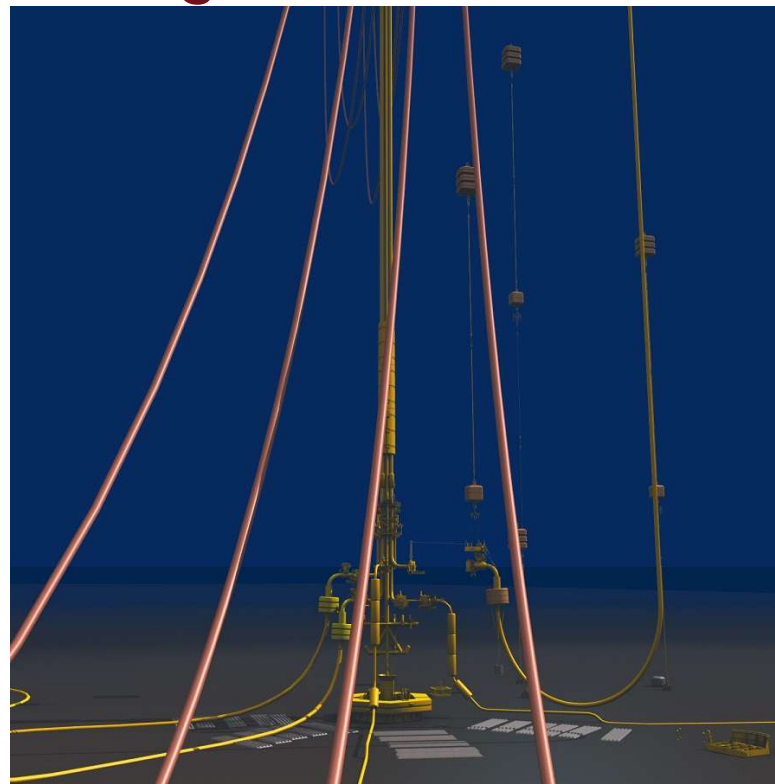


# GirRI Phase 2 Project: Installation Challenges on a Brown Field Project



LAFONTAINE Karine  
&  
FACHAN Olivia



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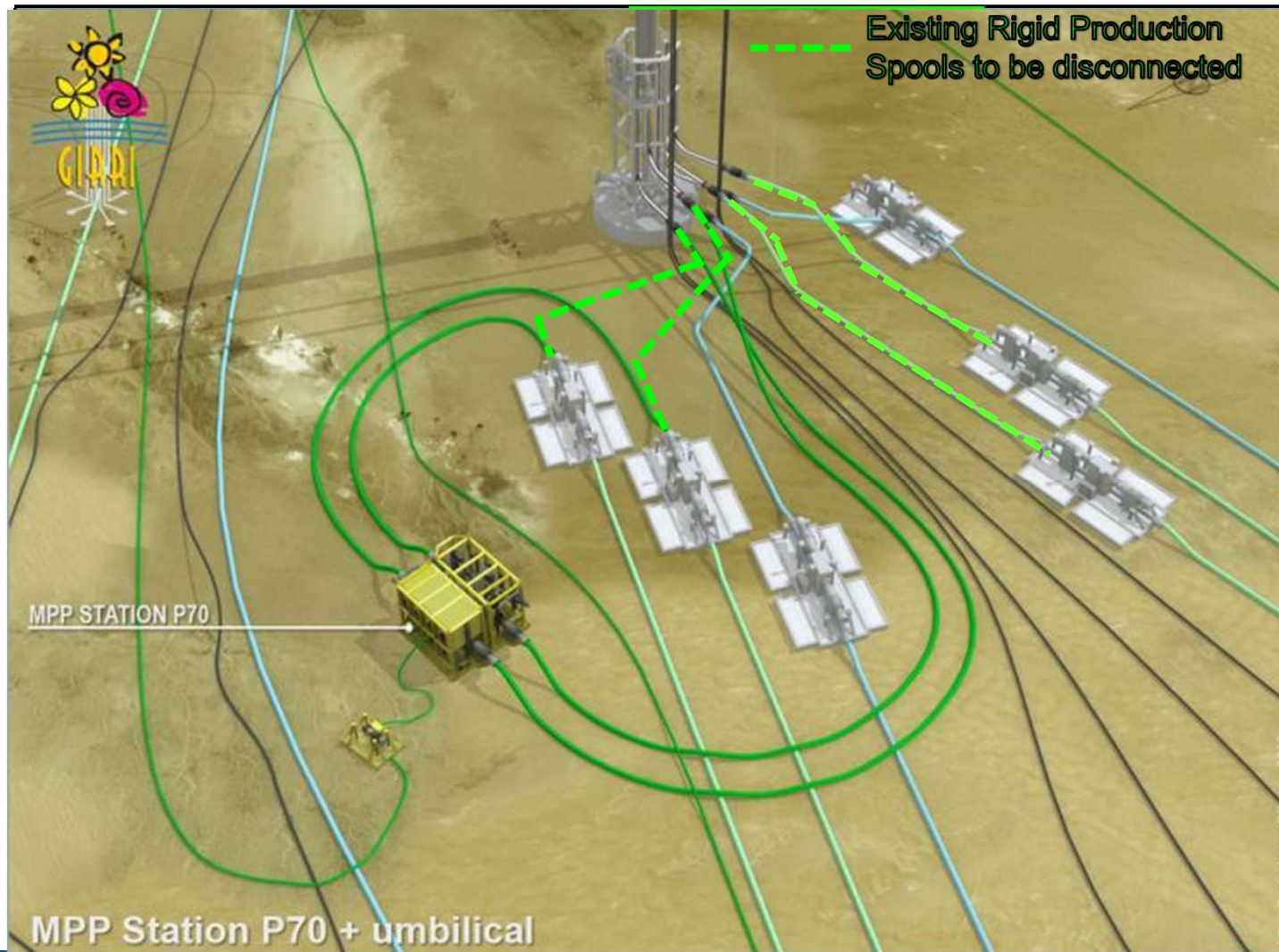
Context

Installation Constraints

Installation Methodologies Presentation



## GirRI SURF2 – Location



Rigid spools to be replaced by Flexible spools

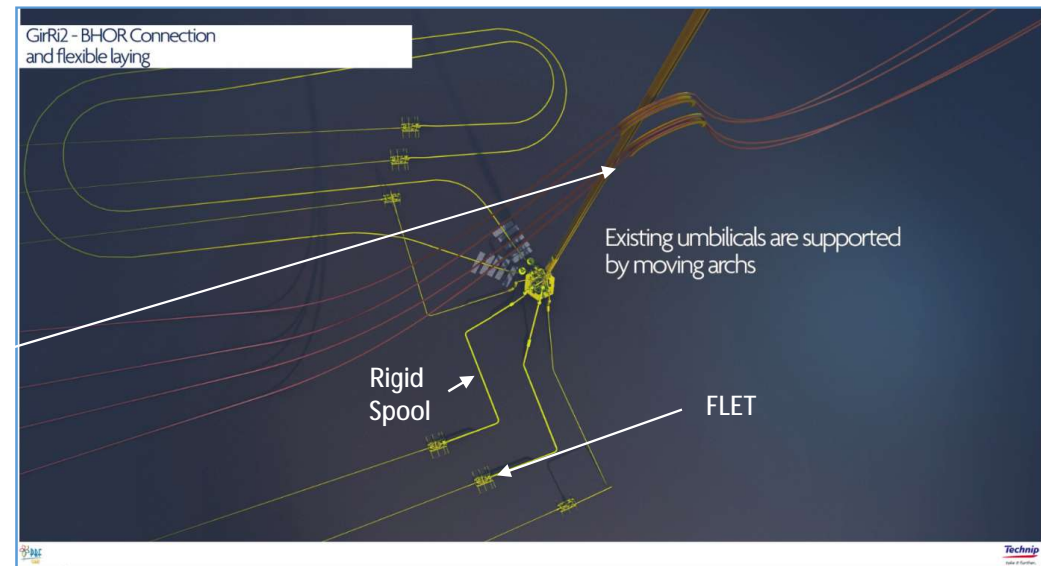
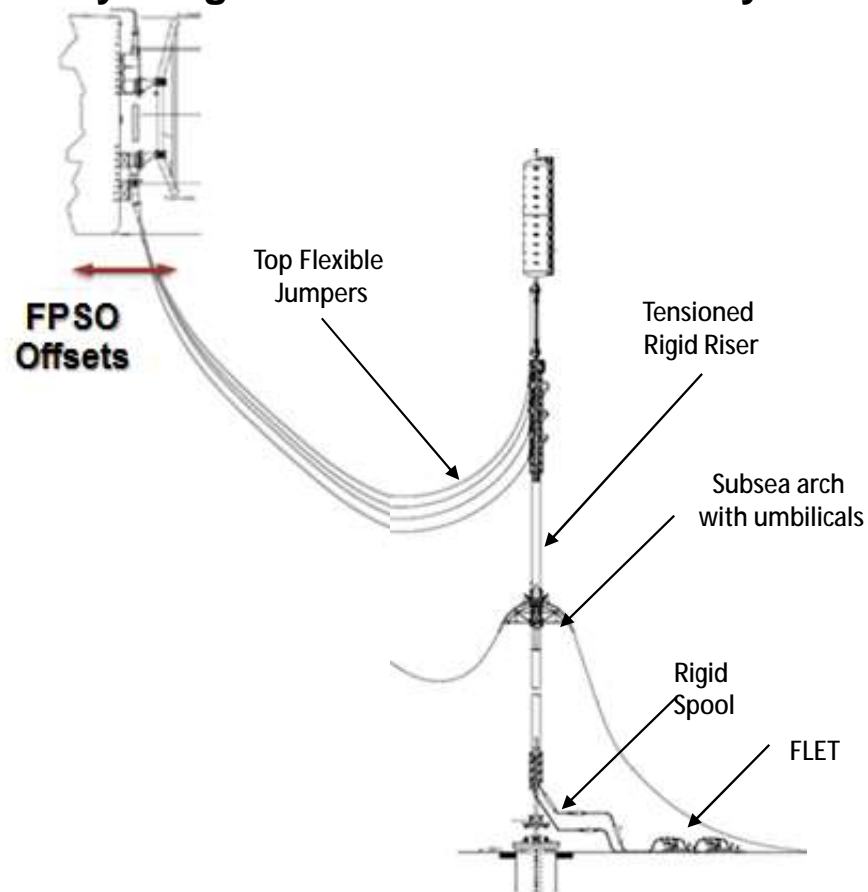
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Installation Constraint n°1: Complex Area



## Main Constraint n°1: Complex Area

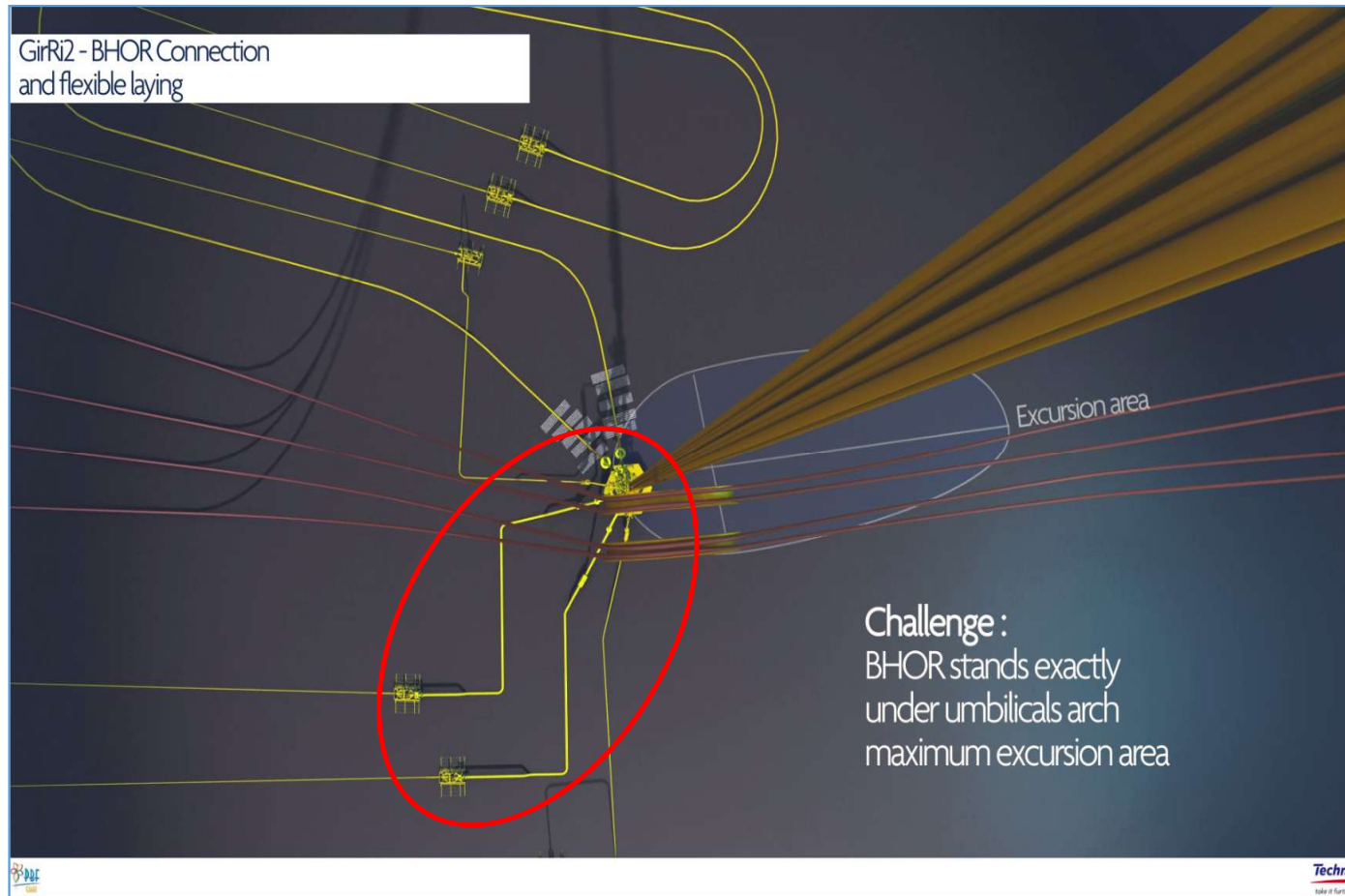
### § Very congested area at BHOR vicinity:



- q **Complex Area:**
  - q **Congested Area**
  - q No vertical access for installation **vessel crane**
  - q ROV limited access at BHOR bottom assembly
  - q Trench
- q **Equipments:**
  - q BHOR limited capacity
  - q Vecto connector not designed for flexible installation

## Main Constraint n°1 : Complex Area

### § No vertical access to working area:



#### q Complex Area:

- q Congested Area
- q **No vertical access for installation vessel crane**
- q ROV limited access at BHOR bottom assembly
- q Trench

#### q Equipments:

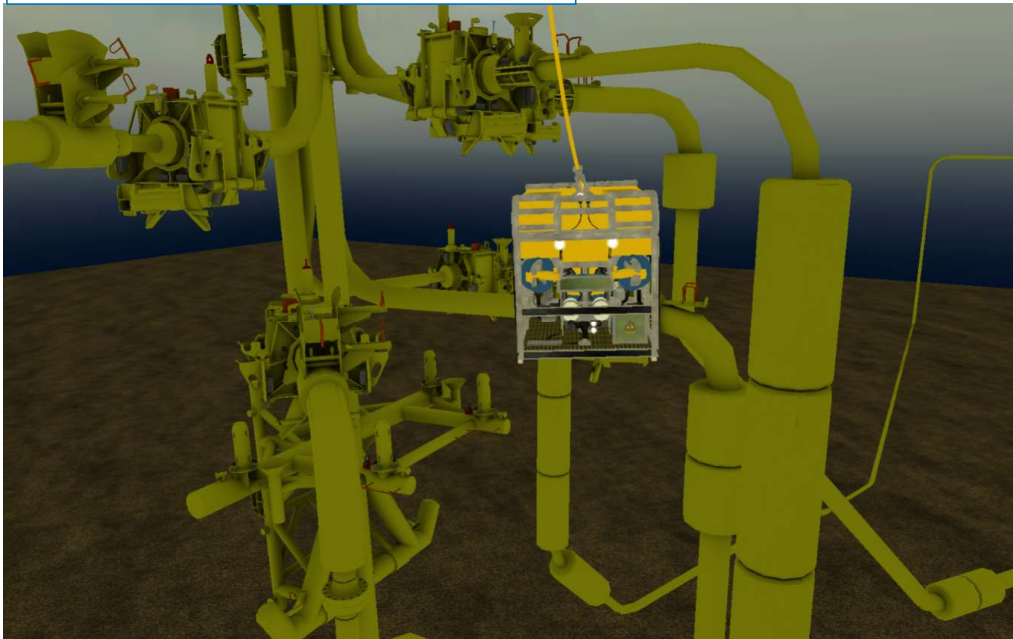
- q BHOR limited capacity
- q Vecto connector not designed for flexible installation



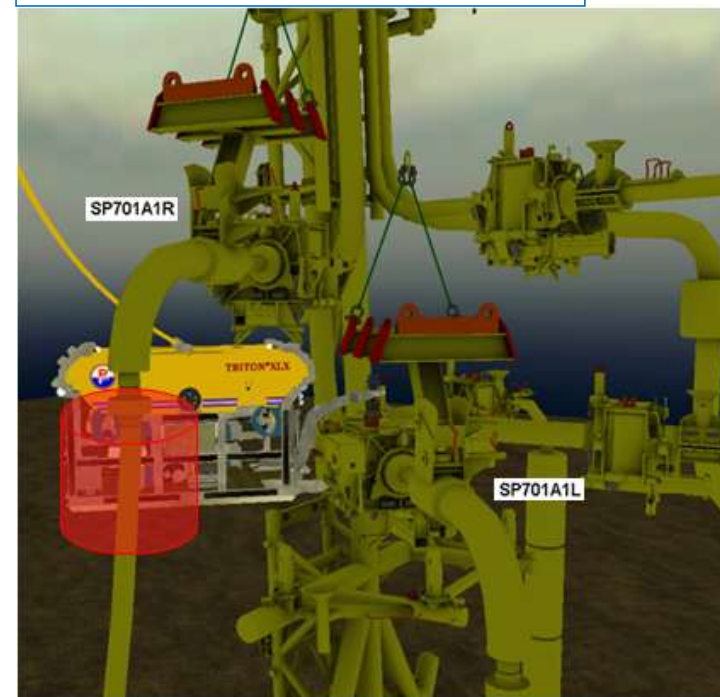
## Main Constraint n°1 : Complex Area

§ Very limited ROV access at BHOR bottom assembly:

Rigid Spools Removal



Flexible Spools Installation



- q **Complex Area:**
  - q Congested Area
  - q No vertical access for installation vessel crane
  - q **ROV limited access at BHOR bottom assembly**
  - q Trench
- q **Equipments:**
  - q BHOR limited capacity
  - q Vecto connector not designed for flexible installation

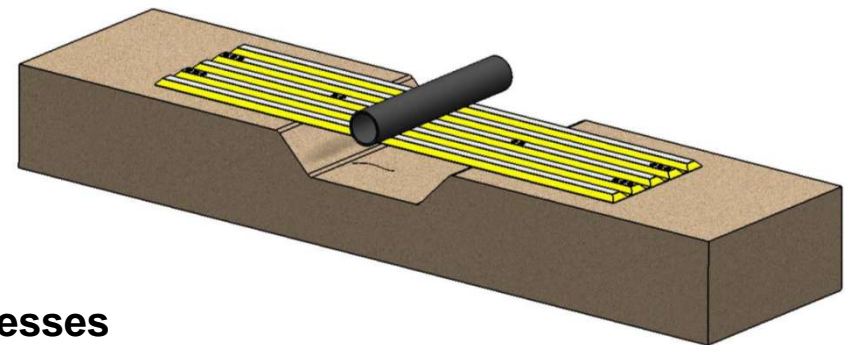
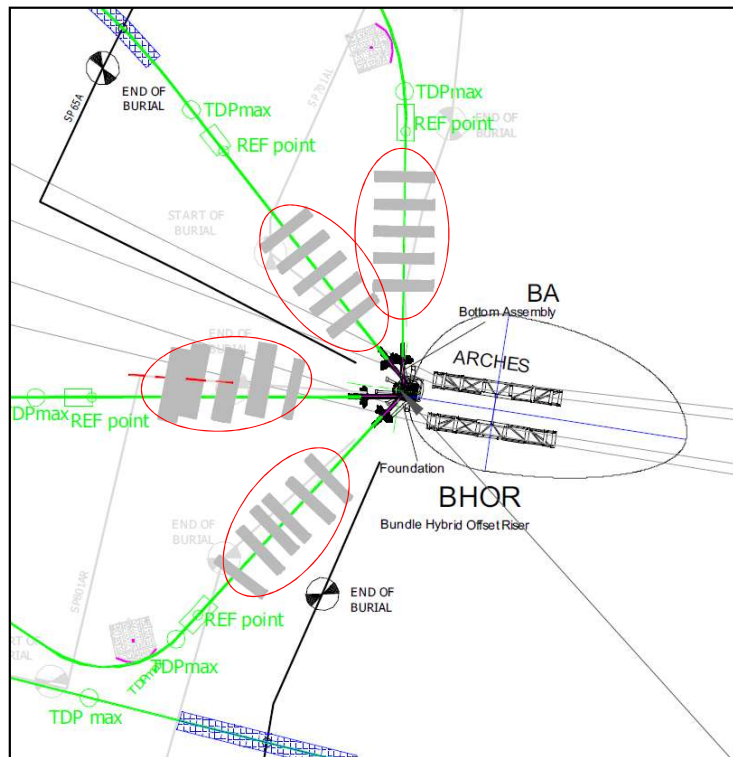
Ø Restriction to installation sequence



## Main Constraint n°1 : Complex Area

- Soil damaged and existing trenches:

- q **Complex Area:**
  - q Congested Area
  - q No vertical access for installation vessel crane
  - q ROV limited access at BHOR bottom assembly
- q **Trench**
- q **Equipments:**
  - q BHOR limited capacity
  - q Vecto connector not designed for flexible installation



Ø Decision to reinforce soil at TDP with Mattresses

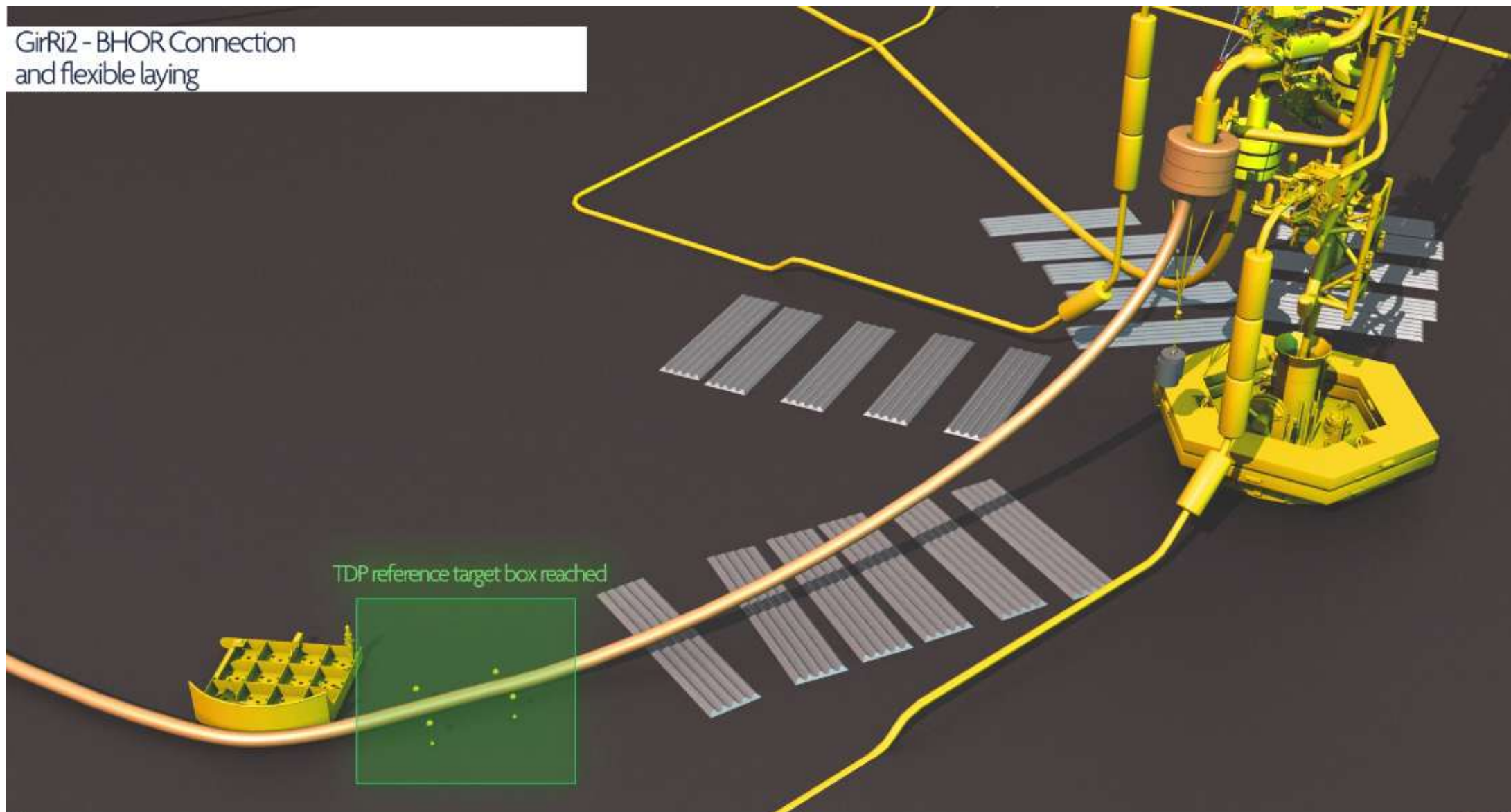


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Installation Constraint n°2: Equipment



## GirRi2 - BHOR Connection and flexible laying

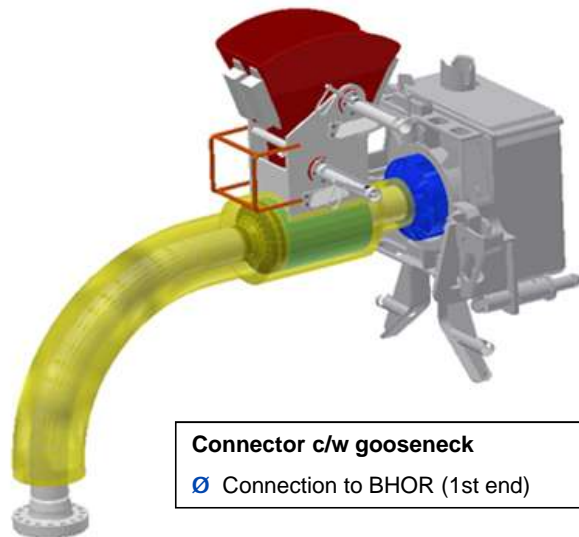


## Main Constraint n°2 : Equipment

§ Horizontal connector has the following drawbacks:

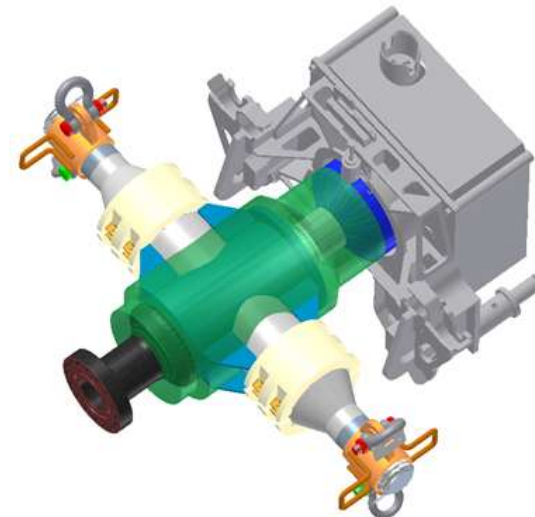
- § No lifting point.
- § Low Pitch and Roll installation tolerances. (+/-5°).

- q Complex Area:
  - q Congested Area
  - q No vertical access for installation vessel crane
  - q ROV limited access at BHOR bottom assembly
  - q Trench
- q Equipments:
  - q BHOR limited capacity
  - q **Vecto connector not designed for flexible installation**



Connector c/w gooseneck

Ø Connection to BHOR (1st end)



Connector c/w straight head

Ø Connection to FLET (1st and 2<sup>nd</sup> end)

Ø Custom design of terminations to allow installation with flexible



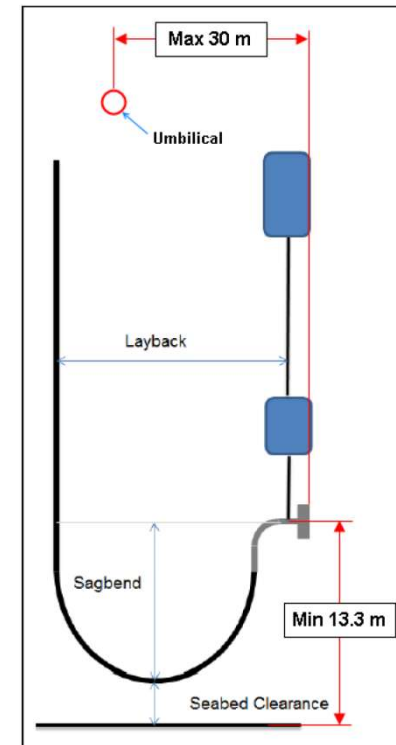
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Installation Methodologies Presentation: Flexible Spools Installation



## Installation Methodology: Flexible Spools Installation

### § Buoyant and “standalone” spool connection to riser:



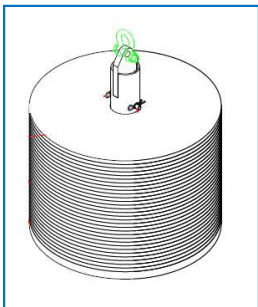
This technical solution has been selected to:

- ✓ Avoid the use of the crane / winch.
- ✓ Ensure a better control of the pulling force applied on the BHOR piping.
- ✓ Mitigate production short fall.



# Installation Methodology: Flexible Spools Installation

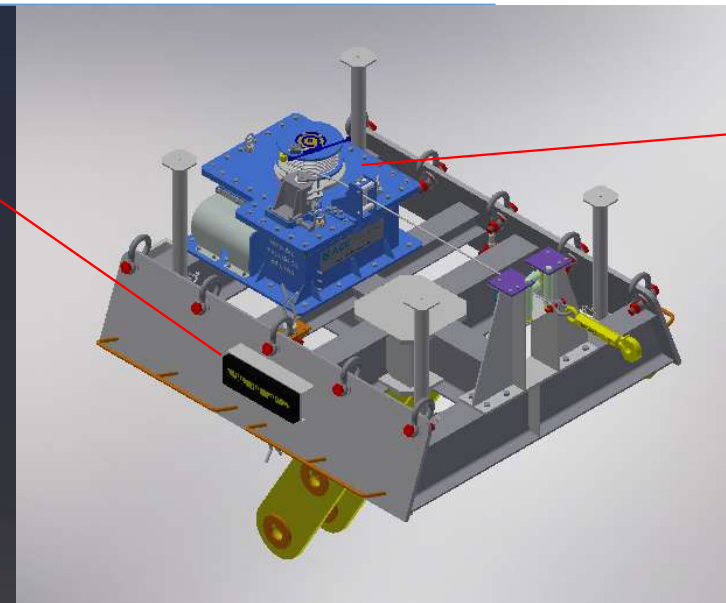
Temporary Buoyancy arrangement



2,4t Clump Weight  
designed for connector  
pitch setting

Inclinometer  
Range: -10 to +10° of pitch

Yoke and its subsea  
winch



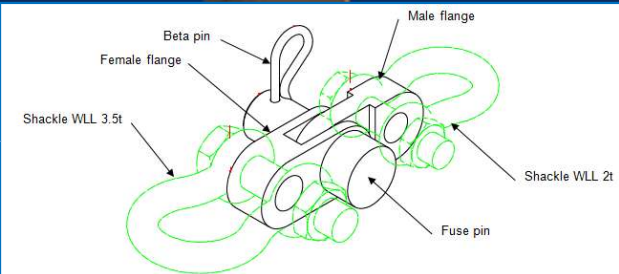
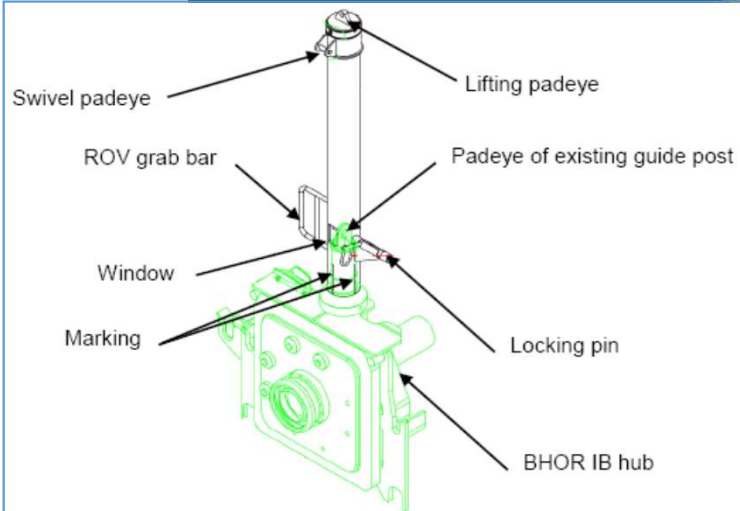
Subsea winch :  
Pulling capacity: 2 t max  
Failsafe brake hold load: 2 t  
Fleet angle: +/- 11°



# Installation Methodology: Flexible Spools Installation

GirRi2 - BHOR Connection  
and flexible laying

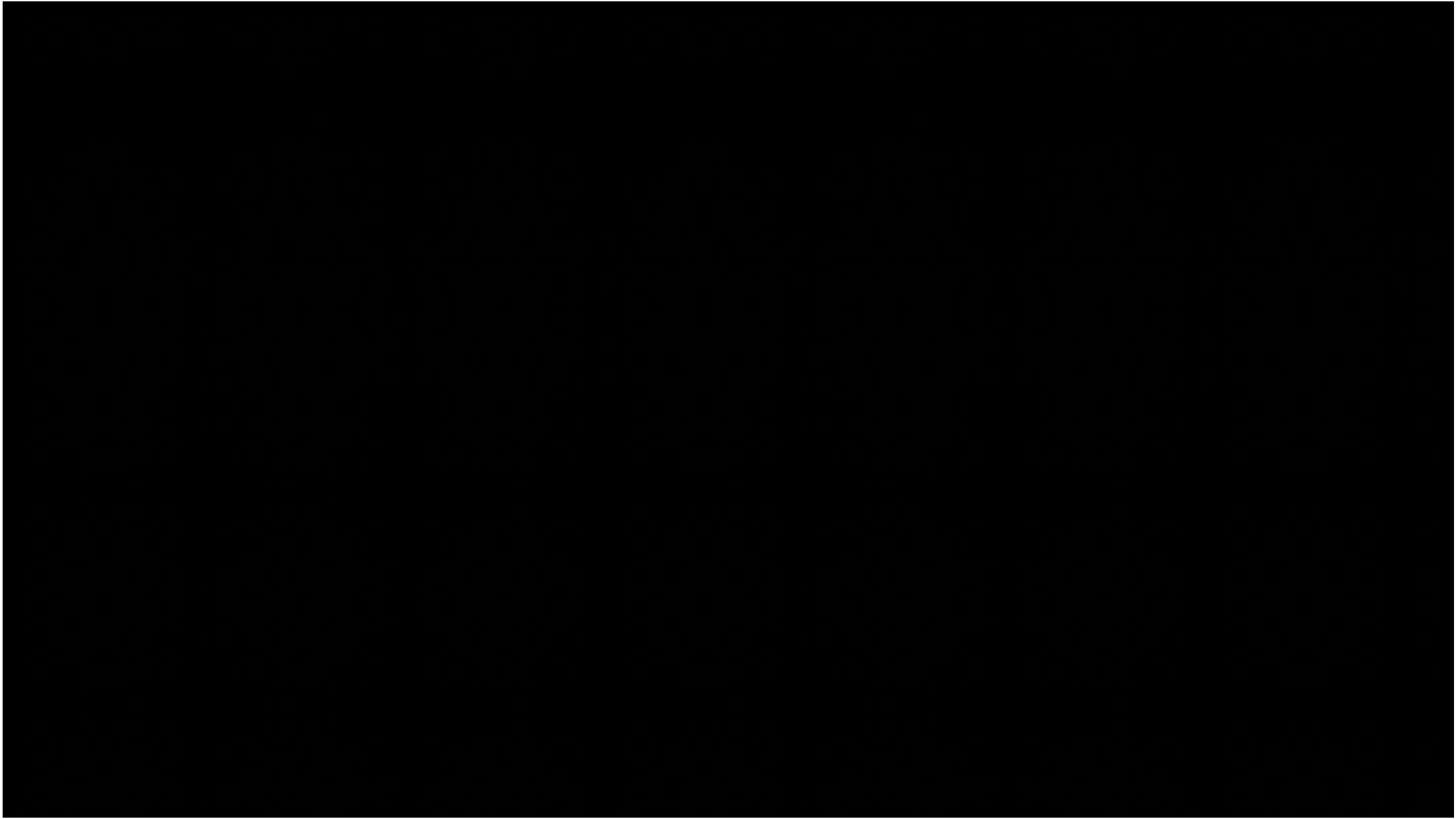
Guide post

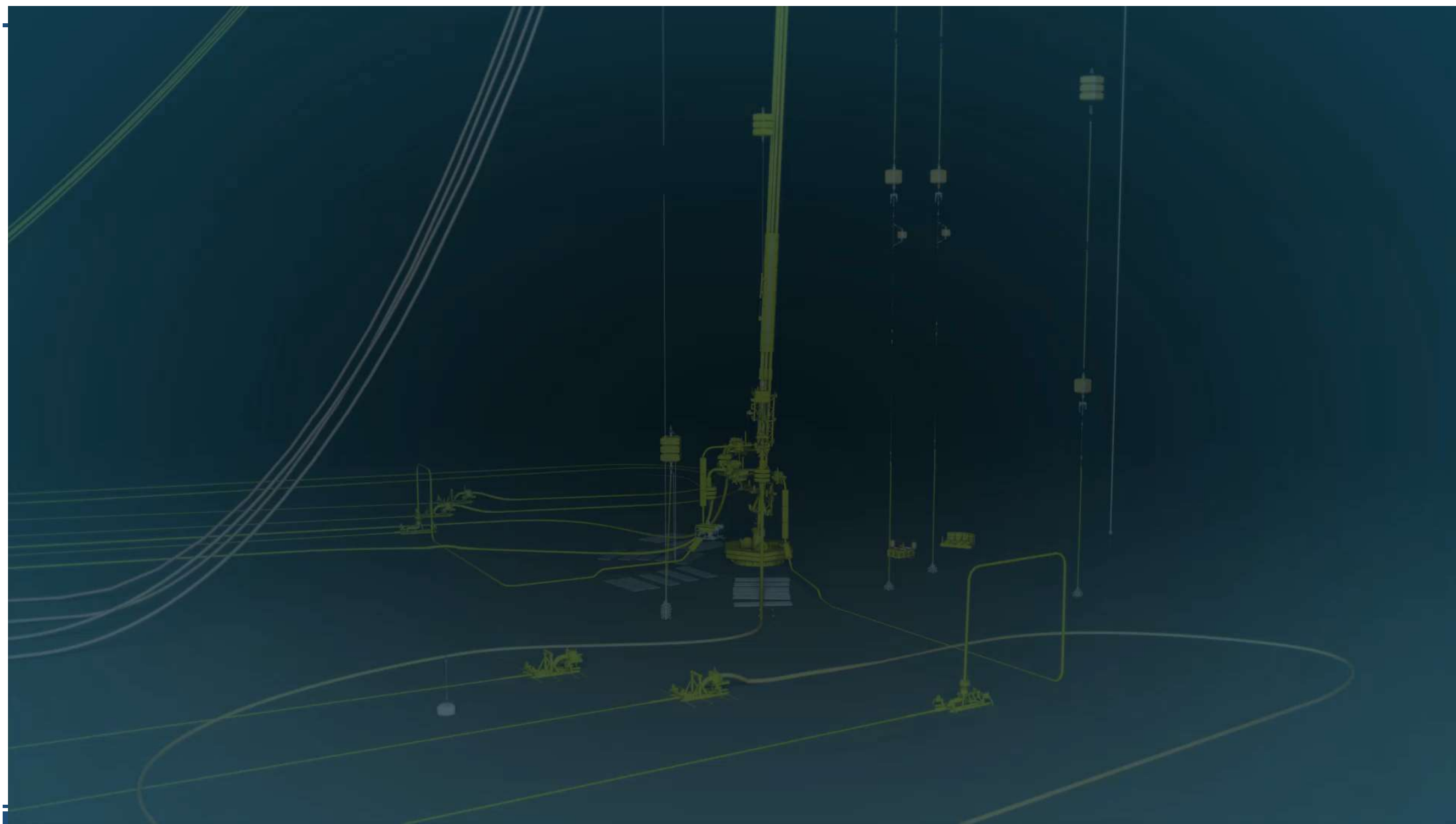


Weak link

Ø Designed to break between 2 and 2,5 t



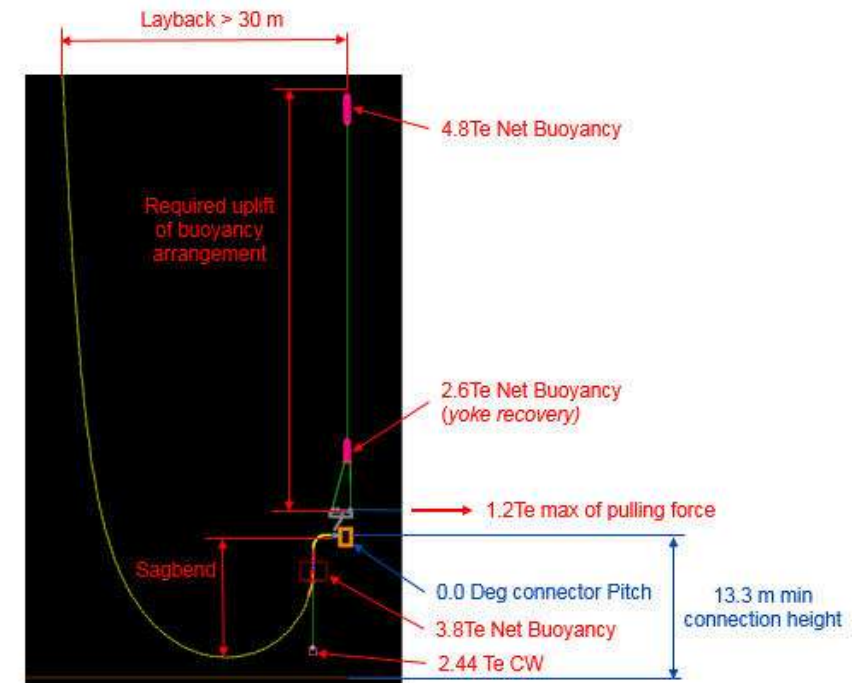




## Installation Methodology: Flexible Spools Installation

### § Reliability of our solution with:

- ✓ A proper step by step method,
- ✓ Sensitivities on the parameters that can be controlled subsea (layback, sagbend, catenary height and buoyancy arrangement uplift),
- ✓ A clearance analysis,
- ✓ A robust engineering for removal of installation aids to ensure BHOR integrity.
- ✓ Structural calculations of BHOR assets performed.



## The Future of Hybrid Risers Base Solution



**Thank you**

