



ASX Code: MTB

24 September 2018

## PRESENTATION IN RESPECT OF VANADIUM AND GERMANIUM

The Company has compiled the attached presentation relating specifically to Vanadium and Germanium at the Kihabe/Nxuu Zn/Pb/Ag Project in Botswana. This is in response to a request from the Ministry of Mines in Botswana.



**KIHABE-NXUU**  
**Zn/Pb/Ag/V/Ge PROJECT**  
**BOTSWANA**

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# Is Vanadium the Energy Storage Solution of the Future?

Date: Sep 14, 2018

Vanadium is an abundant silvery-gray metal, cousin to niobium and tantalum, that is primarily mined in China, Russia, South Africa and Brazil. Part one of our vanadium coverage will focus on the invention, use and applications of vanadium batteries.

While there has been a lot of discussion around which metals will be used in electric vehicle (EV) batteries, predominantly in the nickel, cobalt and lithium space, the EV sector isn't the only one that needs to secure a long term sustainable, green and efficient energy supply.

Vanadium has been pegged as an up and coming energy storage metal especially in relation to large scale applications due to its ability to store extensive amounts of energy.

Invented decades ago, vanadium redox flow batteries, or VRFBs, have only recently gained popularity as a contender for large scale energy storage. VRFBs are a viable option for large scale storage because they are able to provide hundreds of megawatt hours at grid scale. Meaning, they are able to be charged thousands of times without losing capacity, while holding large amounts of energy.

## How it works

The positive and negative sides of a vanadium redox-flow battery are separated by a membrane that selectively allows protons to pass through. While charging, the applied voltage causes vanadium ions to lose one electron each on the positive side. The freed electrons flow through the outside circuit to the negative side, where they are stored.

During use, those stored electrons are released, allowing them to flow back through the outside circuit to the positive side.

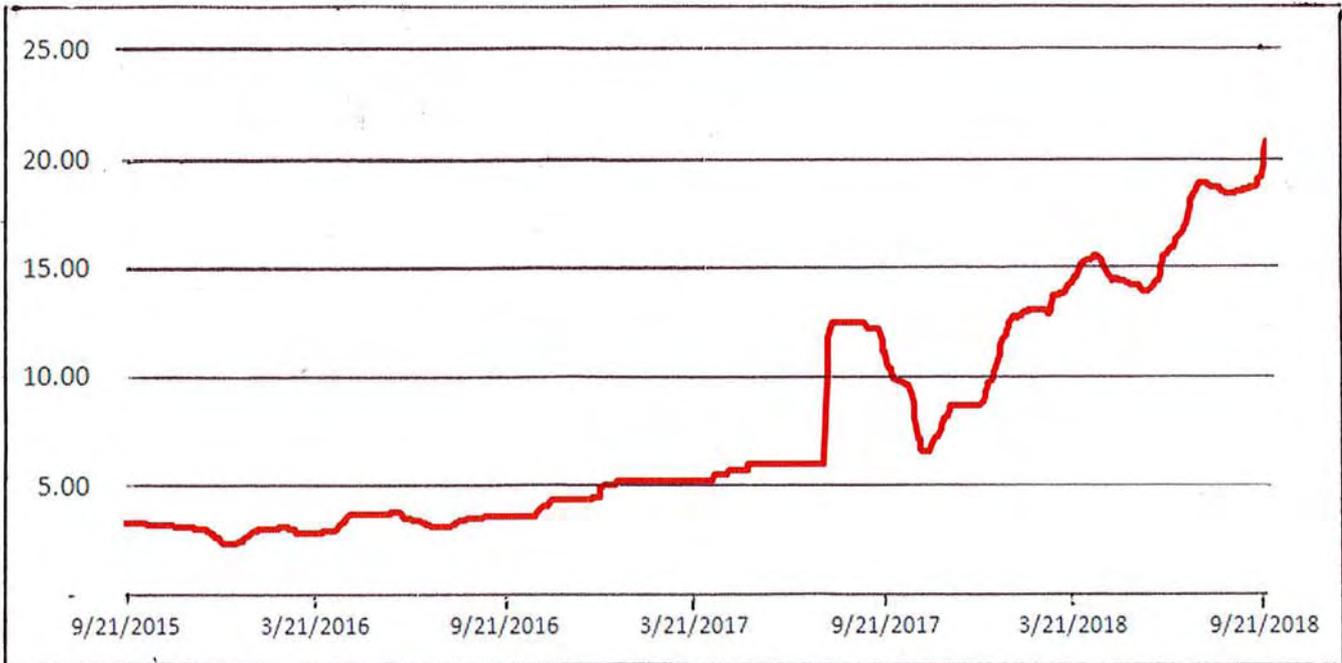
Since their inception in 1984, VRFBs have slowly advanced and refined their storage capacity and delivery technique. The first generation of vanadium batteries weren't able to hold much energy, roughly 12 to 15 watt-hours per liter of electrolyte.

In order to perform, the batteries had to be extremely large, approximately the size of a one or two basketball courts, making them an unrealistic energy solution.

In the 30 plus years since then, VRFBs have come a long way. Today's vanadium batteries are produced in high tech giga-factories, and are a third of the size as the gigantic VRFBs of the 80s. Not only are they smaller, they pack double the energy capacity of the first generation batteries.

<https://www.vanadiumprice.com/is-vanadium-the-energy-storage-solution-of-the-future/>

## Vanadium Pentoxide 98% Min. China US\$ per pound for Last Three Years



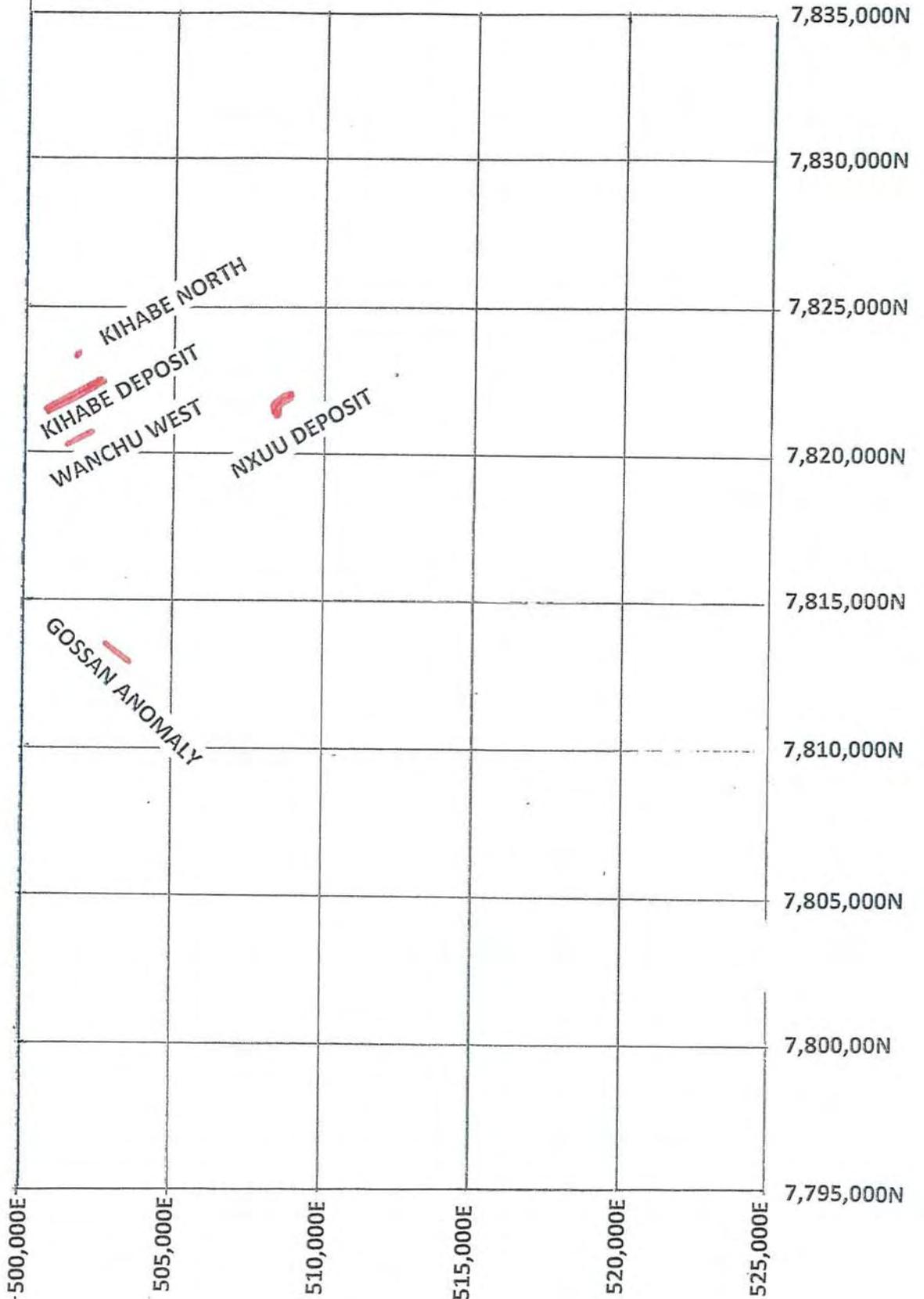
thanks to [www.vandiumprice.com](http://www.vandiumprice.com)

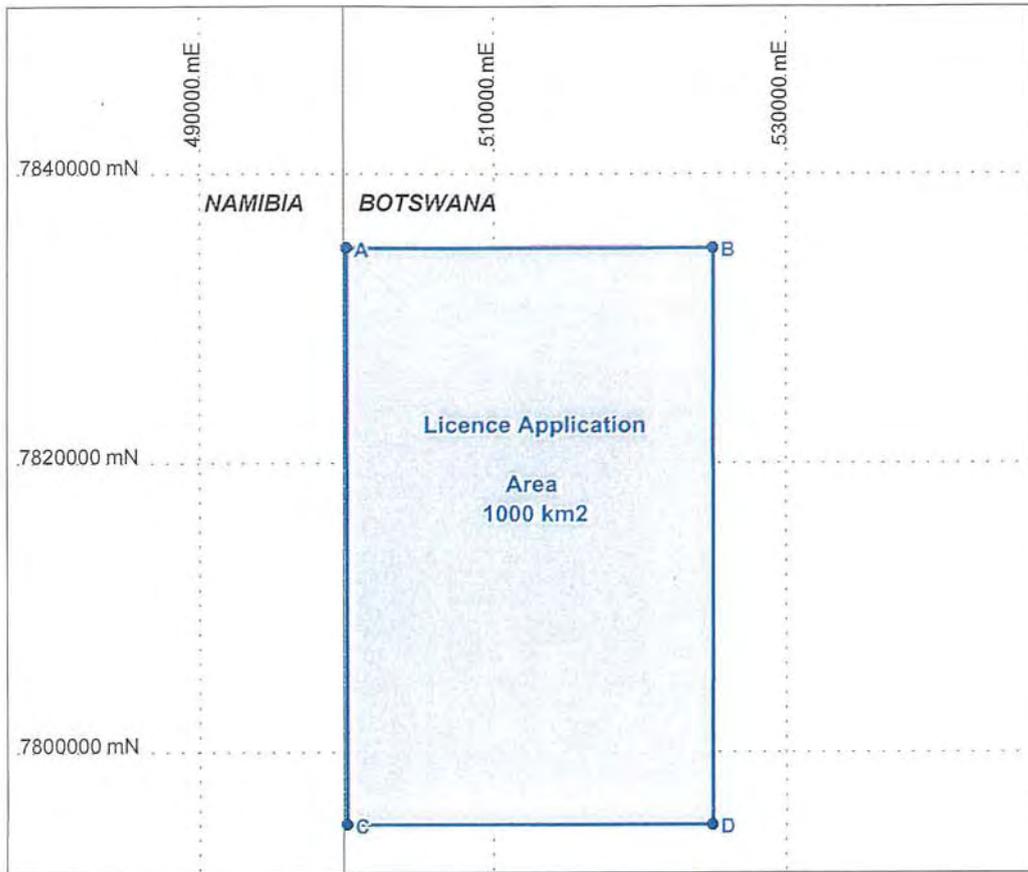
21 September 2018

PL 43/2016

BOTSWANA

NAMIBIA

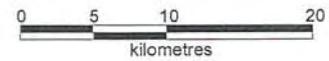




**PL LOCATION REFERENCE CHART**

ID	Longitude	Latitude
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B	21.2381	-19.5807
C	20.9997	-19.9414
D	21.2381	-19.9414

*Coordinates in WGS84 decimal degrees*



**PL 43/2016 – KIHABE PROJECT,  
BOTSWANA**

First Renewal Application

1: 500 000      September 2018



## KIHABE AND NXUU DEPOSITS 2004 JORC CODE Zn/Pb RESOURCE STATEMENTS

*KIHABE DOES NOT INCLUDE VANADIUM OR GERMANIUM  
NXUU DOES NOT INCLUDE SILVER, VANADIUM OR GERMANIUM*

Deposit	External Zn-eq Cut %	Indicated M Tonnes %	Inferred M Tonnes %	Total M Tonnes %	Contained Zinc metal (kt)	Contained Lead metal (kt)
<b>Kihabe</b>	1.5%	11.4 @ 2.90%*	3.0 @ 2.60%*	14.4 @ 2.84%*	259kt	115kt
<b>Nxuu</b>	0.3%	-	10.9 @ 3.20%*	10.9 @ 3.20%*	196kt	153kt
		<b>11.4 @ 2.90%*</b>	<b>13.9 @ 3.07%*</b>	<b>25.3 @ 3.00%*</b>	455kt	268kt

\*Zinc Equivalent

	Zn	Pb	Ag
Kihabe resource calculated on metal prices as at 17/7/2008	US\$1,810/t	US\$1,955/t	US\$18.75/oz

Kihabe Grades	Zn 1.8%	Pb 0.8%	Ag 7.7g/t
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Nxuu resources calculated on zinc and lead par value metal prices

Nxuu Grades	Zn 1.8%	Pb 1.4%
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***This information was prepared and first disclosed under the JORC Code 2004. It has not been updated since to comply with the JORC Code 2012 on the basis that the information has not materially changed since it was last reported.***

### KIHABE-NXUU METAL RECOVERIES

Independent metallurgical test work has confirmed the metal recoveries shown in the table below. Accordingly, the Company believes these recoveries are achievable. Zinc recovered from acid leaching oxide zones will enable Zn metal to be recovered on site from electro-winning.

DEPOSIT	Zone	Time	Zinc	Lead	Silver
<b>Kihabe</b>					
<b>Oxide Zone</b>					
Acid leaching @40°C 30 kg/t acid	Oxide *	24 hrs	96.9%	91.9%	n/a
<b>Sulphide Zone</b>					
Rougher float	Sulphide	90 seconds	91.9%	84.8%	94%
	Sulphide	15.5 mins	93.8%	88.1%	96.4%
<b>Nxuu</b>					
<b>All Oxide</b>					
Acid leaching @25°C 30 kg/t acid	Oxide	12 hrs	93%	93%	n/a

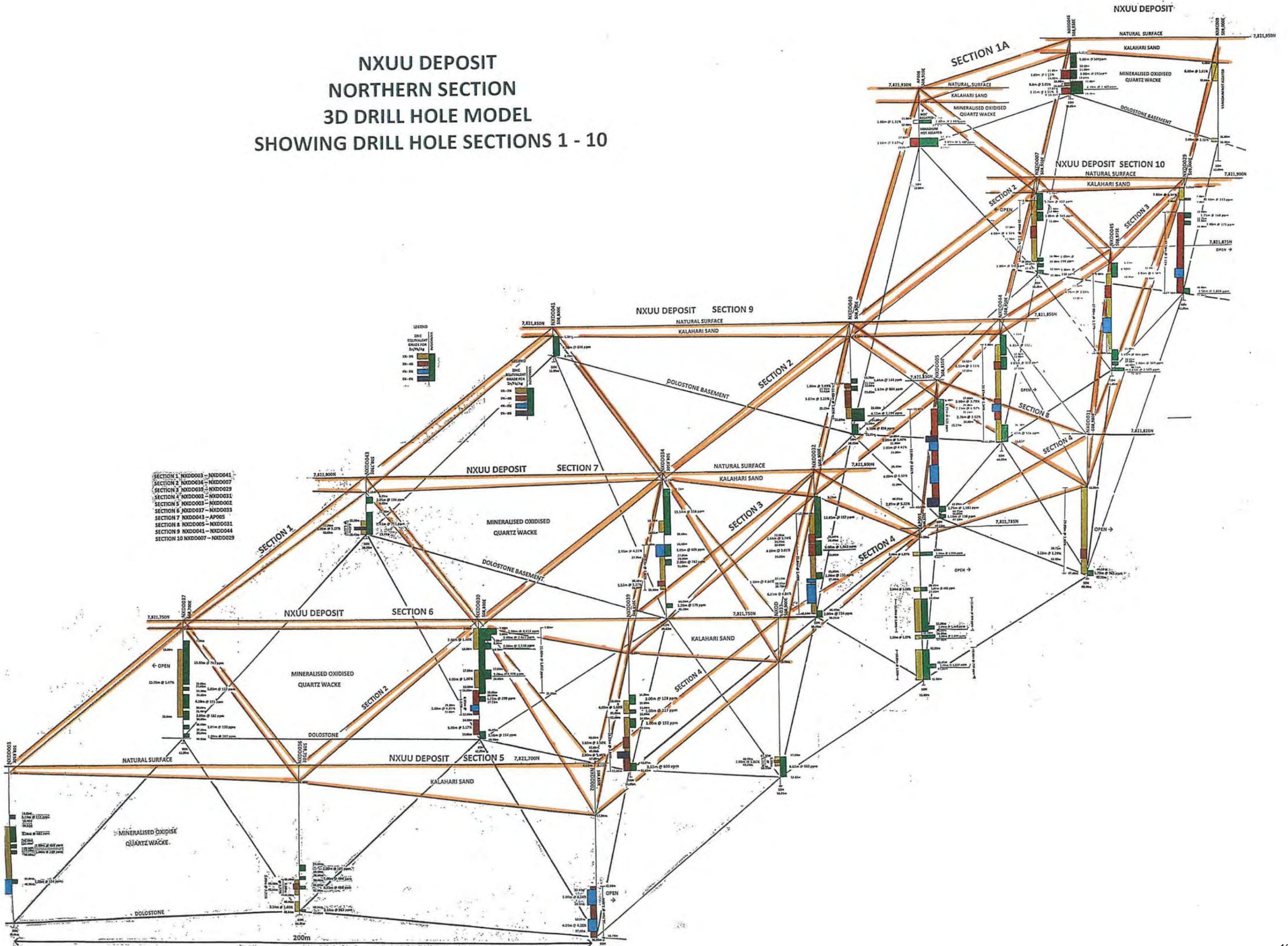
\* Note: Zn mineralisation in the oxidised zones is hosted within Smithsonite (Nxuu) and Baileychlore (Kihabe) and independent test work has confirmed both of these are amenable to acid leaching.

**NXUU DEPOSIT**

**VANADIUM**

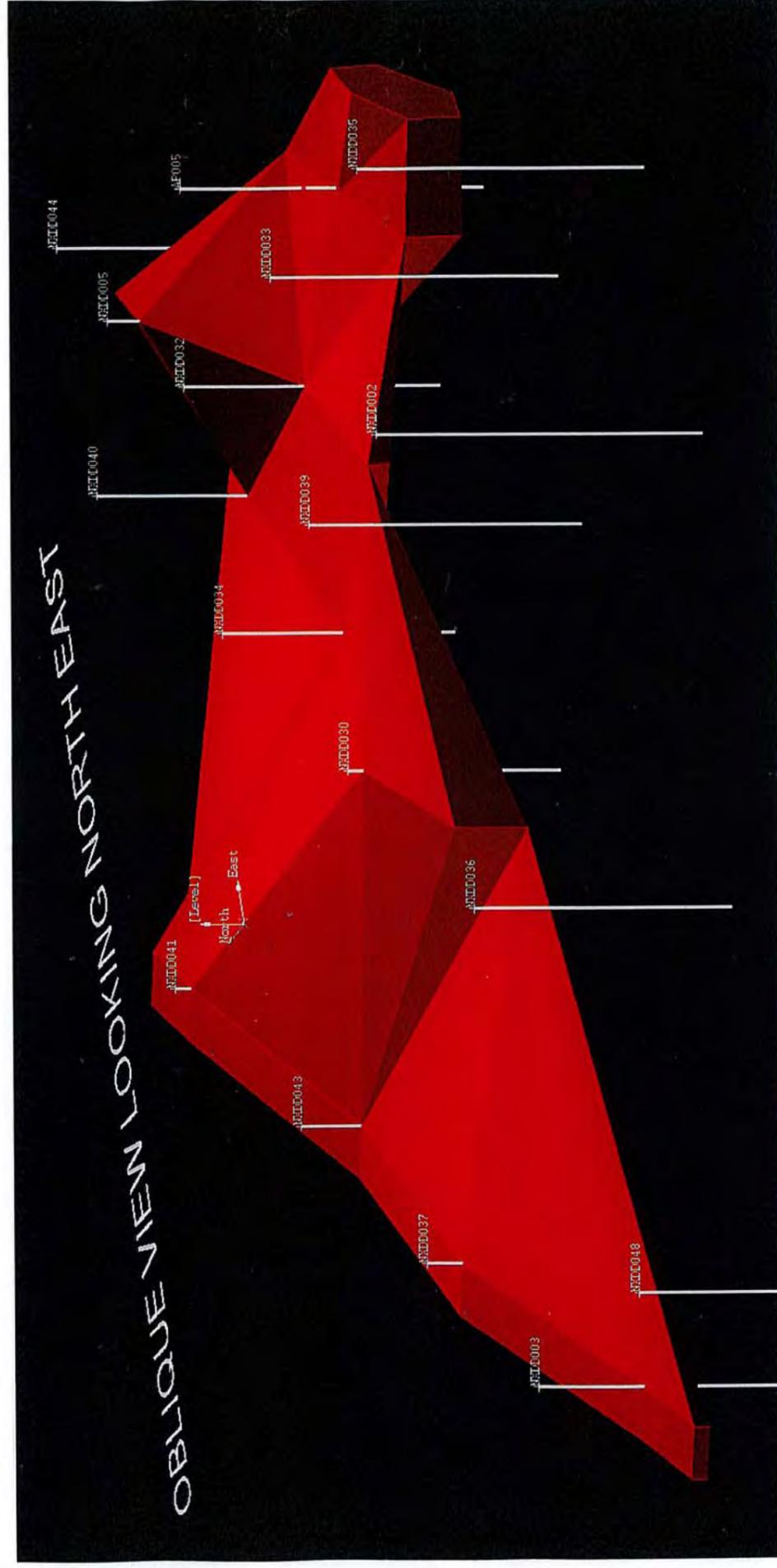
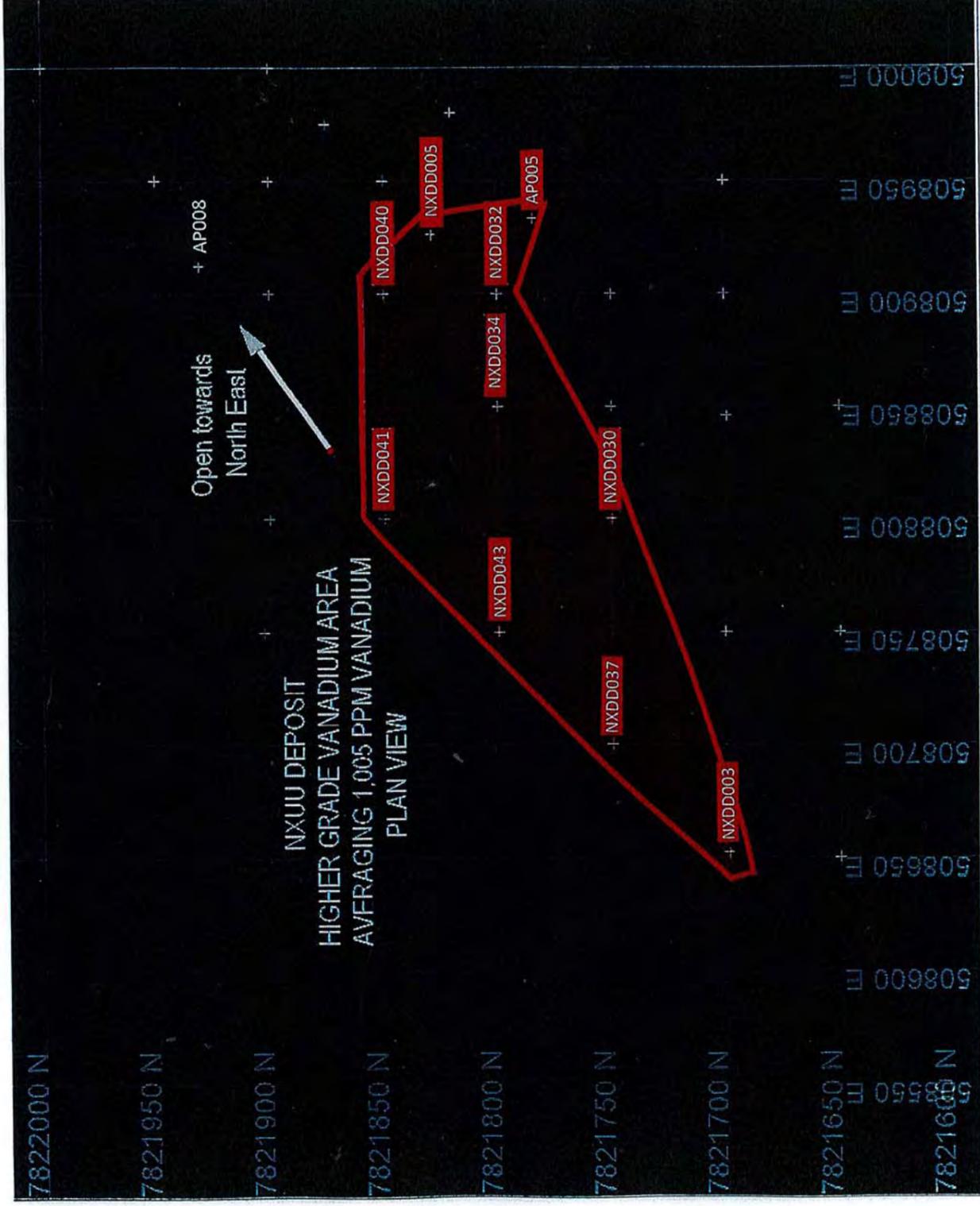


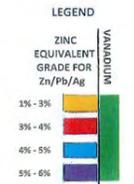
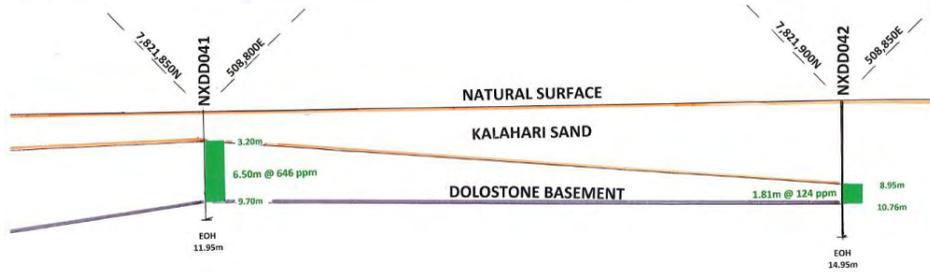
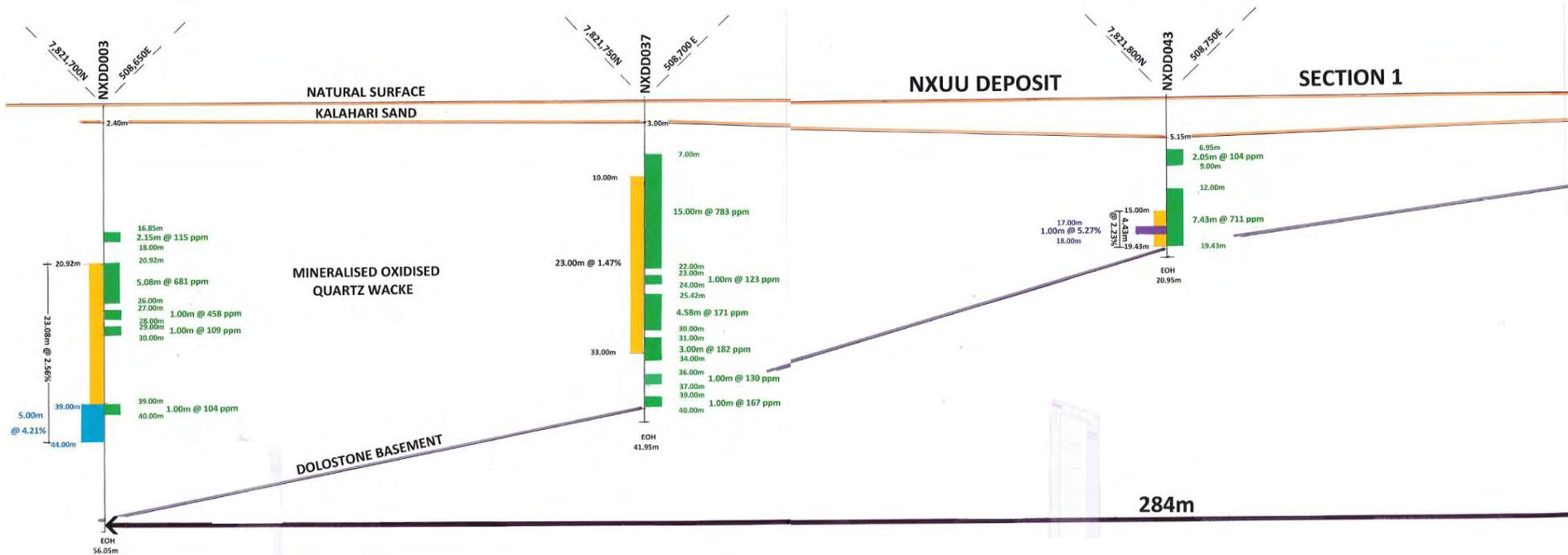
# NXUU DEPOSIT NORTHERN SECTION 3D DRILL HOLE MODEL SHOWING DRILL HOLE SECTIONS 1 - 10



NXUU DEPOSIT CURRENTLY KNOWN HIGHER GRADE VANADIUM ZONE

AREA 270M x 100M AVERAGE GRADE 1,005ppm AVERAGE WIDTH PER HOLE 11.55m

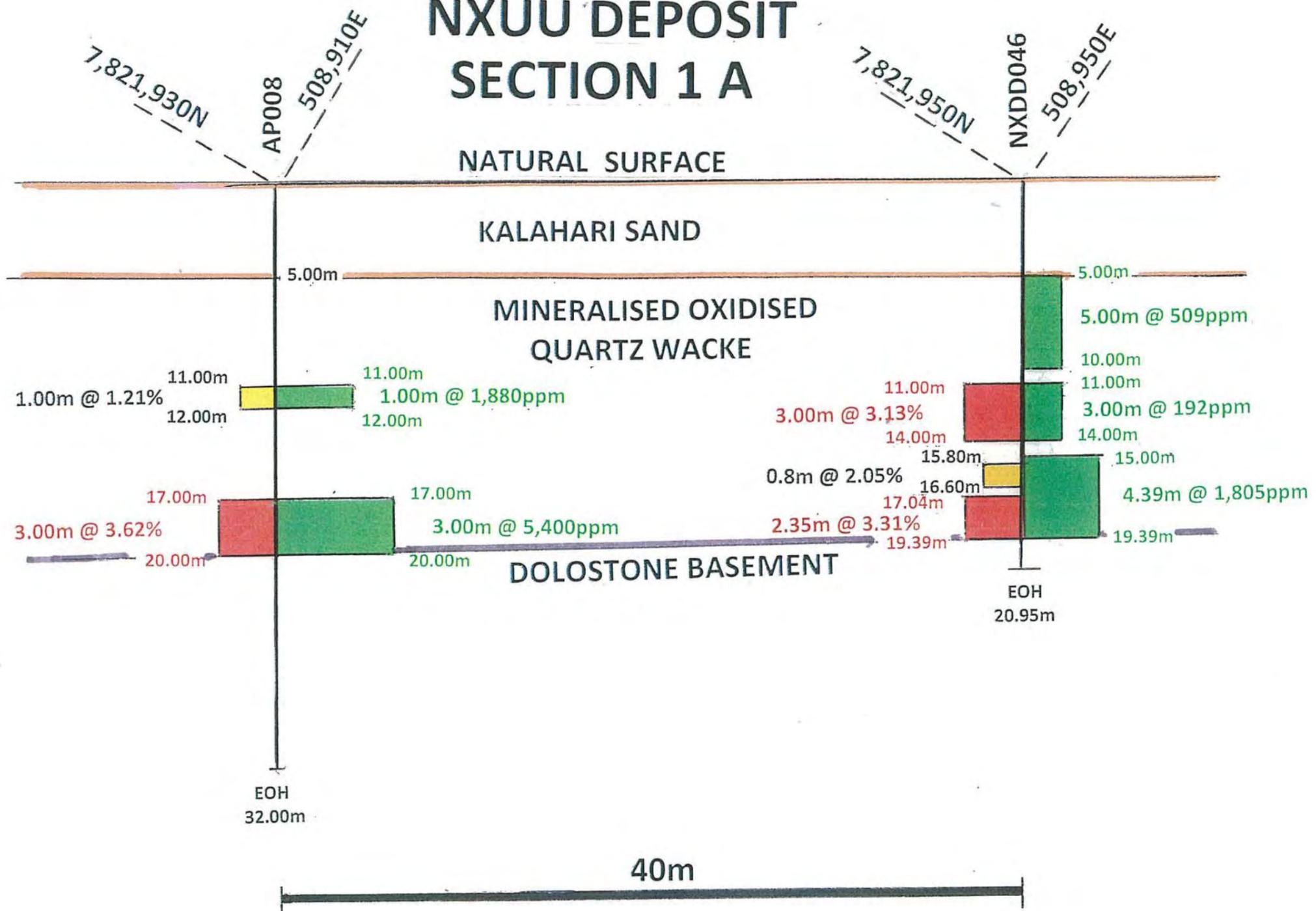
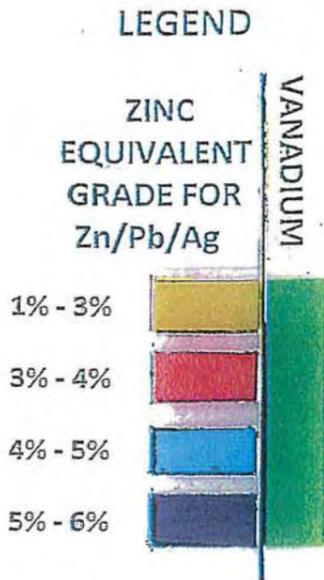


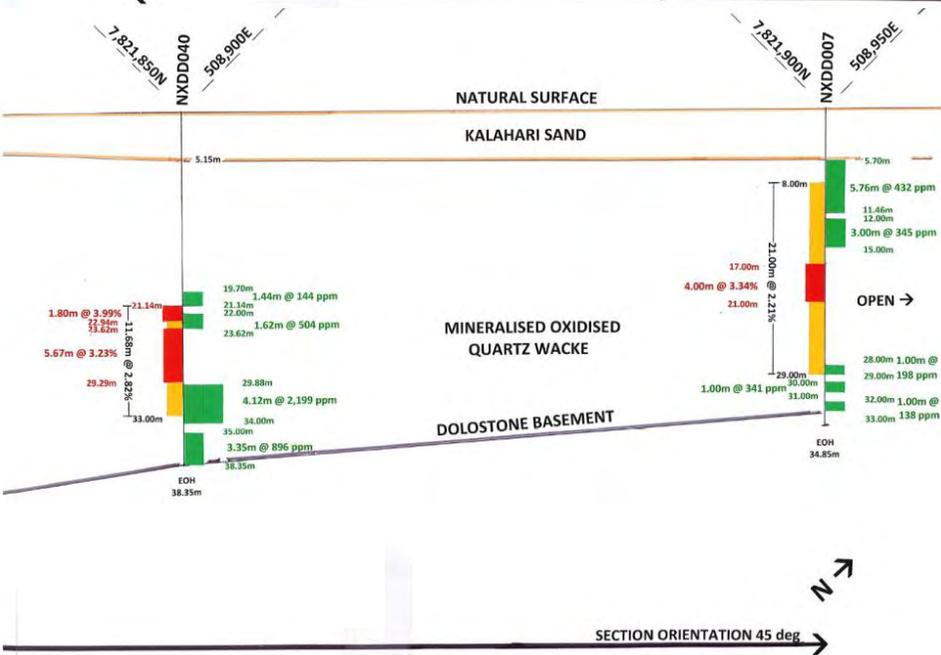
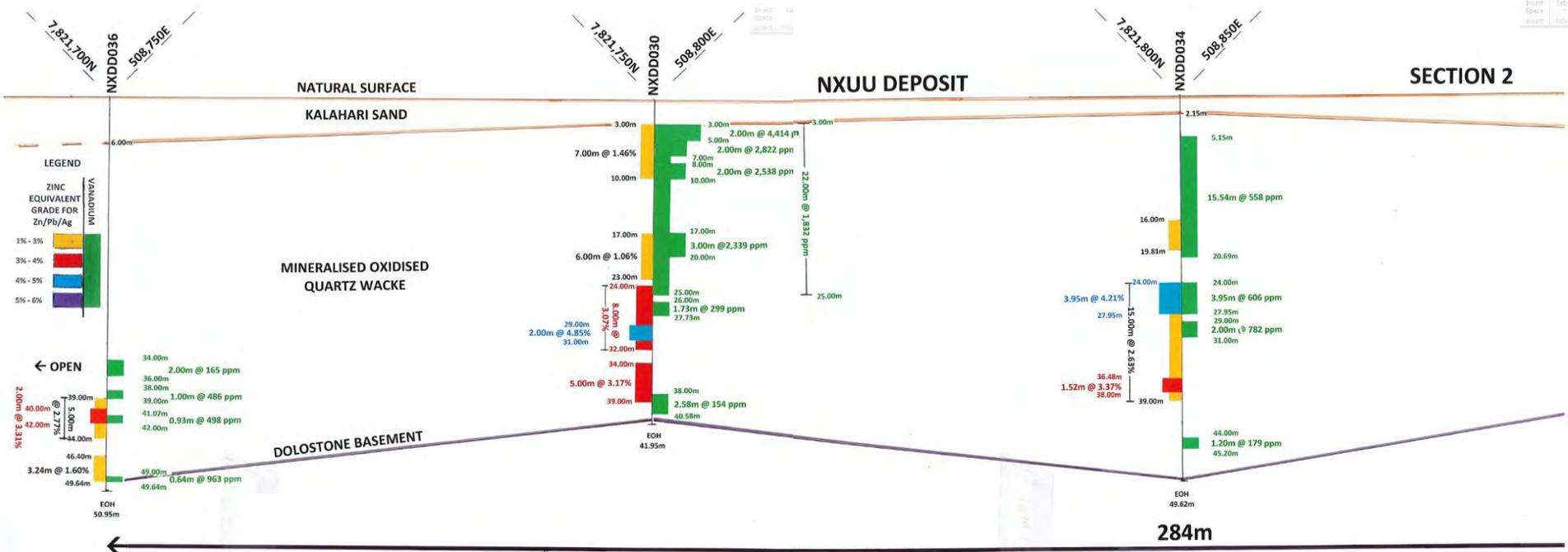


**SECTION ORIENTATION 45 deg**

**N**

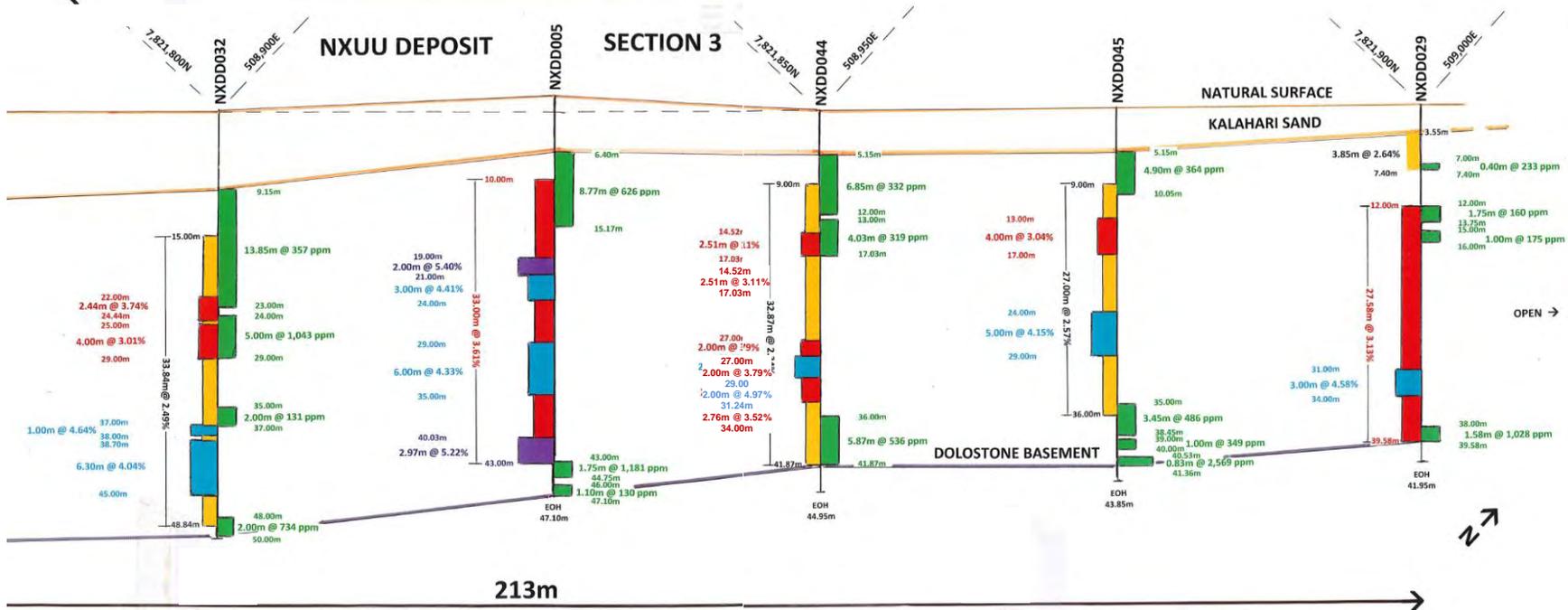
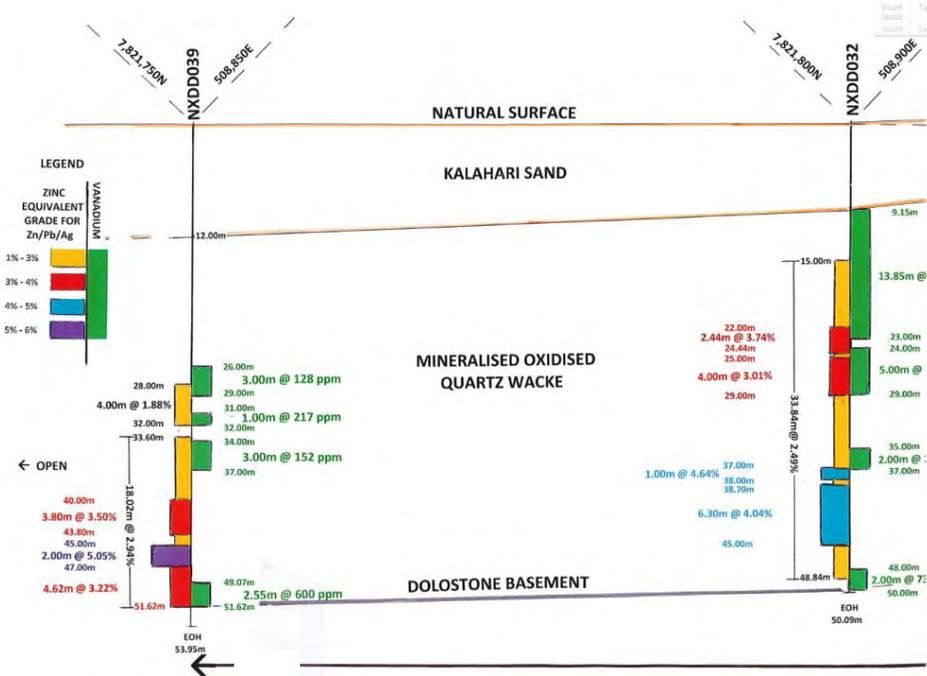
# NXUU DEPOSIT SECTION 1 A



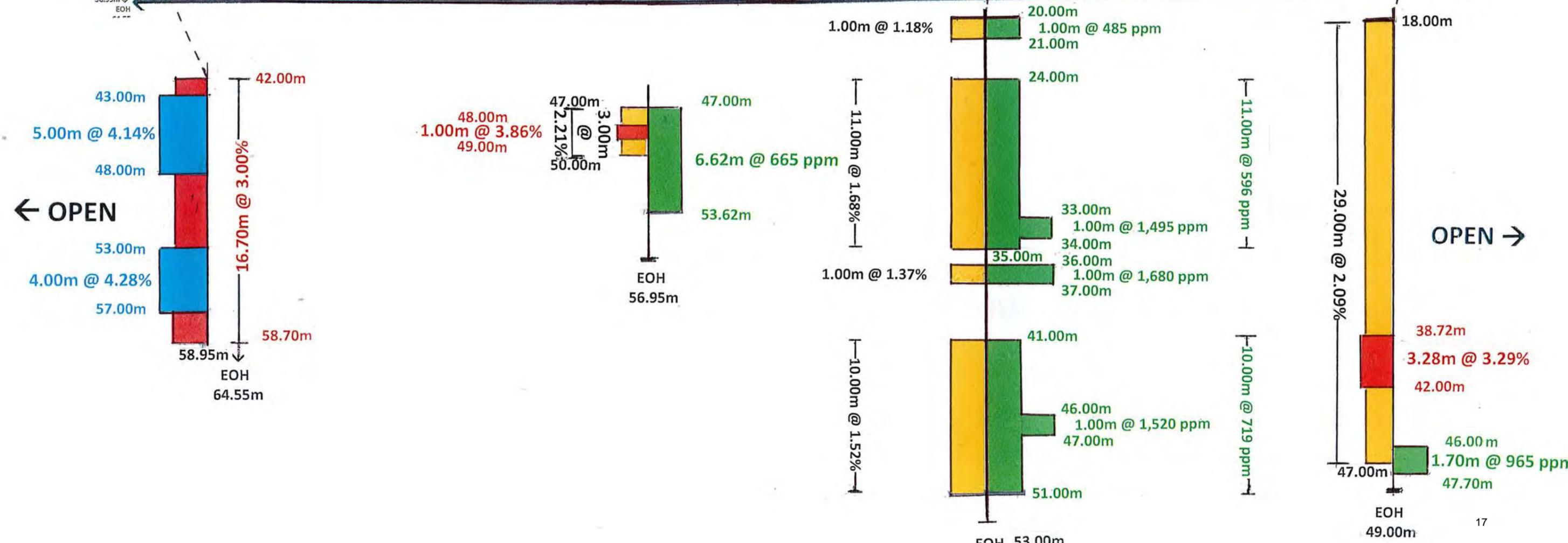
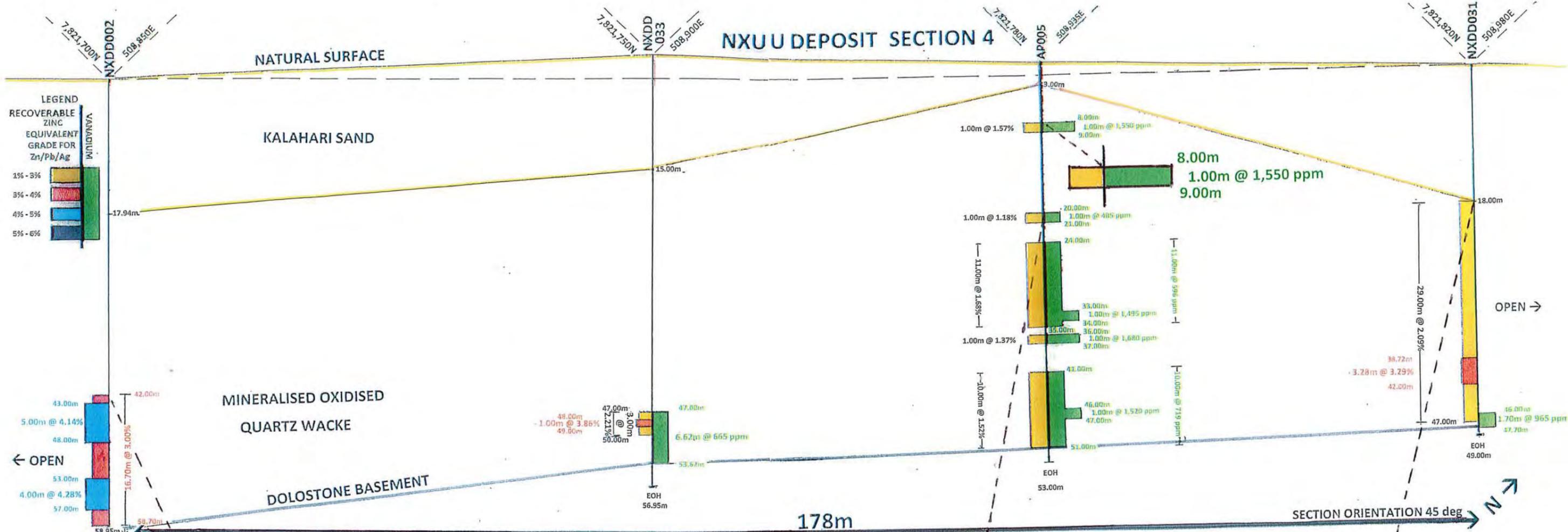


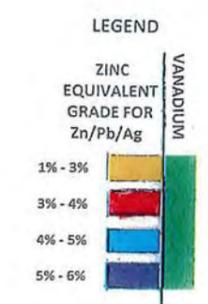
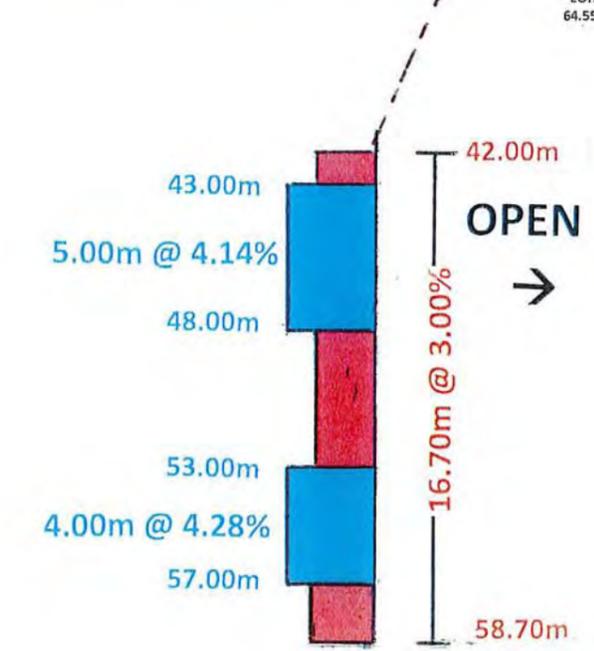
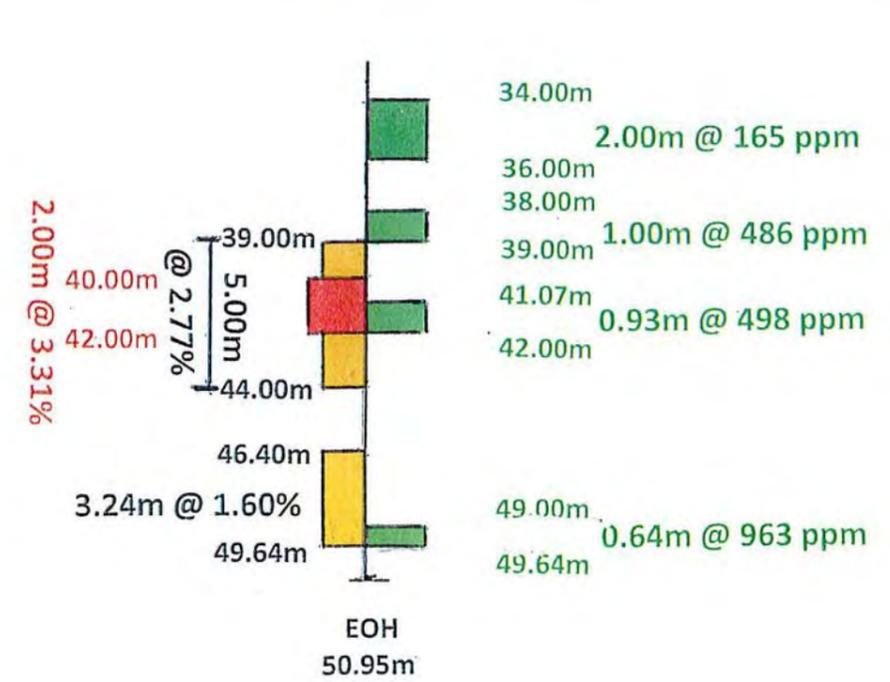
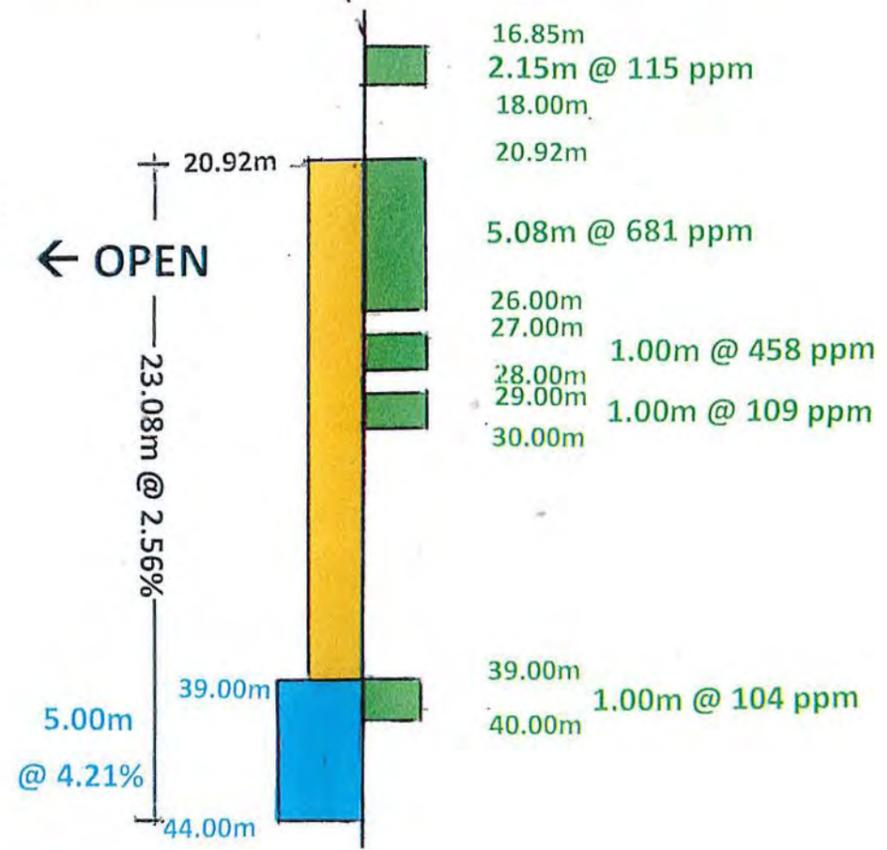
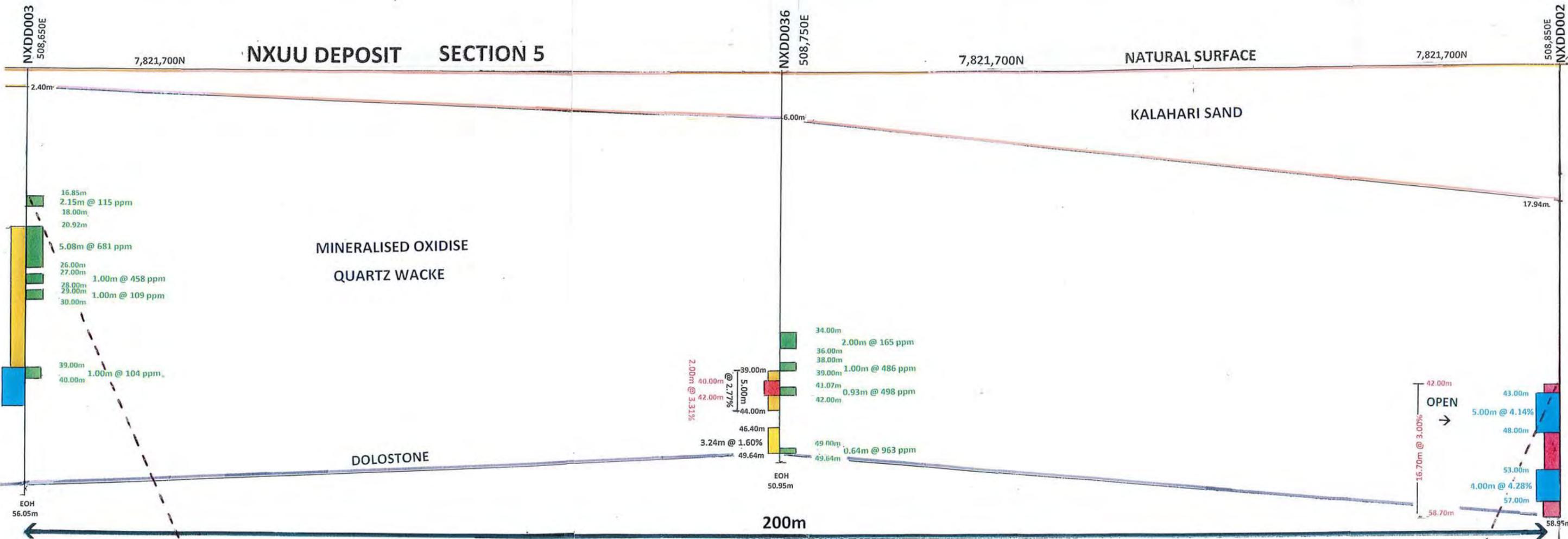


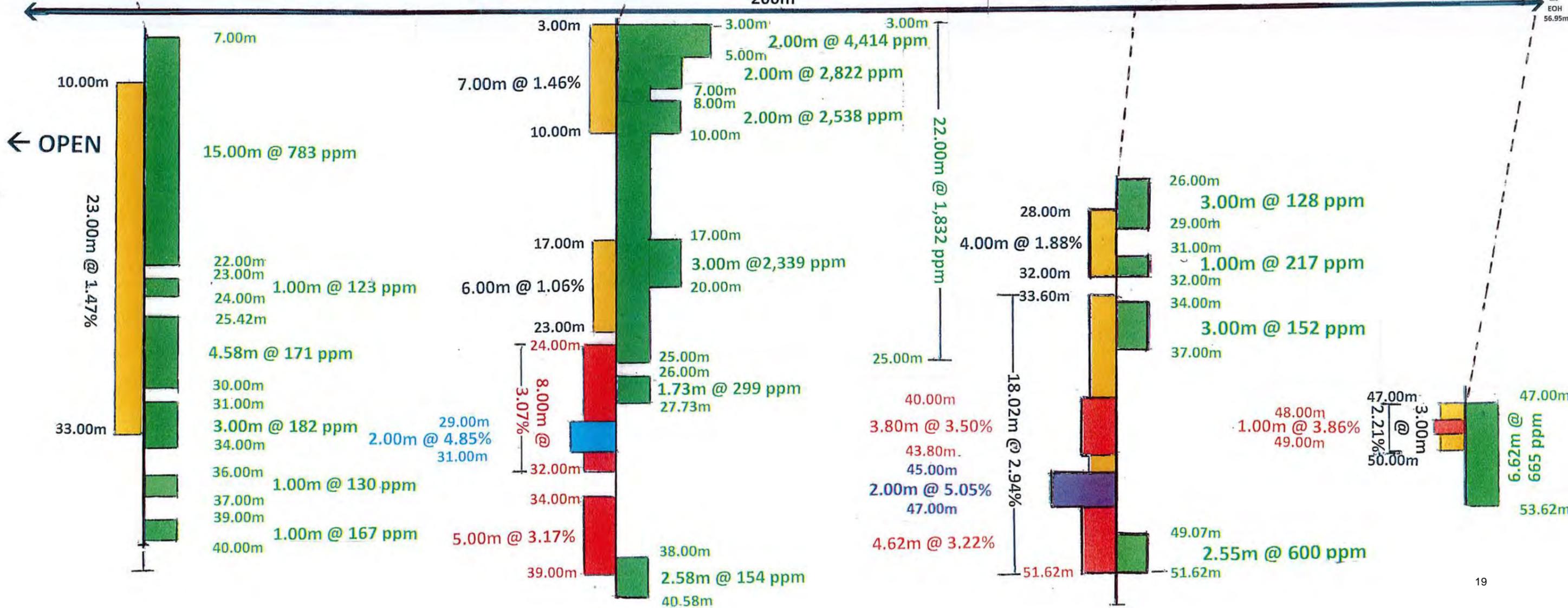
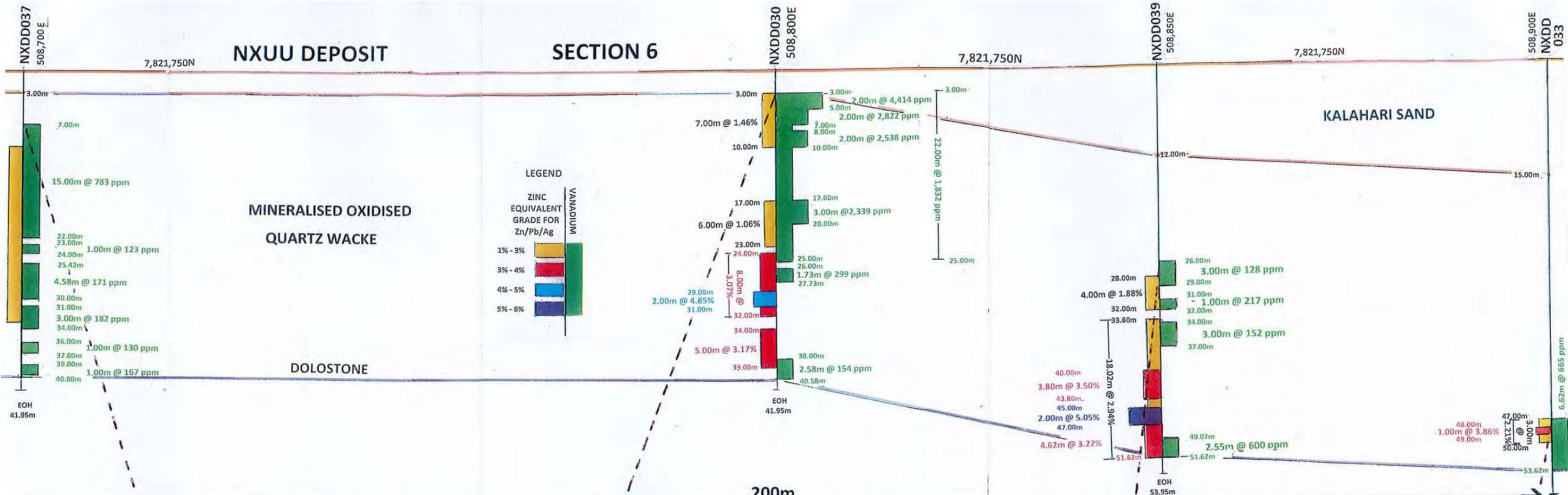
### NXUU DEPOSIT SECTION 3

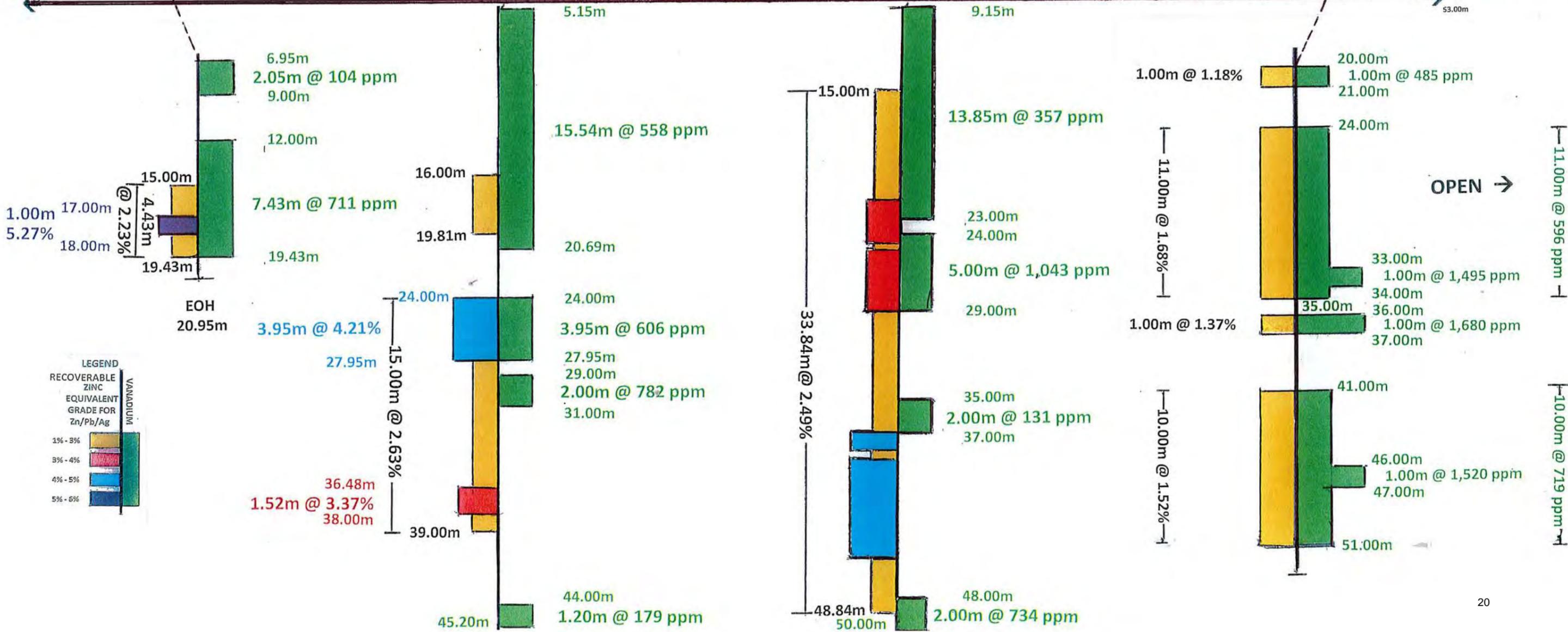
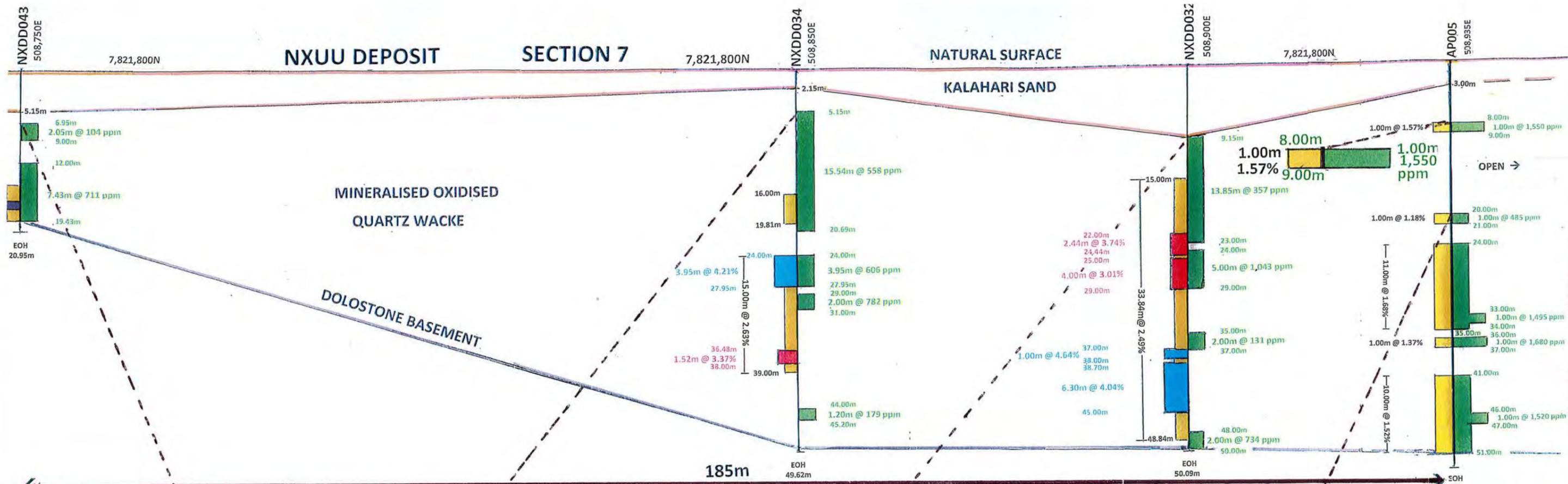


# NXUU DEPOSIT SECTION 4









# NXUU DEPOSIT SECTION 8

NATURAL SURFACE

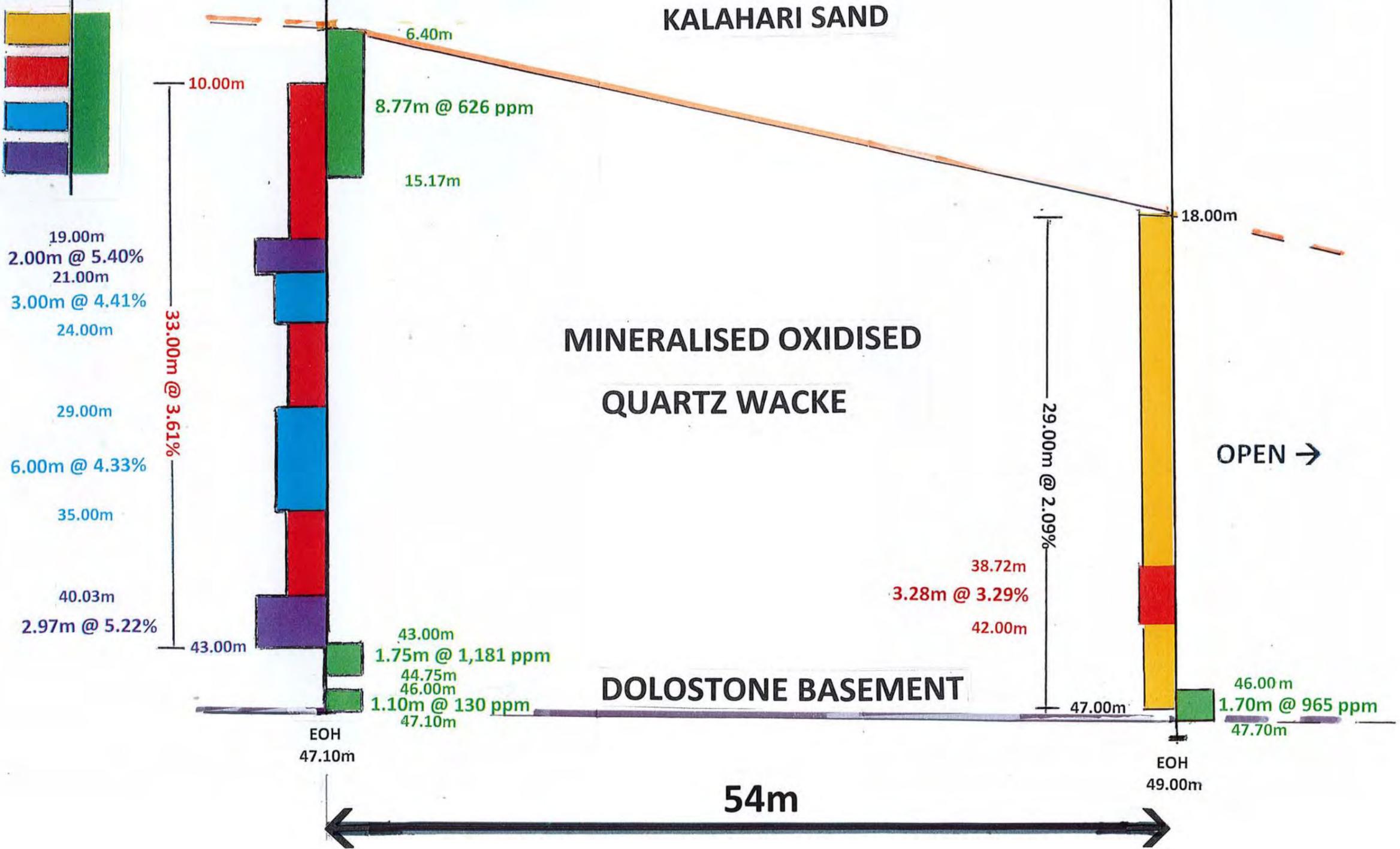
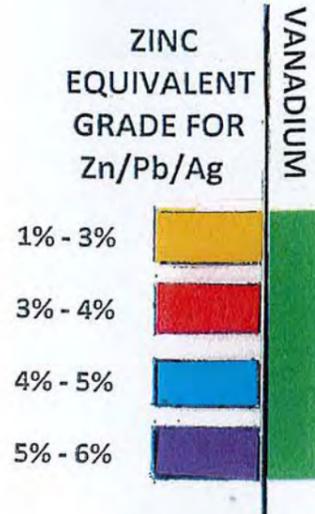
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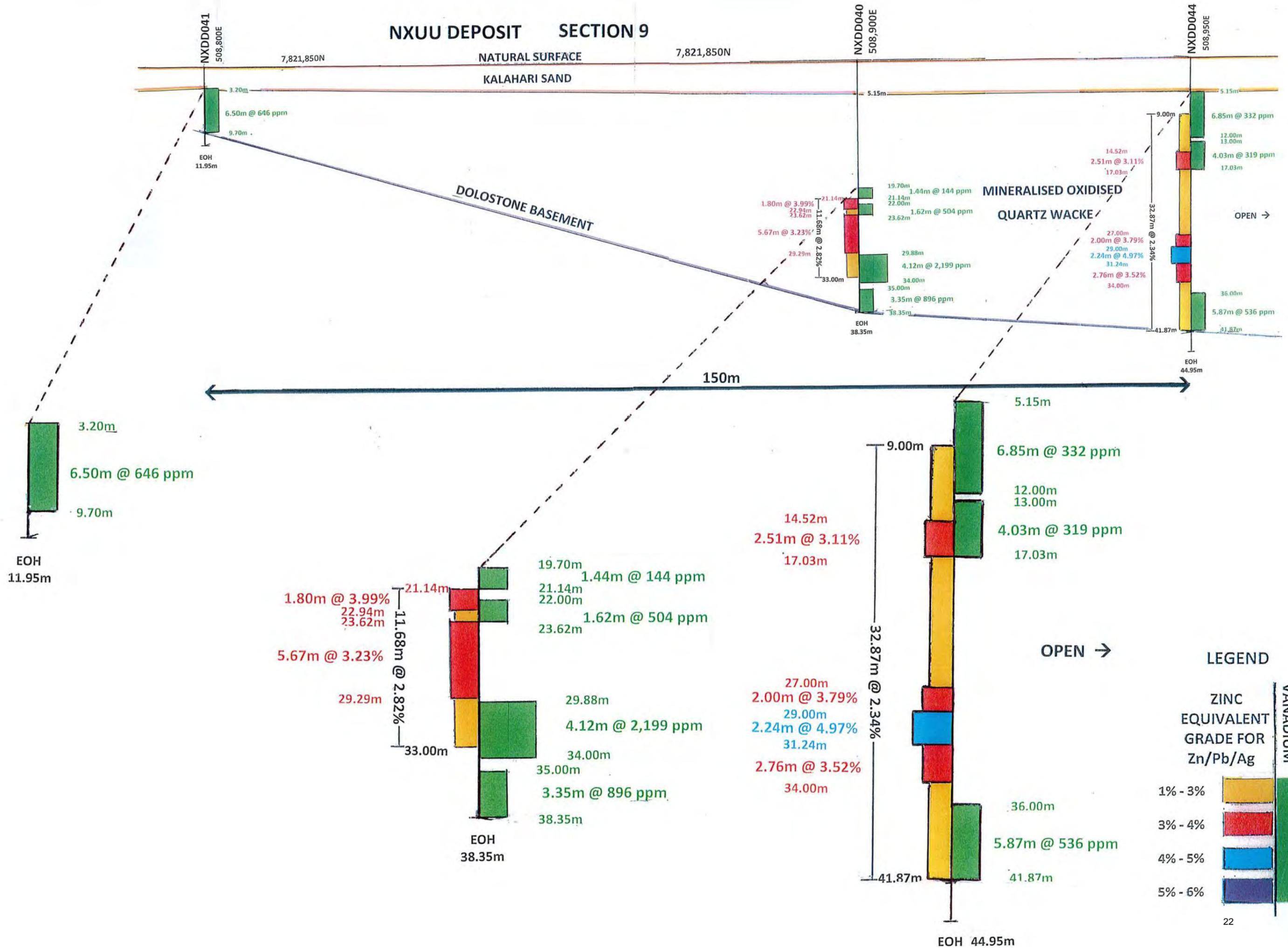
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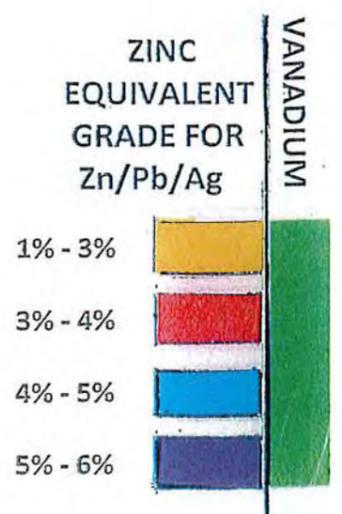
## LEGEND



# NXUU DEPOSIT SECTION 9



### LEGEND



# NXUU DEPOSIT SECTION 10

NATURAL SURFACE

KALAHARI SAND

MINERALISED OXIDISED QUARTZ WACKE

DOLOSTONE BASEMENT

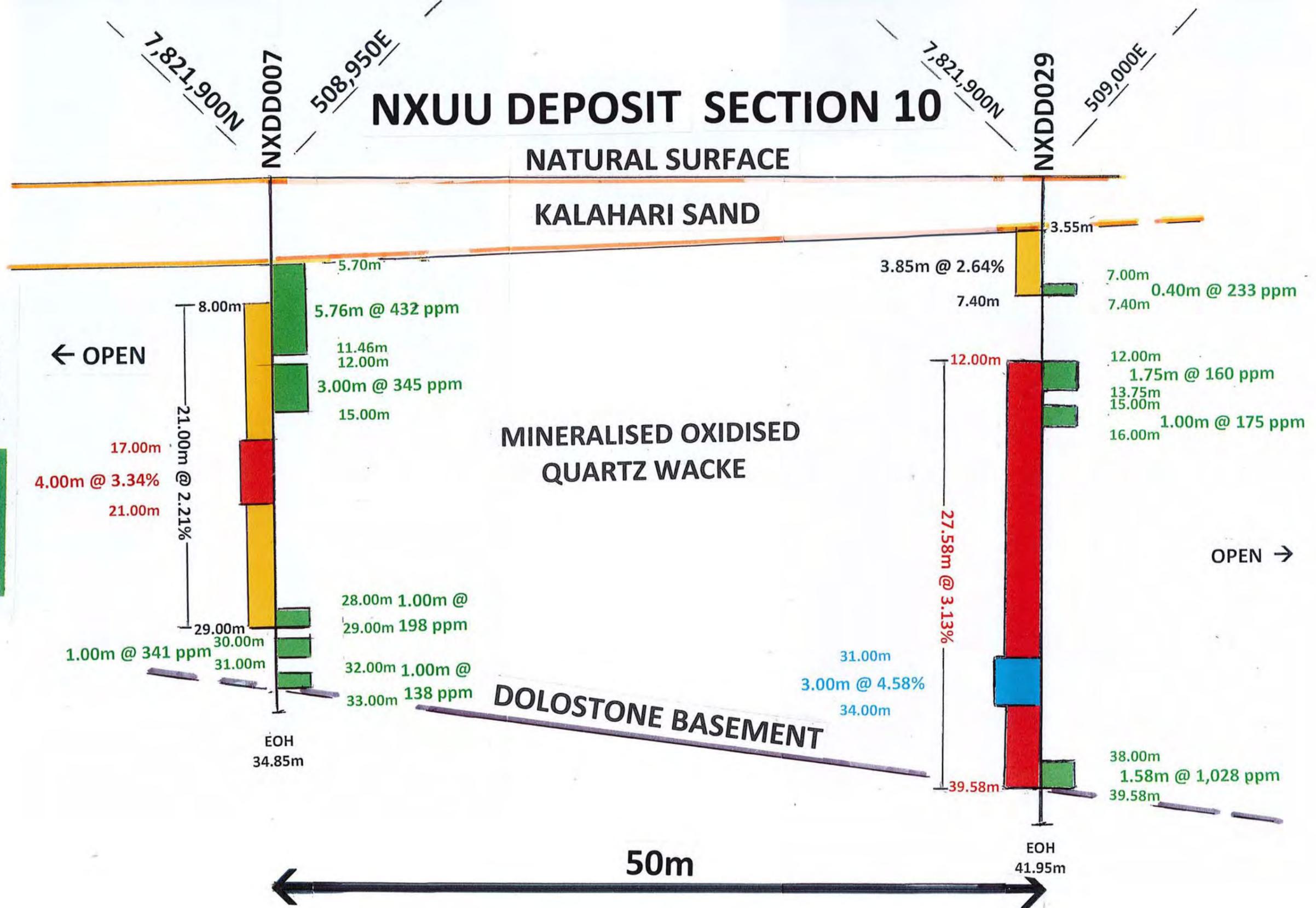
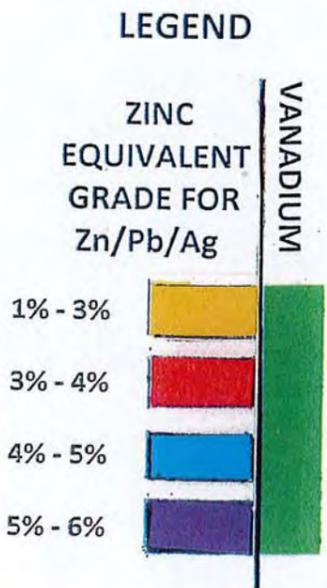
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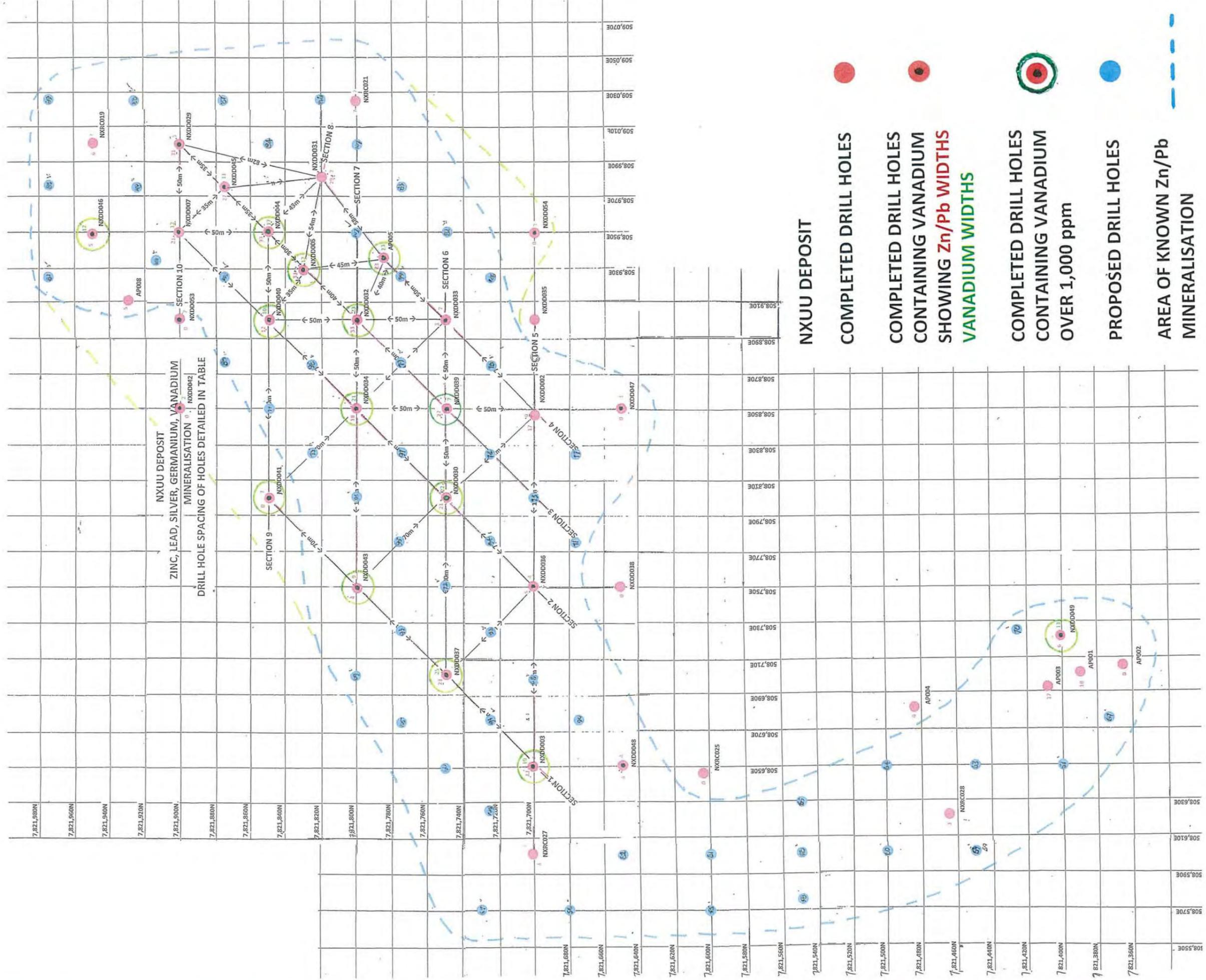
NXDD029

7,821,900N  
508,950E

7,821,900N  
509,000E

50m





NXUU DEPOSIT  
ZINC, LEAD, SILVER, GERMANIUM, VANADIUM  
MINERALISATION 0: NXDD042  
DRILL HOLE SPACING OF HOLES DETAILED IN TABLE

**NXUU DEPOSIT**

**COMPLETED DRILL HOLES**

**COMPLETED DRILL HOLES  
CONTAINING VANADIUM  
SHOWING Zn/Pb WIDTHS  
VANADIUM WIDTHS**

**COMPLETED DRILL HOLES  
CONTAINING VANADIUM  
OVER 1,000 ppm**

**PROPOSED DRILL HOLES**

**AREA OF KNOWN Zn/Pb  
MINERALISATION**

**AREA OF KNOWN  
VANADIUM  
MINERALISATION**

**NXUU DEPOSIT**

**GERMANIUM**

## NXUU GERMANIUM

The Nxuu Deposit contains Germanium which if shown to be recoverable through metallurgical test work could represent a valuable credit. Germanium was not systematically assayed for or assessed in previous drilling campaigns, although it is known to be associated with zinc deposits. Germanium grades of interest were recorded in several holes in the recent drilling programme as shown in the table below.

Germanium is classified as a strategic metal with applications in fibre-optic systems, infrared optics, solar cell applications, and light-emitting diodes (LEDs). The Germanium price quoted by Kitco Germanium on 13 September 2018 was US\$2,291.65 per kg.

**Zinc Equivalent grade calculations do not take into account Germanium as the Company does not yet have sufficient information in respect of potential metallurgical recoveries for this strategic metal.**

### Germanium Grades over 5.00 g/t

HOLE ID	COORDINATES		DIP	AZIMUTH	EOH	INTERVAL			Ge Grade
	Easting	Northing	Degrees	Degrees	(m)	From (m)	To (m)	Width (m)	g/t
NXDD029	509900	7821900	-90	0	41.95	7.00	15.00	8.00	<b>7.10</b>
						17.00	19.00	2.00	<b>5.50</b>
						30.00	34.00	4.00	<b>5.75</b>
NXDD032	508900	7821800	-90	0		39.00	42.00	3.00	<b>5.15</b>
NXDD040	508900	7821850	-90	0	38.35	20.00	29.88	9.88	<b>5.98</b>
NXDD034	508850	7821800	-90	0	49.62	23.00	27.95	4.95	<b>5.25</b>
NXDD030	508800	7821750	-90	0	41.95	3.00	7.00	4.00	<b>5.00</b>
						8.00	11.90	3.90	<b>5.13</b>
						19.00	32.00	13.00	<b>6.62</b>
						37.25	39.00	1.75	<b>5.20</b>
NXDD037	508700	7821750	-90	0	41.95	12.00	14.00	2.00	<b>5.59</b>
						25.42	28.00	2.58	<b>5.24</b>
						30.00	33.00	3.00	<b>6.67</b>

Drilling into the Nxuu deposit was conducted for the following objectives: -

1. To define an accurate Zn/Pb/Ag grade, based on diamond core results as opposed to RC results.
2. To understand the distribution of Germanium and its potential to contribute to the economics of the Project.
3. To ultimately enable the estimation of a resource for the Nxuu deposit to be reported in accordance with the 2012 JORC Code with the inclusion of potential silver and germanium credits, which were not considered in the historical resource estimate that was reported under JORC 2004 Guidelines.

Allowing for natural variability of the mineralisation, the recent results are consistent with previous diamond core drilling results in the target zone with mineralisation occurring in a quartz wacke/sandstone with zones of calcrete near surface under Kalahari sand cover.

Mineralisation occurs as shallow as three metres from surface (NXDD030), with several other holes intercepting mineralisation within the first 10m.