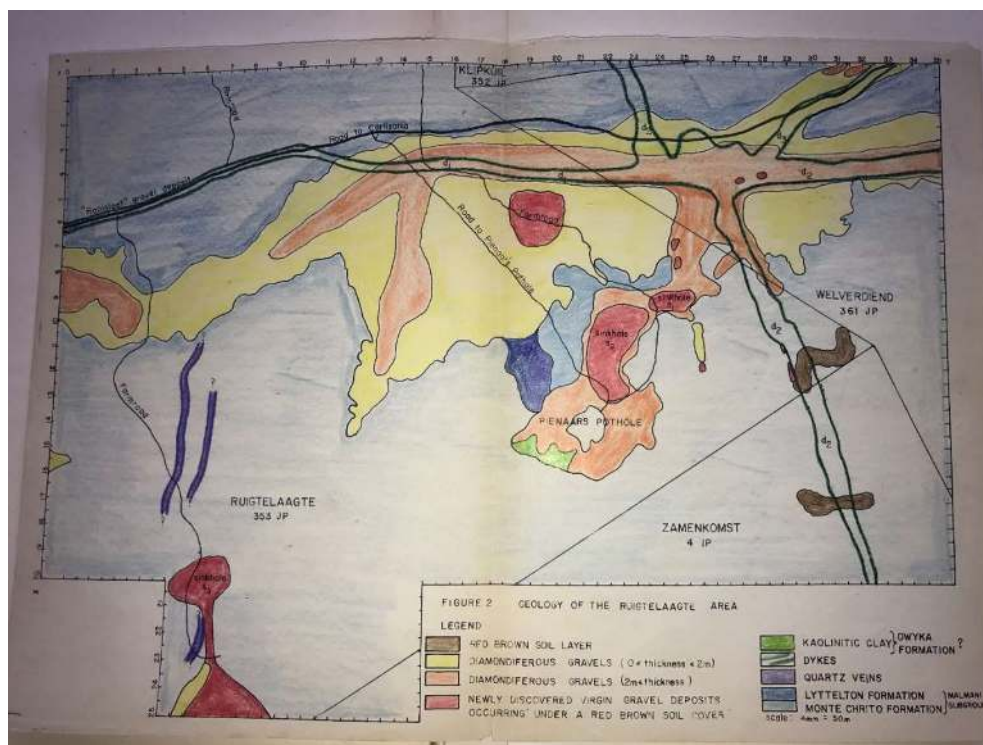


# In Pursuit of Dragon's Blood- The Story of Diamond Lakes



The Diamond Lakes mine sits on 99 hectares of the North West Province of South Africa's Welverdiend- Grasfontein Diamond Run. First mined in the 1920's, the mine has been declared as a mining area since the 1920's. It has changed ownership many times and been explored by some of the World's most eminent diamond geologists and geophysicists.

The site and the area in general sparked a huge diamond rush in the 1920's through to 1939 when the Second World War broke out. The famous Pienaar's Pothole is on Diamond Lakes. More recently the mine was bought by Esroux Mining in the 1970's and was traditionally called 'Ruigtelaagte'. Esroux Mining was started by Mat Roux. Mat had another mine 'Elandsputte' in the 1960's a few kilometres away from Diamond Lakes and renamed it Mat Roux and Sons Diamond Mining. Daan (Daniel Jacobus Nicolaas Roux) and Coen (Coenraad Roux) were the sons that mined the sites with Mat through the 90's to around 2004. New legislation at that time in South Africa provided an opportunity for Staten Island Trading to be formed and equity to be acquired in the Roux mines.

In 1979 Edgar Stettler<sup>1</sup> published his Master's Thesis 'A Geological and Geophysical investigation of the Diamond Runs on Ruigtelaagte and Vicinity, in the Bakerville Area,

<sup>1</sup> <https://www.linkedin.com/in/edgar-stettler-33338a3b>; consulting geophysicist, honorary professor of geophysics at Witwatersrand University.



## INTRODUCTION

The Lichtenburg diamond runs, situated in the karst structures of the Chuniespoort Group dolomites, used to be one of the richest alluvial diamond deposits in the world. These produced 7 220 846 carats between 1922 and 1947 (Du Toit, 1951, p. 38). They therefore left a considerable impression on the mining history of South Africa. The richest area at that time was the famous Welverdiend-Ruigtelaagte-Grasfontein run which starts on the boundary of the farm Klipkuil and Welverdiend in the east, and extends westwards through Ruigtelaagte, Uitgevonden and Grasfontein to end on the farm La Rys Stryd (Figure 1). Until 1947 the diamond production on Ruigtelaagte was 527 961 carats of which the bulk came from Pienaar's Pothole (Du Toit, 1951, p. 16). The production from Ruigtelaagte was surpassed only by that of Grasfontein which produced 2 309 156 carats.

5

It is today estimated that the total amount of documented diamonds to have been recovered from Pienaar's Pothole is around 700 000. Some laugh at that figure and cite a time in the late seventies when Pienaar's was pumped dry and mined with conventional earth moving equipment. Alluding to the poor regulation and security in the 1920's and 30's, much of the mining was done by small contractors on behalf of wealthier individuals who were able to financially stake claims in the area. The records by SA Geoscience are thought to be a significant underestimation of what has truly been recovered from Pienaar's Pothole.



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<sup>5</sup> Geophysical Prospecting for Diamonds in the Lichtenburg District, Western Transvaal; Stettler, Kleywegt, De Wit; Southern African Geophysical Review, 1 (1995) 55-69, South African Geophysical Association

<sup>6</sup> Daan Roux Photograph private collection

In the 1980's and early 1990's, Diamond Lakes was mined by several varied and interesting operators. Newmont SA, Transhex, Esroux- Roux Diamonds, Shenandoah Mining- Albert Vermaas, and Mike Rugen-Smith. In 2006 the company Staten Island Trading acquired a 40% equity stake in Diamond Lakes which was later extended to 60% in 2008. The Roux's hold a 40% equity stake in Diamond Lakes.

The weathered and bleached upper gravels (called potato gravels by the diggers) consist of rounded chert pebbles and cobbles in a red sandy loam (terra rossa) matrix, containing pockets or layers of manganese dioxide nodules which are about 5 mm in diameter, in which diamonds of very good quality have often been found.

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The geology of the area has mystified geologists, geophysicists and diamond mining people since the discovery of the first stone in the area. One profound demonstration of just that, is the fact that the kimberlite source from where the Welverdiend-Grasfontein diamonds have come from has not yet been discovered! Diamonds are only formed naturally at a certain depth and pressure deep within the Earth's core. They are extruded as a volcanic discharge in the form of a kimberlite pipe. It is only once a kimberlite source has breached the surface, and after many millions or even billions of years of geological weathering and movement by water, glaciers or other means that alluvial diamond runs are created. "This is akin to discovering a huge stash of golden eggs coming from a gold-egg laying duck but not having found the duck yet!"<sup>8</sup>

Another phenomenon that has continued to intrigue for almost a century are the Potholes that occur through-out the Lichtenberg Diamond Fields.

- (1) narrow gorge-like sinkholes, examples of which are the King's and Malan's potholes, situated along the eastern side of Grasfontein 356 JP (Figure 1);
- (2) broad, roundish sinkholes, as for example the Pienaar's and Cowper's potholes (Figure 1) situated on the south-eastern portion of Ruigteplaagte 353 JP and the extreme north of Uitgevonden 355 JP, respectively.

#### Sinkholes

All the famous "potholes" on the Lichtenburg diamond fields are sinkholes which acted as penecontemporaneous gravel-traps or formed after the introduction of the diamond bearing sediments. Most of them produced large quantities of diamonds.

With a few exceptions all palaeosinkholes (whether filled with gravel or dolomitic debris) situated outside the gravel runs occur beneath the red-brown soil layer that covers most of the area. These were initially undetected since the diggers concentrated on the runs which formed topographically elevated areas.

Two types of gravel-filled sinkholes were noted, namely:

- Most of the larger, well-known potholes occur outside the present visible main gravel runs. For a detailed description of all the potholes the reader is referred to the publication of Du Toit (1951). Du Toit (1951, p. 26) described the following vertical zoning in the larger potholes:
- (a) basal white layer,
  - (b) diamond bearing lower red zone,
  - (c) poor intermediate zone, and
  - (d) diamond bearing upper pale gravel layer.

This zoning seems to indicate that the potholes were filled or developed in stages.

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<sup>7</sup> Geophysical Prospecting for Diamonds in the Lichtenburg District, Western Transvaal; Stettler, Kleywegt, De Wit; Southern African Geophysical Review, 1 (1995) 55-69, South African Geophysical Association

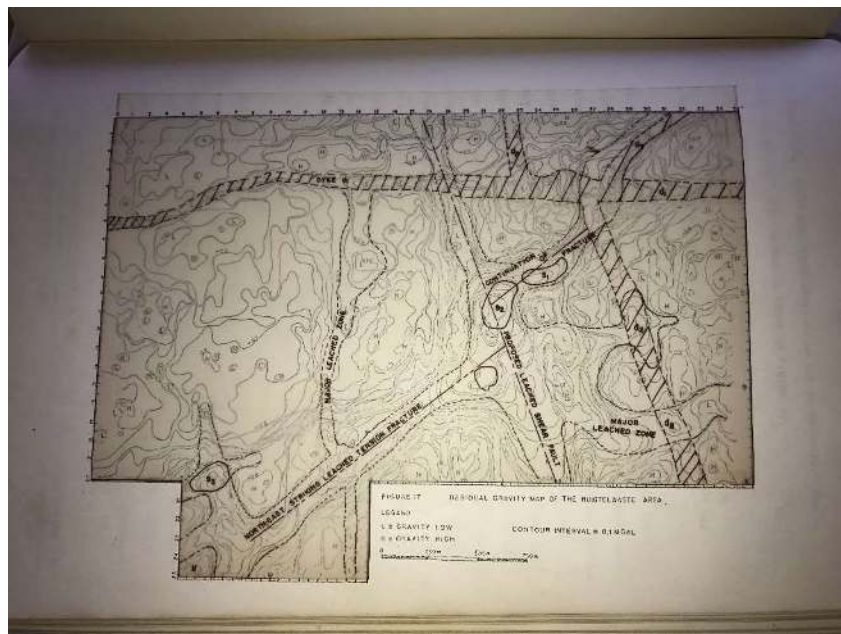
<sup>8</sup> Unknown, presumed to be a diamond digger from the early part of last century- 1920-1950; its noted that the statement amounts to hearsay.

<sup>9</sup> Geophysical Prospecting for Diamonds in the Lichtenburg District, Western Transvaal; Stettler, Kleywegt, De Wit; Southern African Geophysical Review, 1 (1995) 55-69, South African Geophysical Association

Agates and well-rounded chert and quartzite cobbles occur in abundance in Pienaar's pothole. Ilmenites and garnets of kimberlitic and non-kimberlitic origin are present in the heavy mineral fraction and also the amount of these minerals varies sympathetically with the diamond content (Du Toit 1951, p. 19; Roux, pers. comm.). Garnets and agates were found in most of the large potholes (Du Toit 1951, p. 30).

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The geology of Diamond Lakes is even more dramatic and intriguing than just Pienaar's Pothole. There are several large potholes on the mine with large swathes of land still covered by surface diamond bearing alluvial runs. Most of the Mines reserves lie deep under the water table. There are 4 dykes that intersect on Diamond Lakes with fracturing of the bedrock along a diagonal that intersects the midlines of the four potholes; Pienaar's Pothole, S1, S2 and the Gravitate Pothole which is North East to the S2 pothole. "A **dike** or **dyke**, in geological usage, is a sheet of rock that is formed in a fracture in a pre-existing rock body. Dikes can be either magmatic or sedimentary in origin. Magmatic dikes form when magma flows into a crack then solidifies as a sheet intrusion, either cutting across layers of rock or through a contiguous mass of rock."<sup>11</sup>



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The presence of 4 dykes intersecting at a point where a geological fault or fracture line has given birth to 4 large diamondiferous potholes that have all been shown to have kimberlitic material present, juxtaposed with the evidence that the diamonds recovered from these sites have not travelled far geographically, suggests a local kimberlite

<sup>10</sup> Geophysical Prospecting for Diamonds in the Lichtenburg District, Western Transvaal; Stettler, Kleywegt, De Wit; Southern African Geophysical Review, 1 (1995) 55-69, South African Geophysical Association

<sup>11</sup> Wikipedia Dike (Geology) 09.11.2019

<sup>12</sup> A Geological and Geophysical investigation of the Diamond Runs on Ruigteplaagte and Vicinity, in the Bakerville Area, Lichtenburg District' - Edgar Heinz Stettler Thesis October 1979

source. One thought is that the 4 dykes and fault line have somehow had a kimberlite blow out that would have come from deep below the Earth's surface as a conventional volcanic extrusion that then hit a layer of bedrock that was solid enough to have the then molten kimberlite extrusion forced to the surface along the path of least resistance which would have been the 4 dykes and established fault line. The fact that there seems to be several geologically different alluvial deposits that intersect on the mine and in some potholes, suggests that the kimberlite deposition that created the alluvial runs on Diamond Lakes were from different geological events separated by time but from a relatively local source. One suggestion is that the base of Pienaar's Pothole, or possibly all the potholes found along the established fault line may well have had kimberlite seepage into them from below.



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Pienaar's Pothole is the only pothole to have been mined below the water table. The Gravitate Pothole has been mined to the water table. It is about 4-5 acres and has between 8- 15 metres of water depending on rainfall in the area. Both the S1 and S2 potholes have had some mining of the easy to reach upper gravels with the deeper gravels not yet accessed. Historically it has been recorded that Transhex recovered an 11.0 + carat stone from the site- the quality of the stone is not known. In 2018, an 11.2 carat stone was recovered during a bulk sample by a contractor from the S1/S2 region. It was a poor-quality stone, however there are not many diamond resources globally that produce rough diamonds bigger than 10 carats. There was a spectacular exceptional quality 4.2 carat stone D/E colour VVS rough stone and many small fancy colour stones recovered during the bulk sample done in 2018. <sup>14</sup>

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<sup>13</sup> Navin Naidoo Photograph of Pienaar's Pothole- Diamond Lakes Mine

<sup>14</sup> Diamond Recovery Records Diamond Lakes 2018 Confidential

### PROSPECTING RESULTS

As a result of the SAGEO drilling programme it was decided to tender mining leases over the two targets shown in Figures 10 and 11 on Ruigtelaagte. Newmont S.A. was granted rights to prospect the area near the Zamenkomst/Ruigtelaagte boundary and Transhex the area north of Pienaar's Pothole. Newmont prospected their area and found it to be unexploitable. Transhex mined their concession area for over a year on a tax free basis after which they considered the prospect as sub-economical. The largest diamond reportedly recovered weighed just over 11 carats. Following on Transhex, Roux Diamonds worked the deposit before selling it to Albert Vermaas who established the Shenandoah mining venture. South Wits presently hold the mining rights. A major obstacle to profitable mining lies in the fact that most of the diamond bearing gravels occur beneath the water-table.

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The Potholes have been shown to contain huge amounts of diamonds. Vast areas of the mine are covered by varying levels of diamondiferous gravel runs and the geology is punctuated by massive pothole formations that effectively are defects in the dolomite bedrock of the region. The potholes have acted as big gravity sink-traps for diamonds and in some cases manganese. There is much evidence for subterranean gravel runs and only a very expensive 3-dimensional ore model with surveying and drilling to depth will truly reveal the extent of these and possibly give clues as to the Kimberlite source.

There are gravels that have been located to 80 metres below the surface in some areas.

Diamond Lakes has produced excellent quality diamonds in huge quantities. It has also produced a preponderance of fancy coloured diamonds.

Stettler, Kleywegt and De Wit recovered a red purple stone from Pienaar's Pothole-Diamond Lakes, and other excellent quality stones.

diggers. Both sinkholes contain diamondiferous gravels in sinkhole S. The major part of the diamond bearing gravels occur below the water-table. A 1,10 carat stone and a purple red diamond weighing just over 0,6 carat were recovered from a trench next to the Masserenti borehole on Section D (Figure 13). Profile E (Figure 13), across Pienaar's Pothole, is included for purposes of comparison. The size of the individual diamonds recovered along section F (Figure 13) varied between 0,2 and 0,45 carats and were of excellent quality.

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<sup>15</sup> ibid

<sup>16</sup> ibid

Pienaar's Pothole has not only produced a phenomenal amount of diamonds but has also produced a Red-Purple diamond fortuitously found by 3 prominent and globally acclaimed diamond geology experts.

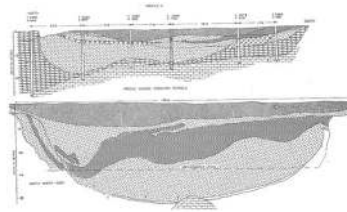


Figure 15. (a) Section D based on the drilling results in (Fig. 10) Pienaar's Pothole (from De Wit, 1983). 17

The following was said about these type of stones by Ehud Laniado, the Founder of Mercury Diamonds in Monaco, a recognized authority in the Global Diamond Industry who worked in the industry for four decades including in Africa. He passed away earlier this year 2019.

“In my examination of fancy colored diamonds thus far, I have talked about the value of rarity. Fancy color diamonds acquire their value because they are a curious occurrence in nature that cannot be predicted. They occur in tiny quantities, and these quantities are ever decreasing, as producing mines slow down or close indefinitely. Nowhere is this rarity more obvious than in red and purple diamonds. In a good year, we might only unearth one or two of these diamonds. It is often difficult to talk about them because so little is known about their causes and origins.

Scientists believe that red coloration is caused by a deformation of the diamond's crystal lattice structure, known as 'plastic deformation.' When light passes through this unusual crystal structure, it bends in a way that reflects a ruby-like color, which varies in intensity. The same process gives pink diamonds their color. However, science has not yet been able to definitively identify why this crystal deformation can lead some stones to show pink coloration and others red, or the causes of the deformation in the first place. Current thinking is that the more deformation displayed, the more tendency towards red coloration. They are so rare, in fact, that only 20 to 30 true red diamonds are believed to exist in the world, and most of them are below half a carat.

Because of their rarity, red and purple diamonds are not often used in jewelry, and are more likely to be stored in the safety deposit boxes of investors fortunate enough to acquire one. Because these diamonds are seen and sold so infrequently, it is impossible to track prices, except to say that they command large valuations

<sup>17</sup> Cross section of Pienaar's Pothole where red-purple diamond found

whenever they are made available to the world. To illustrate: in 1987, the heirs to the estate of American rancher Warren Hancock put up for auction a high quality red diamond of 0.95 carats. The stone was sold for \$880,000 after reportedly being purchased for \$13,500 in 1956 – a 6,500% return on his investment.

In May 2013, Rio Tinto announced a statistical anomaly. A total of three red diamonds were included in the company's annual pink diamond tender. To put this in perspective, in the nearly 30 years of mining at Argyle prior to this date, the company had only ever recovered three other red diamonds from the mine.

The mere existence of red diamonds was probably unknown to most of the world, but gained some mainstream understanding with the release of the 2007 New York Times bestselling novel *The Snowman*, by Jo Nesbø. In Nesbø's gruesome murder-mystery book, a killer leaves behind a small red diamond at the scene of each of his crimes. The book has sold more than 20 million copies"<sup>18</sup>

"Although red diamonds are often credited as being the most rare shade of fancy color diamond, some prominent diamond dealers would likely object since they are more likely to have seen a red diamond pass through their shops than a purple one. Regardless, both are an extraordinary gift of nature, which even those active in the diamond industry may never see in their lifetimes."<sup>19</sup>

There are very few places on the planet Earth that have produced a red-purple diamond. Diamond Lakes and indeed Pienaar's Pothole have their fair share of intrigue and rich history and also to have recorded a red-purple stone. In addition, there have been 2 recorded stones over 11 carats recovered from Diamond Lakes. It is known to the author that an operation close to Diamond Lakes produced a 27 carat stone in recent times, and the biggest stone to have come off Elandsputte in recent memory was 26 carats. These recoveries were not from Diamond Lakes but share the same Diamond run and source. The majority of the surface diamondiferous gravels on Diamond Lakes have not been explored or mined. The area to the East of Pienaar's Pothole produced some very nice colours and clear stones.

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<sup>18</sup> Reds and Purples: The Rarest Diamonds in the World; Ehud Arye Laniado in OPINION June 29-  
<https://www.ehudlaniado.com/home/index.php/news/entry/reds-and-purples-the-rarest-diamonds-in-the-world?tmpl=component&print=1&format=print>

<sup>19</sup> *ibid*

## DRILLING RESULTS

Targets for drilling were selected from the gravity data. Two areas from Ruigtelaagte 353 JP (Figures 10 and 11) are presented as examples. Figures 12, 13 and 14 are the geological sections derived from the drilling. Areas with thick virgin gravels, were selected for sampling using the Masserenti drill of the Department of Environmental Affairs to drill large diameter boreholes (0,75 m). This material was sampled for diamonds. The depth at which diamonds were found could be determined to the nearest 3 metres only (a sampling interval limited by the technical aspects of the Masserenti drill). The two diamonds recovered along Section A were a 0,5 carat stone found by trenching in a manganese nodule pocket in red sandy soil and a 0,2 carat stone recovered from the Masserenti borehole, the latter stone is presumed to originate from a dark chert gravel with clay matrix. Three diamonds of excellent quality totalling 1,62 carats were recovered from a manganese nodule pocket by trenching (Section C). One of the diamonds weighing 0,91 carats was a perfect twin octahedral crystal which could not have survived extensive transport without breaking. The results of this area suggests that the surface layers are diamond bearing.

Two gravel-filled sinkholes were discovered north-east of Pienaar's Pothole. Sinkhole S<sub>2</sub> (see Fig. 11) was covered by a red soil layer and thus inaccessible to the diggers. Both sinkholes contain diamondiferous gravels in sinkhole S. The major part of the diamond bearing gravels occur below the water-table. A 1,10 carat stone and a purple red diamond weighing just over 0,6 carat were recovered from a trench next to the Masserenti borehole on Section D (Figure 13). Profile E (Figure 13), across Pienaar's Pothole, is included for purposes of comparison. The size of the individual diamonds recovered along section F (Figure 13) varied between 0,2 and 0,45 carats and were of excellent quality.

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From the prospecting activities undertaken by Newmont S.A. and Transhex it was established that for selected areas a grade as high as 5 carat/ton was achieved.

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The 5 carat/ton figure thought to have come directly from Transhex amounts to 500 carats/100 tons and is a figure that leaves diamond miners dreaming of untold riches.

There are still significant surface deposits of diamonds on Diamond Lakes. A large bulk sample done in 2018 produced 3500 carats. These recoveries were from easy to reach gravels, and confirmed most of the Stettler Reports finding as to the extent of the surface gravels and confirmation of diamondiferous gravels in S1 and S2 potholes. The bulk sampling did not extend to the Gravitate or Pienaar's Pothole. It was limited to the S1 and S2 potholes, old tailings and identified surface gravels to the East of Pienaar's Pothole.<sup>22</sup>

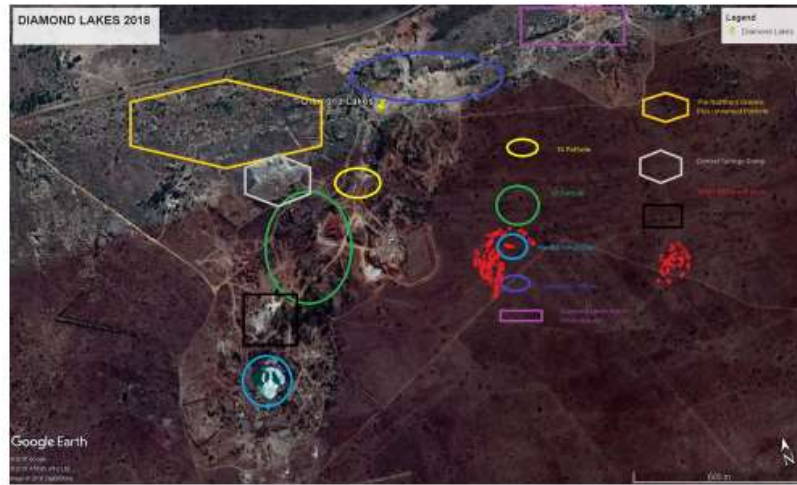
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<sup>20</sup> ibid

<sup>21</sup> ibid

<sup>22</sup> <https://youtu.be/6KwIGCL-QTM>

# Diamond Lakes All Deposits



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Identified diamondiferous areas under Diamond Lakes New Order Mining Right include the following:

1. S1 Pothole
2. S2 Pothole
3. Pienaar's Pothole
4. Gravitite Pothole
5. Diamond Lakes permit STUV section
6. The Northern Gravels plus unnamed pothole
7. Central Tailings Dump
8. South Eastern Gravels
9. Pienaar's Pothole Tailings Dump

The areas that were sampled as part of the 2018 bulk sample were the following:

1. S1 Pothole superficial gravels only<sup>24</sup>
2. S2 Pothole superficial gravels only<sup>25</sup>
3. Pienaar's Pothole Tailings<sup>26</sup>
4. Virgin insitu gravels East of Pienaar's Pothole<sup>27</sup>

<sup>23</sup> Navin Naidoo SIT BDAfrica presentation 05.2018

<sup>24</sup> [https://youtu.be/peTdh5Pu4\\_g](https://youtu.be/peTdh5Pu4_g)

<sup>25</sup> <https://youtu.be/GGZhTgysMMc>

<sup>26</sup> <https://youtu.be/T6YX7Awyfcw>

<sup>27</sup> <https://youtu.be/6KwIGCL-QTM>

## Diamond Lakes- Areas Sampled October 2017- May 2018



28

### Sampled Areas

- S1 Pothole. [https://youtu.be/peTdh5Pu4\\_g](https://youtu.be/peTdh5Pu4_g)
- S2 Pothole. <https://youtu.be/GGZhTgysMMc>
- Pienaar's Pothole Tailings  
<https://youtu.be/T6YX7Awyfcw>
- Insitu virgin gravels East of Pienaar's Pothole  
<https://youtu.be/6KwIGCL-QTM>

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gravels in sinkhole S. The major part of the diamond bearing gravels occur below the water-table. A 1,10

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The vast majority of the diamond reserves on Diamond Lakes are deep and fall below the water-table. At the end of the last century, a moored platform that acted almost like an adhoc dredger was used to mine the base of Pienaar's Pothole. The gravels were extracted and processed on the shoreline. The operation had limited success due to high clay content at the base and inefficient pump systems. It did however prove the viability of a water based gravel extraction and onshore processing option for Pienaar's Pothole and any other gravel resource that was below the water table. There is currently a dredger system being built and tested on Mat Roux and Sons for similar diamond deposits that lie below bodies of water or the water-table. It is expected that this development will influence the manner in which Pienaar's Pothole and Diamond Lakes is developed in the future.

28 Navin Naidoo Diamond Lakes Presentation 05.2018

29 Navin Naidoo Diamond Lakes Presentation 05.2018

30 ibid



31

The benefits of a water-based system for gravel extraction amounts to a huge reduction in energy costs for transport and processing of gravels recovered. There is an established rehabilitation plan for the mine that will take advantage of the fact that alluvial diamond and manganese mining is possible without the use of toxic chemicals like leaching agents, cyanide or other environmentally destructive chemicals.

## The Heart of Diamond Lakes



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The final rehabilitation scheme envisaged will be 4 large independent bodies of water containing a clean and continuous source of water for local fauna and flora. The mine has previously worked with “Working with Wetlands”, and a dynamic natural system of freshwater reservoirs is envisaged that will provide a large wetland area that is self-sustaining and expected to attract migratory and resident bird populations, and local indigenous wildlife. No chemical mining means that once rehabilitation has taken place, there should be little or no trace of old mining operations.

The plan for now as 2019 wraps up is varied. There are several finance options that are being considered with several distinct and individual mine plans that are capable on the

<sup>31</sup> Daan Roux Photos Private Collection

<sup>32</sup> Navin Naidoo Diamond Lakes Presentation 2018

mine. It is presumed that bigger and heavier diamonds will be found in the deeper diamondiferous gravels. There are many hectares of easily accessible surface gravels, like the gravels to the East of Pienaar's. The objective with all of the identified potholes is to mine them to depths below the water table. The quickest way to the deepest accessible diamonds will be to mine the base of Pienaar's Pothole. This is not going to be an easy feat. It will require water and rock engineers, mining engineers, finance specialists, management and accounting experts, exploration geologists, and a team well versed in diamond mining. This is one of the few places in the World where a Red-Purple Diamond is documented to have come from.

The Gravitare pothole has readily accessible gravels just below the water table. It's a much smaller body of water (though the pothole is several times larger than Pienaar's Pothole) and also easier to access. It doesn't have the same allure as Pienaar's but is easily accessible. Gravitare straddles the property and extends onto the property to the East of the Lakes. The new Order Mine Right for Diamond Lakes covers the whole of the Gravitare Pothole.

The S1 and S2 potholes have deep proven gravels. They will require a substantial earthmoving operation and processing facilities for large amounts of gravel. It is the area between S1 and S2 where it's thought that Transhex found 500ct/100 tonnes. This is the area where an 11.2 ct stone of mediocre quality was found last year, as well as a spectacular quality 4.2 ct stone. There is a substantial gravel reserve below where these specimens were recovered from.

The mine has an enviable social development plan that will kick off when operations restart. The pursuit of Dragon's Blood (Red-Purple Diamonds) will have big social development plans attached to it, centred around skills development, education funding, promoting women-in-mining, and diamond beneficiation projects. A crowd funded Women-In-Mining project aimed at Southern African Women from previously disadvantaged backgrounds has been developed with the objective of facilitating the development of local skills in the diamond and gem beneficiation chains. Bloodless Diamonds Africa, the management company in charge of restarting Diamond Lakes, has also recently agreed with a Zambian company Woodpecker's Mine, to collaborate on the beneficiation and import into South Africa of Zambian gems and diamonds. This will be an integral aspect of the Bloodless Diamonds Women In Mining Project.