowledge development in order to facilitate integration between ecology and marine construction works
- Development of science based design guidelines and standards
- Demonstration of experiences with the application of nature concepts
- Make Building with Nature tangible by development of show cases
- Facilitate social acceptance of new concepts



## Building with Nature

### New Cases

- Natural defenses
- Social-Economic development in sensitive estuaries
- Sustainable development of cities in Deltas
- Integrated solutions for rivers
- Feasibility of dredging in sensitive areas





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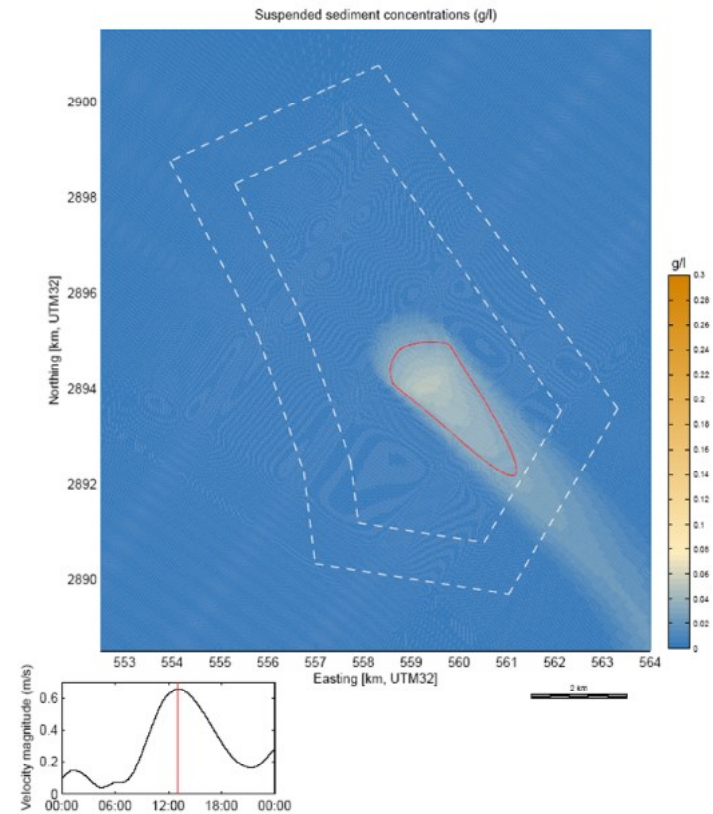
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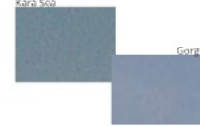


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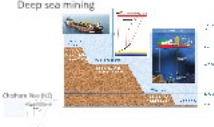
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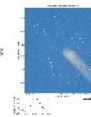
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Marine engineering  
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Hydraulic engineering



EUROPEAN DREDGING ASSOCIATION

# Stakeholder Involvement

## Safety



## Attitude

More, better, faster, safer, more economic and all while protecting the environment!



## Technology

Innovative solutions

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- Engineering
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- Methods
- Tools



## Legislation

Flexibility in regulations is required



Contract format

- ECI
- PPP
- DBFM
- Alliance contract



Responsibilities for government and contractor

# Safety



### SAFETY STATEMENT

Our people are our most valuable assets, making safety a core value. Our goal is: No Injuries No Accidents. This is embedded in our company's culture and supported through Values and Rules. All employees, including our sub-contractors, are expected to take these values and rules to heart.

### VALUES

- I AM RESPONSIBLE FOR MY OWN SAFETY
- I APPROACH OTHERS ABOUT WORKING SAFELY
- I TAKE ACTION IN CASE OF UNSAFE OPERATIONS. IF NECESSARY, I WILL STOP THE WORK
- I ACCEPT FEEDBACK ABOUT MY SAFETY BEHAVIOUR REGARDLESS OF RANK AND POSITION
- I REPORT ALL INCIDENTS, INCLUDING NEAR-MISSES, TO INFORM OTHERS AND BUILD ON LESSONS LEARNED

### RULES

- PREPARE A RISK ASSESSMENT FOR EACH PROJECT, VESSEL OR LOCATION
- OBTAIN A PERMIT TO WORK FOR DEFINED HIGH-RISK ACTIVITIES
- MAKE A JOB HAZARD ANALYSIS FOR HAZARDOUS NON-ROUTINE ACTIVITIES
- BE INFORMED ABOUT RISK & CONTROL MEASURES
- BE FIT FOR DUTY AND WEAR THE PPE REQUIRED





# Attitude

More, better, faster, safer, more economic  
and all while protecting the environment!



# Technology

## Innovative solutions

- Equipment
- Engineering
- Design
- Methods
- Tools



# Legislation

Flexibility in regulations  
is required



## Contract format

- ECI
- PPP
- DBFM
- Alliance contract



Opportunities for proponent and contractor



# In Summary

## Melbourne

- Project completed ahead of schedule
- At least \$200 million under budget
- High compliance with environmental limits
- IPA National Infrastructure Project of the year 2010



NEED RELEASE  
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# MEDIA RELEASE

**FOR IMMEDIATE RELEASE**

**11 March 2010**

## **MELBOURNE CHANNEL DEEPENING AUSTRALIA'S INFRASTRUCTURE PROJECT OF THE YEAR**

The Port of Melbourne's channel deepening project was selected as the infrastructure project of the year, at the prestigious National Infrastructure Awards – held by Infrastructure Partnerships Australia, the nation's peak infrastructure body – in Sydney tonight.

"The Port of Melbourne and its partners should be very proud of their excellent Channel Deepening Project," said IPA chairman, Mark Birrell.

"Dredging was completed in November, one month ahead of schedule and at least \$200 million under budget, showcasing how the public and private sectors can work together to deliver excellent outcomes.

"The project was also subject to unprecedented opposition and scrutiny from pressure groups, but it was delivered extremely well and with none of the problems claimed by opponents.

"Melbourne's Channel Deepening Project was an outstanding project and its success