



## PAPUA NEW GUINEA PETROLEUM SECTOR

The oil price fell sharply in December 2014 from a high of US\$115 barrel to below US\$30 a barrel in early 2016 due to excess world supply. Although the oil price has recovered some ground since then, it is still well below the highs of 2014 and now appears to be stuck at a level around US\$45-50 a barrel. Because of its link to oil prices, the LNG prices also fell sharply and have remained depressed with the Asian spot prices as low as US\$6.00 per million British Thermal Units (MMBtu).

Despite this drop in LNG prices, the PNG LNG Project is still competitive at current price conditions and has established an impressive production record. It is currently operating at in excess of 8 million tonnes per annum (Mtpa) compared to the nameplate capacity of 6.9Mtpa.

LNG demand is not predicted to increase substantially until around 2024.

### PETROLEUM EXPLORATION

Worldwide oil and gas exploration has experienced a significant slowdown since the drop in oil price in 2014.

Although the Petroleum Licence map (see next page) shows licences covering much of the mainland, many are inactive, or largely inactive. Active exploration programmes are however being undertaken by a handful of companies including ExxonMobil, Total, Repsol, Oil Search, Santos, and Horizon and its joint venture partners.

Due to terrain and the remoteness of petroleum prospects, PNG is a high cost location for exploration. At the end of 2016, the Department of Petroleum and Energy

(DPE) records show 61 granted Petroleum Prospecting Licences (PPLs) and 88 applications for PPLs, some over the same area by different applicants.

The number of exploration wells drilled has decreased over recent years and is unlikely to exceed two wells in 2017. One of these wells, Muruk, which spudded late 2016 was a success and is shaping up to be a significant discovery. The well is located in PPL 402 in the Hela Province between the Hides and Juha gas fields, 21km from the nearest Hides infrastructure.

Muruk's proximity to existing PNG LNG infrastructure makes its discovery particularly valuable as an additional



**Petroleum Prospecting Licence 269 Strickland 1 and 2 well site with Rig 103.**



**Drilling at Hides Gas field**

source of gas for a possible expansion of the PNG LNG project.

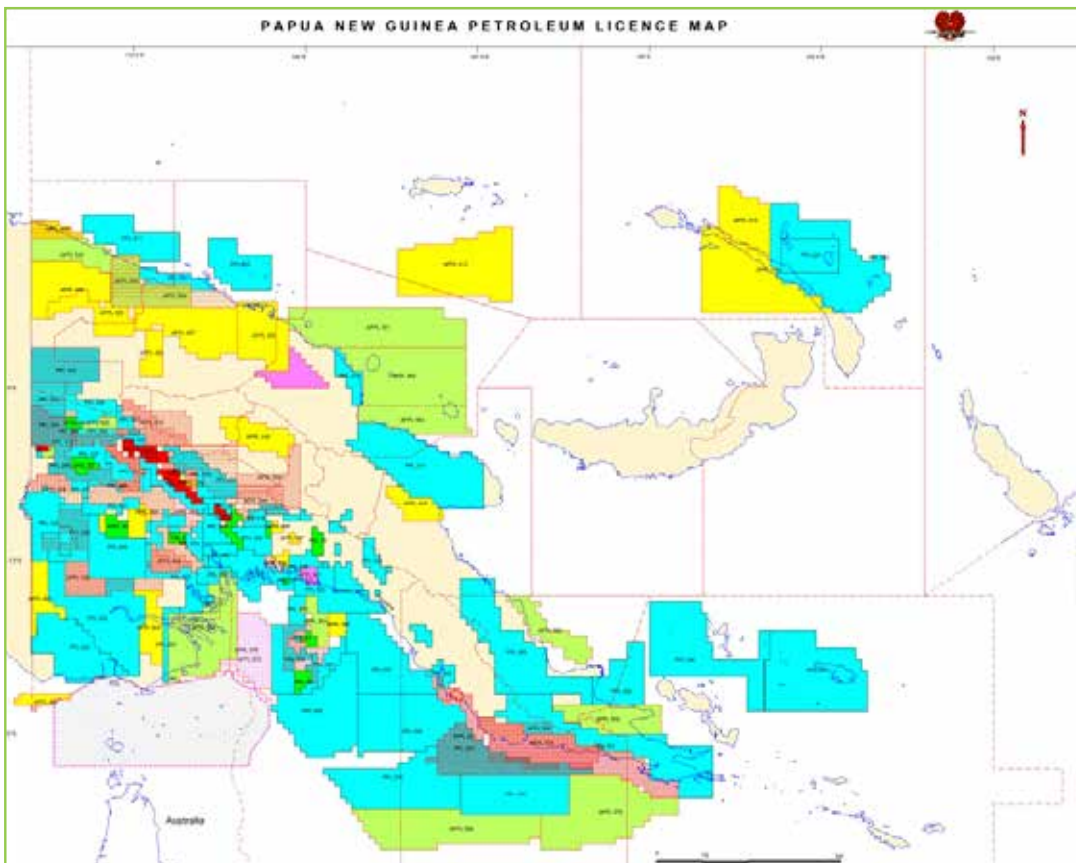
The Muruk result also increases the prospectivity of a number of exploration prospects along the trend between Hides and P'nyang. Oil Search has commenced acquiring additional seismic on a number of leads and prospects in preparation for potential further drilling.

Oil Search also proposes to drill the Kalangar prospect in PPL 339 in the second half of 2018. Kalangar, which lies to the south-east of the Elk-Antelope field about 25 kilo-

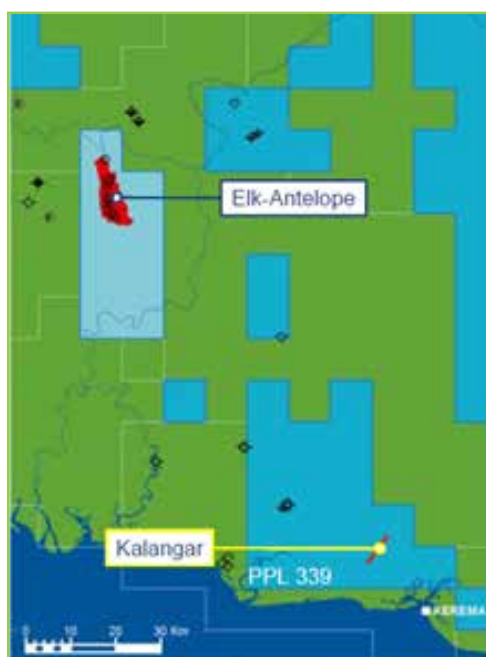
metres north-west of Kerema, has the potential to open up a new prospective trend in the Gulf Province.

In addition, Total is considering exploration in drilling in Petroleum Retention Licence (PRL) 15 to the south of the existing Elk-Antelope discoveries.

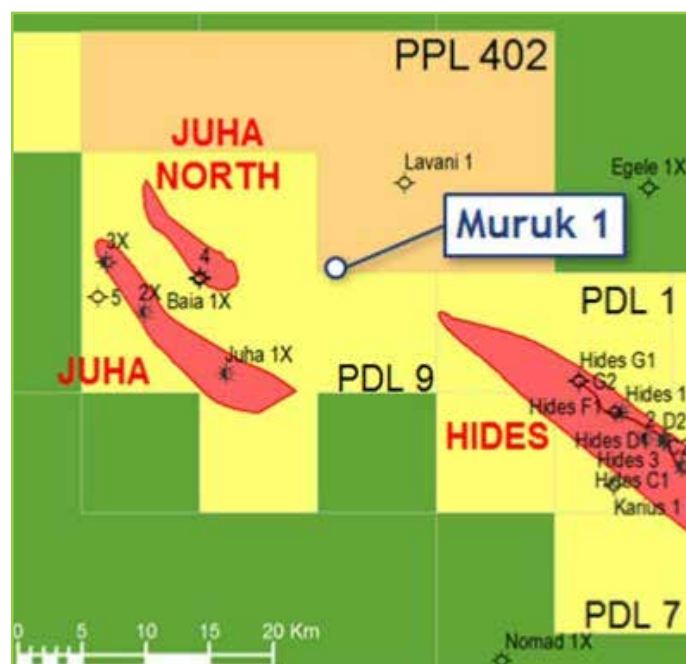
Further to this, the growing interest in offshore deep-water licences is expected to lead to a number of exploration wells in future years and is another emerging potential source for longer term LNG expansion.



Petroleum Licence Map, November 2016



Elk-Antelope field and Kalangar prospect in Gulf Province.



Muruk 1 well located in PPL 402.

## APPRAISAL DRILLING

An appraisal well on the P'nyang field in the far north of Western Province is planned for the fourth quarter of 2017. The well is designed to upgrade the reserves for the proposed PNG LNG expansion and supports Exxon-Mobil's application for a development licence over the P'nyang acreage.

The PPL 402 Joint Venture also proposes to drill an appraisal well at Muruk in late 2017. In addition, appraisal

## PROPOSED PROJECTS

### Papua LNG

Total, as operator of Papua LNG and PRL 15, has completed four appraisal wells on the Elk-Antelope discovery from 2014 to 2017 to properly delineate the fields.

Preliminary engineering studies as well as field surveys and environmental baseline studies have also been undertaken to progress the development process of the discovered resource. The project is currently at pre- Front End Engineering and Design (FEED) stage and a stand-alone option has been developed so far.

As ExxonMobil completed the acquisition of InterOil Corporation during the first quarter of 2017 and thus has become an equity partner in PRL 15 which contains the major Elk-Antelope gas fields, it has enabled discussions on potential "synergies" between PNG LNG and Papua LNG to commence in order to optimise the development of Elk-Antelope fields and to make it the most cost effective project.

Building Papua LNG trains in the PNG LNG plant site and

### PNG LNG Expansion

Appraisal activities for P'nyang and Muruk are planned for 2017 and 2018. Pre-FEED work at P'nyang will continue along with commercial discussions on expansion of PNG LNG.

wells will be drilled in the offshore Pasca field in the third quarter of 2017 and the onshore Barikewa and Kimu fields in late 2017-2018, to confirm the resource base. The shallow water offshore Uramu field is scheduled to be appraised in 2018.

These fields are ideally located to support further gas developments or for domestic power generation and/or regional markets.



**PRL 15 Elk-Antelope site**

sharing downstream facilities would potentially result in capital savings while materially improving operating efficiencies, for the benefit of all stakeholders, including the nation, Governments and local landowners.

The Elk-Antelope PRL-15 joint venture is targeting to enter FEED in 2018 and make a Final Investment Decision in a timely manner as per the conditions set out in the five-year extension of PRL 15 granted in December 2016.

These discussions will focus on understanding cost savings through integration of the PNG LNG and Papua LNG projects while still maintaining two highly credentialed operators of LNG developments, ExxonMobil and Total.



**Cost benefits for LNG expansion integration, with material operating and capital expenditure savings.**

### Western Province Gas

There are several proposals for development of stranded gas fields in Western Province. These fields could be eventually tied-in to the PNG LNG Project or alternatively the Eivala/Tingu and Ketu fields could be connected

with other fields to the south through a long north-south pipeline transecting the length of Western Province and feeding a mid-scale LNG plant at Daru (see map next page).

## OIL AND GAS PROJECTS

### Oil Fields

Oil production from PNG's now mature oil fields is in decline with most of the current production coming from the Kutubu complex and Moran fields.

Production from the Gobe fields has declined rapidly in recent years and these fields now operate primarily as gas producers in support of the PNG LNG Project. Current total crude oil production is about 22,000 barrels of oil per day.

### PNG LNG

The PNG LNG Project, which commenced production in May 2014, has proved to be one of the best LNG start-ups anywhere in the world in recent times.

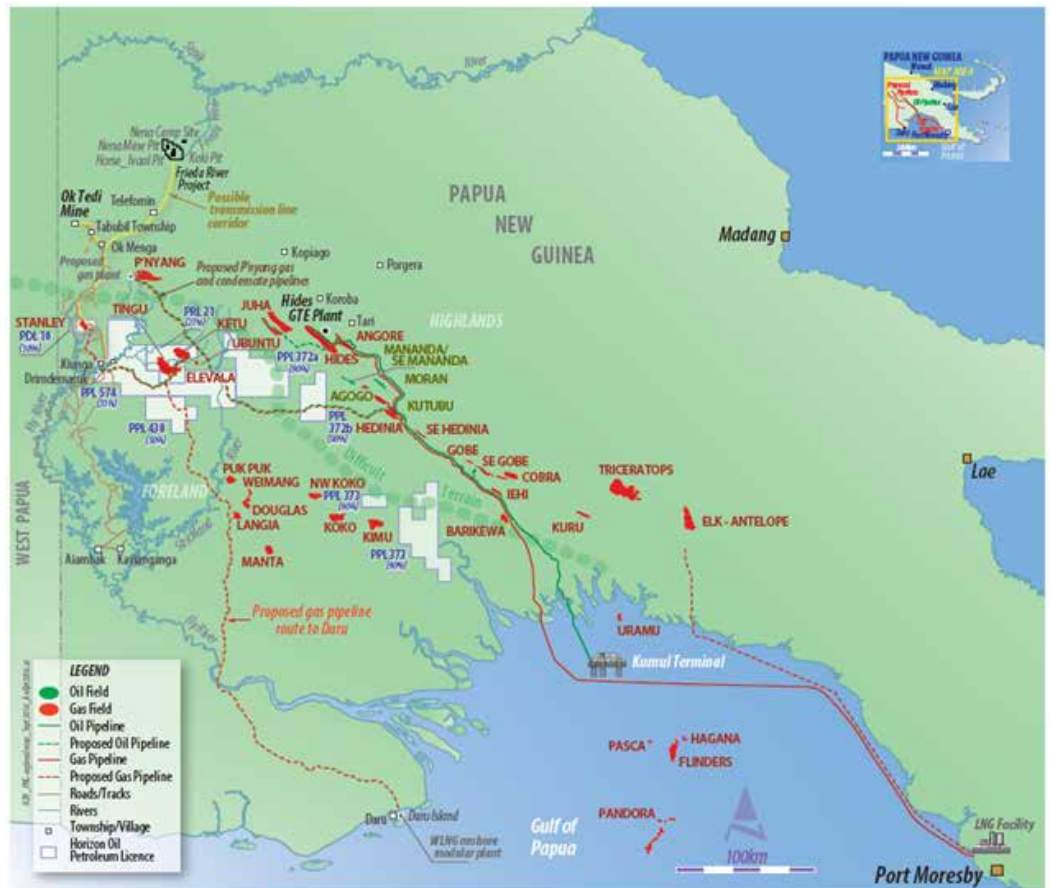
With nameplate capacity of 6.9 million tonnes annually, ExxonMobil has been successful in ramping up production to a current average rate in excess of 8 Mtpa, while also maintaining world-class safety performance and commencing the export of low cost power sufficient to meet about 20% of Port Moresby's power demand.

A recertification and upgrading of natural gas reserves in the PNG LNG Project area in 2016 has provided flexibility to the Joint Venture to sustain the higher rates of production currently being achieved by the project. The increase in reserves also allows for the negotiation of further LNG sales beyond existing long term contracts (6.6 Mtpa) or within the spot market.

The Government has continued the landowner clan vetting process aimed at identifying the landowners eligible to receive benefits from the PNG LNG Project.

Pending the completion of this process, royalty and dividend (equity) payments due to the landowners are being held in trust accounts, royalty in a trust account with the Central Bank, and the dividends in dedicated trust accounts with Mineral Resources Development Company.

The clan vetting process for the plant site landowners near Port Moresby has been completed and they have already approved a structure for payment so it is expected that their share of the royalty money will be released after the 2017 General Election.



Mid-scale LNG proposal for Western Province.

Under the terms of the 2009 Umbrella Benefits Sharing Agreement, landowner groups are entitled to acquire an additional 4.27% equity stake in the Project from the National Government. Prior to the Election, discussions were ongoing between the Government and landowner groups to determine a final purchase price and on ways to finance the acquisition. It is proposed that the transaction will be effected through the transfer of shares in Kumul Petroleum. Post completion, the National Government's effective interest in PNG LNG will reduce to 12.5%, while landowner and Local-level Government total interests will increase to 7.1%.



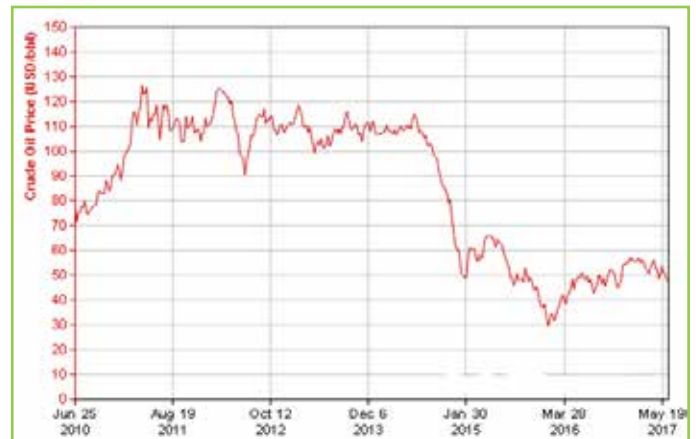
The PNG LNG cargo vessel, Kumul, loading its first LNG cargo at the PNG LNG marine terminal in 2016.

## OIL AND GAS PRODUCTION AND COMMODITY PRICES

Due to excess world supply, the oil price fell sharply in December 2014 from a high of US\$115 barrel to below US\$30 a barrel in early 2016. Although the oil price has recovered some ground since then it is still well below the highs of 2014 and now appears to be stuck at a level around US\$45-50 a barrel (see chart).

LNG prices are linked to oil prices and hence also fell sharply and have remained depressed, and are not predicted to increase substantially around 2024 with the Asian spot prices as low as US\$6.00 per million British Thermal Units (MMBtu). The PNG LNG Project is still competitive at present price conditions and has established an impressive production record.

Crude Oil Price June 2010 – June 2017, USD/bbl



PNG Oil and Condensate Production, 2010 - 2016



A competitive cost base, a reputation as a reliable supplier and a product with a high heating value makes PNG LNG a premium gas product in the region. This reputation will be important in gaining new markets with the planned LNG expansion projects.

PNG's oil production has been on a declining trend since exports commenced in 1992. Peak rates of 150,000 barrels per day (bpd) have now declined to 25,600 bpd in 2016. However, condensate production from the PNG LNG Project has added a further 32,500 bpd to liquids production resulting in a total liquids output in 2016 of 58,100 bpd.

Asian LNG Prices, May 2012 – May 2017



Following start-up in May 2014, LNG export revenues overtook gold as PNG's top export earner. LNG exports were worth K8.2 billion in 2016 and the total value of oil and condensate ('liquids') production was K2.9 billion. In addition, the refined petroleum product from the Napa Napa oil refinery contributed K863 million in export revenues in 2016.

LNG Global Supply-Demand Balance Graph





**Moran Oil and Gas Production**  
Operator: Oil Search Ltd



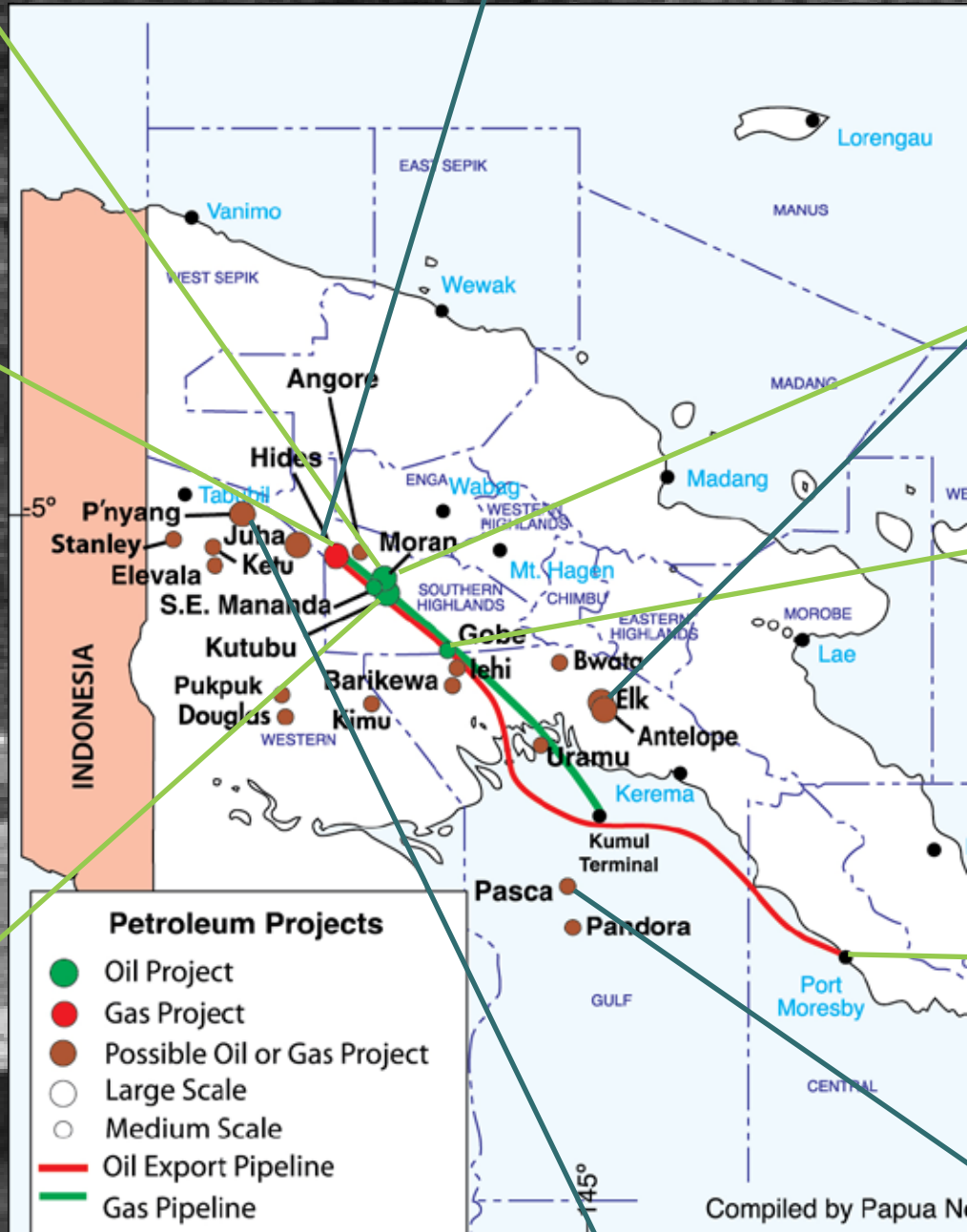
**Muruk Gas Field**  
Operator: ExxonMobil PNG



**Hides Gas Production**  
Operator: ExxonMobil PNG



**Kutubu Oil and Gas Production**  
Operator: Oil Search Limited



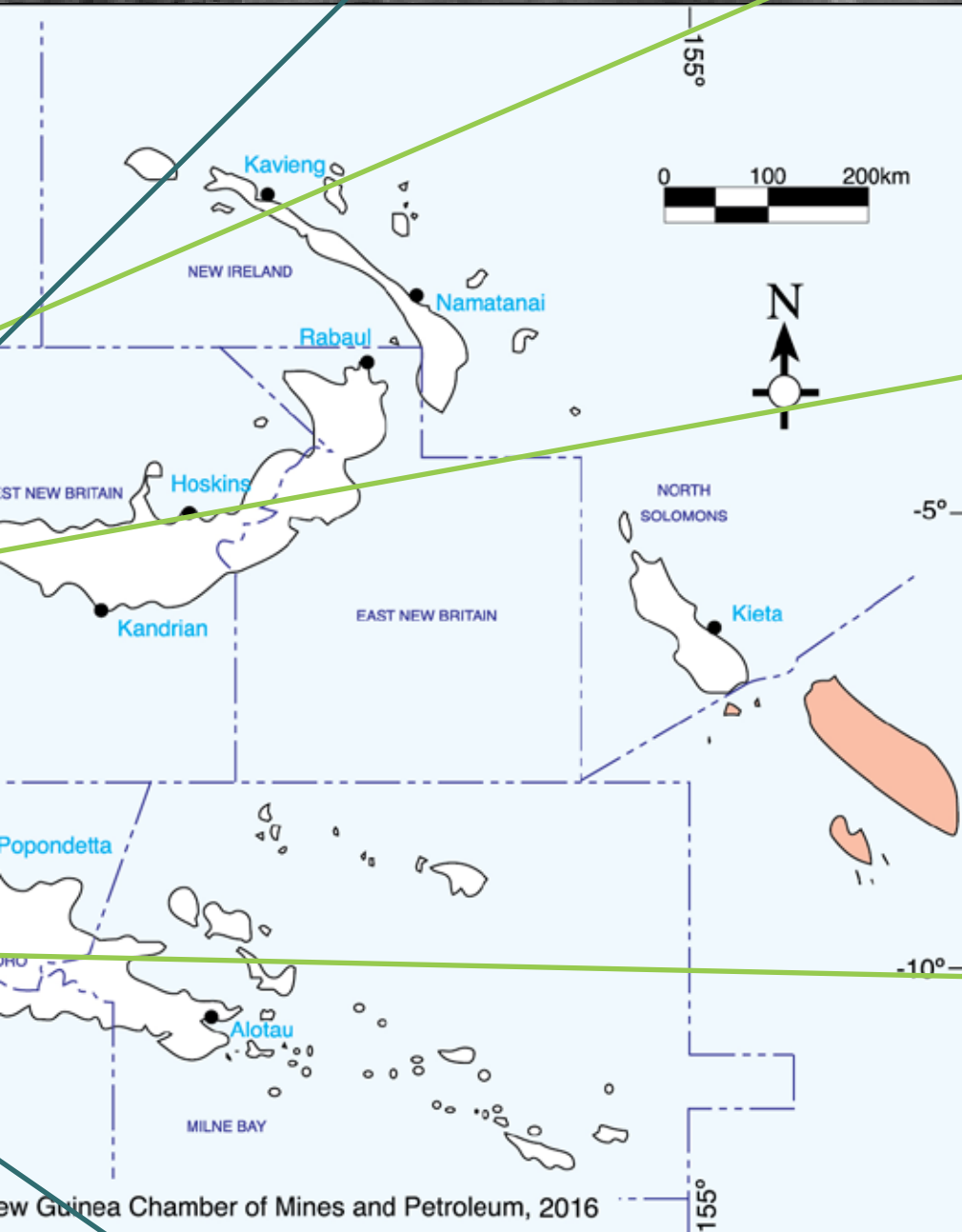
**P'nyang Gas Field**  
Operator: ExxonMobil PNG



**Elk-Antelope Gas Field**  
Operator: Total E&P PNG Ltd



**Agogo Oil and Gas Production**  
Operator: Oil Search Ltd



**Gobe Oil and Gas Production**  
Operator: Oil Search Ltd



**PNG LNG Plant**  
Operator: ExxonMobil PNG



**Pasca Gas Field**  
Operator: Twinza Oil



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