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The Ichthys LNG Project
Major subsea installation phase

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CHUBU
Electric Power
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TOHO GAS GROUP

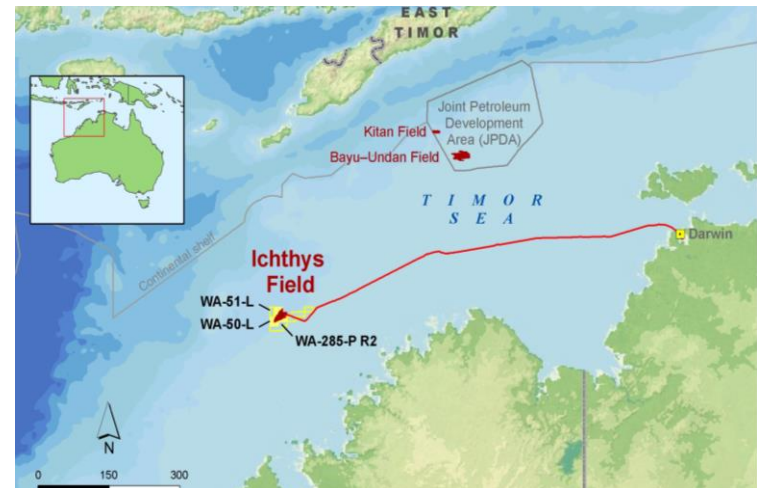
The Ichthys LNG Project is a Joint Venture between INPEX group companies (the Operator), major partner Total, CPC Corporation and the Australian subsidiaries of Tokyo Gas, Osaka Gas, Kansai Electric Power, Chubu Electric Power and Toho Gas.

Background

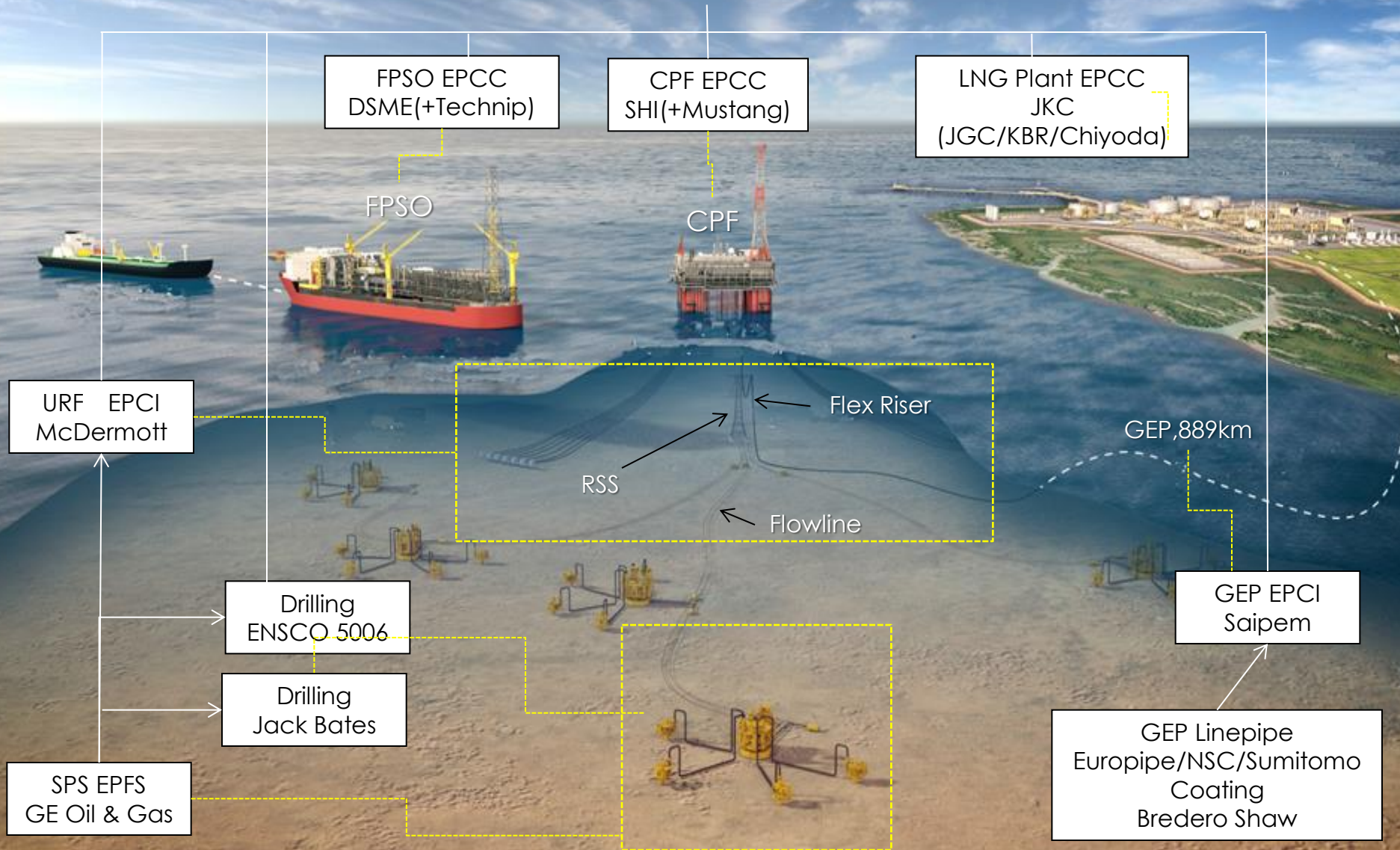


The Ichthys LNG Project

- Reservoirs situated in Timor Sea ~ 200 kilometres off Western Australian coast
- Reserves, proven and probable (2P) of around 12TCF of gas and 500 million barrels of condensate
- Comprised of three mega projects – offshore facilities, gas export pipeline, onshore LNG plant
- Includes some of the world's biggest and most advanced offshore floating units, onshore liquefaction plant near Darwin, and an 889 kilometre pipeline between them.
- 8.4 mtpa LNG, 1.6 mtpa LPG, 100,000 barrels condensate per day at peak
- Challenge of a conventional development in difficult, remote and often extreme environments
- Operational life of at least 40 years
- CAPEX estimated at US\$34 billion



Ichthys Project



Remote Project location

- Remote offshore location – more than 2 hours flight time to nearest capital city (Darwin)
 - Major offshore installation campaign
- Onshore site near Darwin
 - Low population and shortage of skilled labour
 - Required modular construction
 - Global fabrication yards
 - Total module shipping movements ~ 1,073,000 kilometres
- Western Australia is big – 2.5 million square kilometres - France would easily fit inside WA nearly five times
- Perth – world's most isolated continental capital city



HSE challenges

- Wide geographic spread over many international yards
 - Korea, Thailand, China, Philippines, Indonesia, Singapore, Malaysia
- Significant number of work-hours – more than 162,000,000 as of January 2015
- Two-rig drilling campaign – Jack Bates and ENSCO 5006
- Numerous pipe handling and lifting operations for 889 km gas export pipeline
 - 74,000 pipe joints, 1 million movements
- Challenging environments
 - Cyclones (offshore and onshore)
 - Environmental commitments (e.g. whale calving season)
 - Darwin wet season and Darwin tidal variance
- Two-year major offshore installation campaign
 - Major subsea campaign, CPF and FPSO
- Logistics: large number of offshore vessels, significant amount of helicopter travel, large distances
- Large multicultural workforce
- Numerous onshore subcontractors



Aims

Successfully deliver a quality conventional development to last at least 40 years

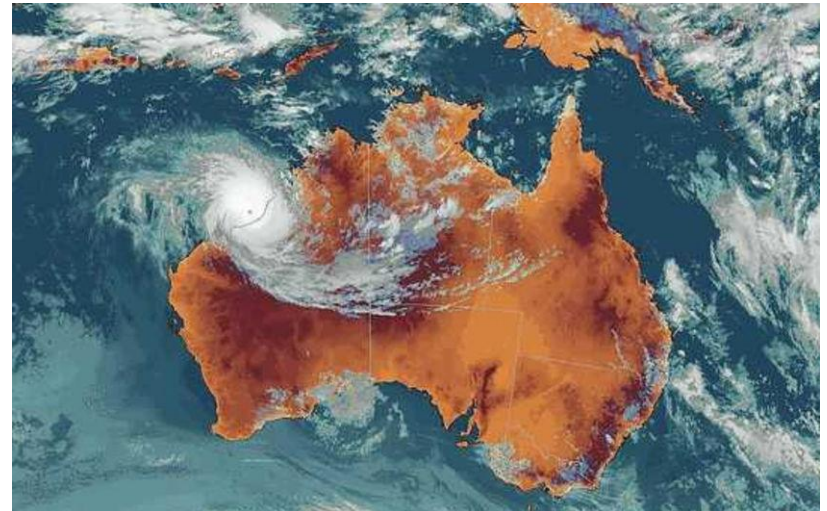
- Overcoming significant HSE challenges
- Difficult, remote and often extreme environments
- Managing significant supply chain and logistical challenges
- Developing technical and social infrastructure

Methods



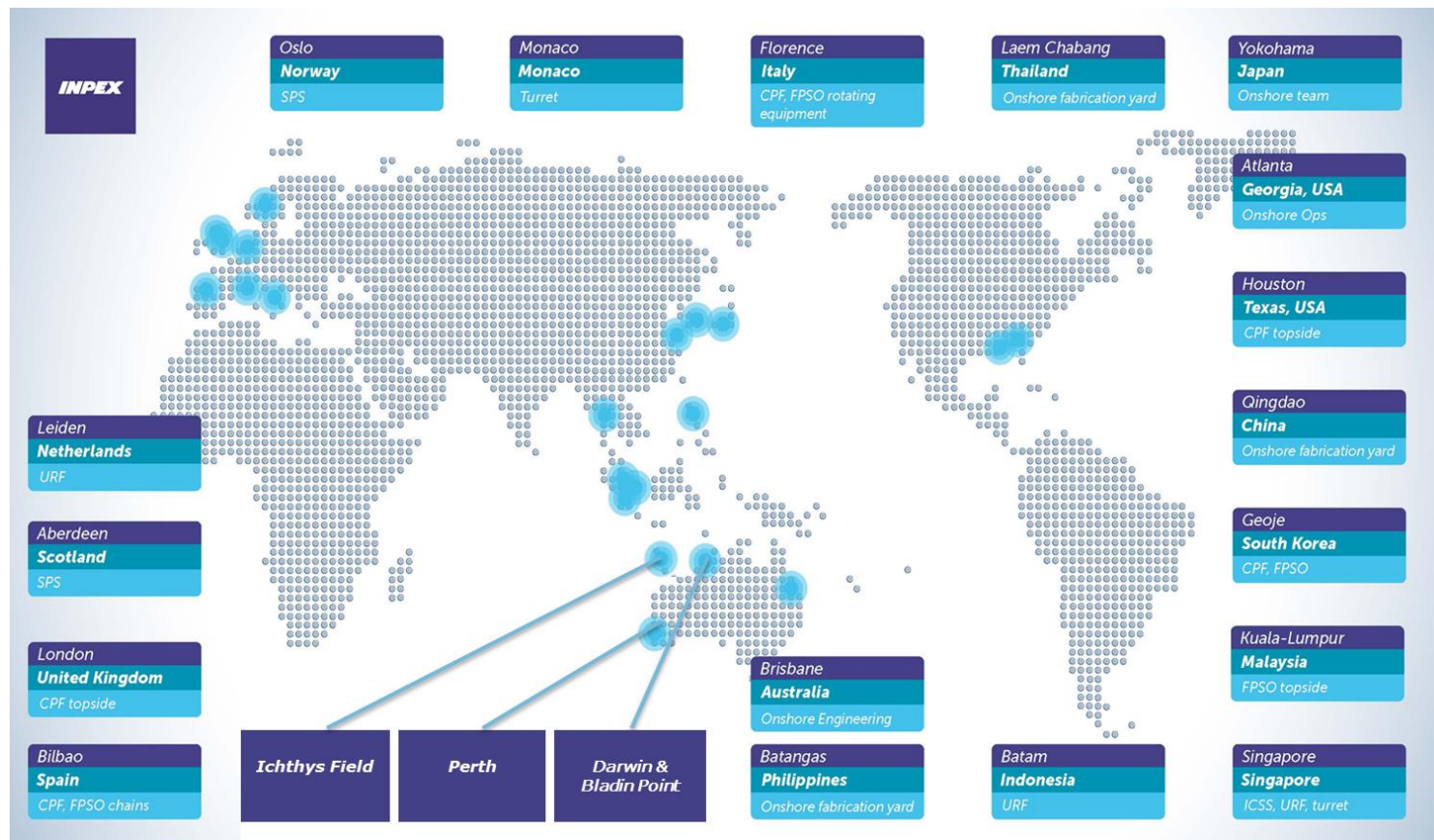
Design for decades in extreme conditions

- Challenge: Design facilities for 40 years of continuous operations in a remote area often subject to extreme weather conditions
- CPF and FPSO: 40 years on site without dry dock
- Browse Basin is very well known for cyclones
- CPF and FPSO designed to withstand 10,000 year return conditions and to be operable in 200 year return conditions



Large global spread

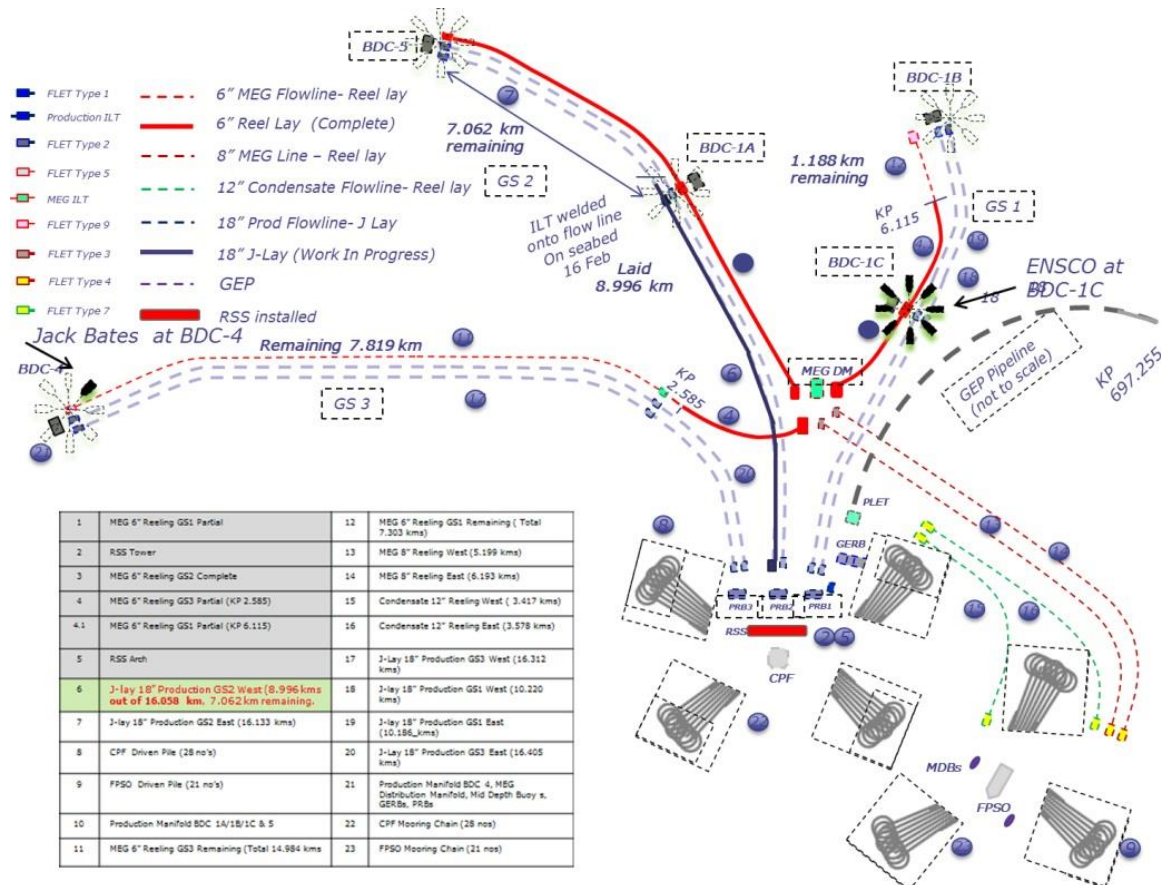
- Selected world renowned contractors resulting in a large global spread and supply chain
- Global spread is reducing as the Project progresses
- Perth, the Ichthys Field and Darwin will remain when construction is complete.



Offshore installation – major subsea campaign

Umbilicals, Risers and Flowlines work:

- Major subsea campaign currently underway; y people offshore and X vessels
- Fabrication, installation and pre-commissioning of subsea umbilicals, risers and flowlines, support structures and control systems
- The connection of these systems to other offshore components
- Installation and connection of the moorings for the CPF and FPSO



Length of supply chain to remote field

- **Mooring chains and piles: example of length of supply chain**
 - 40,000 tonnes of chains manufactured in Spain
 - 48, 490 tonne piles manufactured in Korea
 - Chains shipped to Indonesia and Korea
 - Forerunner chains connected to piles in Korea
 - All equipment sent to Ichthys Field for URF piling campaign.



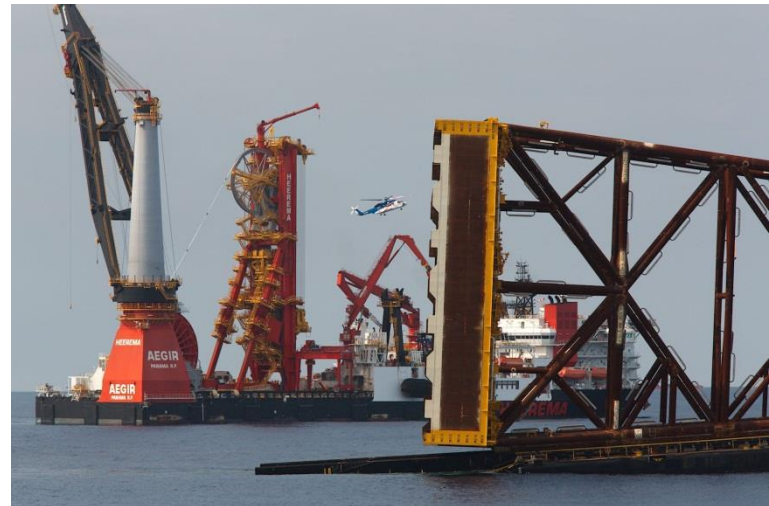
Onshore LNG facilities

- Modular construction
 - Darwin population 120,000, despite land mass three times that of France
 - Limited skilled labour
 - Reduces on-site construction work-hours and trims peak manning levels
- Global fabrication yards: Thailand, China, Philippines, Malaysia
 - More than 200 modules
 - Total module shipping distance nearly 1,073,000 kilometres
- Challenging conditions
 - Darwin 'wet season', cyclones, major tidal variance (up to 8 metres)

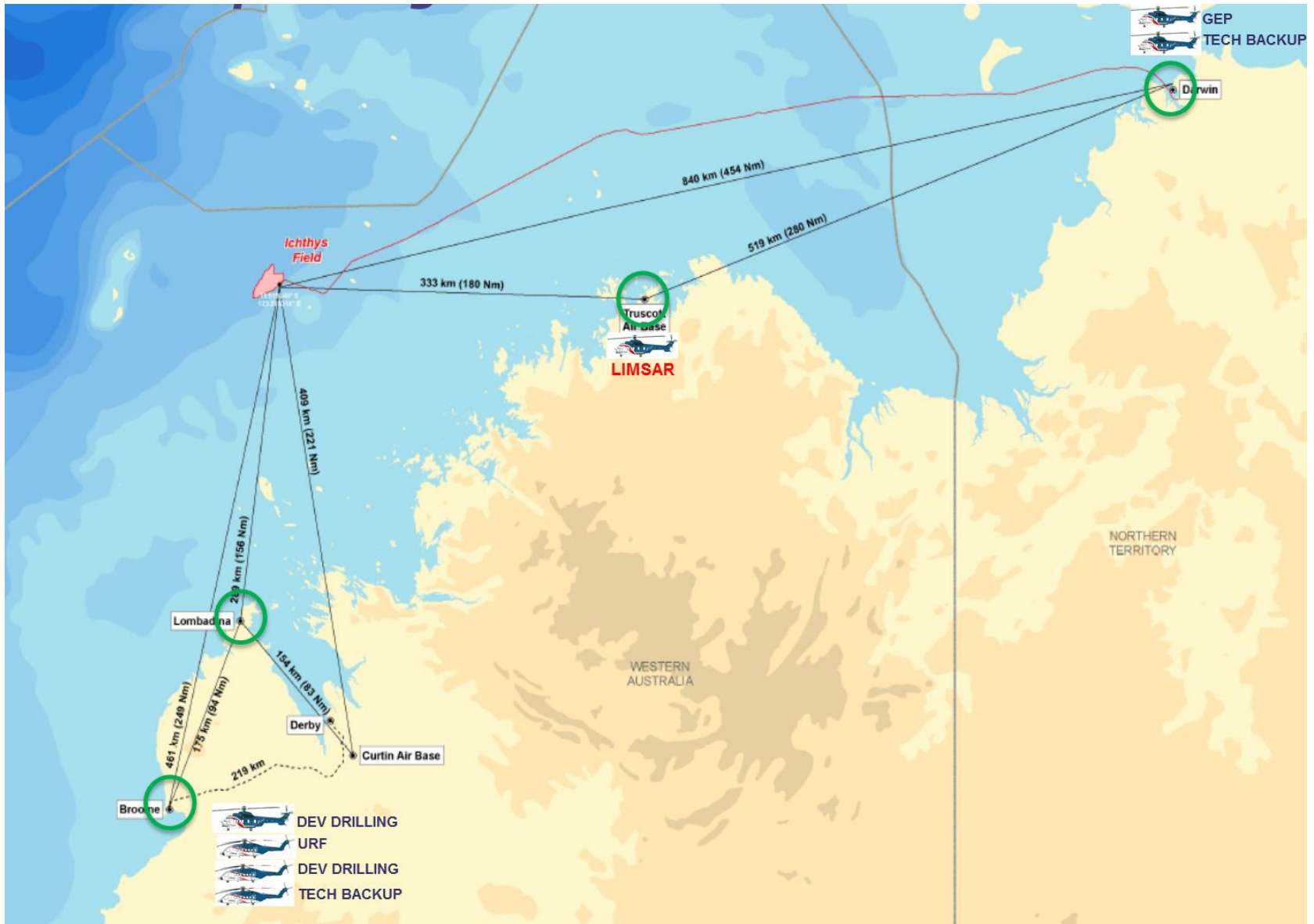


Logistics

- INPEX oversees all offshore travel for the Project
- More than 2,000 people in the Field at peak
- Around 20-25 vessels at peak
- Large travel distances – 450 plus kilometres departing from Broome
- Often delays due to weather, which means constant schedule juggling
- 100 workers will fly daily at peak
- 8,150 people safely moved in first seven months (figures double in 2015)
- 2 hour flight to nearest capital city (Darwin)



Logistics



Technical and social infrastructure

- Remoteness required good technical and social infrastructure
- INPEX and Shell joint investment to build subsea optical fibre cable system
- High-speed data and voice communication services
- Initially for Ichthys and Shell's Prelude FLNG project
- Essential for effective and efficient operations at future offshore facilities
- Offshore workers: reliable link with friends and family



Results/conclusion



Results/conclusion

Project progress

- About 64 per cent complete as of December 2014
- More than 30,000 people worldwide
- CPF hull nearing completion
- FPSO lower turret insertion completed and hull floated
- GEP deepwater pipelay underway
- Subsea equipment installation underway – RSS tower and arch installed and grouting complete
- First christmas tree systems arrived in Australia
- First of two onshore LNG storage tank roofs lifted into place
- Large LNG modules arriving at Bladin Point since June 2014
- Development drilling underway using two drilling rigs