Seafloor Drill Presentation

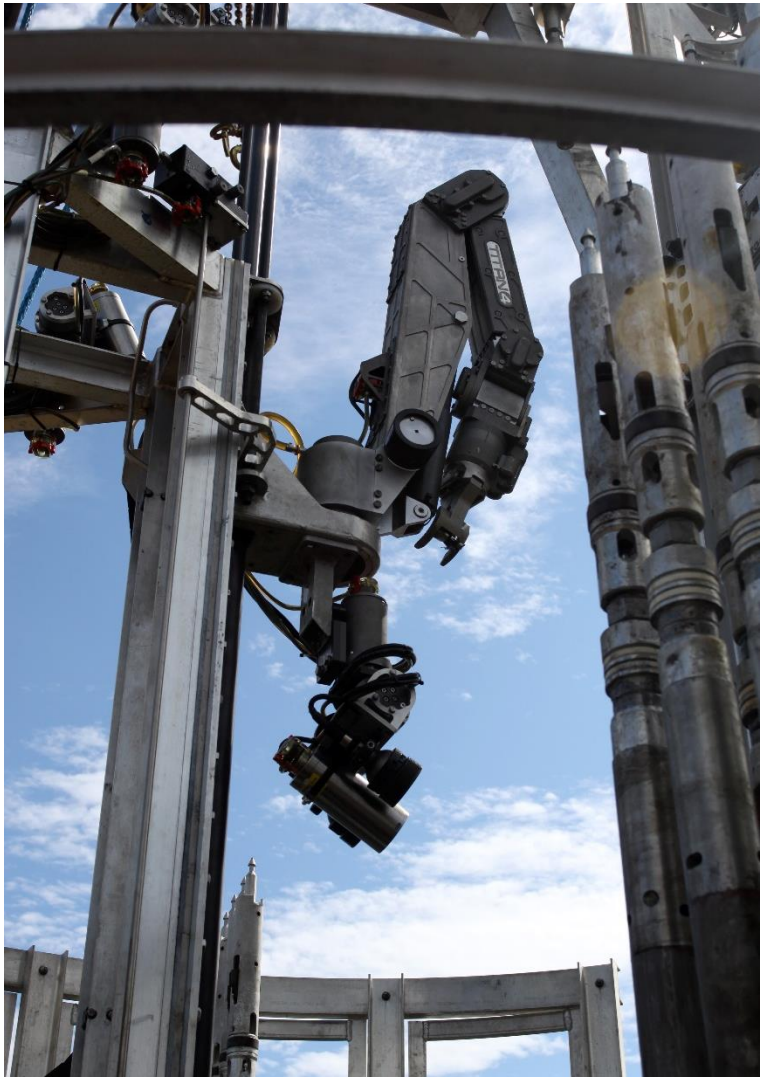
Autonomous Underwater Technology October 22, 2015

Max Gwynn
Project Manager

Fugro AG Pty

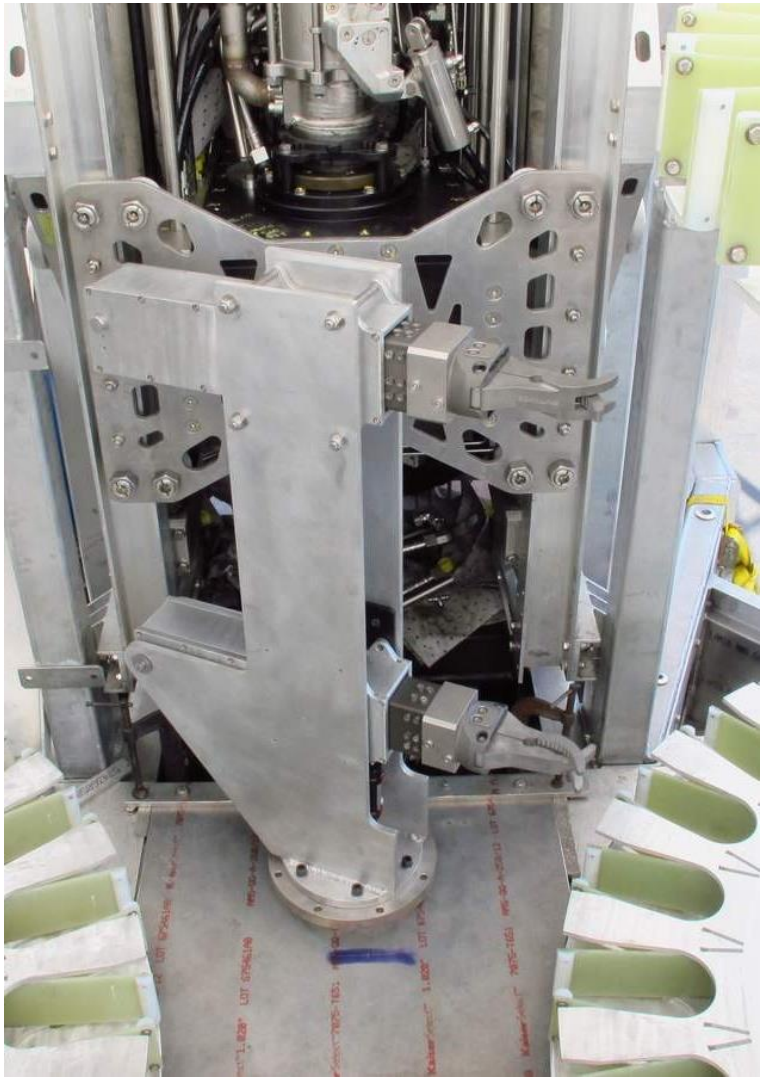
Seafloor Drill I (SFD-I)

- Water Depth Rating: 4,000m
- Weight in Air: 8,000kg or 9T
- System Dimensions:
  - W = 3.8m, L = 5.4m, H = 6.6m
- Drilling Specifications:
  - Standard Geotechnical Samplers
  - Sample Diameter = 73mm
  - Fugro In-Situ Testing Tools
  - 80kN Thrust Capacity at 2cm/s
  - Polymer Mud Injection System at 140L Capacity



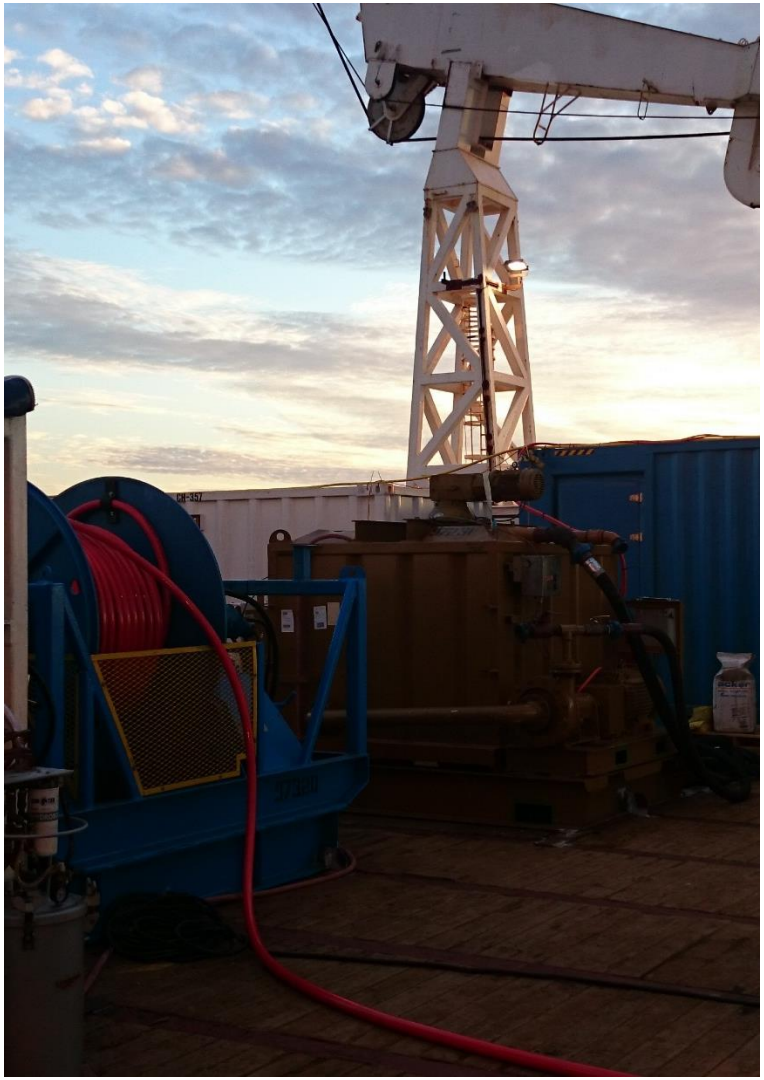
Seafloor Drill II (SFD-II)

- Water Depth Rating: 4,000m
- Weight in Air: 7,200kg or 8T
- System Dimensions:
  - W = 4.3m, L = 5.4m, H = 7.0m
- Main Differences:
  - Automatic Carousel Rod Handling System
  - Loading Arm
  - Reduced LARS Footprint
  - Increased Mud Capacity Inside the Carousels



Seafloor Drills

- Ability to pump mud downhole from a vessel-mounted tank to maintain borehole stability in flowing sand formations
- Flexibility to use a crane deployment option in order to reduce mobilization and demobilization durations
- Variety of sampling tools to ensure optimal recovery and data quality in stratified borehole conditions
- Samples remain vertical during recovery back to deck, which limits soil disturbance per AS best practice



ROV Components

- Combines proven drilling and testing technology with Schilling ROV subsea technology
- Few customized components means off the shelf spares availability, reduced maintenance time and an established workforce of skilled technicians
- Schilling telemetry system enables easy integration of additional sensors and tools

Wireline Technology

The SFDs use patented wireline drilling methods. Advantages include:

- Improved borehole stability by keeping the drill string downhole
- Increased productivity at deeper borehole depths
- Flexibility to alter the sampling and testing program
- Collection of real-time in situ testing data

Synthetic Umbilical

- Patented braided termination achieves 95% strength, which makes the use of a synthetic umbilical possible
- Neutrally buoyant design and bend restrictor create catenary loop without the need for syntactic floats
- Being light-weight allows for increased water depth capabilities
- Allows for heave compensated land outs while the Seafloor Drills are hanging above bottom

Soft Seabed and Slopes

- Four (4) stabilizing jacks and different foot configurations allow for work on very soft seabeds as well as steep slopes
- SFDs have landed on soft seabeds with shear strengths in the order of 1.0 kPa
- SFDs have operated on a maximum slope of 25 degrees

SFD Vessel Deployment

Mid-ship SFD Deck Layout

SFD Vessel Deployment

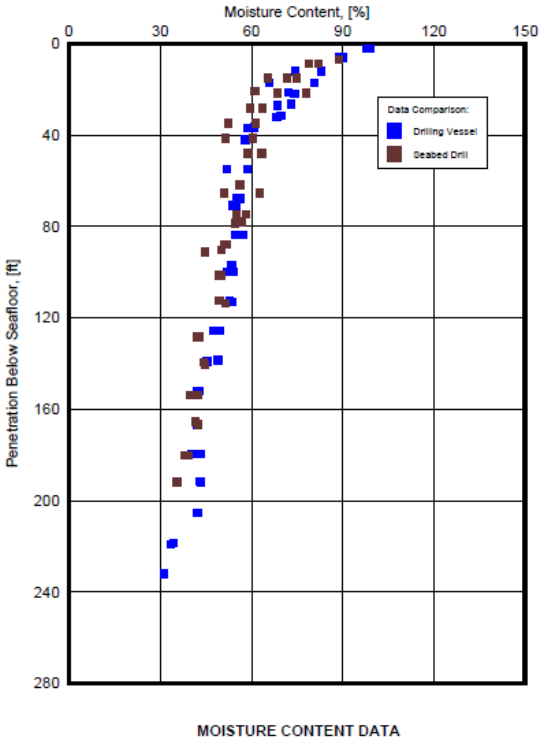
Stern SFD Deck Layout

SFD-II Control Van

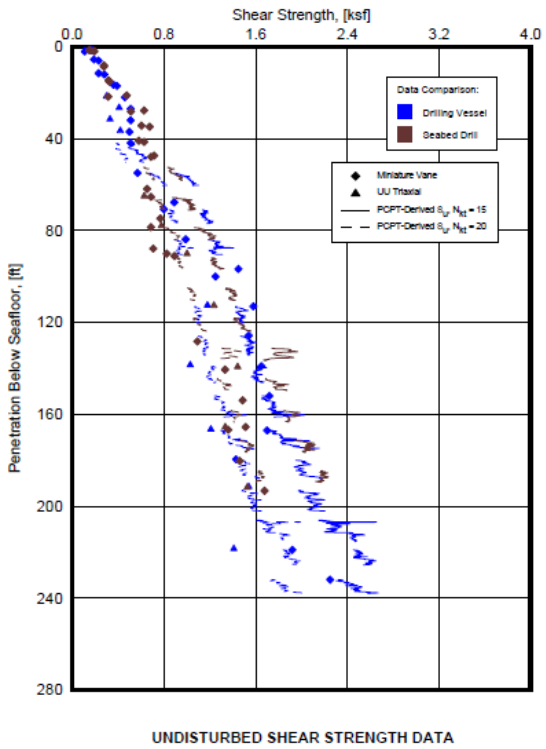
Recent SFD Projects

Project	Location	Water Depth	Scope of Work
Offshore Geotechnical Site Investigation with SFD-II	North West Shelf, Australia	112m	Drilled a total of 323m with Downhole PCPT and Sampling
Offshore Geotechnical Site Investigation with SFD-I	Gulf of Mexico	2,923m **WATER DEPTH RECORD FOR A SEAFLOOR DRILL**	Drilled a total of 62m with Downhole PCPT and Sampling
Offshore Geotechnical Site Investigation with SFD-I	Gulf of Mexico	1,320m	Drilled a total of 575m with Downhole PCPT and Sampling
Offshore Geotechnical Site Investigation with SFD-I	Gulf of Mexico	2,250m	Drilled a total of 530m with Downhole PCPT, Sampling and Ball Probe Testing
Offshore Geohazard Survey with SFD-I	Caspian Sea	600m	Drilled a total of 700m with Downhole PCPT, Sampling, Seismic PCPT and Ball Probe Testing
Offshore Geotechnical and Geohazard Site Investigation with SFD-I	East Africa	1,600m	Drilled a total of 1,250m with Downhole PCPT and Sampling

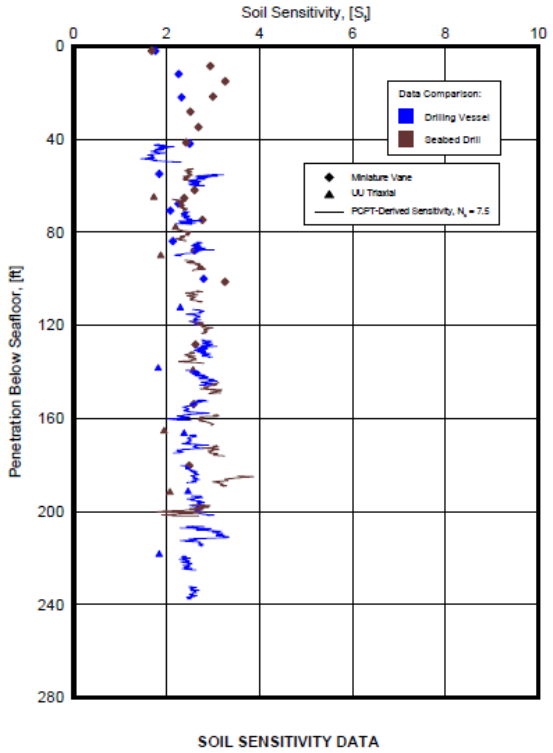
SFD Data Quality



MOISTURE CONTENT DATA

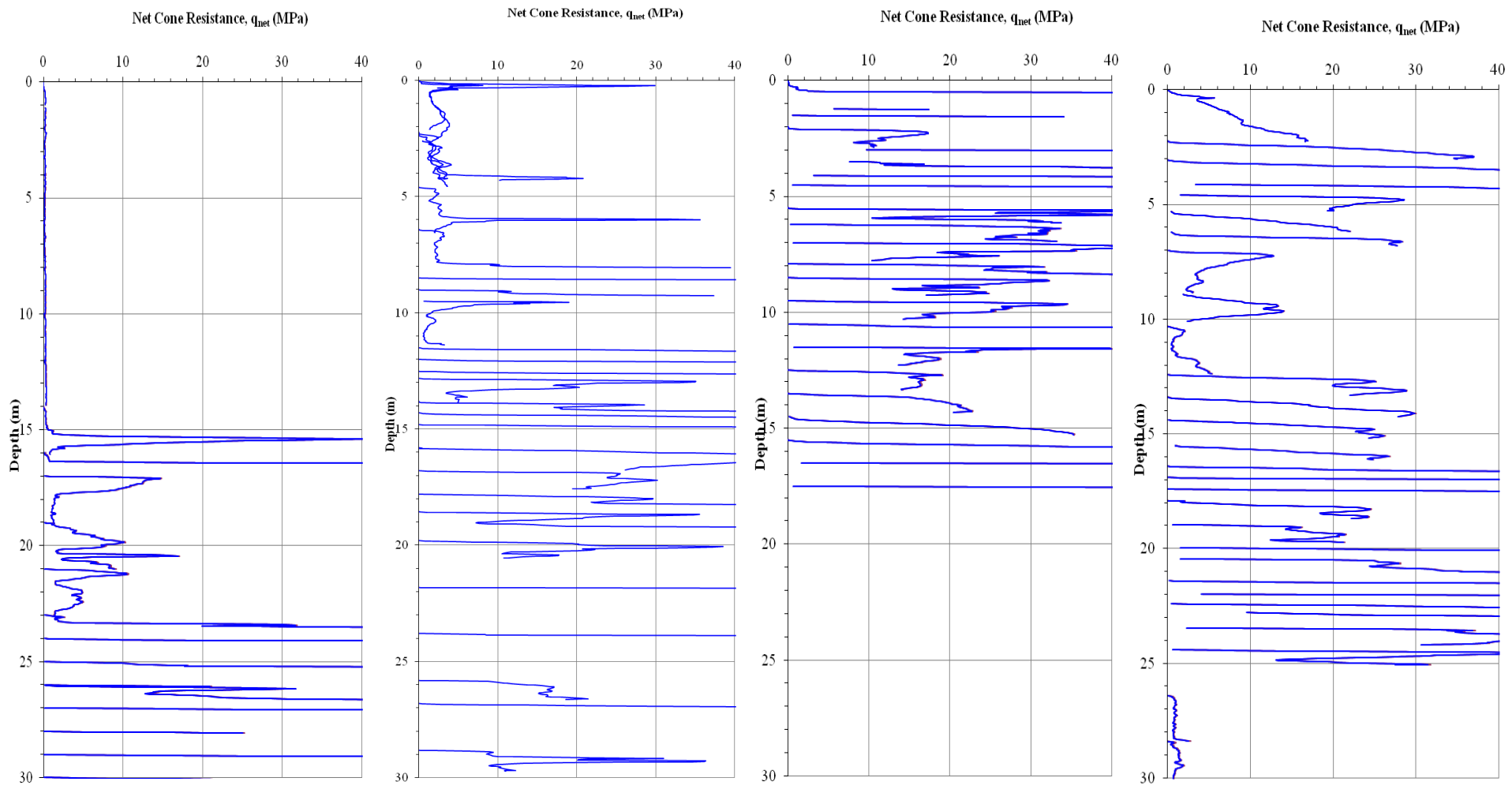


UNDISTURBED SHEAR STRENGTH DATA

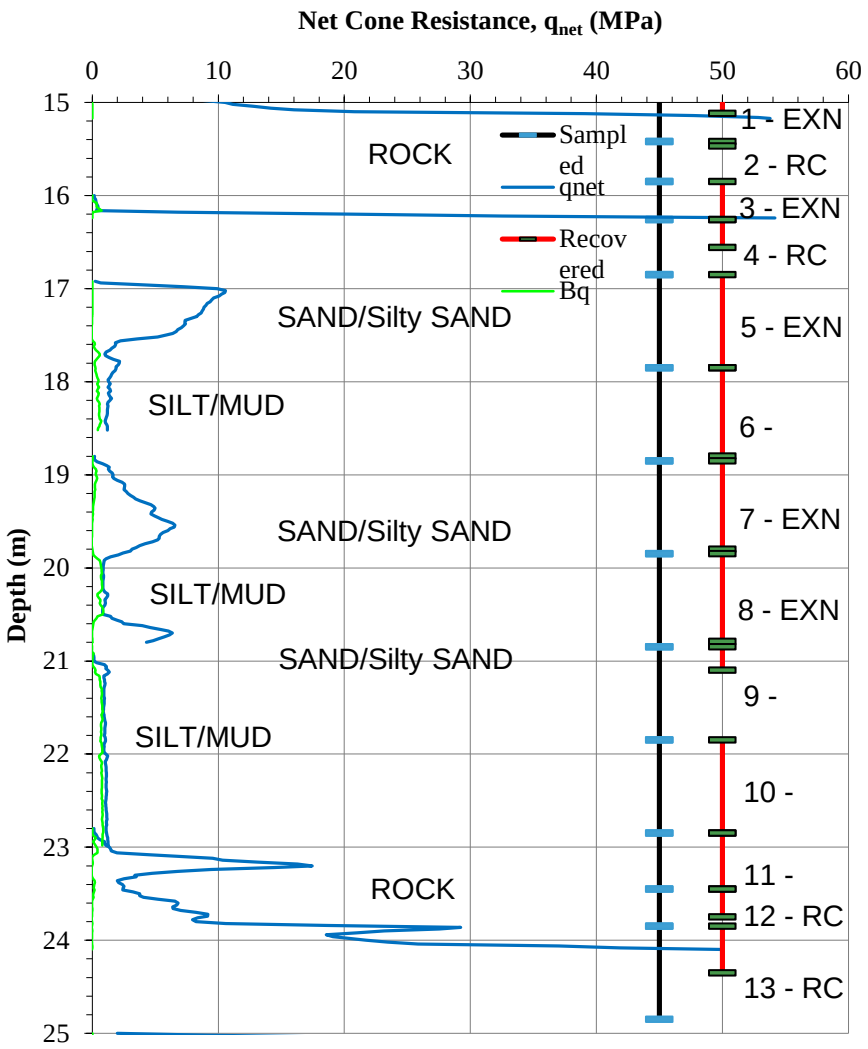


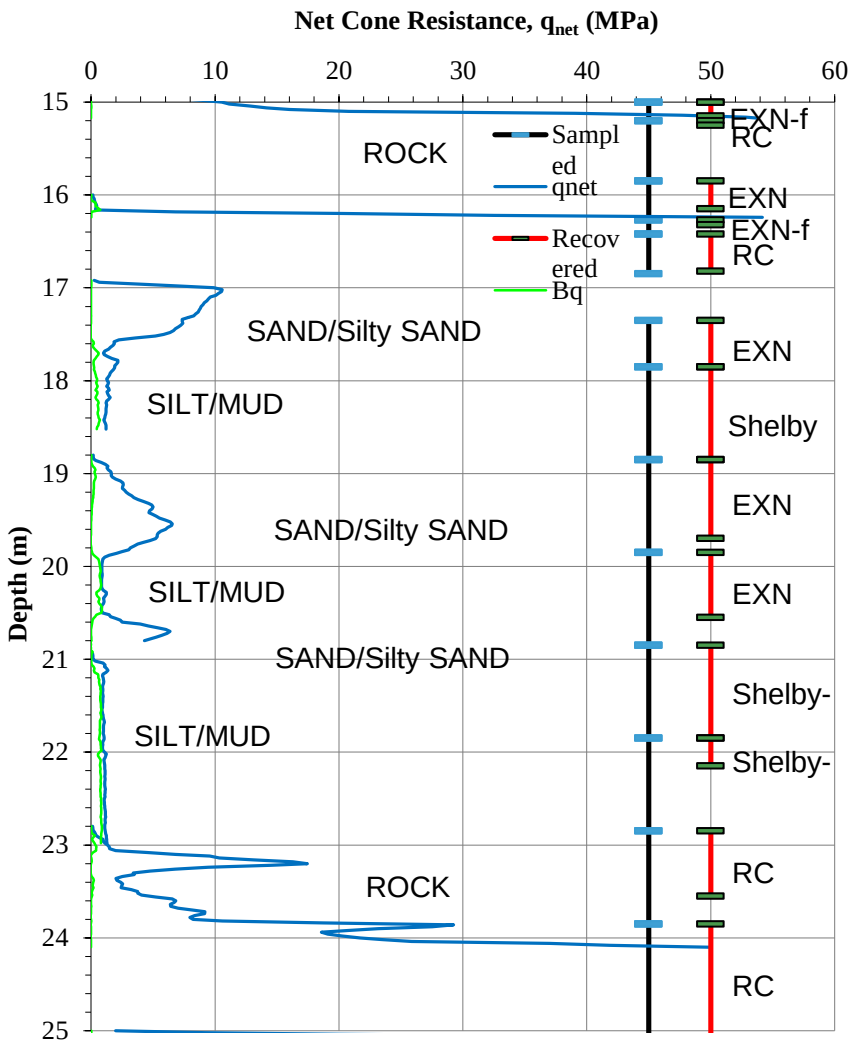
SOIL SENSITIVITY DATA

SFD PCPT Data

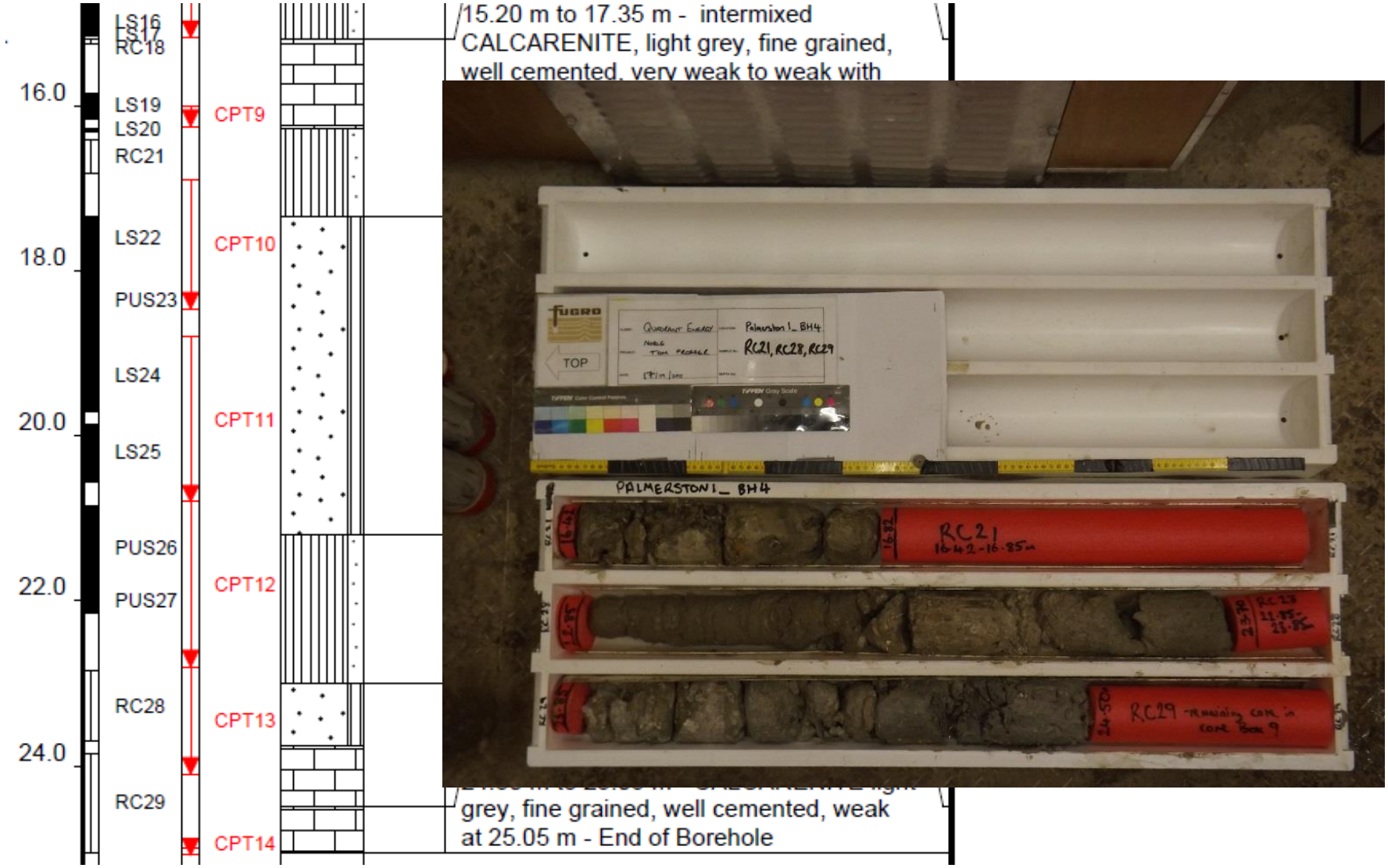


SFD Recovery Data





SFD Samples


LS16
LS17
RC18
16.0
LS19
LS20
RC21
CPT9
LS22
18.0
CPT10
PUS23
LS24
20.0
CPT11
LS25
PUS26
22.0
CPT12
PUS27
RC28
CPT13
24.0
RC29
CPT14
15.20 m to 17.35 m - intermixed
CALCARENITE, light grey, fine grained,
well cemented, very weak to weak with
grey, fine grained, well cemented, weak
at 25.05 m - End of Borehole
TOP
PALMERSTON 1_ BH4
RC21
RC29

Thank you!