# APPENDIX

(Exhibits 1 - 10 to Above Ground, CIEL, GLA submission)

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# **EXHIBIT 1**

# NEWLY DISCOVERED Kavango Basin, NAMIBIA

# ReconAfrica | May 2019

ConAfri

## DISCLOSURE

Certain information in this Presentation may constitute "forward-looking" information or statements which involve known and unknown risks, uncertainties, and other factors which may cause the actual results, performance or achievements of Reconnaissance Energy Africa Ltd. ("Reconnaissance" or the "Company"), or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking information or statements. When used in this Presentation, such information or statements often use words such as "anticipate", "may", "will", "could", "expect", "believe", "plan", "intend" and other similar terminology. In particular, this Presentation may include, without limitation, forward-looking information and statements pertaining to the following: the treatment of Reconnaissance under the regulatory regimes and laws of the jurisdictions in which Reconnaissance conducts its business; drilling and completion of wells; facilities costs and the timing and method of funding thereof; expected timing of development of undeveloped reserves; Reconnaissance's potential future oil and natural gas production levels; the future performance and characteristics of Reconnaissance's oil and natural gas properties; the estimated size of Reconnaissance's potential oil and natural gas reserves; projections of market prices and costs; projections of supply and demand for oil and natural gas; expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, anticipated exploration and development activities; future capital expenditure programs and the timing and method of financing thereof.

Forward-looking information contained in this Presentation is based upon certain assumptions and uncertainties, which may prove to be incorrect. In this Presentation, Reconnaissance has made certain assumptions including, but not limited to: future prices for oil and natural gas; future currency and interest rates; Reconnaissance's ability to generate sufficient cash flow from operations, Reconnaissance's ability to access debt and/or equity financing to meet its future obligations; social, political and economic developments in jurisdictions in which Reconnaissance conducts its business; and Reconnaissance's ability to obtain qualified staff and equipment in a timely and cost-efficient manner to meet Reconnaissance's demand.

Actual results could differ materially from those anticipated in these forward-looking statements and information as a result of various risk factors, including: volatility in market prices for oil and natural gas; the potential for the return of conditions persisting during the recent global crisis and economic downturn; liabilities inherent in oil and gas exploration activity including operational and environmental risks; uncertainties associated with estimating oil and natural gas reserves; competition for, among other things, capital, acquisitions, undeveloped lands and skilled personnel; incorrect assessments of the value of acquisitions; unanticipated geological, technical, drilling and processing problems; fluctuations in foreign exchange or interest rates and stock market volatility; changes in the laws or application thereof by the Governments of the jurisdictions in which Reconnaissance conducts its business; political, social and economic instability in the foreign jurisdictions in which Reconnaissance conducts its business; political, social and economic instability in the foreign jurisdictions in which Reconnaissance operates; increases to capital expenditure programs and the timing and method of financing thereof; the ability of Reconnaissance to achieve drilling success consistent with management's expectations; higher than expected operating costs; uncertainty with respect to net present values of future net revenues from reserves; lower than anticipated future production levels of Reconnaissance assets; delays with respect to timing and the bringing on of production; changes to expected plans and costs of drilling; drilling inventory and the presence of oil pools or gas accumulations; increased cost projections; global supply and demand for oil and natural gas; ability and costs of increasing plant capacity; expected levels of royalty rates, operating costs, general and administrative costs, costs of services and other costs and expenses; and expectations regarding the ability to raise capital

Readers are cautioned that the foregoing statements are not exhaustive and reflect current expectations regarding future events and operating performance as of the date of this Presentation. Although the forward-looking information and statements contained in this Presentation are based upon what management of Reconnaissance believes are reasonable assumptions, Reconnaissance cannot assure readers that actual results will be consistent with the forward-looking information and statements. The forward-looking information contained in this Presentation is made as of the date hereof and the Company undertakes no obligation to update publicly or revise any forward looking information, whether as a result of new information, future events or otherwise, unless required by applicable securities laws. All forward looking information contained in this Presentation is cautionary statement.

# NEWLY DISCOVERED KAVANGO BASIN, NAMIBIA

## 6.3 MM acre licensed area

- Captures entire deep Kavango Basin
- Large scale shale and conventional play
- Similar size to Eagle Ford shale
- One of the most significant undeveloped basins of such depth globally
- OOIP\* of 12 billion bbls of oil (shale only) (Sproule\*\*, Nov 2018)
- Three well drilling campaign begins 2<sup>nd</sup> half 2019

### KEY STATISTICS<sup>1</sup> RECONNAISSANCE ENERGY AFRICA LTD.

>	TSX.V: RECO	May 2019
>	Shares outstanding	56 MM
>	Market Capitalization	С\$11.2 ММ
>	Cash Balance May 2019	C\$3.1MM
>	Insider Ownership (Escrowed)	>55%

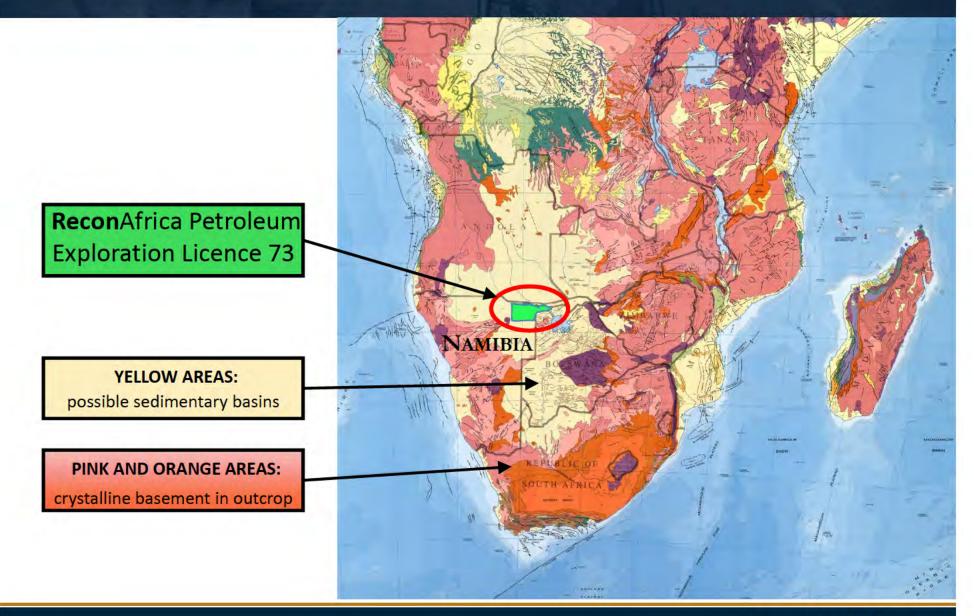
"Nowhere in the world is there a sedimentary basin this deep that does not produce hydrocarbons."

- Bill Cathey President, Earthfield Technologies (Houston)

\*Original Oil In Place \*\* Sproule International is a leading Canadian reservoir engineering firm <sup>1</sup> Upon completion of Reverse Takeover and \$3.3MM concurrent financing, to occur May 2019

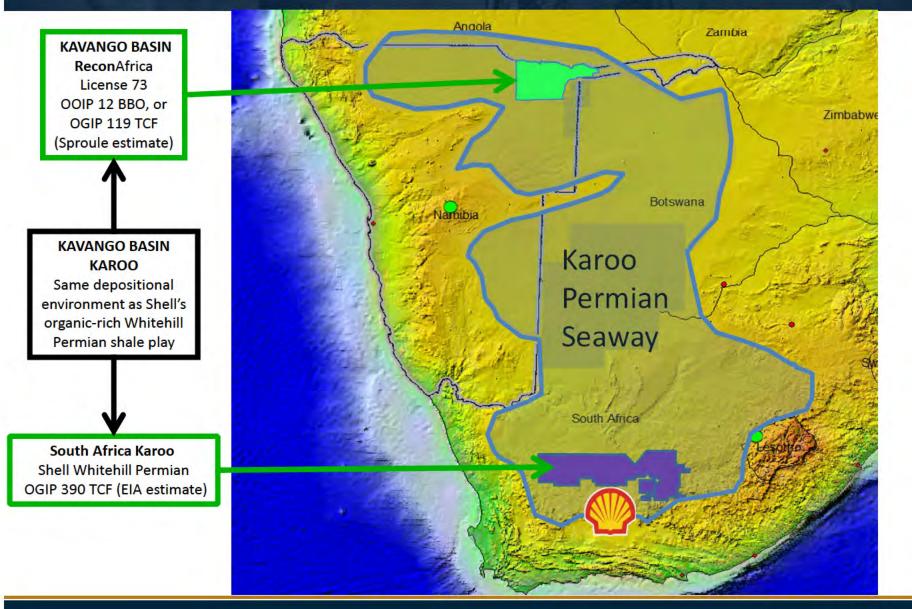


# **RECONAFRICA BLOCK LOCATION**





# **REGIONAL KAROO PERMIAN ACTIVITY**

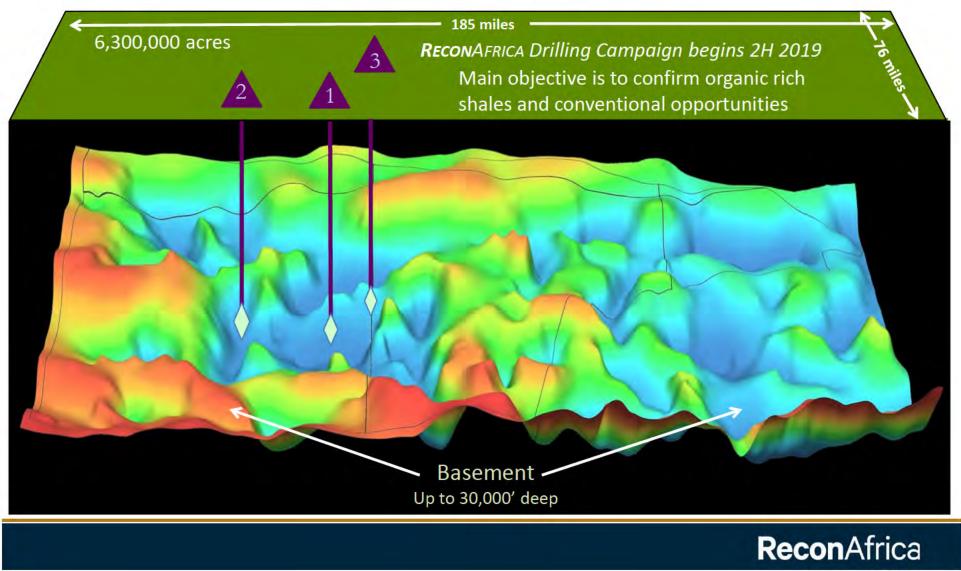




# DEEP KAVANGO BASIN DRILLING LOCATIONS

"Nowhere in the world is there a sedimentary basin this deep that does not produce hydrocarbons."

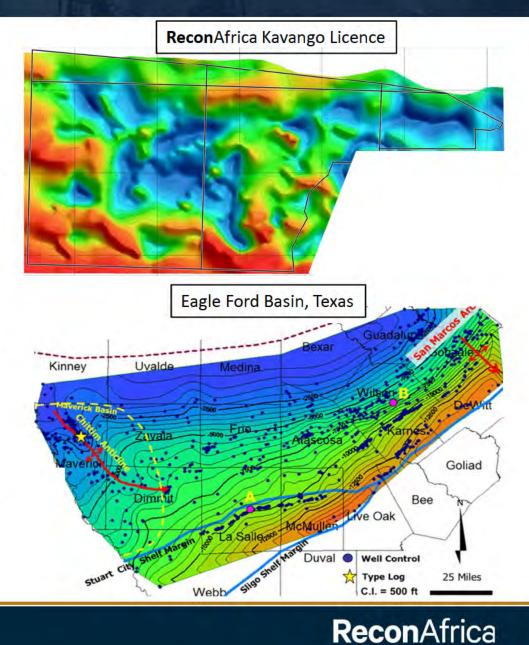
- Bill Cathey, President, Earthfield Technologies (Houston)



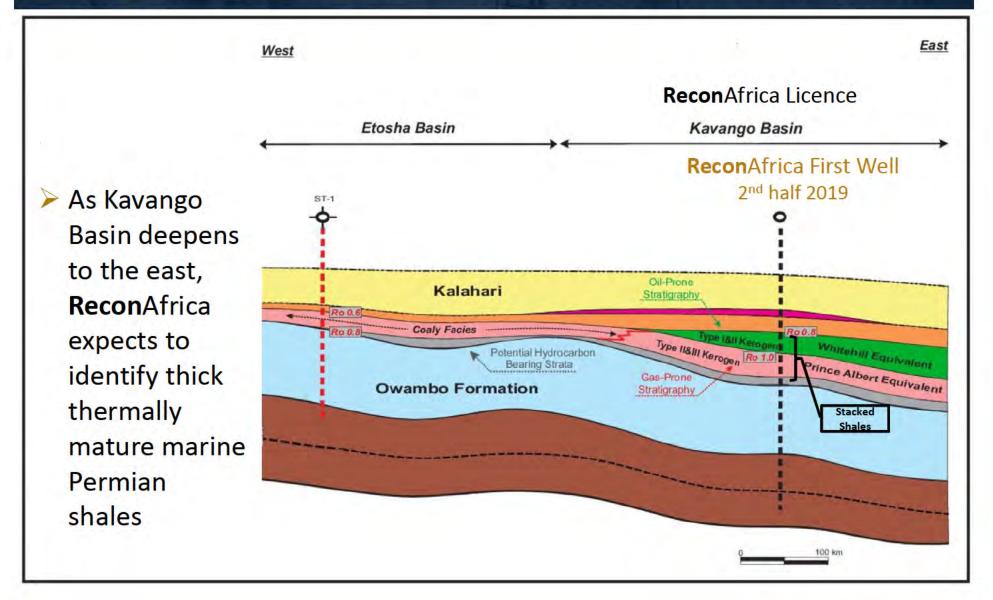
## COMPARISON OF KAVANGO LICENCE & EAGLE FORD

- ReconAfrica holds entire Kavango Basin with 6.3 MM acres, 25,000 km<sup>2</sup>
  - Similar in size to entire Eagle Ford shale (6.9 MM acres)
- Sproule estimate for Kavango (shales only):
  - OOIP: 12 Billion Barrels, or
  - OGIP: 119 TCF
  - Technically recoverable: yet to be determined
- EIA estimate for Eagle Ford shales:
  - Technically recoverable:
     50 TCF gas, 2.4 Billion Barrels oil

OOIP = Original Oil in Place OGIP = Original Gas in Place



# KAVANGO DEEP BASIN RESOURCE OPPORTUNITY





**Recon**Africa

# MONETIZING THE HYDROCARBONS



Paved highway runs through Licence Area to Windhoek

ReconAfrica Licence Area



# ATTRACTIVE NAMIBIA LICENCE TERMS

- ReconAfrica owns 90% interest in Petroleum Exploration Licence 73
  - NAMCOR (Namibia state oil company) holds 10%
- Exploration Phases:
  - First exploration phase requires drilling one well by January 29, 2020
  - Two additional exploration phases to January 2024
    - Right to extend to January 2026
- 25 year Production Licence follows commercial discovery
- Fiscal terms:
  - 5% royalty
  - 35% corporate income tax
- Among the most attractive fiscal regimes worldwide
- Namibia: politically stable, English speaking, common law system

# **BOARD OF DIRECTORS & OFFICERS**



### Jay Park QC CEO and Director

- Leading international oil & gas lawyer with experience in seventeen African countries
- Former director of Caracal Energy, acquired by Glencore in 2014 for US\$1.3 billion



### Dr. James Granath Director, Structural Geologist

Worldwide expertise, specifically in Africa, in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation



### Chet Idziszek Director, Geologist

- 40 years experience in resource industry
- 1990 "Mining Man of the Year" award for his vital role in Eskay Creek gold deposit
- Former director of Arequipa Resources, acquired by Barrick Gold in 1996 for >\$1 billion



#### lan Brown CFO, Chartered Accountant

- Over 39 years experience in public company financial reporting and governance
- From 2014 to 2017, Mr. Brown's principal occupation was acting as Chief Financial Officer of Battle Mountain Gold Inc.



## **TECHNICAL TEAM**



### Daniel Jarvie Geochemist

- Renowned for his geochemical analysis for Mitchell Energy in the development of the Barnett Shale, and former Chief Geochemist for EOG Resources
- In 2010, awarded "Hart Energy's Most Influential People for the Petroleum Industry in the Next Decade"



#### Bill Cathey Geophysicist

- President & Chief Geoscientist of Earthfield Technologies, Bill is a potential new fields expert, with over 35 years of interpretation experience across the globe
- Core clients include Chevron, ExxonMobil and ConocoPhillips



#### Dale Mitiska Geologist

- Proven successful prospect generator
- Over 30 years of diversified operational experience in the exploration and development of oil and gas reserves, including in the Williston Basin/Bakken shale, the San Juan basin, and the Niobrara, Barnett, Marcellus, Eagleford and Woodford shale plays



# FINANCING TERM SHEET

- ReconAfrica is undertaking a financing concurrent with the completion of its reverse takeover
- Non-brokered private placement: C\$3.3 MM
- C\$0.20 per unit
- Units comprise 1 common share and one warrant
  - Each warrant exercisable into one common share at C\$0.50 for a period of 5 years
- Use of proceeds:
  - First well of drilling campaign
  - Related G&A



# **RECON**AFRICA HOLDS ENTIRE BASIN

## Basin-sized opportunity: 6.3 MM acres

- Similar in size to entire Eagle Ford shale (6.9 MM acres)
- 2x the size of Barnett shale (3.2 MM acres)

Sproule estimate (shales only):

- OOIP: 12 Billion Barrels, or
- OGIP: 119 TCF

## Company estimate (shales only):

- OOIP: 49 Billion Barrels, or
- **OGIP: 116 TCF**

"... Optimal conditions for preserving a thick interval of organic rich marine shales ... "

- Sproule Report (Nov 2018)

Targeting equivalent source rock as Shell's Whitehill Permian marine shale play in South Africa



OOIP = Original Oil in Place OGIP = Original Gas in Place



# SHALE PLAY VALUATION BY ACREAGE (BASED ON DATA FROM USA, AUSTRALIA, ARGENTINA)

**PROGRESS IN COMMERCIALIZATION** 

**INCREASES MARKET VALUE OF ACREAGE** \$18,489 \$20,000 \$18,000 \$16,000 Price/Acre \$14,000 \$12,000 \$10,000 \$8,000 \$6,000 \$4,009 \$4,000 \$844 Source: Dolmen Broker \$2,000 \$40 Report, Bloomberg & Reuters \$0 TRENDS UNDEVELOPED APPRAISAL PRODUCTION US\$40/Acre US\$844/Acre US\$4.009/Acre US\$18.489/Acre Regional geology Logs, seismic Production history Successful tests Old logs, seismic Oil & gas shows Production from 100's of wells drilled Test horizontals Modern frac stimulations

Subscribers of the current offering do so at US\$1.34/acre for ReconAfrica's licence
 Success with ReconAfrica's 3-well program will bring licence to 'Undeveloped' stage

**Recon**Africa

# CONTACT

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London UK W1J 6BD

Email: Jay.Park@ReconAfrica.com Tel: +44 7748 354 555 UK | +1 403 801 1111 Canada

### **Reconnaissance Energy Africa Ltd.** Berkeley Square House, Berkeley Square

www.ReconAfrica.com

#### Additional Info:

**Reconnaissance Energy Africa Ltd.** is the resulting entity following completion of the 'reverse takeover' pursuant to the Share Exchange Agreement between Lund Enterprises Ltd. and the shareholders of 1163631 BC Ltd. The Share Exchange Agreement and related Management Information Circular have been filed by Lund under its profile on SEDAR at <u>www.sedar.com</u>, where additional information about **Recon**Africa and the reverse takeover can be found. On 29 March 2019, Lund shareholders approved the Share Exchange Agreement. Completion of the reverse takeover is subject to final approval from the TSX Venture Exchange.

# **EXHIBIT 2**

# Reconnaissance Energy Namibia (Pty) Ltd

Final Environmental Impact Assessment (EIA) Report Vol. 2 of 3 to Support the Application for Environmental Clearance Certificate (ECC) for the Proposed Petroleum (Oil and Gas) Exploration Operations (Drilling of Multiple Stratigraphic Wells) in the Petroleum Exploration License (PEL) No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821, KAVANGO BASIN, KAVANGO WEST AND EAST REGIONS, NORTHERN NAMIBIA

### PROPONENT ADDRESS

c/o Pioneer Oil and Gas Consulting City View Building Unit 13. Cnr of Pasteur and Freud Street P.O. Box 2393

WINDHOEK, NAMIBIA

## ENVIRONMENTAL CONSULTANT ADDRESS

41 Feld Street Ausspannplatz Cnr of Lazarett and Feld Street P. O. BOX 1839

WINDHOEK. NAMIBIA



### OPERATOR

Reconnaissance Energy Namibia (Pty) Ltd Subsidiary of Reconnaissance Energy Africa Ltd (ReconAfrica)

LICENSE PEL 73 Blocks 1719, 1720, 1721, 1819, 1820 and 1821

### WORKING INTERESTS

ReconAfrica owns 90% National Petroleum Corporation of Namibia (Namcor) (A State Owned Company) 10% with costs carried to the development stage

> TYPE OF PETROLEUM EXPLORATION OPERATIONS Drilling of Multiple Stratigraphic Wells Two (2) to Three (3)

### PROPONENT NAMIBIAN ADDRESS c/o Pioneer Oil and Gas Consulting City View Building Unit 13

Corner of Pasteur and Freud Street WINDHOEK, NAMIBIA admin@reconafrica.com

### PROPONENT OVERSEAS ADDRESS

Berkeley Square House, Berkeley Square London UK W1J 6BD UNITED KINGDOM admin@reconafrica.com Phone: +44 7748 354 555

### ENVIRONMENTAL CONSULTANTS

Risk-Based Solutions (RBS) CC (Consulting Arm of Foresight Group Namibia (FGN) (Pty) Ltd) 41 Feld Street Ausspannplatz Cnr of Lazarett and Feld Street P. O. Box 1839, WINDHOEK, NAMIBIA Tel: +264 - 61- 306058; FaxMail: +264-886561821 Mobile: +264-811413229 /812772546; Email: smwiya@rbs.com.na Global Office / URL: www.rbs.com.na

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) Dr. Sindila Mwiya (PhD, PG Cert, MPhil, BEng (Hons), Pr Eng)

**CITATION:** *Risk-Based Solutions (RBS), 2019.* Environmental Impact Assessment (EIA) Report, Vol. 2 of 3 Report to Support the Application for Environmental Clearance Certificate (ECC) for the Proposed Petroleum Exploration Operations (Drilling of Stratigraphic Wells) in Petroleum Exploration License (PEL) 73 Covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821, Etosha Basin, Kavango West and East Regions, Northern Namibia.

Final EIA Report Vol. 2 of 3

### STATEMENT OF QUALIFICATIONS / SUMMARY CV /PROFILE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) – DR. SINDILA MWIYA

Dr. Sindila Mwiya has more than eighteen (18) years of direct technical industry experience in Environmental Assessment (SEA, EIA, EMP, EMS), Energy (Renewable and Non-renewable energy sources), onshore and offshore resources (minerals, oil, gas and water) exploration / prospecting, extraction and utilisation, covering general and specialist technical exploration and production support, Health, Safety and Environment (HSE) permitting for Geophysical Surveys such as 2D and 3D Seismic and Gravity Surveys for mining and petroleum (oil and gas) operations support, through to engineering planning, layout, designing, logistical support, recovery, production / operations, compliance monitoring, rehabilitation, closure and aftercare projects lifecycles.

Through his companies, Risk-Based Solutions (RBS) and Foresight Group Namibia (FGN) (Pty) Ltd, which he founded, he has undertaken more than 200 projects for local, regional (SADC) and international clients. He continue to work for global reputable resources (petroleum and mining / minerals) and energy companies such as BW Offshore (Singapore), Shell Namibia B. V. Limited (Namibia/ the Netherlands), Tullow Oil (UK), Debmarine (DBMN) (Namibia), Reconnaissance Energy Africa Ltd (ReconAfrica) (UK/Canada), Osino Resource Corporation (Canada/Germany/ Namibia), Desert Lion Energy Corporation (Canada/ Australia), Petrobras Oil and Gas (Brazil) / BP (UK), REPSOL (Spain), ACREP (Namibia/Angola), Preview Energy Resources (UK), HRT Africa (Brazil / USA), Chariot Oil and Gas Exploration (UK), Serica Energy (UK), Eco (Atlantic) Oil and Gas (Canada / USA), ION GeoVentures (USA), PGS UK Exploration (UK), TGS-Nopec (UK), Maurel & Prom (France), GeoPartners (UK), PetroSA Equatorial Guinea (South Africa / Equatorial Guinea), Preview Energy Resources (Namibia / UK), Sintezneftegaz Namibia LTD (Russia), INA Namibia (INA INDUSTRIJA NAFTE d.d) (Croatia), Namibia Underwater Technologies (NUTAM) (Namibia), InnoSun Holding (Pty) Ltd (Namibia / France) and OLC Northern Sun Energy (Pty) Ltd (USA /Namibia). Dr. Sindila Mwiya is highly gualified with extensive experience in petroleum, mining, renewable energy (Solar, Wind, Biomass, Geothermal and Hydropower), Non Renewable energy (Coal, Petroleum, and Natural Gas), applied environmental assessment, management and monitoring (Scoping, EIA, EMP, EMP, EMS) and overall industry specific HSE, cleaner production programmes, geoenvironmental, geological and geotechnical engineering specialist fields.

Dr. Sindila Mwiya has undertaken and continue to undertake and manage high value projects on behalf of global and local clients with the single biggest project executed recently valued at NAD4.9 Billion. Currently, (2019-2021) Dr. Sindila Mwiya is responsible for permitting planning through to completion compliance monitoring for four (4) major upstream petroleum operations valued at NAD4.2 Billion for three (3) of our global clients operating in Namibia and other parts of the World. He continue to worked as an Environmental Assessment Practitioner (EAP), Technical Consultant (RBS / FGN), Project Manager and has worked as a Lecturer (University of Namibia- UNAM), External Examiner/ Moderator (Namibia University of Science and Technology-NUST), National (Namibia) Technical Advisor (Directorate of Environmental Affairs, Ministry of Environment and Tourism / DANIDA – Cleaner Production Component) and Chief Geologist for Engineering and Environment Division, Geological Survey of Namibia, Ministry of Mines and Energy and a Field-Based Geotechnician (Specialised in Magnetics, Seismic, Gravity and Electromagnetics Exploration and Survey Methods) under the Federal Institute for Geoscience and Natural Resources (BGR) German Mineral Exploration Promotion Project to Namibia, Geophysics Division, Geological Survey of Namibia, Ministry of Mines and Energy.

He has supervised and continue to support a number of MScs and PhDs research programmes and has been a reviewer on international, national and regional researches, plans, programmes and projects with the objective to ensure substantial local skills development pivotal to the national socioeconomic development through the promotion of sustainable natural resources coexistence developmental approaches, utilisation, management and for development policies, plans, programmes and projects financed by governments, private investors and donor organisations. Since 2006, he has provided extensive technical support to the Department of Environmental Affairs (DEA), Ministry of Environment and Tourism (MET) through GIZ and continue to play a significant role in the amendments of the Namibian Environmental Management Act, 2007, (Act No. 7 of 2007), preparation of new Strategic Environmental Assessment (SEA) Regulations, preparation of the updated Environmental Impact Assessment (EIA) Regulations as well as the preparation of the new SEA and EIA Guidelines and Procedures all aimed at promoting effective environmental management practices.

Among his academic achievements, Dr Sindila Mwiya is a holder of a PhD (Geoenvironmental Engineering and Artificial Intelligence) – Research Thesis: Development of a Knowledge-Based System Methodology (KBSM) for the Design of Solid Waste Disposal Sites in Arid and Semiarid Environments (Namibia)), MPhil/PG Cert and BEng (Hons) (Engineering Geology and Geotechnics), qualifications from the University of Portsmouth, School of Earth and Environmental Sciences, United Kingdom. During the 2004 Namibia National Science Awards, organised by the Namibian Ministry of Education, and held in Windhoek, Dr. Sindila Mwiya was awarded the Geologist of the Year for 2004, in the professional category. Furthermore, as part of his professional career recognition, Dr. Sindila Mwiya is a life member of the Geological Society of Namibia, Consulting member of the Hydrogeological Society of Namibia and a Professional Engineer registered with the Engineering Council of Namibia.

### WINDHOEK JUNE 2018

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## NON TECHNICAL SUMMARY

#### 1. Background

Reconnaissance Energy Namibia (Pty) Ltd (the proponent) and subsidiary of Reconnaissance Energy Africa Ltd (ReconAfrica) holds 90% interest in the petroleum exploration rights under the Petroleum Exploration License (PEL) No. 73 covering the latitude and longitude degree square Blocks 1719, 1720, 1721, 1819, 1820 and 1821. The remaining 10% is held by National Petroleum Corporation of Namibia (Namcor), a State owned company (Parastatal) with costs carried to the development stage. Reconnaissance Energy Namibia (Pty) Ltd is the operator of the license situated in the Kavango Basin which is the eastern extension of the greater Etosha Basin in northern Namibia and the greater Kalahari Basin of Southern Africa. PEL 73 cover parts of the Kavango West and Kavango East Regions of northern Namibia.

In accordance with the provisions of the Petroleum Agreement (PA) signed between the Ministry of Mines and Energy (MME) representing the Government of the Republic of Namibia (GRN) and Reconnaissance Energy Namibia (Pty) Ltd, Reconnaissance Energy Namibia (Pty) Ltd has committed to undertaking exploration activities including the drilling of multiple stratigraphic wells within the license area in order to evaluate the subsurface geology and petroleum systems with potential for oil and / or natural gas occurrences within the license area. A total of eight (8) potential wells drilling locations were initially identified and only two (2) well locations numbers 5-6 and 6-2 falling within Blocks 1819 and 1820 will initially be drilled. Depending on the results of the proposed two (2) initial wells drilling outcomes, other localities may also be drilled in future.

#### Summary of the Proposed Activities 2.

The company intends to drill two (2) stratigraphic Petroleum (oil and gas) wells and the drilling is scheduled to start in the last guarter (Q4) of 2019 between the months of October and December 2019. The proposed drilling operations will be undertaken using a land-based, drilling rig similar, but bigger than a standard water drilling rig platform. The various components of the rig will be transported to site by a truck and the rig will be built onsite. After drilling completion, the rig will be disassembled and the various components will be packed and transported to the next drilling location or final destination. The likely key sources of negative environmental (physical, biological and socioeconomic/cultural/ archaeological) impacts can be divided into two (2) main categories and these are:

### (1) Routine and physical presence operational activities:

- (i) Pre-construction and drilling requirements;
- (ii) Construction;
- Mobilisation: (iii)
- (iv) Spudding and Conductor casing;
- (v) Drilling surface / intermediate and setting casing and cementing process through up 900 m;
- Drilling and continuous coring from 900 meters (2953') to 1900 meters (6234'); (vi)
- (vii) Drilling below 1900 meters to total depth, estimated at 2500 meters (+/-8202');

- (viii) Plug and abandon hole;
- (ix) Rehabilitate all surface disturbances and clear the site of any debris, and;
- (x) Camp removal, site closure / abandonment.

### (2) Unplanned accidental events:

(i) Major land accidental incidence such as diesel / oil spill / fire / explosion.

A standard single well site for conventional onshore oil or gas drilling will typically affect a surface area measuring 150 m by 150 m. The well site will typically hold the drilling rig and additional equipment along with supervisory accommodation and material storage. Once drilling is completed the affected area will be reclaimed to minimise surface disturbance. To prepare for the drilling operations, the existing access road may require to be upgraded and vegetation around the proposed well sites will be cleared and ground levelled. A grader will be required to upgrade and level the existing tracks in order to accommodate for the transportation of heavy truck-mounted drill rig as well as other supply truck that will be services the operations.

A bulldozer and a grader combined with labour-based manpower where it exists, will be used to create new access roads to the drilling localities and around the actual drilling sites. Careful consideration will be given to the sensitivities of the receiving environment including: not cutting down of larger trees and protected flora as well as being on a look out for possible unexploded ordinances that may be buried. The scale and duration of site preparation is site-specific and may last for few hours to a couple of days.

### 3. Regulatory Requirements

The proposed oil and gas stratigraphic well drilling activities are listed in the Environmental Management Act, 2007 (Act No. 7 of 2007) and Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and cannot be undertaken without an Environmental Clearance Certificate (ECC). The company is required to have undertaken Environmental Assessment (EA) and preparation of the Environmental Scoping, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) reports in order to support the application for ECC. Reconnaissance Energy Namibia (Pty) Ltd as the proponent and operator of the license area has appointed Risk-Based Solutions (RBS) CC as the environmental consultant to apply for the ECC for the proposed drilling operations in PEL 73.

This Environmental Impact Assessment (EIA) Report Vol. 2 of 3 has been prepared by Risk-Based Solutions (RBS) CC on behalf of the proponent in order to fulfil the environmental requirements with respect to the proposed drilling operations in PEL 73. The purpose of this Scoping Report is to identify key environmental issues to be covered in the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP).

## 4. Summary of the Baseline Environment

The general area of PEL 73 comprise sandy terrain with topographic setting averaging around 1115 m above mean sea level with gently adulating and mature forested Kalahari Longitudinal Dune Belts aligned in east west direction. The temperatures are highest on average in November, at above 26°C and the annual rainfall within the PEL 73 is around 588 mm. The rainy season is from November to April. The well locations 5-6 and 6-2 falls in the Ncamangoro and Mashare Constituencies of the Kavango West and East Regions, respectively. Ncamangoro Mashare Constituencies falls within the boundaries of the Mbunza and Sambyu

Traditional Authorities, respectively. Overall, the proposed well locations are situated in a remote and sparsely populated areas with limited skills base. The project area is accessible via the D3425 Gravel Road from Rundu to Ncaute. Alternatively, from Grootfontein along tarred B8 Road to Rundu until the northern fence of the Mangetti National Park boundary and turn right into the straight sandy track linking the D3425 to the B8 tarred Road (4 x 4 Only).

The highest population density in the area is concentrated along the D3425 along the Omatako Ephemeral River Channel. Increasingly, however, forested communal land is also being allocated to the local people on leaseholds who in turn are fencing some of this land making it difficult to access in come area due to the fences. The main economic activities of the area are: Subsistence agriculture, mainly small-scale millet (mahangu) farming, timber harvesting including community forestry resources and tourism. Livelihoods are thus considerably diversified, with residents relying also on wages and salaries, pensions, Government monthly grants and cash remittances. Source of water supply in the project area is groundwater with recharge linked to the Omatako Ephemeral River Channel.

In terms of fauna and flora, the general project is estimated to have at least 67 species of reptile, 32 amphibian, 116 mammal, 210 bird species (breeding residents), at least 107 species of larger trees and shrubs (>1m in height) and up to 111 species of grasses are known to or expected to occur in the general PEL 73 area.

With well know pre-colonial farming settlements with links to historical and modern cultural heritages, both the Kavango East and West Regions and the general surrounding license area is likely to hold archaeological resources. Based on the results of field-based assessment that has been undertaken, the local drilling sites falls within undisturbed forested areas with no signs of historical or modern archaeological / cultural resources.

The over utilisation of the natural resources such as illegal logging, wood and grasses for rural housing and homestead / communal farms fencing, unseasonal and too frequent fires, poaching, subsistence agriculture of slash and burn as well as the clearing for the ever increasing settlements in key habitat areas including pristine forested areas that are now being allocated to the local communities as new leaseholds are some of the biggest problems facing the fauna and flora in the Kavango West and Kavango East Regions.

## 5. Public and Stakeholder Consultation

Public and stakeholder consultations process covering all the Interested and affected Parties (I&APs) were conducted during the months of March and May 2019. Copies of the Environmental Assessment Reports were distributed to the following key the institutional stakeholders including the Offices of the Governors of Kavango West and Kavango East Regions as well as the Ministry of Safety and Security (MSS) in both regions with respect to the assessment of unexploded ordnances around the proposed drilling localities. Well attended public /stakeholder meetings were held in Nkurenkuru, Kavango West Region and Rundu, Kavango East Regions on the 9<sup>th</sup> and 10<sup>th</sup> May 2019 respectively.

Overall, the proposed project activities has received greater positive support from I&APs because if the results of the proposed petroleum drilling operations proves positive, it will tremendous and positively transform the local, regional and national socioeconomic landscapes of Kavango West Region, Kavango East Region and Namibia as whole. As part of the Corporate Social Responsibilities (CSR), it's hereby recommended that the drilling of water boreholes to supply water for the proposed oil and gas drilling operations be considered by Reconnaissance Energy Namibia (Pty) Ltd. The new water boreholes shall be equipped with cattle drinking points and a veterinary vaccination fence and handed over to the Regional Councils on completion of the drilling operation for use by all the local communities. The de-

bushing and widening of the sandy track road linking the D3425 to the B8 tarred Road from Grootfontein to Rundu for the benefits of the wider local rural community shall also be considered if CSR financial resources are available.

In addressing the potential risk for unexploded ordinances around the project area, Reconnaissance Energy Namibia (Pty) Ltd shall prepare detailed maps of the drilling locations areas of interest showing access passing through untouched areas, drilling locations and all supporting areas such as the campsite. The maps shall be provided to the Regional Commander Kavango West Region, Chief Inspector lithete, Namibian Police, Ministry of Safety and Security (MSS) in order for the explosive team to be able to go in field and undertake detailed field-based site-specific surveys of the areas of interest before drilling mobilisation can be implemented. Reconnaissance Energy Namibia (Pty) Ltd exploration team shall accompany the Namibian Police Explosive team when conducting the field-survey in order to make sure that key areas of interest are cleared.

Whenever a project team goes to the field as part of the preparatory, implementation, operation, closure or abandonment the political (Governors and local Councillors) and traditional leaders of the Kavango West and East Regions shall be informed and kept updated on the progress.

### 6. Alternatives and Impact Assessment Results

Alternatives to the proposed project activities have been considered and included: The location of the proposed drilling locations, safety and security requirements, existing supporting infrastructure, land use, visual effects, source of fresh water supply, sources of energy, solid and liquid waste management, sources of labour and the no action / no drilling options. Components of the receiving environment (physical, biological, socioeconomic, cultural and archaeological) that have been evaluated and assessed with respect to the proposed drilling operations have been grouped as follows:

- Physical environment (Water quality, physical infrastructure and resources, air quality, noise and dust, landscape and topography, soil quality, and Climate change influences);
- Biological environment (Habitat, protected areas and resources, flora, fauna and ecosystem functions, services, use values and non-use or passive use), and;
- Socioeconomic, cultural and archaeological environment (Local, regional and national socioeconomic settings, subsistence agriculture, community forestry, tourism and recreation and cultural, biological and archaeological resources).

The following is the summary of the impact assessment results of the key components of the receiving environment:

- 1. Fauna and Flora: Campsite and drilling site physical disturbances, vehicles movements and actual drilling operations may affect the local fauna and the flora (Assessment of negative Impacts localised Low, Significant Impact: Negligible);
- 2. Water Pollutions: In the context of the impact assessment of the risk posed by the proposed oil and gas exploration drilling in the study area, it is concluded that most of the risk categories are *moderate to negligible* if proposed measures are adhered to. However, the risks associated with: aquifer pollution vulnerability, impacts due to contaminated water discharge, impacts due to tank bursts or/and pipe breaks and that associated with impacts due to backwash water have high to moderate impacts with regard to water resources negative impacts in the study area. The exploration hole will

be materially isolated from the rest of its immediate surrounding by cement casing/grouting and properly closed on top; else total plugging of the exploration hole is recommended;

- Noise and Dusts Generation The proposed operations are likely to generate noise and dust from the campsite and drilling site physical disturbances, vehicles movements and actual drilling operations. Vehicle and other related noise will be limited around the operations based with no existing background noises (Assessment of negative Impacts localised Low, Significant Impact: Negligible);
- 4. Air Emissions: The main sources of air emissions are likely to be from combustion fuels from the vehicles, generators, and other equipment, vehicles and fugitive emissions (Assessment of negative Impacts Localised Low, Significant Impact: Negligible);
- 5. Solid Waste management: Although very limited for a very short period of time, various types of wastes are likely to be generated mainly around the proposed campsite and drilling locations. Waste management will not be an issue because necessary facilities and containers for waste management will be provided (*Assessment of negative Impacts Low, Significant Impact: Negligible*);
- 6. Liquid Waste management: Generated mainly around the proposed campsite and drilling locations. Liquid waste management will not be an issue because chemical toilets will be provided (*Assessment of negative Impacts Low, Significant Impact: Negligible*), and;
- 7. General Disturbances / Cultural and Social: Cultural Social issues will need to be considered seriously because the proposed survey area fall largely in communal land with different traditional authorities. However, the actually drilling locations do not have villages close nearby and the actual drilling locations are not fixed and can be shifted as maybe required (*Assessment of negative Impacts Localised Low, Significant Impact: Negligible).*

### 7. Conclusion and Recommendations

The overall significance negative impacts that the proposed project activities will have on the receiving environmental will be localised, temporally for the duration of the drilling operations and will be of low significance without mitigations and negligible with mitigations.

Based on the findings of this Environmental Assessment covering Environmental Scoping and Environmental Impact Assessment (EIA), it's hereby recommended that the proposed stratigraphic multi-well drilling operations in the PEL No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821 be issued with an new Environmental Clearance Certificate with the following key conditions:

- (i) The proponent must adhere to the provisions of all national legislation, regulations, policies, procedures and permits / authorisation requirements;
- (ii) The proponent shall adhere to all the provisions of the EMP and mitigation measures must be implemented and monitored as detailed in EMP Report Vol. 3 of 3, and;
- (iii) Villages / settlements and communal crop fields shall be avoided when choosing the access route, camp site, water well location and actual drilling location. A distance of 500 m to 1 km is hereby recommended between any local villages / settlements and the campsite / drilling locality.

## 1. BACKGROUND TO THE PROJECT

## 1.1 Introduction

Reconnaissance Energy Namibia (Pty) Ltd (the Proponent and Operator) holds petroleum exploration rights under the Petroleum Exploration License (PEL) No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821. Reconnaissance Energy Namibia (Pty) Ltd, is a subsidiary of Reconnaissance Energy Africa Ltd (ReconAfrica), a public listed company in Canada and United Kingdom. The company intends to drill stratigraphic multi-wells within license area and starting with the two (2) well locations Nos. 5-6 and 6-2 to be drilled to a Total Depth (TD) of about 2500 m (2.5 km).

The overall aim and objective of the proposed stratigraphic multi-wells drilling operations is to study the geology and petroleum systems of the PEL 73 and in particular, the potential for both large scale conventional and non-conventional play types within the Kavango Basin. Depending on the outcomes of the proposed initial drilling operations, additional drilling operations may be undertaken within the license area.

### 1.2 Petroleum Exploration License (PEL) No. 73

ReconAfrica thorugh its wholly owned subsidiary Reconnaissance Energy Namibia (Pty) Ltd owns 90% interest in Petroleum Exploration Licence 73 covering the Kavango Basin in northeast Namibia, pursuant to a Petroleum Agreement signed between the company and the Namibian Ministry of Mines and Energy (MME) representing the State. The National Petroleum Corporation of Namibia (Namcor), a State owned company (Parastatal) holds the remaining 10% interest in the Licence, with its costs carried to the development stage. The Licence has an exploration period comprising three phases, ending 29<sup>th</sup> January 2024, or if extensions are requested and granted, ending 29<sup>th</sup> January 2026.

Following declaration of a commercial discovery, the Petroleum Agreement entitles ReconAfrica to a production licence having a 25 year term. The fiscal terms of the Petroleum Agreement call for a 5% royalty, and an additional profits tax that applies late in the life of a producing field. ReconAfrica's Namibian subsidiary, Reconnaissance Energy Namibia (Pty) Ltd, is required to pay Namibian corporate income tax of 35%.

## **1.3 Project Location**

The exploration licence covers an area of approximately 25,341.33 sq km (6.3 million acres), and based on commercial success. PEL No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821 falls within the Kavango Basin forming part of the greater Etosha Basin of northern Namibia and Kalahari Basin of Southern Africa (Figs. 1.1 -1.3). PEL 73 is situated in Kavango West and East Regions of northern Namibia (Figs. 1.3 and 1.4). A total of eight (8) potential well drilling locations have identified in Blocks 1819 and 1820 but only two (2) locations (Wells locations 5-6 and 6-2) will be drilled first to be followed by additional drilling if the initial results proves positive (Fig. 1.5).

The proposed well drilling locations 5-6 and 6-2 falls in the Ncamangoro and Mashare Constituencies of the Kavango West and East Regions, respectively (Fig. 1.5). Ncamangoro Mashare Constituencies falls within the boundaries of the Mbunza and Sambyu Traditional Authorities, respectively.

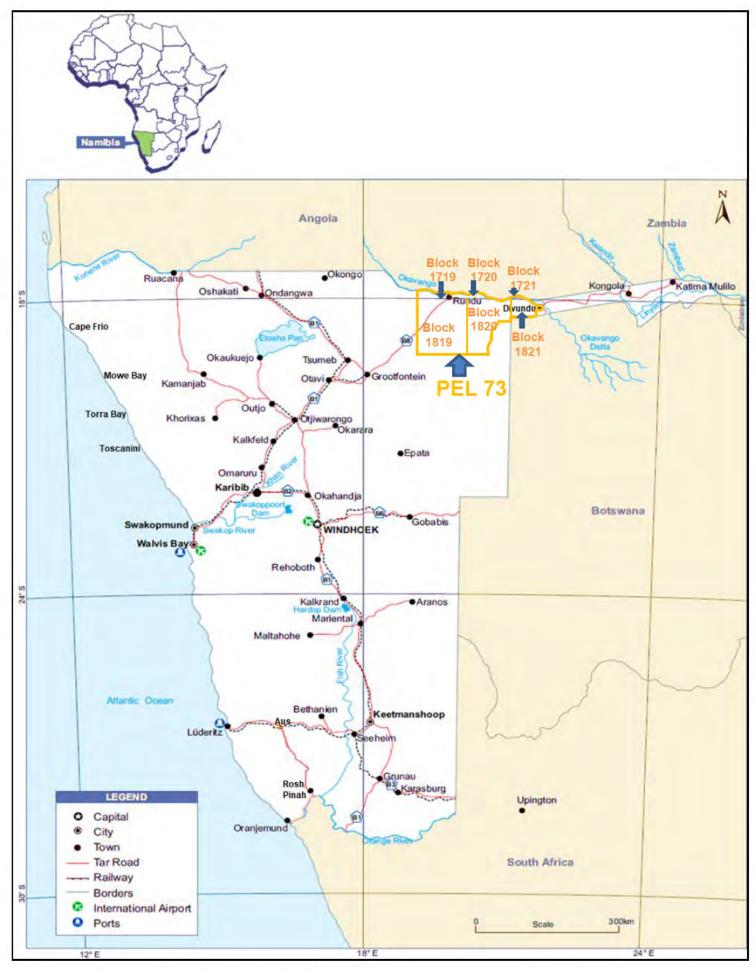
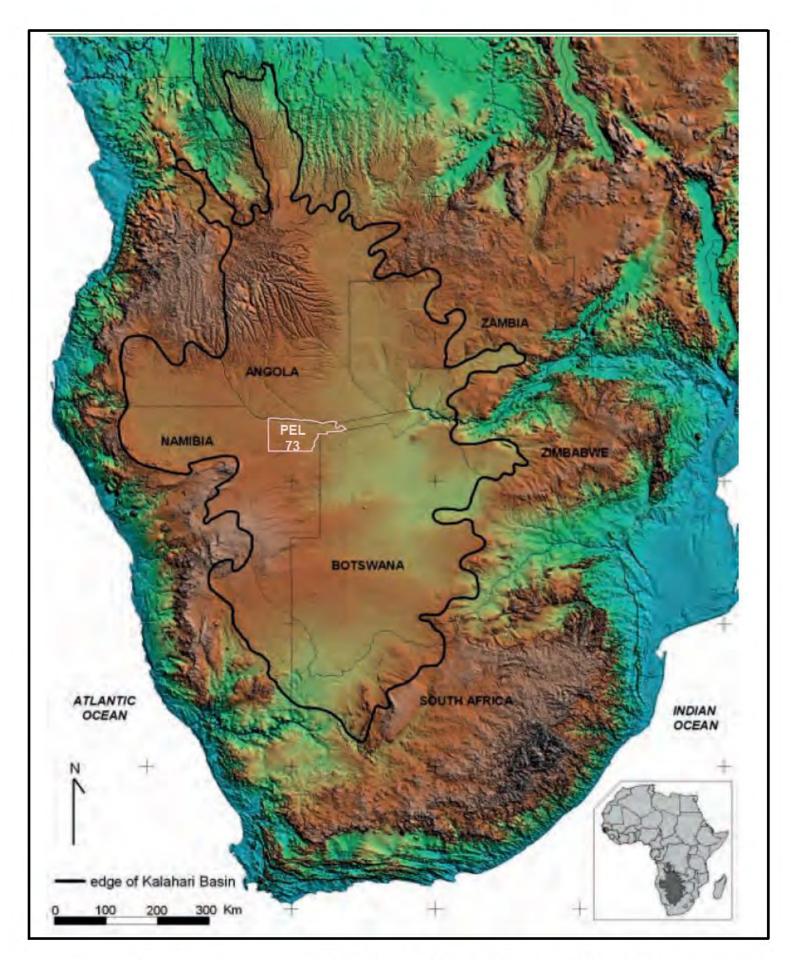


Figure 1.1: Regional location of PEL No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821 (Source: Risk-Based Solutions, 2015).



## Figure 1.2: Lateral extent of Kalahari Group sediments (Source: Haddon, 2005)

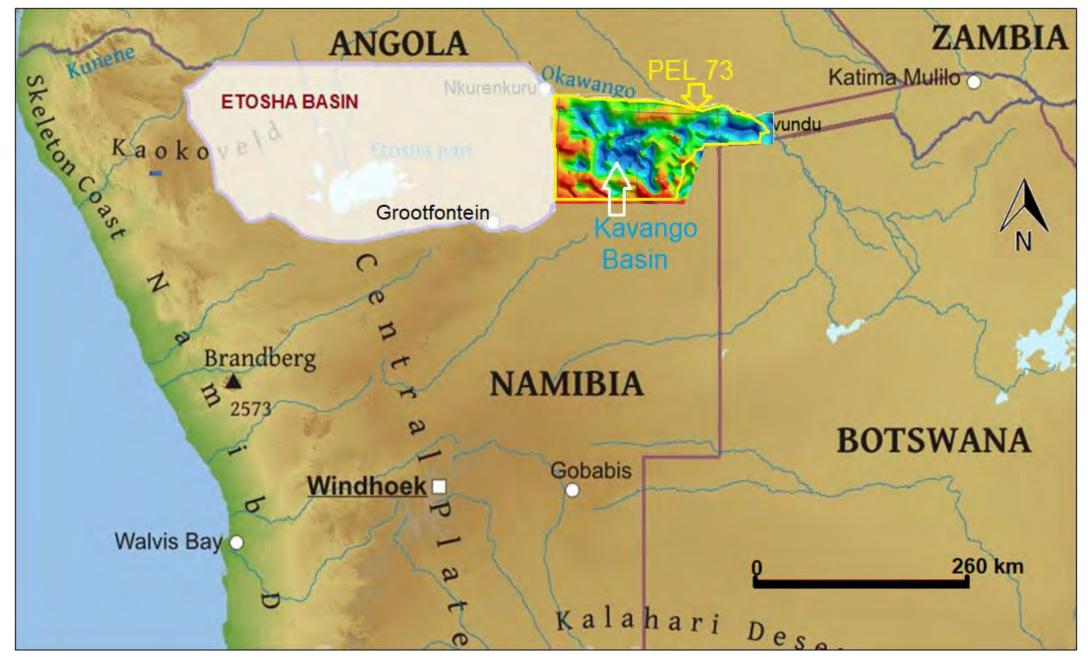


Figure 1.3: The Kavango Basin in north-eastern Namibia showing the location of the PEL 73 covering 1719, 1720, 1721, 1819, 1820 and 1821 (Source: www.freeworldmaps.net).

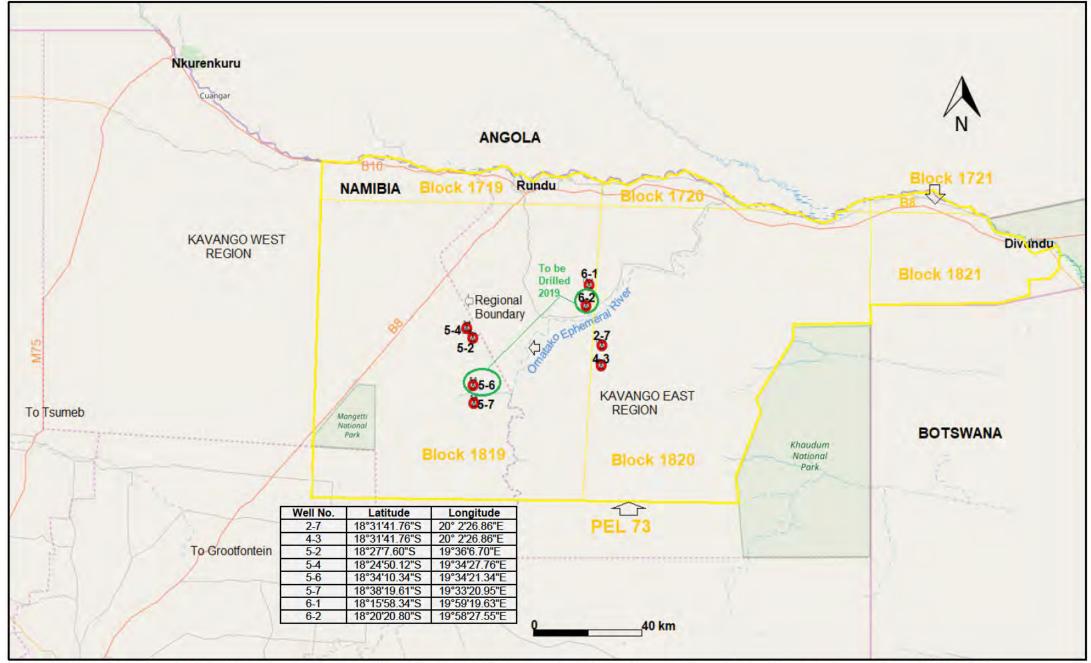


Figure 1.4: Kavango West and Kavango East Regional boundary and the wells locations (Data Source: <u>www.mme.gov.na</u> and Reconnaissance Energy Namibia, 2019).

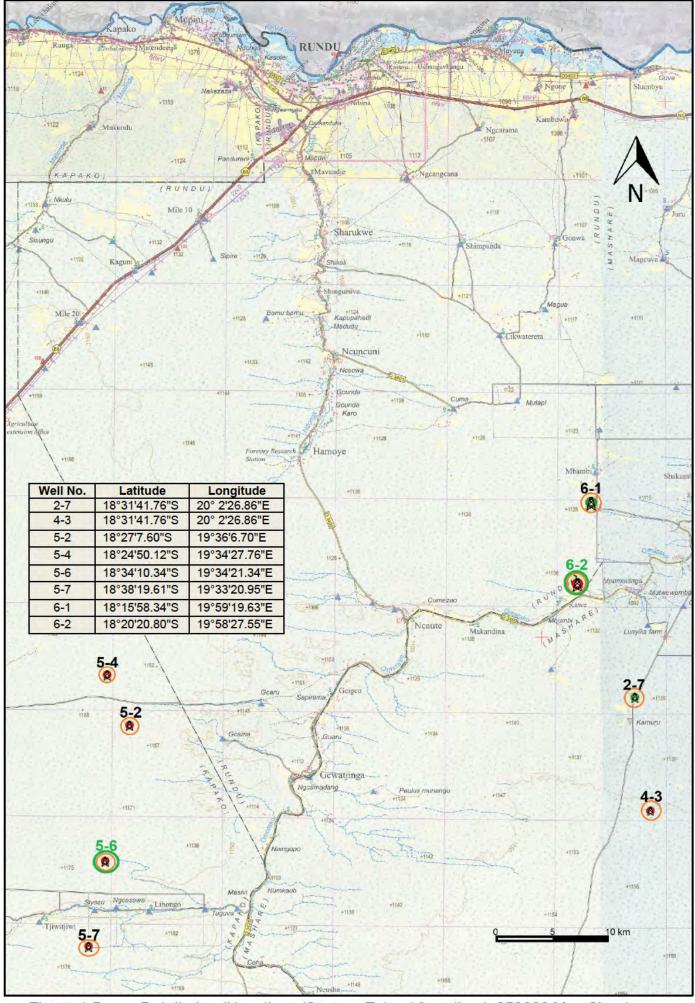


Figure 1.5 Detailed well locations (Source: Extract from the 1: 250000 Map Sheet, Namibia Survey General, 2002).

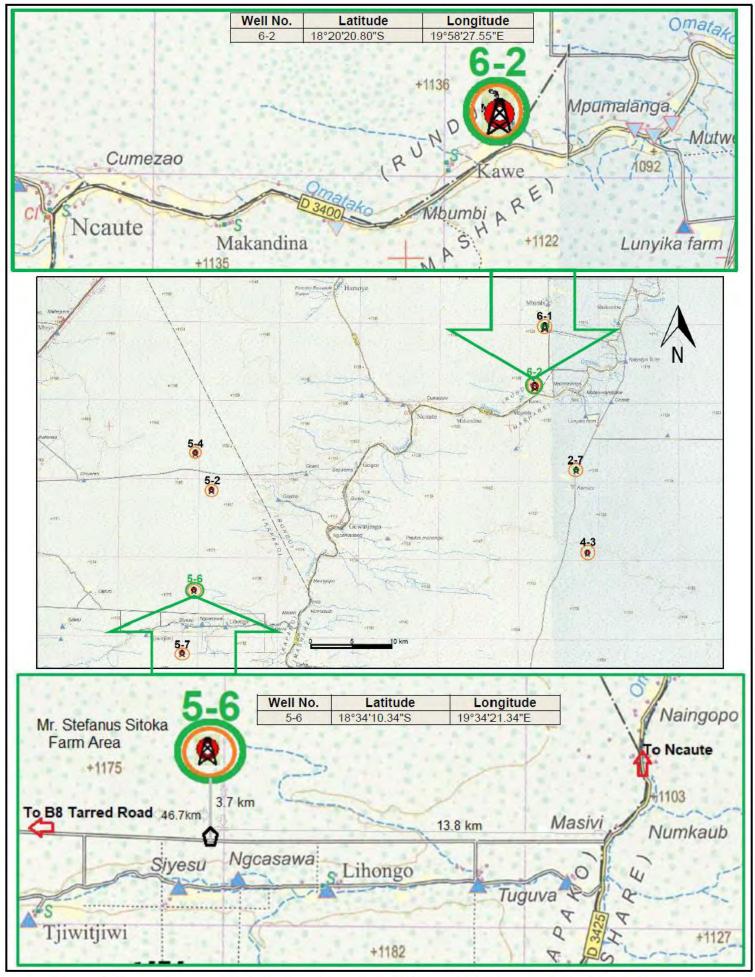


Figure 1.6 Enlarged detailed well locations 5-6 and 6-2 (Source: Extract from the 1: 250000 Map Sheet, Namibia Survey General, 2002).

# **1.4 Access to the Drilling Locations 6-2 and 5-6**

## 1.4.1 Overview

The following is the summary of the local access to the two (2) initial targeted drilling locations 6-2 and 5-6 as shown in Figs. 1.6 and 1.7):

(i) The drilling location 6-2: From Grootfontein along the B8 tarred road to Rundu drive for 253 km (2.5 km before the turn-off from the B8 into the Town of Rundu). Turn right into the D3425 gravel road to Ncaute which is 55.4 km away (Plate 1.1). Just before Ncaute settlement turn left into the excellent gravel road D3400 towards Makandena for 18 km (Plates 1.2 - 1.4). There is an existing 500 m long access track coming off the D3400 road (Plate 1.5 and Figs. 1.6 and 1.7). The drilling location is situated about 500 m to the north off the D3400 road (Plate 1.6).

**Alternatively,** from Grootfontein along tarred B8 Road to Rundu, drive for 156 km until the northern fence of the Mangetti National Park boundary (Fig. 1.7). Turn right into the straight sandy track parallel to the Park boundary fence and drive for 61 km along this track linking the D3425 to the B8 tarred Road from Grootfontein to Rundu to the location 18° 36" 08.51" S, 19° 42" 02.69" E and turn left at this location into D3425 road and drive for 35 km to Ncaute following the Omatako Ephemeral River Channel (Plates 1.7-1.9 and Figs. 1.6 and 1.7). Just after Ncaute settlement, turn right into the excellent gravel road D3400 towards Makandena for 18 km. The drilling location is situated about 500 m to the north off the D3400 road with an existing sandy track coming off the D3400 gravel road (Plate 1.6 and Figs. 1.6 and 1.7);

(ii) The drilling location 5-6: From Grootfontein along the B8 tarred road to Rundu drive for 253 km (2.5 km before the turn-off from the B8 into the Town of Rundu) (Fig. 1.7). Turn right into the D3425 gravel road to Ncaute which is 55.4 km away (Plates 1.1 and 1.2). Along the D3425 road from Ncaute following the Omatako Ephemeral River Channel, drive for 35 km up to location 18° 36" 08.51" S, 19° 42" 02.69" E right turn. Turn right into the straight sandy track linking the D3425 to the B8 tarred Road from Grootfontein to Rundu (Plates 1.7 -1.9). Drive for 13.8 km to the location 18° 36" 07.41" S, 19° 34" 13.31" E and turn right at this location into a newly cleared private farm access of Mr. Stefanus Sitoka (Plates 1.10 - 1.12 and Figs. 1.6 and 1.7). The drilling location area 5-6 is about 3.7 km from this junction towards the north (Plate 1.13).

**Alternatively,** from Grootfontein along tarred B8 Road to Rundu, drive for 156 km until the northern fence of the Mangetti National Park boundary (Plate 1.9 and Fig. 1.7). Turn right into the straight sandy track parallel to the Park boundary fence and drive for 46.7 km along this track linking the D3425 to the B8 tarred Road from Grootfontein to Rundu to the location 18° 36" 07.41" S, 19° 34" 13.31" E, elevation 1181mamsl and turn north (left) at this location into a newly cleared private farm access of Mr. Stefanus Sitoka (Plates 10 -12 and Figs. 1.6 and 1.7). The drilling location area 5-6 is about 3.7 km from this junction towards the north (Plate 1.13).

## 1.4.2 Accessibility Challenges

Access challenges including heavy sandy terrain, thick bushes (Plates 1.14 -1.16) and potential for extremely slippery and muddy D3425 road during the rainy season (**December – March**) on certain sections of the 35 km stretch between Ncaute and the location 18° 36" 08.51" S, 19° 42" 02.69" E, along the Omatako Ephemeral River Channel (Plates 1.17 and 1.18).

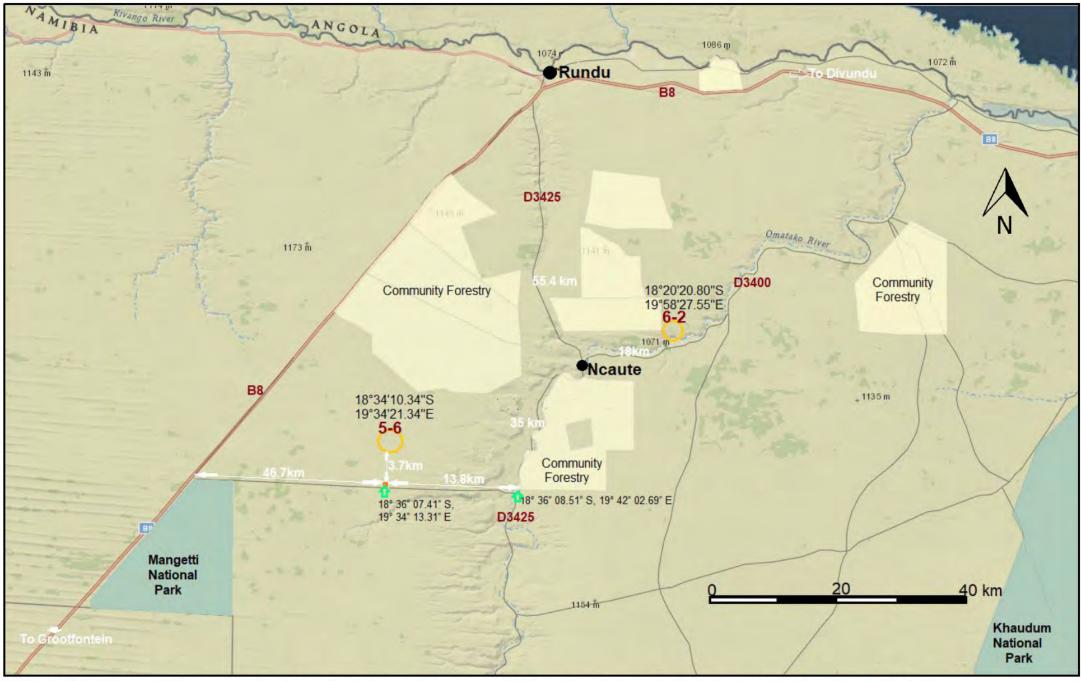


Figure 1.7 Access to the drilling locations 5-6 and 6-2 (Sources: <u>www.kavangozambezi.org/en/-</u> arcgis Accessed, March 2019).



Plate 1.1: The D3425 gravel road from Rundu to Ncaute which is 55.4 km away.



Plate 1.2: The settlement of Ncaute.



Plate 1.3: The D3400 18 km towards Makandena to the well location 6-2.



Plate 1.4: The nearest village / settlement to the well location 6-2.



Plate 1.5: Sandy access to the well location 6-2 coming off the D3400 road.



Plate 1.6: General view around the well location 6-2 showing plenty of low vegetation/ openings for a campsite or drilling location without cutting down the big trees.



Plate 1.7: The Omatako Ephemeral River Channel along the D3425 road from Ncaute to the well location 5-6.



Plate 1.8: The location 18° 36" 08.51" S, 19° 42" 02.69" E, a key turn to the well location 5-6 into the straight sandy track linking the D3425 to the B8 tarred Road from Grootfontein to Rundu. This turn is 35 km from Ncaute along the D3425 road.



Plate 1.9: The straight sandy track to the well location 5-6 linking the D3425 to the B8 tarred Road from Grootfontein to Rundu.



Plate 1.10: Location 18° 36" 07.41" S, 19° 34" 13.31" E, the key turning point from the well No. 5-6 location area through the newly cleared private farm access of Mr. Stefanus Sitoka.



Plate 1.11: Newly cleared private farm access by Mr. Stefanus Sitoka towards the well location 5-6.



Plate 1.12: Existing campsite by Mr. Stefanus Sitoka south of the general well location 5-6 area.



Plate 1.13: General view around well No. 5-6 location area showing plenty of low vegetation/ openings for a campsite or drilling location without cutting down the big trees.

Plate 1.14: Access challenges including heavy sandy terrain to well 5-6 location.

Plate 1.15: Well 5-6 bush thinking that will require bush clearing and winding of the access.

Plate 1.16: Well 6-2 bush thinking that will require bush clearing and winding of the access.

Plate 1.17: Potential for extremely slippery sections along the D3425 road during the rainy season (December – March) on certain sections of the 35 km stretch between Ncaute and the location 18° 36" 08.51" S, 19° 42" 02.69" E, along the Omatako Ephemeral River Channel.

Plate 1.18: Potential for extremely muddy sections along the D3425 road during the rainy season (December – March) on certain sections of the 35 km stretch between Ncaute and the location 18° 36" 08.51" S, 19° 42" 02.69" E, along the Omatako Ephemeral River Channel.

# 1.5 **Project Motivation**

The Kavango Basin, location of PEL 73, offers both large scale conventional and nonconventional potential petroleum (oil and gas) exploration play types. The implementation of the proposed drilling operations is a vital step in trying to understand the geology, stratigraphy and the petroleum system of the basin. The results from the proposed drilling operations will be used to optimise the geological and petroleum system exploration models and assist in evaluating the possibility of the Kavango Basin as well as the greater Etosha Basin being able to contain potential economically viable hydrocarbon reserves.

Finding hydrocarbons (oil and gas) and the development of a successful oil and gas industry in Kavango East or West Regions will have direct and indirect benefits to Namibia and its people and to include the following:

- Increased State income through rights rentals and payment of direct and indirect taxes;
- Increased understanding and knowledge of the Kavango Basin, the greater Etosha and Kalahari Basins petroleum systems of Namibia that could finally led to the discovery of economic oil or gas or both resources that will change the economic landscape of Namibia for benefits of its people;
- Contributions to the national geosciences skills development and knowledge transfer through on job training and short-term job attachments of Namibians;
- Contributions to the short and long-term strategies of attracting investments in the petroleum exploration sector in Namibia through new data acquisition, research, monitoring and management.
- Contribution to the long-term strategy that will promote the coexistence of petroleum operations with other land users in Namibia;
- Direct contributions to the training of young Namibians through contributions to the national training fund;
- Contributions to economic growth through ongoing exploration investments and potential future oil and gas discovery;
- Creation of employment opportunities through short and long-term contacts, and;
- Contribution to the development of local infrastructures to support the ongoing oil and gas exploration opportunities.

The socioeconomic impacts of exploratory drilling will primarily be concerned with provision of temporary employment, supply of services and demands on local infrastructure services. The socioeconomic impacts will be small and short term, since the duration of drilling activities is predicted to be only between 20 - 30 days. However, such impacts will start before mobilisation of equipment to the drilling site occurs, and will continue even after drilling has finished.

Subject to the availability of the local skilled base to support the proposed project activities, safety, commercial and other technical considerations, Reconnaissance Energy Namibia (Pty) Ltd plans to maximise the use of Namibian goods and services providers for the drilling operations, in accordance with its commitment to shared prosperity in its host countries. Many of the jobs associated with oil and gas exploratory drilling require highly specialised skillsets, the majority of which will be supplied by the international drilling companies contracted by

Reconnaissance Energy Namibia (Pty) Ltd. Nonetheless, as a company committed to creating shared prosperity in its host countries, Reconnaissance Energy Namibia (Pty) Ltd is seeking to maximise the employment and development opportunities of suitably-qualified Namibian personnel and services providers wherever possible.

# **1.6 Project Spatial Extent and Scope of the Assessment**

The spatial scope of the proposed drilling operations covers the following locations:

- Drilling locations immediate impact zones: The area likely to be directly influenced by the drilling activities at the well location and includes: a radius of 150 m site operational areas, campsite, material storage and all the support services and equipment, and;
- Drilling location broader impact zone including the access road and all the surrounding socioeconomic zones of the local constituency / communal area, regional (Kavango East and West Regions) and national (Namibia) likely to be positively or negatively affected by the proposed drilling operations and logistics.

# **1.7 Summary of EIA Approach and Methodology**

## **1.7.1 Overview of the EIA Methodology**

The Environmental Assessment process inclusive of all the specialist studies was undertaken in accordance with the provisions of the Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991) as amended, the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and the Environmental Management Act, 2007, (Act No. 7 of 2007) as shown in Fig. 1.8.

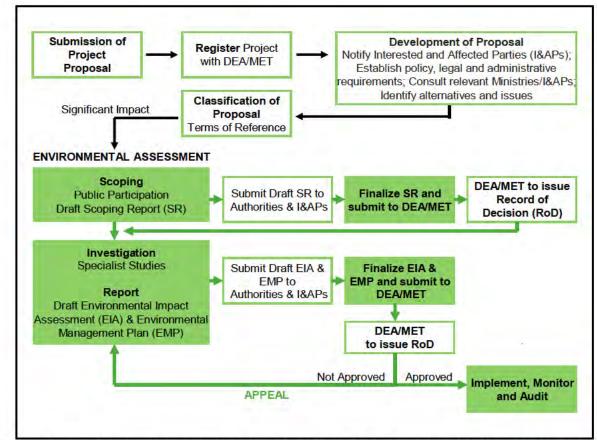
The assessment process also took into considerations Reconnaissance Energy Namibia (Pty) Ltd corporate governance requirements as well as all other relevant Namibian laws, regional (Southern Africa Development Community – SADC) and international environmental and petroleum exploration protocols, standards and practices applicable for onshore oil and gas well drilling operations.

## 1.7.2 Summary EIA Terms of Reference (ToR)

Summary of the proposed activities, alternatives and key issues considered during the Environmental Assessment (EA) process are shown Table 1.1 with more details provided in Annex 1 (Scoping Report).

The EIA and EMP process was performed with reasonable skill, care and diligence in accordance with professional standards and practices existing at the date of performance of the assessment and that the guidelines, methods and techniques used and applied in this study conformed to the national regulatory requirements, process and specifications in Namibia and in particular as required by Ministry of Mines and Energy (MME), Ministry of Environment and Tourism (MET) and the client (Proponent).

The preparation of the EIA and EMP reports was undertaken in line with the January 2015 MET Environmental Assessment Reporting Guideline.



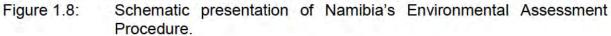


 Table 1.1:
 Summary of the proposed activities, alternatives and key issues considered during the Environmental Assessment (EA) process covering EIA and EIA.

PROPOSED PROJECT ACTIVITIES		ALTERNATIVES CONSIDERED	KEY ISSUES TO BE EVALUATED AND ASSESSED WITH ENVIRONMENTAL MANAGEMENT PLAN (EMP) / MITIGATION MEASURES PREPARED		
1. 2.	Pre-construction and drilling requirements Construction phase	<ul> <li>Drilling locations: Alternative locations have been identified and out of the eight (8) sites initially</li> </ul>	Potential land use conflicts / opportunities for coexistence between proposed exploration and other existing land uses such as agriculture community forestry, timber harvesting conservation and tourism		
3. 4. 5.	Mobilisation Spudding and Conductor casing Drilling surface / intermediate and setting casing and cementing	selected, only two (2) will be drilling for now. Additionally, the locations o each of the two (2) wells to be drilling can also be moved around an event tha	Physical Environment	<ol> <li>Water quality</li> <li>Physical infrastructure and resources</li> <li>Air quality, noise and dust</li> <li>Landscape and topography</li> <li>Soil quality</li> <li>Climate change influences.</li> </ol>	
6.	process through up 900 m Drilling and continuous coring from 900 meters (2953') to 1900 meters (6234')	<ul> <li>site-specific location is not environmentally favourable;</li> <li>(ii) Other Alternative: Water supply options including the use of existing bore ore drilling of new boreholes</li> </ul>		<ol> <li>Habitat</li> <li>Protected areas and resources</li> <li>Flora</li> <li>Fauna</li> <li>Ecosystem functions, services, use values and non-use or passive use.</li> </ol>	
7. 8. 9.	Drilling below 1900 meters to total depth, estimated at 2500 meters (+/-8202') Plug and abandon hole Rehabilitate all surface	<ul> <li>dniling of new boreholes that can later be handed over to the local community. Considerations for other land uses opportunities such as agriculture, timber harvesting, conservation and tourism have also been evaluated</li> <li>(iii) Ecosystem Function (What the Ecosystem Does</li> <li>(iv) Ecosystem Services</li> <li>(v) Use Values</li> <li>(vi) Non-Use, or Passive Use</li> <li>(vii) The No-Action Alternative</li> </ul>	Socioeconomic, cultural and archaeological environment	<ol> <li>Local, regional and national socioeconomic settings</li> <li>Subsistence agriculture</li> <li>Community forestry</li> <li>Tourism and recreation</li> <li>Cultural, biological and archaeological resources</li> </ol>	
10. 11.	disturbances and clear the site of any debris Camp removal, site closure / abandonment, and; Major land accidental incidence such as diesel / oil spill/ fire / explosion		Environmental Management Plan (EMP) Providing Mitigation Measures and Monitoring Plan	<ul> <li>Mitigation shall focus on the following in order of preference:</li> <li>1. Enhancement, e.g. provision of new habitats;</li> <li>2. Avoidance, e.g. alternative / sensitive design to avoid effects on ecological receptors;</li> <li>3. Reduction, e.g. limitation of effects on receptors through design changes; and</li> <li>4. Compensation, e.g. community benefits such as a water well being provided.</li> </ul>	

PEL No. 70 Blocks 1719, 1720, 1721, 1819, 1820 and 1821 A-051

## **1.7.3 Summary of Key Environmental Assessment Steps**

In accordance with the provisions of the EIA Regulations, 2012, the key assessment steps are summarised in Fig. 1.8. A detailed outline of the methodology and approach is provided in the Scoping Report (Annex 1).

The following is the summary of the key environmental assessment steps:

- (i) Project screening process was undertaken in November December 2018;
- (ii) A Draft Scoping Report prepared was prepared in January March 2019 and released for public consultation March 2019 (Annex 1);
- (iii) The project was registered with the Environmental Commissioner through the submission of the Draft Scoping Report through the Ministry of Mines and Energy (Competent Authority) on the 3<sup>rd</sup> April 2019;
- (iv) Specialist studies (Flora, Fauna, Water, Socioeconomic and Archaeology) implemented in November 2018 March 2019;
- (v) Public and stakeholder consultations process including publishing of notices in local newspapers was undertaken in May 2019. Additionally letters were send to the Kavango West and Kavango East Regional Councils as well as to the Police Explosive Units in Kavango West and East Regions with respect to advice on possibility of unexploded ordinances at the drilling localities;
- (vi) Additional local consultation outreach process were undertaken through the Offices of Governors for Kavango West and Kavango East Regions;
- (vii) Well attended public /stakeholder meetings were scheduled in Nkurenkuru and Rundu on the 9<sup>th</sup> and 10th May 2019 respectively;
- (viii) An approval of the project Scoping Report was issued by the Environmental Commissioner in the Ministry of Environment and Tourism (MET) dated 27<sup>th</sup> May 2019 (Fig. 1.9);
- (ix) Finalised the preparation of the Scoping report and prepared the Draft EIA and EMP Reports –May June 2019;
- (x) Comments and inputs from the public and stakeholder consultations used to finalise the Draft EIA and EMP Reports June 2019, and;
- (xi) The final EIA and EMP reports used to support the application for Environmental Clearance Certificate (ECC) for the proposed petroleum (Oil and Gas) exploration operations (drilling of multiple stratigraphic wells) in the Petroleum Exploration License (PEL) No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821 in Kavango Basin;
- (xii) The ECC application to be submitted to the Office Environmental Commissioner through the Ministry of Mines and Energy (Competent Authority) **June 2019**.



**MINISTRY OF ENVIRONMENT AND TOURISM** 

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21 May 2019

### OFFICE OF THE ENVIRONMENTAL COMMISSIONER

Dr. Sindila Mwiya The Environmental Assessment Practitioner Risk Based Solutions CC P. O. Box 1839 Windhoek

Dear Sir,

SUBJECT: DRAFT ENVIRONMENTAL SCOPING REPORT VOL 10F 3 TO SUPPORT THE NOTIFICATION FOR APPLICATION OF ENVIRONMENTAL CLEARANCE CERTIFICATE PROJECT REGISTRATION FOR THE PROPOSED PETROLEUM (OIL AND GAS) EXPLORATION OPERATION LICENSE (PEL) 73 COVERING BLOCKS 1719, 1720, 1721, 1819, 1820 & 1821 ETOSHA BASIN, KAVANGO WEST AND EAST REGIONS, NORTHERN NAMIBIA

The above subject bear reference

This letter serve to acknowledge receipt of your draft Scoping report, dated 3 April 2018. Kindly, proceed with the full Environmental Impact Assessment report and Environmental Management Plan (EMP) which will form the basis upon which an environmental clearance certificate for the project will be issued.

Yours sincerely

Fredrick Mupoti Sikabongo DEPUTY ENVIRONMENTAL COMMISSIONER

"Stop the poaching of our rhinos"

All official correspondence must be addressed to the Permanent Secretary

Figure 1.9: Approval of the project Scoping Report issued by the Environmental Commissioner in the Ministry of Environment and Tourism (MET) dated 27<sup>th</sup> May 2019.

## 1.7.4 Specialist Studies to be undertaken for EIA and EMP

Based on the recommendations of the final Scoping Report, the following desktop specialist studies were undertaken as part of the Environmental Assessment Process leading to the preparation of the EIA and EMP Reports for the proposed two (2) stratigraphic well drilling operations in PEL 73:

- (i) Flora and fauna (Annex 2);
- (ii) Socioeconomic (Annex 3);
- (iii) Archaeology (Annex 4), and;
- (iv) Ground and surface water (Annex 5).

## 1.7.5 EMP Framework

The overall focus of the EMP framework has been to develop appropriate mitigation measures for each activity likely to have significant positive or negative impacts on the physical, biological, socioeconomic, cultural and archaeological receiving environment. The mitigation measures as detailed in the EMP Report Vol. 3 of 3 have focus on the following approach in order of preference:

- (i) Enhancement, e.g. provision of new habitats;
- (ii) Avoidance, e.g. alternative / sensitive design to avoid effects on ecological receptors;
- (iii) Reduction, e.g. limitation of effects on receptors through design changes, and;
- (iv) Compensation, e.g. community benefits such as a water well being provided.

## **1.7.6 Assumptions and Limitations**

The following assumptions and limitations underpins the approach to this EIA study:

- The proposed activities information, plans and appropriate data sets received from the project partners, specialist assessments are assumed to be current and valid at the time of the study;
- The Impact assessment outcomes and recommendations provided in this report are valid for the entire duration of the proposed initial two (2) wells drilling and the subsequent multiple additional wells that may be drilled based on the results / outcomes of the wells 5-6 and 6-2;
- A precautionary approach has been adopted in instances where baseline information was insufficient or unavailable or site-specific information for the additional are not yet available for the multiple wells to be drilled based on the outcomes of the well locations 5-6 and 5-2, and;
- Mandatory timeframes as provided for in the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007) will apply to the review and decision of the EIA and EMP reports by the Environmental Commissioner.

# 2. PROPOSED PROJECT DESCRIPTION

# 2.1 Overview

Reconnaissance Energy Namibia (Pty) Ltd acquired a high resolution geomagnetic survey of the licence area and conducted a detailed analysis of the resulting data and other available data, including reprocessing and reinterpretation of all existing geological and geophysical data. The survey and analysis confirm that the Kavango Basin reaches depths of up to 9.144 km (30,000 feet), under optimal conditions to preserve a thick interval of organic rich marine shales and is anticipated to hold an active petroleum system.

Reconnaissance Energy Namibia (Pty) Ltd intend to drill two (2) petroleum (oil and gas) stratigraphic wells 5-6 and 6-2 in Blocks 1829 and 1820 in PEL 73. The drilling operations are set to start in the last quarter (Q4) of 2019 between the months of October and December 2019. The proposed drilling operations will be undertaken using a land-based rig.

The proposed drilling operations will be undertaken in remote area with challenging logistical arrangements such as the sandy and potential slippery accesses roads (Plates 1.17 and 1.18).

# 2.2 Logistical Arrangements and Site Layout

To prepare for initial drilling, the access road and well site/s may require vegetation clearing, levelling, if necessary, with a bulldozer and/or grader / labour-based option if manpower exists with the local area, with careful consideration given to sensitivities of the receiving environment including: not cutting down of larger trees and protected flora as well as being on a look out for possible unexploded ordinances that may be buried.

The scale and duration of site preparation is site-specific and may last for few hours to a couple of days depending on the length of the access or size of the site to be prepared. A temporary drilling campsite will be established around each of the drilling sites. Fig. 2.1 shows an indicative drill site layout to be established at each of the drilling locations. The campsite will accommodated the drilling crew and equipment.

Energy supply will be provided by diesel generators for the operations requiring higher voltage while solar will be used for lighting and gas for cooking. Chemical toilets will be provided onsite.

A standard single well site for conventional onshore oil or gas drilling will typically affect a surface area measuring 150 metres by 150 metres (Fig. 2.1). The well site will typically hold the drilling rig and additional equipment along with supervisory accommodation and material storage (Fig. 2.1).

Once drilling is completed the affected area will be reclaimed to minimise surface disturbance. Standard drilling supplies such as food and fuel and parts will be obtained in Windhoek or Rundu. Specialised drilling equipment and fluids not available in Namibia will be sourced internationally.

Water supply will either be trucked to the site or obtained from two (2) new boreholes that could to be drilled in the area, one (1) each well location. The boreholes will be drilled an estimated depth of 150 m within the Kalahari Group and polyvinyl chloride (PVC) casing will be installed from 0 - 150 m.

Once the drilling operations have completed the water borehole could be handover to the local community with a condition of being able to utilise the boreholes in the event that additional

drilling operations becomes necessary in the future. The various components of the rig will be transported to site by a truck and the rig will be built onsite. After drilling completion, the campsite and the rig will be disassembled and the various components will be packed and transported to the next drilling location.

# 2.3 Drilling Rig and Well Design

## 2.3.1 **Rig Components and Specifications**

Onshore drilling rigs can vary quite dramatically depending on what environment and formations the rig will be drilling. Originally, the rigs were nothing more than wooden structures in a "v-frame" structure. Today rigs are built out of steel components that would allow it to be moved after the well drilling operations.

Fig. 2.2 shows the key components of a land based rig. Detailed specification of a land-based drilling rig similar to type that will be used for the proposed drilling operations in PEL 73 is shown in Fig. 2.3.

The list characteristics of the drilling fluids to be used for the proposed drilling operations in PEL 73 is shown in Table 2.1.

Material	Concentration, lb/bbl	Function	Property	Units	Range
Bentonite	5 - 10	Viscosity / Filtration Control	Density	S.G.	1.2
Potassium Chloride	5 - 60	Inhibition Source of Kio	Funnel Viscosity	sec/qt	45 -60
Caustic Potash	0.25 - 0.75	Alkalinity	Plastic Viscosity	cP	12 - 25
PHPA	0.5 - 1.5	Encapsulation Agent	Yield Point	lb/100 sq ft	10 - 20
Starch	3 - 6	Filtration Control	6rpm(reading)	n/a	8 - 10
Lignite	2 - 4	HTHP Filtration Control	10s Gel Strength	lb/100 sq ft	6 - 8
Barite	As Needed	Weight Material	10m Gel Strength	lb/100 sq ft	8 - 20
Drill Paper	As Needed	Fluid Loss Control Material	API Filtration	mL/30min	8 - 10
LCM Materials	As Needed	Fluid Loss Control Material	Solids Content	v/v %	<6%

Table 2.1:	Drilling fluids characteristics (Source: Reconnaiss	anco Enorav Namihia 2010)
	Drilling hulus characteristics (Source. Reconnaiss	ance Energy Marninia, $2013$ ).

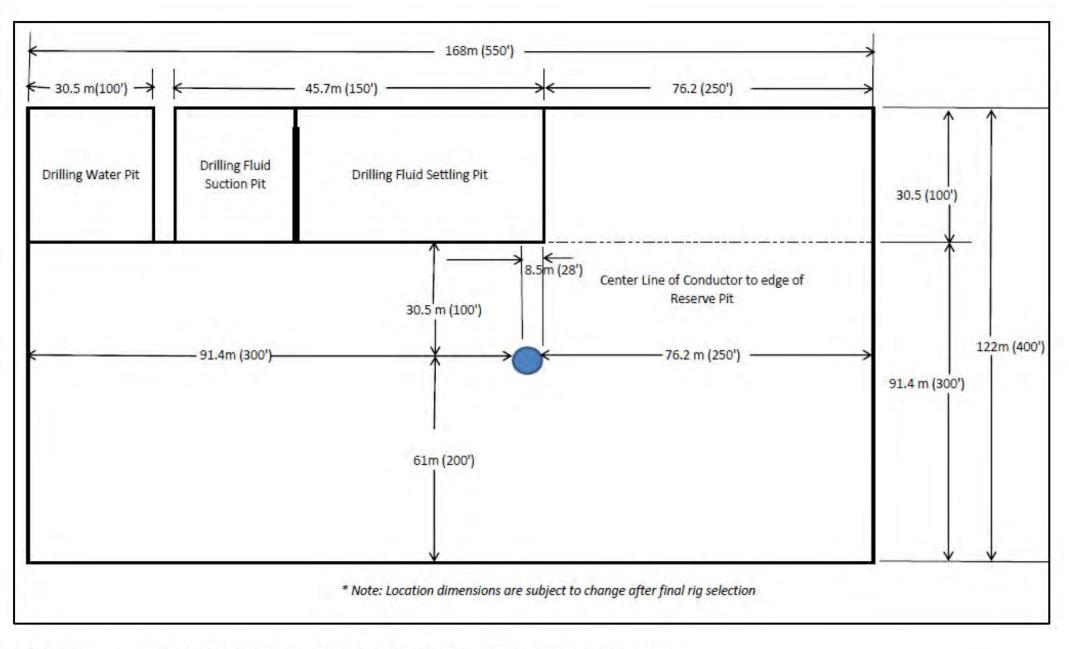


Figure 2.1: Indicative Well site layout (Source: Reconnaissance Energy Namibia, 2019).

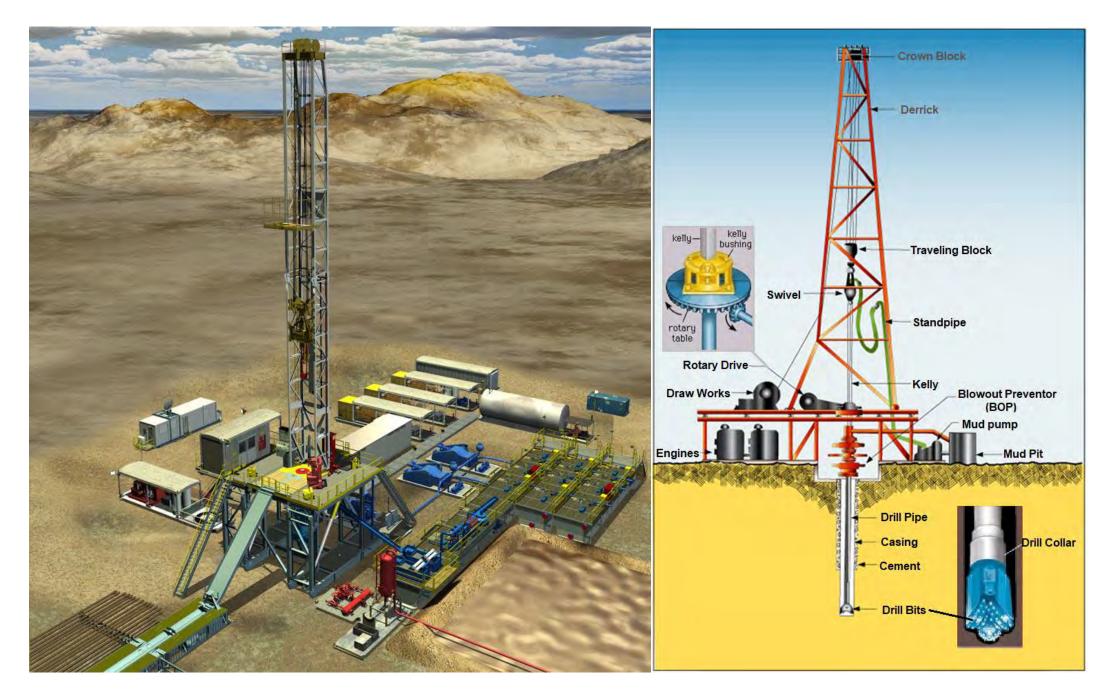


Figure 2.2: Components of an onshore Oil Rig (Source: Modified from www. entranceconsulting.com).

	IPMENT SPECIFICATIONS WEIGHT
Total full weight	46 Tonne (excluding truck)
Load per rear axle	8,5 Tonne (approx.)
	Super single off road or double highway tyres
Tyres	
	NSPORTING DIMENSIONS
Length (excluding truck)	17.2 m
Height retracted	4.2 m
Width	2.5 m
	PERATING DIMENTIONS
Length (excluding truck)	17.2 m
Height retracted	14.0 m
Height extended	23.4 m
Width	2.5 m
Clearance under table	From 1.5 m to 4,1 m with fully extended Outriggers
	ENGINE
1 x Caterpillar C27 ACERT	708kW IND C @ 1800 rpm
Fuel tank capacity	1450 L
	COOLING
3 x Horizontal cooler for hyd	draulic system
1 x Horizontal combined wa	ater, after cooler and diesel overflow
-10° C/14° F to 50° C/122°	F design temperature
	TOP DRIVE
Drive type	Hydraulic
Maximum torque	36 kNm (intermittent)
Rotation brake	For directional drilling
Hydraulic pull-down	200 kN
Hydraulic pull-up	900 kN
Rotary Speed	Variable step less control with torque limiter
Torque & Speed at Gear 3	5 220 Nm (320) bar @ 330 rpm (360 l/min) - nominal
Torque & Speed at Gear 2	20 870 Nm (320) bar @ 82 rpm (360 l/min) - nominal
Torque & Speed at Gear 1	536 000 Nm (320) bar @ 43 rpm (360 l/min) - nominal
Drive through hole	5"
Float Sub & Sub Saver	100mm float
	FEED SYSTEM
Cylinder size	280/200mm
	2 x 4100mm
Feed cylinder stroke	350 bar
Max pressure	900 kN
Max pressure Pull up	900 kN 200 kN
Max pressure Pull up Pull down	200 kN
Feed cylinder stroke Max pressure Pull up Pull down Pullback feed speed	200 kN Cylinder 0,4 m/sec, Top Drive 0,8 m/sec
Max pressure Pull up Pull down	200 kN

	DRILL ROD AND CASING	
Drill rod	Up to range III	
Casing	Up to range III	
Angle drilling	Up to range II	
	MAST	
External Mast	Multiple closed cell rectangular sections	
Internal Mast	Large diameter central section and rails	
Hydraulic Mast erection	Hydraulic Cylinder	
Table opening	27,5" (697 mm)	
Mast slide	2500 mm	
	HYDRAULIC SYSTEM	
System type	Full variable flow hydraulic system with load sensing	
Hydraulic tank	2400 LAUX tank plus 1000 L operating = 3400 L	
Filters	On suction and pressure lines	
1	PIPE HANDLING SYSTEM	
Rotation Angle	0° (parallel to Mast) - 130°	
Mounted	2 Axle Trailer with super tyres	
Operating Cabin	Also remote control of all hydraulic function	
Self alignment and attache	ed to drill Rig with hands off make and brake system	
Full range of screw and w	elded casings up to Range III and 24 "	

1	FLUID INJECTION SYSTEM	
Mission Magnum mud pump	4 x 3 x 13	
FMC piston pump	220 L per min	
Service winch	4 t – 24 m	
Wire line winch	2 t - 1800 m of wire rope at 60 m/min	
Tool lubrication for DTH		
Power break out for brea	king hammer and drill collars	
Power slips		
	CONTROL CABIN	
Rotating Cabin for optima	al view of Mast top and Mast table	
Air-conditioning and sour	ad abatement for operators comfort	
Ergonomic layout of cont	rols and panels	

#### PAINT SPESIFICATIONS

Three coat marine standard system with total of 400 microns DFT



Figure 2.3: Detailed specification of a land-based drilling rig similar to type that will be used for the proposed drilling operations (Source: Reconnaissance Energy Namibia, 2019).

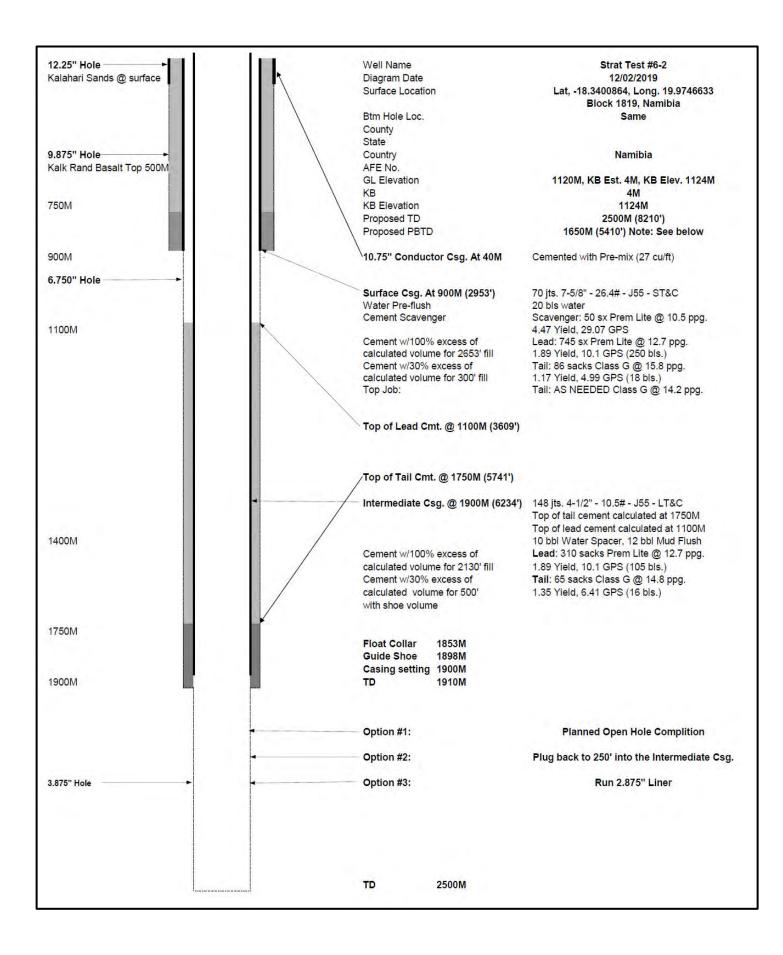
## 2.3.2 Overview of the Well Design and Plan

Reconnaissance Energy Namibia (Pty) Ltd intend to drill the proposed two (2) petroleum (oil and gas) stratigraphic wells Nos. 5-6 and 6-2) in PEL 73 to Total Depth (TD) 2500 km (Fig. 2.4). The estimated lithological depths will vary but expected to be as follows:

- ✤ Kalahari Group +/- 200 to 500 m, and;
- ✤ Basalt formation +/- 600 900 m.

The following is the summary of the well drilling plan:

- (i) Tri cone, Mud Rotary method to be used through the Kalahari Sands formation assuming the following:
  - ✤ Drill 0 60m 18 inch;
  - Place 14 inch Steel casing into hole, and;
  - Cement in place.
- (ii) Continue drilling from 60 to refusal assuming the following plan:
  - Refusal being, the end of Kalahari sand and as far as possible through the basalt formation, and;
  - If the basalt formation is too hard, percussion drilling will be used to continue the hole until it has gone through the basalt formation.
- (ii) Well casing plan:
  - ✤ A 5.5 inch casing to case the hole;
  - Casing to be cemented in place, and;
  - Diverter/Rotation Blow-Out Preventer (BOP) will be installed.
- (iii) Conduct all safety tests, checks to ensure everything is in place before continuing onto the coring part of the hole;
- (iv) Once everything is in place, test, checks completed;
- (v) Start lowering HQ barrel (2.5 inch Core barrel), and;
- (vi) Start Drilling, retrieving core every 6 m to End of Hole (EOH) (drill and bore holes) or Total Depth (TD).



# Figure 2.4: Well design (not to Scale) (Source: Reconnaissance Energy Namibia, 2019).

# 2.4 Stages of the Proposed Drilling Operations

The following is the summary of the key stages of the proposed drilling operations:

## 1. **Pre-Construction and Drilling Requirements:**

- Confirm location and access route, survey from nearest access point to location;
- Stake location to accommodate drilling contractor's foot print;
- Do overhead power line and buried line locates;
- Confirm surface use agreement with surface owner;
- Confirm that all permits, authorisations, consents and certificates such as Environmental Clearance Certificate (ECC), Radioactive Sources Authorisation, Explosive Permits, Oil Spill Contingency Plan (OSCP), Emergency Response Plan (ERP) and permit to drill are in place, and;
- Confirm water source options and method of transport. A back-up source will need to be confirmed.

## 2. Construction Phase:

- Drilling contractor construction equipment;
- Build access road and location per approved drilling permit and environmental requirements using acceptable building materials and practices;
- Dig and fence off reserve and water pits with sheep tight fencing or to local requirements, and;
- Drill water supply well and complete. Have rental diesel powered generator available.

## 3. Mobilisation:

- Drilling contractor drilling rig with support equipment;
- Drilling contractor living quarters and office facilities as required to support drilling personnel and up to 6 operator personnel;
- Mobilise casing, cement and well head equipment to location;
- Hold pre-spud meeting with all personnel, and;
- Notify Reconnaissance management and government of spud date and time.

## 4. Conductor Casing:

 Drill 12.25" (311.15mm) air/rotary to a minimum of 40 meters (+/- 157'). Set and grout 10.75" Overburden Drilling (OD) conductor in place (Figs. 2.5 and 2.6), and;  Install diverter or rotating head system in preparation to drill to bottom of the Etjo formation.

# 5. Drilling surface / intermediate and setting casing and cementing process through up 900 m:

- Pick-up 9.875" (250.825mm) air / mud / rotary surface bit with Bottom Hole Assembly (BHA) as required;
- Have mud loggers rigged up and begin logging at 500 meters;
- Drill to 900 meters (+/-2953'), catch samples every 10 meters;
- Rig-up and run 7.625" Overburden Drilling (OD) casing to within 3 meters (+/-10') of bottom;
- Cement casing per agreed to specifications;
- ✤ After waiting on cement for 6 hrs, cutoff casing and install 3000# wellhead, and;
- Test well head to 100 BAR (1500 PSI).

## 6. Drilling and continuous Coring from 900 meters (2953') to 1900 m (6234'):

- Install Blow-Out Preventer (BOP) and test to 207 Bar (3000 PSI);
- Test casing 70% of manufactures rating or 100 bar whichever is lower;
- Pick-up 171.45 mm (6.75") clean out bit. Drill out cement and 3m new hole;
- Pull Out of Hole (POOH) lay down tools. Strap or count drill pipe on way out of hole to confirm depth;
- Pick-up coring tools with core bit to cut minimum 63.50 m (2.5") core and Run In Hole (RIH);
- Begin coring from 903 meters to +/- 1900 meters;
- Core and retrieve cores as required. Retrieval and storage will be determined by geologist on site. A written procedure will be furnished before coring begins. Catch samples every 3 meters;
- Make wiper or reaming trips as required by hole conditions;
- Pull Out of Hole (POOH), deploy coring tools in preparation to run wire line logs;
- Log per attached logging procedure;
- Rig-up and run 114.3m (4.5") Overburden Drilling (OD) casing;
- Cement casing to agreed specifications;
- Waiting on cement (WOC) 6 hours, and;

✤ Land casing and pack-off as required. Test pack-off to 207 bar (3000 PSI).

## 7. Drilling below 1900 meters to Total Depth (TD) of +/- 2500m (+/-8202'):

- Pick-up 98.425m (3.875") bit and required Bottom Hole Assembly (BHA);
- Run In Hole (RIH) to top of cement;
- Drill ahead from 1900 meters to 2500 meters. Catch samples every 3 m;
- Circulate samples per geologist's instructions;
- Be prepared to trip for core as required. If additional coring is required, do so per on-site geologist's instructions otherwise continue per above;
- ✤ At Total Depth (TD), circulate samples, and;
- Pull Out of Hole (POOH) to run wire line logs according to the logging procedure.

## 8. Plug and Abandon Hole:

- Run In Hole (RIH) open ended to plug and abandonment operations (P&A) hole per attached program;
- Pull Out of Hole (POOH) setting cement plugs per regulatory requirements;
- Cut-off well head. Install dry hole marker per local requirements;
- Back fill cellar and reclaim location as required by surface use agreement or permit requirements, and;
- Rig Down Move Out (RDMO) location.
- 9. Rehabilitate all surface disturbances and clear the site of any debris;
- **10.** Camp removal, site closure / abandonment.

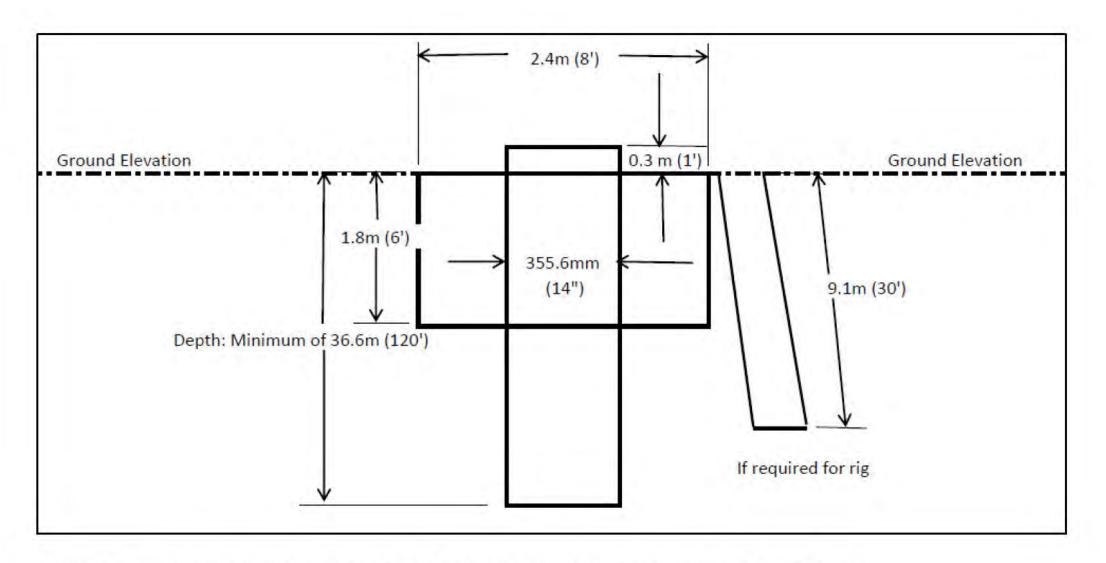


Figure 2.5: Indicative conductor, cellar ring and mouse hole (Source: Reconnaissance Energy Namibia, 2019).

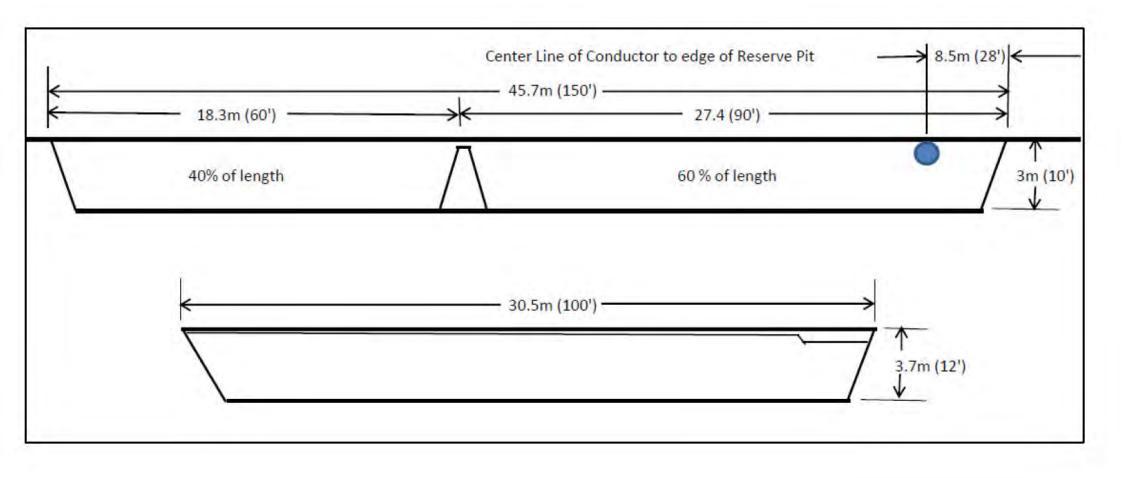


Figure 2.6: Indicative design of the proposed drilling mud reserve pit (Source: Reconnaissance Energy Namibia, 2019).

# 3. REGULATORY FRAMEWORK

# 3.1 Petroleum Exploration and Production Legislation

In accordance with the Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991), and in an effort to promote petroleum exploration activities in Namibia, the Ministry of Mines and Energy (MME) has the mandate to issue three types of licenses namely; Reconnaissance, Exploration and Production Licences. Exploration licence is issued under Section 34 of the Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991), and includes any renewal of such licence. A production licence is issued under Section 50 and includes any renewal of such licence.

# 3.2 Environmental Regulations

Environmental assessment and management in Namibia is governed by the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007). The proposed petroleum exploration activities by Reconnaissance Energy Namibia (Pty) Ltd covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821 falls within the categories of listed activities that cannot be undertaken without an Environmental Clearance Certificate (ECC).

# 3.3 Legislation Register

The following is the summary of the key legislation relevant to the proposed offshore drilling project in PEL 73:

- Petroleum (Exploration and Production) Act, 1991 and Associated Regulations;
- Environmental Management Act, (No. 7 of 2007) and associated EIA Regulations;
- Immigration Control Act 7 of 1993;
- Customs and Excise Act 20 of 1998;
- The Regional Councils Act, 1992, (Act 22 of 1992);
- The Local Authorities Act, 1992, (Act 23 of 1992);
- Hazardous Substances Ordinance 14 of 1974;
- Atmospheric Pollution Prevention Ordinance 11 of 1976;
- Water Act 54 of 1956, Government Gazette No 217 dated 5 April 1962 and Water Resources Management Act, 2004, (Act No. 24 of 2004);
- Atomic Energy and Radiation Protection Act (Act No. 5 of 2005);
- The Nature Conservation Ordinance, Ordinance 4 of 1975, Amendment Act, Act 5 of 1996 and the current draft Parks and Wildlife Management Bill of 2006;
- The Labour Act 2004, (Act 15 of 2004), amended 2010;

- Convention on Biological Diversity ("Biodiversity"), 29 December 1993: Objective: To develop national strategies for the conservation and sustainable use of biological diversity;
- Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES or "Endangered Species"), 1 July 1975: Objective: To protect certain endangered species from over-exploitation by means of a system of import/export permits;
- United Nations Framework Convention on Climate Change ("Climate Change"), 21 March 1994: Objective: To achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system, and;
- Kyoto Protocol to the United Nations Framework Convention on Climate Change ("Climate Change – Kyoto Protocol"), 1 January 1997: Objective: To further reduce greenhouse gas emissions by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries.

## 3.4 Standards and Guidelines

Industrial effluent likely to be generated by the proposed drilling operations activities must comply with provisions of the Government Gazette No 217 dated 5 April 1962 (Table 3.1) while the drinking water quality comparative guideline values are shown in Table 3.2.

Colour, odour and	The effluent shall contain no substan	ce in concentrations capable of producing		
taste	colour, odour or taste			
рН	Between 5.5 and 9.5			
Dissolved oxygen	At least 75% saturation			
Typical faecal coli	No typical faecal coli per 100 ml			
Temperature	Not to exceed 35 °C			
Chemical demand oxygen	Not to exceed 75 mg/l after applying a correction for chloride in the method			
Oxygen absorbed	Not to exceed 10 mg/l			
Total dissolved solids		The TDS shall not have been increased by more than 500 mg/l above that of the		
(TDS)	intake water			
Suspended solids	Not to exceed 25 mg/l			
Sodium (Na)	The Na level shall not have been increased by more than 50 mg/l above that of the intake water			
Soap, oil and grease	Not to exceed 2.5 mg/l			
	Residual chlorine	0,1 mg/l as Cl		
	Free & saline ammonia	10 mg/l as N		
	Arsenic	0,5 mg/l as As		
	Boron	1,0 mg/l as B		
	Hexavalent Cr	0,05 mg/l as Cr		
Other constituents	Total chromium	0,5 mg/l as Cr		
	Copper	1,0 mg/l as Cu		
	Phenolic compounds	0,1 mg/l as phenol		
	Lead	1,0 mg/l as Pb		
	Cyanide and related compounds	0,5 mg/l as CN		
	Sulphides	1,0 mg/l as S		
	Fluorine	1,0 mg/l as F		
	Zinc	5,0 mg/l as Zn		

Table 3.1:R553 Regional Standards for Industrial Effluent, in Government Gazette No<br/>217 dated 5 April 1962.

#### Comparison of selected guideline values for drinking water quality (after Department of Water Affairs, 2001). Table 3.2:

Parameter and Expression of the results			WHO Guidelines for Drinking- Water Quality 2 <sup>nd</sup> edition 1993		Proposed Council Directive of 28 April 1995 (95/C/13- 1/03) EEC	Council Directive of 15 July 1980 relating to he quality intended for human consumption 80/778/EEC		U.S. EPA Drinking water Standards and Health Advisories Table December 1995		Namibia, Department of Water Affairs Guidelines for the evaluation of drinking-water for human consumption with reference to chemical, physical and bacteriological quality July 1991			
			Guide Value		Proposed Parameter Value	Level (GL)	Admissible Concentrati on (MAC)	Contar	aximum ninant Level (MCL)	Group A Excellent Quality	Group B Good Quality	Group C Low Health Risk	Group D Unsuitable
Temperature Hydrogen ion	t pH, 25° C	°C -	R	- <8.0	- 6.5 to 9.5	12 6.5 to	25 10		-	- 6.0 to 9.0	- 5.5 to 9.5	- 4.0 to 11.0	- <4.0 to
concentration Electronic conductivity	EC, 25° C	mS/ m		-	280	8.5 45	-		-	150	300	400	<u>&gt;11.0</u> >400
Total dissolved solids	TDS	mg/l	R	1000	-	-	1500		-	-	-	-	-
Total Hardness	CaCO <sub>3</sub>	mg/l		-	-	-	-		-	300	650	1300	>1300
Aluminium	Al	μg/l	R	200	200	50	200	S	50-200	150	500	1000	>1000
Ammonia	$NH_4^+$	mg/l	R	1.5	0.5	0.05	0.5		-	1.5	2.5	5.0	>5.0
A	N	mg/l	-	1.0	0	0.04	0.4	0	-	1.0	2.0	4.0	>4.0
Antimony	Sb	μg/l	Р	5 10	3	-	10 50	C C	6	50	100 300	200 600	>200
Arsenic Barium	As Ba	µg/l µg/l	Р	700	10	- 100	- 50	C	50 2000	100 500	1000	2000	>600
Berylium	Ве	μg/I μg/I	- '	-	-	-	-	C	4	2	5	10	>10
Bismuth	Bi	μ g/l		-	-	-	-		-	250	500	1000	>1000
Boron	B	μg/l		300	300	1000	-		-	500	2000	4000	>4000
Bromate	BrO <sub>3</sub> -	μg/l		-	10	-	-	Р	10	-		-	-
Bromine	Br	μg/l		-	-	-	-		-	1000	3000	6000	>6000
Cadmium	Cd	μg/l		3	5	-	5	С	5	10	20	40	>40
Calcium	Ca	mg/l		-	-	100	-		-	150	200	400	>400
0	CaCO <sub>3</sub>	mg/l		-	-	250	-		-	375	500	1000	>1000
Cerium	Ce	µg/l	5	-	-	-	-	0	-	1000	2000	4000	>4000
Chloride Chromium	Cl <sup>-</sup> Cr	mg/l µg/l	R P	250 50	- 50	25	- 50	S C	250 100	250 100	600 200	1200 400	>1200 >400
Cobalt	CI	μg/I μg/I	Г	- 50	- 50	-	- 50	C	-	250	500	1000	>1000
Copper after 12	Cu	μg/l	Р	2000		100	-	С	TT##	500	1000	2000	>2000
hours in pipe	04	µ g/l		-	-	3000 <sup>1</sup>	-	S	1000	-	-	-	-
Cyanide	CN <sup>-</sup>	μ g/l		70	50	-	50	С	200	200	300	600	>600
Fluoride	F <sup>-</sup>	mg/l		1.5	1.5	-	at 8 to 12 °C:	С	4	1.5	2.0	3.0	>3.0
		mg/l		-	-	-	1.5 at 25 to 30 °C: 0.7	P,S	2	-	-	-	-
Gold	Au	µ q/l		-	-	-	-		-	2	5	10	>10
Hydrogen sulphide	H <sub>2</sub> S	μ g/l	R	50	-	-	undetectable		-	100	300	600	>600
lodine		μg/l		-	-	-	-		-	500	1000	2000	>2000
Iron	Fe	μg/l	R	300	200	50	200	S	300	100	1000	2000	>2000
Lead	Pb	μg/l		10	10	-	50	С	TT#	50	100	200	>200
Lithium	Li	µg/l		-	-	-	-		-	2500	5000	10000	>10000
Magnesium	Mg CaCO <sub>3</sub>	mg/l		-	-	30 7	50 12		-	70	100 420	200 840	>200 >840
Manganese	Mn	mg/l	Р	- 500	- 50	20	50	S	- 50	290 50	1000	2000	>840
Manganese Mercury	Hg	μg/l μg/l	Г	1	50 1	- 20	1	C	2	5	1000	2000	>2000
Molybdenum	Mo	μg/l		70	-	-	-		-	50	100	200	>200
Nickel	Ni	μg/l		20	20	-	50		-	250	500	1000	>1000
Nitrate*	NO <sub>3</sub> <sup>-</sup>	mg/l	Р	50	50	25	50		45	45	90	180	>180
	Ν	mg/l		-	-	5	11	С	10	10	20	40	>40
Nitrite*	NO <sub>2</sub> -	mg/l		3	0.1	-	0.1	_	3	-	-	-	-
0	N	mg/l		-	-	-		С	1	-	-	-	-
Oxygen, dissolved	O <sub>2</sub>	% sat.		-	50	-	-		-	-	-	-	-
Phosphorus	$P_2O_5$	μg/l		-	-	400	5000		-	-	-	-	-
	PO4 <sup>3-</sup>	μ <u>g/</u> ι μg/l		-	-	300	3350		-	-	-	- 1	-
Potassium	K	mg/l		-	-	10	12		-	200	400	800	>800
Selenium	Se	μg/l		10	10	-	10	С	50	20	50	100	>100
Silver	Ag	μg/l		-	-	-	10	S	100	20	50	100	>100
Sodium	Na 2	mg/l	R	200	-	20	175		-	100	400	800	>800
Sulphate	SO4 <sup>2-</sup>	mg/l	R	250	250	25	250	S	250	200	600	1200	>1200
Tellurium Thallium	Te TI	μg/l μg/l		-	-	-	-	С	- 2	2 5	5 10	10 20	>10 >20
Tin	Sn	μg/i μg/i		-	-	-	-	U	-	5 100	200	400	>20
Titanum	Ti	μg/l		-	-	-	-		-	100	500	1000	>1000
Tungsten	W	μg/l	1	-	-	-	-		-	100	500	1000	>1000
Uranium	U	μ g/l		-	-	-	-	Р	20	1000	4000	8000	>8000
Vanadium	V	μg/l		-	-	-	-		-	250	500	1000	>1000
Zinc after 12 hours	Zn	μg/l	R	3000	-	100	-	S	5000	1000	5000	10000	>10000
in pipe		μg/l		-	-	5000	-		-	-	-	-	-
			P: Prov R: Ma			to con	plaints from		rrent; P: Proporeatment techr				

## 3.5 Summary of the Drilling Permitting Requirements

Based on the analysis of all the key and relevant regulatory systems in Namibia with respect to the proposed drilling operations by in PEL 73, Table 3.3 summarises the likely key and important permits and endorsements that will be required before the proposed drilling can be implemented.

Table 3.3:Summary of the applicable permits, required supporting documents,<br/>authorising institution and applicable legal framework / legislation.

	Type of Permit / Approval	Studies / Report / Documents Required	Authorising / Institution	Legal Framework
1.	Environmental Clearance Certificate (ECC)	Environmental Assessment Study covering Scoping, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP).	Office of the Environmental Commissioner, Ministry of Environment and Tourism (MET)	Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007)
2.	Freshwater Abstraction Including Borehole Drilling and Discharge Permits	Summary Report including boreholes location, volumes of freshwater pumped and wastewater likely to be discharged	Department of Water Affairs (DWA), Ministry of Agriculture, Water and Forestry (MAWF)	Water Act 54 of 1956, Government Gazette No 217 dated 5 April 1962 and Water Resources Management Act, 2004, (Act No. 24 of 2004);
3. 4.	Oil Spill Contingency Plan (OSCP) Emergency Response Plan (ERP)	Oil Spill Contingency Plan (OSCP) Emergency Response Plan (ERP) Report	Approved / Endorsed by the Ministry of Mines and Energy (MME) – Office of the Petroleum Commissioner	Petroleum (Exploration and Production) Act, 1991 and Associated Regulations
5.	Radioactive Authorisation (Import and Export Permits) for the use of radioactive sources for logging	Radiation management Plan (RMP). The RMP must be in the prescribed format (Guide Available and the completion of the application form	Authorisation Issued by the National Radiation Protection Authority (NRPA), Ministry of Health and Social Services (MHSS)	Atomic Energy & Radiation Protection Act (Act No 5 of 2005) and Radiation Protection & Waste Disposal Regulations (No 221 of 2011)
6.	Explosive Permit (Import and Export) of Explosives in Namibia including Use, Store and Transportation	Written application for a permit to import, transport, use and store explosives must be submitted	The Inspector General Explosive Control Division Namibian Police Force, Ministry of Safety and Security (MSS)	Explosives Act, 1956 (Act 26 of 1956, as amended) and Regulations (GNR 1604 of 8 September 1972, as amended)
7.	Drilling Permit /Letter of Consent to Drill	Pre-Drilling Data Pack (PDDP), Basis of Well Design documents, ECC, Approved Oil Spill Contingency Plan (OSCP), Emergency Response Plan (ERP), and all other key supporting Documents and a mandatory Rig inspection	Ministry of Mines and Energy – Office of the Petroleum Commissioner	Petroleum (Exploration and Production) Act, 1991 and Petroleum Regulations as Amended

## 3.6 Corporate Governance

The proponent is fully committed to doing business in compliance with all the applicable national laws, regional (Southern Africa Development Community–SADC) initiatives / protocols and international best practices in line with company's' Code of Business Conduct. The following key corporate governance documents are available from <a href="http://reconafrica.com">http://reconafrica.com</a>.

- Code of Business Conduct and Ethics;
- Corporate Governance Committee Charter;
- Audit Committee Charter;
- Anti-Bribery Policy;
- Disclosure Policy, and;
- Whistle Blower Policy.

# 4. RECEIVING ENVIRONMENT

## 4.1 Overview

The PEL No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821 falls within the Kavango West and East Regions. The general license area is sandy averaging around 1115 m above mean sea level (mamsl) and dominated by gently adulating and mature forested Kalahari Longitudinal Dune Belts aligned in east west direction (Annex 1).

## 4.2 Climate

The license area has a subtropical steppe/ low-latitude semi-arid hot climate (Mendelsohn et al. 2002). Detailed information on the climate setting of the project area is provided in Annex 5. Within the license area, annual temperature may averages 23°C. The temperatures are highest on average in November, at above 26°C. The lowest average temperatures in the year occur in July, when it is around 18 °C. The average annual rainfall within the PEL 73 is around 588 mm with up to 730 mm along the Okavango River.

## 4.3 Fauna and Flora

#### 4.3.1 Overview

A detailed desktop fauna and flora assessment was undertaken as part of the EIA and EMP process in order to assess in detail the biodiversity of the project area (Annex 2). It is estimated that at least 67 species of reptile, 32 amphibian, 116 mammal and 210 bird species (breeding residents) are known to or expected to occur in the general Kavango East and West Regions (Annex 2). It is estimated that at least 107 species of larger trees and shrubs (>1m in height) and up to 111 species of grasses are known to or expected to occur in the general area.

#### 4.3.2 Important Areas (Habitats)

The most important areas in the general area are (Annex 2):

- Perennial Okavango River: The Okavango River is viewed as a site of special ecological importance in Namibia due to its biotic richness, threatened plants and insects (Curtis and Barnard 1998) (Fig. 4.1);
- (ii) Ephemeral Omuramba Omatako: Ephemeral rivers are viewed as sites of special ecological importance in Namibia due to its biotic richness, large mammals, high value for human subsistence and tourism (Curtis and Barnard 1998) (Fig. 4.1);
- (iii) Ephemeral Pans: Ephemeral pans are viewed as sites of special ecological importance in Namibia due to its biotric richness, endemic crustacean, Red Data birds, and habitat/resource for humans and wildlife (Curtis and Barnard 1998). Although important larger pans such as Nyae Nyae, etc. fall outside the PEL 73 area, all other smaller pans are also viewed as important habitat;
- (iv) Kaudum National Park: The Kaudum NP falls within the North-Eastern Kalahari Woodlands vegetation type with omurambas which act as ideal routes for wildlife. Dominant trees include: Acacia erioloba, Adansonia digitata, Baikiaea plurijuga, Combretum imberbe, Guibourtia coleosperma and Spirostachys africana. Important wildlife includes: African wild dog, leopard, lion, spotted hyaena, side-

striped jackal, elephant, giraffe, blue wildebeest, eland, kudu, oryx, red hartebeest reedbuck, roan, tsessebe and warthog. Important birds include: Abdim's stork, African golden oriole, African hobby falcon, Bradfield's hornbill, ground hornbill, lesser spotted eagle, racket-tailed roller, steppe eagle and yellow-billed kite (www.met.gov.na and Annex 2), and;

(v) Mangetti National Park: The Mangetti NP falls within the North-Eastern Kalahari Woodlands vegetation type with the vegetation on the dune crests markedly different to that in dune valleys – i.e. Kalahari woodland vegetation dominates the dune crests, whereas mixed acacia savannah vegetation characterises the dune valleys. Dominant trees include: Acacia erioloba, Acacia mellifera, Combretum collinum, Commiphora species, Schinziophyton rautanenii and Terminalia sericea. Important wildlife includes: African wild cat, leopard, spotted hyaena, blue wildebeest, common duiker, kudu, oryx, sable, steenbok and occasional elephant and wild dog. Important birds include: bateleur, lapped-faced vulture, tawny eagle, Meyer's parrot and striped kingfisher (www.met.gov.na and Annex 2).

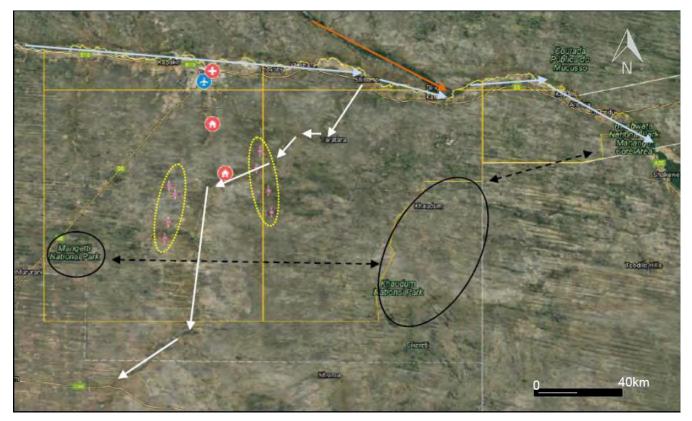


Figure 4.1: Important habitats in the general area are: Okavango River (blue arrows); Quito River (orange arrow); Omuramba Omatako (white arrows) and the Kaudum and Mangetti National Parks (black oblongs). Elephant movement between Kaudum and Mangetti NP's and Kaudum NP and Bwabwata NP (Mahangu Core Area) are indicated (dotted black lines). Important prospecting sites indicated (dotted yellow lines).

The proposed well location does not fall in any of above listed sensitive habits. The general surrounding local well locations are not pristine.

### 4.3.3 Fauna and Flora Diversity Conclusions

Timber harvesting, wood and grasses harvesting for rural housing and homestead / communal farms fencing, signs previous wild fires, subsistence agriculture of slash and burn, new cleared forestry allocated for new leaseholds, erosion and bush encroachment are common all along the access routes and around the general proposed well location areas and are some of the biggest problems facing the fauna and flora in the Kavango West and Kavango East Regions (Plates 4.1 - 4.6).

The most important reptile species are viewed as the endemics (*Ichnotropis grandiceps* and *Lygodactylus bradfieldi*), species classified as rare (*Lycophidion multimaculatum*, *Psammophis jallae*, *Causus rhombeatus*) and species classified as vulnerable (*Stigmochelys pardalis*, *Psammobates oculiferus*, *Kinixys spekii*, *Python natalensis*, *Varanus albigularis*, *Varanus niloticus*) from the general area. Furthermore, *Ichnotropis grandiceps*, classified as data deficient (IUCN 2018) is also viewed as important (Annex 2).

The most important amphibian species from the area is the giant bullfrog (*Pyxicephalus adspersus*) with "population decreasing" according to the IUCN (2018) as it is consumed as food throughout its range.

The most important mammal species from the general area are probably those classified as rare (*Nycteris hispida, Kerivoula argentata, Kerivoula lanosa, Mastomys shortridgei, Civittictis civetta, Paracynictis selousi*) and endangered (*Lycaon pictus, Lutra maculicollis, Equus (burchellii) quagga*) under Namibian legislation and those classified by the IUCN (2018) as endangered (*Lycaon pictus*), vulnerable (*Loxodonta africana, Smutsia (Manis) temminckii, Acinonyx jubatus, Panthera pardus, Panthera leo, Hippopotamus amphibious, Giraffa cemelopardalis*) and near threatened (*Hipposideros vittatus*). However, some of the above species – e.g. other, hippo, etc. – are only associated with the Okavango River. The most important species expected to occur in the Ncaute-Karukuvisa area would be the African wild dog (*Lycaon pictus*) and pangolin (*Smutsia (Manis) temminckii*).

The most important bird species expected to occur in the general area are those classified as endangered (hooded vulture, white-backed vulture, tawny eagle, martial eagle, bateleur, southern ground-hornbill), vulnerable (secretarybird, white-headed vulture, lappet-faced vulture and) and near threatened (marabou stork, peregrine falcon, kori bustard) from Namibia (Simmons *et al.* 2015) as well as those classified by the IUCN (2018) as critically endangered (hooded vulture, white-headed vulture, white-backed vulture), endangered (lappet-faced vulture), 4 vulnerable (secretarybird, tawny eagle, martial eagle, southern ground-hornbil) and near threatened (bateleur, kori bustard).

The most important larger tree/shrub species expected to occur in the general area are *Baikiaea plurijuga* (Protected F#; LR-nt), *Burkea africana* (Protected F#), *Guibourtia coleosperma* (Protected F#), *Dialium engleranum* (Protected F#)), *Philenoptera violacea* (Protected F#), *Pterocarpus angolensis* (Protected F#; LR-nt), *Schinziophyton rautanenii* (Protected F#), *Sclerocarya birrea* (Protected F#) and *Strychnos* species (Protected F#). The most importand grasses those commonly used for thatching – *Eragrostis pallens* and *Cymbopogon* species – i.e. economic value. If herbs and "lower" plants (e.g. algae, lichens, etc.) were to be included, this would undoubtedly increase the floral composition of the area tremendously – e.g. more than 100 lichen species are known from coastal Namibia. Although, the focus for this desktop study was limited to the bigger and thus more obvious species of trees, shrubs and grasses, the importance other species such as lichens, ferns, Lithops, etc. is also acknowledged.

Plate 4.1: Timber harvesting in PEL 73.

Plate 4.2: Wood and grasses harvesting for rural housing and homestead.

Plate 4.3: Wood harvesting communal farms fencing.

Plate 4.4: Subsistence agriculture of slash and burn.

Plate 4.5: Forestry clearing for the newly allocated communal leaseholds.

Plate 4.6: Bush encroachment after the abandonment of an unproductive allotment that was subjected to a slash and burn rural subsistence agriculture practices. A slashed and burned portion can only be used for period of two (2) years planting seasons before moving to new a plot after all the soil nutrients are leached out.

## 4.3.6 Fauna and Flora Diversity Recommendations

All human induced activities (including the proposed exploration) may affect local fauna and flora depending on the extent of the operations. Assessing potential impacts is occasionally obvious, but more often difficult to predict accurately. Such predictions may change depending on the scope of the activity – i.e. once initiated, may have a different effect on the fauna and flora as originally predicted. Thus continued monitoring of such impacts during the exploration phase(s) is imperative. Overall, however, the proposed petroleum exploration activities (drilling of multiple stratigraphic wells in PEL 73) are likely to affect only a very localised and limited areas and over a shorter period linked to the widening of the accesses, campsites and actual drilling sites. Mitigation measures that will minimise the likely impacts on fauna and flora are provided in the EMP Report Vol. 3 of 3.

## 4.4 Socioeconomic Settings

Nkurenkuru is the capital of the Kavango West Region and it's situated about 140 km west of Rundu the regional Capital of Kavango East region. The boundary between Kavango East and West generally follows the Omatako-Omuramba River (Fig. 4.2 and Annex 3).

The Kavango West Region covers an area of 24,591.27 km<sup>2</sup> and lies directly south of Angola and the Kavango River and east of Ohangwena and Oshikoto Regions, north of Otjozondjupa Region and west of the Kavango East Region. Kavango West Region is subdivided into eight electoral constituencies namely: Kapako, Mankumpi, Mpungu, Musese, Ncamangoro, Ncuncuni, Nkurenkuru, and Tondoro (Annex 3).

Kavango East Region covers an area of 23,987 km<sup>2</sup> and is bordered by the Kavango West, Otjozondjupa and Zambezi Regions. The constituencies in Kavango East Region include: Rundu Urban, Rundu Rural, Mashare, Mukwe, Ndiyona and Ndonga Linena (Annex 3).

Both regions and the project area are characterised by an extremely uneven population distribution. The interior of the regions are very sparsely inhabited, while the northernmost strip, especially along the Kavango River, has a high population concentration (National Planning Commission, 2012 and Fig. 4.2). According to Mendelsohn *et al.* (2006), the general livelihood of the people in the two regions is derived from small-scale agro-pastoralism, supported by fishing along the Okavango River. Overall, subsistence agriculture comprising animal husbandry (cattle and goats), cultivation of millet and maize and timber logging are an integral part of the day to day survival of the rural population within the project.

Based on the results of the socioeconomic assessment undertaken as part of the EIA and EMP process, the following is the summary of the socioeconomic settings of the proposed project area (Fig. 4.2 and Annex 3):

- The population of Ncamangoro Constituency is 7043 people, which is 8.1% people of Kavango West Region. Mashare Constituency has 8885 people, which is 11.2% of Kavango East population;
- Inter-Census growth rates are 1.6% for Kavango East Region and 0.6% for Kavango West Region;
- Gender distribution is slightly inclined towards higher female shares. Mashare Constituency had 52% of female and 48% of male population and Ncamangoro Constituency had 51.9% female and 48.1% male population;

- The population density in both regions is above national average. 6.2 people for km<sup>2</sup> in Kavango East was and 3.6 people for 1 km<sup>2</sup> in Kavango West;
- Inter-census recorded that both Kavango Regions have high proportion of persons with disabilities, particularly high was in Kavango West (7.6%). This is the highest in Namibia. East recorded 6.0% of persons with disabilities;
- Ncamangoro Constituency falls within the Mbunza Traditional Authority and Mashare Constituency falls within Sambyu Traditional Authority;
- Rukavango-speaking people constitute the largest language group in Kavango (79.4% of the population), and San constitute 0.4% of the region's population;
- Mashare Constituency's adult literacy rate stood at 72% and Ncamangoro recorded only 63.3% of people being literate. Literacy rates in both constituencies are not only below their respective regional average rates, but they are among lowest in Namibia;
- Kavango Regions (East and West) has the largest population of unemployed youth aged 15-35 and the highest unemployment rates. Unemployment in Kavango East is 39.6% and in Kavango West stands at 36.4 %. Unemployment in Ncamangoro Constituency stood at 52.2%. Unemployment rate for female is higher than for male;
- Kavango regions have highest incidence of poverty, 53% of all population. Poverty is defined as the number of households who are unable to afford sufficient resources to satisfy their basic needs;
- The main employment industries in Kavango East and Kavango West is agriculture, forestry and fisheries. Around 45.95% of employed in Kavango East are in the agriculture, forestry and fisheries sector and in Kavango West the share is even larger 80.04%;
- The Kavango West and East Regions are relatively well covered with a network of roads; unfortunately, most of these roads are gravel or sandy roads that make travel difficult. Kavango East Region has one airport, at Rundu, that accommodates national flights. Several smaller airstrips cater for the tourism sector especially in the eastern part of the region;
- Nevertheless, people living deep in the interior of both regions are far from social infrastructure, thus access to education and medical treatment is difficult;
- The communities living in the northern part of the Kavango West and Kavango East Regions along the road from Nkurenkuru to Rundu and Rundu to Divundu road are relatively well connected to the national electricity grid. The remainder of the rural communities situated away from the river and the main road are connected mostly with off-grid facilities that utilise either solar power systems or diesel power systems;
- The Okavango River is the main source of water for the people living along the river, and for their livestock, whereas villages away from river depend entirely on groundwater from boreholes supplied by MAWF and in some cases from seasonal pans. The urban areas - settlements and towns are provided with water by the NamWater;
- The main economic activities of both Kavango Regions are agriculture, mainly smallscale mahangu farming, providing some food self-sufficiency but little food security;

aquaculture; timber harvesting; tourism, particularly in Kavango East Region; and some minor mining activities;

- There are a number of community forests within the Kavango East and Kavango West Regions Two (2) community forests in Kavango West and ten (10) community forests in Kavango East. The proposed project's drilling sites are not located within the community forest areas, however they are very close to Gcwatjinga and Mbeyo community forests. Illegal harvesting of timber in Kavango Regions is on rise and attributed to the high demand for timber worldwide, and;
- Tourism is mainly in Kavango East Region. In Kavango West Region it is limited and undeveloped. Tourism in the Kavango East Region is mostly focused on the eastern part of the region around Divundu, to some extent in the central part of the region next to the Kavango River and in Rundu. This is associated with the fact that most of the biodiversity, wildlife and scenic areas are found in the eastern part of the region. Kavango East Region falls within the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA).

Proposed drilling sites for PEL 73 Blocks 1819 and 1820 are very remotely located with limited accessibility. The development will have mainly positive impacts on the surrounding areas. Below table presents potential positive and negative impacts and offers enhancement measures for positive impacts. The associated negative impacts could be mitigated with mitigation measures as provided in Annex 3 and the EMP Report Vol. 3 of 3.

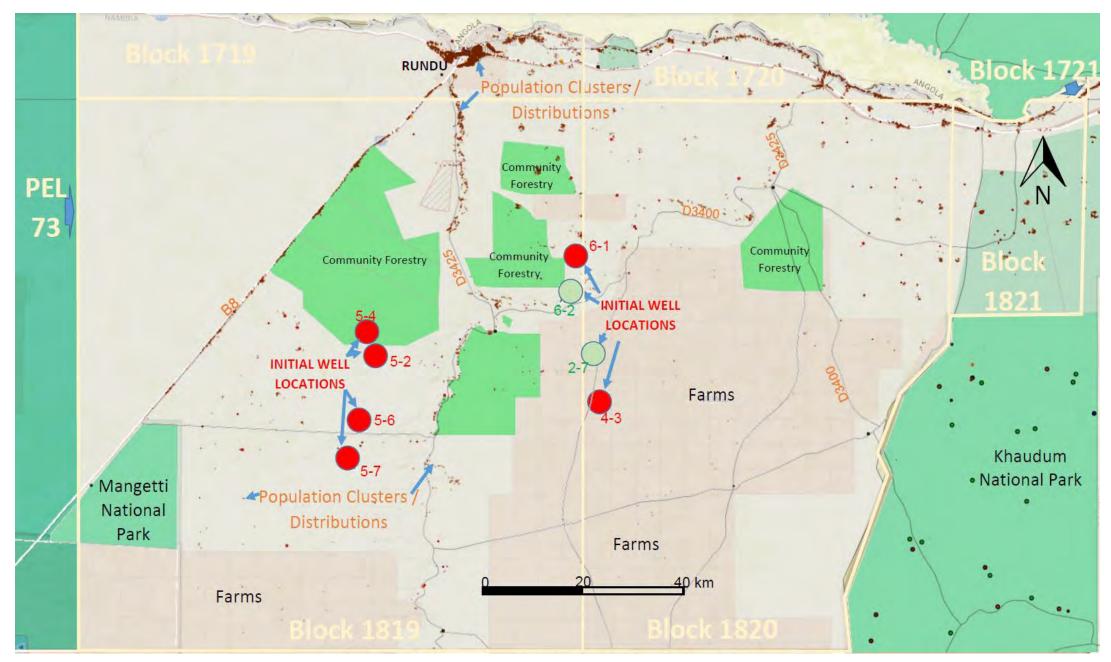


Figure 4.2: Population density, roads and socioeconomic setting around PEL 73 covering Block 1719, 1720, 1721, 1819, 1820 and 1821 and the well locations (Data Sources: <a href="http://www.kavangozambezi.org/en/-">www.kavangozambezi.org/en/-</a> arcgis Accessed, March 2019).

# 4.5 Geology and Petroleum System

#### 4.5.1 Regional Overview

Reconnaissance Energy Namibia (Pty) Ltd, the Proponent and operator of PEL 73 is targeting equivalent rocks to the hydrocarbon prone unconventional deposits within the Karoo Group of the main Karoo Basin in South Africa (Fig. 4.5).

The main producing formations within the Main Karoo Basin are the Prince Albert, Whitehill and Collingham, and all of the Lower Ecca Group.

The Prince Albert Formation within the Karoo Basin of South Africa is composed of mudstones with shales and some small sandstone units. The overlying Whitehill Formation is comprised of fine grained, finely laminated black organic rich shale.

The shales contain dolomite lenses near the base. The Collingham Formation is comprised of dark grey mudstones, intercalated with thin yellow clay like layers of ashfall tuff. At the top of the formation, the mudstone grades into sandstone.

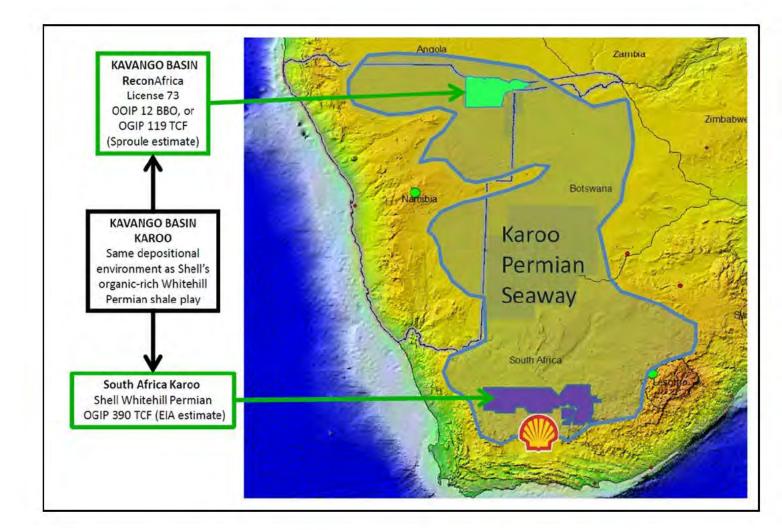


Figure 4.3: Extent of the Karoo Rocks in Southern Africa (Source: Reconnaissance Energy Namibia <u>http://reconafrica.com</u>, Accessed June 2019).

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## 4.5.2 PEL 73 Potential Active Petroleum System Opportunities

Reconnaissance Energy Namibia (Pty) Ltd has interpreted high resolution aero magnetic data documenting a very deep untested Kavango Basin with optimal conditions for preserving a thick interval of organic rich marine shales in the lower portion of the Karoo Super Group (Fig. 4.4). Maximum depth to basement is estimated at over 9 kilometres (Fig. 4.5). The company has also completed structural and geological interpretations of magnetic inversion profiles, backfilling the basin with stratigraphic section of Precambrian, Permian and Cretaceous sediments (Fig. 4.6).

Reconnaissance Energy Namibia (Pty) Ltd.'s interpretation strongly suggests that the formational equivalents to the Lower Ecca Group will be preserved in the untested deeper portions of the Kavango Basin. The company believes that these target sediments lie in a previously unrecognized Karoo Basin along major trans African lineaments that link northeast Namibia to the better known Karoo rift basins in eastern Africa.

Reconnaissance Energy Namibia (Pty) Ltd.'s geologic team has defined a beneficial structural framework and depositional basin configuration utilising a high-resolution aero-magnetic database. The company has developed a fully integrated structural inversion model for the entirety of the Kavango Basin defining a pull-apart basin with targetable half grabens capable of housing substantial thickness of Karoo-aged sediments and reef-prone Lower Paleozoic Units. Regional geologic investigations of the Permian Karoo Seaway, including main Karoo Basin, Botswana Kalahari Basin and Namibian basins Karasburg, Nama, Waterberg, Huab and Owambo support potential for adequate thickness of resource-prone sediments. Preliminary analyses indicate basin depths supportive of oil and gas thermal maturation levels (Figs. 4.4- 4.6).

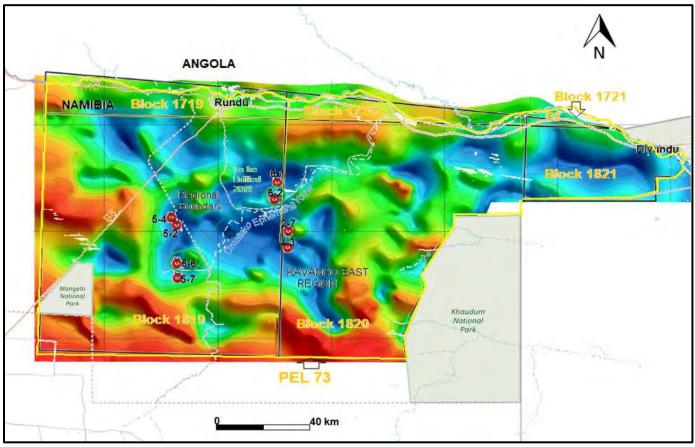


Figure 4.4: PEL 73, Kavango Basin and well locations (Source: Reconnaissance Energy Namibia <u>http://reconafrica.com</u>, Accessed June 2019).

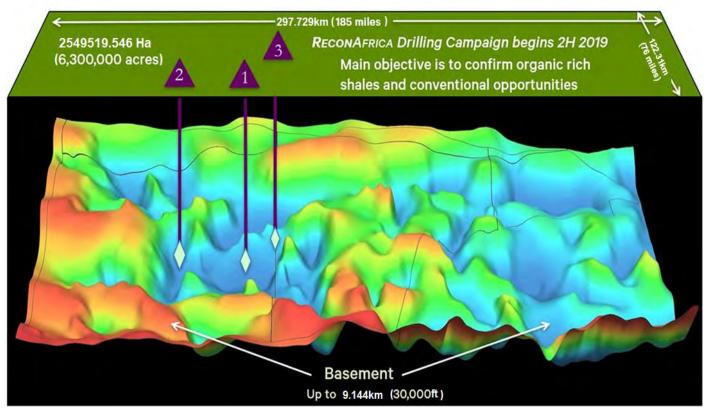


Figure 4.5: 3D model representation of PEL 73 and the Kavango Basin based on the interpretation and integration of the geophysical, structural and geological data sets (Source: Reconnaissance Energy Namibia <u>http://reconafrica.com</u>, Accessed June 2019).

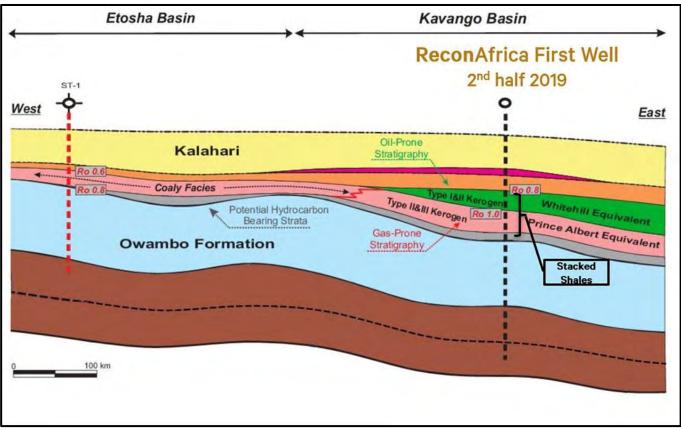


Figure 4.6: Kavango deep basin resource opportunity (Source: Reconnaissance Energy Namibia http://reconafrica.com, Accessed June 2019).

## 4.6 Water

#### 4.6.1 Overview

The study area is located in northern Namibia straddling portions of the East and Western Kavango Regions. By virtue of its location the study area forms part of a low lying peneplain of the Omatako, Cubango-Cuito and Okavango surface water Basins (Annex 4). The land surface gently slopes in the north easterly direction from an elevation of 1200 mamsl in the south western corner to about 1029 mamsl in the north eastern corner of PEL 73.

In view of the target exploration sites, it is important to note that sites 5-4, 5-6, 5-2 and 5-7 are situated on the western fringe of a drainage active zone; whereas sites 6-1, 6-2, 2-7 and 4-3 are slight out of the active zone of the Omatako River and are potentially areas of surface water ponding, infiltration and groundwater through flow (Fig. 4.7).

Further south of the PEL No. 73 particularly covering Block 1818, water supply is from groundwater resources associated with the Kalahari Group. According to CSIR (1982), there are three (3) hydrogeological units in the Kalahari Group: namely the upper, middle and lower Kalahari (Table 4.1). Of the three units shown in Table 4.1, the middle Kalahari sandstone is recognised as the most promising aquifer of the three units, whereas the lower Kalahari is reported to be argillaceous and of poor water quality.

The deep and regional groundwater flow system equivalent to the lower Kalahari aquifer unit benefits from direct recharge around the rim of the basin and from elevated outcrops, would characteristically artesian (marl and clay confining layer) with elevated total dissolved solids (TDS) due a long resident times, and therefore prone to poor water quality (Fig. 4.8). This system is not expected to be shallower than 160 m except where elevated by igneous intrusions.

Project falls within the rural, communal areas where water supply is provided by the Rural Water Supply Division within the Department of Water Affairs (DWA) in the Ministry of Agriculture, Water and Forestry (MWAF). In private commercial farmland, individual farm owners provide for all their water needs through the application for abstraction permits from the Department of Water Affairs. A detailed assessment of the surface and groundwater situation within the project area is highly recommended.

		5500			
<b>GROUP / SEQUENCE</b>	STRATIGRAPHIC UNIT	Nature Type	RIPTION Aquifer Potential		
		Aquitard, leaky	Low Yielding, locally		
	Fine and Silt	Aquifer	high Yielding		
Kalahari	Sandstone, Sand & Clay	Aquifer	Low Yielding		
	Marl and Clay	Confining Layer	None		
	Conglomerate & Gravel	Aquifer	High Yielding		
Karoo	Basalt/Sandstone	Aquitard/Weathered	Conditional		

Aguitard/Fractured

Table 4.1: Conceptual hydrogeology characteristics of the study area.

Schist/Quartzite/dolomite

Damara

Conditional

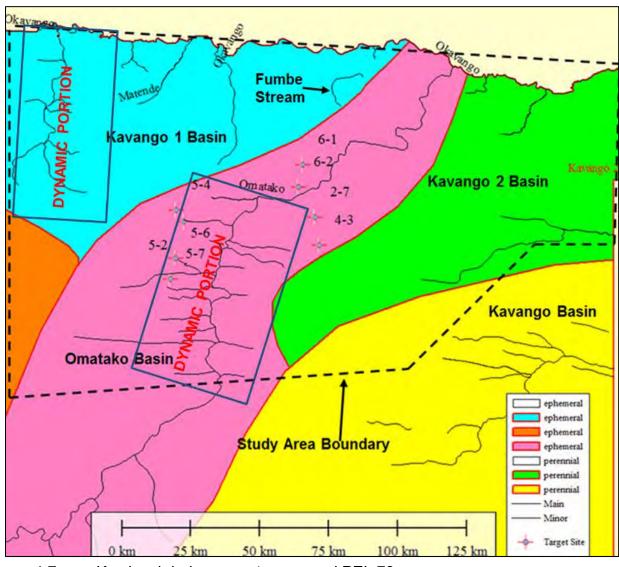


Figure 4.7: Key local drainage system around PEL 73.

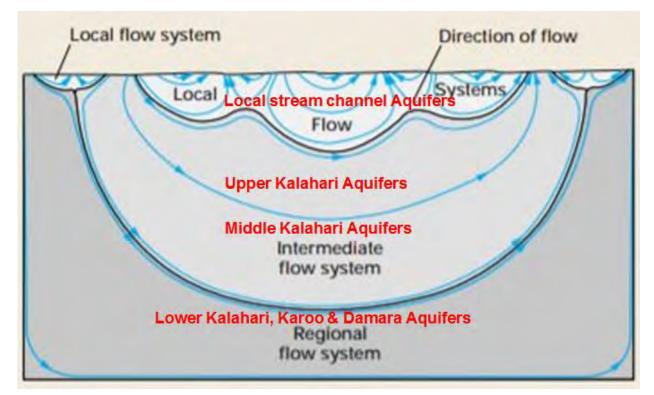


Figure 4.8: Conceptual groundwater flow components around PEL 73.

## 4.6.2 Summary of the Impact and Risk Assessment on Water

Detailed assessments of the potential negative impacts that proposed multiple stratigraphic well drilling operations in PEL 73 will have on the surface and groundwater are provided in Annex 4. Detailed mitigation measures are also provided in Annex 4 and the EMP Report Vol. 3 of 3. The following is the summary of the impact and risk assessment associated with the proposed activities on the surface and groundwater (Annex 4):

- (i) Aquifer pollution vulnerability (APV): On the basis of aquifer pollution vulnerability (APV) evaluation, it can be concluded that the aquifer pollution vulnerability of the upper Kalahari in study area is extremely high due to elevated groundwater levels of some times less than 10 m. This vulnerability largely relates to ground based activities which have the potential of polluting both surface and groundwater. In the context of the expected exploration drilling care should be exercised not to allow pollutants in this zone of the stratigraphy;
- Increased risk of flooding: The risk of flooding considering the paucity of the geographic footprint of the proposed drilling in combination with the low topographic slope of the area is low and can however turn into the moderate risk zone with low impact between November and March in view of duration and areacoverage risk measures;
- (iii) Impacts due to contaminated water discharge: Drilling rigs maintain cleanliness by washing oil remnants and other forms of dirty every now and then, and this waste should be collected in moveable chambers and disposed-off safely, but should this oil contaminated waste-water find other ways to either groundwater or surface water bodies, remedial actions are usually difficulty and expensive. However, sometimes oil spills occur and these can pose very high contamination risks to both surface and groundwater resources. In the study area, this risk increases during wet months of year from November to March and due to low topographic and groundwater gradients as well as the possible impact on water resources, vegetation and on aquatic life this risk is rated high and needs concerted attention;
- (iv) Impacts due to oil tank bursts or/and pipe breaks: Although the likelihood of this risk is low, the impact if it happens is significant, for this reason, the risk is highlighted as a going concern of high priority and therefore special attention should be associated with efforts to make sure it does not happen;
- (v) Impacts due to vehicle fuel leaks: This risk is associated with leaks and fuel emissions from cars either parked or fuelling at the drilling site, these emissions and leaks have the potential of reaching both groundwater and surface water if there are active pathways. Even though the pathways to groundwater resources are not significant, those to surface water (during wet periods) taking into consideration the proximity of these sites to streams needs attention. However, this risk scores moderate due to its paucity and likelihood;
- (vi) Impacts due to backwash water: This risk is closely related to the impacts due to contaminated water discharge, and scores high due its nature, and magnitude given that machines and cored samples need to be cleaned with considerable amounts of water. Another measure of significance is the reversibility of impacts if such incidents take place. It is common knowledge that polluted soil and polluted-water pollute water, and complete remedial is usually impossible and costly to the environment and in monetary terms;

- (vii) Impacts due to loss of drainage area: This risk has moderate impact, in most measures it scores low, but if it occurs it is permanent. For this reason, it is rated moderate for this proposed drilling in that the site is within the immediate catchment of a stream;
- (viii) Impacts due to Increased or reduced runoff: This risk scores moderate due to its nature and its low reversibility if it happens, however it scores low in all other aspects. Vegetation clearing and paved area increases runoff and largely contribute to flood risk even during rainfall event which would otherwise pose no risk in natural environments. For this reason, this risk is considered low, and should be treated as such in monitoring and management plans;
- (ix) Impacts due to drainage pattern disturbances: This risk is almost negligible due its small impacts with regard to extent, and duration if it happens; it has low magnitude and reversibility impacts;
- Impacts due to Increase suspended load: This risk is almost negligible, and this is because there is little or no mobilization of suspended load in the long term, but should be considered during construction stage of proposed project;
- (xi) Impacts due to increased risk of salinization: This risk of high concern and particular attention should be paid to manage and mitigate it. Salinisation generally speaks to increasing total dissolved solids (TDS) in water resources. In general, petroleum and gas contain high content of carbon, nitrogen, sulphur and metals like copper, nickel and vanadium. Therefore, exposure of petroleum/gas waste to water bodies raises the risk of elevated TDS and elevated content of heavy metals in water;
- (xii) Impacts due to disrupted groundwater flow/pathways: There are limited to no obvious groundwater flow/pathways in the study area, therefore, this risk is negligible, and;
- (xiii) Impacts due to elevated or reduced groundwater levels: It is envisaged that apart from the serious nature of the risk, the impact is low due to small extent, magnitude and reversibility of the risk should it occur. Groundwater withdrawal for drilling and other activities should be at the safe yield of production boreholes; therefore proper pump testing and data.

## 4.6.3 Conclusions and Recommendations on Water

The endorheic drainage system in combination with drying and episodic rainfall climatic conditions created at the onset of the break-up of the Gondwanaland super-continent provided the coarse sediment river/stream channel bedload which forms the present day aquifers of the lower Karoo and lower Kalahari Groups of geological formations (Figs. 4.6 and 4.7). At a local scale; the reactivation of old tectonic faults and the associated intrusion of basaltic igneous materials provided the impetus for high mass transport capacity of recent drainage system which forms the coarse stream channel bedload sediments relating to aquifers of the upper Kalahari Group.

In the context of the impact assessment of the risk posed by the proposed oil and gas exploration drilling in the study area, it is concluded that most of the risk categories are moderate to negligible if proposed measures are adhered to. However, the risks associated with: aquifer pollution vulnerability, impacts due to contaminated water discharge, impacts due to tank bursts or/and pipe breaks and that associated with impacts due to backwash water have high to moderate impacts with regard to water resources negative impacts in the study area. It is therefore recommended that the proposed mitigation measures be considered as integral part of the environmental management plan (EMP).

Long term and cumulative impacts will be limited if the exploration holes will have cement casing up to the Base of Groundwater Protection (BGWP) which is regarded as the depth at which groundwater quality changes from non-saline to saline (4000 mg/l). This principle also applies to saline stratigraphic horizons in sections above the BGWP. In essence, the exploration hole should be materially isolated from the rest of its immediate surround by cement casing/grouting. Should it happen that the exploration hole still has a role to play after the exploration exercise, it should be properly closed on top; else total plugging of the exploration hole is recommended.

# 4.7 Archaeology

### 4.7.1 Overview of Archaeological Resources in PEL 73

A specialist desktop archaeological assessment was undertaken as part of the EIA and EMP process covering PEL 73 (Annex 5). Previous systematic archaeological investigations of the Kavango East and West Regions revealed human occupations that predate the pre-colonial farming settlements. In addition to archaeological heritage, modern heritage of Kavango East and West Regions is characterised by remnants of numerous historic, sacred cultural sites as well as present-day community graves and cemeteries mainly along the Omatako River basin that are to be avoided (Annex 5).

### 4.7.2 Archaeological Baseline Findings

The desk archaeological heritage impact assessment study has only identified a group of archaeological heritage sites within the footprint of the proposed project. These are located between 12 and 28k km from proposed drilling sites and are located along the Omatako River basin between Ncaute and Taratara villages, near the drilling site 6-2, (Table 4.2 and Fig. 4.9). Additionally, a group of other sites whose quantity has not been established are also found south west of Omatako River basin. These sites will not be impacted by the proposed oil explorations development neither are they vulnerable nor sensitive. However, it cannot be ruled out that other significant archaeological evidence of pre-colonial occupation will likely be found along the tributaries of the Omatako River basin mainly due to the presence of fresh water in the immediate area.

If they do occur, the nature of anticipated archaeological materials along the Omatako river course will likely be of diagnostic nature from Late Stone Age period due to the spread of the industry in this area (Annex 5). However, such surface artefacts will have no archaeological values because they will likely disturbed and in secondary depositions/context.

 Table 4.2:
 List of archaeological sites identified within the footprints of the proposed project.

Site No.	GPS location	Region	Constituency
1	18°13'54.72"S / 19°44'9.88"E	Kavango East	Mcuma/Chimpanda
2	18°21'50.17"S / 19°49'53.12"E	Kavango East	Shikambu
3	18°21'48.47"S / 19°51'24.65"E	Kavango East	Baramasono
4	18°11'1.21"S / 20°10'15.72"E	Kavango East	Baramasono
5	18°10'59.89"S / 20°11'18.68"E	Kavango East	Taratara

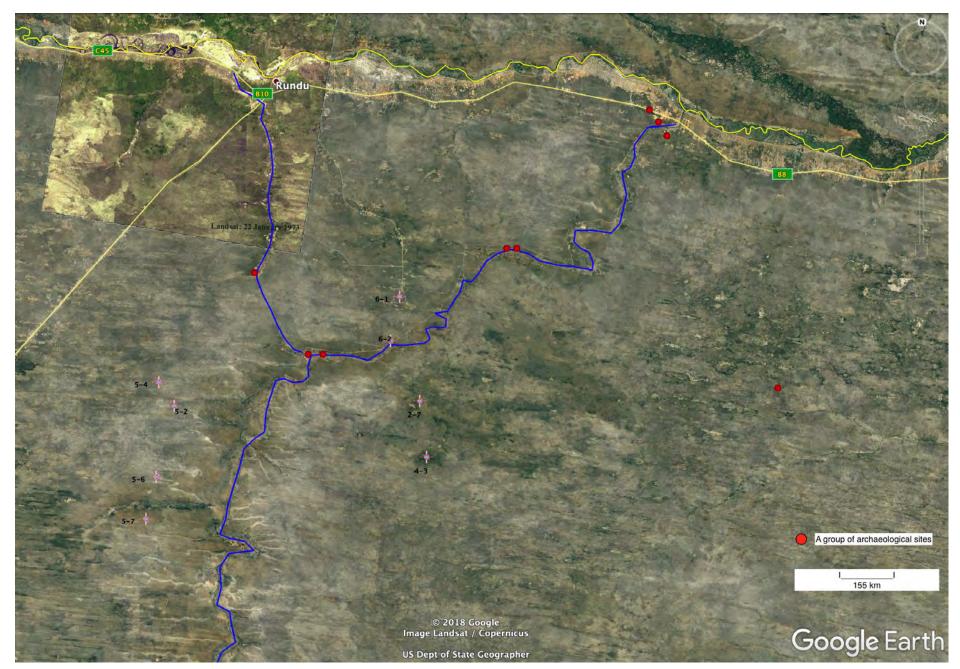


Figure 4.9: A group of archaeological sites (red, quantities not established) in relation to the proposed oil exploration drilling sites. The blue lines indicate the river systems from the main Okavango River.

## 4.7.3 Archaeological Impact Assessment Results

In the unlikely event that archaeological sites are exposed during site works, the expected nature of impact would be in the form of direct physical disturbance or destruction. The expected magnitude of this impact would be LOW. Due to the fact that impacts on archaeological sites are irreversible, these would be HIGH, with a LOCAL spatial scale (Annex 5). The consequence of the impact would be LOCALIZED, and its significance would be LOW. The interpretation of this assessment would indicate a LOW significance, indicating that the risk of archaeological impact is so low as to have no influence on the project decision.

Furthermore, this assessment has not located any historical or sacred sites in vicinity of the proposed drilling sites, but caution must be exercised since there are existing modem villages. In the case of the "no-go" alternative, no disturbance of the sites would occur at the group of identified archaeological sites and therefore the impact on archaeological would not occur, and so the "no go" alternative has not been assessed here. From the cumulative impact perspective and low sensitivity of the sites, it is expected that the project will not have a negligible cumulative impact on Namibia's archaeology resource base on the known archaeological sites (Annex 5).

# 4.8 Stakeholder Consultations and Engagement

### 4.8.1 Overview

According to the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 and the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007), a person conducting a public consultation process must give notice to all potential Interested and Affected Parties (I&APs) of the application for ECC which is subjected to public consultation and participation process. The EIA Regulations clearly state that potential interested and affected parties must be provided with a reasonable opportunity to comment on the application under section 21(6) of the EIA Regulations.

Consultation of the Interested and Affected Parties (I & APs) has been part of the EIA process for this project in line with the environmental regulatory requirements. Due to the specialised nature of the proposed project activities (Petroleum Exploration-Drilling of multiple stratigraphic wells within PEL 73) and situated in remote communal areas, the project team focused heavily on working with the regional, local and traditional leaders who have been responsible for informing their local communities about the proposed activities.

Continuous consultation and updating of the political (Governors and local Councillors) and traditional leaders of the Kavango West and East Regions about the proposed activities shall continue to be undertaken in order to make sure that the local community are kept up to date on the ongoing activities and do not feel afraid if they happen to come across the exploration team in area.

#### 4.8.2 Stakeholders Consultation Process Undertaken

Prior to the implementation of the public and stakeholder consultation processes as part of the formal project registration with the Government, a Draft Scoping Report with Terms of Reference for the EIA and EMP phases was prepared and on the 3<sup>rd</sup> April 2019 submitted to the Environmental Commissioner in the Ministry of Environment and Tourism through the Petroleum Commissioner in the Ministry of Mines and Energy. An approval of the project Scoping Report was issued by the Environmental Commissioner dated 27<sup>th</sup> May 2019 (Fig. 1.9).

Public and stakeholder consultations process covering all the Interested and affected Parties (I&APs) were conducted during the months of March and May 2019. Copies of the Environmental Assessment Reports were distributed to the following key the institutional stakeholders including the Offices of the Governors of Kavango West and Kavango East Regions as well as the Ministry of Safety and Security (MSS) in both regions with respect to the assessment of unexploded ordnances around the proposed drilling localities.

Furthermore, copies of the reports were also distributed at Public Libraries in Windhoek, Kavango West and Kavango East Regions. Public notices were published in the local newspapers inviting all I&APs to registered as stakeholders. Additional local consultation outreach process were undertaken through the Offices of Governors for Kavango West and Kavango East Regions. Well attended public /stakeholder meetings were held in Nkurenkuru, Kavango West Region and Rundu, Kavango East Regions on the 9<sup>th</sup> and 10<sup>th</sup> May 2019 respectively (Plates 4.7 and 4.8). Minutes of the meetings are provided in Annex 6.

Public notices were published in the Confidente Weekly Newspaper dated 16<sup>th</sup> – 22<sup>nd</sup> May 2019 and Namibian Daily Newspaper dated Tuesday 21<sup>st</sup> May 2019 (Figs. 5.10 and 5.11 and Annex 6). A feature article was also published in the Namibian Sun dated Monday 27<sup>th</sup> May 2019 (Figs. 5.12 and 5.13) in order to complement the two (2) notices. The feature article was based on information provided to the Journalist. The closing date for submission of written inputs /comments /objection is Friday 31<sup>st</sup> May 2019.

#### 4.8.3 Dangers of Unexploded Ordinances

As part of the stakeholders consultation process, contacts were with the Police Regional Commanders for Kavango West and East Regions under the Ministry of Safety and Security (MSS). Letters were send to the two (2) Police Regional Commanders requesting for advice with the respect to the dangers / risk for potential unexploited ordinances with respect to the proposed drilling locations (Annex 6). Invitations to attend the organised meetings in Nkurenkuru and Rundu on the 9<sup>th</sup> and 10<sup>th</sup> May 2019 respectively, were also extended to the two (2) Police Regional Commanders.

Representatives from the Police Regional Offices attended the meetings in Nkurenkuru and Rundu (Annex 6). A response from the Police Inspector General directing the Regional Commander for Kavango West Region to provide support to Reconnaissance Energy Namibia (Pty) Ltd was received dated 31<sup>st</sup> May 2019 (Fig. 5.14).



Plate 4.7: Nkurenkuru meeting 9<sup>th</sup> May 2019, Kavango West Region.



Plate 4.8: Rundu meeting 10<sup>th</sup> May 2019, Kavango East Region.

#### CONFIDENTE lifting the list

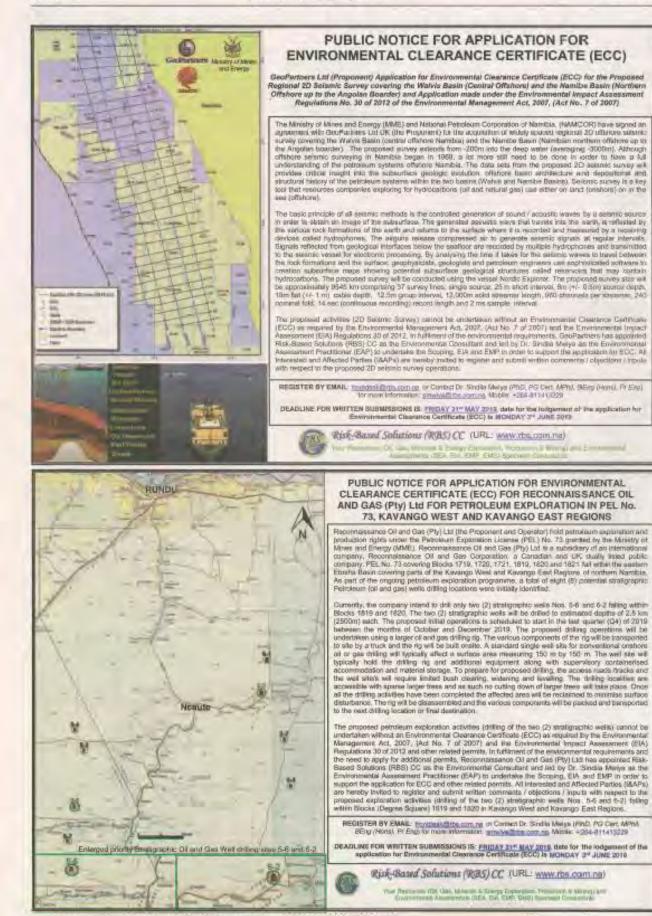


Figure 5.10: Copy of the Public Notice published in the Confidente Newspaper dated 16<sup>th</sup> – 22<sup>nd</sup> May 2019.

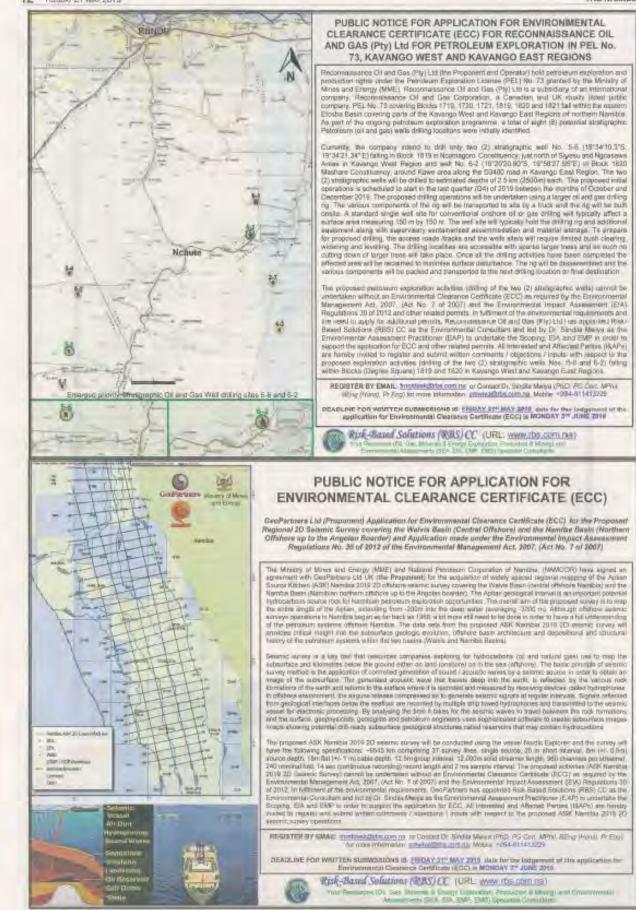


Figure 5.11: Copy of the Public Notice published in the Namibian daily Newspaper dated Tuesday 21<sup>st</sup> May 2019.

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#### Editor's corner

#### **Banning** imports not so simple

Water Calls Schlerwein that public entities may only process that public that this must include production north of the red line for consumers north of the red line. The anaouncement, although 29 y

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Chive has made millions. If not billing off our construction in our little corner of the world and Namilian computers have seen very little of that. We are hoping to see this change under the new directive.

#### **Contact details**

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# Haikali

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#### Oil and gas

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#### PEL No 73

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#### Cattle CONTINUED FROM PARK I

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also expect a high risk of inviron-mental degradation and enusion because of exopering the carty-ing engacity." Norwenith says some people have driven their livestock line Augola and the Kacango regions but there are still for many cattle in Ohangoeros.

In Ohangeens. The cattle are now competing for the available wone and some times go days without deliking

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Figure 5.12: Copy of the Front Page Oil and Gas that was published in Namibian Sun daily Newspaper dated 27th May 2019 based on information provided to the Journalist by the EAP.



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of the company, nor that he would take unfair advantage of the equal

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two advantage of the situation" that he rende no longer vero deci-sions or remove any director. Any suggestion he sade or wish he had he says were opposed to simply universed and he says he

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MONDAY MAY 27 2015





The requirements of the Swapo headquarters ten-der while too big a financial risk for local centrac-tors in the current accountic environment, says Birbel Kurchers, the consulting general manages of the Construction Industries Tederation of Namithia (CIF). According to Kirchner, the first payments

would have been delayed and the contractor would save had limited control over interest claims for late payments or non-payment. This is not a real that local companies under the correct scoromic conditions can take, expectally as they are stready anagging linancially."

#### DESKI NANDUSTO



# MALLEGES SAFLAND MONEY IS BEING SIPHONED OFF Haikali files suit against **business partners**

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The co-owner of Safland Property Services Naminia wants the High Court to freeze the company's accounts.

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Bednessman Kanga Halkaf has brought an argent High Court rapperty services Namination. The Markovies Namination. The Markovies Namination of the source of the services of the services of an article all unones held in the source and the finalisation of an obser matter he has against the company in the High Court. The ther sources the final acts the

company in the High Court. In that matter Halkali axis the High Courts wellow this min "top-pressive and unfairly prejudical conductor the trustees of the Altraidor Trast and or the altrain the trustees of the shortness, the winding up of the company". The other respond-ents include Saffand Inseruitous Eliot Na

International, First Na-tional Bank Namihia, Karol van der Morroe, ny Rossur Murinda van der Mer

Saffard Property Services Namibia. The Matodor Trust holds the other 50%. Easel van der Merwe is a director at Saffard Namibia and a trustee of the trust, while Rossouw and Marinda van der Merwe are truston of the trust. Halkall alleges that his counter-

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parts in the company. South African chardbalders, Item been sightening off famils from the company and maniferring these to Soffand Inne-

lves managing the portfin GETTER DAYS: Banga Halkali and Karel van de Merws pictured in Octo bur 2017 at the ground breaking ceremony of the River Mail at Granjeiny of

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In his paper before the court of prides Half all writes that the oth-ter days. Half all writes that the oth-ure is of this application. The second lin of the Government Institutions

Pensian Fund (GTPE), holding a smill drare, PS, is an investor par-temport in drat pertificio which is worth wound. NSI billion.

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The number of the beard and a non-executive director. The trust and couldence we had an each other, in my view at the time, node it unseessary to formally discuss and con-clude a shareholder's agree-ment.

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"Every day we are getting a large number of cattle flocking in from number of carte nucleong in prim infor next, as far as 0 formportin in the Konette Rogina, Oshana, Omna-ti and Oshikota. The side of Okengo Ina become the recipient of all these Freshele, We are now experimiting enhaltinges or managing geneous and infinitence." Ndow mile size

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#### Search for oil and gas resumes

#### CATREINHE SASMAN

A British and Canadian company, Reconnaissance Oil and Gas, is has applied for an environmental elem-nne certificato (ECC) to defil for oil and gas on state land in the commnal areas of Rayango West and Ka-

vange East. Written comments on this applica-tion must be submitted before 20 May

100 must be submitted before 30 May in the environmental consultanty on the project, likely Based Solutions. The final environmental impact as-sessment (EAA) and environmental management plan (CMIC) will be sub-mitted to the ministery of conversionment and transition with May, Once the EGC, and other permitter membra conductive order submitter membra conductive. and other permits – like friedwater and waterwater permits, explosives import permits and radiation sources permits – have been issued, drilling will airer. The preposed drilling is in start in November and December. Two of the wells planned in Knwango West are just meth of the Niroux and the Ngeasona areas; the one planned for Kawago East in around the Kawe area along the D3400 road.

for Kävinge East in around the Kase aret along the D3400 road. If the ECC is granted, host wells will be drilled to depths of between 255 and 3.5 klometers. The enricintometeral constituent on the project, Risk-Based Solutions, which has recommission that an RCC be issued to the company, said in the elsest of discovery of an ac-tive periodean applicing the series expo-tion that the series of the series expo-net in landscape of the two Wawapp regions and Namibie as a whale will be "immersionly and posisitively trans-formed" for the heardtr of all Namib-tans". Laus"

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Figure 5.13:

Copy of the page 2 of the Front Page Oil and Gas feature article that was published in Namibian Sun daily Newspaper dated 27th May 2019 based on information provided to the Journalist by the EAP.

Figure 5.14: Copy of the letter confirming the directive given to the Kavango West Region Regional Police Commander of Explosives to support Reconnaissance Energy Namibia (Pty) Ltd with site surveys in order to make sure that the proposed drilling locations are safe with respect to the danger for unexploded ordinances.

#### 4.8.4 Discussion of Inputs / Issues Raised by Stakeholders

Overall, the proposed project activities has received greater positive support from I&APs because if the results of the proposed petroleum drilling operations proves positive, it will tremendous and positively transform the local, regional and national socioeconomic landscapes of Kavango West Region, Kavango East Region and Namibia as whole.

The following is the summary of the key Corporate Social Responsibilities (CSR) recommendations / suggestions that were raised by the participants from the two meetings held in Nkurenkuru and Rundu with aim of raising the living standard of rural poor:

- (i) Drilling of new water boreholes at each of the proposed well location because it will be difficulty to get water for the proposed stratigraphic well drilling operations in the general area from the existing boreholes. Once the proposed stratigraphic well drilling operations have been completed the new water boreholes shall be handed over to the Regional Councils for the greater benefits of the rural communities;
- (ii) If resources allows, Reconnaissance Energy Namibia (Pty) Ltd could also add a cattle drinking point and a veterinary vaccination fence to at least one of the water boreholes drilled in support of the local subsistence rural framers, and;
- (iii) Access to the well 5-6 location particularly for the movement of equipment from Windhoek to site could use the sandy track road turn-off just after Mangetti National Park along the tarred B8 Road to Rundu. This will require de-bushing and widening of this track and such a move will greatly benefit the local communities in long run in terms of improve road access and connectivity to the national road network.

Following the completion of the public and stakeholder consultation process, all the key inputs / comment / objections received from the public and stakeholders were incorporated in the Final EIA and EMP Reports.

#### 4.8.5 Recommendations on Stakeholder Consultations Outcomes

It's hereby recommended that the drilling of water boreholes to supply water for the proposed oil and gas drilling operations be considered by Reconnaissance Energy Namibia (Pty) Ltd.

Once the drilling operations have been completed the water boreholes shall be equipped and cattle drinking points and a veterinary vaccination fence.

The new water boreholes shall be handed over to the Regional Councils in order to make sure that it provides wider greater benefits to not only the owner of the land where the borehole has been drilled but for all the nearby rural communities.

Additionally, and as part of the Corporate Social Responsibilities (CSR), Reconnaissance Energy Namibia (Pty) Ltd, shall provide de-bushing and access widening support for the sandy track road linking the D3425 to the B8 tarred Road from Grootfontein to Rundu for the benefits of the wider local rural community.

Whenever a project team goes to the field as part of the preparatory, implementation, operation, closure or abandonment the political (Governors and local Councillors) and traditional leaders of the Kavango West and East Regions shall be informed and kept updated on the progress. The following is summary of the recommended key contact person:

## 4.8.6 Recommendations on Dangers of Unexploded Ordinances

Reconnaissance Energy Namibia (Pty) Ltd shall prepare detailed maps of the drilling locations areas of interest showing access passing through untouched areas, drilling locations and all supporting areas such as the campsite. The maps shall be provided to the Regional Commander Kavango West Region, Chief Inspector lithete, Namibian Police, Ministry of Safety and Security (MSS) in order for the explosive team to be able to go in field and undertake detailed field-based site-specific surveys of the areas of interest before drilling mobilisation can be implemented (Fig. 4.13). Reconnaissance Energy Namibia (Pty) Ltd exploration team shall accompany the Namibian Police Explosive team when conducting the field-survey in order to make sure that key areas of interest are cleared

## 4.8.7 Recommended Useful Contacts

The following is list of key selected contact details of key persons as maybe required:

- 1. Ms. Maggy Shino, Petroleum Commissioner, Ministry of Mines and Energy +264-812882182, Tel: +264 61 2848209, Fax: +264 61 2848200, Email: <u>Maggy.Shino@mme.gov.na</u>;
- 2. Mr. Tupa Iyambo, Chief Inspector of Petroleum Affairs, Ministry of Mines and Energy Cell: +264 81 240 2183 Telephone, +264 61 284 8300, Fax: +264 61 284 8200; <u>Tupa.lyambo@mme.gov.na;</u>
- 3. Dr Fredrick Mupoti Sikabongo, Deputy Environmental Commissioner, Office of the Environmental Commissioner, Ministry of Environment and Tourism (MET), 0812930537, Tel: +264 61 284 2751, Email: <u>freddy sikabongo@yahoo.co.uk;</u>
- 4. Mr. Colgar Sikopo, Director of Parks and Wildlife Management, Ministry of Environment and Tourism (MET), Tel: +264 61 2842528, Email: colgar.sikopo@met.gov.na;
- 5. Mr. Immanuel Mulunga, Managing Director, National Petroleum Corporation of Namibia (Pty.) Ltd (Namcor), +264-811277267, +264 61 204 5061/30/92; info@namcor.com.na
- 6. Hon. Governor Sirkka Ausiku, Kavango East Region Email: <u>sausiku@kavangowestog.gov.na;</u>
- 7. Hon. Johannes Kahonzo Sikondo, local councillor of Ncamagoro Constituency Kavango West Region where the well 5-6 is located, Email: <u>sauyemwaservicestation@gmail.com</u>, Mobile +264-811 545 417;
- 8. Hon. Ambassador Dr. Samuel Mbambo, Governor of Kavango East Region (Contact Ms. Muyenga Sophia, PA, <u>sophiamuyenga@yahoo.com</u>;
- 9. Hon. Councillor Michael Shipandeni Shikongo, Kavango East Region local Councillor where the well 6-2 is situated Mobile +264-811 564177/ 812398 701;
- 10.Mr. Stefanus Sitoka, Owner of the Communal Farm where the well 5-6 is located, Mobile Phones: +264816055218/813120998, Email: <u>sitoka.sitoka@gmail.com</u>;
- 11. Chief Inspector lithete, the Regional Commander Kavango West Region, Namibian Police, Ministry of Safety and Security (MSS) (+264-812721814).

# 5. IMPACT ASSESSMENT

## 5.1 Assessment Procedure

The Environmental Assessment process for the EPL No. 5469 has been undertaken in accordance with the provisions of the Environmental Impact Assessment (EIA) Regulations No. 30 of 2012 gazetted under the Environmental Management Act, (EMA), 2007, (Act No. 7 of 2007).

# 5.2 Assessments of Alternatives and Key Issues

### 5.2.1 Summary of Alternatives

The following alternatives have been considered:

- (i) Location of the PEL and Proposed Wells: The PEL No. 73 and the proposed well locations falls within the Kavango Basin situated in north-eastern Namibia. The Kavango Basin an important newly discovered basin with great potential for an active petroleum system with opportunity for hydrocarbons (oil and gas) occurrences and hence the need to undertake exploration in this specific area. However, the location of the proposed well locations has taken into considerations alternative locations mainly based on the availability of the already existing access tracks to conduct the drilling operations;
- (ii) **Other Alternative Land Uses:** The PEL area fall within the sparsely populated communal land of the Kavango East and West Regions. Communal subsistence agricultural land uses are dominated by cattle, goats, timber harvesting and seasonal crop farming practices. Due to the limited scope and site-specific nature of the proposed exploration activities, there are no conflicts anticipated and the proposed activities will coexist with the current and future uses in the area;
- (iii) **Ecosystem Function** (**What the Ecosystem Does**): There are wildlife habitats, carbon cycling or the trapping of nutrients and characterised by the physical, chemical, and biological processes or attributes that contribute to the forested self-maintenance of the ecosystem in this area. The proposed exploration activities will not affect the ecosystem function due to the limited scope and site-specific nature of the proposed exploration activities;
- (iv) Ecosystem Services: Food chain, harvesting of animals or plants, and the provision of clean water or scenic views are some of the local ecosystem services associated with the PEL area. However, the proposed exploration activities will not affect the ecosystem services due to the limited scope and site-specific nature of the proposed exploration activities;
- (v) Use Values: The PEL area has direct use for other land uses such as subsistence agriculture and its wildlife, food chain linkages that sustains the complex life within this area and bequest value for future generations to enjoy. The proposed exploration activities will not destroy the current use values due to the limited scope and site-specific nature of the proposed exploration activities as well as the adherence to the provisions of the EMP;
- (vi) **Non-Use or Passive Use**: The PEL area has an existence value that is not linked to the direct use / benefits to current or future generations. The proposed exploration

activities will not affect ecosystem current or future non or passive uses due to the limited scope and site-specific nature of the proposed exploration activities;

- (vii) **Potential Land Use Conflicts:** Considering the current land use practices (subsistence farming) as well as potential other land uses including petroleum exploration, it's likely that the economic spin-off from any positive exploration outcomes leading to the discovery of economic petroleum resources in the general area can co-exist with the existing and potential future land use options of the general area. However, much more detail assessment of any likely socioeconomic impacts will need to be undertaken as part of the full oilfield development and production EIA that must be undertaken if economic resources are discovered. The use of thematic mapping thereby delineating zones for specific uses within the PEL area will greatly improve and promote the multiple land use practices and coexistence opportunities;
- The No-Action Alternative A comparative assessment of the environmental (viii) impacts of the 'no-action' alternative (a future in which the proposed exploration activities do not take place) has been undertake. An assessment of the environmental impacts of a future, in which the proposed exploration and possible discovery of economic petroleum resources does not take place, may be good for the receiving environment because there be no any form of negative environmental impacts due to proposed exploration or possible petroleum production operations will take place in the PEL area. The environmental benefits will include no negative environmental impacts on the receiving environment. However, it is important to understand that even if the proposed exploration activities do not take, to which the likely negative environmental impacts is likely to be low and localised, the current and other future land uses will still have some negative impacts on the receiving environment. The likely negative environmental impacts of other current and future land uses that may still happen in the absence of the proposed petroleum exploration activities includes:
  - Illegal logging;
  - Wood and grasses for rural housing and homestead / communal farms fencing;
  - Unseasonal and too frequent fires;
  - Poaching;
  - Subsistence agriculture of slash and burn;
  - Forestry clearing for the ever increasing settlements in key habitat areas including pristine forested areas that are now being allocated to the local communities as new leaseholds;
  - ➢ Erosion;
  - Bush encroachment, and;
  - > Overgrazing.

Furthermore, it's also important to understand what benefits might be lost if the proposed exploration activities do not take place. Key loses that may never be realised

if the proposed project activities do not go-ahead include: Loss of potential added value to the unknown underground potential petroleum resources that maybe found within the PEL No. 73, socioeconomic benefits derived from current and future exploration and possible petroleum production capital investments, license rental fees, royalties payable to Government, direct and indirect contracts and employment opportunities, export earnings, foreign direct investments and various taxes payable to the Government.

# 5.3 Identification of Likely Positive Impacts

#### 5.3.1 Overview

The following are the key likely positive impacts that maybe realised and have been evaluated in this EIA for the proposed multiple wells drilling operations:

- Increased earnings to the State Revenue through annual petroleum rights rentals and local taxes payable;
- Increased temporal contracts and employment opportunities for local services providers and local revenue circulation from ancillary (industrial support) service demands;
- Demand for some public services may increase;
- In event of discovery, unemployment may decrease;
- Utility payment increase and infrastructure may be expanded, and;
- Improved knowledge on the natural resources and in particular the deeper subsurface profile of the Etosha Basin.

As part of the EIA process, a socioeconomic specialist study was undertaken focusing on assessing the likely actual positive socioeconomic contributions that the proposed drilling operations will have on the economy particularly in an event of a discovery (Annex 3).

## 5.4 Identification of Likely Negative Impacts

#### 5.4.1 Summary of Sources and Likely Key Negative Impacts

The likely key sources of negative environmental (physical, biological and socioeconomic/cultural/ archaeological) impacts have been divided into the following two (2) main categories:

#### (1) Routine and physical presence operational activities:

- (i) Pre-construction and drilling requirements;
- (ii) Construction phase;
- (iii) Mobilisation;
- (iv) Spudding and Conductor casing;
- (v) Drilling surface / intermediate and setting casing and cementing process through up 900 m;

- (vi) Drilling and continuous coring from 900 meters (2953') to 1900 meters (6234');
- (vii) Drilling below 1900 meters to total depth, estimated at 2500 meters (+/- 8202');
- (viii) Plug and abandon hole;
- (ix) Rehabilitate all surface disturbances and clear the site of any debris, and;
- (x) Camp removal, site closure / abandonment.

#### (2) Unplanned accidental events:

(i) Major land accidental incidence such as diesel / oil spill / fire / explosion.

### 5.4.2 Summary of Receptors Likely to be Negative Impacted

Based on the findings of this EIA inclusive of the findings and recommendations of the specialist studies, the following is the summary of the key environmental receptors that may be negatively impacted by the proposed activities with mitigation measures to be provided in the EMP Report Vol. 3 of 3:

#### (i) **Physical environment:**

- ✤ Water quality;
- Physical infrastructure and resources;
- ✤ Air quality, noise and dust;
- Landscape and topography;
- Soil quality, and;
- Climate change influences.

#### (ii) **Biological environment**:

- Habitat;
- Protected areas and resources;
- Flora;
- Fauna, and;
- Ecosystem functions, services, use values and non-use or passive use.

#### (iii) Socioeconomic, cultural and archaeological environment

Local, regional and national socioeconomic settings;

- Subsistence agriculture;
- Community forestry;
- Tourism and recreation, and;
- Cultural, biological and archaeological resources.

Based on the findings and recommendations of Scoping report (Annex 1), a fauna and flora specialist has been conducted (Annex 2) and provided a detailed overview of key resources / protected areas / resources / ecosystems that may be affected by the proposed multiple stratigraphic wells drilling operations in PEL 73.

# 5.5 Impact Assessment Criteria

## 5.5.1 Impact Definition and Screening

For the purpose of this report, a natural and/or human environmental impact is defined as: "Change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects." (ISO 14001).

The proposed project activities (routine and non-routine) have been considered during the EIA terms of their potential to:

- Interact with the existing environment (physical, biological and social elements), and;
- Breach relevant national legislation, relevant international legislation, standards and guidelines, and corporate environmental policy and management systems.

Where a project activity and receptor has been considered to have the potential to interact with the natural receiving environment, the impact has been defined and ranked according to its significance. Table 5.1 provides the definition of different categories of impacts that have been identified and assessed in this EIA Report.

The EIA process has assessed the potential impacts resulting from routine project activities, assuming that the project activity that may cause an impact to occur but the impact itself is dependent on the likelihood (Probability) (Table 5.1).

Correct control measures through the implantation of the EMP and monitoring thereof has been prepared aimed at reducing any negative significant impacts on the receiving environment as the results of the proposed project activities.

The mitigation measures priority shall, however, be focused on measures aimed at preventing the occurrence of negative impacts. In the absence of specific information on receptors and mitigation measures, the precautionary approach and the environmental principles as outlined in the Environmental Management Act, 2007, (Act No. 7 of 2007) have been adopted with an allocation of a medium or high importance / sensitivity to such receptors.

#### Table 5.1:Definition of impact categories.

	Adverse	Considered to represent an adverse change from the baseline, or to introduce a new undesirable factor.
Nature of Impact	Beneficial	Considered to represent an improvement to the baseline or to introduce a new desirable factor.
	Direct	Results from a direct interaction between a planned or unplanned Project activity and the receiving environment.
Type of	Indirect	Results from the Project but at a later time or at a removed distance or which may occur as a secondary effect of a direct impact.
Impact	Cumulative	Results from (i) interactions between separate Project-related residual impacts; and (ii) interactions between Project-related residual impacts in combination with impacts from other projects and their associated activities. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
	Short-term	Predicted to last only for a limited period but will cease on completion of the activity, or as a result of mitigation/reinstatement measures and natural recovery typically within a year of the project completion.
	Medium-	Predicted to last only for a medium period after the Project finishing, typically one to five years.
Duration of	Long-term	Continues over an extended period, typically more than five years after the Project's completion.
Impact	Permanent	Occurs during the development of the Project and causes a permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime.
	Local	Affects locally important environmental resources or is restricted to a single habitat/biotope, a single community.
	Regional	Affects nationally important environmental resources, or an area that is nationally mportant/protected or has macro-economic consequences.
	National	Affects nationally important environmental resources, or an area that is nationally important/protected or has macro-economic consequences.
Scale of Impact	International	Affects internationally important resources such as areas protected by international Conventions
	Transboundary	Impacts experienced in one country as a result of activities in another.
	Negligible	Possibility negligible
	Improbable	Possibility very low
Probability	Probable	Distinct possibility
	Highly Probable	Most likely
	Definite	Impact will occur regardless of preventive measures

### 5.5.2 Sensitivity of Receptors

Potential environmental and social effects has been assessed in relation to the baseline conditions, i.e. the conditions that would prevail should the proposed project activities not proceed. For the purpose of this assessment, receptors are defined as elements of the natural or human environment which may interact with, or be interacted by, the proposed project activities.

Baseline conditions are those that existed at the time of the assessment. Impact identification have been considered in terms of receptors and resources sensitive to changes of the following environmental components (Table 5.2):

 Physical environment (Water quality, physical infrastructure and resources, air quality, noise and dust, landscape and topography, soil quality, and Climate change influences);

- Biological environment (Habitat, protected areas and resources, flora, fauna and ecosystem functions, services, use values and non-use or passive use), and;
- Socioeconomic, cultural and archaeological environment (Local, regional and national socioeconomic settings, subsistence agriculture, community forestry, tourism and recreation and cultural, biological and archaeological resources).

It is recognised that some receptors and resources may be more vulnerable to change or to have greater importance than others. Within the project area of influence, the importance and sensitivity of receptors (physical, biological and human) was determined based on professional judgement and taking into account the following:

- Relevant legislative or policy standards or guidelines;
- Relative importance/value assigned to existing social or environmental features and receptors;
- Capacity of the receptor to absorb change, and;
- Capacity of the receptor to recover from change.

In evaluating the severity of potential environmental impacts, the following factors have been taken into consideration:

- Receptor/ resource characteristics: The nature, importance and sensitivity to change of the receptors / target or resources that could be affected;
- Impact Magnitude: The magnitude of the change that is induced;
- Impact Duration: The time period over which the impact is expected to last;
- Impact Extent: The geographical extent of the induced change, and;
- Probability of Occurrence: Chance of an impact occurring;
- Regulations, Standards and Guidelines: The status of the impact in relation to regulations (e.g. discharge limits), standards (e.g. environmental quality criteria) and guidelines.

The overall impact severity has been categorised using a semi-quantitative scale as shown in Table 5.2 for sensitivity of receptors, Table 5.3 for magnitude, Table 5.4 for duration, Table 5.5 for extent and Table 5.6 probability.

Table 5.2:Overall Scoping phase sensitivity assessment matrix results for the proposed multiple stratigraphic oil and gas well drilling<br/>operations in PEL 73, Kavango Basin, Kavango West and Kavango East Regions.

SENSITIVITY						SENSITIVITY PHYSICAL BIOLOGICAL ENVIRONMENT ENVIRONMENT								SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL ENVIRONMENT						
SENSITIN	VIT	Y RATI	ING	CRITERIA	i i	ŝ									values			1		1
1	Ne	gligib	le	The receptor or resource is resistant to change or is of little environmental value		urce									val	A 11				ogic
2		Low		The receptor or resource is tolerant of change without detriment to its character, is of low environmental or social value, or is of local importance.		Reso	I Dust	hhy		ences					s, use ve use	ational	ture	È		haeok
3	The receptor or resource has low capacity to absorb change without		Quality	ure and	voise and	Topography		Climate Change Influences	Habitat	Protected Areas	Flora	Fauna	, services or passiv	ocal, regional and national socioeconomic settings	e Agricul	Community Forestry	Tourism and Recreation	Cultural, Biological and Archaeological Resources		
4		High The receptor or resource has moderate capacity to absorb change without significantly altering its present character, has some environmental or social value, or is of district/regional importance.		Water	infrastruc	Air Quality, Noise and Dust	Landscape	Soil	hate Cha	Ŧ	Protect	LL.	Fa	functions non-Use	al, region cioecono	Subsistence Agriculture	Commun	Touri Reci	Biological Reso	
5 Very High The receptor or resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.			Physical infrastructure and Resources	Air (	La		Clin					Ecosystem functions, services, and non-Use or passive	Local, socic	S	Î		Cultural,			
	1	1.	Pre	-construction and drilling requirements	1.	-	-	-	-	-	-	-		-	-	+	+	+	+	+
17				-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	
SICAL		3.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	pilisation	-	-	-	+	-	-	-	-	-	-	-	+	+	+	+	12
SO	112	4.		Idding and Conductor casing	-	-	-	-	1	-	1	1 1 2 -1	-	-	1.1.1	+	+	+	+	1
PHY: ERAT	3	5.	Dril	ling surface / intermediate and setting casing and cementing cess through up 900 m	-	-	-	-	-	÷	-	+	-	-	-	+	+	+	÷	
E AND PHYSICAL COPERATIONAL CTIVITIES		6.	Dril	ling and continuous coring from 900 meters (2953') to 1900 ters (6234')	-	1.4	1.41	-		1. ÷.	-		-	-		+	÷	+	÷	16
PRESENCE	7. Drilling below 1900 meters to total depth, estimated at 2500 meters (+/-8202')		*	-	-	-	-	-	-	÷	12	-		+	+	+	+			
ЫЩ	1	8.	Plu	g and abandon hole	+	-	-	-	-	-	1	-	-	-	-	+	+	+	+	1 %
RA	- (2	9.	Rel	nabilitate all surface disturbances and clear the site of any debris		-		-	-	-	-		-		-	+	+	+	+	13
		10.	Car	np removal, site closure / abandonment		-	l e	-	1	-	1 4 3	1		-	T-all	+	+	+	+	
UNPLANNED ACCIDENTAL EVENTS	EVENIS	11.	exp Res acc	or land accidental incidence such as diesel / oil spill/ fire / losion (Note: Well Control arrangements and related Emergency sponse Plan (ERP) are designed to bring the risk of any unplanned idental event to ALARP (As Low As Reasonably Practicable) and rable			-	-			-	-			-	+	+	+	+	

 Table 5.3:
 Scored on a scale from 0 to 5 for impact magnitude.

SCALE	DESCRIPTION					
0 No observable effect						
1	Low effect					
2	Tolerable effect					
3	Medium high effect					
4	High effect					
5	Very high effect (devastation)					

Table 5.4: Scored time period (duration) over which the impact is expected to last.

SCALE	DESCRIPTION
т	Temporary
P	Permanent

 Table 5.5:
 Scored geographical extent of the induced change.

SCALE	DESCRIPTION
L	Limited impact on location
0	Impact of importance for municipality;
R	Impact of regional character
N	Impact of national character
М	Impact of cross-border character

#### 5.5.3 Likelihood (Probability) of Occurrence

The likelihood (probability) of the pre-identified events occurring has been ascribed using a qualitative scale of probability categories (in increasing order of likelihood) as shown in Table 5.6. Likelihood is estimated on the basis of experience and/ or evidence that such an outcome has previously occurred. Impacts resulting from routine/planned events (i.e., normal operations) are classified under category (E).

Table 5.6: Summary of the qualitative scale of probability categories (in increasing order of likelihood).

SCALE	DESCRIPTION						
А	Extremely unlikely (e.g. never heard of in the industry)						
B Unlikely (e.g. heard of in the industry but considered unlike							
C Low likelihood (egg such incidents/impacts have occurred to are uncommon)							
D	Medium likelihood (e.g. such incidents/impacts occur several times per year within the industry)						
E	High likelihood (e.g. such incidents/impacts occurs several times per year at each location where such works are undertaken)						

### 5.5.4 Significance Criteria

In order to assess the overall level of an impact, the following was established:

- The sensitivity or importance of the receptor (Table 5.2), and;
- The magnitude of the effect occurring and the change to the existing baseline conditions as a result of the project (Tables 5.3 – 5.6).

The assessment of the level of impacts has been based on a four-point scale, where adverse impacts identified as 'Major' or 'Moderate' are considered 'Significant' and 'Minor' adverse impacts are considered as 'Not Significant'. Positive impacts have been classified simply as 'beneficial', where applicable.

'None' is where a resource or receptor will not be affected in any way by a particular activity or the predicted effect is deemed to be 'negligible' or 'imperceptible', or is indistinguishable from natural background variations.

The framework for assessing the level of adverse significance impacts is outlined in Table 5.7 with the EIA matrix used in assessing the significance negative impact shown in Table 5.8.

A combination of the sensitivity of the receiving environment (Table 5.2) and the magnitude, duration, extent and probability (Tables 5.3 - 5.6) of the impact under consideration determines the significance of the impact (Tables 5.7 and 5.8). It is important to note that impacts have been considered / evaluated without the implementation of mitigation measures as detailed in the EMP Report Vol. 3 of 3.

IMPACT SEVERITY	RECEPTOR CHARACTERISTICS (SENSITIVITY)										
Magnitude, Duration, Extent, Probability	Very High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)						
Very High (5)	Major [5/5]	Major [4/5[	Moderate [3/5]	Moderate [2/5]	Minor 1/5						
High (4)	Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4]	Minor[1/4]						
Medium (3)	Major [5/3]	Moderate[4/3]	Moderate[3/3]	Minor[2/3]	None[1/3]						
Low (2)	Moderate [5/2]	Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]						
Negligible (1)	Minor [5/1]	Minor [4/1]	None [3/1]	None [2/1]	None [1/1]						

Table 5.7: Summary of the significance negative impact rating.

 Table 5.8:
 Summary of the EIA matrix used in assessing the significance negative impact of the proposed multiple stratigraphic oil and gas well drilling operations in PEL 73, Kavango Basin, Kavango West and Kavango East Regions on the receiving environment.

IMPACT SEVERITY Magnitude, Duration, Extent, Probability		RITY						PHYSICAL ENVIRONMENT						BIOLOGICAL ENVIRONMENT					SOCIOECONOMIC, CULTURAL AND ARCHAEOLOGICAL				
		Ve	ery High (5)	High(4)	Medium (3)	Low (2)	Negligible (1)	-	P	Dust			ses	11 A				ices,	nal				
V	ery High (5)	N	Major [5/5]	Major [4/5]	Moderate [3/5]	Moderate [2 /6	Minor 1/5	>	urea	D Pu		Ailer	Change Influences	tat	s			ons, servinon-Use use	regional and national peconomic settings	Subsistence Agriculture	stry		al and
1	High (4)		Major [5/4]	Major [4/4]	Moderate [3/4]	Moderate [2/4	Minor[1/4]	Water Quality	truct	Quality, Noise and	aphy				Are	m	a			Agric	Community Forestry	Tourism and Recreation	ogics
N	Medium (3)			None[1/3]	ero	l infrastruct Resources	No	Landscape Topography	Soil Quality	nang	Habitat	cted	Flora	Fauna	m functio	nom	nce	unity	ourism and Recreation	Biological			
Low (2) Negligible (1)		w (2) Moderate [5/2] Mod		rate [5/2] Moderate[4/2]	Minor[3/2]	None[2/2]	None[1/2]	Wat	Re	ality	To	So	Climate Cl		Protected Areas	1.1		Ecosystem functions, services, use values and non-Use or passive use	regi	iste	E	Tou Re	Cultural, Biological and Archaeological Resource
				Minor [4/1]	None [3/1]	None [2/1]			Physical infrastructure and Resources	Air Qui							-1-11		Local, regional ar socioeconomic	Subs	8		
_		_								-								100 m					
	10.0045	1.						-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/
	4 L	2.		truction pha	se			-4/2					-1/1		-1/1			-1/1 -1/1	+1/1 +1/1	-1/1 -1/1	-1/1 -1/1	-1/1 -1/1	-1/
	NO	3. 4.		isation	n du cate a caralin	-		-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/
	INE AND PHYSICAL NCE OPERATIONAL ACTIVITIES	5.	Drillin	g surface /	and Conductor casing rface / intermediate and setting casing and process through up 900 m			-2/2	-1/1	-305	-3/2	-3/2	-3/2	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/
	AND F	6.			uous coring from 900 meters (2953') to		-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/*	
	PRESENCE AC	7.		g below 19 meters (+/-8		total depth,	estimated at	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/1
j.	INI	8.		and abando				-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/1
	PRE	9.	Reha any d		Irface disturba	ances and cl	ear the site of	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	1/1
		10.	Camp	removal, si	ite closure / a	bandonmen	t	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/1
UNPLANNED ACCIDENTAL EVENTS		11.	10.       Camp removal, site closure / abandonment         11.       Major land accidental incidence such as diesel / oil spill/ fire / explosion				-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	-1/1	+1/1	-1/1	-1/1	-1/1	-1/1	

## 6. CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusions

The overall significance negative impacts that the proposed project activities will have on the receiving environmental will be localised, temporally for the duration of the drilling operations and will be of low significance without mitigations and negligible with mitigations. The following is the summary of the impact assessment results of the key components of the receiving environment:

- 1. Fauna and Flora: Campsite and drilling site physical disturbances, vehicles movements and actual drilling operations may affect the local fauna and the flora (Assessment of negative Impacts localised Low, Significant Impact: Negligible);
- 2. Water Pollutions: In the context of the impact assessment of the risk posed by the proposed oil and gas exploration drilling in the study area, it is concluded that most of the risk categories are *moderate to negligible* if proposed measures are adhered to. However, the risks associated with: aquifer pollution vulnerability, impacts due to contaminated water discharge, impacts due to tank bursts or/and pipe breaks and that associated with impacts due to backwash water have high to moderate impacts with regard to water resources negative impacts in the study area. The exploration hole will be materially isolated from the rest of its immediate surrounding by cement casing/grouting and properly closed on top; else total plugging of the exploration hole is recommended;
- Noise and Dusts Generation The proposed operations are likely to generate noise and dust from the campsite and drilling site physical disturbances, vehicles movements and actual drilling operations. Vehicle and other related noise will be limited around the operations based with no existing background noises (Assessment of negative Impacts localised Low, Significant Impact: Negligible);
- 8. Air Emissions: The main sources of air emissions are likely to be from combustion fuels from the vehicles, generators, and other equipment, vehicles and fugitive emissions (Assessment of negative Impacts Localised Low, Significant Impact: Negligible);
- 9. Solid Waste management: Although very limited for a very short period of time, various types of wastes are likely to be generated mainly around the proposed campsite and drilling locations. Waste management will not be an issue because necessary facilities and containers for waste management will be provided (*Assessment of negative Impacts Low, Significant Impact: Negligible*);
- 10.Liquid Waste management: Generated mainly around the proposed campsite and drilling locations. Liquid waste management will not be an issue because chemical toilets will be provided (*Assessment of negative Impacts Low, Significant Impact: Negligible*), and;
- 11. General Disturbances / Cultural and Social: Cultural Social issues will need to be considered seriously because the proposed survey area fall largely in communal land with different traditional authorities. However, the actually drilling locations do not have villages close nearby and the actual drilling locations are not fixed and can be shifted as maybe required (*Assessment of negative Impacts Localised Low, Significant Impact: Negligible*).

## 6.2 Recommendations

Based on the findings of this Environmental Assessment covering Environmental Scoping and Environmental Impact Assessment (EIA), it's hereby recommended that the proposed stratigraphic multi-well drilling operations in the PEL No. 73 covering Blocks 1719, 1720, 1721, 1819, 1820 and 1821 be issued with an new Environmental Clearance Certificate with the following key conditions:

- (i) The proponent must adhere to the provisions of all national legislation, regulations, policies, procedures and permits / authorisation requirements;
- (ii) The proponent shall adhere to all the provisions of the EMP and mitigation measures must be implemented and monitored as detailed in EMP Report Vol. 3 of 3, and;
- (iii) Villages / settlements and communal crop fields shall be avoided when choosing the access route, camp site, water well location and actual drilling location. A distance of 500 m to 1 km is hereby recommended between any local villages / settlements and the campsite / drilling locality.

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## 8. Annexes

1. Final Environmental Scoping Report Vol. 1 of 3

# **EXHIBIT 3**



Independent Statistics & Analysis U.S. Energy Information Administration

# Technically Recoverable Shale Oil and Shale Gas Resources:

# South Africa

September 2015



Independent Statistics & Analysis www.eia.gov U.S. Department of Energy Washington, DC 20585

This report was prepared by the U.S. Energy Information Administration (EIA), the statistical and analytical agency within the U.S. Department of Energy. By law, EIA's data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. The views in this report therefore should not be construed as representing those of the Department of Energy or other Federal agencies.

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#### **Executive Summary**

#### Introduction

Although the shale resource estimates presented in this report will likely change over time as additional information becomes available, it is evident that shale resources that were until recently not included in technically recoverable resources constitute a substantial share of overall global technically recoverable oil and natural gas resources. This chapter is from the 2013 EIA world shale report <u>Technically Recoverable Shale Oil</u> and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States.

#### **Resource categories**

When considering the market implications of abundant shale resources, it is important to distinguish between a technically recoverable resource, which is the focus of this supplement as in the 2013 report, and an economically recoverable resource. Technically recoverable resources represent the volumes of oil and natural gas that could be produced with current technology, regardless of oil and natural gas prices and production costs. Economically recoverable resources are resources that can be profitably produced under current market conditions. The economic recoverability of oil and gas resources depends on three factors: the costs of drilling and completing wells, the amount of oil or natural gas produced from an average well over its lifetime, and the prices received for oil and gas production. Recent experience with shale gas and tight oil in the United States and other countries suggests that economic recoverability can be significantly influenced by above-the-ground factors as well as by geology. Key positive above-the-ground advantages in the United States and Canada that may not apply in other locations include private ownership of subsurface rights that provide a strong incentive for development; availability of many independent operators and supporting contractors with critical expertise and suitable drilling rigs and, preexisting gathering and pipeline infrastructure; and the availability of water resources for use in hydraulic fracturing. See Figure 1.



Figure 1. Stylized representation of oil and natural gas resource categorizations

Note: Resource categories are not drawn to scale relative to the actual size of each resource category. The graphic shown above is applicable only to oil and natural gas resources.

Crude oil and natural gas resources are the estimated oil and natural gas volumes that might be produced at some time in the future. The volumes of oil and natural gas that ultimately will be produced cannot be known

ahead of time. Resource estimates change as extraction technologies improve, as markets evolve, and as oil and natural gas are produced. Consequently, the oil and gas industry, researchers, and government agencies spend considerable time and effort defining and quantifying oil and natural gas resources.

For many purposes, oil and natural gas resources are usefully classified into four categories:

- Remaining oil and gas in-place (original oil and gas in-place minus cumulative production at a specific date)
- Technically recoverable resources
- Economically recoverable resources
- Proved reserves

The oil and natural gas volumes reported for each resource category are estimates based on a combination of facts and assumptions regarding the geophysical characteristics of the rocks, the fluids trapped within those rocks, the capability of extraction technologies, and the prices received and costs paid to produce oil and natural gas. The uncertainty in estimated volumes declines across the resource categories (see figure above) based on the relative mix of facts and assumptions used to create these resource estimates. Oil and gas in-place estimates are based on fewer facts and more assumptions, while proved reserves are based mostly on facts and fewer assumptions.

**Remaining oil and natural gas in-place (original oil and gas in-place minus cumulative production)**. The volume of oil and natural gas within a formation before the start of production is the original oil and gas in-place. As oil and natural gas are produced, the volumes that remain trapped within the rocks are the remaining oil and gas in-place, which has the largest volume and is the most uncertain of the four resource categories.

**Technically recoverable resources.** The next largest volume resource category is technically recoverable resources, which includes all the oil and gas that can be produced based on current technology, industry practice, and geologic knowledge. As technology develops, as industry practices improve, and as the understanding of the geology increases, the estimated volumes of technically recoverable resources also expand.

The geophysical characteristics of the rock (e.g., resistance to fluid flow) and the physical properties of the hydrocarbons (e.g., viscosity) prevent oil and gas extraction technology from producing 100% of the original oil and gas in-place.

**Economically recoverable resources.** The portion of technically recoverable resources that can be profitably produced is called economically recoverable oil and gas resources. The volume of economically recoverable resources is determined by both oil and natural gas prices and by the capital and operating costs that would be incurred during production. As oil and gas prices increase or decrease, the volume of the economically recoverable resources increases or decreases, respectively. Similarly, increasing or decreasing capital and operating costs result in economically recoverable resource volumes shrinking or growing.

U.S. government agencies, including EIA, report estimates of technically recoverable resources (rather than economically recoverable resources) because any particular estimate of economically recoverable resources is tied to a specific set of prices and costs. This makes it difficult to compare estimates made by other parties using different price and cost assumptions. Also, because prices and costs can change over relatively short periods, an estimate of economically recoverable resources that is based on the prevailing prices and costs at a particular time can quickly become obsolete.

**Proved reserves.** The most certain oil and gas resource category, but with the smallest volume, is proved oil and gas reserves. Proved reserves are volumes of oil and natural gas that geologic and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. Proved reserves generally increase when new production wells are drilled and decrease when existing wells are produced. Like economically recoverable resources, proved reserves shrink or grow as prices and costs change. The U.S. Securities and Exchange Commission regulates the reporting of company financial assets, including those proved oil and gas reserve assets reported by public oil and gas companies.

Each year EIA updates its report of proved U.S. oil and natural gas reserves and its estimates of unproved technically recoverable resources for shale gas, tight gas, and tight oil resources. These reserve and resource estimates are used in developing EIA's <u>Annual Energy Outlook</u> projections for oil and natural gas production.

- Proved oil and gas reserves are reported in EIA's U.S. Crude Oil and Natural Gas Proved Reserves.
- Unproved technically recoverable oil and gas resource estimates are reported in EIA's <u>Assumptions</u> report of the Annual Energy Outlook. Unproved technically recoverable oil and gas resources equal total technically recoverable resources minus the proved oil and gas reserves.

Over time, oil and natural gas resource volumes are reclassified, going from one resource category into another category, as production technology develops and markets evolve.

Additional information regarding oil and natural gas resource categorization is available from the <u>Society of</u> <u>Petroleum Engineers</u> and the <u>United Nations</u>.

#### Methodology

The shale formations assessed in this supplement as in the previous report were selected for a combination of factors that included the availability of data, country-level natural gas import dependence, observed large shale formations, and observations of activities by companies and governments directed at shale resource development. Shale formations were excluded from the analysis if one of the following conditions is true: (1) the geophysical characteristics of the shale formation are unknown; (2) the average total carbon content is less than 2 percent; (3) the vertical depth is less than 1,000 meters (3,300 feet) or greater than 5,000 meters (16,500 feet), or (4) relatively large undeveloped oil or natural gas resources.

The consultant relied on publicly available data from technical literature and studies on each of the selected international shale gas formations to first provide an estimate of the "risked oil and natural gas in-place," and then to estimate the unproved technically recoverable oil and natural gas resource for that shale formation. This methodology is intended to make the best use of sometimes scant data in order to perform initial assessments of this type.

The risked oil and natural gas in-place estimates are derived by first estimating the volume of in-place resources for a prospective formation within a basin, and then factoring in the formation's success factor and recovery factor. The success factor represents the probability that a portion of the formation is expected to have attractive oil and natural gas flow rates. The recovery factor takes into consideration the capability of current technology to produce oil and natural gas from formations with similar geophysical characteristics. Foreign shale oil recovery rates are developed by matching a shale formation's geophysical characteristics to U.S. shale oil analogs. The resulting estimate is referred to as both the risked oil and natural gas in-place and the technically recoverable resource. The specific tasks carried out to implement the assessment include:

1. Conduct a preliminary review of the basin and select the shale formations to be assessed.

- 2. Determine the areal extent of the shale formations within the basin and estimate its overall thickness, in addition to other parameters.
- 3. Determine the prospective area deemed likely to be suitable for development based on depth, rock quality, and application of expert judgment.
- 4. Estimate the natural gas in-place as a combination of *free gas*<sup>1</sup> and *adsorbed gas*<sup>2</sup> that is contained within the prospective area. Estimate the oil in-place based on pore space oil volumes.
- 5. Establish and apply a composite success factor made up of two parts. The first part is a formation success probability factor that takes into account the results from current shale oil and shale gas activity as an indicator of how much is known or unknown about the shale formation. The second part is a prospective area success factor that takes into account a set of factors (e.g., geologic complexity and lack of access) that could limit portions of the prospective area from development.
- 6. For shale oil, identify those U.S. shales that best match the geophysical characteristics of the foreign shale oil formation to estimate the oil in-place recovery factor.<sup>3</sup> For shale gas, determine the recovery factor based on geologic complexity, pore size, formation pressure, and clay content, the latter of which determines a formation's ability to be hydraulically fractured. The gas phase of each formation includes dry natural gas, associated natural gas, or wet natural gas. Therefore, estimates of shale gas resources in this report implicitly include the light wet hydrocarbons that are typically coproduced with natural gas.
- 7. Technically recoverable resources<sup>4</sup> represent the volumes of oil and natural gas that could be produced with current technology, regardless of oil and natural gas prices and production costs. Technically recoverable resources are determined by multiplying the risked in-place oil or natural gas by a recovery factor.

Based on U.S. shale production experience, the recovery factors used in this supplement as in the previous report for shale gas generally ranged from 20 percent to 30 percent, with values as low as 15 percent and as high as 35 percent being applied in exceptional cases. Because of oil's viscosity and capillary forces, oil does not flow through rock fractures as easily as natural gas. Consequently, the recovery factors for shale oil are typically lower than they are for shale gas, ranging from 3 percent to 7 percent of the oil in-place with exceptional cases being as high as 10 percent or as low as 1 percent. The consultant selected the recovery factor based on U.S. shale production recovery rates, given a range of factors including mineralogy, geologic complexity, and a number of other factors that affect the response of the geologic formation to the application of best practice shale gas recovery technology. Because most shale oil and shale gas wells are only a few years old, there is still considerable uncertainty as to the expected life of U.S. shale well production over 30 years. Because a shale's geophysical characteristics vary significantly throughout the formation and analog matching is never exact, a shale formation's resource potential cannot be fully determined until extensive well production tests are conducted across the formation.

#### **Key exclusions**

In addition to the key distinction between technically recoverable resources and economically recoverable resources that has been already discussed at some length, there are a number of additional factors outside of the scope of this report that must be considered in using its findings as a basis for projections of future

<sup>4</sup> Referred to as risked recoverable resources in the consultant report.

<sup>&</sup>lt;sup>1</sup> Free gas is natural gas that is trapped in the pore spaces of the shale. Free gas can be the dominant source of natural gas for the deeper shales.

<sup>&</sup>lt;sup>2</sup> Adsorbed gas is natural gas that adheres to the surface of the shale, primarily the organic matter of the shale, due to the forces of the chemical bonds in both the substrate and the natural gas that cause them to attract. Adsorbed gas can be the dominant source of natural gas for the shallower and higher organically rich shales.

<sup>&</sup>lt;sup>3</sup> The recovery factor pertains to percent of the original oil or natural gas in-place that is produced over the life of a production well.

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production. In addition, several other exclusions were made for this supplement as in the previous report to simplify how the assessments were made and to keep the work to a level consistent with the available funding.

Some of the key exclusions for this supplement as in the previous report include:

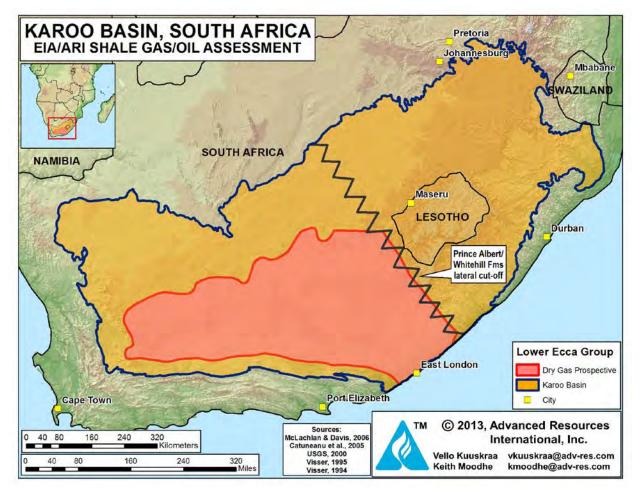
- 1. **Tight oil produced from low permeability sandstone and carbonate formations** that can often be found adjacent to shale oil formations. Assessing those formations was beyond the scope of this supplement as in the previous report.
- 2. **Coalbed methane and tight natural gas** and other natural gas resources that may exist within these countries were also excluded from the assessment.
- 3. Assessed formations without a resource estimate, which resulted when data were judged to be inadequate to provide a useful estimate. Including additional shale formations would likely increase the estimated resource.
- 4. **Countries outside the scope of the report**, the inclusion of which would likely add to estimated resources in shale formations. It is acknowledged that potentially productive shales exist in most of the countries in the Middle East and the Caspian region, including those holding substantial non-shale oil and natural gas resources.
- 5. **Offshore portions of assessed shale oil** and shale gas formations were excluded, as were shale oil and shale gas formations situated entirely offshore.

# **XIX. SOUTH AFRICA**

#### SUMMARY

South Africa has one major sedimentary basin that contains thick, organic-rich shales - - the Karoo Basin in central and southern South Africa, Figure XIX-1.<sup>1,2,3</sup> The Karoo Basin is large (236,400 mi<sup>2</sup>), extending across nearly two-thirds of the country, with the southern portion of the basin potentially favorable for shale gas. However, the basin contains significant areas of igneous (sill) intrusions that may impact the quality of the shale resources, limit the use of seismic imaging, and increase the risks of shale exploration.





Advanced Resou

The Permian-age Ecca Group, with its organic-rich source rocks in the Lower Ecca Formation, is the primary shale formation addressed by this assessment. Of particular interest is the organic-rich, thermally mature black shale unit in the Whitehill Formation of the Lower Ecca. This shale unit is regionally persistent in composition and thickness and can be traced across most of the southern portion of the Karoo Basin.<sup>4</sup>

We estimate that the Lower Permian Ecca Group shales in this basin contain 1,559 Tcf of risked shale gas in-place, with 370 Tcf as the risked, technically recoverable shale gas resource, Table XIX-1. We have excluded the Upper Ecca shales in this basin from quantitative assessment because their TOC content is reported to be below the 2% TOC standard used by this resource assessment study.

Basic Data	Basin/G	Gross Area	Karoo (236,400 mi <sup>2</sup> )							
sic I	Shale F	Formation	Prince Albert	Whitehill	Collingham					
Ba	Geolo	ogic Age	L. Permian	L. Permian	L. Permian					
	Depositiona	I Environment	Marine	Marine	Marine					
ent	Prospective Area (mi <sup>2</sup> )		60,180	60,180	60,180					
Physical Extent	Thickness (ft)	Organically Rich	400	200	200					
cal	THICKNESS (II)	Net	120	100	80					
ıysi	Depth (ft)	Interval	6,000 - 10,500	5,500 - 10,000	5,200 - 9,700					
Чd	Deptil (it)	Average	8,500	8,000	7,800					
Reservoir Properties	Reservoir Pres	sure	Mod. Overpress.	Mod. Overpress.	Mod. Overpress.					
Reservoir Propertie	Average TOC (	<i>w</i> t. %)	2.5%	6.0%	4.0%					
Res	Thermal Matur	ity (% Ro)	3.00%	3.00%	3.00%					
	Clay Content		Low	Low	Low					
a	Gas Phase		Dry Gas	Dry Gas	Dry Gas					
nrc	GIP Concentra	tion (Bcf/mi <sup>2</sup> )	42.7	58.5	36.3					
Resource	Risked GIP (To	f)	385.3	845.4	327.9					
	Risked Recove	rable (Tcf)	96.3	211.3	82.0					

 Table XIX-1:
 Shale Gas Reservoir Properties and Resources of the Karoo Basin



#### INTRODUCTION

South Africa is a net natural gas importer, primarily from neighboring Mozambique and Namibia. As such, South Africa has given priority to exploration for domestic gas and oil. Shale exploration is initiated via a Technical Cooperation Permit (TCP), which may lead to an Exploration Permit (EP) and eventually to a production contract. The country has a corporation tax of 28% and royalty of 7%, terms that are favorable for gas and oil development.

A number of major and independent companies have signed Technical Cooperation Permits (TCPs) to pursue shale gas in the Karoo Basin, including Royal Dutch Shell, the Falcon Oil & Gas/Chevron joint venture, the Sasol/Chesapeake/Statoil joint venture, Sunset Energy Ltd. of Australia and Anglo Coal of South Africa.

#### 1. KAROO BASIN

#### 1.1 Introduction

The Karoo foreland basin is filled with over 5 km of Carboniferous to Early Jurassic sedimentary strata. The Early Permian-age Ecca Group underlies much of the Karoo Basin, cropping out along the southern and western basin margins, Figure XIX-1. The Ecca Group contains a sequence of organic-rich mudstone, siltstone, sandstone and minor conglomerates.<sup>5</sup>

#### 1.2 Geologic Setting

The larger Ecca Group, encompassing an interval up to 10,000 ft thick in the southern portion of the basin, is further divided into the Upper Ecca (containing the Fort Brown and Waterford Formations) and the Lower Ecca (containing the Prince Albert, Whitehill and Collingham Formations), Figure XIX-2. The three Lower Ecca formations are the subject of this shale resource assessment.

The regional southwest to northeast cross-section illustrates the structure of the Cape Fold Belt of the Ecca Group on the south and the thermal maturity for the Ecca Group on the north, Figure XIX-3.<sup>6</sup>



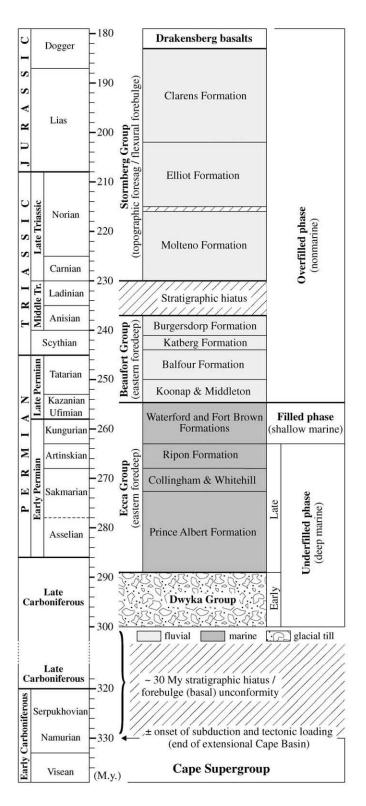


Figure XIX-2. Stratigraphic Column of the Karoo Basin of South Africa

Source: Catuneanu, O. et al., 2005.



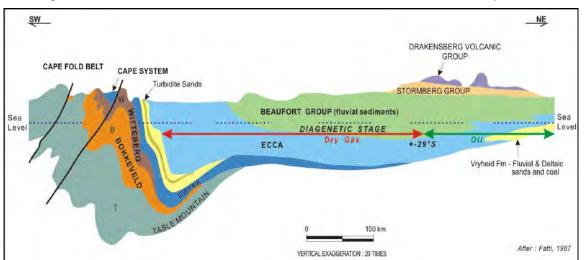


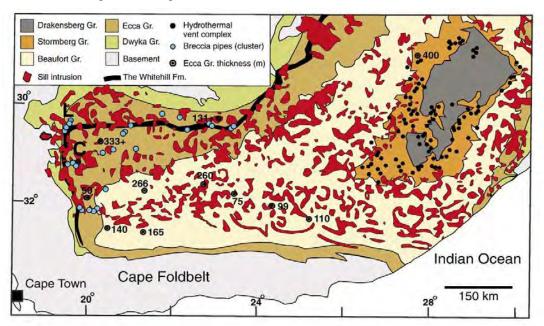
Figure XIX-3. Schematic Cross-Section of Southern Karoo Basin and Ecca Group Shales

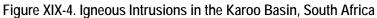
Source: McLachlan, I. and Davis, A., 2006.

Major portions of the Karoo Basin have igneous (sill) intrusions and complex geology, with the most extensive and thickest sills concentrated within the Upper Ecca and Balfour formations.<sup>7</sup> This unusual condition creates significant exploration risk in pursuing the shale resources in the Karoo Basin, Figure XIX-4.<sup>8</sup> (Note that this map reflects the maximum extent of intrusions, which are expected to be less within the target shale formations.) Local mapping indicates that contact metamorphism is restricted to quite close to the intrusions. As such, we removed 15% of the prospective area to account for the potential impact of igneous intrusions and significantly risked the remaining resource.

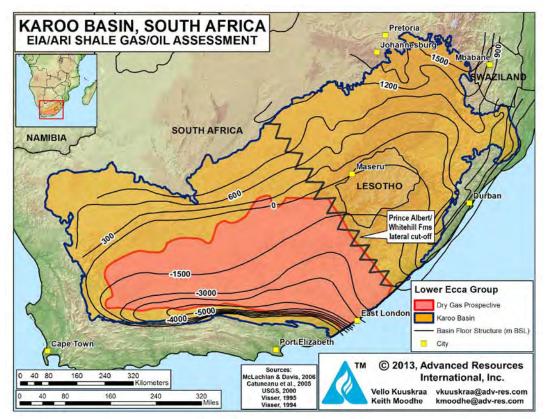
The prospective area for the Lower Ecca Group shales is estimated at 60,180 mi<sup>2</sup>, Figure XIX-5. The boundaries of the prospective area are defined by the outcrop of the Upper Ecca Group on the east, south and west/northwest and the pinch-out of the Lower Ecca Group shales on the northeast, Figure XIX-1. The dry gas window is south of the approximately 29° latitude line. Given the thermal maturity information and the depositional limits of the Lower Ecca shales, the prospective area of the Lower Ecca shales is primarily in the dry gas window.

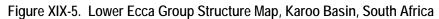






Source: Svensen, H. et al., 2007.





Source: ARI, 2013.



#### 1.2 Reservoir Properties (Prospective Area)

**Lower Ecca Shales.** The Lower Ecca shales include the thick basal Prince Albert Formation, overlain by the thinner Whitehill and Collingham Formations. Each of these sedimentary units has been individually assessed and is discussed below.

**Prince Albert Shale**. The Lower Permian Prince Albert Formation has a thick, thermally mature area for shale gas in the Karoo Basin. Depth to the Prince Albert Shale ranges from 6,000 to over 10,000 ft, averaging about 8,500 ft in the deeper prospective area in the south. The Prince Albert Shale has a gross thickness that ranges from 200 to 800 ft, averaging 400 ft, with a net organic-rich thickness of about 120 ft.

The total organic content (TOC) of the Prince Albert Shale within its organic-rich net pay interval ranges from 1.5 to 5.5%, averaging 2.5%, Figure XIX-6.<sup>8</sup> Local TOC values of up to 12% have been recorded.<sup>9</sup> However, in areas near igneous intrusions much of the organic content may have been lost or converted to graphite.

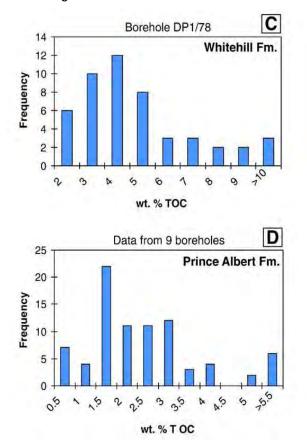
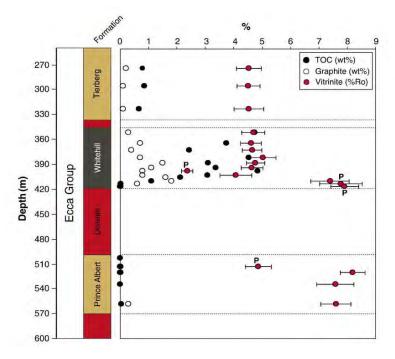
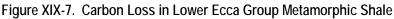


Figure XIX-6. Total Organic Content of Prince Albert and Whitehill Formations

Source: Svensen, H. et al., 2007.

Because of the presence of igneous intrusions, the thermal maturity of the Prince Albert Shale is high, estimated at 2% to 4%  $R_o$ , placing the shale well into the dry gas window. In areas near igneous intrusions, the formation is over-mature, with vitrinite reflectance ( $R_o$ ) values reaching 8%, indicating that the organic content has been transformed into graphite and  $CO_2$ , Figure XIX-7. The Prince Albert Shale was deposited as a deep marine sediment and is inferred to have mineralogy favorable for shale formation stimulation.





Based on limited well data, primarily from the Cranemere CR 1/68 well completed in the Upper Ecca interval, the Prince Albert Shale appears to be overpressured and has a high thermal gradient.

**Whitehill Shale**. The organic-rich Lower Permian Whitehill Formation contains one of the main shale gas targets in the Karoo Basin of South Africa. The depth to the Whitehill Shale ranges from 5,500 to 10,000 ft, averaging 8,000 ft in the prospective area. The Whitehill Shale has an estimated gross organic thickness of 100 to 300 ft,<sup>10</sup> with an average net thickness of 100 ft within the prospective area, as shown by the isopach map on Figure XIX-8.<sup>11</sup>



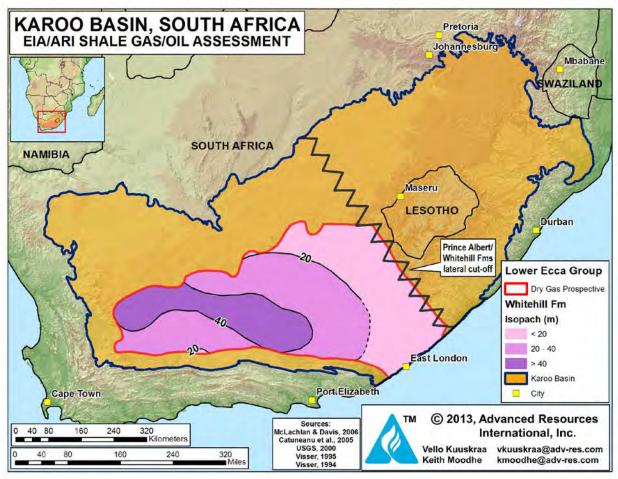


Figure XIX-8. Isopach Map of the Whitehill Formation

Source: ARI, 2013.

The total organic content (TOC) for the Whitehill Shale in the prospective area ranges from 3% to 14%, averaging 6%. Local areas have TOC contents up to 15%.<sup>4</sup> In areas near igneous intrusions, portions of the organic content may have been converted to graphite. The main minerals in the Whitehill Formation are quartz, pyrite, calcite and chlorite, making the shale favorable for hydraulic stimulation. The Whitehill Shale is assumed to be overpressured. The thermal maturity ( $R_o$ ) of the Whitehill Shale in the prospective area ranges from 2% to 4%, placing the shale into the dry gas window.

The hydrogen and oxygen indexes of the Whitehill Formation indicate a mixture of Type I and Type II kerogen.<sup>9</sup> The Whitehill Shales was deposited in deep marine, anoxic setting and contains minor sandy interbeds from distal turbidites and storm deposits.<sup>12,13</sup>



**Collingham Shale**. The Lower Permian Collingham Formation (often grouped with the Whitehill Formation) contains the third shale formation addressed by this resource study. The Collingham Formation has an upward transition from deep-water submarine to shallow-water deltaic deposits.<sup>9</sup> The depth to the Collingham Shale averages 7,800 ft within the prospective area. Except for total organic content, the shale has reservoir properties similar to the Whitehill Shale. It has an estimated gross organic thickness of 200 ft, a net thickness of 80 ft, and TOC of 2% to 8%, averaging 4%. Thermal maturity is high, estimated at 3%  $R_o$ , influenced by igneous intrusions. The shale is assumed to be overpressured based on data from the Upper Ecca Group.

*Upper Ecca Shales.* The Upper Ecca Formation extends over a particularly thick, 1,500 m (~5,000 ft) vertical interval in the central and northern Karoo Basin. The Upper Ecca contains two shale sequences of interest - - the Waterford and the Fort Brown. The Fort Brown Formation accounts for the great bulk of the vertical interval of the Upper Ecca. These shales are interpreted by some investigators to have been deposited in a shallow marine environment,<sup>2</sup> although others categorize them as lacustrine.<sup>14</sup>

The organic content and thermal maturity of the Upper Ecca shales are considerably less than for the Lower Ecca shales. The total organic content (TOC) is reported to range from about 1% to 2%. With a thermal maturity ranging from 0.9% to 1.1%  $R_o$ , the Upper Ecca shales area is in the oil to wet gas window.<sup>15</sup>

In the materials below, we provide a qualitative description for the Upper Ecca shales. However, because their average TOC is below the 2% criterion set for the study, these shales have been excluded from our quantitative assessment.

The boundaries of the prospective area for the Upper Ecca shales are defined by the outcrop of the Upper Ecca on the east, south and west and the shallowing of the Lower Ecca shales on the northeast. The shale oil window is north of the approximately 29° latitude line. A significant basalt intrusion area of about 10,000 mi<sup>2</sup> in the center of the prospective area has been excluded. Major portions of the prospective area have igneous intrusions that have locally destroyed portions of the organics, creating significant exploration risk.

*Fort Brown Shale.* The Fort Brown Shale, as described in the Cranemere CR 1/68 well, is a dark gray to black shale with occasional siltstone stringers. In this well, the Fort Brown Shale exists over a gross interval of nearly 5,000 ft (1,500 m) from 7,012-11,997 ft. Sunset



Energy, the current permit holder in the area surrounding the Cranemere CR 1/68 well, reports that 24-hour DST testing in one interval of the Fort Brown shale, from 8,154-8,312 ft, had a flow rate of 1.84 MMcfd. The well is reported to have blown out at a depth of about 8,300 ft (2,500 m), requiring 10.5 pound per gallon mud to bring the well under control.

The prospective area for the Upper Ecca Fort Brown Shale is estimated at 31,700 mi<sup>2</sup>. The Fort Brown Shale in the prospective area has an average depth of 6,000 ft and ranges from 3,000 to 9,000 ft. The shale has an estimated 600 ft of net organic rich thickness, based on using a net to gross ratio of 20% and an average gross thickness of 3,000 ft. The shale has a total organic content (TOC) that ranges from 1 to 2% and an estimated average thermal maturity of 1.1%  $R_{o}$  (based on limited data).

*Waterford Shale.* The prospective area for the Upper Ecca Waterford Shale is estimated at 20,800 mi<sup>2</sup>. The Waterford Shale in the prospective area has an average depth of 4,500 ft, ranging from 3,000 to 6,000 ft. The shale has an estimated 100 ft of net organic rich thickness within an average gross thickness of 500 ft. Total organic content ranges from 1 to 2%, with average thermal maturity, based on very limited data, of 0.9%  $R_o$ .

#### 1.3 Resource Assessment

*Prince Albert Shale.* Within its 60,180-mi<sup>2</sup> dry gas prospective area, the Prince Albert Shale has a resource concentration of about 43 Bcf/mi<sup>2</sup>. Given limited exploration data, the risked shale gas in-place is estimated at 385 Tcf. Based on favorable TOC and reservoir mineralogy, balanced by complex geology and volcanic intrusions in the prospective area, ARI estimates a risked, technically recoverable shale gas resource of 77 Tcf for the Prince Albert Shale in the Karoo Basin.

*Whitehill Shale.* Within its 60,180-mi<sup>2</sup> dry gas prospective area, the Whitehill Shale has a resource concentration of about 59 Bcf/mi<sup>2</sup>. While somewhat more defined than the Prince Albert Shale, the exploration risk for the Whitehill Shale is still substantial, leading to a risked shale gas in-place of 845 Tcf. Based on favorable reservoir mineralogy but complex geology, ARI estimates a risked, technically recoverable shale gas resource of 211 Tcf for the Whitehill Shale in the Karoo Basin.



**Collingham Shale.** With a prospective area of 60,180 mi<sup>2</sup> and with a resource concentration of 36 Bcf/mi<sup>2</sup>, the risked gas in-place for the Collingham Shale is estimated at 328 Tcf, with a risked, technically recoverable shale gas resource of 82 Tcf.

Considerable uncertainty surrounds the characterization and assessment of the shale oil resources of South Africa, particularly for the net organic-rich thickness and the vertical and areal distribution of thermal maturity. Shale exploration is just starting in the Karoo Basin and few data points exist, particularly for the Upper Ecca group of formations.

#### 1.4 Recent Activity

Falcon Oil & Gas Ltd., an early entrant into the shale gas play of South Africa, obtained an 11,600-mi<sup>2</sup> TCP along the southern edge of the Karoo Basin. Shell obtained a larger 71,400-mi<sup>2</sup> TCP surrounding the Falcon area. Sunset Energy holds a 1,780-mi<sup>2</sup> TCP to the west of Falcon. The Sasol/Chesapeake/Statoil JV TCP area of 34,000 mi<sup>2</sup> and the Anglo Coal TCP application area of 19,300 mi<sup>2</sup> are to the north and east of Shell's TPC, Figure XIX-9. <sup>16</sup>

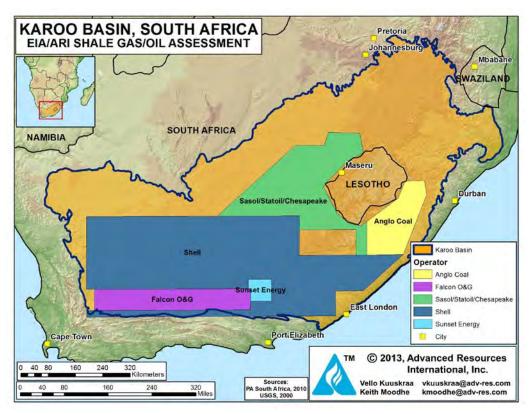


Figure XIX-9. Map Showing Operator Permits in the Karoo Basin, South Africa

Source: ARI, 2013.



Recently, Chevron announced that it would partner with Falcon Oil & Gas to pursue the shale resources of the Karoo Basin, starting with seismic studies.<sup>17</sup>

Five older (pre-1970) wells have penetrated the Ecca Shale interval. Each of the wells had gas shows, while one of the wells - - the Cranemere CR 1/68 well - - flowed 1.84 MMcfd from a test zone at 8,154 to 8,312 ft. The gas production, considered to be from fractured shale, depleted relatively rapidly during the 24-hour test. The CR 1/68 well was drilled to 15,282 ft into the underlying Table Mountain quartzite and had gas shows from six intervals, starting at 6,700 ft and ending at 14,650 ft, indicating that the shales in this area are gas saturated.

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- <sup>4</sup> Branch, T. et al., 2007. "The Whitehill Formation A High Conductivity Marker Horizon in the Karoo Basin." South African Journal of Geology, vol. 110, p. 465-476.
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<sup>&</sup>lt;sup>1</sup> McLachlan, I. and Davis, A., "Petroleum Exploration In The Karoo Basins, South Africa." Petroleum Agency SA, 2006.

- <sup>14</sup> Horsfeld, B. et al., 2009. "Shale Gas: An Unconventional Resource in South Africa? Some Preliminary Observations." 11<sup>th</sup> SAGA Biennial Technical Meeting and Exhibition, Swaziland, 16-18 September, p. 546.
- <sup>15</sup> Raseroka, A.L., 2009. "Natural Gas and Conventional Oil Potential in South Africa's Karoo Basin." AAPG International Conference and Exhibition, 15-18 November, Rio de Janeiro, Brazil.
- <sup>16</sup> Petroleum Exploration and Production Activities in South Africa, Petroleum Agency South Africa, September 2010, <u>http://www.petroleumagencysa.com/files/Hubmap 09-10.pdf</u>.
- <sup>17</sup> Maylie, D., 2012. "Chevron Joins Shale Hunt in South Africa". Wall Street Journal, December 14, <u>www.wsj.com</u> accessed March 29, 2013.



# **EXHIBIT 4**

## **RECONAFRICA INVESTOR PRESENTATION**

# NEWLY DISCOVERED Kavango Basin NAMIBIA & BOTSWANA

## ReconAfrica | September 2020

**RECO :** TSXV ; **RECAF** : OTC ; **0XD :** Frankfurt www.**Recon**Africa.com

# FORWARD-LOOKING INFORMATION

Certain information in this Presentation may constitute "forward-looking information" within the meaning of Canadian securities legislation. Forward-looking information can be identified by the use of forward-looking terminology such as "expects", "plans", "anticipates", "believes", "intends", "estimates", "projects", "aims", "potential", "goal", "objective", "prospective" or variations of such words and phrases or statements that certain actions, events or conditions "will", "would", "may", "can", "could" or "should" occur. All statements other than statements of historical facts included in this Presentation constitute forward-looking information, including, but not limited to, statements with respect to the treatment of Reconnaissance Energy Africa Ltd. ("Reconnaissance" or the "Company") under the regulatory regimes and laws of the jurisdictions in which Reconnaissance conducts its business; drilling and completion of wells; facilities costs and the timing and method of funding thereof; expected timing of development of undeveloped reserves; Reconnaissance's potential future oil and natural gas production levels; the future performance and characteristics of Reconnaissance's oil and natural gas reserves; projections of market prices and costs; projections of supply and demand for oil and natural gas; expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, anticipated exploration and development activities; future capital expenditure programs and the timing and method of financing thereof.

Forward-looking information is necessarily based on the beliefs, estimates, assumptions and opinions of the Company's management on the date the forward-looking information is made, including assumptions regarding future prices for oil and natural gas; future currency and interest rates; Reconnaissance's ability to generate sufficient cash flow from operations; access to debt and/or equity financing to meet its operating costs and future obligations; social, political and economic developments in jurisdictions in which Reconnaissance conducts its business; Reconnaissance's ability to obtain qualified staff and equipment in a timely and cost-efficient manner to meet Reconnaissance's demand; and assumptions related to the factors set forth below. While these factors and assumptions are considered reasonable by the Company as at the date of this Presentation in light of management's experience and perception of current conditions and expected developments, these statements are inherently subject to significant business, economic and competitive contingencies and uncertainties.

Known and unknown factors and risks could cause the actual results, level of activity, performance or achievements of the Company to be materially different from those expressed by such forward-looking information, including, but not limited to: volatility in market prices for oil and natural gas; the continuation of the recent global financial crisis and economic downturn; liabilities inherent in oil and gas exploration activity including operational and environmental risks; uncertainties associated with estimating oil and natural gas reserves; competition for, among other things, capital, acquisitions, undeveloped lands and skilled personnel; incorrect assessments of the value of acquisitions; unanticipated geological, technical, drilling and processing problems; fluctuations in foreign exchange or interest rates and stock market volatility; changes in the laws or application thereof by the governments of the jurisdictions in which Reconnaissance conducts its business; political, social and economic instability in the foreign jurisdictions in which Reconnaissance operations; inability to execute on business plans and strategies; increases to capital expenditure programs and the timing and method of financing thereof; the ability of Reconnaissance to achieve drilling success consistent with management's expectations; higher than expected operating costs; uncertainty with respect to net present values of future net revenues from reserves; lower than anticipated future production levels from Reconnaissance's assets; delays with respect to timing and the bringing on of production; changes to expected plans and costs of drilling; drilling inventory and the presence of oil pools or gas accumulations; increased cost projections; global supply and demand for oil and natural gas; ability and costs of increasing plant capacity; expected levels of royalty rates, operating costs, general and administrative costs, costs of services and other costs and expenses; expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, exploration and development; risks and uncertainties related to infectious diseases or outbreaks of viruses, including the COVID-19 pandemic; and such other risks as disclosed in this Presentation, the Company's annual information form for the year ended December 31, 2019, which is available on SEDAR at www.sedar.com under the Company's profile and the Company's continuous disclosure filings. The forward-looking information contained in this Presentation is expressly qualified by these cautionary statements. Although management of the Company has attempted to identify important factors that could cause actual results to differ materially from those contained in the forward-looking information, there may be other factors that cause results not to be as anticipated, estimated or intended and readers are cautioned that the foregoing list is not exhaustive of all factors and assumptions which may have been used. There can be no assurance that such statements will prove to be accurate, as actual results and future events could differ materially from those anticipated by such statements. Readers are advised not to place undue reliance on forward-looking information.

Except as required by the securities disclosure laws and regulations applicable to the Company, the Company undertakes no obligation to update this forward-looking information if management's beliefs, estimates or opinions, or other factors, should change.



# NEWLY DISCOVERED KAVANGO BASIN

## ReconAfrica controls the entire deep Kavango Basin in Namibia & Botswana

- 8.75 MM acre conventional and unconventional play
  - Areally larger than the Eagle Ford
- One of the largest onshore undeveloped hydrocarbon basins in the world
- Stable governments with globally competitive fiscal terms
  - Licence Contracts
  - Royalties 5% vs 25% in Texas
- Successful Technical Team
  - In depth & proprietary knowledge of the basin
- Just completed \$C23M Capital Raise
  - Twice upsized in response to demand
  - Fully funded work program
  - Near term catalysts
    - ReconAfrica 3 well drilling campaign starting Q4 2020
    - ExxonMobil, Shell & Total et al currently active in country

## **KEY CAP TABLE STATISTICS**

> RECO:TS	XV ; RECAF:OTC	
> Shares of	outstanding	105.5 MM
> Fi	ally diluted	178.0 MM
> In	cludes RECO.WT*	34.4 MM
Current	Share Price	C\$0.64
> Market	Capitalization	C\$67.5 MM
Cash		C\$21.0 MM
> Debt		None
Insider (	Ownership**	20.4%

"Nowhere in the world is there a sedimentary basin this deep that does not produce commercial hydrocarbons."

> - Bill Cathey President, Earthfield Technologies (Houston)

\* Warrants exercisable at C\$1.00 until Aug 20, 2025. Forced conversion clause if RECO trades > C\$3.00 for 20 trading days \*\* Inclusive of Founder & Escrowed Shares

## **RECON**AFRICA ACREAGE LOCATION, FOCUS OF MAJORS



## RECO : TSXV ; RECAF : OTC

Strong Adherence to Rule of Law

Namibia

Former German colony, independent from South Africa since 1990

Infrastructure comparable to developed countries

Vetted by the Majors, competitive petroleum regime

## Botswana

Africa's longest standing democracy, former UK colony, sovereign nation since 1966

Fourth most attractive investment destination in Africa\*

\* Source – Quantum Global Research Lab

# **BOARD OF DIRECTORS & OFFICERS**



#### Jay Park QC Chairman of the Board and Director

- Leading international oil & gas lawyer with experience in seventeen African countries
- Former director of Caracal Energy, acquired by Glencore in 2014 for US\$1.3 billion



#### Carlos Escribano CFO, Chartered Accountant

- Over 10 years' experience in senior level financial management
- Served as CFO for publicly traded multi-national corporations in the resource sector, including leadership roles with Vancouverbased precious metals producers operating in Latin America.
- Mr. Escribano is a Chartered Professional Accountant



#### Scot Evans CEO

Scot Evans is an energy industry leader with a combined 35 years of experience with Exxon and Halliburton. In his last position, Mr. Evans served as Vice President of Halliburton's Integrated Asset Management and Technical Consulting organizations where he grew production from 20K to over 100K barrels of oil equivalent per day, creating the equivalent of a Mid-Cap upstream oil company. He is an expert in developing new field resources.



### Dr. James Granath Director, Structural Geologist

Dr. Granath is a structural geologist with extensive knowledge in African petroleum exploration. His expertise lies in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation. Dr. Granath spent 18 years with Conoco Inc. in research, international exploration, and new ventures. He has worked on projects in some 40 countries around the world.



### Shiraz Dhanani Director, Geophysicist

- Shiraz Dhanani's 40 years of experience with major oil companies, include BP and ExxonMobil, and is concentrated in new country access with a strong focus in Africa.
  - As Technical Director of BP in Libya, he played an integral role in negotiating a multi-billion dollar exploration and appraisal contract. He also commenced the world's largest seismic operation both onshore and offshore Libya, and initiated the extensive exploration drilling program to develop the assets for BP.



### Nick Steinsberger SVP, Drilling & Completions

Nick Steinsberger brings 32 years' experience in petroleum engineering, drilling and completions, production, and surface facilities to ReconAfrica. Nick began his career with Mitchell Energy in 1988 and help turn the Barnett into the industry's first commercial shale play reaching peak production of 5.75 Billion Cubic Feet per day in 2012. Based on its success in the Barnett, Mitchell Energy was sold to Devon Energy for \$3.1 Billion in 2002.



### Doug Allen SVP, Investor Relations

- Mr. Allen is an asset management industry specialist with more than 38 years of experience on both the sell-side and buy-side of the investment industry, and more recently the natural resource development industry.
- He serves as the primary liaison with the broker-dealer and asset management industries, as well as the media.



## Anna Tudela Corporate Secretary & Chief Compliance Officer

- Worked on multi billion dollar transactions in Canada, USA and South America
- Over 30 years of experience working with public companies in the securities and corporate finance areas (Canada and USA)
- Former VP, Diversity, Regulatory Affairs and Corporate Secretary of Goldcorp Inc.
- Advisor to Board of Directors on Cross Culture issues and Governance matters including global governance of subsidiaries An industry champion for Board Diversity

## **Recon**Africa

## RECO : TSXV ; RECAF : OTC

# **TECHNICAL TEAM**



### Scot Evans CEO, Geologist

Scot Evans is an energy industry leader with a combined 35 years of experience with Exxon and Halliburton. In his last position, Mr. Evans served as Vice President of Halliburton's Integrated Asset Management and Technical Consulting organizations where he grew production from 20K to over 100K barrels of oil equivalent per day, creating the equivalent of a Mid-Cap upstream oil company. He is an expert in developing new field resources.



#### Daniel Jarvie Geochemist

Mr. Daniel Jarvie is globally recognized as a leading analytical and interpretive organic geochemist, having evaluated conventional and unconventional petroleum systems around the World. Most notably, he completed the geochemical analysis for Mitchell Energy, in their development of the Barnett Shale of the Fort Worth Basin, in Texas. In 2010, he was awarded "Hart Energy's Most Influential People for the Petroleum Industry in the Next Decade."

### Bill Cathey Geophysicist



Bill Cathey, President and Chief Geoscientist of Earthfield Technology, has over 25 years of potential fields interpretation experience. His clients include Chevron, ExxonMobil, ConocoPhillips and many other major and large independent oil and gas companies. Mr. Cathey performed the entire magnetic survey interpretation of the Kavango Basin for ReconAfrica. Mr. Cathey has served as the Chairman of the Potential Fields Group of the Geophysical Society of Houston, and has been a member of the SEG, AAPG, GHS and HGS.

### Dr. Ansgar Wanke Geologist

Dr. Wanke is a geologist with over 20 years of experience in various fields including regional mapping, geochemistry, hydro- and engineering geology, sedimentology and seismic stratigraphy. He joined the University of Namibia geology department in 2008, reviewed and designed several geology curricula, and headed the department from 2012 to 2015.



## Nick Steinsberger SVP, Drilling & Completions

Nick Steinsberger brings 32 years' experience in petroleum engineering, drilling and completions, production, and surface facilities to ReconAfrica. Nick began his career with Mitchell Energy in 1988 and help turn the Barnett into the industry's first commercial shale play reaching peak production of 5.75 Billion Cubic Feet per day in 2012. Based on its success in the Barnett, Mitchell Energy was sold to Devon Energy for \$3.1 Billion in 2002.

## Dr. James Granath Director, Structural Geologist

Dr. Granath is a director of ReconAfrica and a member of the company's technical team. His expertise lies in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation.



### Dale Mitiska Geologist

Mr. Dale Mitiska has over 30 years of diversified geological and operational experience, devoted to prospecting and development of oil and gas reserves. He has a proven track record for adding value and creating organizational growth. Geological investigations include regional basin analysis, exploration and development mapping, detailed reservoir analysis and description, and prospect generation.





# KAVANGO BASIN UN-RISKED RESOURCE IN PLACE

	Namibia	Botswana	Total
Unconventional	12,018.4	6,155.7	18,174.1
Resource	MMbbl	MMbbl	MMbbl
Conventional	Work in	Work in	
Resource	Progress	Progress	

- Sproule 18.2 Billion barrels OOIP for only the Unconventional Resources, June 30/20
- The high quality Aeromagnetic survey identifies both the deep basin geometry (Unconventional) and the structural traps (Conventional)
- Permian Shales :
  - Both a reservoir for Unconventional resources & source rocks for Conventional traps
- Recent data provides for trap and reservoir identification
  - Potentially significant Conventional resource
  - Sproule & **Recon**Africa working to quantify potential Conventional resources in the Basin

# **BASIN DE-RISKERS**

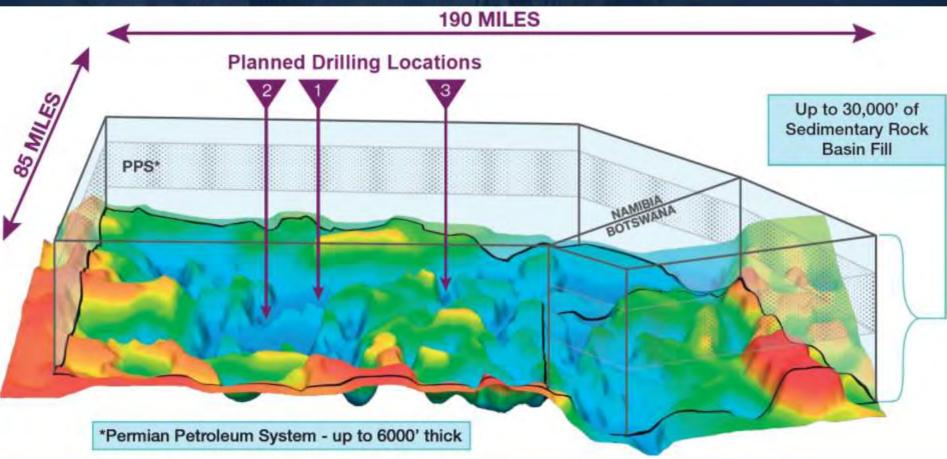
- 1. New High Density Aero-Mag Survey
  - Provides Basin Depth
  - Provides Basin Floor Definition
- 2. Permian Petroleum System
  - Confirmed by ST1 Well
  - Continuous with Main Karoo Basin in SA Permian Unconventional
- 3. Large Conventional Traps Driven by Regional Rift System
  - Advanced Halliburton LithoTect® Modeling
  - Published\* Regional Work Confirms Large Rift Basin
  - Detailed Study Identified Large Prospective Conventional Areas
- 4. Source Rock Geochemistry
  - Estimated Petroleum Generation : Conventional and Unconventional

Recon Africa

\* Granath and Dickson 2017

# 1) NEW HIGH DENSITY AERO-MAG SURVEY

## DEEP KAVANGO RIFT BASIN DEFINITION



ReconAfrica's Drilling Campaign begins 2H 2020. The main objective is to confirm organic rich shales and conventional opportunities in Namibia and Botswana. ReconAfrica licenses 2.45 million acres in Botswana\*, and 6.3 million acres in Namibia, for a total property of 8.75 million acres in the deep Kavango Basin.

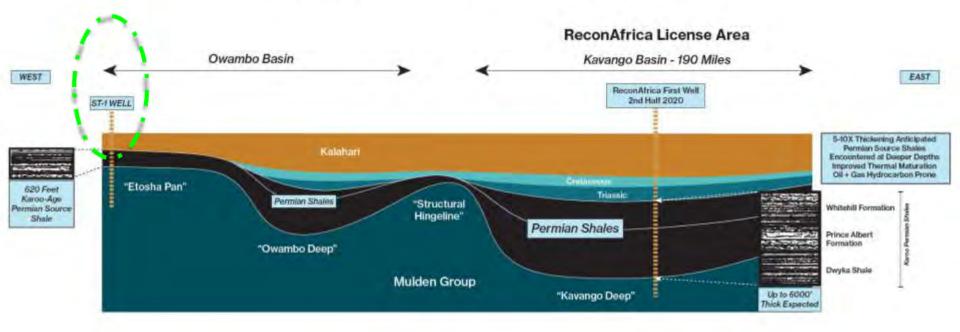
"The Botswana 2.45 million acre permit is subject to a 50% farmout option.

Image provided by Earthfield Technology – March 2020

## 2) PERMIAN PETROLEUM SYSTEM WELL CONTROL

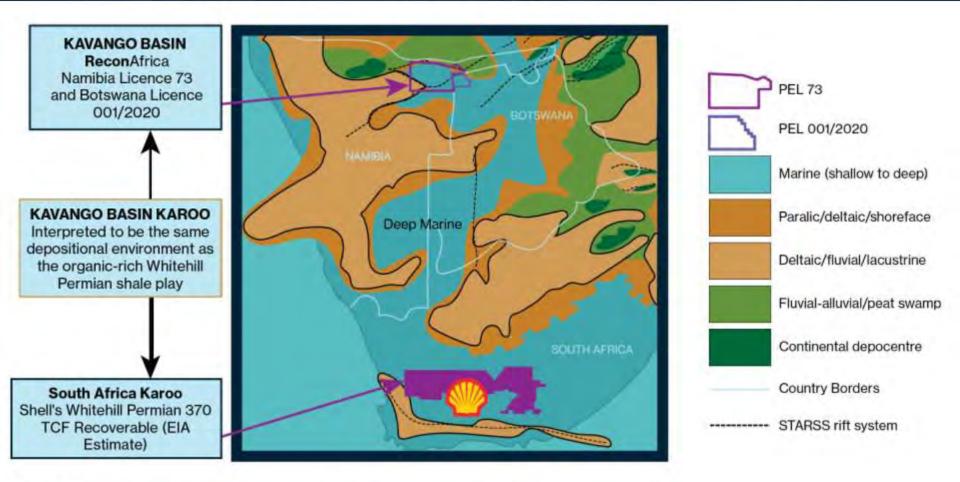
Aeromag and regional data indicates Kavango Basin deepens to the East

- The Permian petroleum system has source/shale rocks in the lower intervals and is modelled to be more thermally mature than the ST1 control well
- Worldwide, Permian rock generates prolific petroleum systems



Source – Dale Mitiska. See Analogous Information Advisory in Appendix A-2

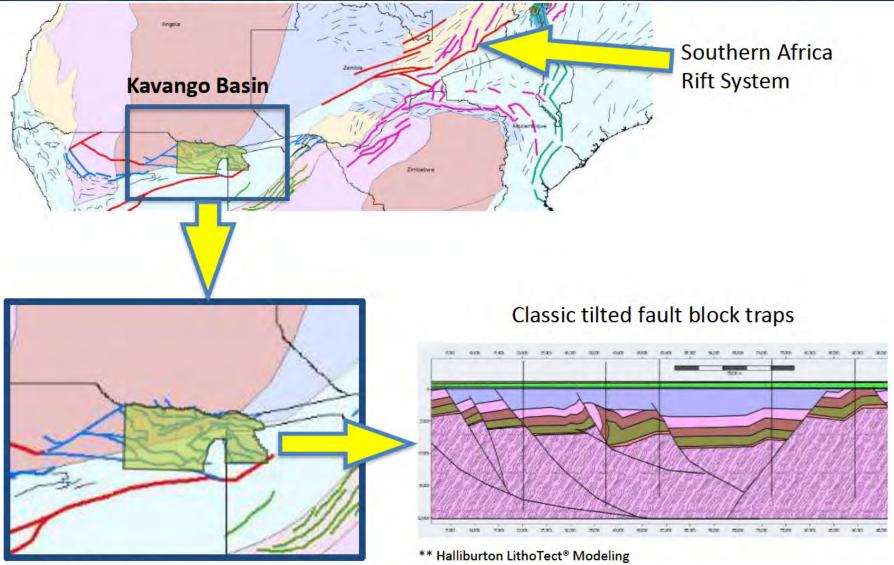
## 2) PERMIAN PETROLEUM SYSTEM (CONT'D) CONTINUOUS WITH SA KAROO BASIN



## Sources:

- 1) Permian Paleogeographic Map provided by Dr. Ansgar Wanke
- Source of Whitehill Permian risked, technically recoverable shale gas resource estimate contained in report of the US Energy Information Administration dated September 2015 entitled "Technically Recoverable Shale Oil and Shale Gas Resources: South Africa". See Analogous Information Advisory in Appendix A-2

# 3) REGIONAL RIFT SYSTEM RIFT BASIN CREATING CONVENTIONAL TRAPS



\* Granath and Dickson 2017

# 4) SOURCE ROCK GEOCHEMISTRY

## ESTIMATED PETROLEUM GENERATION: CONVENTIONAL & UNCONVENTIONAL

	Tota	Petroleum Gene	eration (Expelled	and Retained)			
Conversion	Thickness in Feet						
	200	300	328* on) (mmboe/section)	400 (mmboe/section)	443** (mmboe/section)	500 (mmboe/section)	
	(mmboe/section)	(mmboe/section)					
50% Kerogen Conversion	24	37	40	49	54	61	
75% Kerogen Conversion	37	55	60	73	81	92	

\* net thickness from geological data

\*\* net thickness from Shell's Permian source rock section, Karoo basin, South Africa

50% Kerogen Conversion = ~ 0.84 vitrinite reflectance

75% Kerogen Conversion = ~ 1.10 vitrinite reflectance

Total Petrole	eum Generation Po	tential over Reco	nAfrica's Kavango	o Basin Acreage (8	8.75 million acres	1
Conversion	Thickness in Feet					
	200	300	328	400	443	500
	1641 sections*	1641 sections*	1641 sections*	1641 sections*	1641 sections*	1641 sections
	(billion boe)**	(billion boe)**	(billion boe)**	(billion boe)**	(billion boe)**	(billion boe)**
50% Kerogen Conversion	40	60	66	80	89	100
75% Kerogen Conversion	60	90	99	120	133	150

\* 1641 sections represents 12% of ReconAfrica total holdings of 13,671 sections

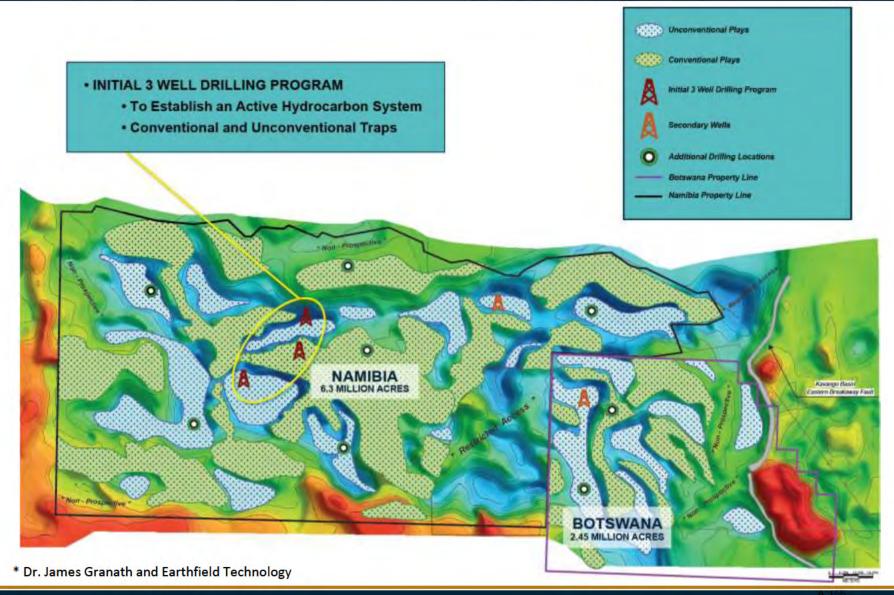
\*\* boe = barrels of oil equivalent

50% Kerogen Conversion = ~ 0.84 vitrinite reflectance

75% Kerogen Conversion = ~ 1.10 vitrinite reflectance

\* Source – Daniel Jarvie, Worldwide Geochemistry LLC. See Appendix A-1

# RESULT; PLAY MAPS DEEP KAVANGO BASIN



## RECO: TSXV ; RECAF : OTC

# **RECON**AFRICA'S COMMITMENT TO DRILLING: CROWN 750 1000 HP DRILLING RIG

- ReconAfrica has acquired the Crown
   750 drilling rig never used
- Rig ownership is expected to reduce overall drilling costs by 60%
- Upgrades currently being made in Houston - on budget
- Shipping to Namibia in Oct 2020
- The right rig for the Kavango Basin - mobile and rated to drill 12,000 vertical feet





# MONETIZING THE HYDROCARBONS; HIGH QUALITY LOCAL INFRASTRUCTURE



Paved highway runs through License Area to Windhoek

ReconAfrica License Area

**Recon**Africa

## RECO : TSXV ; RECAF : OTC

# NAMIBIA & BOTSWANA - LICENCE TERMS

## NAMIBIA

- ReconAfrica owns 90% interest in Petroleum Exploration Licence 73
  - NAMCOR (Namibia state oil company) holds 10%
- Exploration Period:
  - Exploration period continues to January 2024
     Right to extend to January 2026
- 25 year Production Licence follows commercial discovery
- Fiscal terms:
  - 5% royalty
  - 35% corporate income tax

## BOTSWANA

- ReconAfrica holds a 100% working interest in all petroleum rights from surface to basement
  - Subject to 50% Farm-in option
  - **Exploration Period:** 
    - Exploration period continues to June 2024
       O Right to extend to June 2034
  - 25 year Production Licence follows commercial discovery
  - Fiscal terms:
    - Royalties subject to negotiation and range from 3 to 10%

Recon Africa

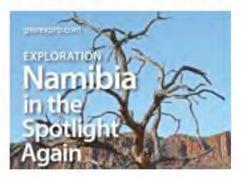
22% corporate income tax

## **Globally competitive fiscal regimes**

# RECONAFRICA INVESTMENT CONCLUSIONS

- Early Mover : Kavango Basin Highly prospective Permian-aged
  - Discovered new <u>deep</u> sedimentary basin licenced entire basin 8.75 million acres
- > Excellent fiscal terms in a stable regulatory and political environment
- Proven technical team in depth & proprietary knowledge of the basin
- Just completed \$C23M Capital Raise
  - Twice upsized in response to demand
  - Fully funded work program
- 2H 2020 Catalyst-rich
  - ReconAfrica spuds 1<sup>st</sup> of 3 wells in Q4
  - Drilling program to confirm active petroleum system
  - ExxonMobil, Shell & Total active in Namibia
  - Significant partnering potential

# **GEO**ExPro



## APPENDIX : DAN JARVIE

# Petroleum Potential for Kavango Basin - ReconAfrica -

## BY DAN JARVIE, WORLDWIDE GEOCHEMISTRY, LLC



RECO : TSXV ; RECAF : OTC

#### Daniel Jarvie GEOCHEMIST

Mr. Daniel Jarvie is globally recognized as a leading analytical and interpretive organic geochemist, having evaluated conventional and unconventional petroleum systems around the World. Most notably, he completed the geochemical analysis for Mitchell Energy, in their development of the Barnett Shale of the Fort Worth Basin, in Texas. In 2010, he was awarded "Hart Energy's Most Influential People for the Petroleum Industry in the Next Decade."

Mr. Jarvie is retired Chief Geochemist for EOG Resources, the largest producer of shale oil resource plays in North America. He is the President of Worldwide Geochemistry, LLC, working as a consultant to industry, focused on unconventional shale resource plays and prospects, and has also established a research lab to evaluate various aspects of unconventional shalegas and shale-oil petroleum systems as well as conventional petroleum systems. His specialties include source rock characterization, especially for resource assessments, and also detailed source rock characterization for conventional petroleum systems analysis, including bulk and compositional kinetic determinations, high resolution light hydrocarbon and fingerprinting analysis, pyrolysis and catalysis studies.

A-1

# APPENDIX : ADDITIONAL DISCLAIMERS

Resources encompasses all petroleum quantities that originally existed on or within the earth's crust in naturally occurring accumulations, including Discovered and Undiscovered (recoverable and unrecoverable) plus quantities already produced. Resources described in this news release are classified in the following categories:

Undiscovered petroleum initially-in-place ("UPIIP") is that quantity of petroleum that is estimated, on a given date, to be contained in accumulations yet to be discovered. The recoverable portion of UPIIP is referred to as Prospective Resources and the remainder is unrecoverable.

Prospective resources are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects. Prospective Resources have both an associated chance of discovery and a chance of development.

Unrecoverable is that portion of UPIIP quantities which is estimated, as of a given date, not to be recoverable by future development projects. A portion of these quantities may become recoverable in the future as commercial circumstances change or technological developments occur; the remaining portion may never be recovered due to the physical/chemical constraints represented by subsurface interaction of fluids and reservoir rocks.

Certain resource estimate volumes disclosed herein and in the Sproule Report are arithmetic sums of multiple estimates of UUPIIP and prospective resources, which statistical principles indicate may be misleading as to volumes that may actually be recovered. Readers should give attention to the estimates of individual classes of resources and appreciate the differing probabilities of recovery associated with each class as explained under this Resource Definitions section.

In this presentation, the Company provides certain historical information concerning reserves or resources, estimates of the volume of reserves or resources, production estimates, historical production amounts, well tests and other information relating to areas in geographical proximity to the Company's property interest, which may be "analogous information" as defined by applicable securities laws. This analogous information is derived from publicly available information sources that the Company believes are predominantly independent in nature and for which references to such information sources have been provided in such sections. Some of this data may not have been prepared by qualified reserves evaluators or auditors and the preparation of any estimates may not be in strict accordance with the COGE Handbook. In addition, estimates by engineering and geo-technical practitioners may vary and the differences may be significant. The Company believes that the provision of this analogous information is relevant to the Company's activities, given its ownership interests and operations (either ongoing or planned) in the areas in question, however, readers are cautioned that there is no certainty that any of the Company's activities in these areas will be successful to the extent in which operations in the areas in which the analogous information is derived from were successful, or at all. Such information is not an estimate of the reserves or resources attributable to the lands held or to be held by the Company and there is no certainty that the reserves and resource data and economics information for the lands held or to be held by the Company will be similar to the information presented herein.

In certain sections of this presentation, the Company provides certain historical, market and industry data and forecasts that were obtained from third-party sources, industry publications and publicly available information, as well as industry data prepared by management on the basis of its knowledge of the areas in which the Company operates. This third-party source information is derived from publicly available information sources that the Company believes are predominantly independent in nature. Historical, market and industry data and forecasts generally state that they have been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. The Company believes that the provision of this third-party source information is relevant to understanding the environment in which the Company's activities, business and operations are carried out, however, readers are cautioned that there is no certainty that any of the Company's activities in these areas will be successful to the extent in which operations in the areas in which the third-party source information is derived from were successful, or at all.

An investment in the securities offered under the proposed financing involves risks that should be carefully considered by prospective investors before purchasing such securities. The risks outlined in the short form prospectus and in the documents incorporated by reference therein should be carefully reviewed and considered by prospective investors in connection with an investment in such securities. See "Risk Factors" in the short form prospectus in the short form prospectus and in the securities.

# CONTACT

## SCOT EVANS, CEO

DOUG ALLEN, SVP IR Email: info@reconafrica .com

## Reconnaissance Energy Africa Ltd.

Vancouver Office Suite 1500 - 999 West Hastings Street Vancouver, BC V6C 2W2 Canada Ph: +1 604 423 5384 (Local) Ph: 1 877 631 1160 (Toll Free Canada & USA)

London Office Level 1, Devonshire House One Mayfair Place London, UK W1J 8AJ Ph: +44 (0) 20 3205 7005

**RECO :** TSXV ; **REC : F** : OTC ; **OXD :** Frankfurt www.**Recon**Africa.com

# **EXHIBIT 5**

# **RECONAFRICA INVESTOR PRESENTATION**

# NEWLY DISCOVERED Kavango Basin NAMIBIA & BOTSWANA

# ReconAfrica July 2020

TSXV: RECO OTC: RECAF Frankfurt: 0XD www.ReconAfrica.com

# FORWARD-LOOKING INFORMATION

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Forward-looking information is necessarily based on the beliefs, estimates, assumptions and opinions of the Company's management on the date the forward-looking information is made, including assumptions regarding future prices for oil and natural gas; future currency and interest rates; Reconnaissance's ability to generate sufficient cash flow from operations; access to debt and/or equity financing to meet its operating costs and future obligations; social, political and economic developments in jurisdictions in which Reconnaissance conducts its business; Reconnaissance's ability to obtain qualified staff and equipment in a timely and cost-efficient manner to meet Reconnaissance's demand; and assumptions related to the factors set forth below. While these factors and assumptions are considered reasonable by the Company as at the date of this Presentation in light of management's experience and perception of current conditions and expected developments, these statements are inherently subject to significant business, economic and competitive contingencies and uncertainties.

Known and unknown factors and risks could cause the actual results, level of activity, performance or achievements of the Company to be materially different from those expressed by such forward-looking information, including, but not limited to volatility in market prices for oil and natural gas, the continuation of the recent global financial crisis and economic downturn; liabilities inherent in oil and gas exploration activity including operational and environmental risks; uncertainties associated with estimating oil and natural gas reserves; competition for, among other things, capital, acquisitions, undeveloped lands and skilled personnel; incorrect assessments of the value of acquisitions; unanticipated geological, technical, drilling and processing problems; fluctuations in foreign exchange or interest rates and stock market volatility; changes in the laws or application thereof by the governments of the jurisdictions in which Reconnaissance conducts its business; political, social and economic instability in the foreign jurisdictions in which Reconnaissance operations, inability to execute on business plans and strategies; increases to capital expenditure programs and the timing and method of financing thereof; the ability of Reconnaissance to achieve drilling success consistent with management's expectations; higher than expected operating costs; uncertainty with respect to net present values of future net revenues from reserves; lower than anticipated future production levels from Reconnaissance's assets; delays with respect to timing and the bringing on of production; changes to expected plans and costs of drilling; drilling inventory and the presence of oil pools or gas accumulations; increased cost projections; global supply and demand for oil and natural gas; ability and costs of increasing plant capacity; expected levels of royalty rates, operating costs, general and administrative costs, costs of services and other costs and expenses; expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, exploration and development; risks and uncertainties related to infectious diseases or outbreaks of viruses, including the COVID-19 pandemic, and such other risks as disclosed in this Presentation, the Company's management discussion and analysis for the nine months ended September 30, 2019, which is available on SEDAR at www.sedar.com under the Company's profile and the Company's other continuous disclosure filings. The forward-looking information contained in this Presentation is expressly gualified by these cautionary statements. Although management of the Company has attempted to identify important factors that could cause actual results to differ materially from those contained in the forward-looking information, there may be other factors that cause results not to be as anticipated, estimated or intended and readers are cautioned that the foregoing list is not exhaustive of all factors and assumptions which may have been used. There can be no assurance that such statements will prove to be accurate, as actual results and future events could differ materially from those anticipated by such statements. Readers are advised not to place undue reliance on forward-looking information.

Except as required by the securities disclosure laws and regulations applicable to the Company, the Company undertakes no obligation to update this forward-looking information if management's beliefs, estimates or opinions, or other factors, should change.

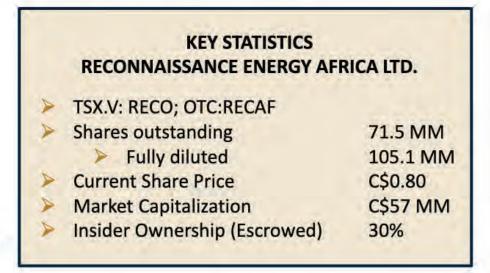
## NEWLY DISCOVERED KAVANGO BASIN, NAMIBIA & BOTSWANA

## ReconAfrica controls the entire deep Kavango Basin – Unprecedented!

- 8.75 MM acre conventional and unconventional play
  - Areally larger than the Eagle Ford
- Potentially the largest undeveloped hydrocarbon basin in the world

Stable governments with Tier 1 fiscal terms

- Successful Technical Team
  - Thorough understanding of the basin
- Near term catalysts
  - ReconAfrica 3 well drilling campaign in Q4 2020
  - ExxonMobil, Shell & Total et al active drilling Q4 2020



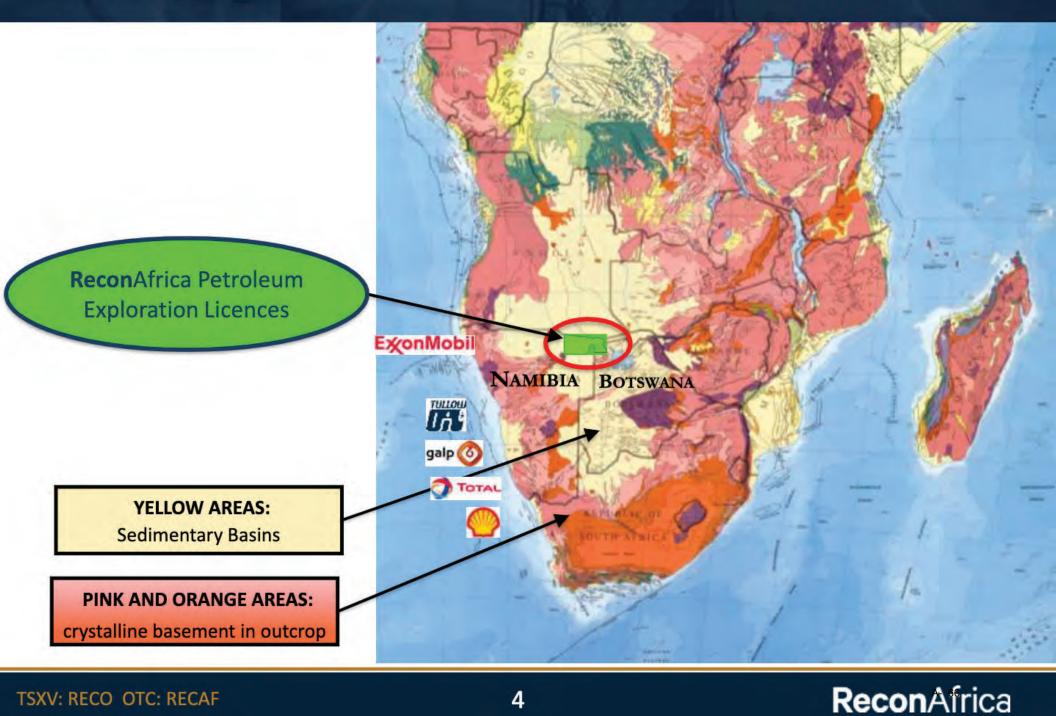
"Nowhere in the world is there a sedimentary basin this deep that does not produce commercial hydrocarbons."

> - Bill Cathey President, Earthfield Technologies (Houston)

> > **Recon**Africa

## TSXV: RECO OTC: RECAF

# **RECON**AFRICA ACREAGE LOCATION, FOCUS OF MAJORS



## TSXV: RECO OTC: RECAF

Strong Adherence to Rule of Law

Namibia

Former German colony, independent from South Africa since 1990 Infrastructure rivaling developed countries Vetted by the Majors, excellent petroleum regime **Botswana** 

Africa's longest standing democracy, former UK colony, sovereign nation since 1966 Most attractive investment destination in Africa\*

\* Source – Quantum Global Research Lab

# **TECHNICAL TEAM**



## Scot Evans COO, Geologist

Scot Evans is an energy industry leader with a combined 35 years of experience with Exxon, Landmark Graphics and Halliburton. In his last position, Mr. Evans served as Vice President of Halliburton's Integrated Asset Management and Technical Consulting organizations with global responsibilities



## Daniel Jarvie Geochemist

Mr. Daniel Jarvie is globally recognized as a leading analytical and interpretive organic geochemist, having evaluated conventional and unconventional petroleum systems around the World. Most notably, he completed the geochemical analysis for Mitchell Energy, in their development of the Barnett Shale of the Fort Worth Basin, in Texas. In 2010, he was awarded "Hart Energy's Most Influential People for the Petroleum Industry in the Next Decade."



## Bill Cathey Geophysicist

Bill Cathey, President and Chief Geoscientist of Earthfield Technology, has over 25 years of potential fields interpretation experience. His clients include Chevron, ExxonMobil, ConocoPhillips and many other major and large independent oil and gas companies. Mr. Cathey performed the entire magnetic survey interpretation of the Kavango Basin for ReconAfrica. Mr. Cathey has served as the Chairman of the Potential Fields Group of the Geophysical Society of Houston, and has been a member of the SEG, AAPG, GHS and HGS.



## Dr. Ansgar Wanke Geologist

Dr. Wanke is a geologist with over 20 years of experience in various fields including regional mapping, geochemistry, hydro- and engineering geology, sedimentology and seismic stratigraphy. He joined the University of Namibia geology department in 2008, reviewed and designed several geology curricula, and has been heading the department from 2012 to 2015.







Nick Steinsberger brings 32 years' experience in petroleum engineering, drilling and completions, production, and surface facilities to ReconAfrica. Nick began his career with Mitchell Energy in 1988 and help turn the Barnett into the industry's first commercial shale play reaching peak production of 5.75 Billion Cubic Feet per day in 2012. Based on its success in the Barnett, Mitchell Energy was sold to Devon Energy for \$3.1 Billion in 2002.

## Dr. James Granath Director, Structural Geologist

Dr. Granath is a director of ReconAfrica and a member of the company's technical team. His expertise lies in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation.



## Dale Mitiska Geologist

Mr. Dale Mitiska has over 30 years of diversified geological and operational experience, devoted to prospecting and development of oil and gas reserves. He has a proven track record for adding value and creating organizational growth. Geological investigations include regional basin analysis, exploration and development mapping, detailed reservoir analysis and description, and prospect generation.



# **BOARD OF DIRECTORS & OFFICERS**



## Jay Park QC CEO and Director

- Leading international oil & gas lawyer with experience in seventeen African countries
- Former director of Caracal Energy, acquired by Glencore in 2014 for US\$1.3 billion



### Carlos Escribano CFO, Chartered Accountant

- Over 10 years' experience in senior level financial management Served as CFO for publicly traded multi-national corporations in
- the resource sector, including leadership roles with Vancouverbased precious metals producers operating in Latin America. Mr. Escribano is a Chartered Professional Accountant



### Dr. James Granath Director, Structural Geologist

Dr. Granath is a structural geologist with extensive knowledge in African petroleum exploration. His expertise lies in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation. Dr. Granath spent 18 years with Conoco Inc. in research, international exploration, and new ventures. Subsequently he has advised many companies on structural geology and tectonics as applied to exploration problems, and has worked on projects in some 40 countries around the world.



### Doug Allen SVP, Investor Relations

- Mr. Allen is an asset management industry specialist with more than 38 years of experience on both the sell-side and buy-side of the investment industry, and more recently the natural resource development industry.
- He serves as the primary liaison with the broker-dealer and asset management industries, as well as the media.



TSXV: RECO OTC: RECAF

### Shiraz Dhanani Director, Geophysicist

- Shiraz Dhanani's expertise, gained over the course of 40 years with major oil companies including BP and ExxonMobil, is concentrated in new country access with a strong focus in Africa.
  - As Technical Director of BP in Libya, he played an integral role in negotiating a multi-billion dollar exploration and appraisal contract. Also while with the BP team he commenced the world's largest seismic operation both onshore and offshore Libya, and initiated the extensive exploration drilling program to develop the assets. Shiraz is also credited for, through a successful drilling and appraisal program, proving the viability of the Silurian black shales in Northern Africa (Tunisia), joint venturing and monetizing the asset to Anadarko in 2011.



7

#### Anna Tudela Corporate Secretary

- Worked on multi billion dollar transactions in Canada, USA and South America
- Over 30 years of experience working with public companies in the securities and corporate finance areas (Canada and USA)
- Former VP, Diversity, Regulatory Affairs and Corporate Secretary of Goldcorp Inc.
- Advisor to Board of Directors on Cross Culture issues and Governance matters including global governance of subsidiaries An industry champion for Board Diversity

# ESTIMATED 31 BILLION BARREL OIL IN PLACE

	Namibia	Botswana	Total
Un-Conventional	12.0 BBO in	5.0 BBO	17.0 BBO*
	Place	in Place	in Place
Conventional	10.3 BBO in	3.7 BBO	14.0 BBO
	Place	in Place	in Place
Total Resource	22.3 BBO in	8.7 BBO	31.0BBO
	Place	in Place	in Place

\* Sproule Estimate

**31.0 Billion Barrel Oil In Place** 

# **BASIN DE-RISKERS**

# 1. New High Density Aero-Mag Survey

- Confirms Basin Depth
- Confirms Basin Floor Definition

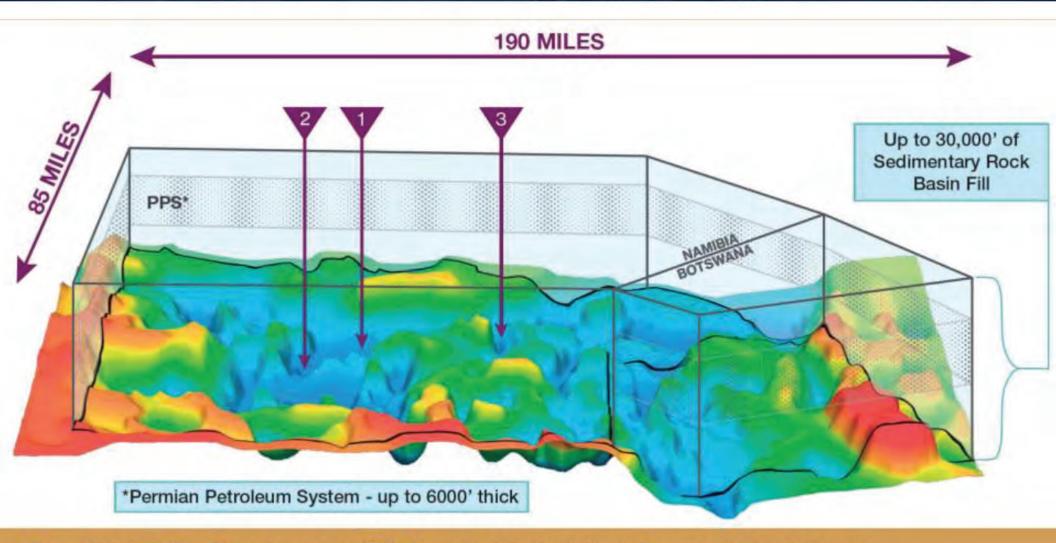
# 2. Permian Petroleum System

- Confirmed by ST1 Well
- Continuous with Shell SA Permian Unconventional

# 3. Large Conventional Traps Driven by Regional Rift System

- Advanced Halliburton LithoTect 
   <sup>®</sup> Modeling
- Regional Work Confirms Large Rift Basin
- Detailed Study Identified Large Prospective Conventional Areas

# 1) DEEP KAVANGO RIFT BASIN DEFINITION



ReconAfrica's Drilling Campaign begins 2020. The main objective is to confirm organic rich shales and conventional opportunities in Namibia and Botswana. ReconAfrica licenses 2.45 million acres in Botswana\*, and 6.3 million acres in Namibia, for a total property of 8.75 million acres in the deep Kavango Basin.

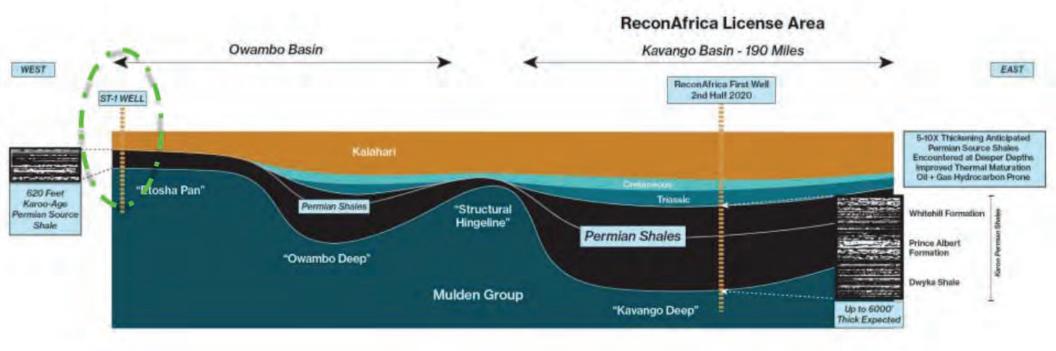
\*The Botswana 2.45 million acre permit is subject to a 50% farmout option.

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# 2) WELL CONTROL

Worldwide, Permian rock generates prolific petroleum systems

As the Kavango Basin deepens to the east the Permian petroleum system thickens with thermally mature source/shale rocks in the lower intervals

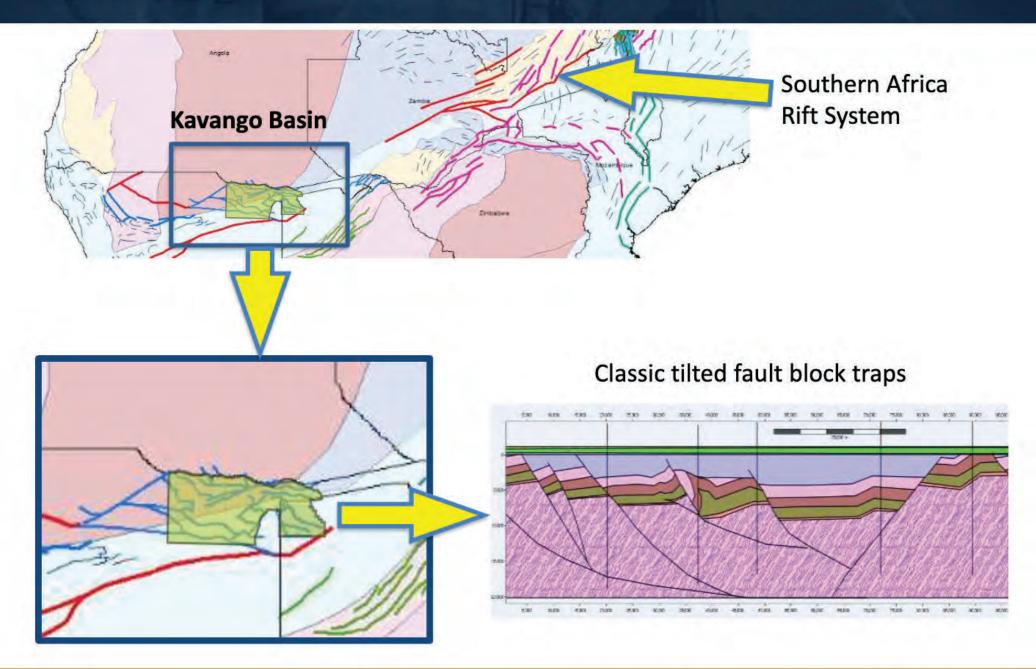


### 2) REGIONAL KAROO PERMIAN SEAWAY



### **Recon**Africa

# 3) RIFT BASIN CREATING CONVENTIONAL TRAPS



### **Recon**Africa

#### TSXV: RECO OTC: RECAF

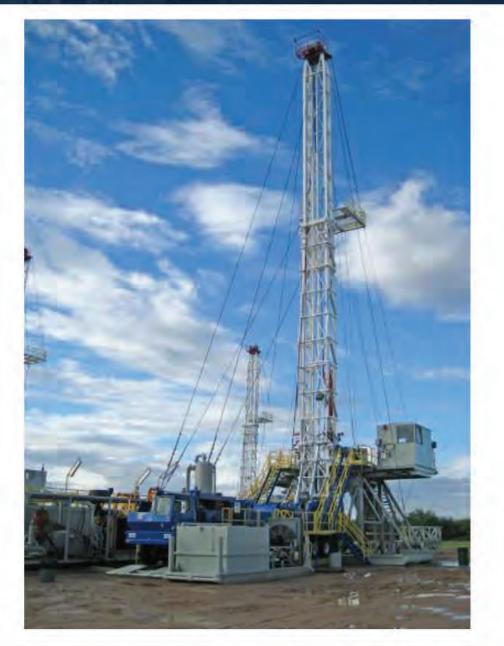
### **RESULT; PLAY MAPS DEEP KAVANGO BASIN** Unconventional Plays - Thick Permian Shales < - 1 **Driginal Oil In Place 17 BBO Conventional Permian - Triassic Plays** Original Oll In Place 14 880 INITIAL 3 WELL DRILLING PROGRAM K Initial 3 Well Drilling Program Proves Active Permian Hydrocarbon System Secondary Wells Conventional and Unconventional Traps Additional Drilling Locations lotswaria Property Line Namibia Property Line 0 NAMIBIA Recorgo Hatty MILLION ACRES ern Breakaway Fair Nost - Pros BOTSWANA 2.45 MILLION ACRE 1210 12210 13

### **Recon**Africa

#### TSXV: RECO OTC: RECAF

# **RECON**AFRICA'S COMMITMENT TO DRILLING: CROWN 750 1000 HP DRILLING RIG

- ReconAfrica has acquired the Crown 750 drilling rig – never used
- Rig ownership will reduce overall drilling costs by 60%
- Upgrades currently being made in Houston - on budget
- Shipping to Namibia in Sept 2020
   on schedule
- The right rig for the Kavango Basin
   mobile and rated to drill 12,000
   vertical feet



### **Recon**Africa

# MONETIZING THE HYDROCARBONS; EXCELLENT LOCAL INFRASTRUCTURE



Paved highway runs through License Area to Windhoek

ReconAfrica License Area

### **Recon**Africa

#### TSXV: RECO OTC: RECAF

### NAMIBIA & BOTSWANA - ATTRACTIVE LICENSE TERMS

### NAMIBIA

- ReconAfrica owns 90% interest in Petroleum Exploration License 73
  - NAMCOR (Namibia state oil company) holds 10%
- Exploration Period:
  - Exploration period continues to January 2024
    - Right to extend to January 2026
- 25 year Production License follows commercial discovery
- Fiscal terms:
  - 5% royalty
  - 35% corporate income tax

### BOTSWANA

- **Recon**Africa holds a 100% working interest in all petroleum rights from surface to basement
  - Subject to 50% Farm-in option to Renaissance
     Oil
  - **Exploration Period:** 
    - An initial 4-year exploration period with renewals up to an additional 10 years 2030
  - 25 year Production License follows commercial discovery

### Fiscal terms:

 Royalties subject to negotiation and range from 3 to 10%.

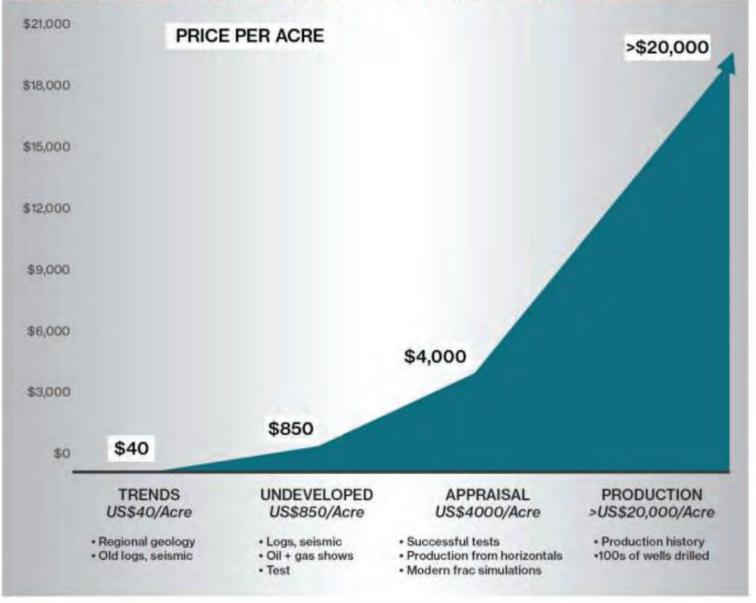
**Recon**Africa

22% corporate income tax

### Amongst the most attractive fiscal regimes worldwide

# SHALE PLAY VALUATION BY ACREAGE (US\$)(BASED ON DATA FROM USA, AUSTRALIA, ARGENTINA)

#### PROGRESS IN COMMERCIALIZATION INCREASES MARKET VALUE OF ACREAGE



 Success with ReconAfrica's 3-well program will bring license to "Undeveloped" stage.

 At current share price, investors in ReconAfrica buy into Kavango Basin at <US\$10/acre</li>

Source: Dolmen Broker Report, Bloomberg & Reuters

#### TSXV: RECO OTC: RECAF

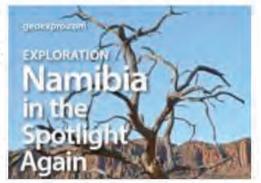
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### **Recon**Africa

# **RECONAFRICA INVESTMENT CONCLUSIONS**

- Early Mover
  - Discovered a new <u>deep</u> sedimentary basin
  - Licensed the entire basin 8.75 million acres
  - Kavango Basin Highly prospective Permian-aged
    - Worldwide, all basins of this depth produce commercial hydrocarbons
      - 3 well drilling program designed to confirm active petroleum system
- Successful technical team in depth knowledge of the basin
- Tier 1 fiscal terms in a stable regulatory and political environment
- 2H 2020 Catalyst-rich
  - ReconAfrica spuds first wells in Q4
  - ExxonMobil, Shell & Total active drilling
  - Excellent partnering potential 2021

# **GEO**ExPro



# **Recon**Africa

# CONTACT

JAY PARK QC, CEO Email: jay.park@reconafrica.com

SCOT EVANS, COO Email: scot.evans@reconafrica.com

Doug Allen, SVP IR Email: doug.allen@reconafrica.com

Reconnaissance Energy Africa Ltd. London Office Level 1, Devonshire House One Mayfair Place London, UK W1J 8AJ Ph: +44 (0) 20 3205 7005

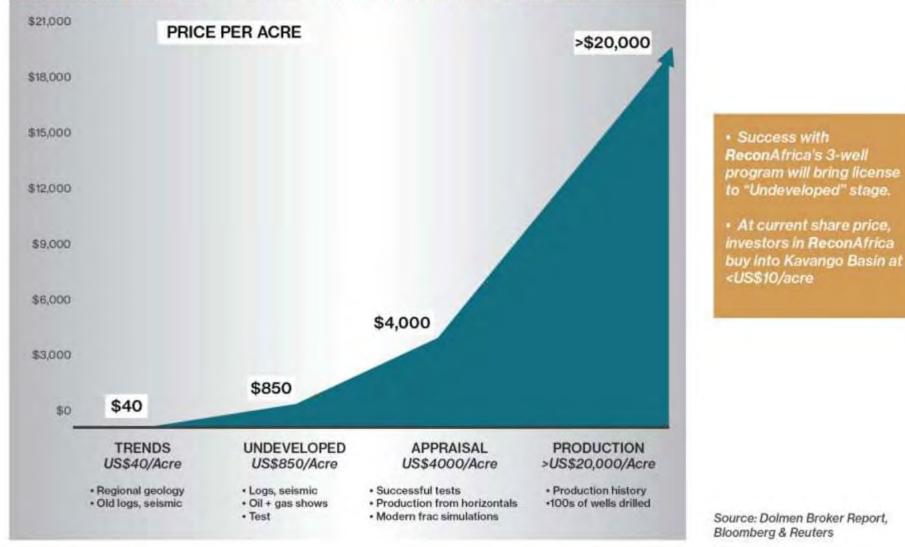
Vancouver Office Suite 1500 - 999 West Hastings Street Vancouver, BC V6C 2W2 Canada Ph: +1 604 423 5384 (Local) Ph: 1877 631 1160 (Toll Free Canada & USA)

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# **EXHIBIT 6**

# SHALE PLAY VALUATION BY ACREAGE (US\$)(BASED ON DATA FROM USA, AUSTRALIA, ARGENTINA)

#### PROGRESS IN COMMERCIALIZATION INCREASES MARKET VALUE OF ACREAGE



# **EXHIBIT 7**

### **RECONAFRICA INVESTOR PRESENTATION**

# NEWLY DISCOVERED Kavango Basin NAMIBIA & BOTSWANA

### Recon AFRICA



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Certain information in this Presentation may constitute "forward-looking information" within the meaning of Canadian securities legislation. Forward-looking information can be identified by the use of forward-looking terminology such as "expects", "plans", "anticipates", "believes", "intends", "estimates", "projects", "aims", "potential", "goal", "objective", "prospective" or variations of such words and phrases or statements that certain actions, events or conditions "will", "would", "may", "can", "could" or "should" occur. All statements other than statements of historical facts included in this Presentation constitute forward-looking information, including, but not limited to, statements with respect to the treatment of Reconnaissance Energy Africa Ltd. ("Reconnaissance" or the "Company") under the regulatory regimes and laws of the jurisdictions in which Reconnaissance conducts its business; drilling and completion of wells; facilities costs and the timing and method of funding thereof; expected timing of development of undeveloped reserves; Reconnaissance's potential future oil and natural gas production levels; the future performance and characteristics of Reconnaissance's oil and natural gas reserves; projections of market prices and costs; projections of supply and demand for oil and natural gas; expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, anticipated exploration and development activities; future capital expenditure programs and the timing and method of financing thereof.

Forward-looking information is necessarily based on the beliefs, estimates, assumptions and opinions of the Company's management on the date the forward-looking information is made, including assumptions regarding future prices for oil and natural gas; future currency and interest rates; Reconnaissance's ability to generate sufficient cash flow from operations; access to debt and/or equity financing to meet its operating costs and future obligations; social, political and economic developments in jurisdictions in which Reconnaissance conducts its business; Reconnaissance's ability to obtain qualified staff and equipment in a timely and cost-efficient manner to meet Reconnaissance's demand; and assumptions related to the factors set forth below. While these factors and assumptions are considered reasonable by the Company as at the date of this Presentation in light of management's experience and perception of current conditions and expected developments, these statements are inherently subject to significant business, economic and competitive contingencies and uncertainties.

Known and unknown factors and risks could cause the actual results, level of activity, performance or achievements of the Company to be materially different from those expressed by such forward-looking information, including, but not limited to: volatility in market prices for oil and natural gas; the continuation of the recent global financial crisis and economic downturn; liabilities inherent in oil and gas exploration activity including operational and environmental risks; uncertainties associated with estimating oil and natural gas reserves; competition for, among other things, capital, acquisitions, undeveloped lands and skilled personnel; incorrect assessments of the value of acquisitions; unanticipated geological, technical, drilling and processing problems; fluctuations in foreign exchange or interest rates and stock market volatility; changes in the laws or application thereof by the governments of the jurisdictions in which Reconnaissance conducts its business; political, social and economic instability in the foreign jurisdictions in which Reconnaissance operations; inability to execute on business plans and strategies; increases to capital expenditure programs and the timing and method of financing thereof; the ability of Reconnaissance to achieve drilling success consistent with management's expectations; higher than expected operating costs; uncertainty with respect to net present values of future net revenues from reserves; lower than anticipated future production levels from Reconnaissance's assets; delays with respect to timing and the bringing on of production; changes to expected plans and costs of drilling; drilling inventory and the presence of oil pools or gas accumulations; increased cost projections; global supply and demand for oil and natural gas; ability and costs of increasing plant capacity; expected levels of royalty rates, operating costs, general and administrative costs, costs of services and other costs and expenses; expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, exploration and development; risks and uncertainties related to infectious diseases or outbreaks of viruses, including the COVID-19 pandemic; and such other risks as disclosed in this Presentation, the Company's annual information form for the year ended December 31, 2020, which is available on SEDAR at www.sedar.com under the Company's profile and the Company's continuous disclosure filings. The forward-looking information contained in this Presentation is expressly qualified by these cautionary statements. Although management of the Company has attempted to identify important factors that could cause actual results to differ materially from those contained in the forward-looking information, there may be other factors that cause results not to be as anticipated, estimated or intended and readers are cautioned that the foregoing list is not exhaustive of all factors and assumptions which may have been used. There can be no assurance that such statements will prove to be accurate, as actual results and future events could differ materially from those anticipated by such statements. Readers are advised not to place undue reliance on forward-looking information.

Except as required by the securities disclosure laws and regulations applicable to the Company, the Company undertakes no obligation to update this forward-looking information if management's beliefs, estimates or opinions, or other factors, should change.



## NEWLY DISCOVERED KAVANGO BASIN

### ReconAfrica controls the entire Kavango Basin in Namibia & Botswana

- 8.5 MM acres covers the entire basin
- One of the largest onshore undeveloped hydrocarbon basins in the world
- Stable governments competitive fiscal terms
  - Licence Contracts
  - Royalties 5% in Namibia
- Successful Technical Team
  - In depth knowledge of the basin
- Strong Cash Position ~C\$70M<sup>(3)</sup>
  - Fully funded six well drilling and multiple 2D seismic programs
- Catalyst-rich near term
  - First well confirmed active petroleum system, light oil and high BTU natural gas shows, exceeding pre-drill expectations
  - Currently drilling the 2<sup>nd</sup> well plus commencing 450km of 2D Seismic June 2021
  - 3<sup>rd</sup> Well Q3 2021
  - Significant partnering potential in Q4 2021

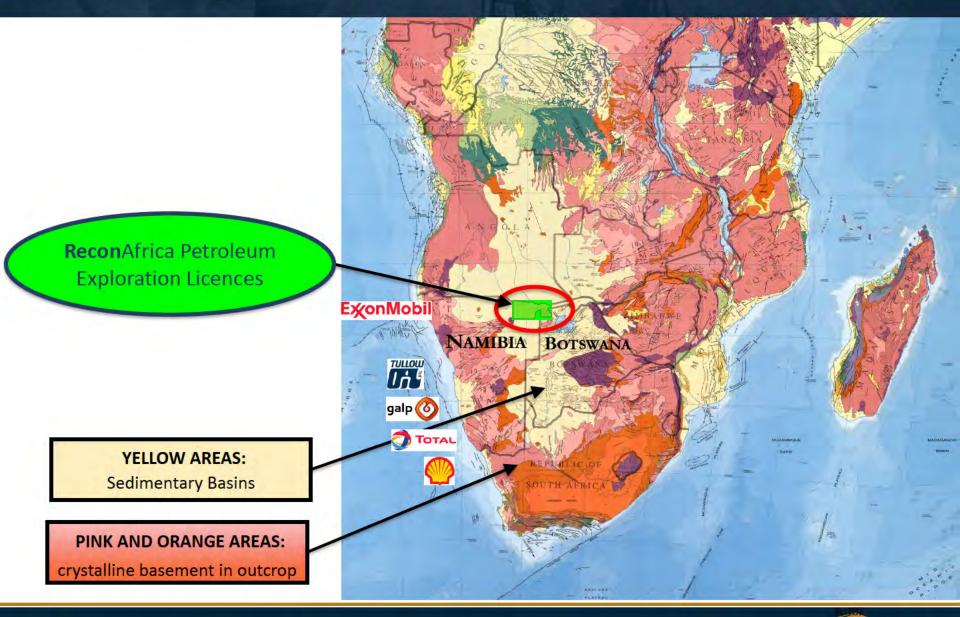
**KEY CAP TABLE STATISTICS** 

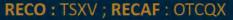
>	RECO:TSXV ; RECAF:OTCQX ; 0X	(D:Frankfurt
>	Shares outstanding	161.2 MM
	Fully diluted	185.5 MM
	Est. Proforma ROE <sup>(1)</sup>	206.0 MM
>	Recent Share Price	C\$8.50
>	Market Capitalization	C\$1.5 BN
>	Debt	None
>	Insider Ownership <sup>(2)</sup>	~12%
	and the second sec	100 M

- (1) Pending completion of Plan of Arrangement between ReconAfrica and Renaissance Oil
- (2) Inclusive of Founder Shares in Escrow and In the Money Dilutive Securities
- (3) After giving effect to the May 2021 Financing



### **RECON**AFRICA ACREAGE LOCATION, FOCUS OF MAJORS

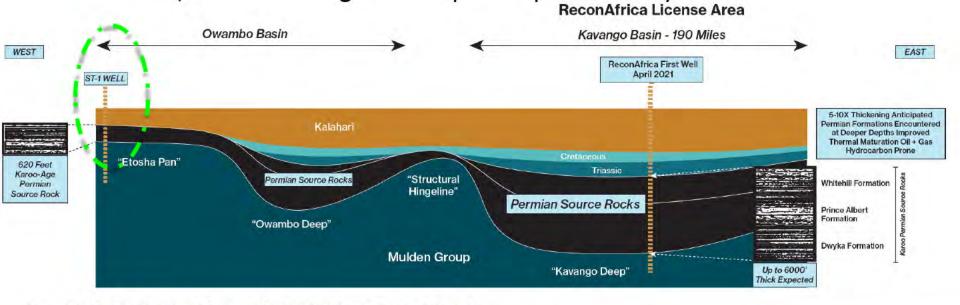






## HOW DID WE DISCOVER THE BASIN?

- The ST-1 Well from the 1960's showed evidence of a Permian aged source rock.
   Aeromag and regional data indicates the Kavango Basin deepens to the East, results of 6-2 and 6-1 wells expected to confirm this along with 2D seismic program
- The Permian petroleum system has source rocks in the lower intervals and is modelled to be more thermally mature than the ST1 control well
- Worldwide, Permian rock generates prolific petroleum systems



Source - Dale Mitiska. See Analogous Information Advisory in Appendix A-2



Strong Adherence to Rule of Law

Namibia

Former German colony, independent from South Africa since 1990

Infrastructure comparable to developed countries

Vetted by the Majors, competitive petroleum regime

### Botswana

Africa's longest standing democracy, former UK colony, sovereign nation since 1966

Fourth most attractive investment destination in Africa\*

\* Source – Quantum Global Research Lab



## **BOARD OF DIRECTORS & OFFICERS**



#### Jay Park QC Chairman of the Board and Director

- Leading international oil & gas lawyer with experience in seventeen African countries
- Former director of Caracal Energy, acquired by Glencore in 2014 for US\$1.3 billion



#### Carlos Escribano CFO, Chartered Accountant

- Over 10 years' experience in senior level financial management
- Served as CFO for publicly traded multi-national corporations in the resource sector, including leadership roles with Vancouver-based precious metals producers operating in Latin America.
  - Mr. Escribano is a Chartered Professional Accountant

#### Nick Steinsberger SVP, Drilling & Completions



#### Scot Evans CEO

Scot Evans is an energy industry leader with a combined 35 years of experience with Exxon and Halliburton. In his last position, Mr. Evans served as Vice President of Halliburton's Integrated Asset Management and Technical Consulting organizations where he grew production from 20K to over 100K barrels of oil equivalent per day, creating the equivalent of a Mid-Cap upstream oil company. He is an expert in new resource development.



#### Dr. James Granath Director, Structural Geologist

Dr. Granath is a structural geologist with extensive knowledge in African petroleum exploration. His expertise lies in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation. Dr. Granath spent 18 years with Conoco Inc. in research, international exploration, and new ventures. He has worked on projects in some 40 countries around the world.



#### Mark Gerlitz Director

Mark Gerlitz is the Principal of Canadian-based MonteLago Consulting providing advisory services to the International Energy Industry. Mr. Gerlitz has over 20 years experience advising States, national and international energy companies across the entire energy value chain. His expertise comprises numerous important areas, including: financing, strategic planning, mergers and acquisitions, joint ventures, partnerships, farm-ins and other business combinations, energy marketing sales, as well as environmental, social and governance matters.



#### Nick Steinsberger brings 32 years' experience in petroleum engineering, drilling and completions, production, and surface facilities to ReconAfrica. Nick began his career with Mitchell Energy in 1988 and helped turn the Barnett into the commercial gas play reaching peak production of 5.75 Billion Cubic Feet per day in 2012. Based on its success in the Barnett, Mitchell Energy was sold to Devon Energy for \$3.1 Billion in 2002.

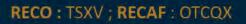
#### Anna Tudela Corporate Secretary & Chief Compliance Officer

- Worked on multi billion-dollar transactions in Canada, USA and South America
- Over 30 years of experience working with public companies in the securities and corporate finance areas (Canada and USA)
- Former VP, Diversity, Regulatory Affairs and Corporate Secretary of Goldcorp Inc.
- Advisor to Board of Directors on Cross Culture issues and Governance matters including global governance of subsidiaries

#### Hon. Diana McQueen SVP, Corp Communications & Stakeholder Relations

- Senior Policy advisor and business development manager in the fields of Energy, Environment, Regulatory, Indigenous Relations and Municipal Issues
- Minister of Energy, Minster of Environment & Water, Minister of Environment & Sustainable Resource Development/Forestry and Climate Change, Minister of Municipal Affairs and Government House leader, and member of numerous committees such as Treasury Board, and Agenda & Priorities.
- Extensive energy and environmental public policy experience at regional, provincial and international levels





7

# **TECHNICAL TEAM**



#### Scot Evans CEO, Geologist

Scot Evans is an energy industry leader with a combined 35 years of experience with Exxon and Halliburton. In his last position, Mr. Evans served as Vice President of Halliburton's Integrated Asset Management and Technical Consulting organizations where he grew production from 20K to over 100K barrels of oil equivalent per day, creating the equivalent of a Mid-Cap upstream oil company. He is an expert in new resource development.



#### Daniel Jarvie Geochemist

Mr. Daniel Jarvie is globally recognized as a leading analytical and interpretive organic geochemist, having evaluated petroleum systems around the World. Most notably, he completed the geochemical analysis for Mitchell Energy, in their development of the Barnett formation of the Fort Worth Basin, in Texas. In 2010, he was awarded "Hart Energy's Most Influential People for the Petroleum Industry in the Next Decade."

#### Bill Cathey Geophysicist



Bill Cathey, President and Chief Geoscientist of Earthfield Technology, has over 25 years of potential fields interpretation experience. His clients include Chevron, ExxonMobil, ConocoPhillips and many other major and large independent oil and gas companies. Mr. Cathey performed the entire magnetic survey interpretation of the Kavango Basin for ReconAfrica. Mr. Cathey has served as the Chairman of the Potential Fields Group of the Geophysical Society of Houston, and has been a member of the SEG, AAPG, GHS and HGS.

#### Dr. Ansgar Wanke Geologist

Dr. Wanke is a geologist with over 20 years of experience in various fields including regional mapping, geochemistry, hydro- and engineering geology, sedimentology and seismic stratigraphy. He joined the University of Namibia geology department in 2008, reviewed and designed several geology curricula, and headed the department from 2012 to 2015.



#### Nick Steinsberger SVP, Drilling & Completions

Nick Steinsberger brings 32 years' experience in petroleum engineering, drilling and completions, production, and surface facilities to ReconAfrica. Nick began his career with Mitchell Energy in 1988 and helped turn the Barnett into the commercial gas play reaching peak production of 5.75 Billion Cubic Feet per day in 2012. Based on its success in the Barnett, Mitchell Energy was sold to Devon Energy for \$3.1 Billion in 2002.

#### Dr. James Granath Director, Structural Geologist

Dr. Granath is a director of ReconAfrica and a member of the company's technical team. His expertise lies in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation.

#### Claire Preece ESG & Corporate Communications

Ms. Claire Preece has over 25 years experience and is well versed in Community and Environment Impact Assessments, environmental and socio-economic reporting, gender development and equity, strategy development, and stakeholder engagement in both private and not-forprofit sectors. Additionally, her work with Boards and Operations teams has allowed her to participate in strategy and planning all the way through to implementation, a valuable continuum of skills and abilities.

#### Shiraz Dhanani Advisory Committee

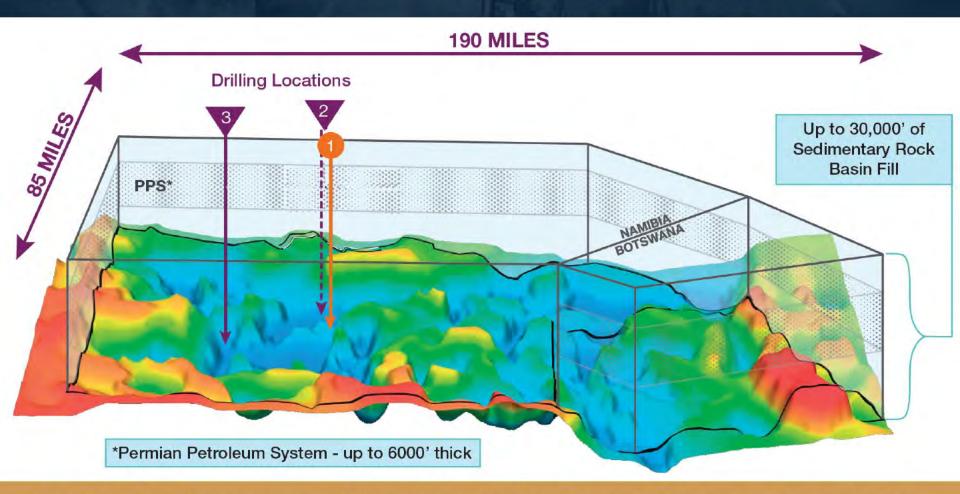
Shiraz Dhanani's 40 years of experience with major oil companies, include BP and ExxonMobil, and is concentrated in new country access with a strong focus in Africa. As Technical Director of BP in Libya, he played an integral role in negotiating a multi-billion dollar exploration and appraisal contract. He also commenced the world's largest seismic operation both onshore and offshore Libya, and initiated the extensive exploration drilling program to develop the assets for BP.





RECO : TSXV ; RECAF : OTCQX

### KAVANGO RIFT BASIN - AERO-MAG SURVEY



ReconAfrica's Drilling Campaign began Q1 2021 and targets three to six wells in the coming year. The main objective is to confirm organic rich source rocks and conventional opportunities in Namibia and Botswana. ReconAfrica's licenses cover 2.2 million acres in Botswana and 6.3 million acres in Namibia, for total licensed land of 8.5 million acres in the Kavango Basin.

Image provided by Earthfield Technology – March 2020



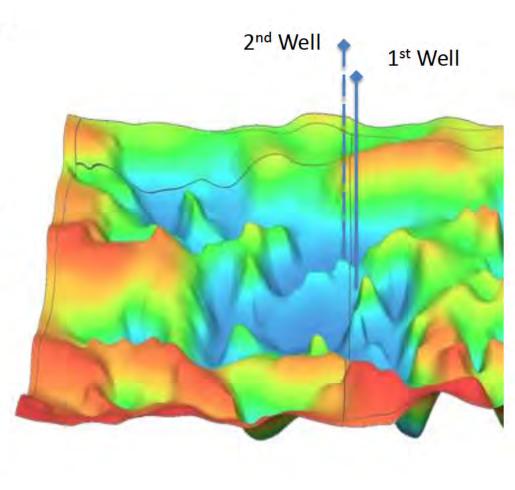
# FIRST WELL DISCOVERS A WORKING CONVENTIONAL PETROLEUM SYSTEM

### Results of the 6-2 Well (First Well)

- Expectation: Evidence of source rocks
- Actual: Over 200m (660ft) of oil/gas shows, oil samples
  - Light oil w/high BTU gas
  - Porous, permeable sediments
  - Marine source rocks and carbonate reservoirs
  - Structurally high suggesting trap

Second Well 6-1: Drilling, ~60 days

- Extension of 6-2 rock in thicker complete petroleum section
  - Results expected end of June / early July





# NEW DISCOVERY OF A WORKING CONVENTIONAL PETROLEUM SYSTEM

- 1<sup>st</sup> well shows migrated, thermogenic petroleum over 3 separate intervals
- 1<sup>st</sup> well proved all key components of a working petroleum system are present (confirmed by independent third parties<sup>(1)</sup>)

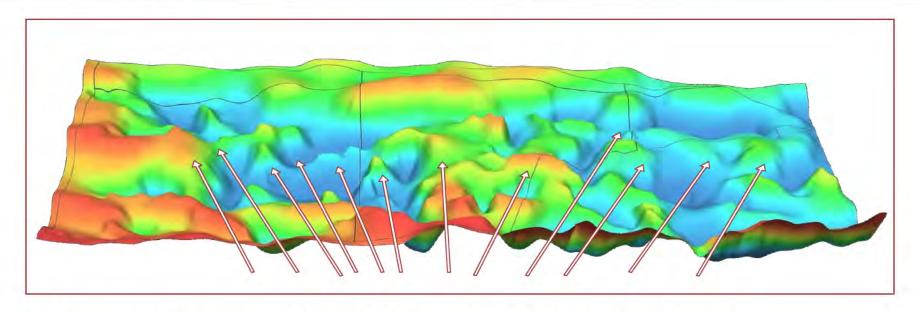
1	Sedimentary Basin	~
	Source Rock	~
	Seal	~
	Reservoir Rock	$\checkmark$

### A remarkable success for the 1st well in a new basin

 Historically most prolific basins take multiple wells to confirm an active petroleum system

<sup>(1)</sup> Schlumberger provided wireline logging services, Netherland Sewell and Associates performing well log analysis, and Geomark Research evaluating petroleum geochemistry

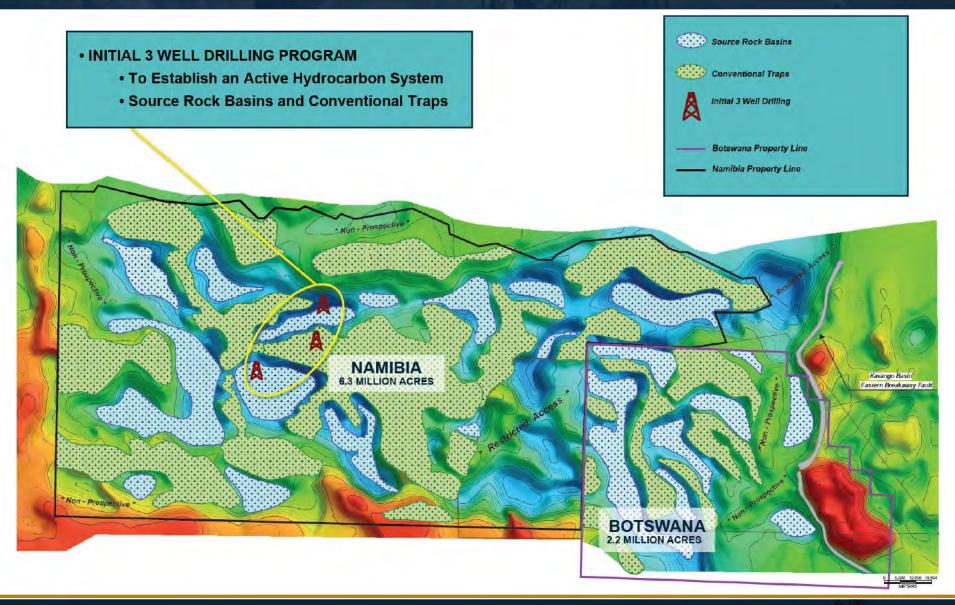
## THIS IS JUST THE BEGINNING



- Numerous large traps identified throughout ReconAfrica's blocks
- All targeting conventional play types
- > Over 5 separate sub-basin play types with multiple potential horizons per play
- 2D Seismic programs set up multi well drilling programs; field delineation; resource definition



### PLAY MAPS DEEP KAVANGO BASIN





RECO : TSXV ; RECAF : OTCQX

### 2D SEISMIC PROGRAM - 450KM JUNE 2021

- Low intensity Polaris Explorer 860 seismic acquisition tractor, designed for environmentally sensitive areas
- Lowest impact seismic acquisition equipment in the world
- Low cost / high quality data
- Weight drop system, no shot holes
- Direct line between 6-2 well and 6-1 well to confirm the geologic model





Polaris 860 Seismic Tractor : Lightest impact equipment available



## COMPANY OWNED (JARVIE-1) DRILLING RIG

- ReconAfrica owns its own 1,000 HP drilling rig
- Rig ownership reduces drilling costs by 50% and provides flexibility
- Rated to drill up to ~13,000 vertical feet
- 1<sup>st</sup> well completed April 2021
- 2<sup>nd</sup> well spud May 2021 targeting 60 days to drill
- 3<sup>rd</sup> well Q3 2021 (4<sup>th</sup> well Q4 2021)
- The right rig for the Kavango Basin. The rig is mobile and designed for drilling vertically into conventional formations.





### MONETIZING THE HYDROCARBONS; HIGH QUALITY LOCAL INFRASTRUCTURE



Paved highway runs through License Area to Windhoek

ReconAfrica License Area

Potential Trans-Zambezi Rail Project - - -



## THE PATH TO PRODUCTION

- Proximity to High Quality Road, Rail and Port Infrastructure
  - Phase 1 Trucking and rail to Walvis Bay
  - Phase 2 Rail extension from railhead through our licence area into Zambia<sup>1</sup>
  - Phase 3 Longer term pipeline solution to be integrated into development plans
- Seaborne Export Market (Brent Benchmark)
  - Deepwater Port at Walvis Bay with existing oil infrastructure
  - Jetties appropriate for 500,000 bbl tankers (Aframax, Suezmax)
- Longer Term Potential
  - Local crude oil refining
  - Domestic and export sales of natural gas

(1) Pending approval of the Trans-Zambezi rail project, from Grootfontein to Rundu and Katima Mulilo



### ENVIRONMENTAL AND COMMUNITY ENGAGEMENT BEST PRACTICES

- Active Engagement with Local Communities
  - Strong local hiring and training policy
  - Safe drinking water well program underway
  - Actively supporting higher levels of education
- Strict adherence to regulations and environmental best practice



- No drilling in environmental sensitive areas, local ecosystems will be protected
- Working in concert with all relevant Government Ministries
- **Environmental Consultation Process** 
  - Comprehensive Stakeholder Consultation, Environmental Impact Assessments and Environmental Management Plans for all projects and activities
  - Received drilling Environment Clearance Certificate in August 2019



### NAMIBIA & BOTSWANA - LICENCE TERMS

### NAMIBIA

- ReconAfrica owns 90% interest in Petroleum Exploration Licence 73
  - NAMCOR (Namibia state oil company) holds 10%
- Exploration Period:
  - Exploration period continues to January 2024
     Right to extend to January 2026
- 25 year Production Licence follows commercial discovery
- Fiscal terms:
  - 5% royalty
  - 35% corporate income tax

### BOTSWANA

- ReconAfrica holds a 100% working interest in all petroleum rights from surface to basement
  - Subject to 50% Farm-in option
  - **Exploration Period:** 
    - Exploration period continues to June 2024
       Right to extend to June 2034
  - 25 year Production Licence follows commercial discovery
  - Fiscal terms:
    - Royalties subject to negotiation and range from 3 to 10%
    - 22% corporate income tax

### **Globally competitive fiscal regimes**

### CATALYST RICH 2021 AND 2022

### Drilling, Seismic, Data Compilation, JV Initiatives

- > 4 Stratigraphic Test Wells of 6 Wells Planned
- 6-2 Well Significantly Exceeded Pre-Drill Expectations
- 6-1 Well Drilling (end of June / early July)
- 5-2 Well Expected Spud (end of July / early August)
- Fourth Well TBD (November)
- Fifth Well / Sixth Well
- > 2D Seismic Program
- 450 km high quality, low impact, environmentally efficient (June to August)
- Additional 2D to evaluate additional sub basins and delineate structural plays
- Farm Out Joint Venture Program
- Q4 2021 following the integration of all data compiled in 2021, with results in Q1 2022



## **RECONAFRICA INVESTMENT CONCLUSIONS**

- ReconAfrica holds 8.5 million acres highly prospective Permian-aged basin
- Remarkable success with 1<sup>st</sup> well (6-2) confirms a working petroleum system
- Attractive fiscal terms
- Supportive governments with stable regulatory and political environment
- Over C\$70 million of cash<sup>(1)</sup>
  - Fully funded 4-6 well drilling program and 2D seismic programs in '21/'22
- Catalyst-rich near term
  - 1<sup>st</sup> well over 200 meters (660ft) of light oil and high BTU natural gas indicators/shows, exceeding pre-drill expectations
  - 2<sup>nd</sup> well drilling / 450km 2D Seismic program June 2021
  - 3<sup>rd</sup> well Q3 2021 (4<sup>th</sup> well Q4 2021)
  - Significant partnering potential in Q4 2021

(1) After giving effect to the May 2021 Financing



### APPENDIX : DAN JARVIE

### Petroleum Potential for Kavango Basin - ReconAfrica -

#### BY DAN JARVIE, WORLDWIDE GEOCHEMISTRY, LLC



#### Daniel Jarvie GEOCHEMIST

Mr. Daniel Jarvie is globally recognized as a leading analytical and interpretive organic geochemist, having evaluated petroleum systems around the World. Most notably, he completed the geochemical analysis for Mitchell Energy, in their development of the Barnett formation of the Fort Worth Basin, in Texas. In 2010, he was awarded "Hart Energy's Most Influential People for the Petroleum Industry in the Next Decade."

Mr. Jarvie is retired Chief Geochemist for EOG Resources, one of the largest independent oil producers in North America. He is the President of Worldwide Geochemistry, LLC, working as a consultant to industry and has also established a research lab to evaluate various aspects of petroleum systems worldwide. His specialties include source rock characterization, especially for resource assessments, and also detailed source rock characterization for conventional petroleum systems analysis, including bulk and compositional kinetic determinations, high resolution light hydrocarbon and fingerprinting analysis, pyrolysis and catalysis studies.



#### RECO : TSXV ; RECAF : OTCQX

### ESTIMATED PETROLEUM GENERATION

	Thickness in Feet						
Conversion	200	300	328*	400	443**	500	
	(mmboe/section)	(mmboe/section)	(mmboe/section)	(mmboe/section)	(mmboe/section)	(mmboe/section)	
50% Kerogen Conversion	24	37	40	49	54	61	
75% Kerogen Conversion	37	55	60	73	81	92	
* net thickness from geological			00	/3	01	52	
* net thickness from Shell's Pe		tion Vouse basin Cou	the Africa				
net thickness from Shell's Pe	ermian source rock sect	tion, karoo basin, sou	ith Africa				
50% Kerogen Conversion = ~ 0.	84 vitrinite reflectance						

Conversion	Thickness in Feet					
	200	300	328	400	443	500
	1641 sections*	1641 sections*	1641 sections*	1641 sections*	1641 sections*	1641 sections
	(billion boe)**	(billion boe)**	(billion boe)**	(billion boe)**	(billion boe)**	(billion boe)*
50% Kerogen Conversion	40	60	66	80	89	100
75% Kerogen Conversion	60	90	99	120	133	150

\* 1641 sections represents 12% of ReconAfrica total holdings of 13,671 sections

\*\* boe = barrels of oil equivalent

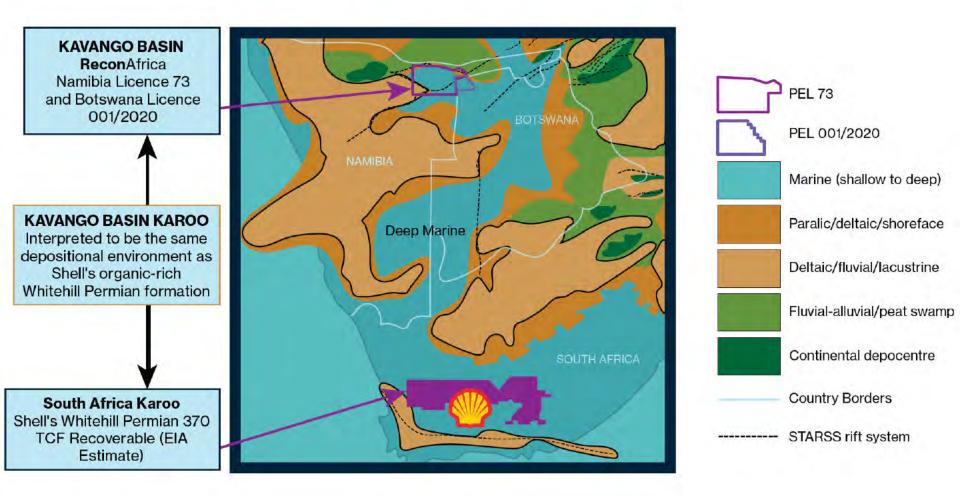
50% Kerogen Conversion = ~ 0.84 vitrinite reflectance

75% Kerogen Conversion = ~ 1.10 vitrinite reflectance

\* Source – Daniel Jarvie, Worldwide Geochemistry LLC. See Appendix A-1



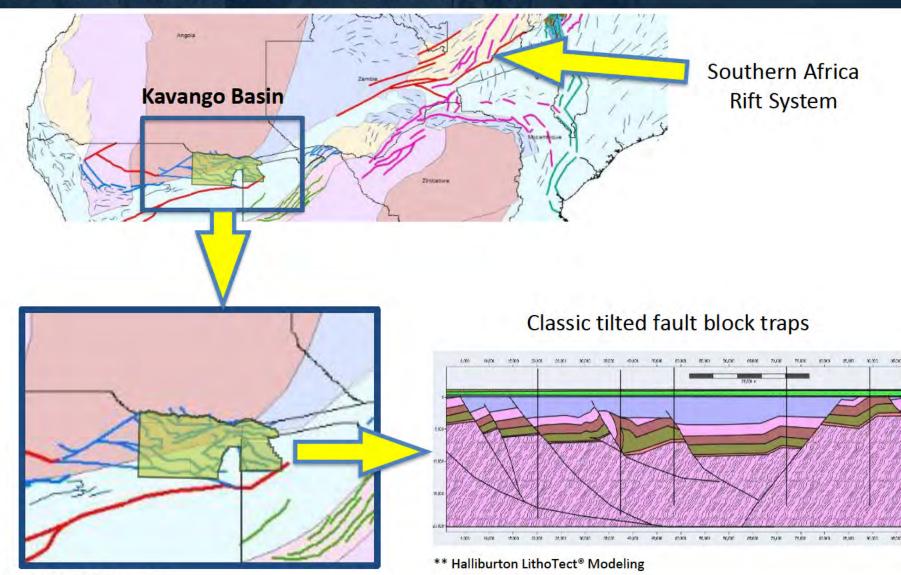
### PERMIAN PETROLEUM SYSTEM (CONT'D) CONTINUOUS WITH SA KAROO BASIN





RECO : TSXV ; RECAF : OTCQX

### **REGIONAL RIFT SYSTEM** RIFT BASIN CREATING CONVENTIONAL TRAPS



\* Granath and Dickson 2017

RECO : TSXV ; RECAF : OTCQX

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### APPENDIX : ADDITIONAL DISCLAIMERS

Resources encompasses all petroleum quantities that originally existed on or within the earth's crust in naturally occurring accumulations, including Discovered and Undiscovered (recoverable and unrecoverable) plus quantities already produced. Resources described in this news release are classified in the following categories:

Undiscovered petroleum initially-in-place ("UPIIP") is that quantity of petroleum that is estimated, on a given date, to be contained in accumulations yet to be discovered. The recoverable portion of UPIIP is referred to as Prospective Resources and the remainder is unrecoverable.

Prospective resources are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects. Prospective Resources have both an associated chance of discovery and a chance of development.

Unrecoverable is that portion of UPIIP quantities which is estimated, as of a given date, not to be recoverable by future development projects. A portion of these quantities may become recoverable in the future as commercial circumstances change or technological developments occur; the remaining portion may never be recovered due to the physical/chemical constraints represented by subsurface interaction of fluids and reservoir rocks.

Certain resource estimate volumes disclosed herein and in the Sproule Report are arithmetic sums of multiple estimates of UUPIIP and prospective resources, which statistical principles indicate may be misleading as to volumes that may actually be recovered. Readers should give attention to the estimates of individual classes of resources and appreciate the differing probabilities of recovery associated with each class as explained under this Resource Definitions section.

In this presentation, the Company provides certain historical information concerning reserves or resources, estimates of the volume of reserves or resources, production estimates, historical production amounts, well tests and other information relating to areas in geographical proximity to the Company's property interest, which may be "analogous information" as defined by applicable securities laws. This analogous information is derived from publicly available information sources that the Company believes are predominantly independent in nature and for which references to such information sources have been provided in such sections. Some of this data may not have been prepared by qualified reserves evaluators or auditors and the preparation of any estimates may not be in strict accordance with the COGE Handbook. In addition, estimates by engineering and geo-technical practitioners may vary and the differences may be significant. The Company believes that the provision of this analogous information is relevant to the Company's activities, given its ownership interests and operations (either ongoing or planned) in the areas in question, however, readers are cautioned that there is no certainty that any of the Company's activities in these areas will be successful to the extent in which operations in the areas in which the analogous information is derived from were successful, or at all. Such information is not an estimate of the reserves or resources attributable to the lands held or to be held by the Company and there is no certainty that the reserves and resource data and economics information for the lands held or to be held by the Company and therein.

In certain sections of this presentation, the Company provides certain historical, market and industry data and forecasts that were obtained from third-party sources, industry publications and publicly available information, as well as industry data prepared by management on the basis of its knowledge of the areas in which the Company operates. This third-party source information is derived from publicly available information sources that the Company believes are predominantly independent in nature. Historical, market and industry data and forecasts generally state that they have been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. The Company believes that the provision of this third-party source information is relevant to understanding the environment in which the Company's activities, business and operations are carried out, however, readers are cautioned that there is no certainty that any of the Company's activities in these areas will be successful to the extent in which operations in the areas in which the third-party source information is derived from were successful, or at all.

An investment in the securities offered under the proposed financing involves risks that should be carefully considered by prospective investors before purchasing such securities. The risks outlined in the short form prospectus and in the documents incorporated by reference therein should be carefully reviewed and considered by prospective investors in connection with an investment in such securities. See "Risk Factors" in the short form prospective investors in connection with an investment in such securities.





## CONTACT

SCOT EVANS, CEO GRAYSON ANDERSEN, INVESTOR RELATIONS

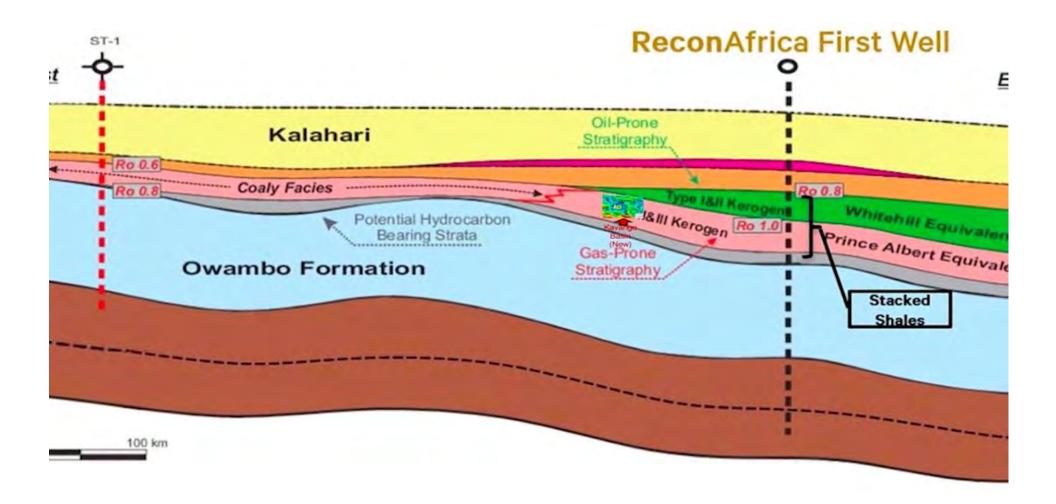
#### **Reconnaissance Energy Africa Ltd.**

Email: investors@reconafrica.com Email: grayson.andersen@reconafrica.com Ph: 1 877 631 1160 (Toll Free Canada & USA)

London Office Level 1, Devonshire House One Mayfair Place London, UK W1J 8AJ Ph: +44 (0) 20 3205 7005

RECO : TSXV ; RECAF OTCOX ; OXD : Frankfurt

# **EXHIBIT 8**



# **EXHIBIT 9**

# NEWLY DISCOVERED Kavango Basin, NAMIBIA

### **Recon**Africa | September 2019

conAfric

### DISCLOSURE

Certain information in this Presentation may constitute "forward-looking" information or statements which involve known and unknown risks, uncertainties, and other factors which may cause the actual results, performance or achievements of Reconnaissance Energy Africa Ltd. ("Reconnaissance" or the "Company"), or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking information or statements. When used in this Presentation, such information or statements often use words such as "anticipate", "may", "will", "could", "would", "expect", "believe", "plan", "intend" and other similar terminology. In particular, this Presentation may include, without limitation, forward-looking information and statements pertaining to the following: the treatment of Reconnaissance under the regulatory regimes and laws of the jurisdictions in which Reconnaissance conducts its business; drilling and completion of wells; facilities costs and the timing and method of funding thereof; expected timing of development of undeveloped reserves; Reconnaissance's potential future oil and natural gas production levels; the future performance and characteristics of Reconnaissance's oil and natural gas properties; the estimated size of Reconnaissance's potential oil and natural gas reserves; projections of market prices and costs; projections of supply and demand for oil and natural gas; expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, anticipated exploration and development activities; future capital expenditure programs and the timing and method of financing thereof.

Forward-looking information contained in this Presentation is based upon certain assumptions and uncertainties, which may prove to be incorrect. In this Presentation, Reconnaissance has made certain assumptions including, but not limited to: future prices for oil and natural gas; future currency and interest rates; Reconnaissance's ability to generate sufficient cash flow from operations, Reconnaissance's ability to access debt and/or equity financing to meet its future obligations; social, political and economic developments in jurisdictions in which Reconnaissance conducts its business; and Reconnaissance's ability to obtain qualified staff and equipment in a timely and cost-efficient manner to meet Reconnaissance's demand.

Actual results could differ materially from those anticipated in these forward-looking statements and information as a result of various risk factors, including: volatility in market prices for oil and natural gas; the potential for the return of conditions persisting during the recent global crisis and economic downturn; liabilities inherent in oil and gas exploration activity including operational and environmental risks; uncertainties associated with estimating oil and natural gas reserves; competition for, among other things, capital, acquisitions, undeveloped lands and skilled personnel; incorrect assessments of the value of acquisitions; unanticipated geological, technical, drilling and processing problems; fluctuations in foreign exchange or interest rates and stock market volatility; changes in the laws or application thereof by the Governments of the jurisdictions in which Reconnaissance conducts its business; political, social and economic instability in the foreign jurisdictions in which Reconnaissance operates; increases to capital expenditure programs and the timing and method of financing thereof; the ability of Reconnaissance to achieve drilling success consistent with management's expectations; higher than expected operating costs; uncertainty with respect to net present values of future net revenues from reserves; lower than anticipated future production levels of Reconnaissance assets; delays with respect to timing and the bringing on of production; changes to expected plans and costs of drilling; drilling inventory and the presence of oil pools or gas accumulations; increased cost projections; global supply and demand for oil and natural gas; ability and costs of increasing plant capacity; expected levels of royalty rates, operating costs, general and administrative costs, costs of services and other costs and expenses; and expectations regarding the ability to raise capital and to continually add to reserves through acquisitions, exploration and development.

Readers are cautioned that the foregoing statements are not exhaustive and reflect current expectations regarding future events and operating performance as of the date of this Presentation. Although the forward-looking information and statements contained in this Presentation are based upon what management of Reconnaissance believes are reasonable assumptions, Reconnaissance cannot assure readers that actual results will be consistent with the forward-looking information and statements. The forward-looking information contained in this Presentation is made as of the date hereof and the Company undertakes no obligation to update publicly or revise any forward looking information, whether as a result of new information, future events or otherwise, unless required by applicable securities laws. All forward looking information contained in this Presentation is cautionary statement.





### NEWLY DISCOVERED KAVANGO BASIN, NAMIBIA

### 6.3 MM acre licensed area

- Captures entire deep Kavango Basin in Namibia
- Large scale shale and conventional play
- Similar size to Eagle Ford shale
- One of the most significant undeveloped basins of such depth globally
- OOIP\* of 12 billion bbls of oil (shale only) (Sproule\*\*, Nov 2018)
- Three well drilling campaign begins Q1 2020

*Origina	l Oil	In Pl	ace
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\*\* Sproule International is a leading Canadian reservoir engineering firm

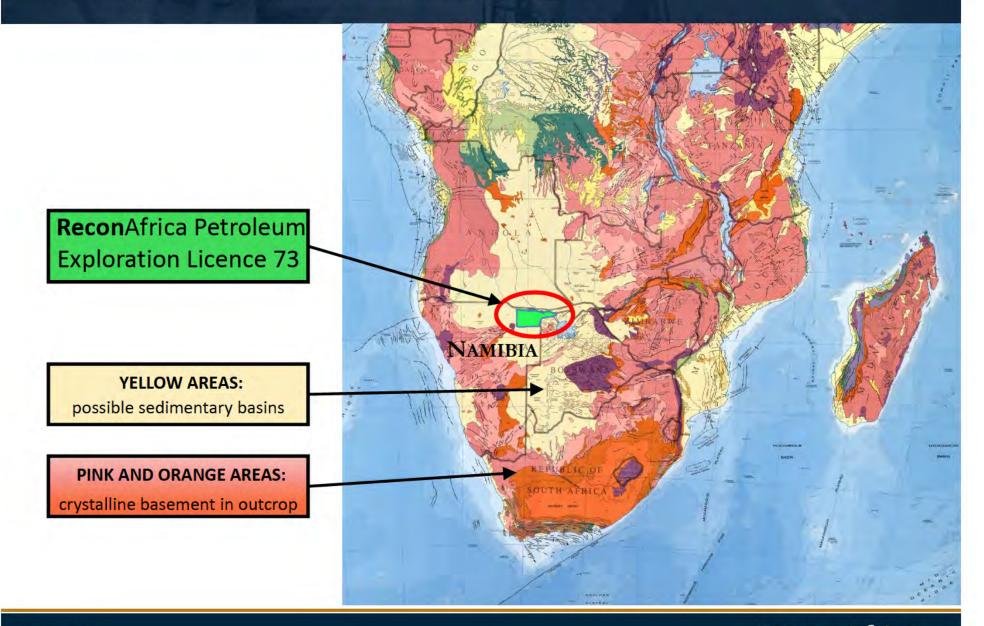
### KEY STATISTICS RECONNAISSANCE ENERGY AFRICA LTD.

>	ISX.V: RECO	Sept 2019
>	Shares outstanding	61.3 MM
>	Market Capitalization	C\$12.2 MN
>	Cash Balance 1 Sept 2019	C\$3.1MM
>	Insider Ownership (Escrowed)	49%

"Nowhere in the world is there a sedimentary basin this deep that does not produce hydrocarbons."

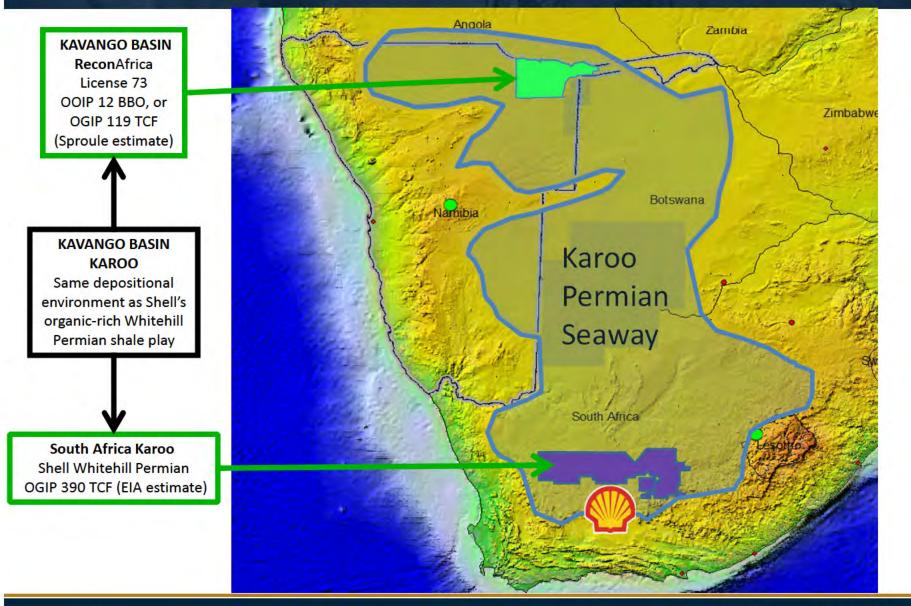
- Bill Cathey President, Earthfield Technologies (Houston)

### **RECONAFRICA BLOCK LOCATION**



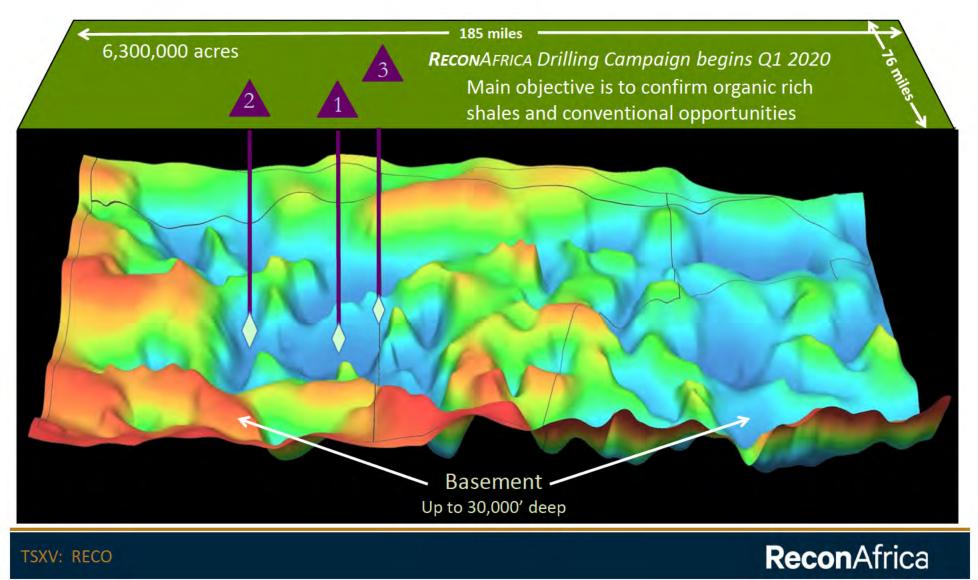


### REGIONAL KAROO PERMIAN ACTIVITY



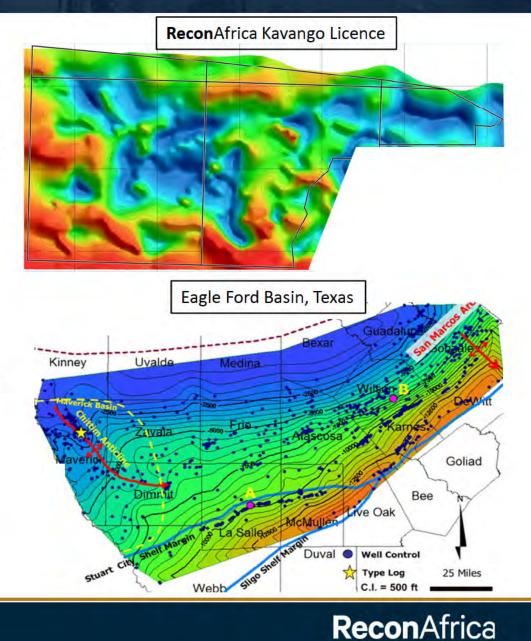


### DEEP KAVANGO BASIN DRILLING LOCATIONS

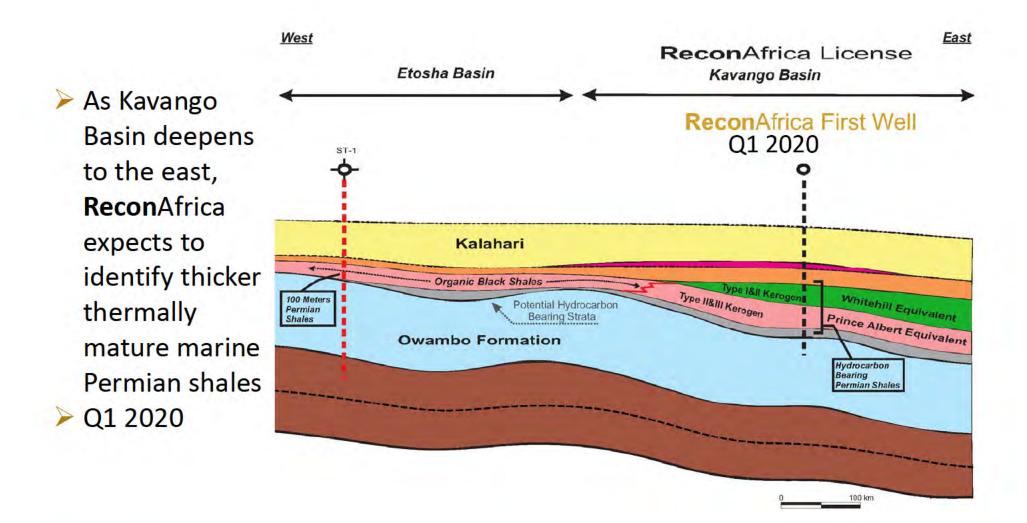


### COMPARISON OF KAVANGO LICENCE & EAGLE FORD

- ReconAfrica holds entire Kavango Basin in Namibia with 6.3 MM acres, 25,000 km<sup>2</sup>
  - Similar in size to entire Eagle Ford shale (6.9 MM acres)
- Sproule estimate for ReconAfrica Kavango rights (shales only):
  - OOIP: 12 Billion Barrels, or
  - OGIP: 119 TCF
  - Technically recoverable: yet to be determined
- EIA estimate for Eagle Ford shales:
  - Technically recoverable: 50 TCF gas, 2.4 Billion Barrels oil
     OOIP = Original Oil in Place
     OGIP = Original Gas in Place



### KAVANGO DEEP BASIN RESOURCE OPPORTUNITY





### CONVENTIONAL AND NON-CONVENTIONAL TARGETS

### Conventional

"...The pre-Cretaceous and subsequent rifted and tilted half-grabens will have set up the right trap configurations... and diversity of facies to encounter reservoir rocks."

- Shiraz Dhanani, ex BP Libya (June 2019)

### **Non-Conventional**

"...Optimal conditions for preserving a thick interval of organic rich marine shales..."

- Sproule Report (Nov 2018)\*

**Recon**Africa

A-220

# In all, the basin is optimally conducive to a functioning petroleum system that must be drilled

\* Sproule International is a leading Canadian reservoir engineering firm



### MONETIZING THE HYDROCARBONS



Paved highway runs through Licence Area to Windhoek

ReconAfrica Licence Area

TSXV: RECO

**Recon**Africa

### ATTRACTIVE NAMIBIA LICENCE TERMS

- ReconAfrica owns 90% interest in Petroleum Exploration Licence 73
  - NAMCOR (Namibia state oil company) holds 10%
- Exploration Phases:
  - First exploration phase requires drilling one well by January 29, 2020
  - Two additional exploration phases to January 2024
    - Right to extend to January 2026
- 25 year Production Licence follows commercial discovery
- Fiscal terms:
  - 5% royalty
  - 35% corporate income tax
- Among the most attractive fiscal regimes worldwide
- Namibia: politically stable, Commonwealth state, rule of law applies



### **BOARD OF DIRECTORS & OFFICERS**



#### Jay Park QC CEO and Director

- Leading international oil & gas lawyer with experience in seventeen African countries
- Former director of Caracal Energy, acquired by Glencore in 2014 for US\$1.3 billion



#### Dr. James Granath Director, Structural Geologist

Worldwide expertise, specifically in Africa, in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation



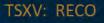
#### Chet Idziszek Director, Geologist

- 40 years experience in resource industry
- 1990 "Mining Man of the Year" award for his vital role in Eskay Creek gold deposit
- Former director of Arequipa Resources, acquired by Barrick Gold in 1996 for >\$1 billion



#### lan Brown CFO, Chartered Accountant

- Over 39 years experience in public company financial reporting and governance
- From 2014 to 2017, Mr. Brown's principal occupation was acting as Chief Financial Officer of Battle Mountain Gold Inc.





### **TECHNICAL TEAM**



#### Daniel Jarvie Geochemist

- Renowned for his geochemical analysis for Mitchell Energy in the development of the Barnett Shale, and former Chief Geochemist for EOG Resources
- In 2010, awarded "Hart Energy's Most Influential People for the Petroleum Industry in the Next Decade"



#### Bill Cathey Geophysicist

- President & Chief Geoscientist of Earthfield Technologies, Bill is a potential new fields expert, with over 35 years of interpretation experience across the globe
- Core clients include Chevron, ExxonMobil and ConocoPhillips



#### Dale Mitiska Geologist

- Proven successful prospect generator
- Over 30 years of diversified operational experience in the exploration and development of oil and gas reserves, including in the Williston Basin/Bakken shale, the San Juan basin, and the Niobrara, Barnett, Marcellus, Eagleford and Woodford shale plays



### **RECENTLY COMPLETED REVERSE TAKEOVER**

- ReconAfrica is the result of the reverse takeover of Lund Enterprises and Reconnaissance, which was completed on 30 August 2019
- As part of that transaction, ReconAfrica raised C\$3.4 MM in a non-brokered private placement, at C\$0.20 per unit, with units comprising one common share and one warrant
  - Each warrant exercisable into one common share at C\$0.50 for a period of 5 years
- The use of proceeds for the placement are:
  - First well of drilling campaign
  - Related G&A



### **RECON**AFRICA HOLDS ENTIRE BASIN

### Basin-sized opportunity: 6.3 MM acres

- Similar in size to entire Eagle Ford shale (6.9 MM acres)
- 2x the size of Barnett shale (3.2 MM acres)

Sproule estimate (shales only):

- OOIP: 12 Billion Barrels, or
- OGIP: 119 TCF

Company estimate (shales only):

- OOIP: 49 Billion Barrels, or
- OGIP: 116 TCF

"...Optimal conditions for preserving a thick interval of organic rich marine shales..."

- Sproule Report (Nov 2018)

Targeting equivalent source rock as Shell's Whitehill Permian marine shale play in South Africa

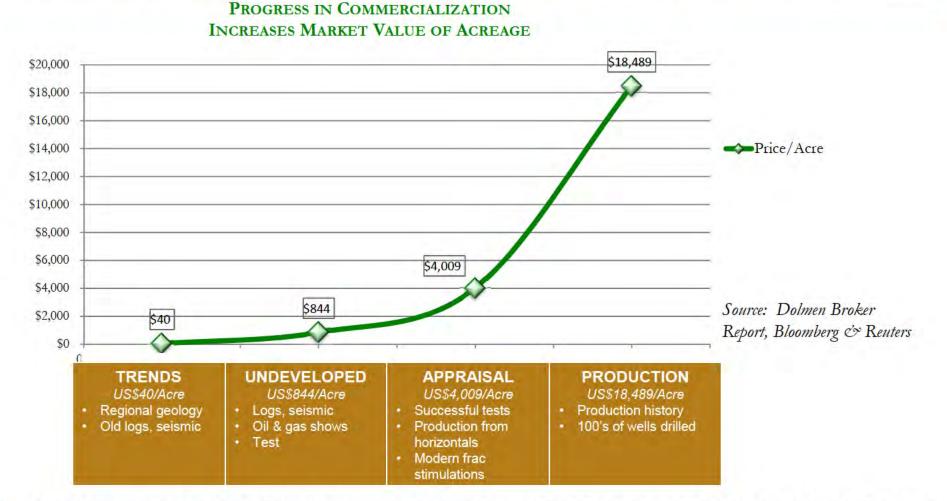


OOIP = Original Oil in Place OGIP = Original Gas in Place

TSXV: RECO

**Recon**Africa

### SHALE PLAY VALUATION BY ACREAGE (US\$)(BASED ON DATA FROM USA, AUSTRALIA, ARGENTINA)



Success with ReconAfrica's 3-well program will bring licence to 'Undeveloped' stage

ReconAfrica's licence has 6.3 million acres

# CONTACT

JAY PARK QC, CEO Email: Jay.Park@ReconAfrica.com

**Reconnaissance Energy Africa Ltd.** Berkeley Square House, Berkeley Square London UK W1J 6BD

www.ReconAfrica.com

# **EXHIBIT 10**



ReconAfrica Ltd. (RECO-V) RECAF-OTCOX, 0XD – Frankfurt) SECTOR: Energy

STOCK PRICE RATING TARGET PRICE RISK

\$11.40 BUY \$16.00 Very High

#### COMPANY UPDATE

#### 6-1 Well Update; TVD to be Reached This Week; Seismic Program Approved

**OUR TAKE:** Overnight, ReconAfrica released an operations update highlighted by the Company and partner NAMCOR receiving regulatory permits to commence 450 km of 2D seismic. The program, which is anticipated to begin in the third week of July, will be serviced by Polaris Natural Resources, a leading seismic contractor, and take an expected 6-8 weeks to complete. The Company also provided a drilling update on the 6-1 stratigraphic well which continues to drill ahead and anticipated to reach total depth on or before July 11. Immediately after reaching total depth, ReconAfrica will commence logging and coring operations which will be conducted using Schlumberger technology.

#### **OTHER HIGHLIGHTS**

Seismic program begins. Following the confirmation of a working petroleum system, acquiring seismic is the next logical step in the exploration program and data will be helpful in identifying structures and potential reservoirs. Part of the program will connect the first two wells (6-2 and 6-1) which are 16 km apart and will provide a clearer picture of the commercial potential of the central portion of the Kavango Basin. All three Explorer 860 source units have arrived at Polaris's base in Rundu, Namibia. Polaris anticipates hiring approximately 100 local personnel with line crew training starting July 6<sup>th</sup>. Of note, the low impact seismic program will be conducted along existing roadways during daylight hours to minimize wildlife disturbance.

#### RECOMMENDED ACTION

RECO continues to offer a unique high risk/high reward opportunity with well-defined near-term cotalysts

Maintaining our Buy rating and target price of \$16.00/sh: As we noted in our June 14, 2021 report, the entering into the Joint Operating Agreement (JOA) with NAMCOR was an important and positive milestone for the Company. While the JOA with NAMCOR was not a unique agreement for RECO — all license holders, by law, have to enter into a JOA — it represented a milestone step in the partnership's effort to establish the prospectivity of the Kavango Basin, with both parties publicly encouraged with results thus far. Our June 14 report stated that the JOA demonstrated that the companies were encouraged with exploration results and optimistic about the potential productivity of the basin — which on hindsight attached too much significance to the JOA itself — we see the following statements from <u>NAMCOR</u> and the <u>Ministry of Mines and Energy</u> as being supportive of the Company and a positive statement about the Company's exploration prospects.

Despite encouraging initial exploration success to date, near-term price direction will be centered on pending core data analysis which will better define the key components of the reservoir rock (porosity, permeability, and fluid saturation) as well as seismic to better define the potential prospectivity of the basin, with the former expected to be released by the end of July.

In addition to the core analysis, the Company has indicated that it expects to release preliminary results from well #2 (6-1) and results from the 2D seismic program in the fall. These pending results are important milestones and will further define the prospectivity.

<b>KEY STATISTICS AND</b>	) METRICS	HAYWOOD ESTIMATES (USD)								
52-Week High/Low	\$13.84/\$0.56		2020A	2021E	2022E					
YTD Performance	411%	Production (boe/d)	0	0	0					
Dividend Yield	N/A	% Gas	nm	nm	nm					
Shares O/S	185.2 MM (fd)	CAPEX (MM)	\$16.8	\$22.7	\$25.0					
Market Capitalization	\$2,112 MM	Cash Flow (MM)	nm	nm	nm					
Net Debt (Q1/21E)	\$65 MM	CFPS (fd)	nm	nm	nm					
Enterprise Value	\$2,046 MM	D/CF	nm	nm	nm					
Daily Volume (3 mos.)	806,000	EV/DACF	nm	nm	nm					
Currency	CS unless noted	EV/BOE/D	nm	nm	nm					

#### VALUATION

**RECO trades at** 0.7x our heavily risked NAV of \$16.00/sh with an unrisked upside ~\$29/sh at a modest field discovery of 500 mmbbls. See page 2 for our sensitivity to chance of commercialization and field size.

#### Valuation: Material Upside as Kavango Play is De-risked

ReconAfrica is an early-stage resource exploration resource play. As a result, we focus on our total risked NAV for RECO, which includes full value for the prospective recoverable resource potential in the Kavango Basin in NE Namibia and NW Botswana as reported by a NI 51-101 compliant resource report prepared by Sproule, which shows a total net un-risked mean prospective resource of 1,256 MMbbls of oil.

In arriving at our 12-month target price of \$16.00/share, we have risked this upside potential by 36%.

#### Figure 1: RECO Net Asset Value

		Oil	Recoverable Re Unrisked	Unrisked		Risked	Risked
	Field Interest	mmbbl <sup>1</sup>	\$/boe	US\$MM <sup>2</sup>	Risk Factor CoC % <sup>3</sup>	US\$MM	C\$/share 4
Exploration Assets					and the desired		1
Kavango Basin							
Namibia - aggregate working interest	90%	831					
Botswana - aggregate working interest	50%	212					
Total net mmbbl		1,044	\$6.39	\$6,672	36%	\$2,385	\$16.00

(1) Based on net unrisked prospective resource potential from a NI 51-101 compliant resource report prepared by Sproule

(2) PV12.5% on long-term Brent price of US\$65/bbl

(3) Chance of commerciality is a product of the risk of a successful commercial discovery and risk of development; CoC = CoSD\*CoD, or 55%\*65%=36%

(4) Calculated on a fully diluted share count of 185.2 MM shares and USD/CAD exchange rate of \$0.80

#### Source: Haywood Securities Inc.

Sensitivity to Chance of Commercial Success: The chance of commerciality (CoC) is the product of chance of commercial discovery and chance of development. Prospective resources carry material risk related to geological chance of success (chance of discovery), as well as chance of development, should a discovery be made. Should the reader wish to test our risked NAV/share, we provide a sensitivity table below for resource levels ranging from 10-1,200 MMbbls and varying risk factors (CoC).

#### Figure 2: Chance of Commerciality Sensitivity

									Ch	ance of C	ommerci	ality								
	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100
10	\$0.03	\$0.05	\$0.08	\$0.10	\$0.13	\$0.16	\$0.18	\$0.21	\$0.23	\$0.26	\$0.29	\$0.31	\$0.34	\$0.37	\$0.39	\$0.42	\$0.44	\$0.47	\$0.50	\$0.
50	\$0.12	\$0.24	\$0.36	\$0.47	\$0.59	\$0.71	\$0.83	\$0.95	\$1.07	\$1.18	\$1.30	\$1.42	\$1.54	\$1.66	\$1.78	\$1.89	\$2.01	\$2.13	\$2.25	\$2.
100	\$0.30	\$0.60	\$0.90	\$1.20	\$1.50	\$1.81	\$2.11	\$2.41	\$2.71	\$3.01	\$3.31	\$3.61	\$3.91	\$4.21	\$4.51	\$4.81	\$5.12	\$5.42	\$5.72	\$6.
250	\$0.52	\$1.03	\$1.55	\$2.06	\$2.58	\$3.10	\$3.61	\$4.13	\$4.64	\$5.16	\$5.68	\$6.19	\$6.71	\$7.22	\$7.74	\$8.26	\$8.77	\$9.29	\$9.80	\$10.
500	\$1.47	\$2.95	\$4.42	\$5.90	\$7.37	\$8.84	\$10.32	\$11.79	\$13.27	\$14.74	\$16.22	\$17.69	\$19.16	\$20.64	\$22.11	\$23.59	\$25.06	\$26.53	\$28.01	\$29.
700	\$2.09	\$4.19	\$6.28	\$8.37	\$10.47	\$12.56	\$14.65	\$16.74	\$18.84	\$20.93	\$23.02	\$25.12	\$27.21	\$29.30	\$31.40	\$33.49	\$35.58	\$37.68	\$39.77	\$41.
925	\$2.37	\$4.74	\$7.11	\$9.47	\$11.84	\$14.21	\$16.58	\$18.95	\$21.32	\$23.68	\$26.05	\$28.42	\$30.79	\$33.16	\$35.53	\$37.89	\$40.26	\$42.63	\$45.00	\$47.
1,200	\$2.63	\$5.27	\$7.90	\$10.53	\$13.17	\$15.80	\$18.43	\$21.06	\$23.70	\$26.33	\$28.96	\$31.60	\$34.23	\$36.86	\$39.50	\$42.13	\$44.76	\$47.40	\$50.03	\$52.

Source: Haywood Securities Inc.



#### Important Information and Legal Disclosures

This report is intended for institutional investors and may only be distributed to non-institutional US clients in the following states: Connecticut, Delaware, Illinois, Louisiana, Maryland, Missouri, New York, Pennsylvania, Tennessee, Virginia, and Wisconsin. Otherwise, this report may only be distributed into those states with an institutional buyer state securities registration exemption.

#### **Analyst Certification**

I, Christopher Jones, hereby certify that the views expressed in this report (which includes the rating assigned to the issuer's shares as well as the analytical substance and tone of the report) accurately reflect my/our personal views about the subject securities and the issuer. No part of my/our compensation was, is, or will be directly or indirectly related to the specific recommendations.

#### Important Disclosures

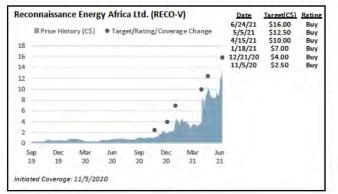
Of the companies included in the report the following Important Disclosures apply:

- The Analyst(s) preparing this report (or a member of the Analysts' households) have a financial interest in ReconAfrica (RECO-V).
- As of the end of the month immediately preceding this publication either Haywood Securities, Inc., one of its subsidiaries, its officers or directors beneficially owned 1% or more of ReconAfrica (RECO-V).
- Haywood Securities Inc. or one of its subsidiaries has managed or co-managed or participated as selling group in a public offering of securities for ReconAfrica (RECO-V) in the last 12 months.
- Haywood Securities, Inc. or one of its subsidiaries has received compensation for investment banking services from ReconAfrica (RECO-V) in the past 24 months.

#### Distribution of Ratings (as of July 8, 2021)

	%	#	IB Clients (TTM)
Buy	83.9%	78	89.7%
Hold	8.6%	8	7.7%
Sell	0.0%	0	0.0%
Tender	1.1%	1	0.0%
UR (Buy)	0.0%	0	0.0%
UR (Hold)	0.0%	0	0.0%
UR (Sell)	0.0%	0	0.0%
Dropped (TTM)	6.5%	6	2.6%

#### Price Chart, Rating and Target Price History (as of July 8, 2021)



B: Buy; H: Hold; S: Sell; T: Tender, UR: Under Review Source: Capital IQ and Haywood Securities

Link to Research Policy: http://haywood.com/what-we-offer/research/research-policy Member of the Canadian Investor Protection Fund

