The opportunity exists to...

...put in place effective means to provide the required functionality of the Northern Gas Transportation System (NGTS) at Brent during and post Brent decommissioning. The two main functionalities are:

- Maintaining NL / WL pipeline tie-ins to FLAGS (including future pigging of NL/WL)
- Providing pig-launching facilities for FLAGS (including isolation of Brent from FLAGS).
Project Objectives – Phase 1

- Connect NLGP to FLAGS direct
- Connect WLGP to FLAGS direct
- Minimise NLGP and WLGP downtime
- Disconnect NLGP and WLGP from Brent Alpha platform
- Ensure that the NLGP and WLGP can be pigged using subsea facilities
Phase 1 Reconfiguration

Brent Alpha Bypass - Phase 1
NLGP & WLGP Reconfiguration

Brent Bravo
Shell/ESSO

Brent Alpha
Shell/ESSO
Northern Leg Isolation Scope

- **Isolation tool**
- Launched from Brent Alpha
- Install three 0.7m plug type pigs separated by a MEG Slug followed by a 4.2m isolation tool
Western Leg Isolation Scope

- **SSIV to be used for isolation**

- Install four 0.6m standard pigs separated by a MEG Slug for decommissioning & commissioning

- Pig train launched from Brent Alpha

- SSIV piping configuration prevents isolation tool being used.

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![Diagram](image-url)

- Red boxes: Standard Pigs
- Yellow box: MEG
- Drive Fluid

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MAGNO
MURCHIESON
THISTLE
NORTH CORMORANT
CORMORANT A
HEATHER A
NINIAN CENTRAL

20" NLGP
16" WLGP
10" PIPELINE

10" pipeline
FLAGS VIA HTT
GJOA LTEE
GJOA PLEM

NLWL PLEM
TCS
NLGP SSIV
WLG SSIV
STRATHSPEY IGLOO
Project Objectives – Phase 2

- Disconnect FLAGS from Brent Alpha and Brent Bravo platforms
- Ensure that the FLAGS line can be pigged using subsea facilities
- Avoid FLAGS shutdown
Brent Alpha Bypass - Phase 2
FLAGS Reconfiguration

Brent Bravo
Shell/ESSO

Brent Alpha
Shell/ESSO

SSIV
IGLOO

NL-WL
PLEM

VES

VASP
PLEM
PLEM

HTT

TCS

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06 April 2012
Tree System & Tie-ins

- Shell standard cocoon system trees c/w Aker controls
- 5 off Oil production + GL trees (3 @ DCE & 2 @ DCW)
- 3 off Gas production trees (2 @ DCE & 1 @ DCW)
- 1 off PWRI tree 2km north of DCE
- 6” dia wet insulated production tie-in spools
- 2” CS GL tie-in spools
- 6” dia PWRI flexible (3.5km) and umbilical (2km)

Dynamic Flexible Riser System

- Tethered wave configuration
  - 2 off 12” production riser
  - 2 off 6” test riser
  - 5.14“ Produced Water Re-injection riser
  - 4” gas lift riser
  - Dynamic Control umbilical
  - 1 off 12.6” gas export riser (bore match 14” PL)
- Riser tie-ins to midline structures (2 off)

Gas Export Pipeline

- 14” x 18 km CS pipeline
- SSIV in midline structure
- PLEM & tie-ins to Fulmar Deep Gas Diverter
Well Tie-in Layout

- Standard GE (Vetco) FA tree systems
- 6” Production lines – ‘cold start temperature rated’ – CRA with ‘wet’ insulation.
- 2” Gas Lift – carbon steel (piggybacked to 6” production for installation)
- Electro-hydraulic Control Jumper – tree to towhead SDU.
- Protection by mattresses
- Spare slots for futures
Flowline Bundle Towhead/Manifold GA

- 1 x 12” production, 1 x 6” test, 1 x 6” PWRI and 1 x 4” GL headers
- Pigging head tie-in flanges for all headers
- Crossover valving to direct any wells onto test
- Control and Chemical Distribution – to wells and manifold.
- 8 well capacity on DCE and 6 well capacity on DCW manifolds
- Dimensions - 22 x 6 x 6 m and 220 tonnes (approx).
Riser System Infrastructure

- Dynamic Riser System comprising:
  - Dynamic Electro-Hydraulic control umbilical – thermoplastic tubes
  - 2 x 12" Production risers – (DCE & DCW have individual riser)
  - 2 x 6” Test risers – (DCE & DCW have individual riser)
  - 1 x 4” PWRI riser – (supplying DCE only)
  - 1 x 4” Gas Lift riser – (supply shared between DC’s)
  - 1 x 12” Gas Export riser

- Risers to be configured as a Tethered Wave

- Risers will have gravity bases for hold down and hold back.

- A control jumper from the midline structure will tie-in to the SSIV structure
Fram Dynamic Riser System

- 3 x 12” risers
- 2 x 6” risers
- 2 x 4” risers
- 1 x dynamic umbilical

Future Tie-Backs
Reeled Pipelay – Fram FPSO to Curlew deep Gas Diverter

- 14” x 20km X65 gas export line – uninsulated but 3 layer PP coating
- 2 trips to lay
- Post lay trenching
- Upheaval buckling – spot rock dump
12" Gas Export Tie-In to Diverter