

PL1095



PL1095 Relinquishment report

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1 Licence history

Lundin Energy Norway AS applied for and was awarded PL1095, following the APA 2020. PL1095 was awarded on 19/02/2021 to Lundin Energy Norway AS (50%) as operator and Equinor Energy AS (50%) as partner. The licence was awarded with an initial period of 7 years, which included a work commitment of geology and geophysics work, an electromagnetic (EM) feasibility study and seismic reprocessing. A drill or drop (DoD) had to be made within 2 years by 19/02/2023, decision on concretisation (BOK) by 19/02/2025, decision to continue (BOV) by 19/02/2027 and PDO by 19/02/2028. The decision to acquire an EM study had to be made within 2 years by 19/02/2023, and a positive EM acquisition would have shifted the initial DoD to 19/02/2024. Lundin Energy Norway AS was acquired by Aker BP AS on the 01/10/2022, and therefore the partnership at the time of the writing of this report was Aker BP AS (50%, operator) and Equinor Energy AS (50%, partner).

An overview of the meetings held in PL1095 is provided in Table 1.1.

Table 1.1 PL1095 meeting overview

Meeting description	Date
Management and exploration committee	09/04/2021
Exploration committee work meeting	22/06/2021
Management and exploration committee	15/11/2021
Management and exploration committee	01/12/2022

The JV partners wish to relinquish the licence due to the limited remaining prospectivity identified on the licence.

2 Database

2.1 Seismic data

Seismic data: Fig. 2.1 shows the seismic data for PL1095. The licence has used the PGS19M05VIK multi-azimuth seismic 3D dataset, with the PGS16M03 dataset, as an additional data set which covered the remaining eastern extent of the licence which was not covered by the PGS19M05VIK seismic dataset (Table 2.1). The PGS19M05VIK 3D seismic dataset was reprocessed as part of the work programme for PL1095, for more details see 3 Geological and geophysical studies.

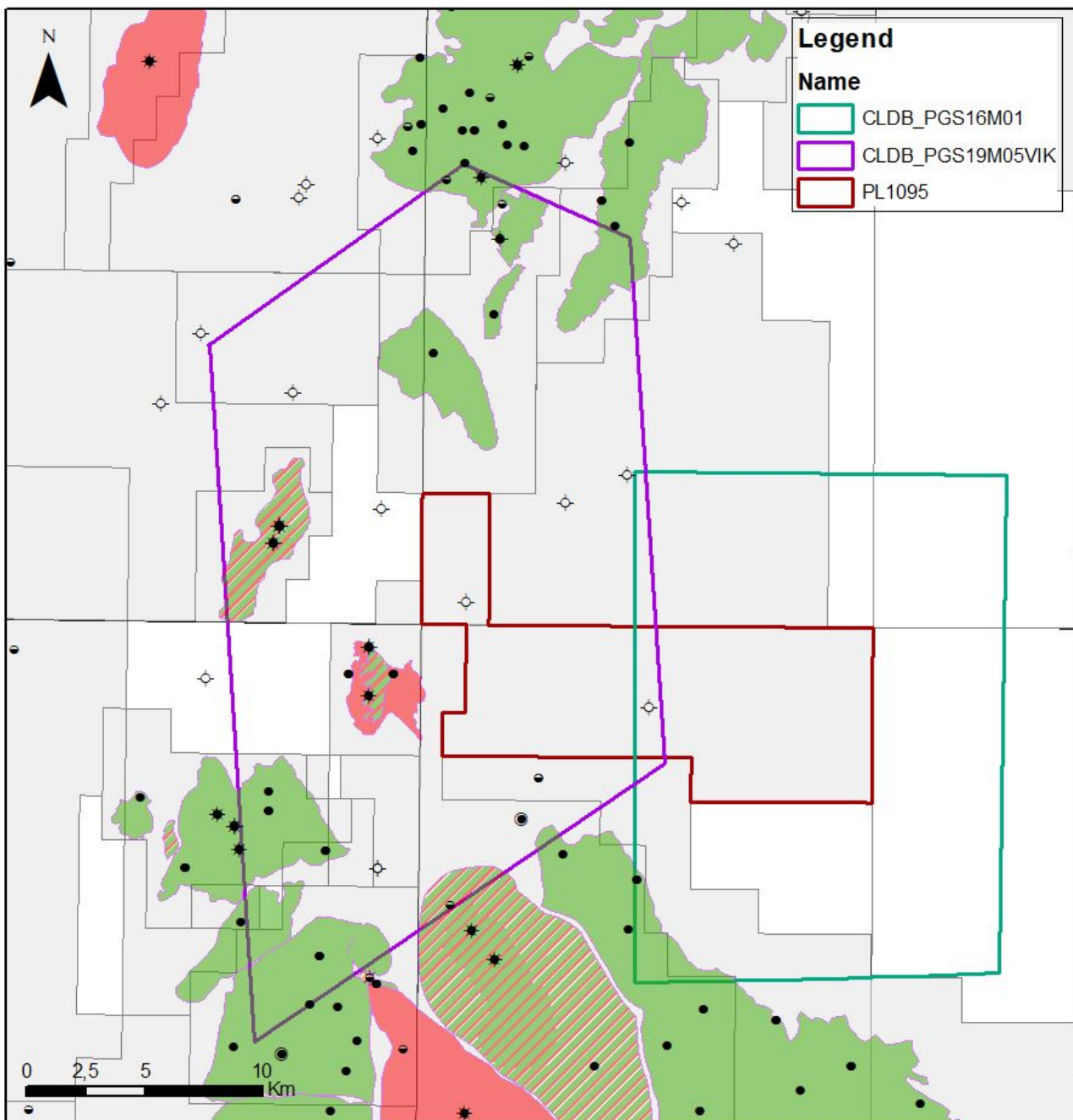


Fig. 2.1 Seismic Database

Table 2.1 PL1095 seismic database

Seismic survey name	Underlying surveys	NPDID	Type of survey
PGS19M05VIK	LN0902, MC3D-SVG11, PGS19004	7004,7378,9059	3D merge
PGS16M01	MC3D-SVG11	7378	3D merge

2.2 Well Data

Key wells relevant to this report and PL1095 are shown in red in Fig. 2.2 and Table 2.2. Many more wells were used in the regional work on the Paleocene interval carried out as part of the work programme for PL1095.

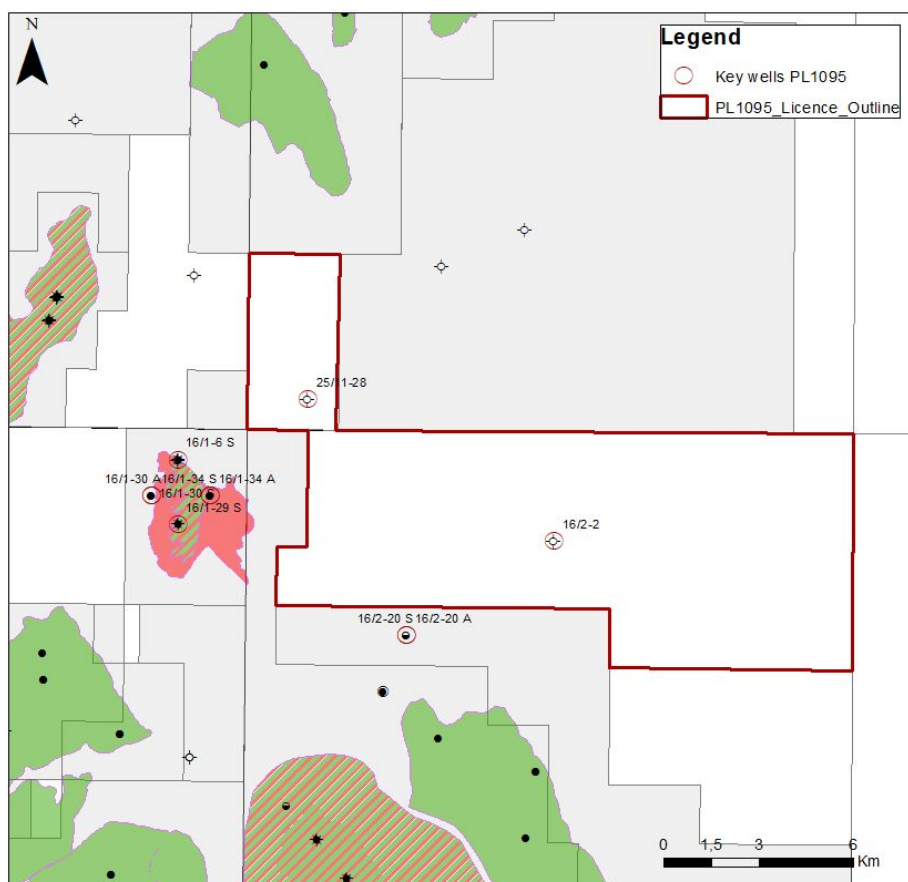


Fig. 2.2 Key wells PL1095

Table 2.2 Key wells PL1095

Well Name	NPDID	Comment
16/1-6 S	4711	Heimdal sands with hydrocarbons
16/1-34 A	9354	Non-reservoir quality Heimdal interval
16/1-34 S	9326	Heimdal sands with hydrocarbons, most recent wells
16/1-30 A	8749	Lack of Paleocene sands
16/1-30 S	8748	Lack of Paleocene sands
16/1-29 ST2	8383	Heimdal sands with hydrocarbons
16/2-20 A	7316	Lack of Paleocene sands
16/2-20 S	7181	Lack of Paleocene sands
16/2-2	4408	Lack of Paleocene sands
25/11-28	7776	Thin Heimdal sand stringers

3 Geological and geophysical studies

The following studies were carried out in PL1095, relevant to the evaluation of prospectivity in the licence:

- CSEM feasibility study
- Biostratigraphic and sequence stratigraphic study of key wells
- Seismic reprocessing
- AVO work including creating fluid and lithology seismic cubes for the Grid and Heimdal levels. Pcube and probabilistic inversions for Grid and Heimdal levels
- Seismic interpretation and mapping of key horizons
- Pseudo Heimdal thickness calculations from internal Pg sequence isochron mapping
- Regional Paleocene study

A Controlled Source ElectroMagnetics (CSEM) feasibility study was carried out over PL1095 for the various prospective levels. The conclusion of this study was that CSEM was not recommended for assessment of the East of Eden Prospect as a reliance on high-end resistivity parameters prevents extraction of prospect relevant information from a CSEM negative. CSEM was therefore not recommended for assessment of the East of Eden Prospect.

Seismic reprocessing was carried out on the main seismic survey included in the common licence database (PGS19M05VIK). This seismic reprocessing improved the interpretation of the deeper horizons, giving more continuous reflectors. In addition to seismic reprocessing, AVO work was performed, including the creation of fluid and lithology cubes for the Grid and Heimdal intervals and initial P-cube and probabilistic inversions at these levels.

For the Paleocene interval a consistent sequence stratigraphic framework was defined and well reinterpretation was carried out across the study area. This gave increased confidence in the sandstone correlation across the different depositional sequences. This work was crucial in redefining the East of Eden Prospect as most likely a Pg65 shale rather than a Paleocene sand. However, the new interpretation highlighted the potential for Pg50 sand in a newly defined prospect named Idefix (7% on PL1095).

Seismic interpretation of the internal Paleocene horizons was important to the regional understanding and prospect definition within PL1095. Pseudo Heimdal thickness maps were created using internal Paleocene horizons and Paleocene internal formation thicknesses from nearby well data. The Idefix Prospect is defined using the internal Rogaland Group thickness variation as a predictive tool for Heimdal reservoir presence, as seen in analogue fields such as Grane. This method also demonstrated that the East of Eden Prospect did not appear as a thickening in the Pg50 sand system, unlike Idefix. Seismic interpretation of the shallower and deeper horizons was also carried out to assess the prospectivity at all levels. The reprocessing of the seismic was important for the deeper prospectivity evaluation, as it gave more continuous reflectors in the deeper section.

The operator carried out an extensive regional Paleocene study which included seismic interpretation of the internal Paleocene markers, and biostratigraphic and sequence stratigraphic redefinition. Paleocene North Sea fields were also used as analogues to show the regional distribution of hydrocarbons, reservoir properties and trap types in the Paleocene. From this work Gross Depositional Environment (GDE) maps were constructed for all the internal Paleogene sequences, including over PL1095. This regional work had the consequence of the East of Eden

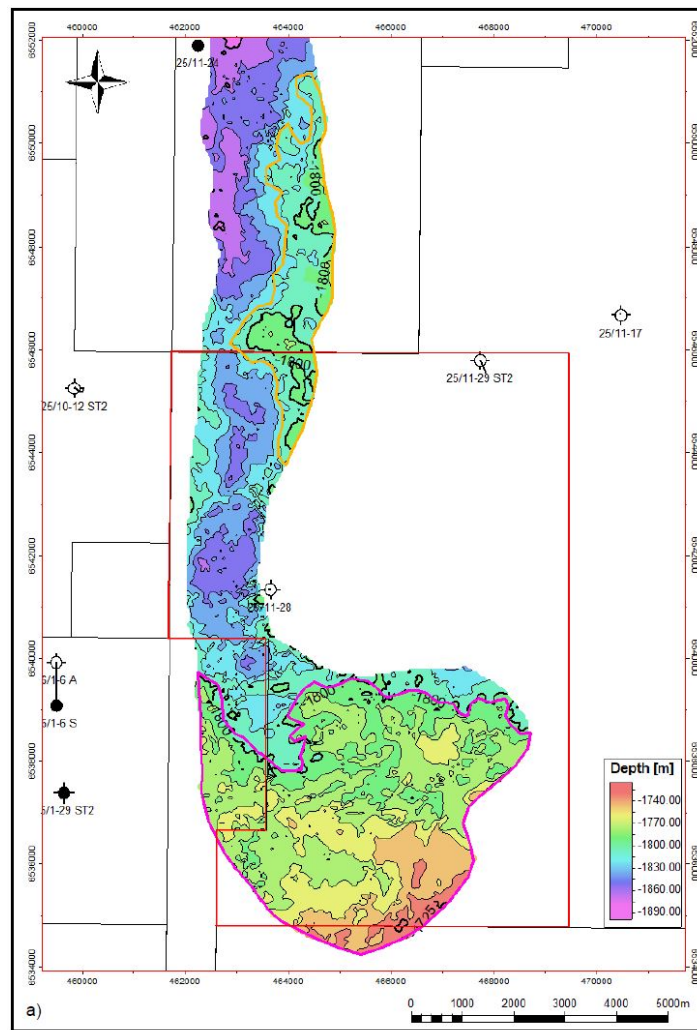
Prospect being redefined as a Pg65 age shale interval, thus removing East of Eden as a prospect within the licence. However, because of this work, the Heimdal (Pg50) Idefix Prospect was defined to the southwest. Only 7% of the Idefix prospect extends into the PL1095 licence area.

4 Prospect update

The original prospects defined in PL1095 can be seen in Table 4.1. The original outlines of the East of Eden Prospect and North of Eden Lead can be seen on the depth map in Fig. 4.1. The East of Eden Prospect has now been redefined as a Pg65 shale. The North of Eden Lead was linked to the East of Eden Prospect and therefore is also now believed to be no longer prospective.

Table 4.1 Original prospects and leads defined on PL1095

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 ⁹ Sm ³] (>0.00)			Gas [10 ⁹ Sm 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)						
East of Eden	P	Oil	5,15	11,39	18,40	0,68	1,71	2,91	0,22	82,0	Hermod Mbr/Paleocene	1719	Ivar Aasen	12
North of Eden	L	Oil		3,07			0,46		0,16	22,0	Hermod Mbr/Paleocene	1781	Ivar Aasen	18



- = North of Eden Lead outline
- = East of Eden P50 prospect outline

Fig. 4.1 East of Eden original depth map *Depth map of East of Eden Prospect with the outline of the East of Eden Prospect and North of Eden Lead highlighted. Depth map from time of application.*

Based on the regional work and revised interpretation, the only prospect defined within PL1095 is 7% of the Heimdal Pg50 Idefix Prospect. Fig. 4.2 shows the location of the original East of Eden Prospect and the newly defined Idefix Prospect. The Idefix Prospect is defined using the internal Rogaland Group thickness variations as a predictive tool for the Heimdal reservoir presence (Fig. 4.3). The Idefix Prospect (Fig. 4.4) is believed to be a continuation of the sands seen in the Lillefix discovery well 16/1-34 S. The resource potential for the Idefix Prospect can be seen in Table 4.2.

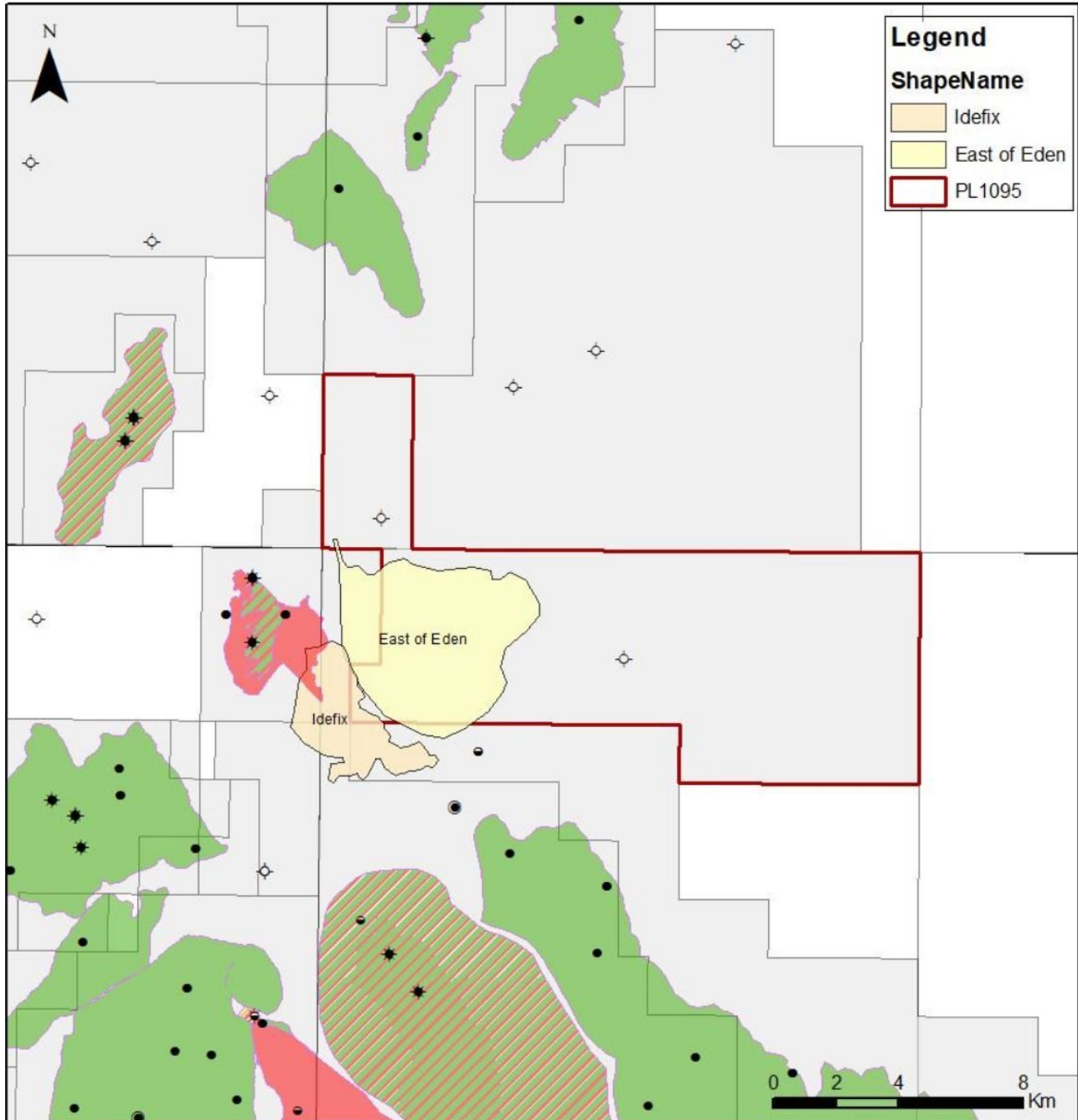


Fig. 4.2 Original and newly defined prospectivity PL1095 *East of Eden* is the original main prospect defined on PL1095. *Idefix* is the newly defined prospect of which 7% is within PL1095.

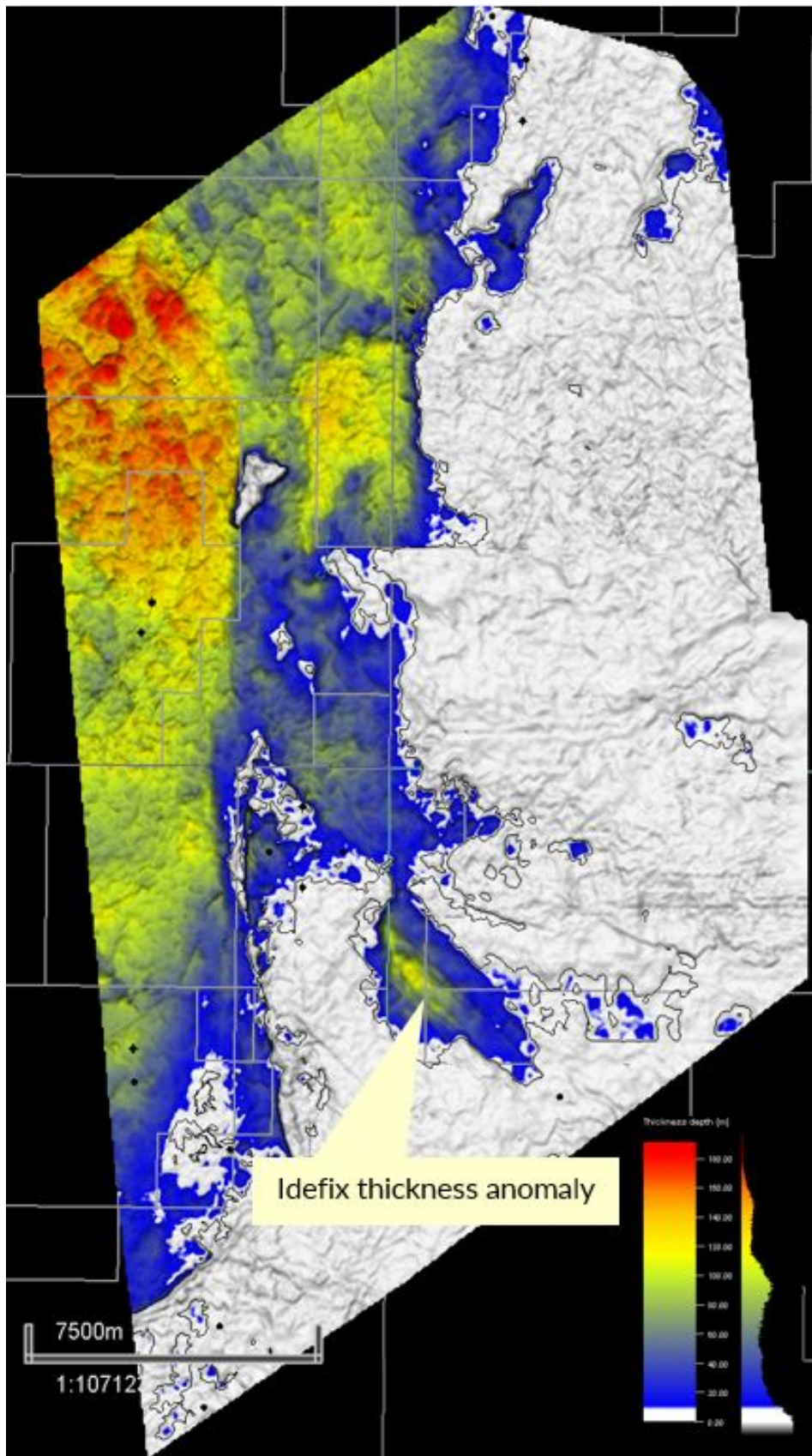


Fig. 4.3 Pseudo Heimdal thickness map (m) Isochron map of Top Lista to Top Shetland minus the background shales giving a pseudo Heimdal thickness map. The Idefix Prospect area remains as a positive thickness anomaly.

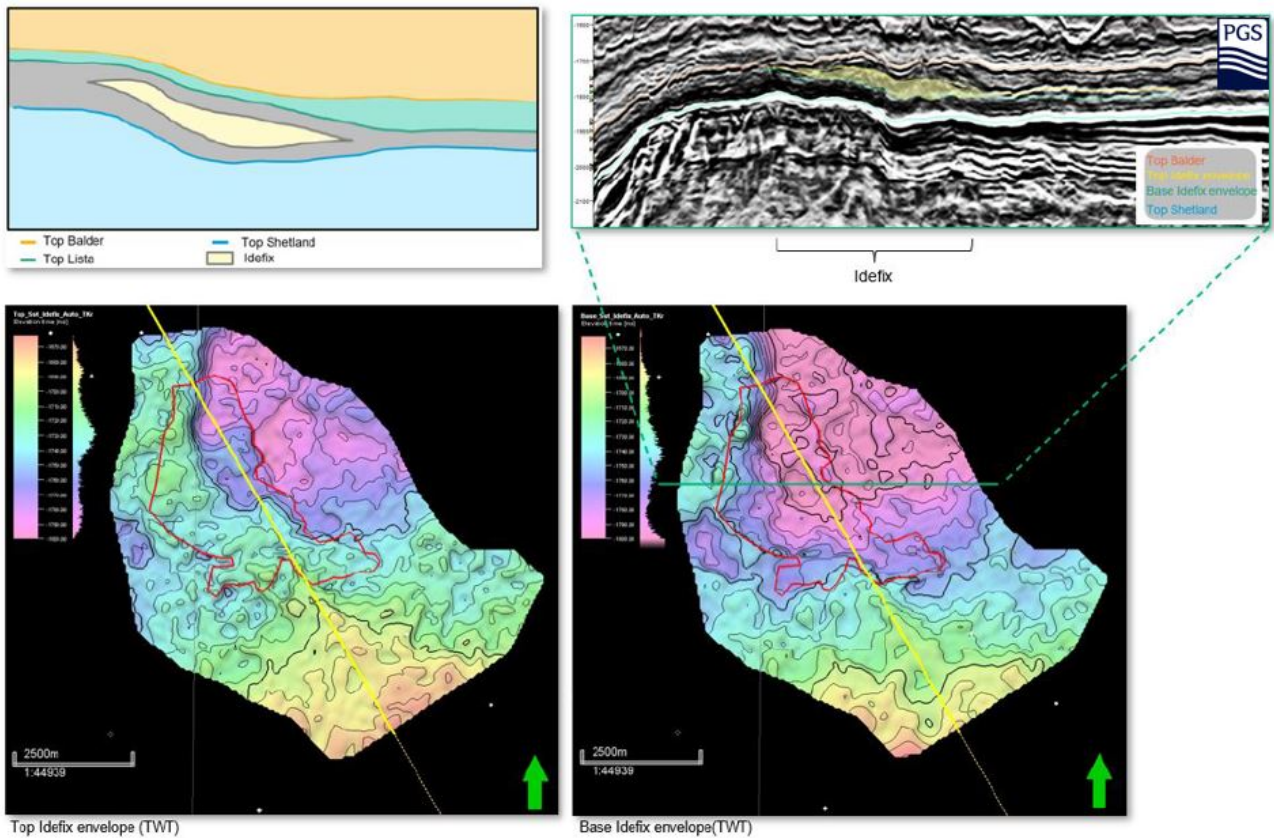


Fig. 4.4 Idefix seismic line, geoschematic cross-section and top and base envelope TWT maps
Geoschematic cross-section illustrating the Idefix Prospect. Seismic line (PGS19M05: Multiclient data courtesy of PGS) across the Idefix Prospect. Location of seismic line is highlighted in green on the base Idefix envelope TWT map below.

Table 4.2 Idefix prospect resources

Prospect name	Phase	Inplace resources* (10 ⁶ Sm ³ OE) P90-P50-P10-Mean	Recoverable resources* (10 ⁶ Sm ³ OE) P90-P50-P10-Mean	GCOS	% on PL1095
Idefix	Oil	12.5-22.8-34-23	3.6-6.89-11.1-7.17	0.2	7

*Total prospect volumes

A thorough evaluation of the remaining prospectivity at all levels has been carried out. No valid traps were identified at the deeper levels (below Top Chalk). The shallow prospectivity was screened using specially constructed lithology and fluid cubes. The Grid Formation is less well-developed in the eastern part of the licence, and in the western part of the licence, no significant traps were identified.

5 Technical evaluation

The Idefix Prospect (7%) is the only identified prospectivity remaining on the licence. A potential development for the Idefix Prospect would either be a direct tie-back to Ivar Aasen or a tie-back to Ivar Aasen via the planned Symra Development. In the base case development plan, three production wells and two water injectors would be required.

6 Conclusion

In light of the work carried out on the licence, no prospectivity has been identified that would justify a positive drill decision. The remaining prospectivity is mainly located outside of PL1095. Therefore, due to the limited remaining prospectivity identified on the licence, the decision has been made to relinquish PL1095.