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## ASX Announcement

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### EP187 SEISMIC RESULTS AND 2020 EXPLORATION PROGRAM UPDATE

#### Highlights

- New EP187 2D seismic processing and interpretation confirms that Empire holds a material Beetaloo Sub-Basin acreage position within its 100% owned and operated tenement
- Large EP187 area identified containing thick continuous Velkerri and Kyalla Shales, clearly undisturbed by faulting and adjoining EP161 where Santos' Tanumbirini-1 is flowing gas after recent fracture stimulation
- Empire's EP187 Velkerri and Kyalla Shales exist at shallower depths than adjoining blocks while maintaining equivalent thickness offering reduced drilling and development costs and increasing the potential for the presence of both gas and liquid hydrocarbons
- Kyalla Shale identified at greater depth and thickness than previously anticipated thereby opening up a new secondary exploration target in EP187<sup>1</sup>
- Well location de-risked ahead of drilling scheduled for mid-2020

#### EP187 SEISMIC RESULTS

Empire Energy Group Limited ("Empire" or the "Company") is pleased to announce the completion of processing and interpretation of the recently acquired (231-line kilometres) 2D seismic data set in its 100% owned Northern Territory (NT) EP187 permit, across the eastern sector of the Beetaloo Sub-Basin. The seismic data confirms that the target shale sequences are present in Empire's EP187 tenement.

Open file Northern Territory Geological Survey<sup>2</sup> data has been combined with these newly interpreted and mapped data sets and has confirmed an easterly extension of the Beetaloo Sub-Basin into EP187 containing the Velkerri and Kyalla Shales, Empire's primary and secondary exploration well appraisal targets, on trend and continuous with those in neighbouring Santos and Origin permits.

In the Beetaloo Sub-Basin, the Velkerri and Kyalla Shales are currently being drilled, appraised, and production flow tested to the west and north west of Empire's EP187 by Origin Energy and Santos. Empire has incorporated into its

<sup>1</sup> Note: Prospective Resource volumes for the Kyalla Shale have not previously been opined on in third party resource reports prepared for Empire due to a prior belief based on limited data that the Kyalla Shale was too shallow in Empire's properties to be prospective for future commercial development

<sup>2</sup> <https://resourcingtheterritory.nt.gov.au/home>

mapping and correlation work publicly available data from Santos' vertical Tanumbirini-1 well, approximately 76km to the north-west (*Figure1*) of Empire's proposed well (SL-4) location and Santos seismic data in EP161.

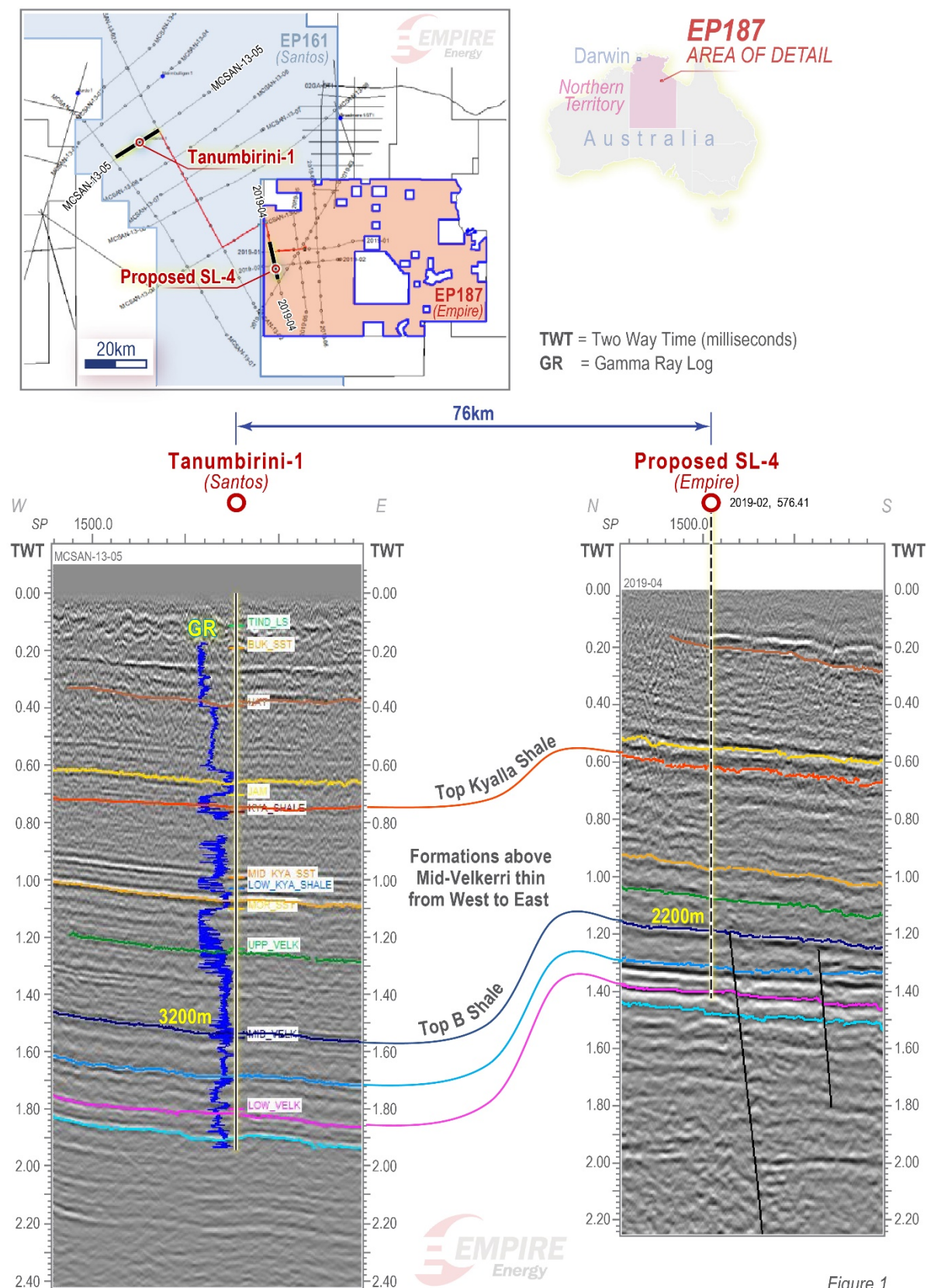


Figure 1

Tanumbirini-1 is currently being production tested by Santos after a 4-stage fracture stimulation and according to Santos "Gas flow rates of over 1.2 mmscf/d have been recorded, exceeding initial expectations for the vertical well. Preliminary gas composition analysis indicates >90% methane, less than 5% total inert content and 3% ethane."<sup>3</sup>

<sup>3</sup> Santos Fourth Quarter Activities Report 22 January 2019: <https://www.asx.com.au/asxpdf/20200122/pdf/44dfgdbv5rkz2g.pdf>

Empire notes this result in the context of US shale development across multiple basins that has demonstrated that horizontal fracture stimulated wells typically produce at substantially higher flow rates than vertical fracture stimulated wells because they expose significantly greater volumes of hydrocarbon-rich rock surface area to the well bore.

Tanumbirini-1 well was drilled in one of the deepest parts of the Beetaloo Sub-Basin, reaching 3,945 metres in depth. Empire's proposed exploration well location (SL-4) has equivalent thickness of Velkerri and Kyalla shales at depths approximately 1,000 metres shallower (*Figure1*) and is expected to reach total depth of approximately 2,500 metres. SL-4 has a shallower target interval than Tanumbirini-1 to appraise resulting in lower drilling costs, and in a success case, lower field development costs. Being less deeply buried and therefore potentially less thermally mature, there is the potential that these target shales in EP187 may contain hydrocarbon liquids as well as natural gas.

## 2020 EP187 EXPLORATION DRILLING PLANNING

The new seismic has identified two areas that are relatively undisturbed by large faults (*Figure2*). One is the Phase 1 Work Program Area on the western boundary and the other is a southern area, though the latter may require additional future seismic acquisition to be further delineated.

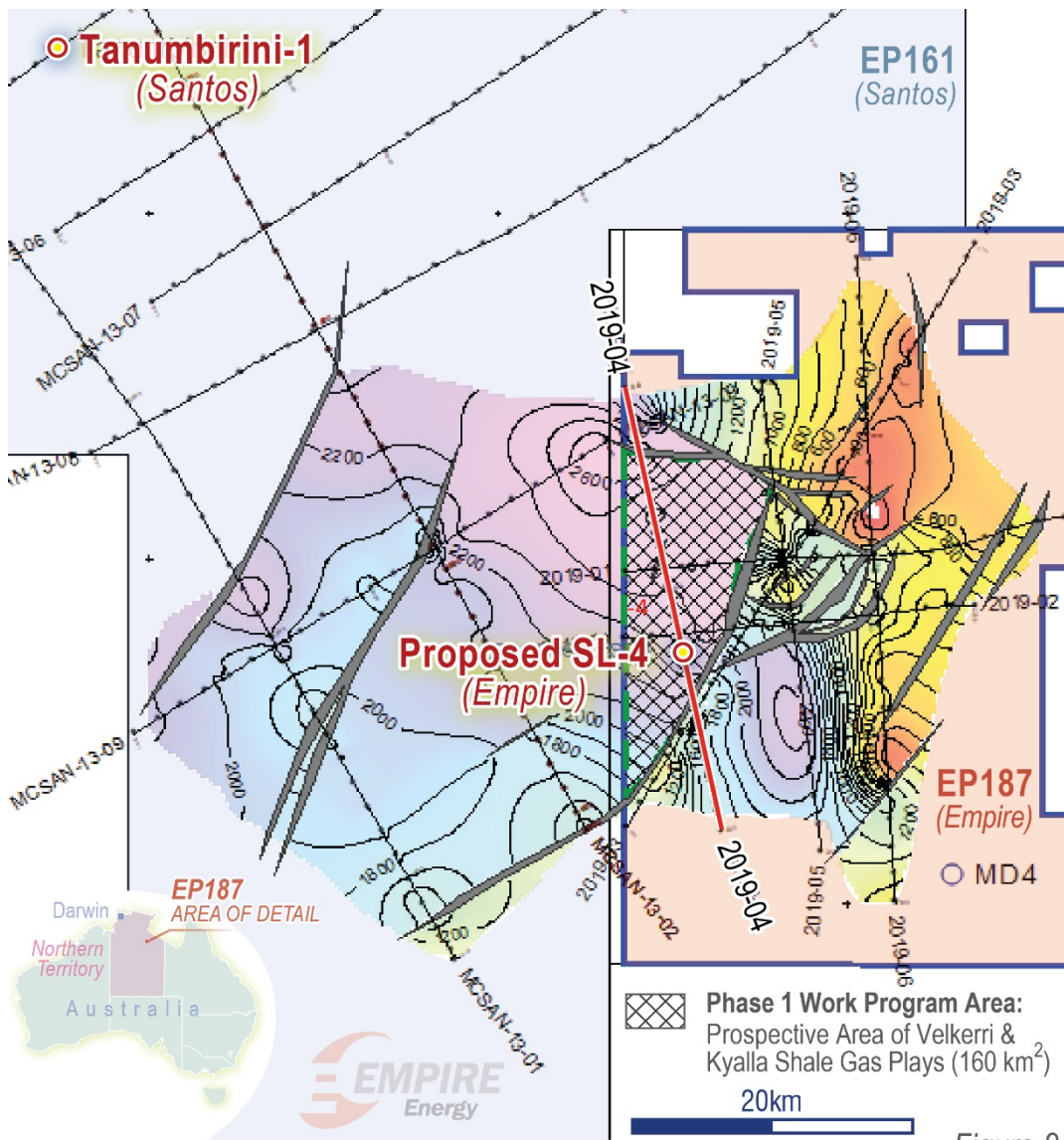


Figure 2

New mapping demonstrates that the Phase 1 Work Program Area extends across approximately 160km<sup>2</sup> (approximately 40,000 acres) (*Figure 2*) on the western flank of EP187 that is a continuance of the play being tested by Santos at Tanumbirini-1.

The 2D seismic has been successful in determining the prospective areas for initial focus and the proposed Empire SL-4 location for Empire's first exploration well as a de-risked location for exploration drilling.

Empire's proposed exploration well location has equivalent combined thicknesses of Middle Velkerri A, B, & C shales of approximately 500 gross metres (approximately 270 metres net), based on Tanumbirini-1 petrophysical cut-offs, and a Kyalla shale thickness of approximately 100 metres, all at depths approximately 1,000 metres shallower than encountered at Tanumbirini-1 (*Figure 1*).

The Empire SL-4 well is expected to reach a total depth of approximately 2,500 metres. The net thickness of the Middle Velkerri shale interval of approximately 270 metres is significant compared to the most prolific North American shale plays. The analogous Marcellus Shale in the US Appalachia region has an average net thickness of 20 metres, the Barnett Shale in North Texas has an average net thickness of 100 metres and the Eagle Ford shale in South Texas has an average net thickness of 90 metres. These US basins currently produce millions of barrels of oil equivalent per day.

Concurrent with the seismic acquisition, Empire has sought regulatory approvals for four well pads as potential drilling locations with the Northern Territory authorities. This will facilitate the final well permitting process now that mapping results are available, giving Empire as Operator the flexibility to choose the best drilling location for our first exploration well, to be drilled in mid-2020.

Empire's initial exploration well will focus on evaluating the Velkerri and Kyalla formations to allow Empire to better understand hydrocarbon content and composition and rock mechanics. The well is being designed to allow for further appraisal work to be carried out in the future from the same well bore, thereby reducing future appraisal costs and operational footprint.

The well design will allow for a future vertical fracture stimulated flow test (subject to regulatory approvals) and ultimately the drilling and completion of a horizontal section (also subject to regulatory approvals) that would seek to achieve commercial flow rates.

## **SUMMARY**

Alex Underwood, Managing Director, commenting on the results, said:

*"We are very pleased with the results of the EP187 seismic program. The seismic data have demonstrated that the most prospective petroleum productive shales of the Beetaloo Sub-Basin extend into our EP187 tenement at depths and thicknesses ideal for petroleum development.*

*The thickness of the Velkerri Shale in our initial priority target area exceeded our expectations, as has the depth and thickness of the Kyalla Shale, thereby opening an additional liquids rich play for Empire to explore and appraise.*

*Our seismic program combined with historical open file seismic data demonstrates that the Velkerri Shale in our EP187 tenement is on trend and continuous with our neighbour Santos which has recently announced encouraging initial flow rates from the existing vertical well Tanumbirini-1.*

*Concurrent with our ongoing exploration activities throughout 2020, Santos' upcoming two well fracture stimulated horizontal appraisal drilling program targeting the Velkerri Shale and Origin's ongoing two well fracture stimulated horizontal appraisal drilling program targeting both the Velkerri Shale and the Kyalla Shale will enhance our understanding of the production potential of these shales in our properties given their broad lateral extent across the Beetaloo Sub-Basin.*

*With planning and approvals for our 2020 exploration drilling program targeting the Velkerri and Kyalla Shales well advanced and fully funded, and our priority drilling location de-risked, we are well placed to execute our 2020 exploration drilling program."*

For queries about this release, please contact:

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## **ABOUT EMPIRE ENERGY GROUP LIMITED**

Empire Energy holds over 14.5 million acres of highly prospective exploration tenements in the McArthur and Beetaloo Basins, Northern Territory. Work undertaken by the Company since 2010 demonstrates that the Eastern depositional Trough of the McArthur Basin, of which the Company holds around 80% has enormous conventional and unconventional hydrocarbon potential. The Beetaloo sub-Basin, in which Empire holds a substantial position, has world-class hydrocarbon volumes in place and a ramp up in industry activity to appraise substantial discoveries already made by major Australian oil and gas operators has recommenced.

Empire Energy is an experienced conventional oil and natural gas producer with operations in the Appalachia region of the USA (New York and Pennsylvania). Empire has been successfully developing and producing oil and gas since 2006.

### **Summary Information**

*The following disclaimer applies to this announcement and any information contained in it (the information). The information in this announcement is of general background and does not purport to be complete. It should be read in conjunction with the Company's other periodic and continuous disclosure announcements lodged with ASX Limited, which are available at [asx.com.au](http://asx.com.au). You are advised to read this disclaimer carefully before reading it or making any other use of this announcement or any information contained in this announcement.*