

Can we avoid 'The Domino Effect' by unlocking near field potential?

# Greater Laggan Area

TROVE Hub Analysis Report



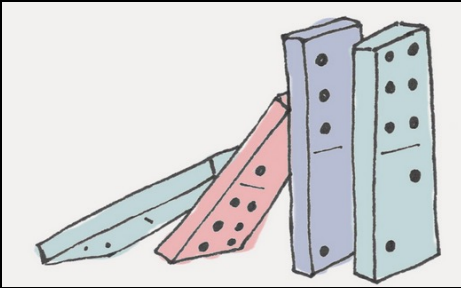
## Disclaimer

- This talk is based on an independent screening assessment of the Greater Laggan area by 1<sup>st</sup> Subsurface for an overseas investor.
- The data used is taken from public-domain sources amassed in the TROVE NW Europe database.
- The views of operator TotalEnergies and co-venturers have neither been sought nor given.
- Consequently, any errors or discrepancies are ours but will be corrected in the final version published as part of DEVEX 2021, where notified.

## Talk Outline

- Background
- Production & Reserves
- Future Tie-backs
- 50km Potential Review
- Conclusions

# The Domino Effect



Hub  
Standalone

## NNS Example

Brent  
Crawford  
Don SW & West Don  
Dunlin, Merlin & Osprey  
Eider  
Emerald  
Frigg  
Heather & Broom  
Hutton  
Leadon  
Linnhe  
Murchison & Playfair  
NW Hutton  
Staffa  
Thistle & Deveron

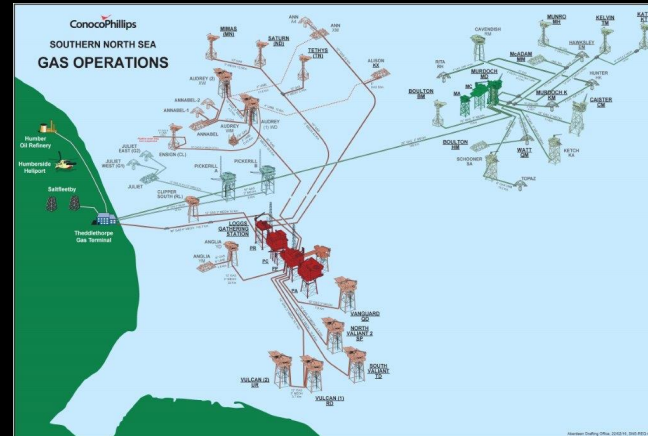
How long before NPS & BSP  
Sullom Voe Terminal?

## CNS Examples

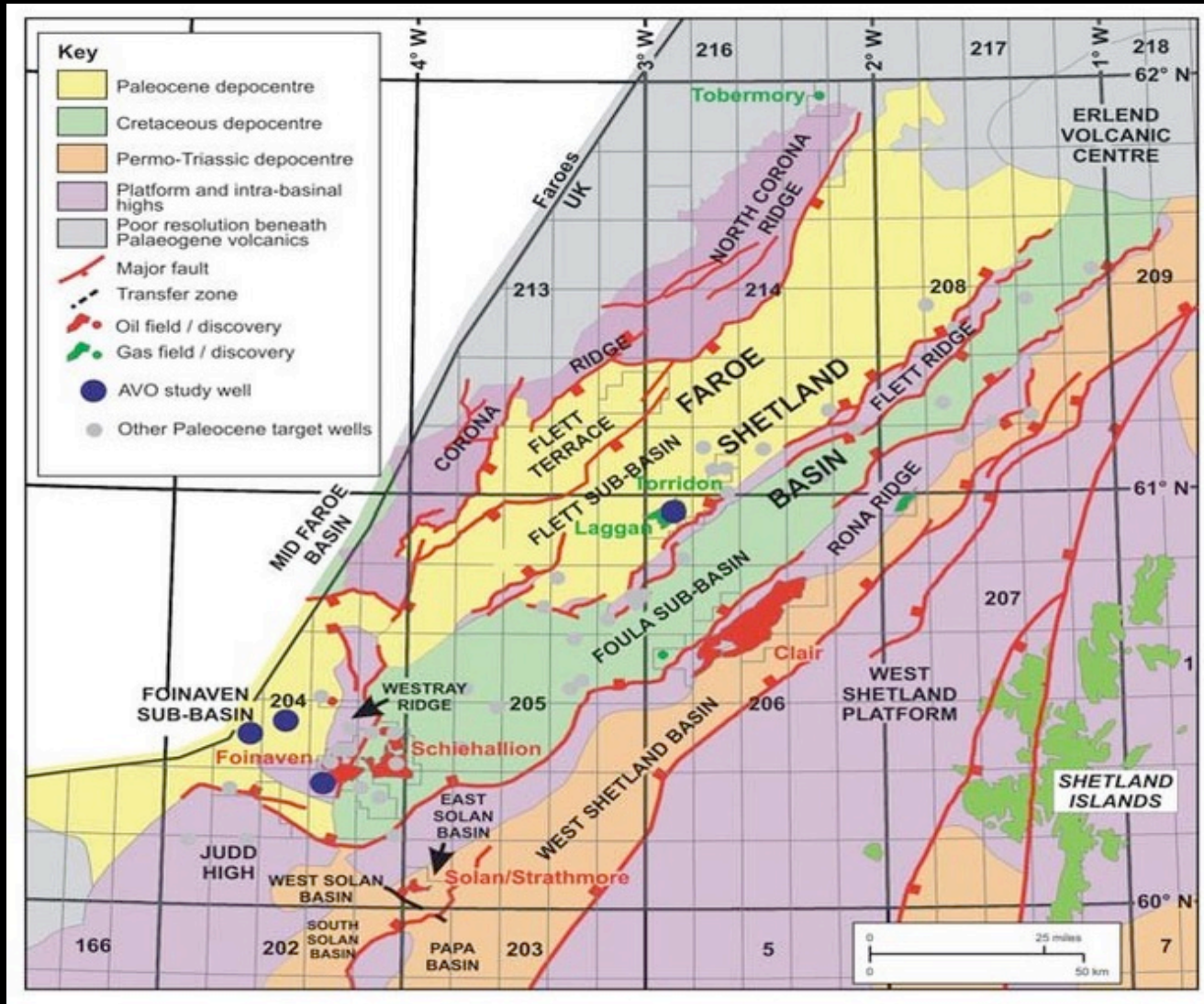
Maureen Mabel Moira  
Fife, Flora, Fergus & Angus  
Argyll, Ardmore & Alma  
Tartan, Petronella, Highlander & Duart

## SNS Example

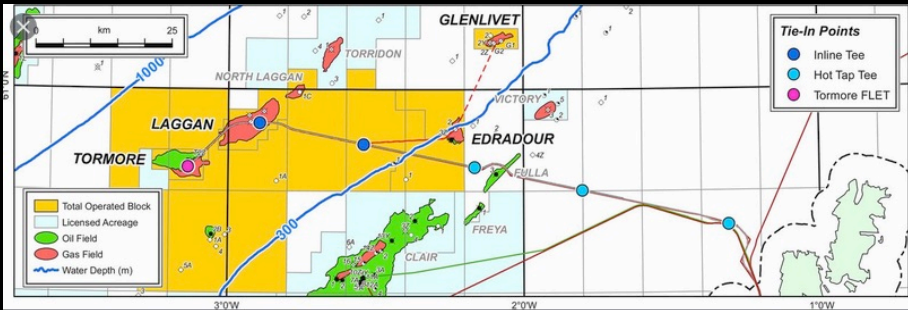
Theddlethorpe Terminal



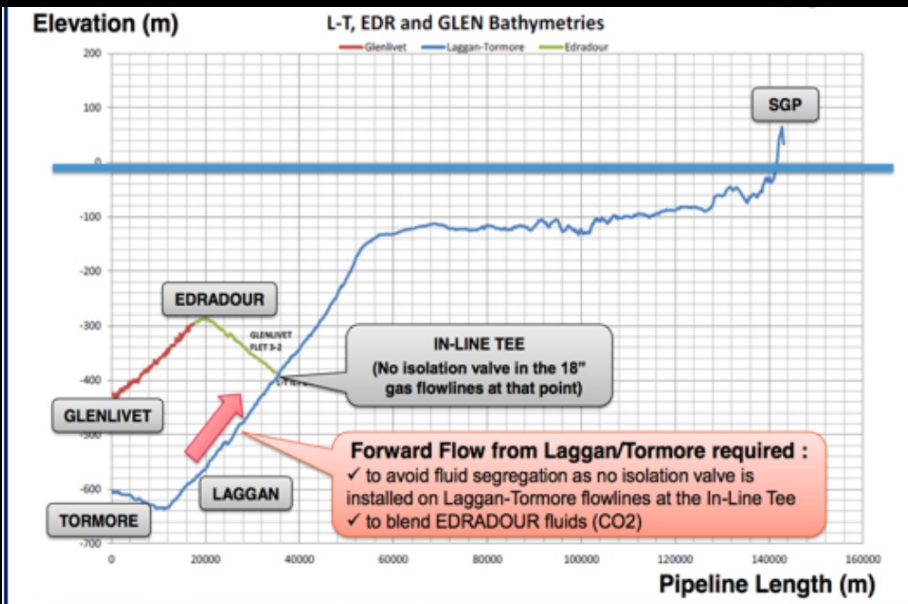
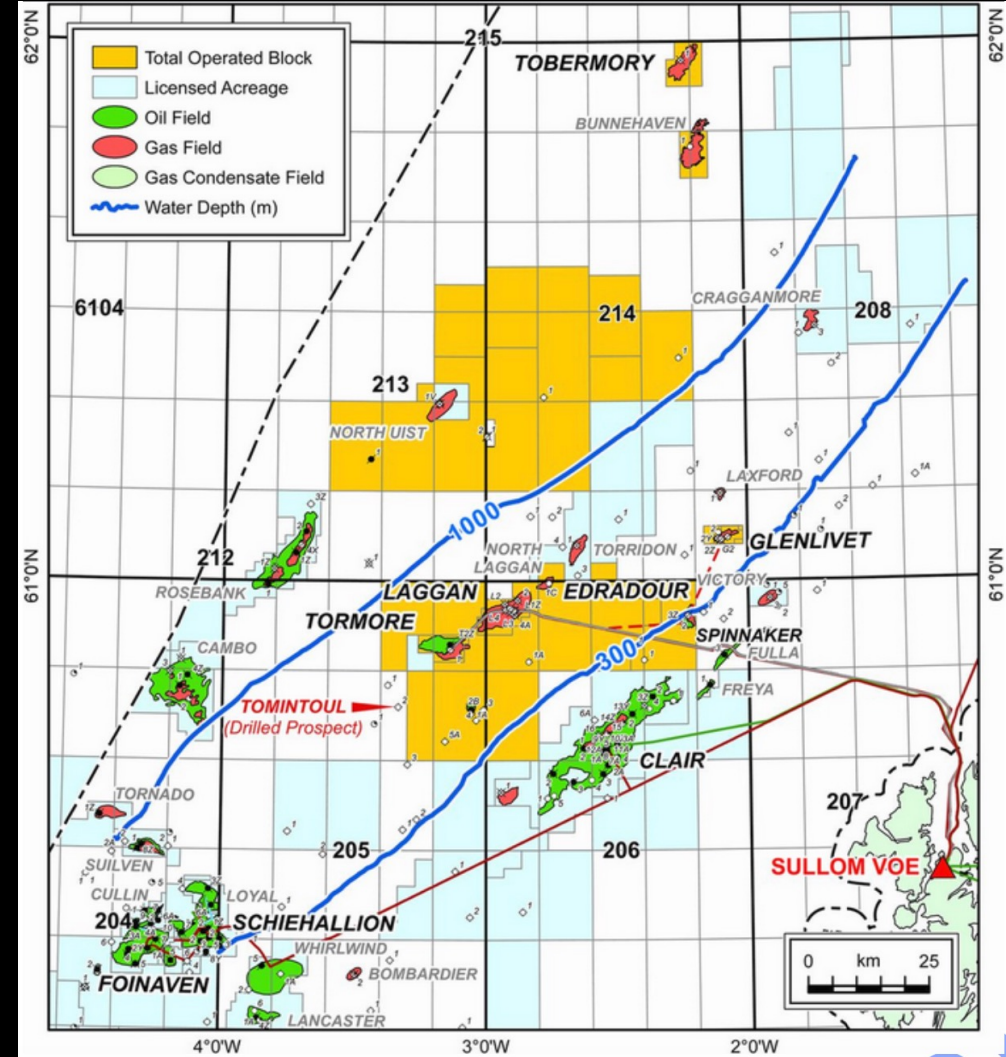
# West of Shetland Regional Geology



## Laggan - Tormore tie-in points

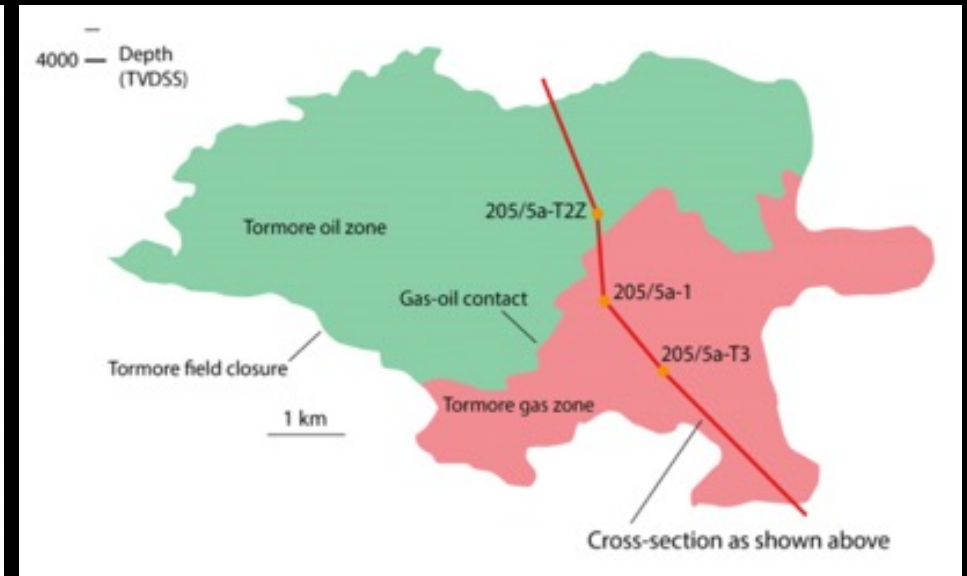
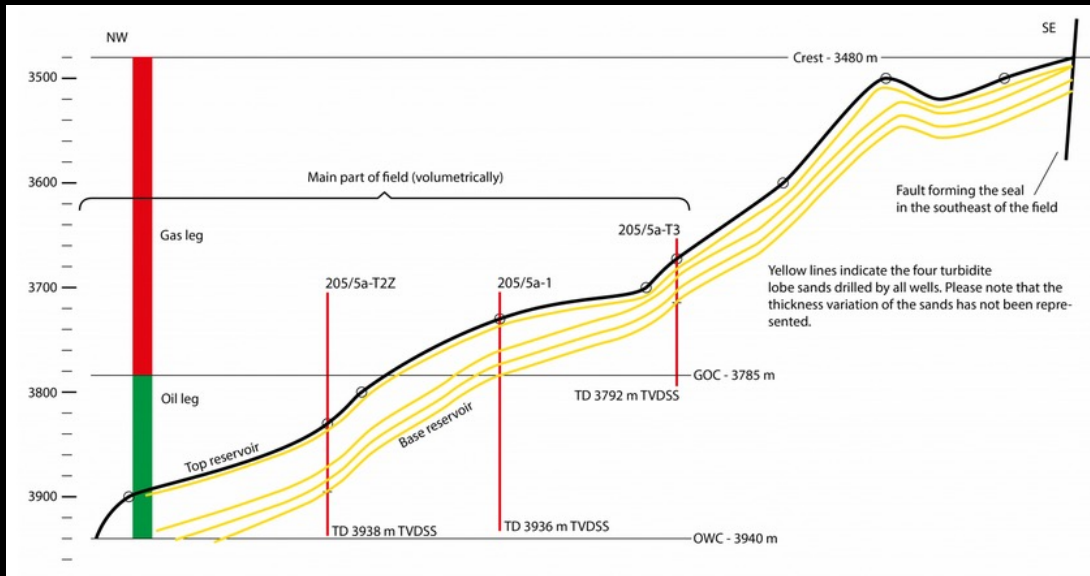


## Bathymetry



# Tormore

## Tormore - a gas field with an oil rim or an oil field with a gas cap?



After ExproNews

## Context alongside NW Europe Fields & Discoveries

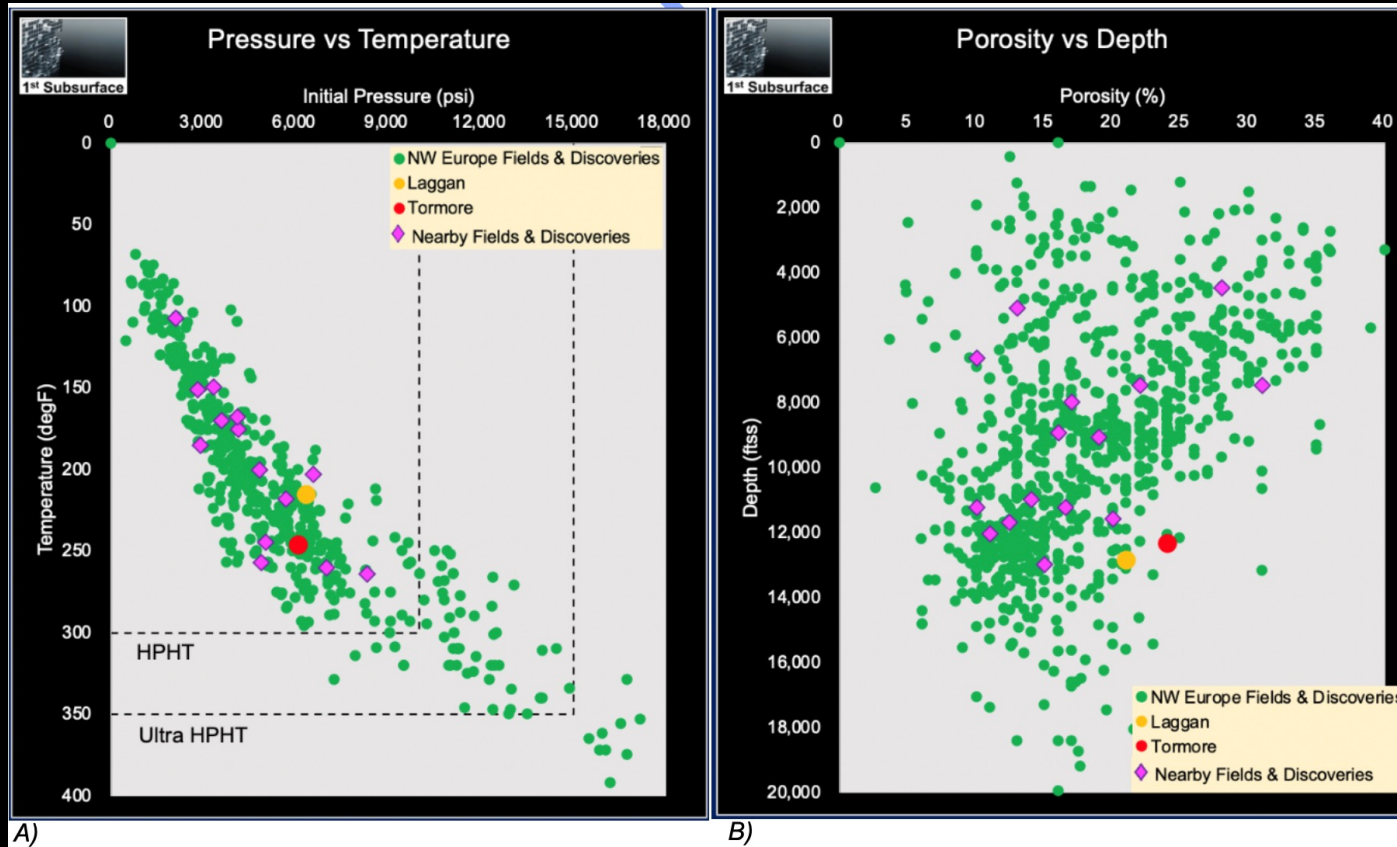
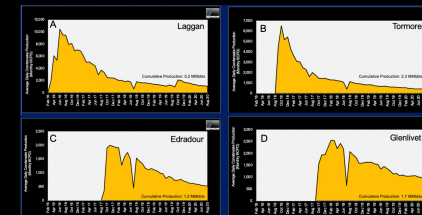
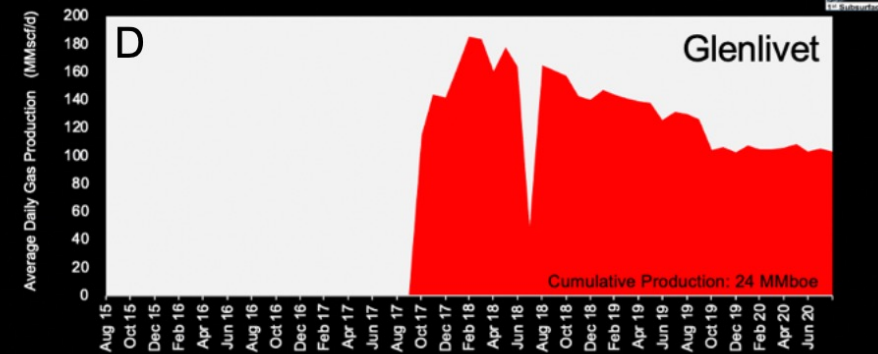
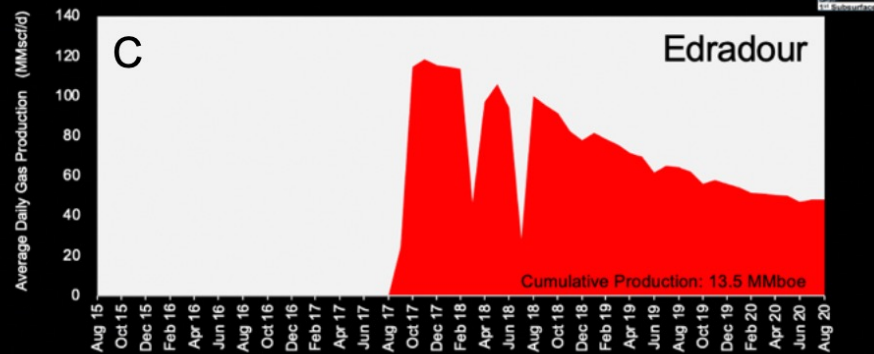
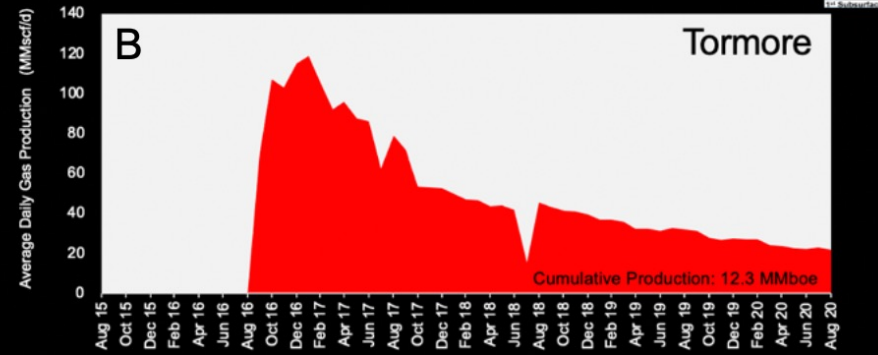
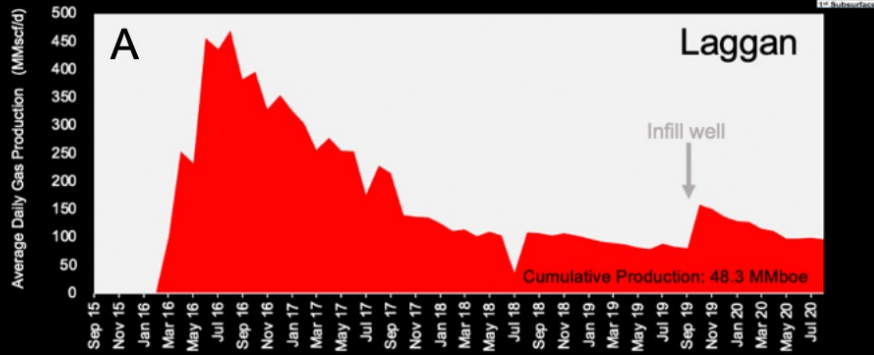


Fig. 3 The fields and discoveries within the Laggan-Tormore region (Magenta diamonds) are compared to other NW Europe fields and discoveries within TROVE (Green circles). Laggan (Yellow circle) and Tormore (Red circle) are highlighted.

A) Pressure v Temperature Chart. B) Porosity v Subsea Depth Chart.

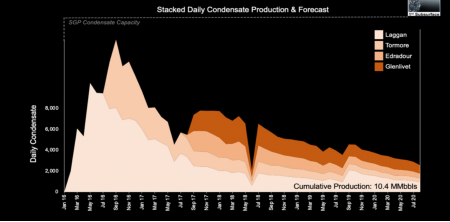
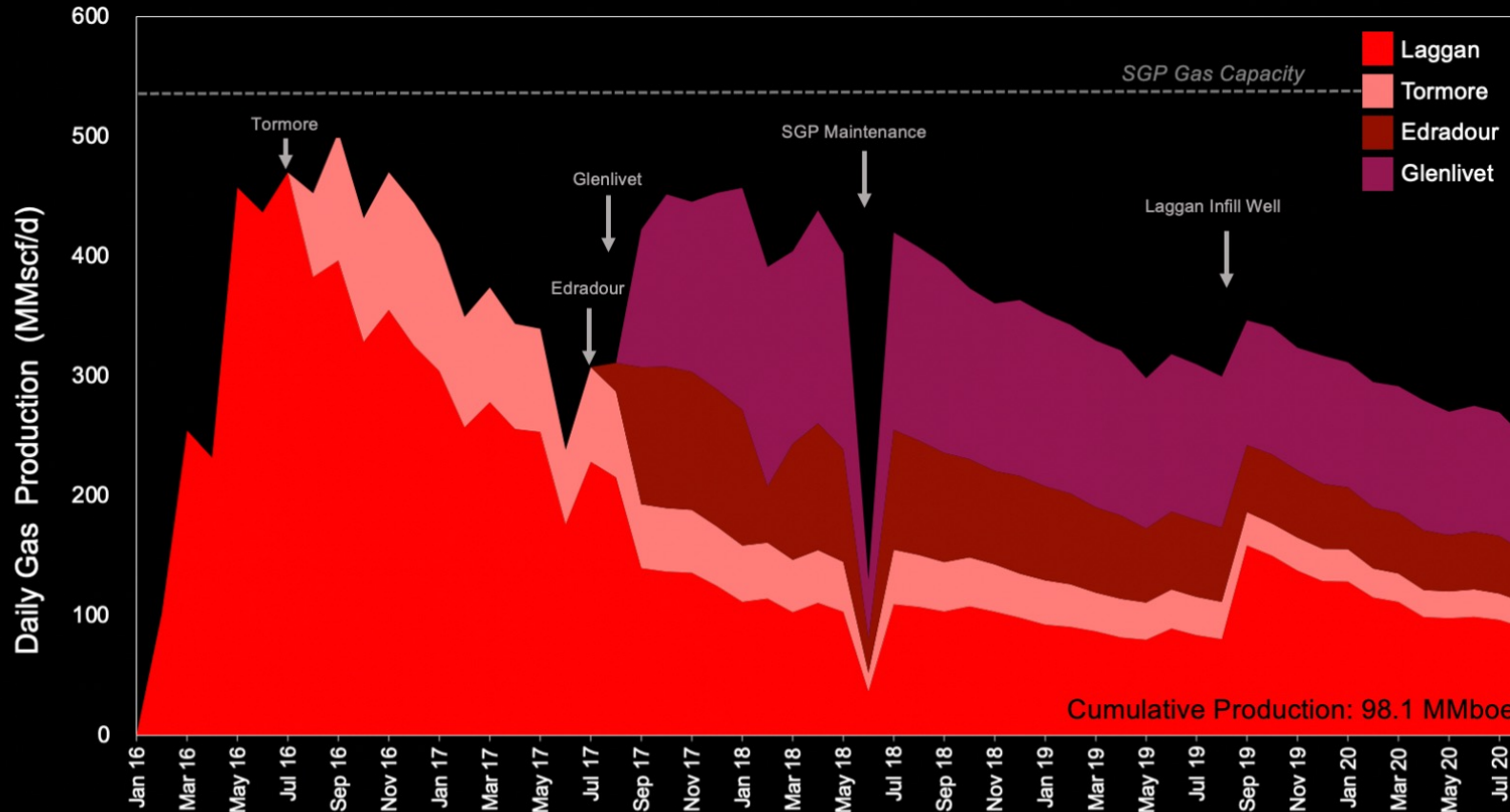
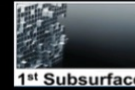


# Life-of-Field Production



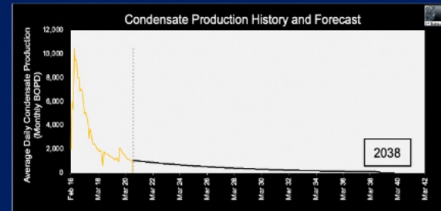
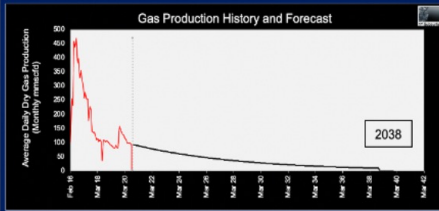
# Hub Production Profiles

## Stacked Daily Gas Production

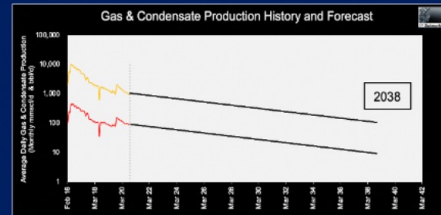


# Decline Curve Analysis

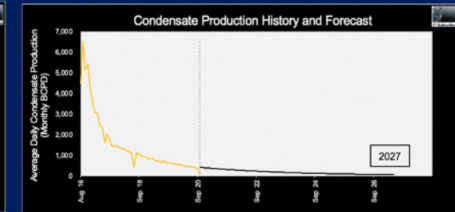
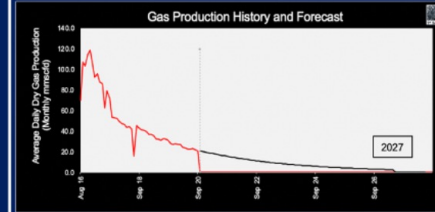
## Laggan Forecast



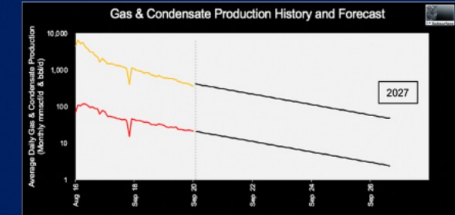
Technical COP: 2038  
 Cumulative Production: 48.3 MMboe  
 URR: 89.2 MMboe  
 RR: 40.67 MMboe (Sept 20 - Oct 38)



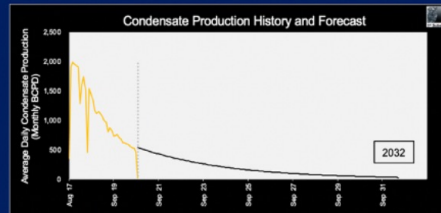
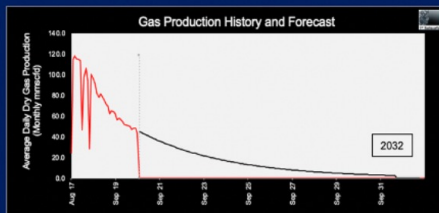
## Tormore Forecast



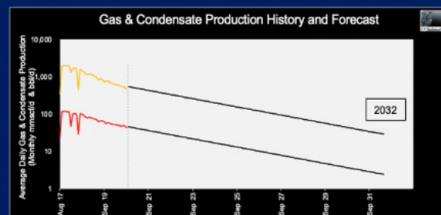
Technical COP: 2027  
 Cumulative Production: 12.3 MMboe  
 URR: 15.8 MMboe  
 RR: 3.5 MMboe (Sept 20 - Apr 27)



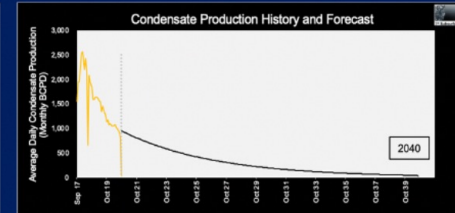
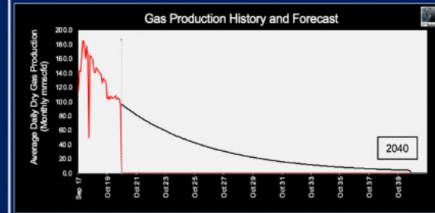
## Edradour Forecast



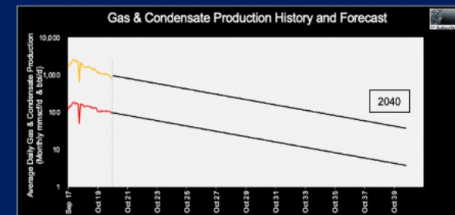
Technical COP: 2032  
 Cumulative Production: 18.5 MMboe  
 URR: 23.8 MMboe  
 RR: 10.3 MMboe (Sept 20 - Apr 32)



## Glenlivet Forecast

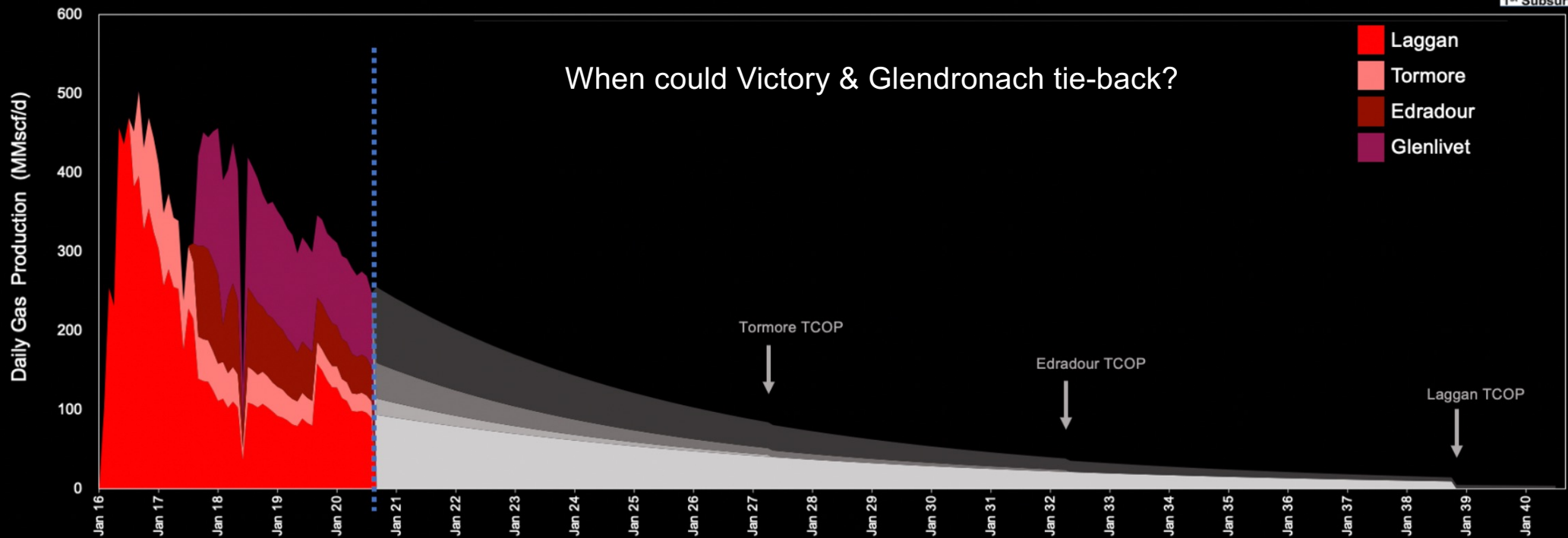
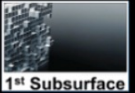


Technical COP: 2040  
 Cumulative Production: 24 MMboe  
 URR: 58.5 MMboe  
 RR: 34.5 MMboe (Sept 20 - Jul 40)



# Production forecast

## Stacked Daily Gas Production & Forecast



TCOP - Technical CoP (no economic cut-off applied)

# Future Tiebacks?



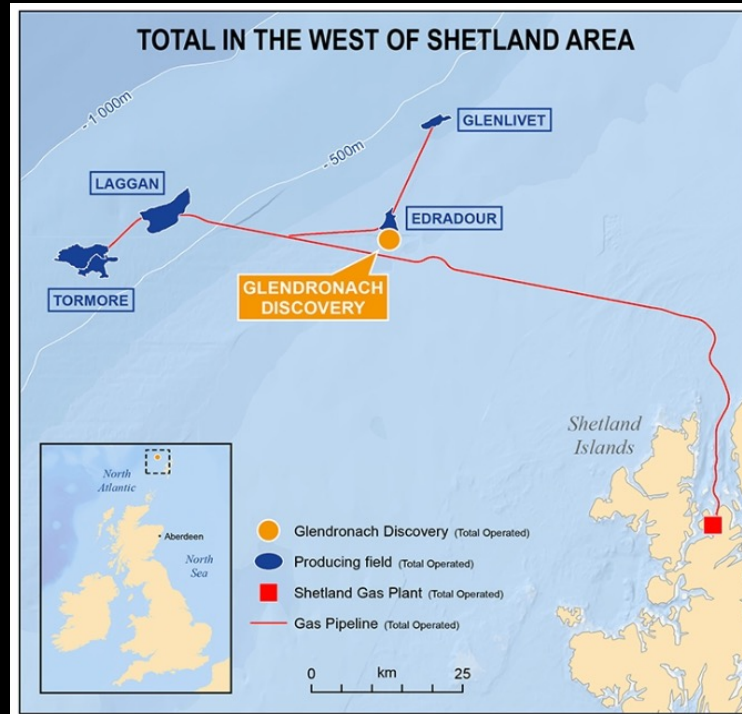
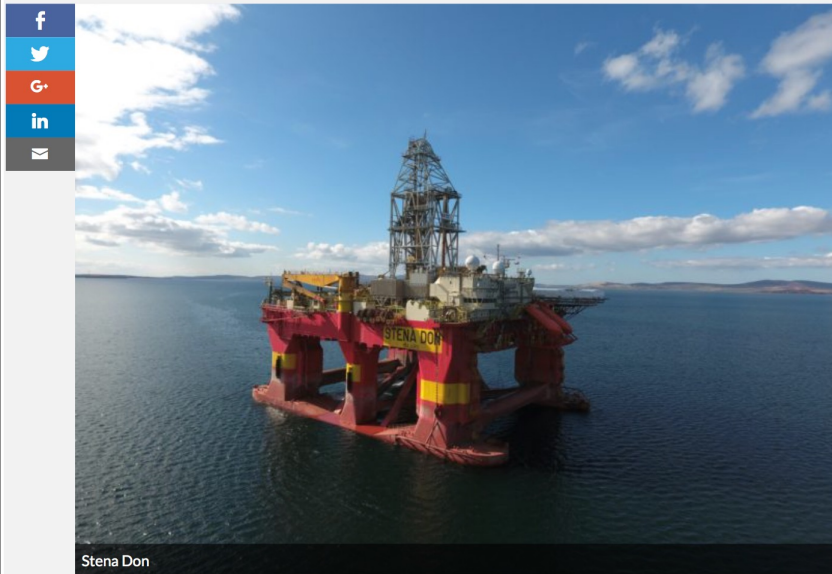
**1<sup>st</sup> Subsurface**

# TotalEnergies' Glendronach discovery – well 206/4a-4

North Sea

## Total reveals major gas find west of Shetland

Written by Mark Lammy - 24/09/2018 7:07 am



Post appraisal GIIP  
~600 Bcf

NATURAL GAS | METALS — 07 Apr 2020 | 11:27 UTC — London

## France's Total studying options for UK's Glendronach gas field, mum on FID

HIGHLIGHTS

OIL & GAS · NORTH SEA

## Resources at Total's major Glendronach discovery cut by 40% following appraisal

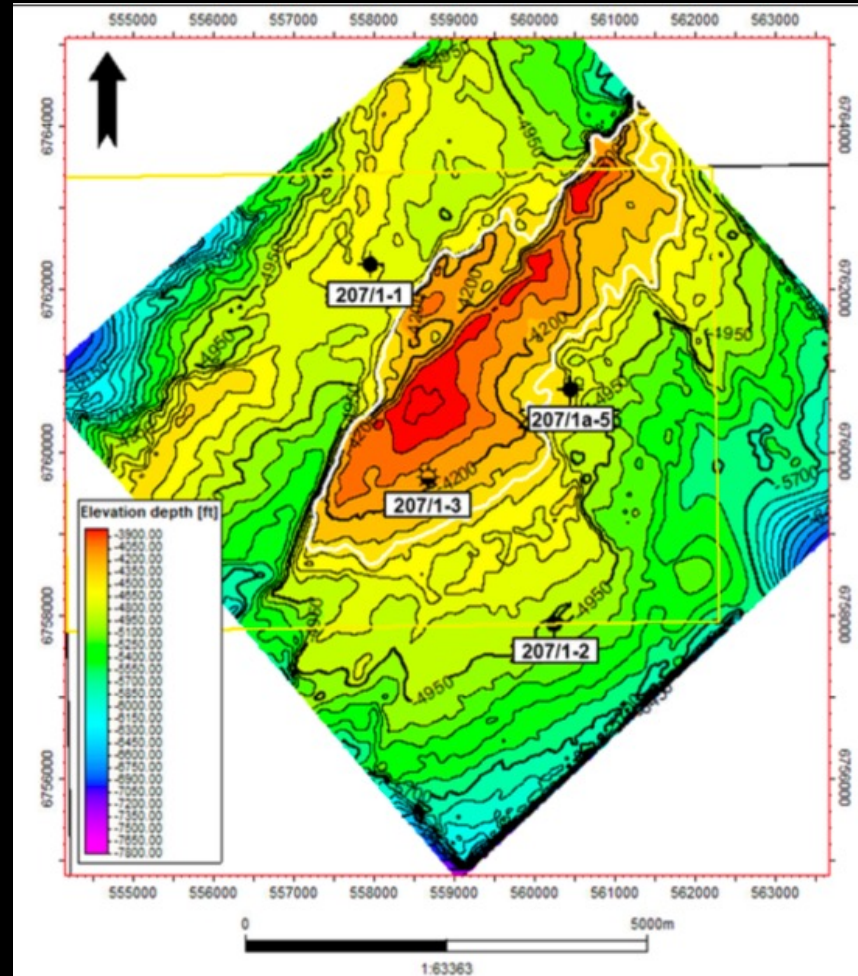
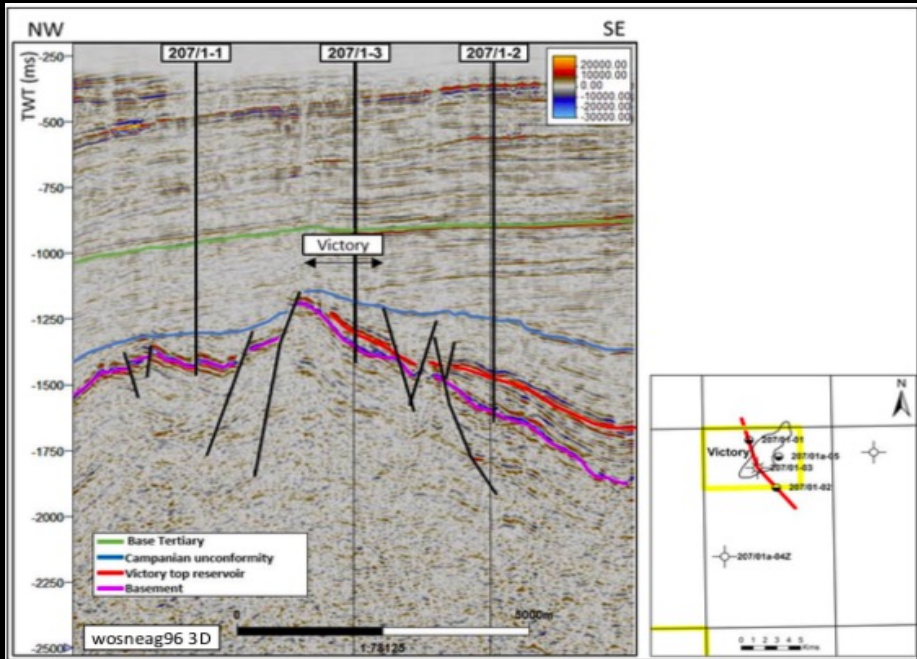
by Allister Thomas

03/03/2020, 7:54 am

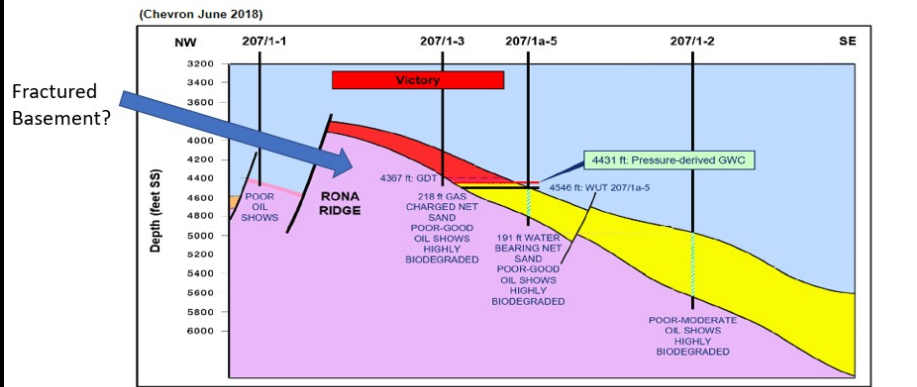


One of the largest offshore discoveries in UK waters of the last decade has had its recoverable resources cut by 40% following an appraisal well.

# Victory – well 207/1-3



## Cartoon x-section of the Victory gas field

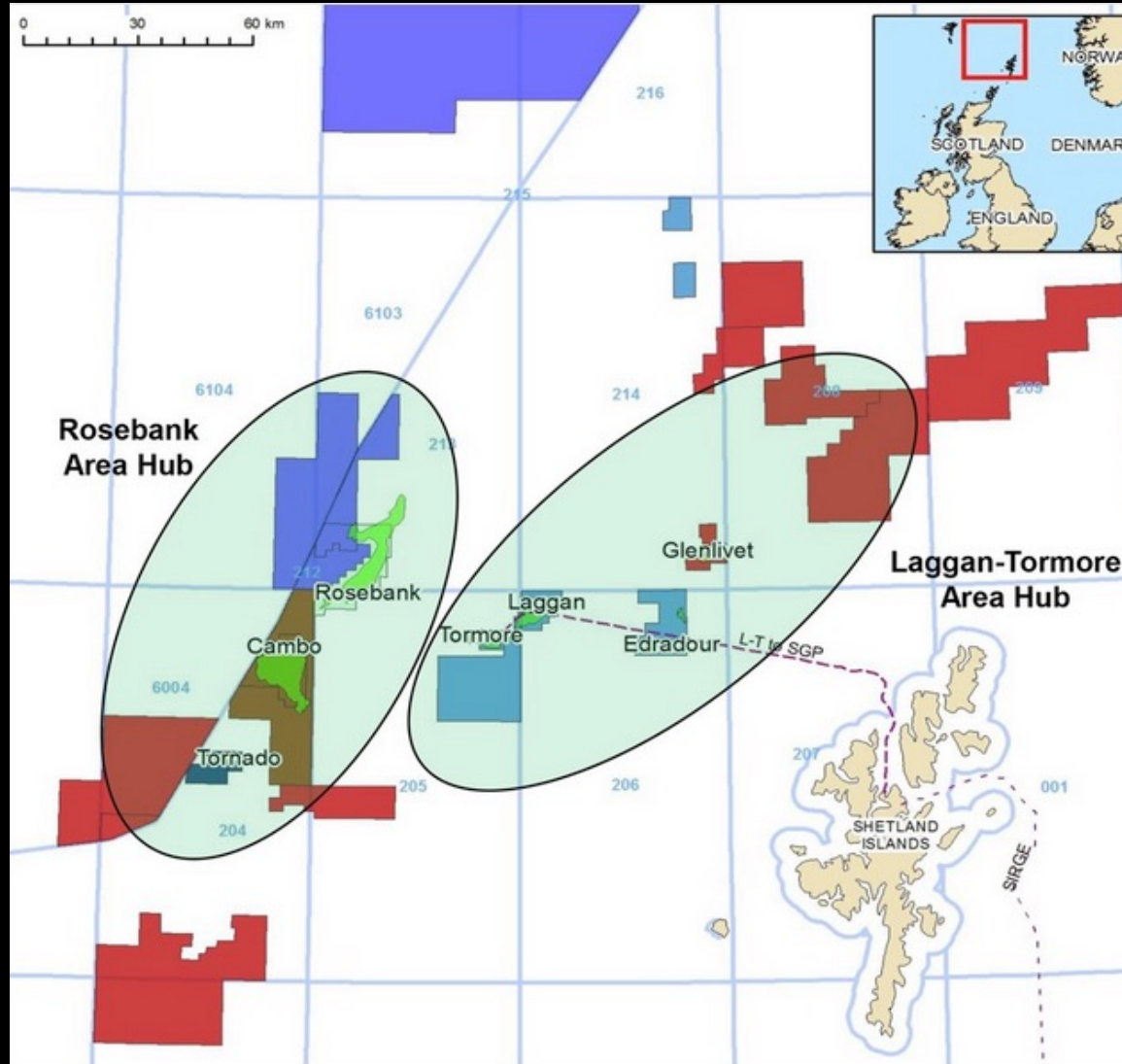


- A 3-year gas production plateau is planned at **70 mmscf/d** (11,666 boepd) from 2025,
- Total planned gas production recovered from the project over the 8-year field life is **157 BCF**

## Future West of Shetland hubs

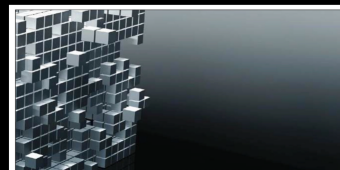
Will Rosebank & Cambo  
export gas via  
Laggan-Tormore?

Cambo ES published  
yesterday states gas  
export via WoSPS



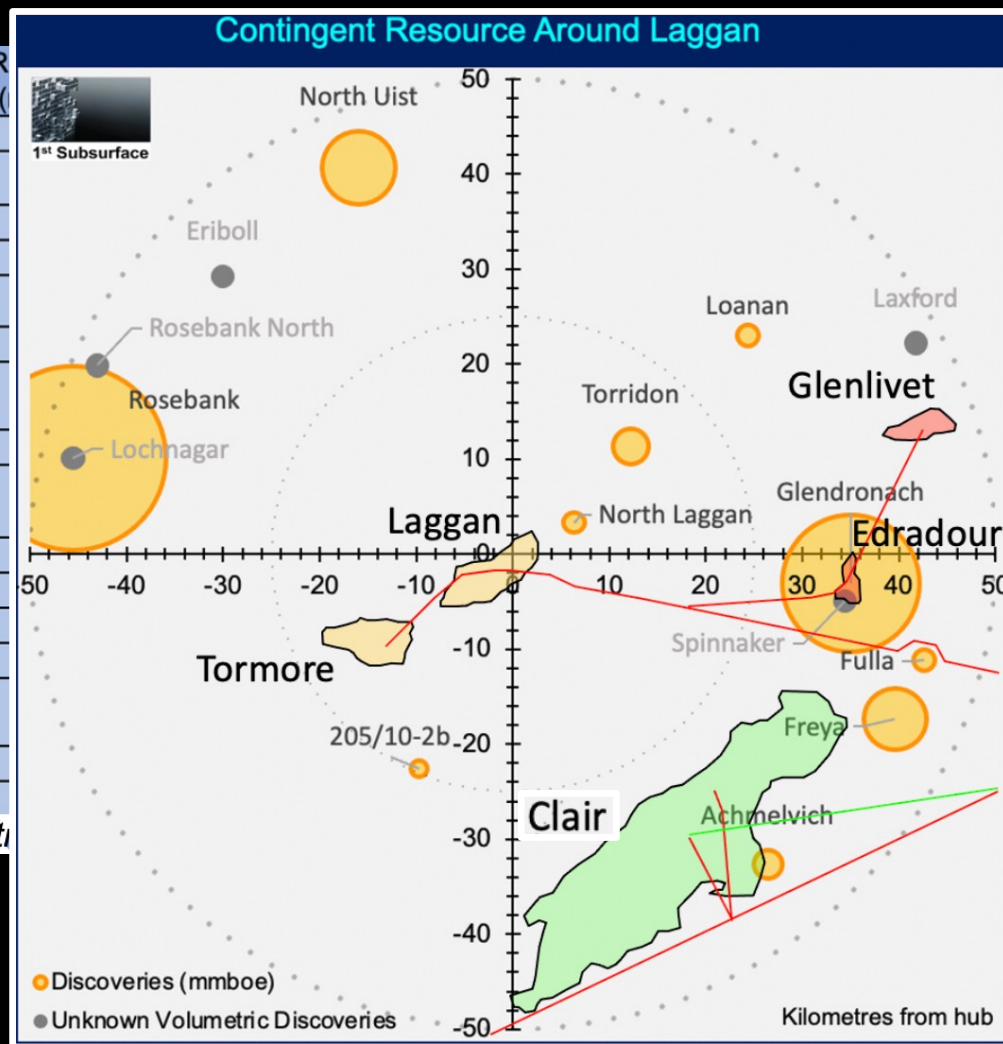


# 50km Potential Review



**1<sup>st</sup> Subsurface**

# Discoveries in Greater Laggan Area



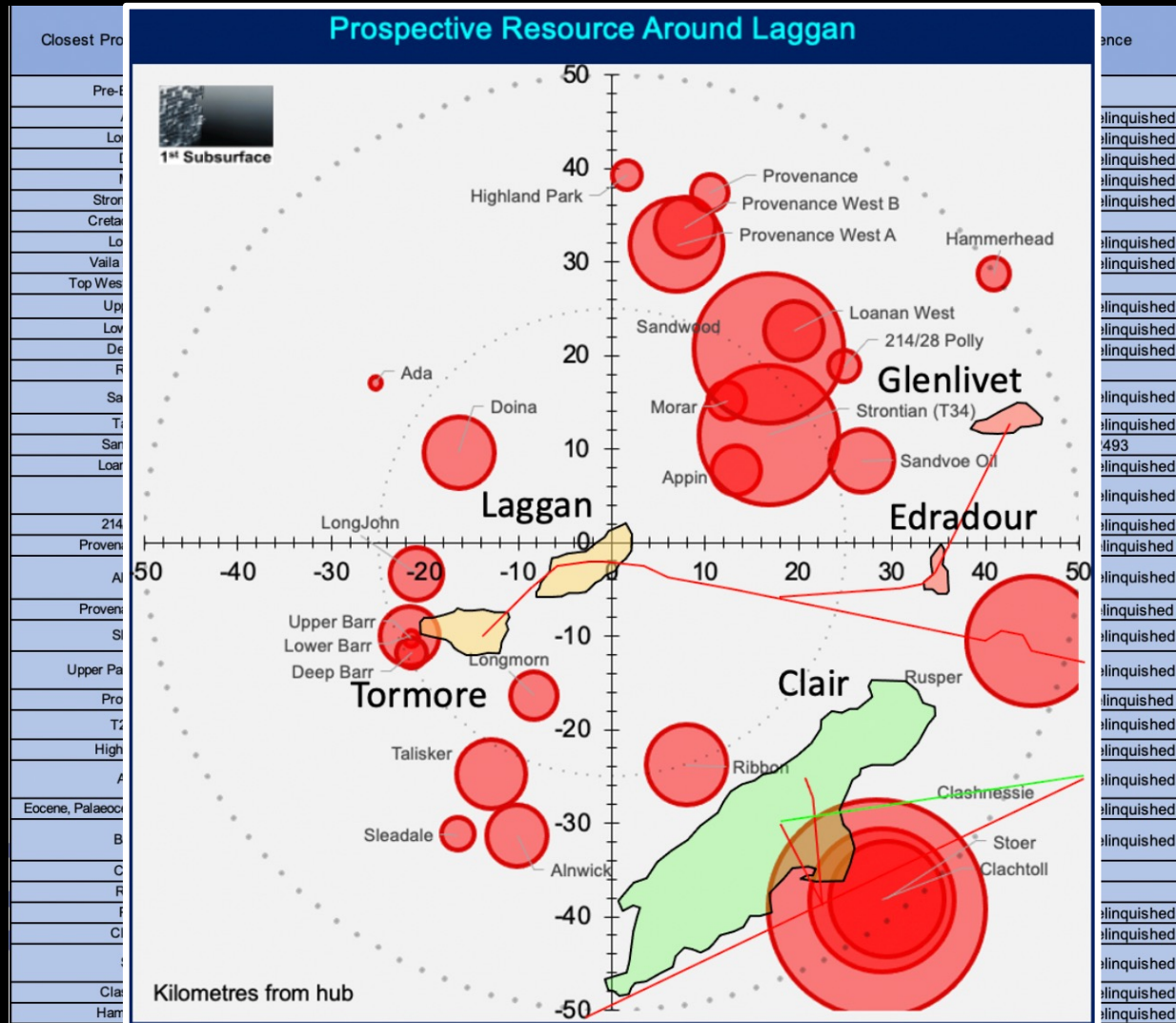
Closest Discoveries	Distance (km)	R ()
North Laggan	7	
Torridon	17	
205/10-2b	25	
Loanan	34	
Spinnaker	35	
Glendronach	35	
Eriboll	42	
Achmelvich	42	
Freya	43	
North Uist	44	
Fulla	44	
Lochnagar	47	
Rosebank	47	
Laxford	47	
Rosebank North	47	
Victory	52	

Fig.12 An ext

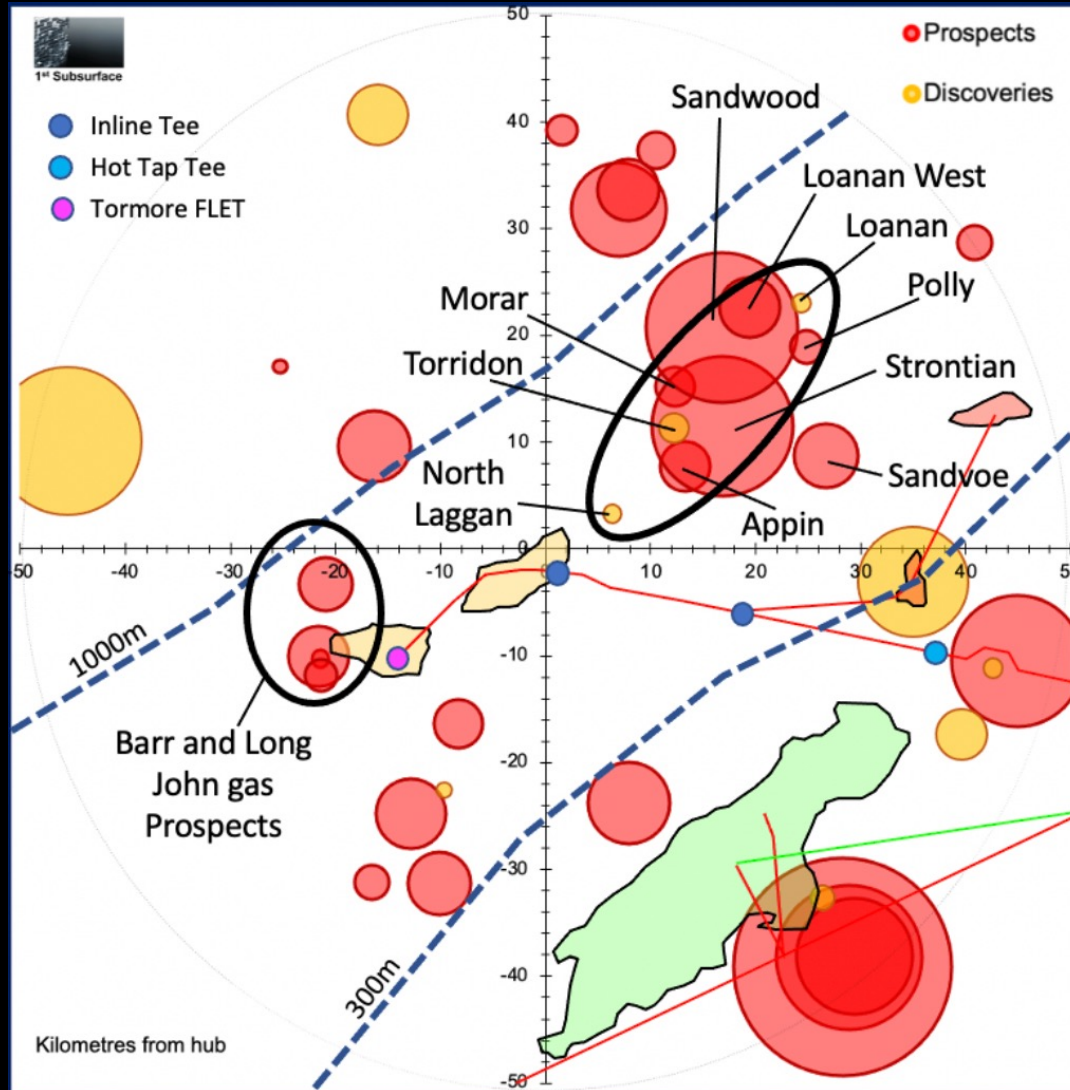
Formation	Trap Type
	TBC
	Tilted fault block
	4 way dip closure
	4 way dip closure
Fm	Stratigraphic
ign	TBC
rous and sts	Basement Fault Block
stone	3-way closure
taceous	Tilted Fault Block
	Structural
ry ssts	Stratigraphic
	tilted fault block
s	4 way dip closure
	Combined updip pinchout and fault seal to NW
na	TBC
tone	Structural

m of Laggan.

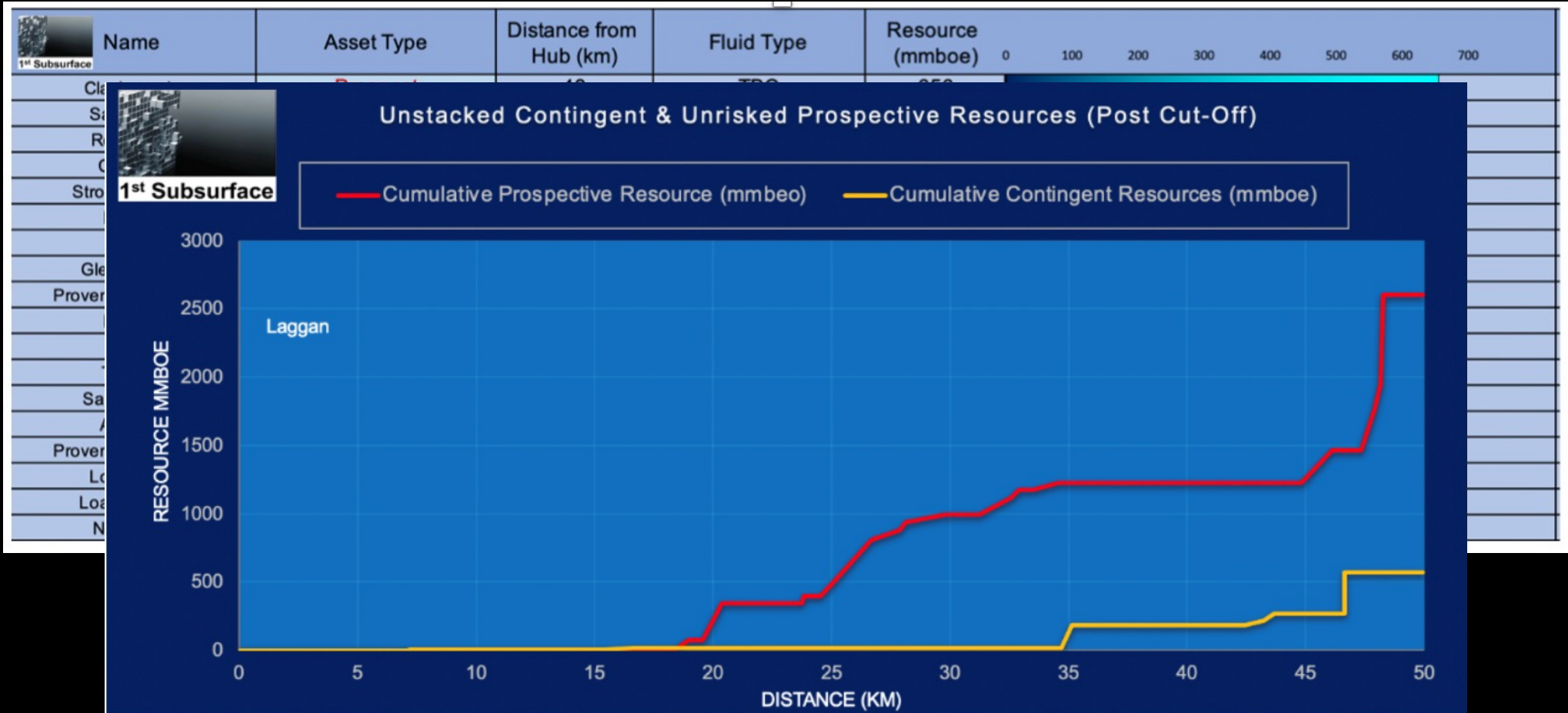
# Prospects in Greater Laggan Area



# Hub Analysis Summary



# Hub Analysis



## Conclusions

Domino effect – Currently any field underperformance in the Laggan Hub could prematurely determine end-of-hub life

Are Glendronach & Victory viable hub tie-backs?  
(Flow assurance issues?)

There is a limited window of opportunity to thoroughly explore and maintain the Greater Laggan Hub.

**Final thought:-**

Is it already too late for many hubs?

# West of Shetland Gas Pipelines to Sullom Voe

Closest Fields	Distance (km)	Reservoir Formation	Fluid Type	Discovery Well	Trap Type	Latitude	Longitude
Laggan	0.0	Vaila Fm	Condensate	206/1-2A	Stratigraphic with updip closure at bounding fault	60.9638	-2.8798
Tormore	17.1	Vaila Fm	Condensate	205/05a-1	Combined	60.8724	-3.1354
Edradour	35.2	Commodore Fm	Condensate	206/4-2	Stratigraphic	60.9347	-2.2310
Clair	35.7	Devonian (ORS) Ssts	Oil	206/8-1A	4 way dip closure	60.6845	-2.5534
Glenlivet	43.2	Vaila Fm	Condensate	214/30a-2	Stratigraphic	61.0766	-2.1134

