

HERRENKNECHT



Tunnelling Systems

UCT 2025

# TRENCHLESS SHORE APPROACHES THE ROLE OF PIPE JACKING AND DIRECT PIPE FOR VARIOUS APPLICATIONS

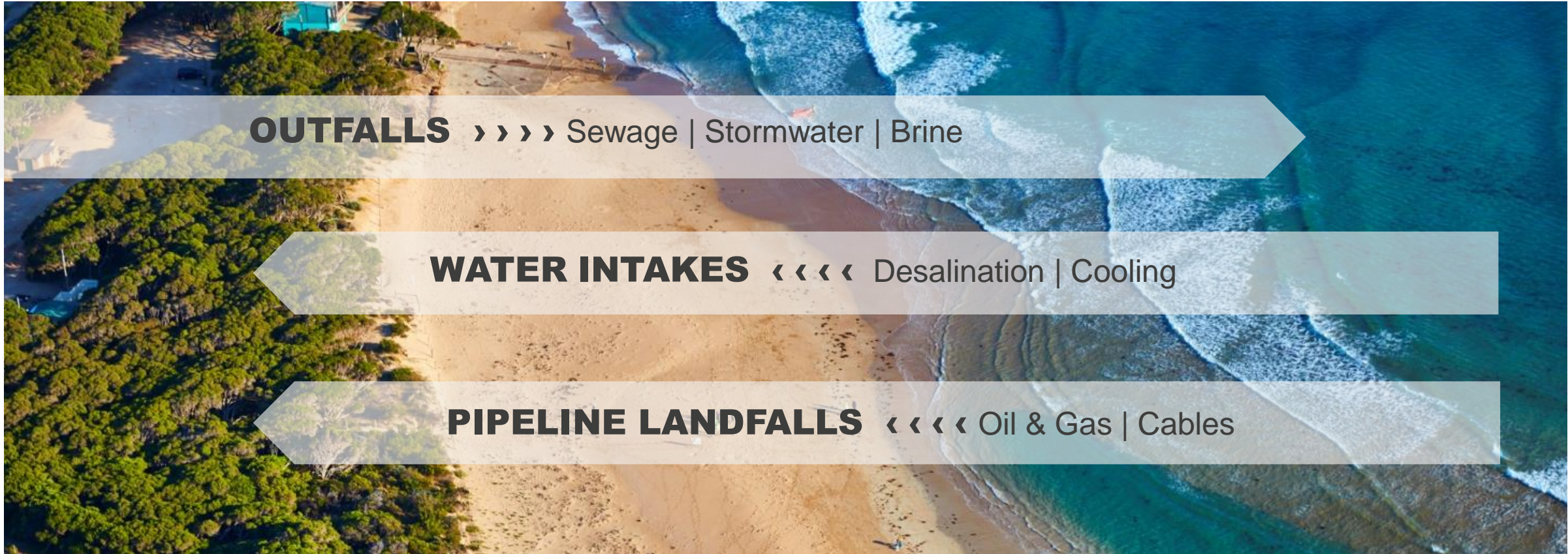
March 2025, Houston  
Dr. Gerhard Lang

UTILITY TUNNELLING

# SHORE WITH MICROTUNNELLING TECHNOLOGIES



# APPLICATION FIELDS OF SEA OUTFALLS, INTAKES AND LANDFALLS



**OUTFALLS** >>>> Sewage | Stormwater | Brine

**WATER INTAKES** <<<< Desalination | Cooling

**PIPELINE LANDFALLS** <<<< Oil & Gas | Cables



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# WHY GOING TRENCHLESS IN COASTAL AREAS

- › Minimized impact on **environment**
  - › protection of wildlife and sea water quality
- › Small jobsite **footprint** onshore
- › Minimum offshore works required | low influence of weather conditions and tide
- › **Accurate** drives of over **2 km** length possible



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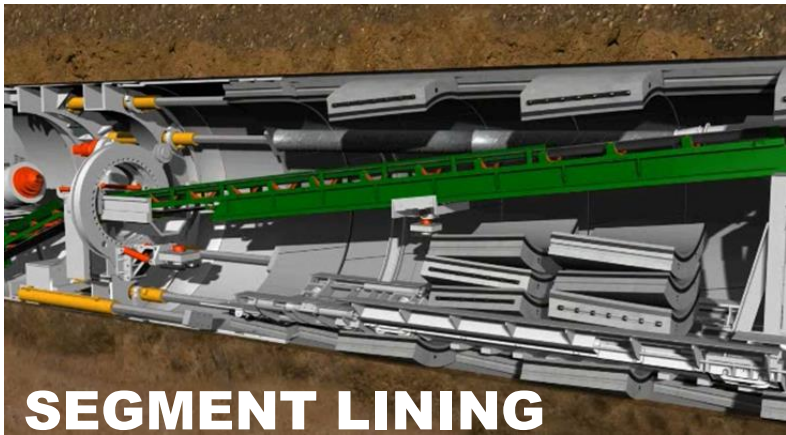


# TRENCHLESS TECHNOLOGIES OF SEA OUTFALLS, INTAKES AND LANDFALLS

TUNNELLING



PIPE JACKING | MICROTUNNELLING

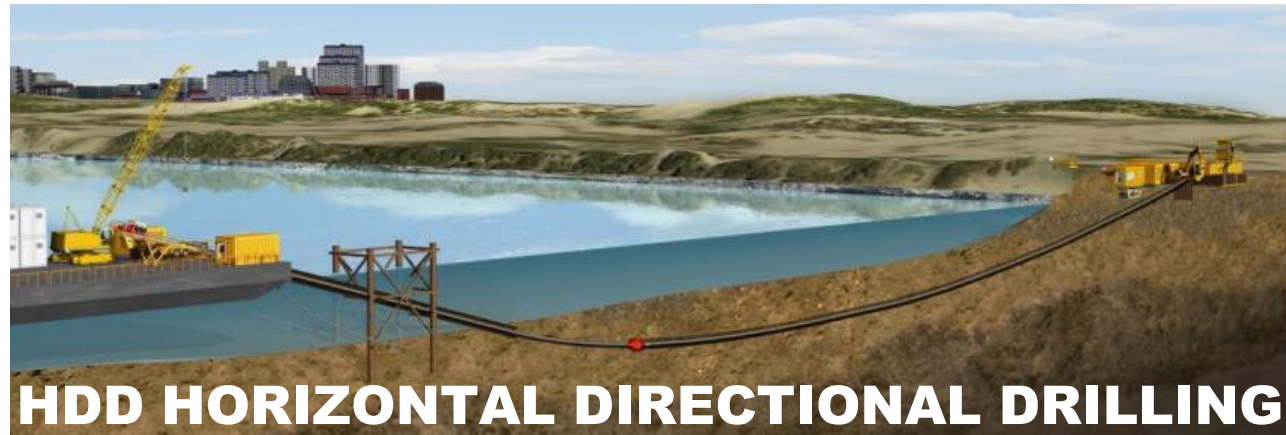


SEGMENT LINING



DIRECT PIPE®

PIPELINE



HDD HORIZONTAL DIRECTIONAL DRILLING

Background image of workers in a tunnel construction site. The workers are wearing safety gear and are working on a large pipe.

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# MICROTUNNELLING FOR SEA OUTFALLS, INTAKES AND LANDFALLS



## PIPE JACKING

for tunnelled casings



## DIRECT PIPE®

one-step installation of steel pipelines (Ø 24" – 60")



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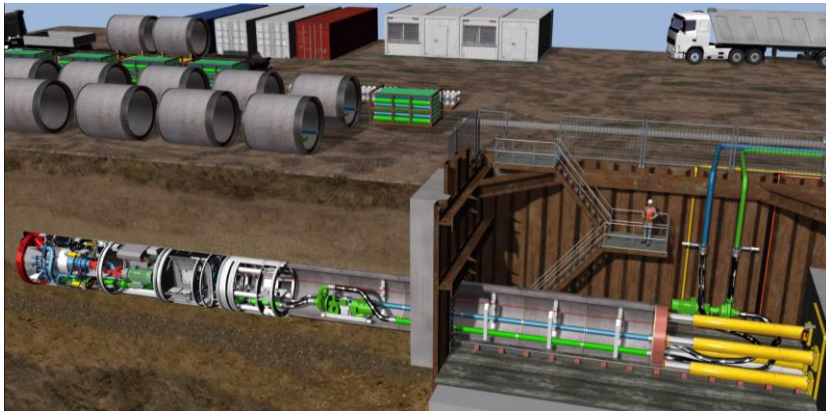
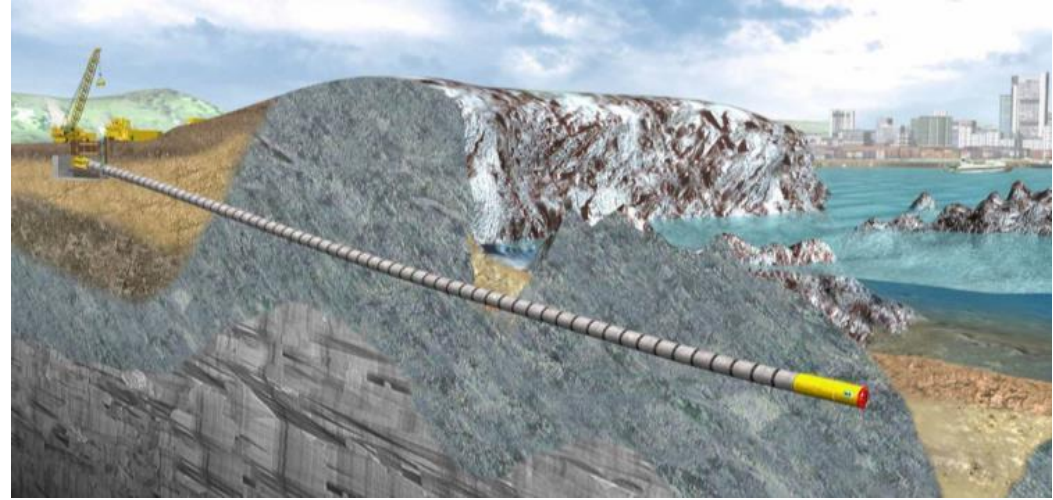


UTILITY TUNNELLING

# PIPE JACKING



# SEA OUTFALLS WITH PIPE JACKING



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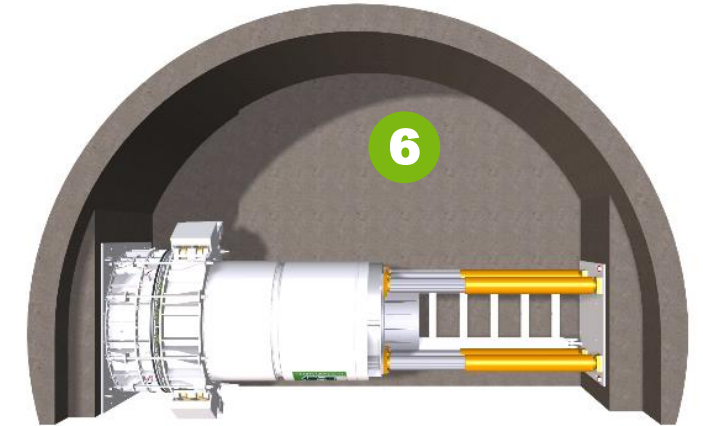
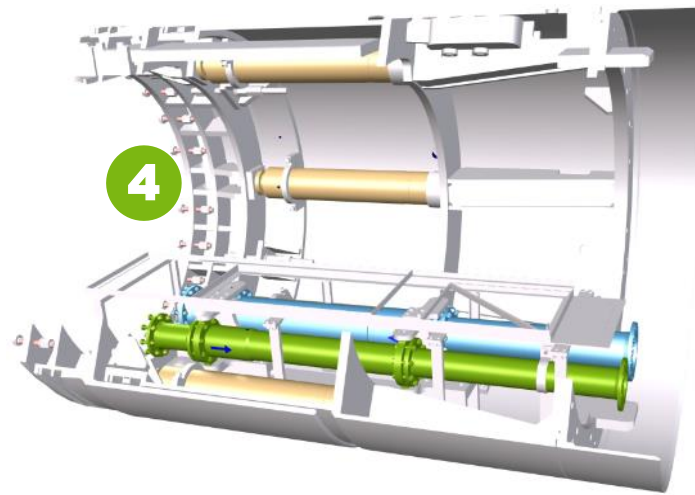




# MTBM MACHINE DESIGN & SUCCESS PARAMETERS



- 1 Cutting wheel and cutter tools
- 2 Main bearing and main drive
- 3 Steering cylinders
- 4 Telecopic station
- 5 Intermediate jacking stations
- 6 Main jacking station
- 7 Jacking pipes



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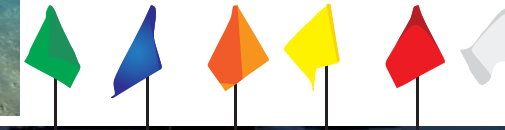
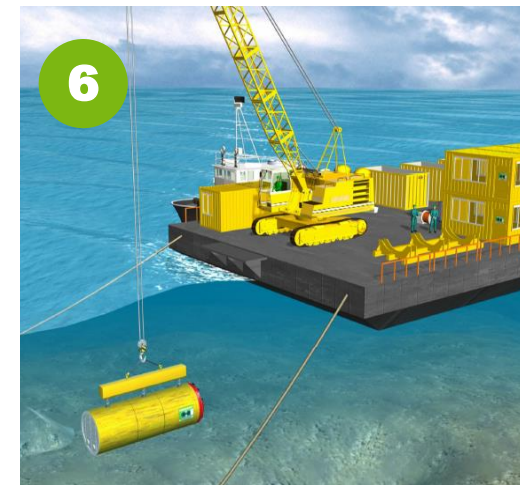
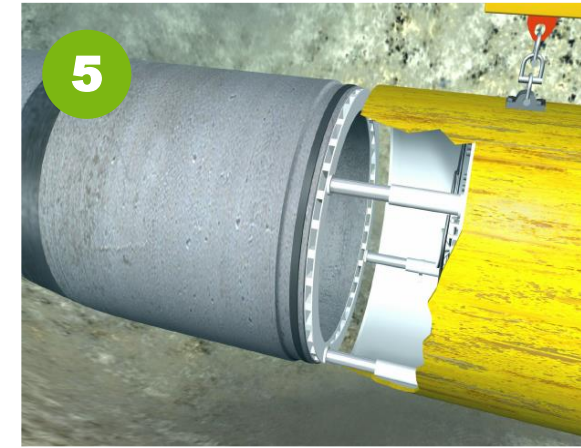
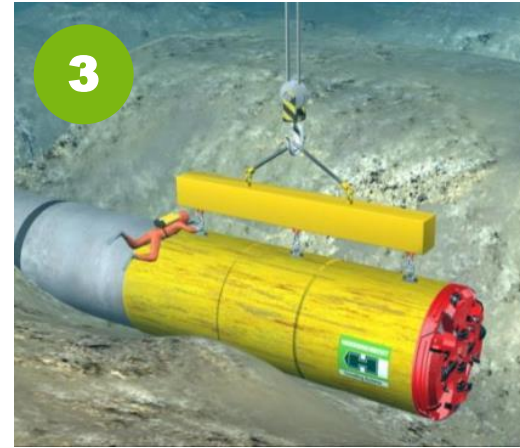
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# MTBM SUBSEA RECOVERY PROCEDURE

- 1 Remove all tunnel-installed equipment
- 2 Prepare machine for release; close bulkhead
- 3 Divers attach crane to lifting eyesad
- 4 Connect hydraulic supply to cylinders
- 5 Extract cylinders to release machine from pipestring
- 6 Recover and lift machine to the surface



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# MTBM SUBSEA RECOVERY PROCEDURE

Machine equipped with **recovery module**

- Hydraulic cylinders to release machine from the pipestring
- Divers connect hydraulic supply to module's outer skin
- Steel can with bulkhead to close the machine hermetically



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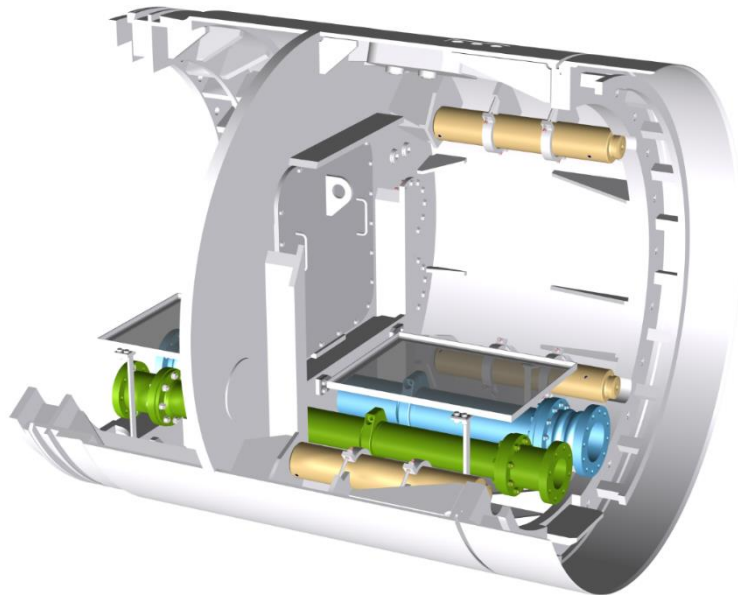
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# MTBM SUBSEA RECOVERY BULKHEAD OPTIONS

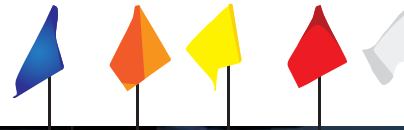
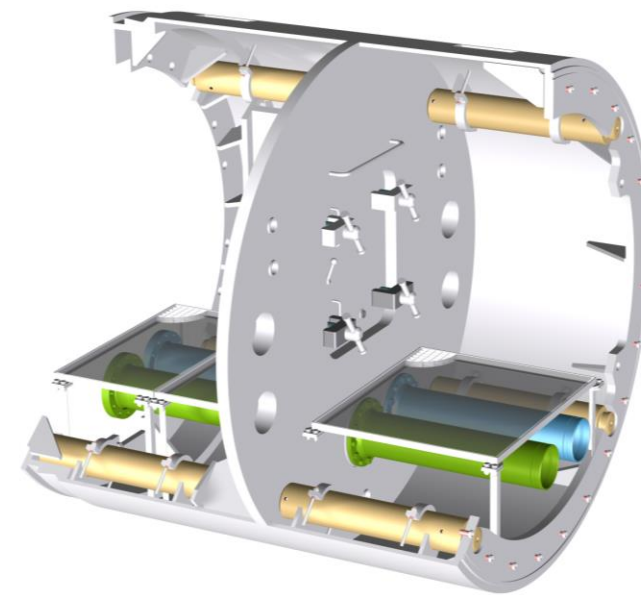
## BULKHEAD FOR MACHINE

- › To close machine for recovery
- › Optional bulkhead to close tunnel, if required



## BULKHEAD FOR TUNNEL

- › To close tunnel, before machine recovery
- › Separate bulkhead for machine required



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# MTBM SUBSEA RECOVERY LIFTING OPTIONS

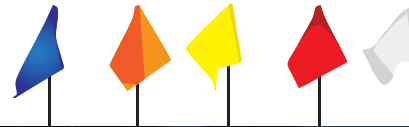
## WITH AIRBAGS



## CRANE IN HARBOR



## CRANE ON BARGE / JACK-UP PLATFORM



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# SEA OUTFALL REFERENCE PROJECTS OVERVIEW WITH PIPE JACKING

EXECUTED WITH  
HERRENKNECHT  
EQUIPMENT

>1000



Sea Outfalls worldwide



Diameters from **OD 790mm**  
up to **OD 3945 mm**



Drive lengths of over **2,500m**



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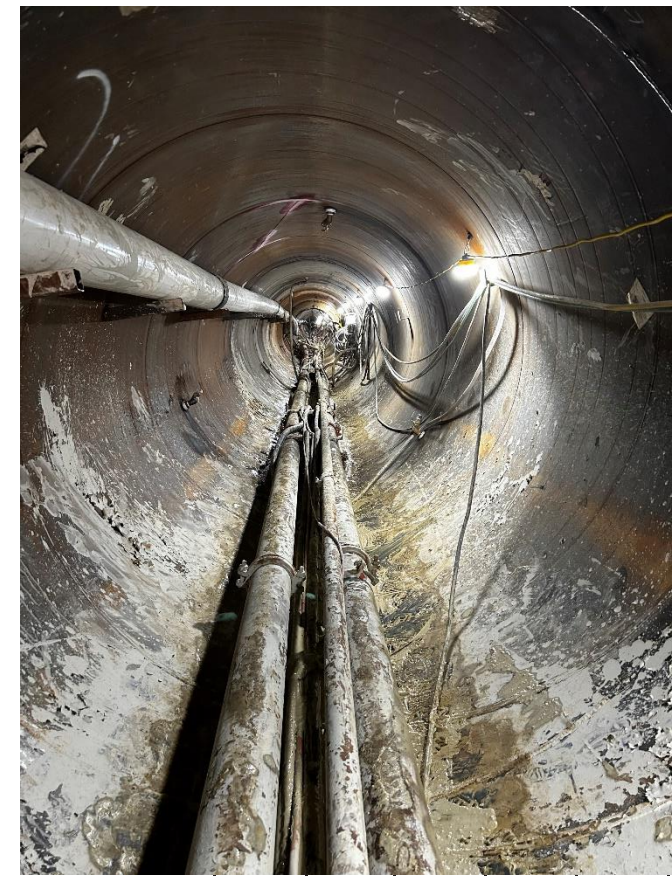
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# DEER CREEK INTAKE PROJECT, USA

- › M-2470M, AVN 1500, OD 1828 mm
- › Tunnel Length: **250 m Sea Outfall**
- › Challenge: “breakthrough” in water reservoir
- › Geology: rock, sand, clay
- › Contractor: James W. Fowler Co.



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# SUR DE TEXAS – TUXPAN PIPELINE ALTAMIRA LANDFALL, MEXICO

- › M-1275M, AVND2000, OD 3200 mm (Pipe ID 2600 mm)
- › Tunnel length: **2,246m Sea Outfall**
- › Geology: sand, silt, clay
- › Best performance: 25.2m a day / 111.2m a month
- › Contractor: Eurohinca



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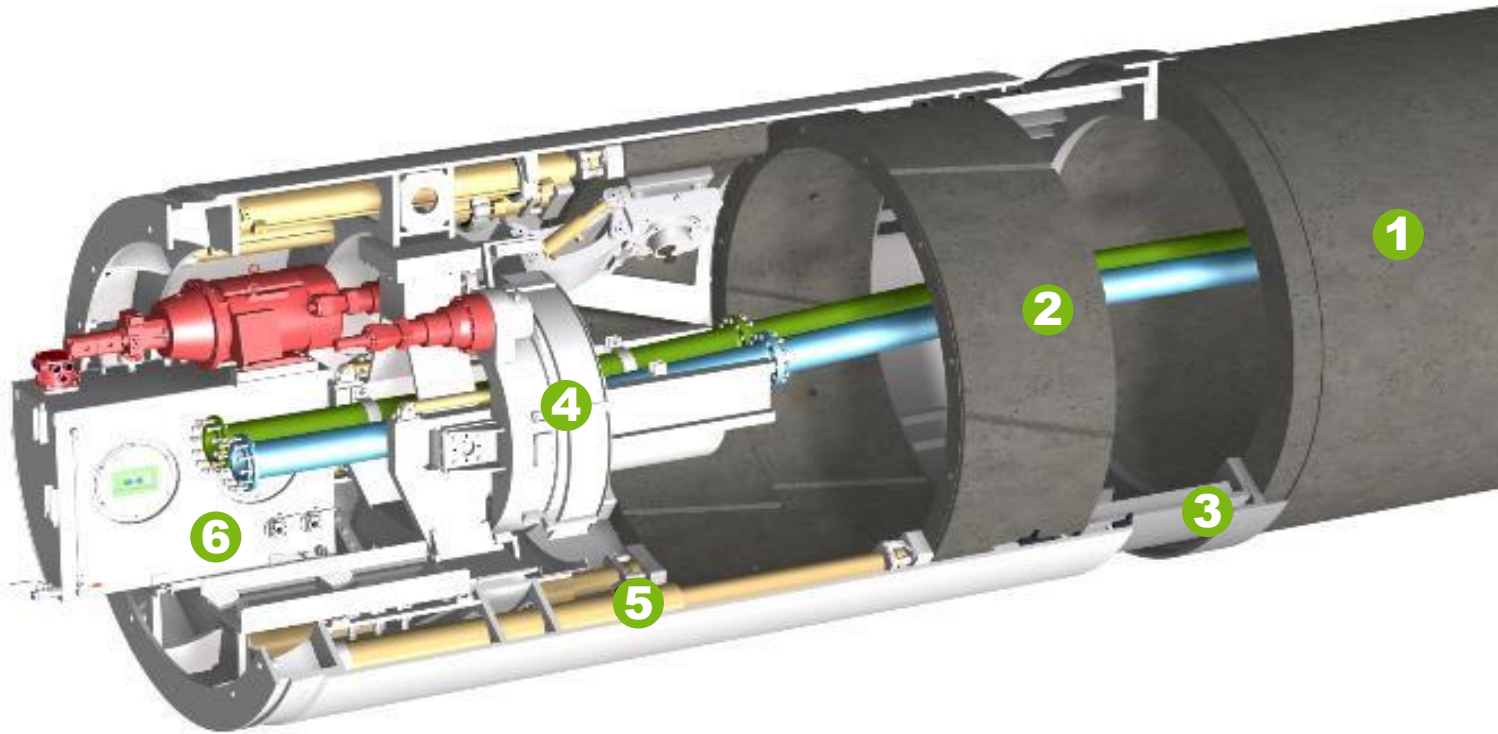
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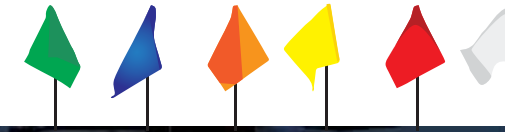


# SUR DE TEXAS – TUXPAN PIPELINE, ALTAMIRA LANDFALL, MEXICO



Push module to change Pipe Jacking  
to Segment Lining (in standby)

- 1 Jacking pipe
- 2 First segment ring
- 3 Adapter ring
- 4 Erector module for ring building
- 5 Thrust cylinders
- 6 Hydraulic powerpack



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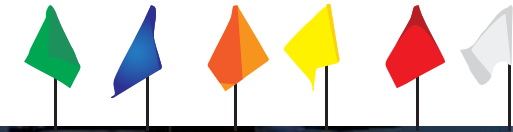
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# DIRECT PIPE OUTFALLS SUR DE TEXAS – TUXPAN PIPELINE



- 1 Direct Pipe® Sea Outfall**
  - › Port Isabel, Brownsville, Texas, USA
  - › AVN1000DP (48") + HK750PT
  - › 1,495 m, 42" pipeline
- 2 AVN Sea Outfall – Altamira, Mexico**
  - › AVND2000, OD3200
  - › 2,246 m Pipe Jacking, tunneled casing
- 3 Direct Pipe® Sea Outfall**
  - › Tamiahua (Tuxpan), Mexico
  - › AVN1200DP (56") + HK750PT
  - › 698 m, 56" casing



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# DIRECT PIPE<sup>®</sup> TECHNOLOGY

- › one-pass installation
- › min. frac out risk | borehole supported
- › high accuracy

**24"** up to 60" steel pipeline installations



# DIRECT PIPE OUTFALLS SUBSEA RECOVERY OF MTBM



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# DIRECT PIPE OUTFALLS SUBSEA RECOVERY OF MTBM



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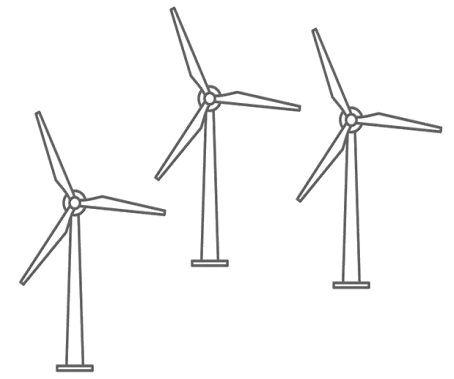
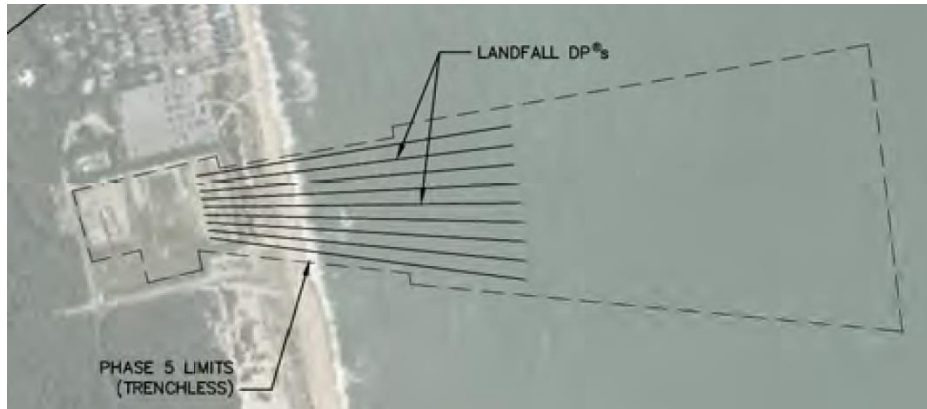
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# CABLE LANDFALLS OFFSHORE WIND VIRGINIA, USA

- › 3x Direct Pipe® equipment in parallel operation
- › Purpose: **42"** casing for cable landfalls
- › Length: 9 drives of **~550m** length each
- › Contractor: Michels



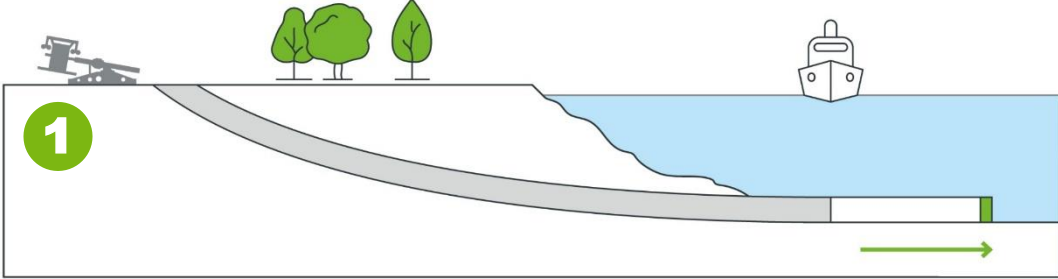
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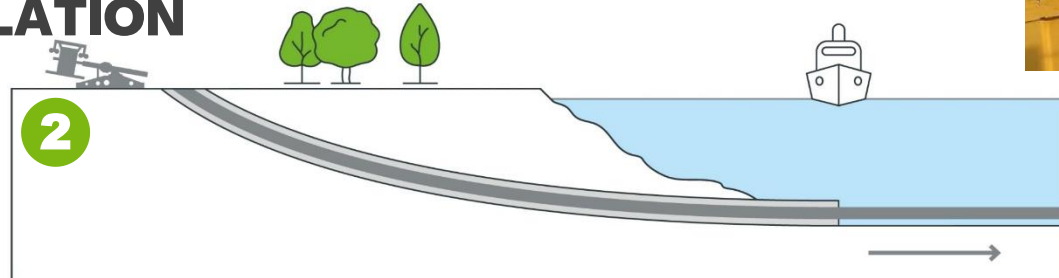
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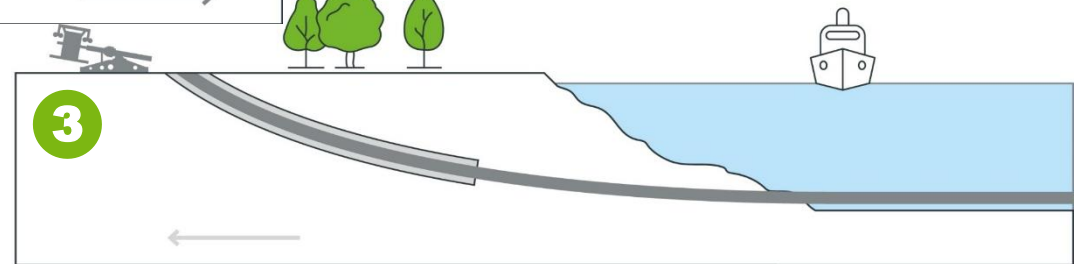
# INSTALLATION OF HDPE PIPE EXAMPLE SEA OUTFALL



Simultaneous excavation of borehole & **INSTALLATION OF STEEL PIPE.**



Subsequent **INSERTION OF HDPE PIPE** into the steel pipe.



Retraction of steel pipe with Pipe Thruster.



# SEA OUTFALL REFERENCE PROJECTS OVERVIEW WITH DIRECT PIPE®

EXECUTED WITH  
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DIRECT PIPE®

**27**   
shore approaches worldwide

 Pipeline diameters from **42"**  
up to **56"**

 Drive lengths up to **2,021m**



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