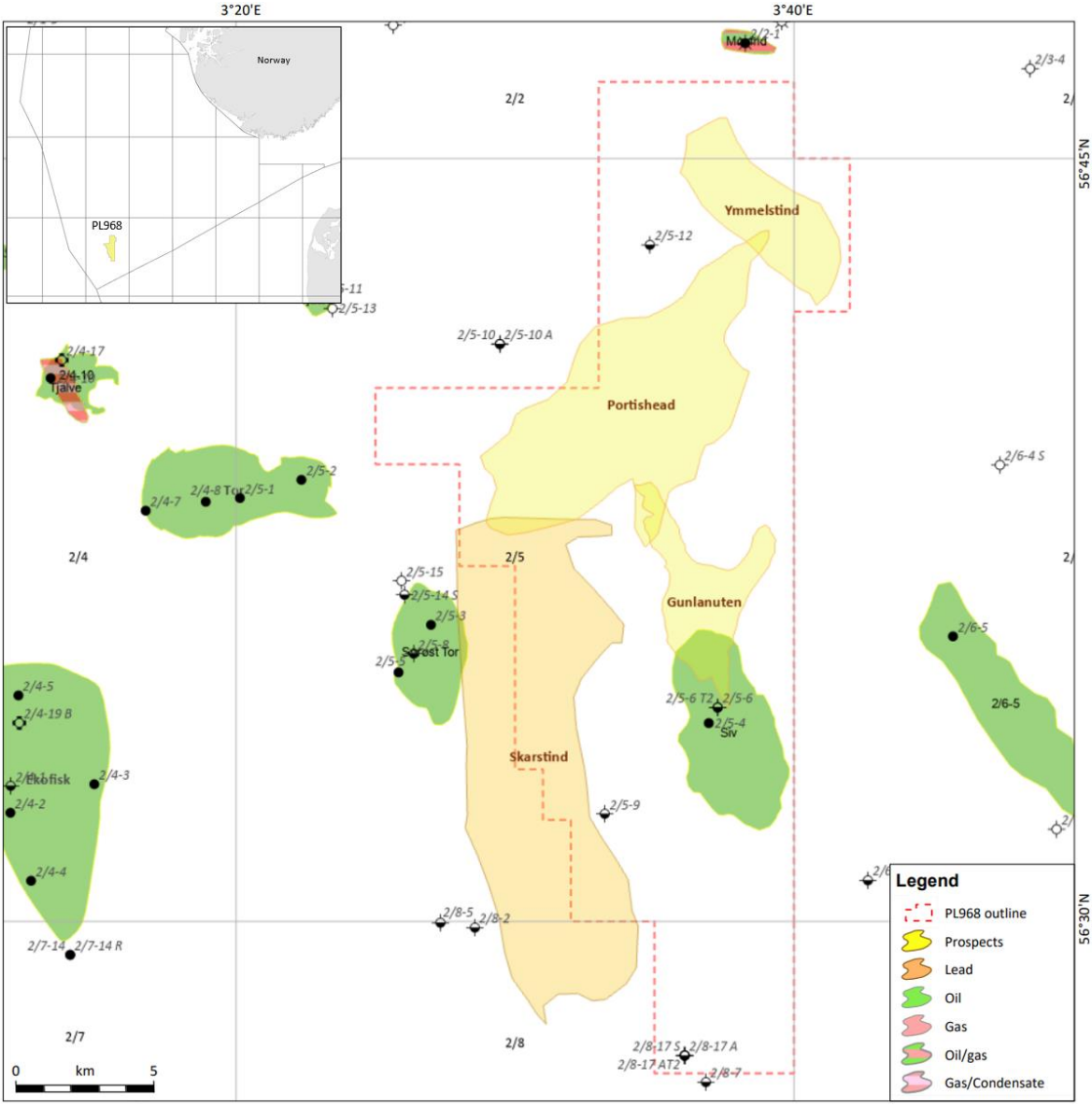
Relinquishment report PL968



AkerBP

DNO
EST - 1971

petoro

2023

Table of Contents

List of Figures

List of Tables

1 Licence History

PL968 is located in the Southern North Sea. The licence covers parts of blocks 2/2, 5, 6, 8 and is located close to thr Tor Field and SE Tor Discovery (Fig. 1.1).

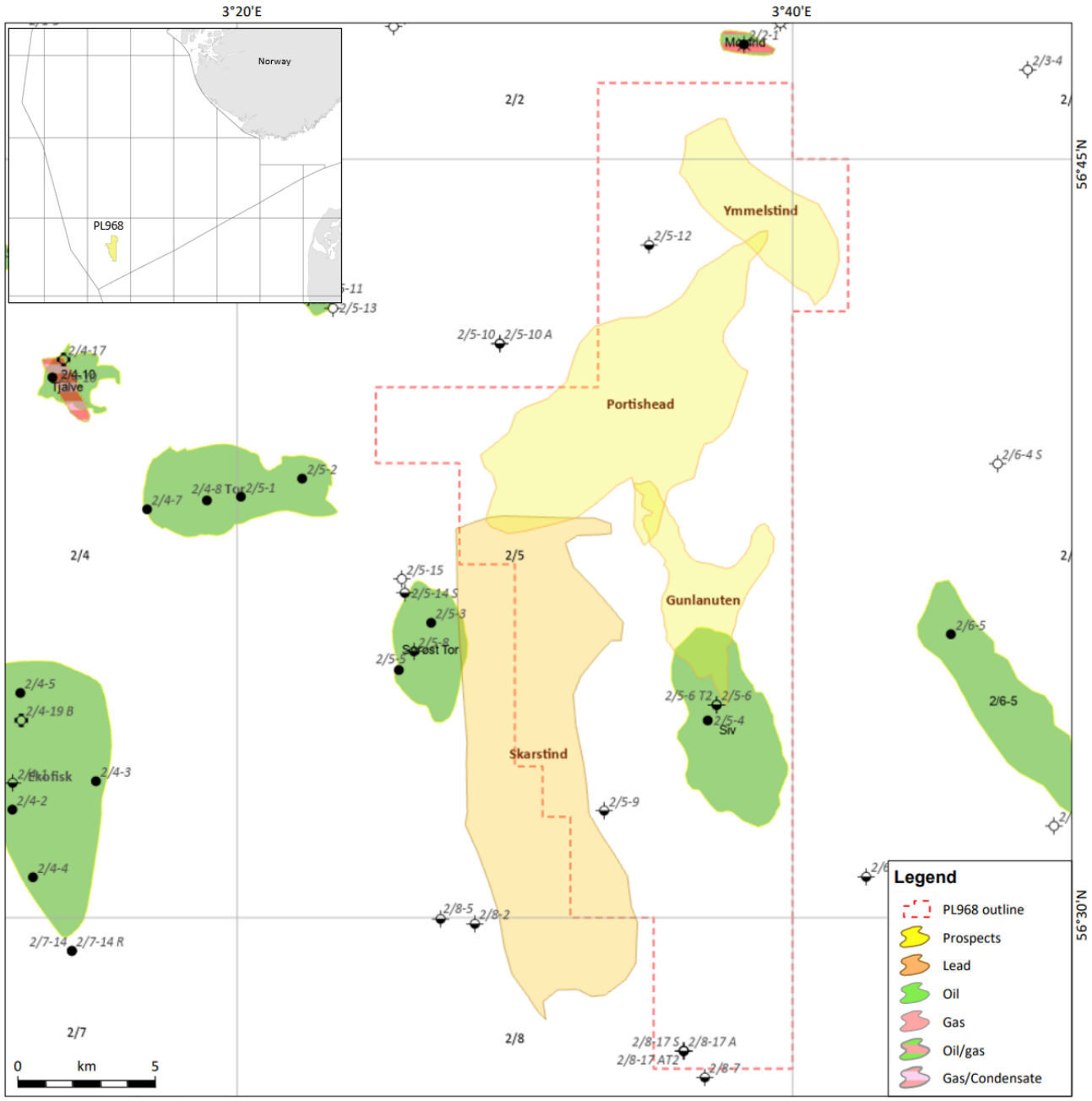


Fig. 1.1 PL968 Location Map with licence inventory at relinquishment

The licence was awarded to DNO Norge AS on 1 March 2019 through the 2018 APA licensing round, with Aker BP ASA, MOL Norge AS and Petoro as partners.

Table 1.1 PL 968 partnership

Company	Equity
DNO Norge AS	50% and operator
Aker BP ASA	30%
Petoro	20%

The work commitment at the time of the licence award consisted of reprocessing 3D seismic data prior to the initial drill or drop decision (1 March 2021). A licence extension was applied for twice and was granted by authorities, with the final drill or drop decision being 1 March 2023.

The following meetings were held in the licence:

2019

- Exploration/ Management Committee Licence Kick-Off Meeting:13 May 2019
- Exploration Committee Work Meeting: 18 June 2019

2020

- Exploration/Management Commitee Licence Meeting: 9 December 2020

2021

- Exploration/Management Commitee Licence Meeting: 18 October 2021

2022

- Exploration/Management Commitee Licence Meeting: 16 November 2022

Since the award, the Joint Venture has fulfilled the work programme and matured the Paleocene Portishead prospect in PL968. Seismic reprocessing has been conducted, in accordance with the work programme. The key risk for the Portishead prospect is reservoir presence and quality.The Gomez well, 2/5-15, in neighbouring license PL006, was key in adressing the reservoir risk, and two extension periods for PL968 were granted by authorities, to be able to incorporate the results from 2/5-15 in the prospect evaluation.

Originally the partnership in the license consisted of four partners, Faroe Petroleum Norge AS (op) 40%, Aker BP ASA 20%, MOL 20% and Petoro 20%. Faroe Petroleum Norge AS was taken over and changed name to DNO Norge AS shortly after the award. When MOL exited Norway 01.01.2022, DNO Norge AS and Aker BP ASA split the MOL share in the license. The licence partnership at the time of award and relinquishment is shown in Table 1.2

Table 1.2 PL 968 Partnership at award and relinquishment

Licence group	Company	Interest [%]
At relinquishment 2023	DNO Norge AS	50
	Aker BP ASA	30
	Petoro AS	20
At award 2019	Faroe Petroleum Norge AS	40
	Petoro AS	20
	Aker BP ASA	20
	MOL Norge AS	20

The recoverable mean volumes for Portishead is 4.32 Mm3OE (total resources). Probability of success is 8% with the main risk being reservoir, followed by trap seal.

An economic analysis was not performed, given the high risk on the project.

Based on the limited resources and negative expected economics, the main prospect (Portishead) does not meet the requirements to make a positive drill decision in PL968.

2 Database Overview

2.1 Seismic data

The common database for PL968 consists of 540 km2 seismic data comprising the PGS survey MC3D-CGRN13. The common database outline is portrayed in Fig. 2.1.

The evaluation conducted prior to the APA2018 licence application was mainly focused on the MC3D- CGR2015 M and the FP15M1. VGCNS06NQ8 and FP18M02 were also used in the prospect mapping and evaluation leading up to the application. Following the award, the license partners agreed on reprocessing the MC3D- CGR2015. A post migration reprocessing workflow of 540 km2 was performed, fulfilling the licence commitments. The reprocessing of the MC3D-CGR2015M survey was completed by Sharp Reflections in Q2 2020 and resulted in the MC3D-CGR2015-DNOR19 survey which has been the basis for most of the recent interpretation and evaluation for the licence area. An overview of the 3D surveys used in the licence evaluations are displayed in Fig. 2.1, and the outline of the reprocessed common database is shown i Fig. 2.2. The final interpretation for the prospect evaluation has been completed on the DNOR19 survey.

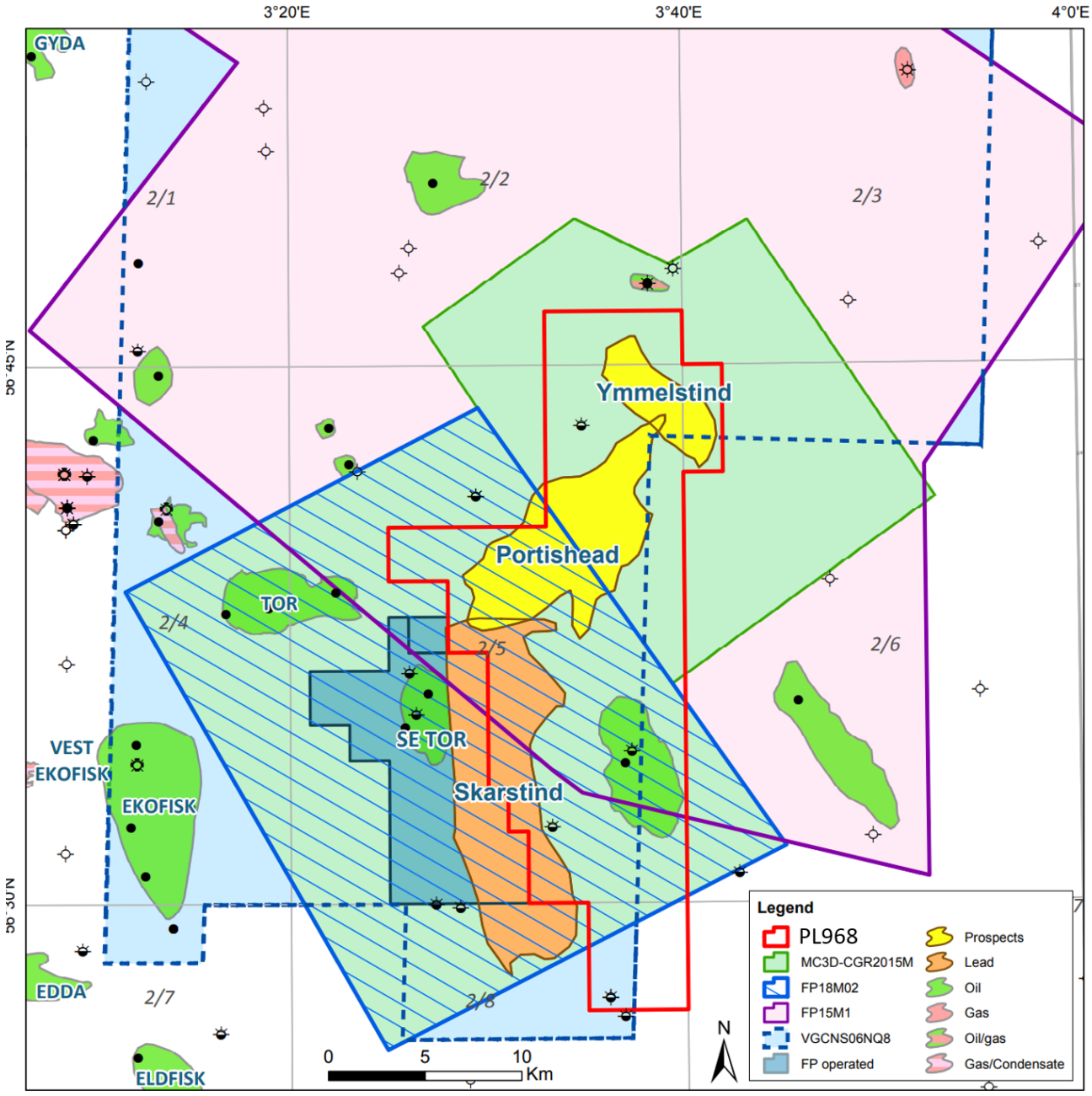


Fig. 2.1 PL968 Seismic Database

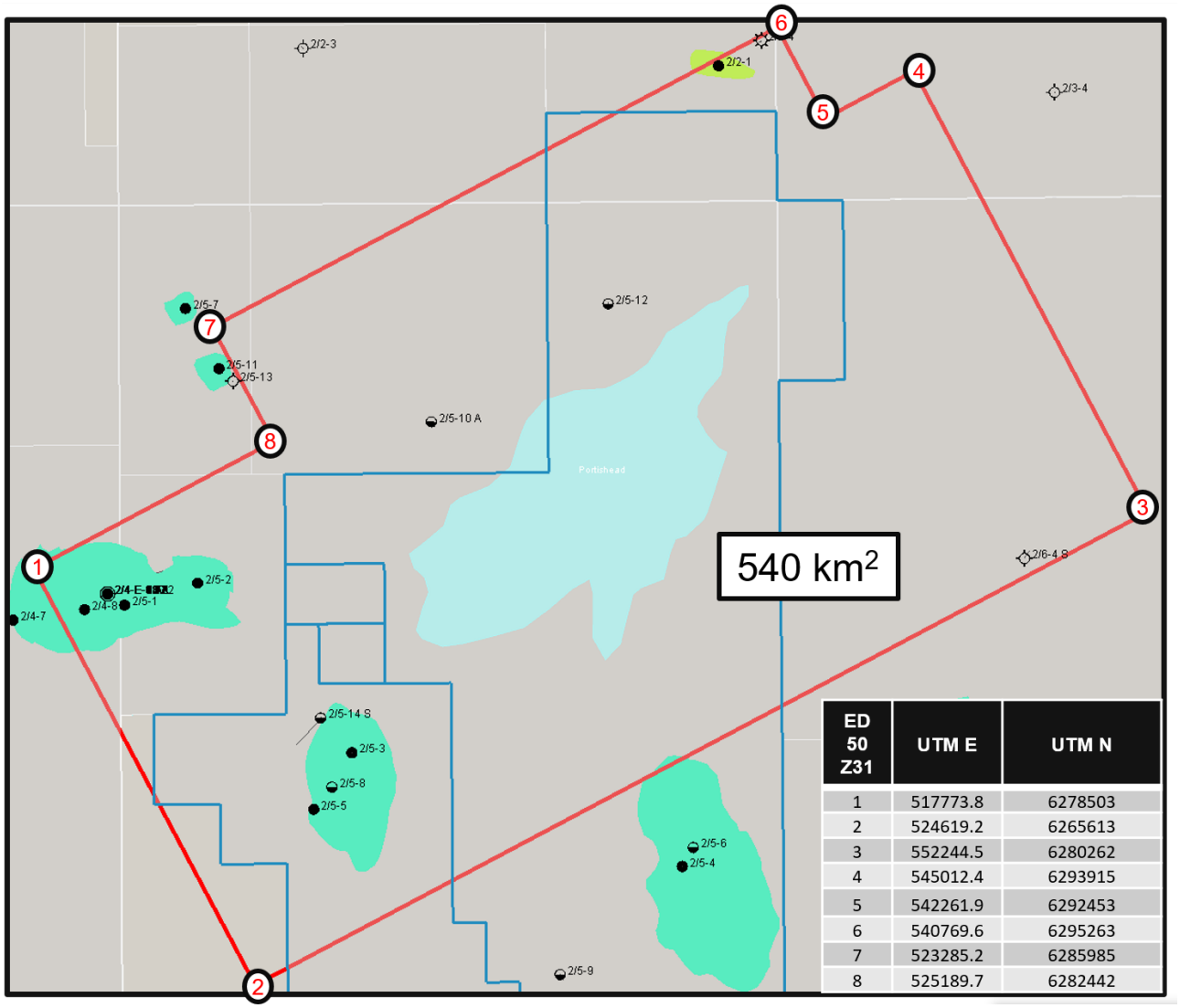


Fig. 2.2 PL968 Common Database

DNOR19
This is a reprocessing of:

- MC3D-CGR2015M, reprocessed and merged by PGS Imaging Oslo in 2015. See below for details on NPDID for individual datasets.

MC3D-CGR2015M

This is a reprocessing and merge of:

- MC3D-NDB2013. NPDID:7922
- MC3D-CGRN13. NPDID: 7904
- CGR2013RM, consisting of surveys; 1) MC3D-CGR-2010 (NPDID: 7190) and 2) MC3D-CGR-2011 in Denmark

2.2 Well data

An overview of the common well database is provided in Table 2.1 and Fig. 2.3 and includes the relevant wells used in the licence evaluation. The common well database consists of 36 wells and includes traded well 2/6-6 S (Oppdal/Driva), and key well 2/5-15 (Gomez).

Table 2.1 PL 968 Common Well Database

Well	Year	Result	TD	TD Formation
2/2-1	1982	OIL & GAS	4003	ZECHSTEIN GP
2/2-4	1988	GAS	4020	SMITH BANK FM
2/3-1	1969	GAS	2934	ZECHSTEIN GP
2/3-2	1969	DRY	2297	VIDAR FM
2/3-3	1971	DRY	2973	ZECHSTEIN GP
2/3-4	1984	DRY	3386	ZECHSTEIN GP
2/4-3	1970	OIL	3431	TOR FM
2/4-4	1970	OIL	3424	TOR FM
2/4-5	1970	OIL	3220	TOR FM
2/4-7	1971	OIL	3494	TOR FM
2/4-8	1972	OIL	4075	TOR FM
2/5-1	1970	OIL	3972	TOR FM
2/5-2	1971	OIL	3597	TOR FM
2/5-3	1972	OIL	3731	TOR FM
2/5-4	1972	OIL	3490	HOD FM
2/5-5	1973	OIL	3456	TOR FM
2/5-6	1978	O/G SHOWS	4132	SKAGERRAK FM
2/5-7	1984	OIL	4531	SKAGERRAK FM
2/5-8	1988	OILSHOWS	3367	HOD FM
2/5-9	1992	OILSHOWS	5460	HAUGESUND FM
2/5-10,10A	1993	OIL SHOWS	4701	SKAGERRAK FM
2/5-11	1997	OIL	3550	TOR FM
2/5-12	2002	OILSHOWS	4153	FARSUND FM
2/5-13	2009	DRY	4675	SKAGERRAK FM
2/5-14 S	2009	SHOWS	3845	TOR FM
2/5-15	2021	DRY	3323	EKOFISK FM
2/6-1	1969	DRY	3336	ZECHSTEIN GP
2/6-2	1980	OIL SHOWS	4760	ZECHSTEIN GP
2/6-3	1982	DRY	4060	BASEMENT
2/6-4 S	1990	DRY	3617	ZECHSTEIN GP
2/6-5	1996	OIL	3260	BASEMENT
2/6-6 S	2019	DRY	3843	ROTLIEGEND GP
2/7-14	1980	OIL	3390	TOR FM
2/8-2	1970	SHOWS	3246	RWDBY FM
2/8-5	1974	OILSHOWS	3304	RWDBY FM
9/11-1	1971	DRY	2196	SKAGERRAK FM
Tor Field		OIL FIELD		

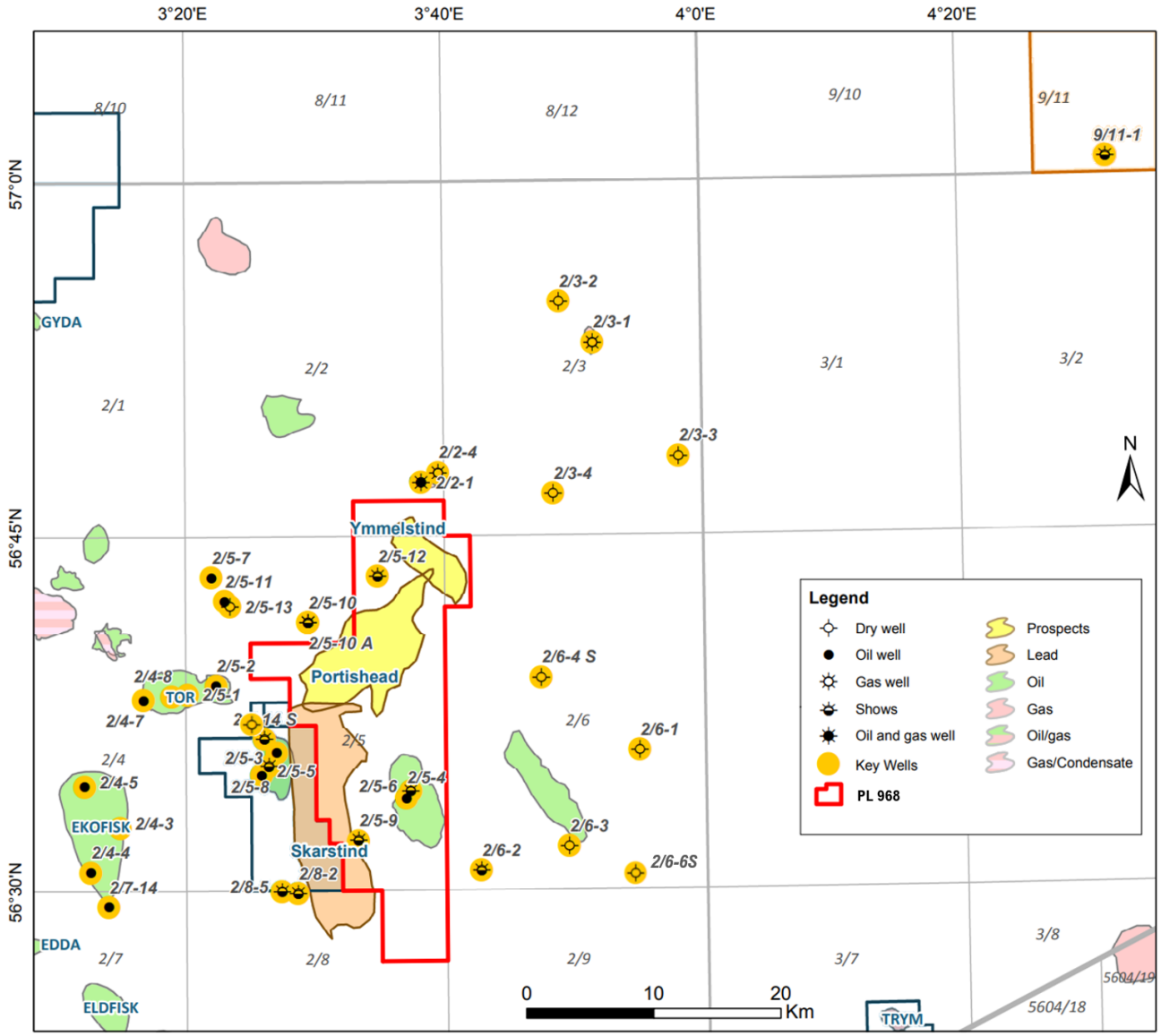


Fig. 2.3 Common well database map

3 Geological and Geophysical Studies

Listed below is a summary of the work done in PL968 and descriptions of the geological and geophysical studies carried out in the licence:

Seismic reprocessing (MC3D-CGRN13)

- A seismic reprocessing of PGS Survey MC3D-CGR2015M-KPSDM was performed by SharpReflections in Spring 2020. The reprocessing consisted of post migration gather conditioning and whitening.

Seismic Interpretation and Well Ties

- Regional and prospect based seismic interpretation in addition to multiple well to seismic ties for key wells in and around the licence area.

Depth Conversion

- A velocity model was created for a semi regional area covering PL968. The model was largely focused on interval velocities from key wells in and around the licence area. A semi regional T/D regression was established for the Top Chalk surface. The depth surface for top reservoir was created using an average velocity surface up from Top Chalk. The resulting Top reservoir surface was then shifted to match the Top Heimdal sandstone in well 2/5-15.

Rock physics model of relevant wells

- Fluid substitution and seismic forward modelling have been done on the key well 2/6-6S to understand the seismic response of the Borr Member reservoir in different fluid scenarios.

Prospect Evaluation

- Detailed prospect mapping and evaluation of the main prospect in the licence.

Post Well Studies on the 2/5-15 Gomez well in neighboring license PL006 C, also operated by DNO, were key in addressing the reservoir risk for the Portishead prospect. Information on the studies can be found in the Final Well Report for 2/5-15 and 2/5-15 Gomez Final Evaluation Report.

4 Prospect Update

The prospects and leads applied for in APA 2018 are shown in Fig. 4.1. The prospectivity at time of relinquishment of PL968 in March 2023, are shown in Fig. 4.2.

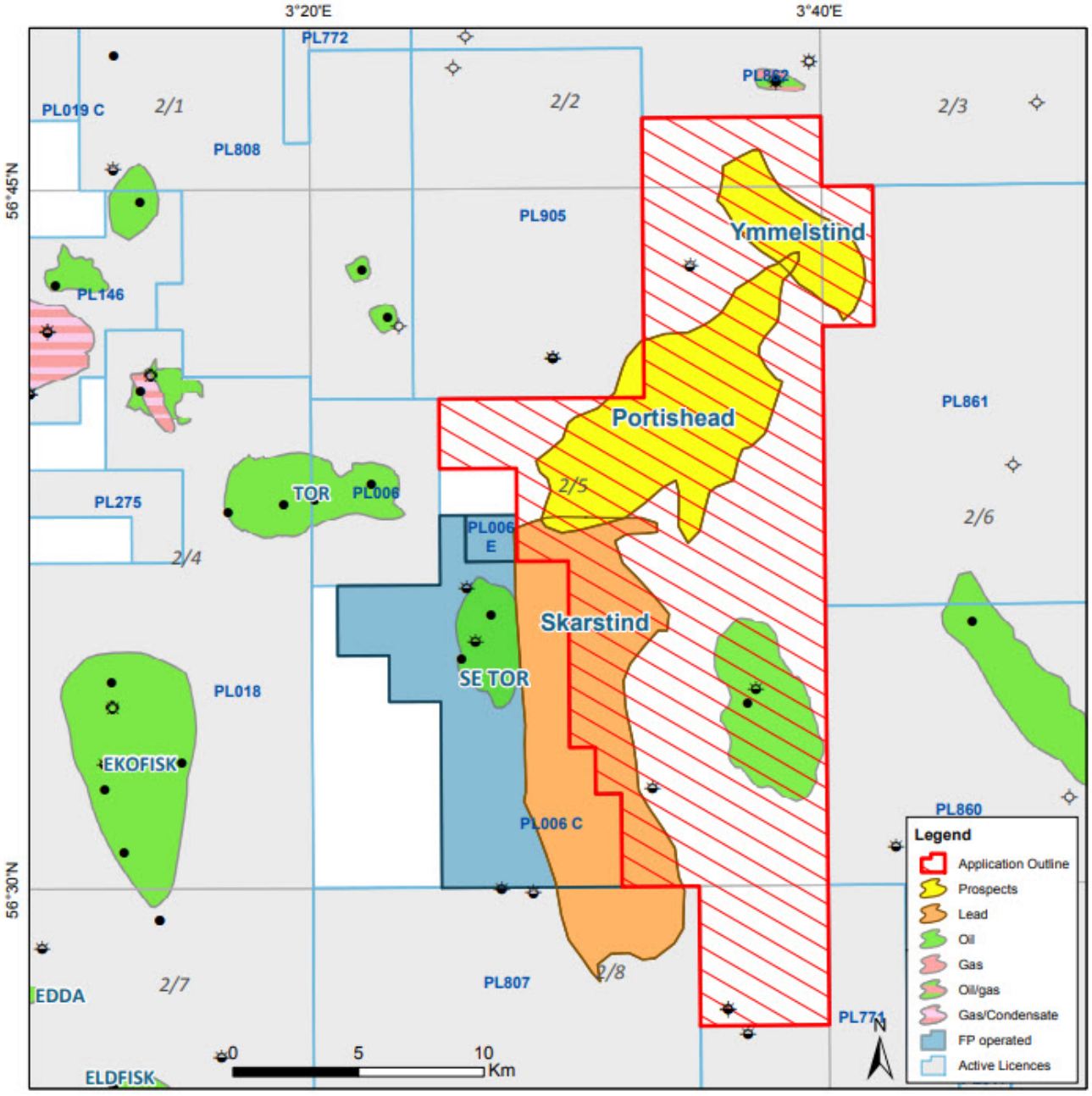


Fig. 4.1 PL968 prospectivity on award in March 2019

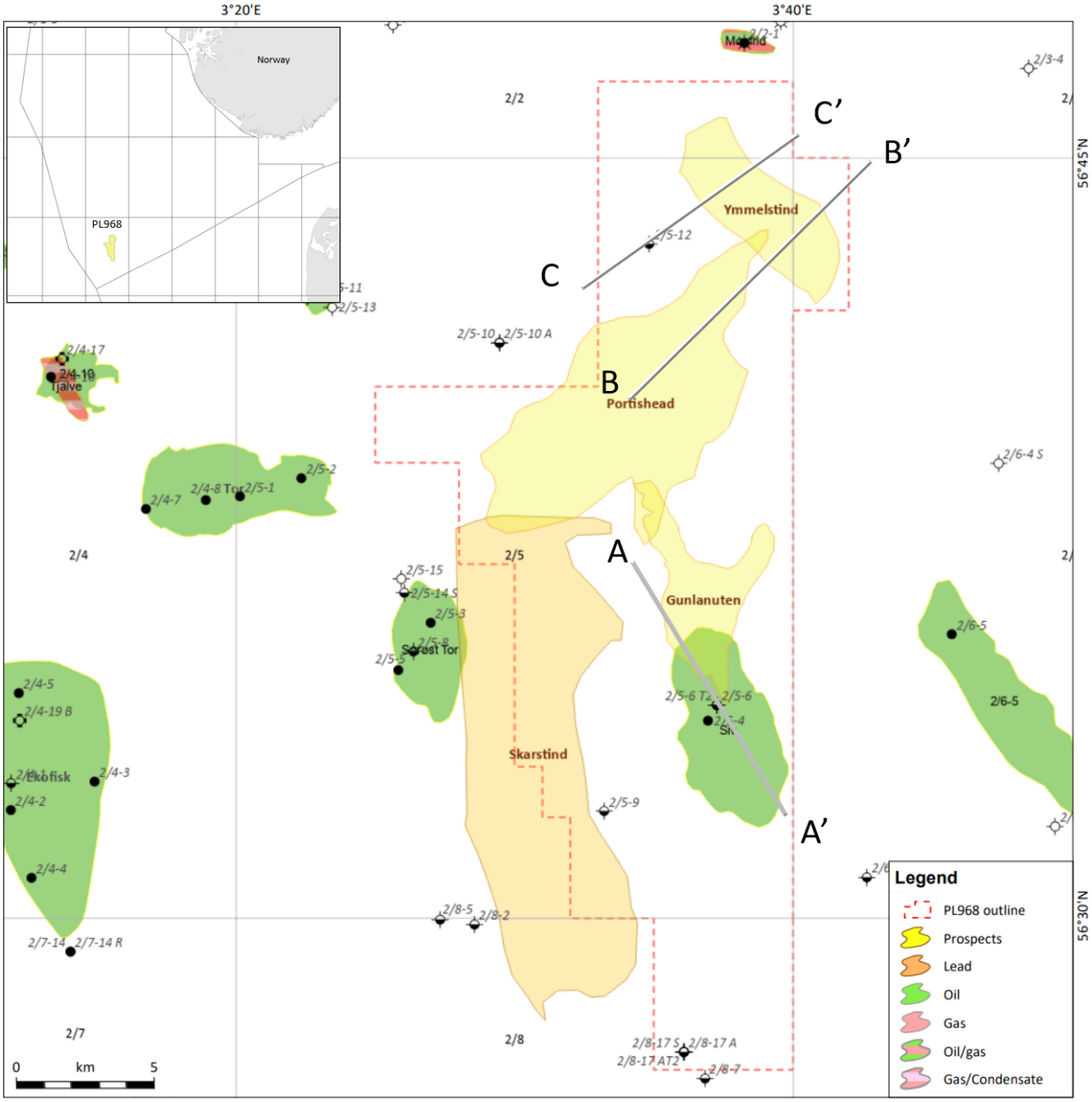


Fig. 4.2 PL968 prospectivity at relinquishment in February 2021 Line of section A-A' , B-B' and C-C' refer to geoseismic sections in figures 4.6, 4.4 and 4.8.

APA 2018

Resource potential for prospectivity applied for during APA 2018 is summarised in Table 4.1. Portishead was the main prospect at the time of the licence application but the result of well 2/5-15 Gomez and subsequent G&G studies resulted in down-grading of this opportunity. The Ymmelstind Prospect and Skarstind Lead were also revisited but no significant changes were made. In addition to maturing the APA2018 inventory, an aditional prospect was added to the licence portfolio (Gunlanuten). The resource potential carried by the operator at the time of relinquishment is summerised in Table 4.2.

Table 4.1 PL968 Resource summary APA 2018

Discovery/ Prospect/ Lead name [1]	D/ P/ L [2]	Case (Oil/ Gas/ Oil&Gas) [3]	Unrisked recoverable resources [4]						Probability of discovery [5] (0.00 - 1.00)	Resources in acreage applied for [%] [6] (0.0 - 100.0)	Reservoir		Nearest relevant infrastructure [8]	
			Oil [10^6Sm^3] (>0.00)			Gas [10^9Sm^3] (>0.00)					Litho-/ Chrono-stratigraphic level [7]	Reservoir depth [m MSL] (>0)	Name	Km (>0)
			Low (P90)	Base (Mean)	High (P10)	Low (P90)	Base (Mean)	High (P10)						
Portishead	P	Oil	2.30	10.10	20.60	0.06	0.35	0.74	0.20	98.0	Heimdal Fm	3150	Tor	10
Ymmelstind	P	Oil	3.16	6.46	10.30	0.52	1.10	1.78	0.10	100.0	Eldfisk Fm	3800	Tor	20
Skarstind	L	Oil	8.10	42.40	88.10	1.40	7.10	14.80	0.09	40.0	Ula Basal Sandstone	4885	Tor	10

Table 4.2 PL968 Resource summary 2023

Discovery/ Prospect/ Lead name [1]	D/ P/ L [2]	Case (Oil/ Gas/ Oil&Gas) [3]	Unrisked recoverable resources [4]						Probability of discovery [5] (0,00 - 1,00)	Resources in acreage applied for [%] [6] (0,0 - 100,0)	Reservoir		Nearest relevant infrastructure [8]	
			Oil [10^6Sm^3] (>0,00)			Gas [10^9Sm^3] (>0,00)					Litho-/ Chrono-stratigraphic level [7]	Reservoir depth [m MSL] (>0)	Name	Km (>0)
			Low (P90)	Base (Mean)	High (P10)	Low (P90)	Base (Mean)	High (P10)						
Portishead		Oil	1.90	3.95	6.80	0.18	0.37	0.64	0.08	100.0	Borr/Paleocene	3000	Tor	15
Gunlanuten	P	Oil	2.06	12.90	29.40	0.43	3.09	7.28	0.19	100.0	Bryne/M.Jurassic	3900	Tor	18
Ymmelstind		Oil	3.16	6.46	10.30	0.52	1.10	1.78	0.10	100.0	Ula/U.Jurassic	3800	Tor	20
Skarstind		Oil	8.10	42.40	88.10	1.40	7.10	14.80	0.09	40.0	Ula/U.Jurassic	4885	Tor	10

Portishead

The prospect is a Palaeocene turbidite channel complex with stratigraphic closure (Fig. 4.3 and Fig. 4.4). The reservoir is a Borr Member sandstone with top seal provided by the Palaeocene Våle Formation shale. Source is the Upper Jurassic Tyne Group shale and charge is via the Gomez structure (Fig. 4.3) in the west. 'Gomez-type oil' is expected and the mean recoverable volume is 4.32 million Sm3. A field of slide blocks (Vidar Formation) cross the Borr Member turbidite channels, and it was originally thought that these rafts could block the channels and form an up-dip stratigraphic trap component. Recent seismic mapping has revealed that the Borr Member channels are likely to continue under the Vidar formation chalk blocks resulting in a high trap risk. However, the main risk for the prospect is related to reservoir quality.

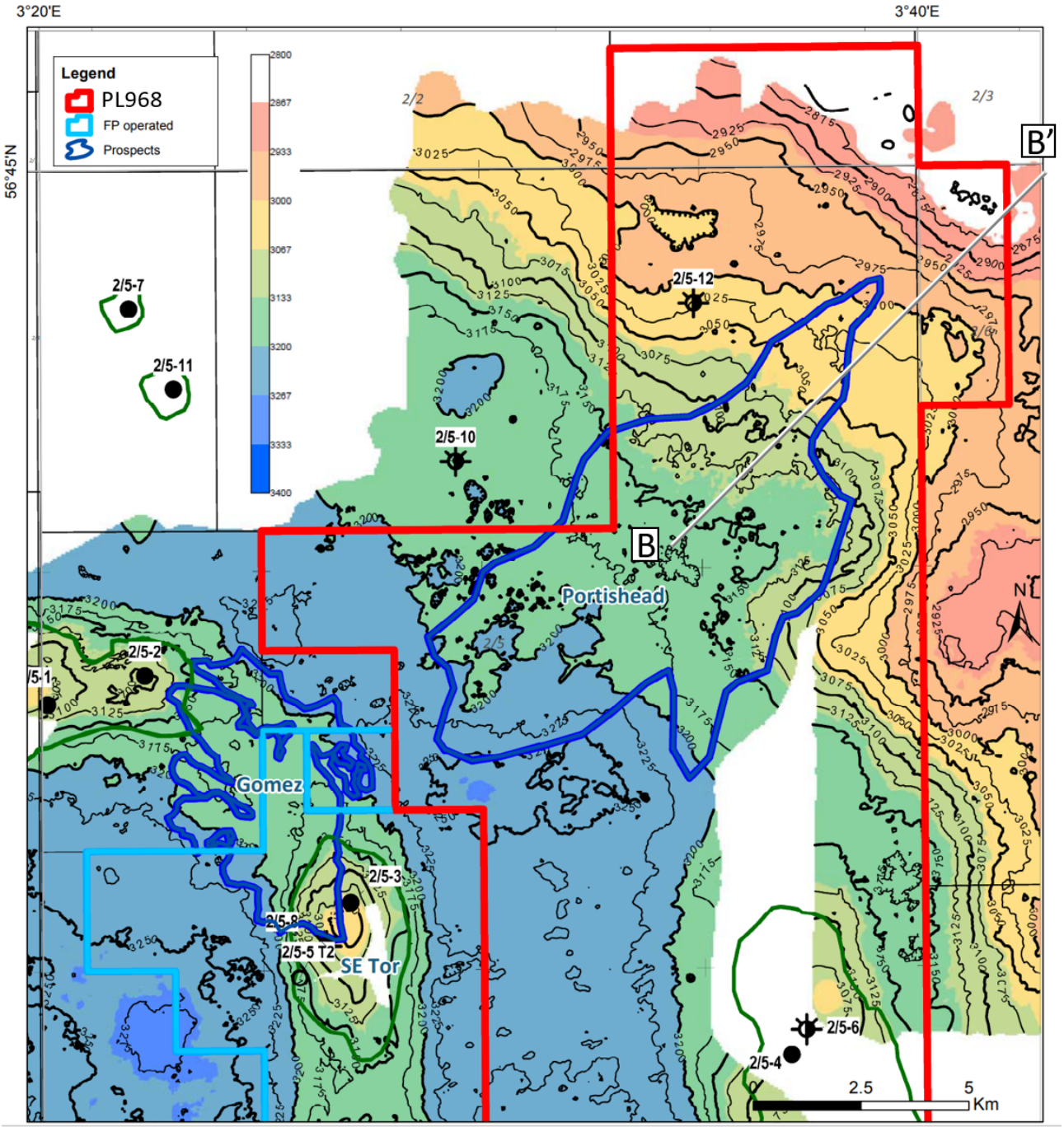


Fig. 4.3 Portishead Depth Map

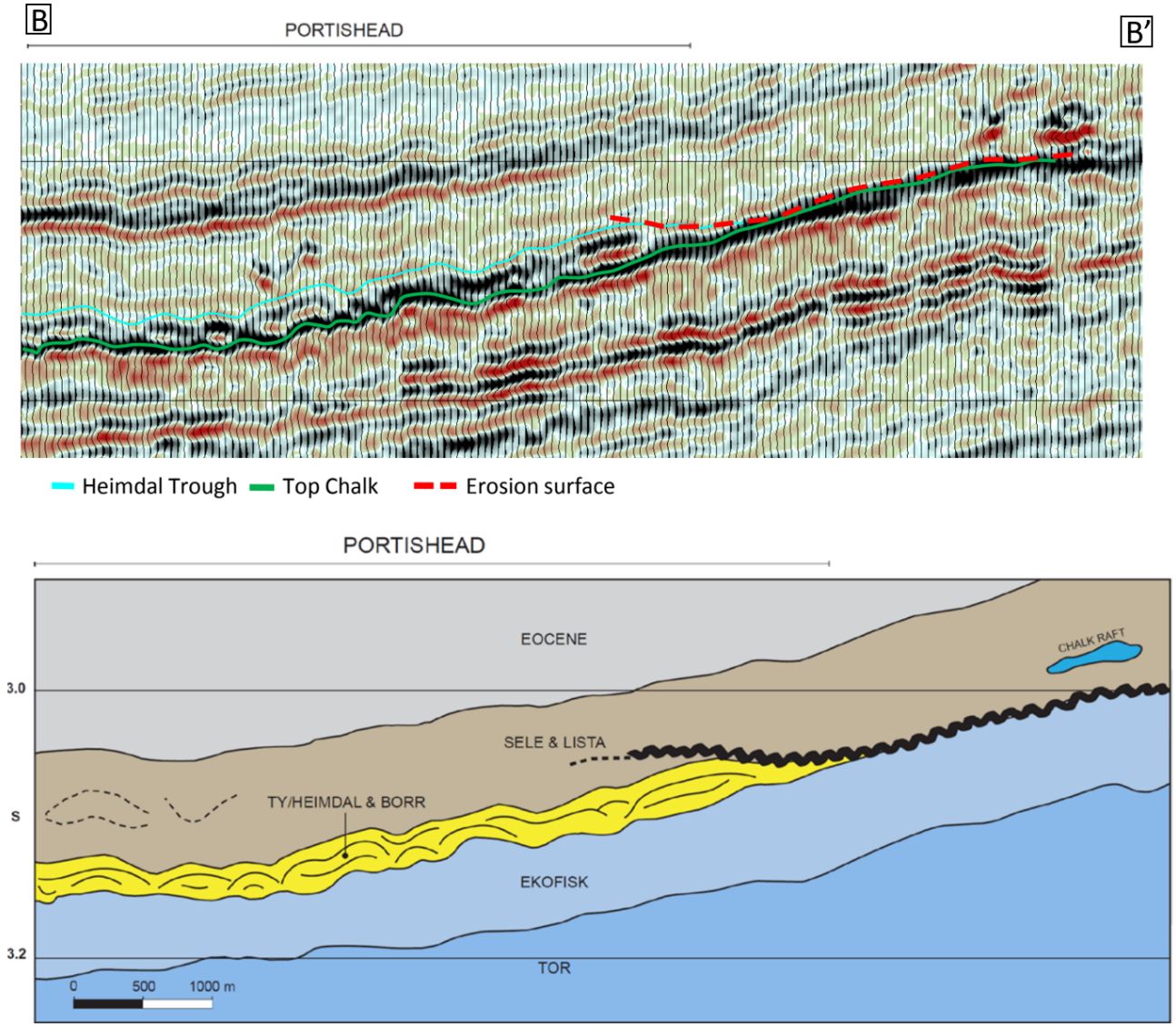


Fig. 4.4 Portishead seismic and geoseismic sections See Figs. 4.2 and 4.3 for line of section.

Gunlanuten

The Gunlanuten Prospect is a small Middle Jurassic four-way dip closure with upside volume potential dependent on fault seal towards the dry well (2/5-6) in the south Fig. 4.5 and Fig. 4.6 The reservoir is Bryne Formation fluvial channels, sourced and sealed by Upper Jurassic shale of the Tyne Group. Retention is the main risk for the small four-way closure whereas lateral fault seal is the main risk for bigger cases.

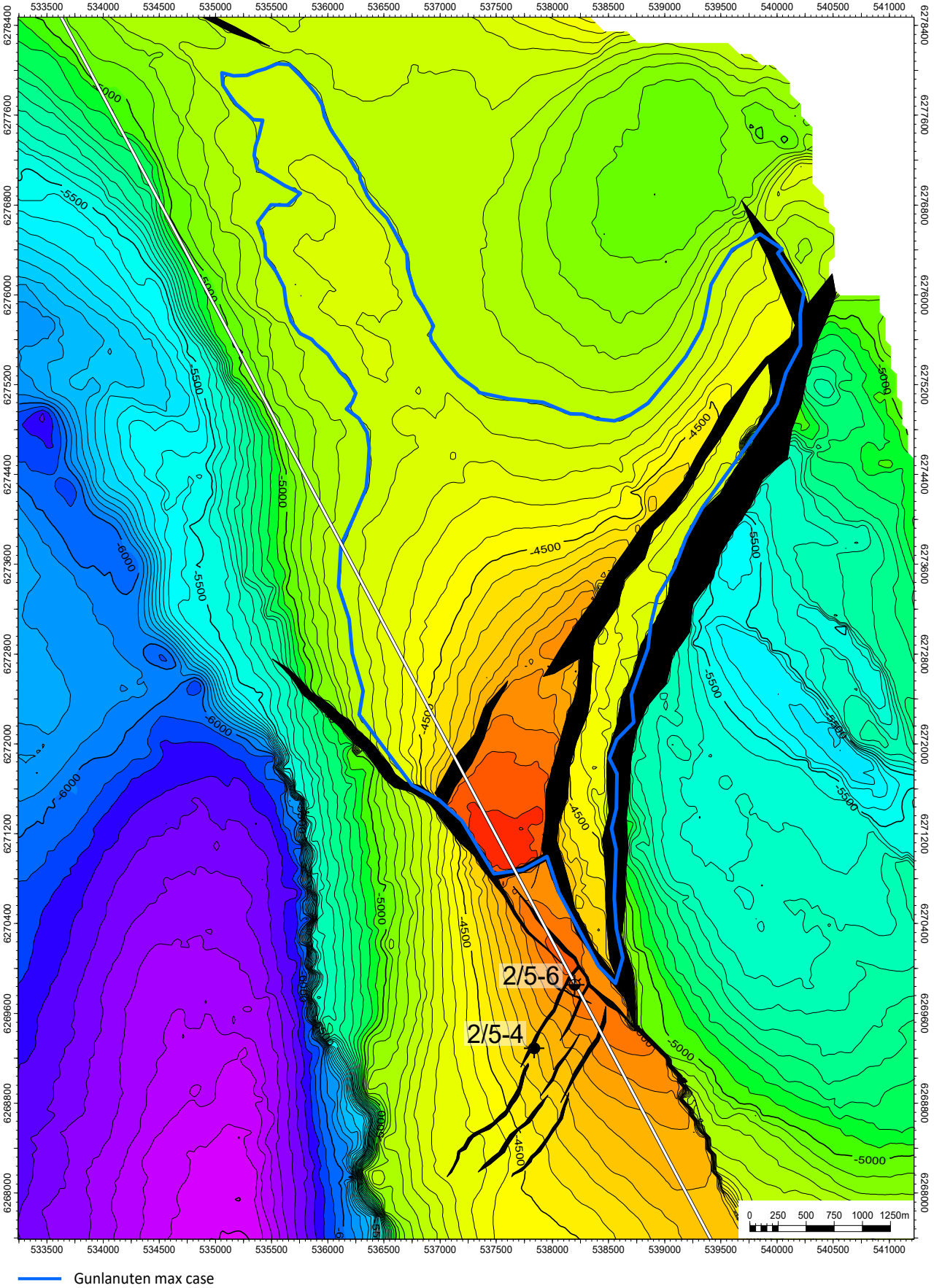


Fig. 4.5 Top Middle Jurassic depth map with the Gunlanuten Prospect

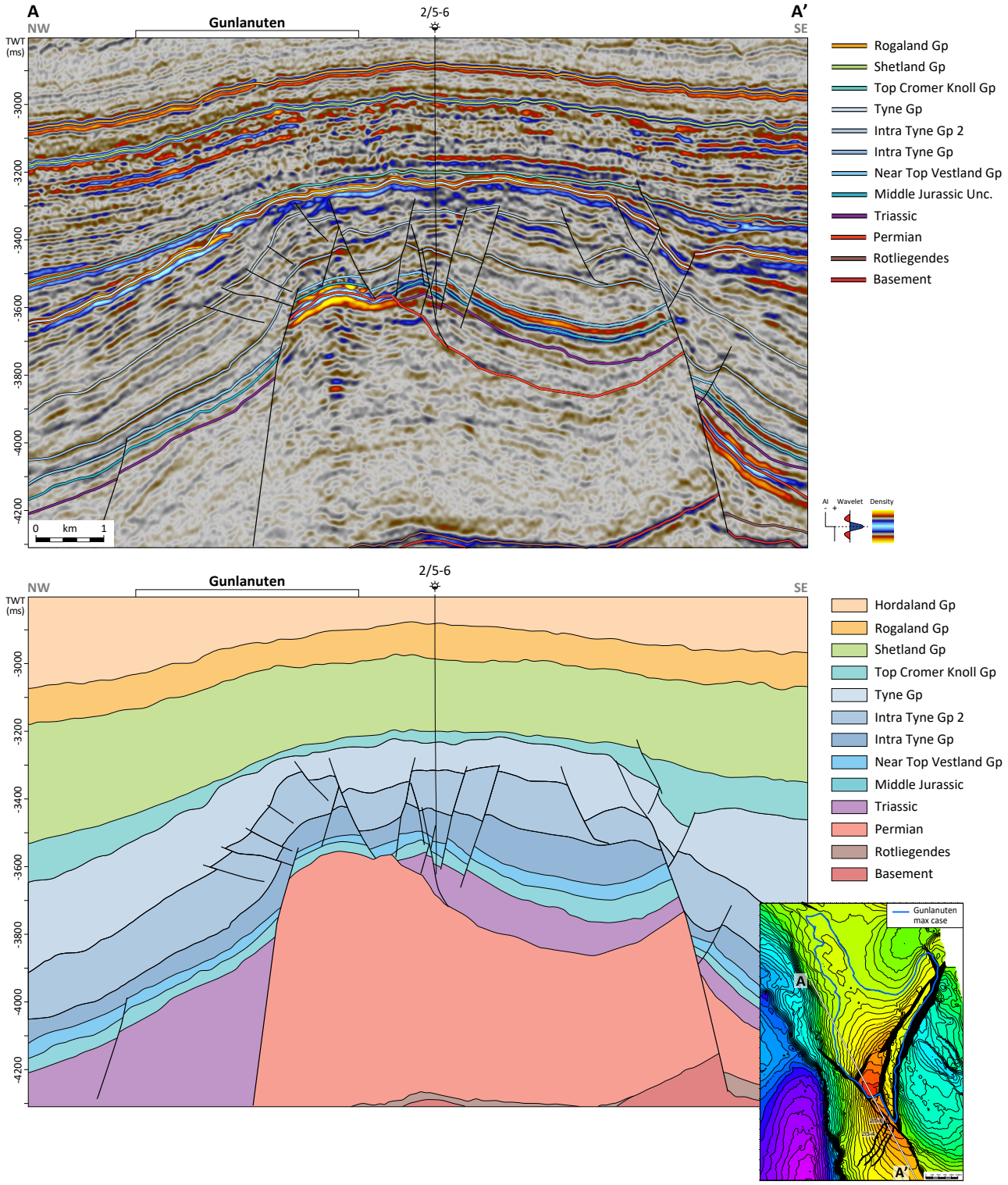


Fig. 4.6 Gunlanuten seismic and geoseismic sections See Figs. 4.2 and 4.5 for line of section.

Ymmelstind

The Ymmelstind Prospect is a combination structural/stratigraphic trap, expressed as a hangingwall terrace to the Sørvestlandet High (Fig. 4.7 and Fig. 4.8). Reservoirs are turbidites, lateral equivalent to the Upper Jurassic Kimmeridgian to Early Tithonian Ula Formation. The sandstones of the Ymmelstind Prospect are encased in organic rich basinal shales that provide source and seal for the prospect. The main risk is lateral seal.

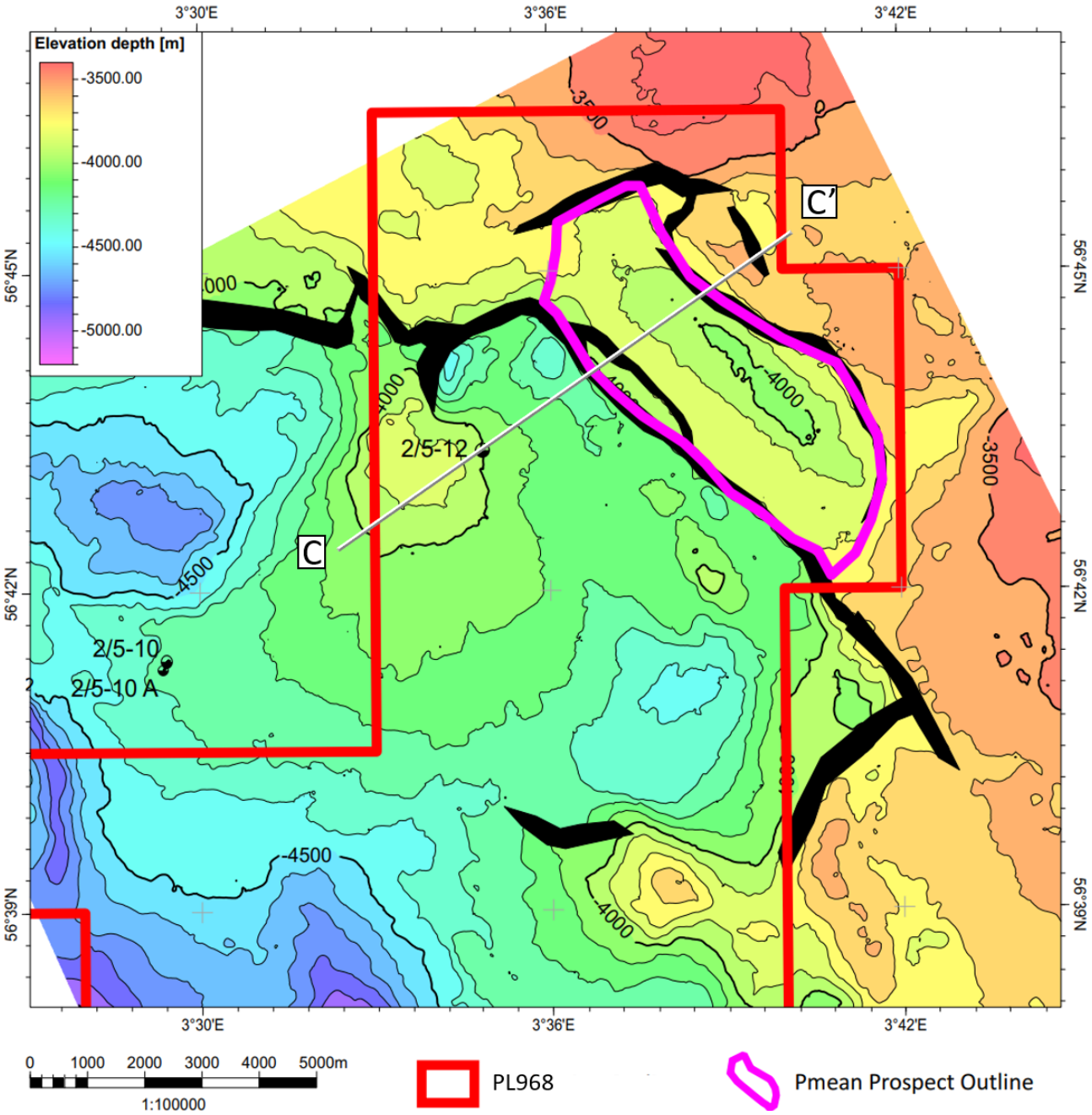


Fig. 4.7 Upper Jurassic depth map (J66) with the Ymmelstind prospect

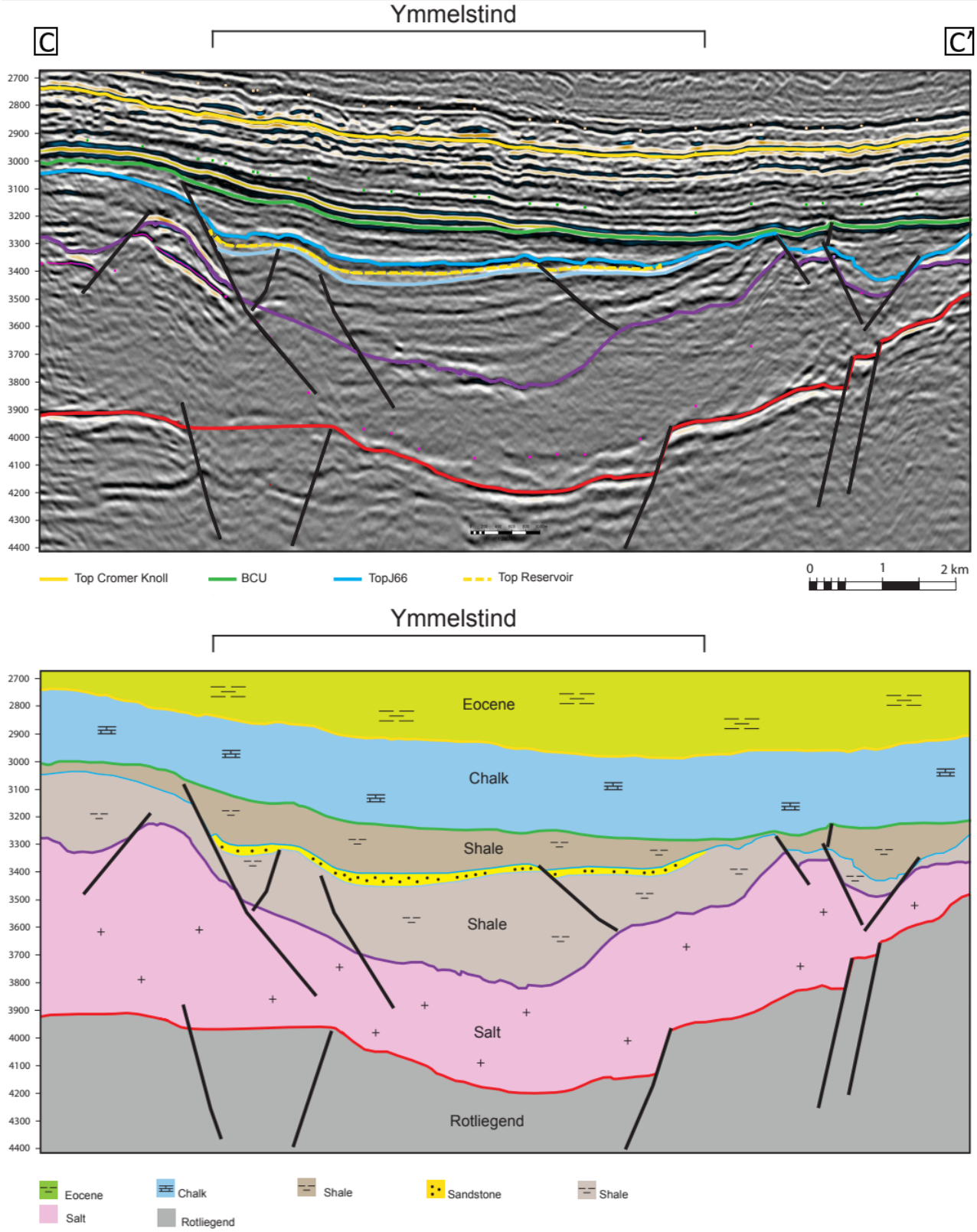


Fig. 4.8 Ymmelstind seismic and geoseismic sections See Figs. 4.2 and 4.7 for line of section.

Skarstind

The Skarstind lead (Fig. 4.2) is a large rotated fault block with crest outside the relinquished PL968 area. The lead has two possible reservoir levels, one in the Upper Jurassic basal Ula sandstone and the second in fluvial sandstones in the Middle Jurassic Bryne Formation. The lead has been identified based on the top Bryne interpretation, but there are large uncertainties in reservoir presence and because of the depth also reservoir quality.

5 Technical Assessment

Key prospect in the licence is the Paleocene Portishead prospect.

Volumes and risk for the Portishead prospect were updated following the Gomez well (2/5-15) in neighboring license PL006 C, drilled in 2021. Following the negative outcome of the well, the risk on the Portishead prospect in PL 968 increased.

An economical analysis has not been performed on the prospect.

6 Conclusion

Following the 2018 APA licensing round, PL968 was awarded in 2019 to DNO Norge AS (Operator), Aker BP ASA, MOLNorge AS and Petoro (partners). The work commitment at the time of award was to reprocess 3D seismic data prior to the initial drill or drop decision (01 March 2021). A licence extension was applied for twice, to incorporate the results of well 2/5-15 (Gomez) and was granted by authorities. The final drill or drop decision being 1 March 2023.

Leading up to the drill or drop decision, several G&G studies (both internal and external) have been implemented to attempt to de-risk and mature the key prospect to a drillable candidate. Reservoir presence and quality and stratigraphic seal was identified as the highest risks for the Portishead prospect. The 2/5-15 well in DNO operated neighbouring licence PL 006 C addressed the reservoir risk. A more detailed seismic interpretation on the reprocessed and improved seismic dataset was used to further evaluate the risk on stratigraphic seal.

Based on the high risk identified on the main prospect, Portishead does not meet the requirements to make a positive drill decision in PL968.

The licencees came to a unanimous decision to relinquish PL968 and the drop notification was submitted to authorities on March 1st 2023.